

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE	PAGE OF PAGES	
			J	1	19
2. AMENDMENT/MODIFICATION NO. 0001	3. EFFECTIVE DATE 04-Mar-2004	4. REQUISITION/PURCHASE REQ. NO. W68SBV-4026-0994		5. PROJECT NO.(If applicable)	
6. ISSUED BY WALLA WALLA DISTRICT,COE-G4P CONTRACTING DIVISION 201 N THIRD AVENUE WALLA WALLA WA 99362-1876	CODE W912EF	7. ADMINISTERED BY (If other than item 6) WALLA WALLA DISTRICT JANI LONG 509/527-7209 JANI.C.LONG@USACE.ARMY.MIL WALLA WALLA WA		CODE W912EF	
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)			X	9A. AMENDMENT OF SOLICITATION NO. W912EF-04-R-0013	
			X	9B. DATED (SEE ITEM 11) 17-Feb-2004	
				10A. MOD. OF CONTRACT/ORDER NO.	
				10B. DATED (SEE ITEM 13)	
CODE	FACILITY CODE				
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS					
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input type="checkbox"/> is extended, <input checked="" type="checkbox"/> is not extended. Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.					
12. ACCOUNTING AND APPROPRIATION DATA (If required)					
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.					
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.					
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).					
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:					
D. OTHER (Specify type of modification and authority)					
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.					
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) TITLE: ICE HARBOR LOCK AND DAM 121KV CIRCUIT BREAKERS INSTALLATION It has been determined necessary and in the best interest of the Government to amend this solicitation to provide answers to questions, and to make changes to the following: Instructions, Conditions, and Notices to Offerors in Section 00100 Section 00800 Section 16050-11, Paragraph 3.1.1. The changed Sections are attached. Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.					
15A. NAME AND TITLE OF SIGNER (Type or print)			16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)		
			TEL: _____ EMAIL: _____		
15B. CONTRACTOR/OFFEROR _____ (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY _____ (Signature of Contracting Officer)		16C. DATE SIGNED 05-Mar-2004	

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

SECTION SF 30 - BLOCK 14 CONTINUATION PAGE

The following have been added by full text:

QUESTIONS AND ANSWERS-AMEND 1

Questions and Answers

Related to the bid:

1. In addition to pg 3 of 91 (bid breakdown), what other forms or information is to be submitted with our bid?

Response: This is a Request for Proposal. Please pay special attention to the Instructions to Offerors in Section 00100.

2. It appears a bid bond is required (in the amount of 20% of the bid price). We question 20% as most other bid bonds are 5%-10%. We request that the 20% be reduced.

Response: We are unable to reduce the bid bond value. It is our standard procedure to require a 20% bid bond.

3. Is WA State Sales/Use Tax the only applicable tax and is it only applicable to the value of the contractor supplied materials?

Response: Bidders must make their own determinations as to what taxes apply in accordance with contract clause (Section 00700) FAR 52.229-3 Federal, State, and Local Taxes. Washington use tax applies to Government furnished property as well as to contractor furnished materials.

Other Questions:

1. Please explain the contractor's design and testing responsibility.

Response: As is described in the last paragraph of section 16050-1.1, the Contractor is to design the interface between the existing COE breaker control schemes and the control scheme for the Government furnished ABB breakers. This includes determining how to best connect the plant's breaker control and indication devices, both manual and automatic, to the control circuits within the breaker, connecting the plant's 480V AC system to the breaker, and connecting the breaker alarm points to the plant alarm systems. It will involve developing and submitting for approval control schematics showing the proposed interconnections and wiring diagrams showing the proposed wire and cable interconnections and uses.

2. Should the contractor include any costs in anticipation of encountering lead, asbestos, or any other hazardous materials?

Response: Section 16050 paragraph 3.1.3 says the oil has been tested for PCBs and halogens and test results indicate the oil is not contaminated. Since there is no mention in the specs of existing lead, asbestos or any other hazardous materials it can be assumed that none will be encountered.

3. Related to section 52.211-10, 1.2, outage scheduling, we recognize that 7 breakers are to be changed out in 6 outages. We request that the Corp modify extend the time duration of the outage in which two breakers are to be changed. We request that the time be doubled to 20 days.

Response: There will be no change to the outage schedule.

4. What is reason you have allowed 1-1/2 weeks in between outages?

Response: In order to maximize power generation the outage schedule will be coordinated with powerhouse maintenance outages so breakers are installed at the same time operations personnel are performing maintenance on the units.

5. Related to section 52.245-3034, why has the Corp listed the hydraulic cylinder and pintle assembly? Does the contractor have any work associated with these items?

Response: This was an error and it will be deleted by an amendment.

6. Is the contractor responsible for unloading the breakers arriving on June 7th? It is feasible that we may not even be on site yet if the first outage isn't until July 6th.

Response: The Government will unload the breakers when they arrive from ABB. This will be clarified by amendment.

7. Related to section 01312, is the referenced "quality control system" spec applicable to this contract? The schedule is fairly well detailed by the owner.

Response: The spec is applicable to this contract. The second sentence in paragraph 1.1 says contractor use of the system is encouraged but not mandatory.

8. Are wire bus jumpers acceptable in lieu of rigid bus jumpers and expansion fittings?

Response: The contract requirement for rigid bus jumpers will not be waived.

9. The spec calls to remove the breakers in one piece. Please supply weights of the breakers. We request that the Corp allow the breakers to be cut to separate the tanks.

Response: The weight of the breakers can be found on Reference drawing #27; less oil the breakers weigh approximately 16,000 pounds. The specs will be amended to allow the breakers to be cut into smaller sizes for removal.

10. Related to oil removal out of the main storage tank, will we be removing the oil from 2 breakers or approx 4000 gal per trip? Are we looking at 4 or 5 trips? In other words, is the storage tank full prior to us removing the oil?

Response: The figures in paragraph 16050-3.1.3 are correct. There are approximately 4500 gallons in the breaker oil storage tank (holds more than that) and approximately 1950 gallons in each breaker. All of the oil needs to be removed.

11. Is the contractor responsible for any mechanical piping or plumbing?

Response: The only piping or plumbing to be removed is fire suppression sprinkler piping. Per paragraph 16050-3.1.1, the Government will remove the sprinkler piping. The Contractor must coordinate requests to remove the piping with the Government.

12. Will the contractor have to generate a generic breaker removal/installation plan or a separate plan specific to each breaker?

Response: It is anticipated that a similar approach will be used to replace all the breakers, therefore one breaker removal/installation plan (specific to this job) may be used for all 7 of the breakers.

13. Are there any CCVT's to disconnect or reconnect?

Response: No there are no CCVTs or other similar devices to be removed in this contract.

14. For bidding purposes, is it safe to assume that the only conduit we are removing/replacing is from the base of the breaker to the breaker control cabinet (varies 3ft-6ft)

Response: Yes, the only conduit to be removed is the short lengths between the breaker control cabinet and the breaker deck. Note that the new breakers have their control cabinet in a different position so the new conduit lengths will be longer than those removed.

SECTION 00100 - BIDDING SCHEDULE/INSTRUCTIONS TO BIDDERS

The following have been modified:

INSTRUCTIONS TO OFFERORS

INSTRUCTIONS, CONDITIONS AND NOTICES TO OFFERORS

PROPOSAL EXPENSES AND PRECONTRACT COSTS. This request for proposal does not commit the Government to pay for costs incurred in the preparation and publication of a proposal or for any other costs incurred prior to execution of a formal contract.

PREAWARD SURVEY. The Government reserves the right to conduct a pre-award survey on any firm under consideration to confirm any part of the information furnished by the offeror, or to require other evidence of managerial, financial, technical and other capabilities, the positive establishment of which is determined by the Government to be necessary for the successful performance of the contract.

The proposal shall be submitted in two volumes as follows:

Volume 1: The Technical Proposal (original plus seven copies) shall demonstrate the merit of the technical approach offered and shall consist of information and data to facilitate technical rating of proposals. A complete listing of all proposed exceptions, deviations, or additions to the specification must be compiled in a separate, marked section. Information to be provided is as follows:

a. **Past Performance.** There are two forms concerning Past Performance included in this Request For Proposal. The first form, the "Past Performance Information", is to be completed by the offeror and returned with the proposal. The other form, "Contractor Performance Questionnaire", is for the offeror's previous customers for whom the offeror replaced 69kV or higher rated circuit breakers with SF₆ circuit breakers, including performing control circuit design and breaker commissioning, to fill out and return directly to the U.S. Army Corps of Engineers as specified on the form. The Government will insert the forms into the offeror's proposal. All forms are required by the proposal receipt date specified in the solicitation.

b. The Government queries the Past Performance Information Retrieval System (PPIRS) in evaluating past performance information. If adequate documentation is not available, then the Government may use a questionnaire to conduct a survey with follow up calls, emails or telephone interviews to verify past performance.

c. The Government may use past performance information obtained from other than the sources identified by the offeror, and that the information may be used for both the responsibility determination and the best value decision.

d. Submit a listing of ALL relevant contracts currently being performed or performed during the past three year period that demonstrate performance relevant to the requirements of the PWS in this solicitation. Include the contract number, type work, type contract, point of contact for the contract, current address and phone number, and email address. Offerors may comment on any problems encountered on the identified contracts. Limit any comments to the discussion of the problems and corrective actions taken.

e. Past performance information on work performed for state, local governments, and private sector clients' similar to the Government requirement will be evaluated equally with similar federal contracts.

f. Offerors may submit information on key personnel and work performed as part of a team or joint venture if the company has no previous past performance history.

g. Offeror's Experience. Provide documentation that demonstrates that the offeror has:

(1) a minimum of 5 years experience in installation design for SF₆ circuit breakers rated 69kV or above, including breaker control schemes,

(2) a minimum of 3 projects in the last 5 years wherein the offeror provided the installation design, and performed the replacement (remove old circuit breakers and install SF₆ circuit breakers) and commissioning of SF₆ circuit breakers, rated 69kV or above,

c. Quality Control. Provide documentation that demonstrates that the Offerer's Quality Control personnel who are to be assigned to this job have knowledge and experience in QC procedures and processes specifically with SF₆ circuit breaker installations. The documentation shall also include:

(1) ISO 9001 Certification, or

(2) Internal quality control processes and/or plans.

Volume 2: The Price Proposal (Section B) shall include and be submitted in the following order:

a. Solicitation, Offer, and Award (SF1442)

b. SECTION 00010, Schedule of Prices/Costs

c. SECTION 00600, Representations, Certifications, and Other Statements of Offerors

FORMAT AND CONTENT

Proposals shall contain, as a minimum, the information specified above in accordance with the following guidelines:

a. Pages containing text shall be consecutively numbered, single spaced, typewritten or typeset in 10-point or larger type, single sided, on 8½"×11" paper with margins of at least one inch. Pages shall be placed in loose-leaf binders. Proposals shall not be permanently bound, in order to facilitate incorporation of the proposal into the final contract document.

b. It is the offeror's responsibility to insure that the proposal is complete prior to submittal (including submission of the offeror's customer's questionnaires). The evaluation panel for the Government may evaluate solely on the information provided in the proposal and will not assume that an offeror possesses any capability unless specified in the proposal.

QUALIFICATIONS

Each offerer shall state in its offer whether they are now or ever have been engaged on any contract or other work similar to that proposed, giving the location and rating of the equipment and the year in which it was installed. They shall also submit such other information as will tend to show their ability to prosecute vigorously the work required by these specifications. A minimum of five years of previous experience in SF₆ circuit breaker installation design, installation, and commissioning will be considered in determining whether the bidder is qualified to perform the work. A prospective contractor must have the necessary capital and experience, and own, or control by firm option the necessary plant to commence the work at the time prescribed in the specifications and thereafter to prosecute and complete the work within the time specified. A prospective contractor must not be already obligated for the performance of other work which would delay the commencement or completion of the work contemplated under this Solicitation.

SECTION 00800 - SPECIAL CONTRACT REQUIREMENTS

The following have been modified:

SPECIAL CONTRACT REQUIREMENTS

SECTION 00800 Special Contract Requirements

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

I.1 The Contractor shall commence work under this contract within 10 calendar days after the date the Contractor receives the notice to proceed, prosecute the work diligently, and complete the entire work ready for use not later than the dates listed below.

1.2 Circuit breakers shall be installed during prescheduled outages established by the Government. Six outages will be scheduled to install the seven circuit breakers. One breaker will be taken out of service at a time for installation of circuit breakers except two breakers shall be installed during one of the outages. Each outage will be approximately 10 calendar days in length to install each circuit breaker. There will be approximately 1-1/2 weeks between outages. The Government will determine the order in which the circuit breakers will be taken out of service for breaker replacement work. The first circuit breaker will be taken out of service and made available for the Contractor to start work on 6 July 2004. The Contractor shall complete the installation of all 7 circuit breakers including field testing by not later than 14 October 2004.

1.3 The Contractor shall complete final cleanup and demobilization by not later than 15 calendar days after completion of work in 1.2.

1.4 The Contractor shall complete final submission of working "as-built" contract drawings (see Section 01010) and final approved versions of Contractor prepared drawings (see Section 01330) by not later than 30 calendar days after completion of work in 1.2.

(End of Clause)

2. 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 amounts shown below for each calendar day of delay until the work is completed or accepted.

(1) The sum of \$410.00 for each calendar day of delay in completing the work described in 1.2 above.

(2) The sum of \$196.00 for each calendar day of delay in completing the work described in 1.3 above.

(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.

(c) The liquidated damages calculated for work activities described under contract subparagraphs 00800-1.2 and 00800-1.3 are not additive. Accordingly, if work described is not completed within the time frames established, liquidated damages will not be simultaneously assessed for both activities.

(End of Clause)

3. 52.211-13 TIME EXTENSIONS (SEP 2000)

Time extensions for contract changes will depend upon the extent, if any, by which the changes cause delay in the completion of the various elements of construction. The change order granting the time extension may provide that the contract completion date will be extended only for those specific elements related to the changed work and that the remaining contract completion dates for all other portions of the work will not be altered. The change order also may provide an equitable readjustment of liquidated damages under the new completion schedule.

(End of Clause)

4. 52.236-4 PHYSICAL DATA (APR 1984)

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

(a) Physical Conditions. The indications of physical conditions on the drawings and in the specifications are the result of site investigations by Government personnel and records of previous construction.

(b) Weather Conditions. Complete weather records and reports may be obtained from the National Weather Service.

(c) Transportation Facilities. Each bidder, before submitting his bid, shall make his own investigations of existing public and private roads, clearances, restrictions, load limits, and of the limitations affecting transportation and ingress and egress at the jobsite.

(d) Engineering Data. The Contractor shall be expected to examine field conditions and, when necessary, employ the services of qualified experts to properly interpret conditions at the site. Engineering data and all factual information available may be examined in the office of the District Engineer upon request.

(End of Clause)

5. ACCESS FOR FOREIGN NATIONALS ONTO PROJECT SITES

In accordance with Engineering Regulation, ER 380-1-18, Section 4, foreign nationals who work on Corps of Engineers' contracts or task orders shall be approved by the HQUSACE Foreign Disclosure Officer or higher before being allowed on the project site. This includes subcontractor employees. The Contractor shall submit to the Walla Walla District Security Officer, the names of all foreign nationals proposed to access onto the project site, along with documentation to verify that he/she was legally admitted into the United States and has authority to work and/or go to school in the US. Such documentation may include a US passport, Certificate of US citizenship (INS Form N-560 or N-561), Certificate of Naturalization (INS Form N-550 or N-570), foreign passport with I-551 stamp or attached INS Form I-94 indicating employment authorization, Alien Registration Receipt Card with photograph (INS Form I-151 or I-551), Temporary Resident Card (INS Form I-688), Employment Authorization Card (INS Form I-688A), Reentry Permit (INS Form I-327), Refugee Travel Document (INS Form I-571), Employment Authorization Document issued by the INS which contains a photograph (INS Form I-688B).

The name and address of the Security Officer for the Walla Walla District is:

Mr. Dave Piper, Security Officer
Walla Walla District, COE
201 N. Third Avenue
Walla Walla, WA 99362-1876

(End of Clause)

6. 52.000-3016 REQUIRED LIABILITY INSURANCE (APR 1984) (FAR 28.306)

(a) The Contractor shall procure and maintain during the entire period of his performance under this contract the following minimum insurance:

- (1) Coverage complying with laws of the state in which the contract is performed governing insurance requirements pertaining to Workmen's Compensation and Employers' Liability Insurance.
- (2) Bodily injury liability insurance with minimum limits of \$500,000 per occurrence shall be required on the comprehensive form of policy.
- (3) Automobile bodily injury and property damage liability with minimum limits of \$200,000 per person and \$500,000 per occurrence for bodily injury liability; and \$20,000 per occurrence for property damage liability shall be required.

(b) Prior to the commencement of work hereunder, the Contractor shall furnish to the Contracting Officer, a certificate or written statement of the above required insurance. The policies evidencing required insurance shall contain the endorsement to the effect that cancellation or any material change in the policies adversely affecting the interest of the Government in such insurance shall not be effective for such period as may be prescribed by the laws of the State in which this contract is to be performed and in no event less than 30 days after written notice thereof to the Contracting Officer.

(c) The Contractor agrees to insert the substance of this clause including this paragraph in all subcontracts hereunder.

(End of Clause)

7. 52.000-3018 SUCCESSOR CONTRACTING OFFICER

Any Contracting Officer assigned to the Walla Walla District and acting within their authority may take formal action on this contract when a contract action needs to be taken and the primary Contracting Officer is unavailable.

(End of Clause)

9. 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 specifications by references, 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 which 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 mis-description 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 mis-described 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 identified on the following index of drawings.

FILE NUMBER	SHEET NUMBER	TITLE	REVISION NUMBER	DATE
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(End of drawing list)

Contract drawings created on CADD will be available in electronic form for use by the Contractor. No For Information Only drawings are available on CADD. CADD drawings are identified as such by the Computer Aided Design and Drafting symbol near the title block. The Contractor assumes all risks associated in using electronic CADD drawings. The contract drawings shall govern if there are any discrepancies between the electronic copy and the contract drawing. The Contractor shall promptly notify the Contracting Officer of any discrepancies. The Government will not be responsible to correct the electronic CADD drawing. If contract modifications are issued, the associated electronic CADD drawings will not be available to the Contractor. Electronic copies of CADD drawings are only available in Intergraph Microstation format. The Government will provide the files on CD ROM. If the Contractor requires different media, such as floppy disks, the Contractor shall be responsible for all conversions required for their use and associated conversion inaccuracies.

(End of Clause)

12. 252.236-7004 PAYMENT FOR MOBILIZATION AND DEMOBILIZATION (DEC 1991)

(a) The Government will pay all costs for the mobilization and demobilization of all of the Contractor's plant and equipment at the contract lump sum price for this item.

(!) Sixty percent of the lump sum price upon completion of the Contractor's mobilization at the work site.

(2) The remaining forty percent upon completion of demobilization.

(b) The Contracting Officer may require the Contractor to furnish cost data to justify this portion of the bid if the Contracting Officer believes that the percentages in paragraphs (a)(1) and (2) of this clause do not bear a reasonable relation to the cost of the work in this contract.

(1) Failure to justify such price to the satisfaction of the Contracting Officer will result in payment, as determined by the Contracting Officer, of --

- (i) Actual mobilization costs at completion of mobilization;
 - (ii) Actual demobilization costs at completion of demobilization; and
 - (iii) The remainder of this item in the final payment under this contract.
- (1) The Contracting Officer's determination of the actual costs in paragraph (b)(1) of this clause is not subject to appeal.

(End of Clause)

13. 52.000-3021 LISTING OF GOVERNMENT-FURNISHED PROPERTY

(a) The Government will furnish to the Contractor the property listed below to be incorporated or installed into the work or used in performing the contract. The listed property will be furnished at the place specified. The Contractor is required to accept delivery and load and transport the property to the jobsite at its own expense. The Contractor shall verify its quantity and condition and acknowledge receipt in writing to the Contracting Officer. The Contractor shall also report in writing to the Contracting Officer within 24 hours of delivery and damage to or shortage of the property as received. All such property shall be installed or incorporated into the work at the expense of the Contractor, unless otherwise indicated in this contract.

The following items will be made available to the Contractor at the project site. Four breakers are scheduled to be delivered to the project site by 7 June 2004. The remaining three breakers are scheduled to be delivered by 12 July 2004. After delivery, the circuit breakers will be located on a concrete pad outside the fenced area on the south shore approximately ¼ mile downstream from the powerhouse ready for the Contractor to move them to the installation site.

<u>Item No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Estimated Acquisition Cost</u>
1	Circuit breaker 115kv, 2000 amp, 40ka 3 cycle	7 each	\$57,200 each
2	SF6 gas, 115 lb gas cylinders	4 cylinders	\$757 each

(b) The above estimated acquisition costs are provided to indicate the Contract Clauses: Government Property (Fixed Price Contracts) or Government-Furnished Property (Short Form) which is applicable to accounting for and care of Government-furnished property. These acquisition costs shall not be included by the Contractor in the contract price.

(End of Clause)

15. 52.217-7 OPTION FOR INCREASED QUANTITY – SEPARATELY PRICED LINE ITEM
(MAR 1989)

The Government may require the performance of the numbered line items, identified in The Schedule as optional items, in the quantity and at the prices stated in The Schedule. The Contracting Officer may exercise Optional Item 0010 by written notice to the Contractor within 30 calendar days after date of receipt by the Government of the Contractor's submittal for the erection engineer as required in Section 16050 paragraph 1.3.4.3. As the work progresses and parts are removed and disassembled unforeseen

repairs may be discovered. In this event the Contracting Officer might exercise Optional Item 0009 to make the repairs.

(End of Clause)

The following have been deleted:

52.245-3034 Listing of Government-Furnished Property JUL 2001

(End of Summary of Changes)

SECTION 16050

IHCB0316050

MISCELLANEOUS ENGINEERING SERVICES, ELECTRICAL EQUIPMENT
AND WORK FURNISHED BY THE CONTRACTOR

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SECTION 16050

MISCELLANEOUS ENGINEERING SERVICES, ELECTRICAL EQUIPMENT
AND WORK FURNISHED BY THE CONTRACTOR

PART 1 GENERAL

1.1 GENERAL INFORMATION

This Section specifies the miscellaneous electrical equipment and work required to remove seven (7) existing 121 kV oil circuit breakers, install seven (7) Government-furnished 121 kV SF₆ gas circuit breakers, and perform commissioning of the installed circuit breakers. This Section also includes the requirements for Erecting Engineer services, if the Government chooses to exercise that option. Electrical equipment and site work includes but is not limited to the following for each circuit breaker:

a. Remove the control, instrumentation, power, and relaying wiring between the existing breaker control cabinets and the Government control panels and boards.

b. Remove the conduit between the existing breaker control cabinets and the conduit stub-ups on the transformer deck below the cabinets.

c. Remove the existing oil circuit breakers including oil, bushings and breaker tanks.

d. Install Government-furnished 121 kV SF₆ gas circuit breakers on existing foundations, including approved seismic anchoring.

e. Furnish and install new conduits from the existing transformer deck conduit stub-ups to the control cabinet of the new SF₆ gas circuit breakers.

f. Furnish and install new molded-case air circuit breakers and operating mechanisms in the Government Unit Control Boards SU1, SU2 and SU3.

g. Furnish, install, and test new cables for control, relaying, and power for the Government-furnished circuit breakers. These cables shall replace the existing cables in destination, routing, and purpose, as described in the specifications and drawings.

h. Furnish and install new flexible expansion connectors to connect the 115kV tubular bus to the new circuit breaker. As necessary, furnish and install new 115kV tubular bus to enable connection between the Government-furnished circuit breakers and existing transformers and disconnect switches.

i. Perform breaker commissioning and field testing activities in accordance with the breaker manufacturer's recommendations.

j. Remove and dispose of circuit breaker oil including oil from the Project circuit breaker oil storage tank.

In addition, the Contractor shall perform the necessary engineering design to interface the breaker control schemes of the Government-furnished breakers with the Ice Harbor project breaker control schemes.

1.2 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 C2 (1999) National Electric Safety Code
- ANSI C80-1 (1990) Rigid Steel Conduit-Zinc Coated

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM A 123 (1989a) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- ASTM A 153 (1987) Zinc Coating (Hot-Dip) on Iron and Steel Hardware

BUILDING OFFICIALS CODE ADMINISTRATORS INTERNATIONAL, INC. (BOCA)

- IBC 2000 (2000) International Building Code

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

- FEMA 301 (1997) NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures

INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)

- IEEE Std 383 (1992) Class 1E Electric Cables, Field Splices, and connections for Nuclear Power Generating Stations

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

- NEMA FB 1 (1993) Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
- NEMA WC 57 (1998) Control Cables
- NEMA WC 70 (1999) Non-shielded Power Cables rated 2000 Volts or Less for the Distribution of Electrical Energy
- NEMA WC 74 (2000) 5-46 kV Shielded power cable for Use in the Transmission and Distribution of Electric Energy
- NEMA WD 6 (1988) Wiring Devices - Dimensional Requirements

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- NFPA 70 (2002) National Electric Code

UNDERWRITERS LABORATORIES (UL)

- UL 50 (1992) Enclosures for Electrical Equipment
- UL 360 (1986) Liquid-Tight Flexible Steel Conduit
- UL 514A (1993) Metallic Outlet Boxes
- UL 514B (1993) Fittings for Conduit & Outlet Boxes

1.3 SUBMITTALS

Government approval is required for all submittals with a "GA" designation submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with SECTION 01330.

1.3.1 SD-01 Data

1.3.1.1 Electrical Equipment; GA

Within 30 calendar days after date of award:

Data and catalog cuts as required to indicate complete compliance with the contract specifications. All data and catalog cuts shall include the project name, and contract number. As a minimum, data and catalog information shall be submitted for the following:

- a. Conduit
- b. Expansion type bus connectors
- c. Wire and Cable

Submit cable manufacturer's data for approval including dimensioned sketches of multiple-conductor 600-volt cables showing cable construction, and sufficient additional data to demonstrate compliance with these specifications.

- d. Wire Markers

Furnish a written certificate from an approved independent testing laboratory to indicate that the markers will not stain or discolor after 20 years service when subjected to an accelerated aging test while in contact with wire insulating materials. Identification on tags and markers shall be as shown on the drawings or as directed.

1.3.2 SD-04 Drawings

1.3.2.1 Electrical Schematic and Connection diagrams; GA

Within 60 calendar days after date of award, schematic and connection drawings of all equipment to be furnished or installed under this contract. Drawings shall clearly show outline dimensions (where applicable), complete control schematics, wiring numbers and connections necessary to interface existing project equipment and control/alarm schemes with the Government-furnished circuit breakers.

1.3.2.2 Seismic anchoring diagrams; GA

Sixty (60) days prior to the start of breaker installation work, design work of the seismic anchorage system, including drawings, calculations, and materials to be used shall be submitted.

1.3.3 SD-07 Schedules and Plans

1.3.3.1 Breaker Installation Plan; GA

Sixty (60) days prior to the start of breaker installation work, the Contractor shall submit a detailed plan for installing the breakers.

1.3.3.2 Spill Containment Plan; GA

The Contractor shall submit a plan for prevention of spills and for containment of any spills of circuit breaker oil. Plan shall list the equipment proposed for use and all actions to prevent spills.

1.3.4 SD-08 Statements

1.3.4.1 Breaker Functional Test Procedure; GA

Thirty (30) days prior to the breaker functional testing, the Contractor shall submit a plan for testing the installed breaker to ensure the breaker has been assembled, installed, and adjusted to perform according to the manufacturer's recommendations.

1.3.4.2 Breaker Commissioning Test Procedure; GA

Thirty (30) days prior to the breaker commissioning testing, the Contractor shall submit a plan for testing the proper operation of the breaker control and annunciation, interlocks and permissives, according to the manufacturer's recommendations. The plan shall also include testing for proper polarity and phase rotation for all current transformer connections. The testing will include "in-service" checks of phase current measurements after the new breaker has been energized.

1.3.4.3 Erecting Engineer's Qualifications; GA

The Contractor shall submit the qualifications for the erecting engineer(s).

NOTE: Qualifications for erecting engineer(s) shall be submitted by not later than 15 calendar days after date of Notice to Proceed whether or not Optional Item No. 0010 in the Bid Schedule, Section 00010 has been exercised.

1.3.5 SD-09 Reports

1.3.5.1 Wire and Cable Factory Tests, Inspections, and Verifications; GA

Thirty (30) days prior to shipping any wire and cable, submit certified copies of test reports including test results. Lot number and reel or coil number of wire and cable tested shall be indicated on the test reports.

1.3.5.2 Wire and Cable Field Tests; GA

Within 30 days of completing tests, the Contractor shall submit certified copies of test reports including test results. No wire or cable shall be energized until authorized by the Government Quality Assurance Representative (GQAR). Circuit number and location for each cable tested shall be indicated on the test reports.

1.3.5.3 Breaker Functional Tests; GA

Within 30 days of completing tests, submit certified copies of the reports. Reports shall include summary of tests performed, a list of all tests and results of such tests. The report shall also include a complete listing of all test set-up parameters, equipment status including control systems functional changes, non-functioning equipment or cables. Reports of all witness tests shall be signed by the witnessing representatives of the Contractor and the Contracting Officer.

1.3.5.4 Breaker Commissioning Tests; GA

Within 30 days of completing tests, submit certified copies of the reports. Reports shall include summary of tests performed, a list of all tests and results of such tests. The report shall also include a complete listing of all test set-up parameters, equipment status including control systems functional changes, non-functioning equipment or cables. Reports of all witness tests shall be signed by the witnessing representatives of the Contractor and the Contracting Officer.

1.4 GENERAL REQUIREMENTS

1.4.1 Materials, Equipment and Installation

Furnish new and unused materials and equipment and any defective material or equipment damaged in the course of installation shall be replaced or repaired. The installation shall be in accordance with the National Electrical Code, NFPA 70, and the National Electrical Safety Code, ANSI C2, except where otherwise specifically shown or specified, in which case the drawings and specifications shall govern. Omission of details on the drawings or in the specifications shall not be construed as permitting deviations from Code requirements.

1.4.2 Standard Products

Material and equipment shall be the standard products of manufacturers regularly engaged in the manufacture of these products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

1.4.3 Corrosion Prevention

All equipment shall be protected to prevent deterioration from corrosion. The general requirements are specified below; however, other corrosion-resisting treatments that are the equivalent of those specified may be used.

1.4.3.1 Fastenings and Fittings

Screws, bolts, nuts, pins, studs, springs, washers and other miscellaneous fastening and fittings shall be of corrosion-resistant material or shall be treated in an approved manner to render them resistant to corrosion. All fastenings which are to be exposed directly to the weather shall be of corrosion-resisting material.

1.4.3.2 Corrosion-Resisting Materials

Corrosion-resisting steel, copper, brass, bronze, copper-nickel-copper alloys are acceptable corrosion-resisting materials.

1.4.3.3 Corrosion-Resisting Treatments

Treatments shall be in accordance with ASTM A 123 or ASTM A 153.

1.4.3.4 Finish

Final painting shall be done in accordance with manufacturer's standard practice.

1.5 SEISMIC DESIGN REQUIREMENTS

The circuit breaker shall be anchored to the existing powerhouse reinforced concrete deck. The anchorage system shall be designed assuming the concrete deck has an $f'c = 3000$ psi. The anchorage system shall be designed to resist wind or seismic force, whichever governs in accordance with IBC 2000 or FEMA 302. Friction resistance shall be neglected for purposes of the seismic anchor design. The design work of the anchorage system shall be performed, and the submittal (including details, specifications, and calculations) shall be stamped by a professional civil or a structural engineer who is currently registered in the state of Washington. Approval will not constitute an acceptance of the design or assign any responsibility for errors made by the Contractor to the Government.

1.6 CONTRACT DRAWINGS

a. General. The contract drawings indicate the work to be accomplished in as much detail as is practical. Except for such modifications as may be required to interface the project breaker control schemes with the Government-furnished circuit breaker control, they constitute the working drawings for construction, installation, and for purchase of required materials. The Contractor shall field verify all existing dimensions, details, and features relevant to requirements for equipment, apparatus, and other powerhouse coordinating features required for the installation of the circuit breakers.

b. Departures from Drawings. If departures from the contract drawings are deemed necessary, details of such departures and reasons for them shall be submitted not later than 30 days before scheduled installation date. No such departures shall be made without prior written approval. The control schemes shown on the contract drawings are not intended to exclude the Contractor's method for accomplishing the functions indicated. However, if any alternate equipment is approved, the Contractor shall bear the cost and be responsible for furnishing and installing any additional wiring devices that are required.

1.7 NOTIFICATIONS

1.7.1 Notify GQAR

The following notification shall be given to the GQAR within the time specified before its occurrence. Formal written notification to the GQAR will not be required. Allow the GQAR a sufficient number of working days advance notice so the GQAR can make arrangements to witness the work or make the inspections.

(1) Fourteen (14) days prior to the start of any breaker testing, the Contractor shall notify the GQAR so that arrangements can be made for Government (HDC) personnel to witness the testing.

PART 2 PRODUCTS

2.1 CONDUIT

2.1.1 Rigid Steel

Rigid steel conduit shall conform to ANSI C80.1 and shall be zinc-coated both inside and outside by hot-dip galvanizing method.

2.1.2 Flexible Steel

Flexible conduit shall conform to UL 360, shall have a hot-dip galvanized steel core, copper ground wire and a waterproof extruded PVC cover.

2.1.3 Fittings

Fittings for rigid conduit shall be threaded and conform to UL 514B. Fittings for flexible conduit shall conform to UL 514B.

2.1.4 Expansion Fittings

Expansion fittings shall be weatherproof, with an internal bonding assembly and shall provide at least 4 inches of conduit movement.

2.2 INSULATED WIRE AND CABLE

2.2.1 General

All wire and cable used for power, control, and relaying systems shall be provided and shall conform to the requirements specified herein, including

conductor size, stranding, number of conductors, rated circuit voltage, and cabling, for each type of service. Wire and Cable shall be as indicated on the drawings, or as specified under the detailed requirements of these specifications for the particular construction or use.

2.2.2 Wire and Cable Schedule

Wire and cable shall be furnished in accordance with the Conduit and Cable Schedule, and as indicated on the reference drawings. Existing quantities listed in the Conduit and Cable Schedules are approximate.

2.2.3 Governing Standards

Materials, construction and tests, unless otherwise specified, shall conform to the applicable requirements of NEMA WC 70 and NEMA WC 74. The referenced parts only of IEEE Standard 383 form a part of this specification.

2.2.4 Rated Circuit Voltages

Wire and cable for circuits operating at 600 volts and below shall have minimum rated circuit voltages in accordance with Table 3.1 of NEMA WC 70.

2.2.5 Conductors

a. Material. Conductors shall conform to all the applicable requirements of Section 2 of NEMA WC 70 or Section 2 of WC 74 as applicable, and shall be annealed copper. Copper conductors may be bare, or tin- or lead-alloy-coated, if required by the type of insulation used.

b. Size. Minimum wire size shall be No. 12 AWG for power circuits; No. 14 AWG for relaying and control circuits; and No. 16 AWG for annunciator circuits.

c. Stranding. Conductor stranding classes cited herein shall be as defined in Appendix G of NEMA WC 70 and Appendix H of NEMA WC 74, as applicable. Lighting conductors No. 10 AWG and smaller shall be solid or have Class B stranding as defined in Table 1 of ASTM B 8. Any conductors used between stationary and moving devices, such as hinged doors or panels, shall be Class H or K stranding. All other conductors shall have class B or C stranding, except that conductors shown on the drawings, or in the schedule, as No. 12 AWG may be 19 strands of No. 25 AWG, and conductors shown as No. 10 AWG may be 19 strands of No. 22 AWG.

2.2.6 Insulation

a. Insulation Voltage Rating and Insulation Level. The rated voltage of the insulation shall be 600 volts for all circuits operating below 2,000 volts, with 100 percent insulation level.

b. Insulation Material. Insulation shall be cross-linked-thermosetting-polyethylene (XLPE) type or an ethylene-propylene-rubber (EPR) type meeting the requirements of Section 3 of NEMA WC 70, or Section 4 of NEMA WC 74, as applicable. Polyvinyl chloride (PVC) insulation will not be accepted.

c. Insulation Thickness. The insulation thickness for single-conductor cables and single conductors of multiple-conductor control cables used for control and related purposes rated below 2,000 volts shall be as required by Section 3 of NEMA WC 70.

2.2.7 Jackets

All cables shall have jackets meeting the requirements of Section 4.1 of NEMA WC 70, or Section 7.1 of NEMA WC 74, as applicable, and as specified herein.

Individual conductors of multiple-conductor cables shall be required to have jackets only if they are necessary for the conductor to meet other specifications herein. Jackets of single-conductor cables and of individual conductors of multiple-conductor cables, except for shielded cables, shall be in direct contact and adhere or be vulcanized to the conductor insulation. Multiple-conductor cables and shielded single-conductor cables shall be provided with a common jacket, which shall be tightly and concentrically formed around the core. Repaired jacket defects found and corrected during manufacturing are permitted if the cable, including the jacket, afterward fully meets these specifications and the requirements of the applicable standards.

a. Jacket Material. The jacket shall be one of the materials listed below, in accordance with the applicable paragraphs of NEMA WC 70 and NEMA WC 74. Polyvinyl chloride compounds will not be permitted. Variations from the materials required below will be permitted only if approved for each specific use, upon submittal of sufficient data to prove that they exceed all specified requirements for the particular application.

- (1) Neoprene, heavy-duty black.
- (2) Chlorosulfonated polyethylene, heavy-duty.
- (3) Chlorinated polyethylene, cross-linked, heavy-duty.

b. Jacket Thickness. The minimum thickness of the jackets at any point shall be not less than 80 percent of the respective nominal thickness specified below:

(1) Thickness of the jackets of the individual conductors of multiple-conductor cables shall be as required by Section 4.1 of NEMA WC 70, and shall be in addition to the conductor insulation thickness required by Section 3 of NEMA WC 70 for the insulation used. Thickness of the outer jackets or sheaths of the assembled multiple-conductor cables shall be as required by Section 4.1 of NEMA WC 70.

(2) Single conductor cables, if nonshielded, shall have a jacket thickness as specified in Section 4.1 of NEMA WC 70. If shielded, the jacket thickness shall be in accordance with the requirements of Section 4.1 of NEMA WC 70, or Section 7.1 of NEMA WC 74, as applicable.

2.2.8 Identification

Only one color-code method shall be used for each cable construction type. Colored braids will not be permitted. Control cable color-coding shall be in accordance with Appendix E of NEMA WC 57. Power cable color-coding shall be black for Phase A, red for Phase B, blue for Phase C, white for grounded neutral, and green for an insulated grounding conductor, if included.

2.2.9 Cabling

Individual conductors of multiple-conductor cables shall be assembled with flame and moisture-resistant fillers, binders, and a lay conforming to Part 5 of NEMA WC 57, or Section 5 of NEMA WC 70, as applicable, except that flat twin cables will not be permitted. Fillers shall be used in the interstices of multiple-conductor round cables with a common covering where necessary to give the completed cable a substantially circular cross section. Fillers shall be of a non-hygroscopic material, compatible with the cable insulation, jacket, and other components of the cable. The rubber filled or other approved type of binding tape shall consist of a material that is compatible with the other components of the cable and shall be lapped at least 10 percent of its width.

2.2.10 Dimensional Tolerance

The outside diameters of single-conductor cables and of multiple-conductor cables shall not vary more than 5 percent and 10 percent, respectively, from the manufacturer's published catalog data.

2.2.11 Flame Tests

All multiple-conductor and single-conductor cable assemblies shall pass the IEEE Standard 383 flame tests, paragraph 2.5, using the ribbon gas burner. Single-conductor cables and individual conductors of multiple-conductor cables shall pass the flame tests of Part 3 of NEMA WC 57, Section 6 of NEMA WC 70, or Section 7.1 of NEMA WC 74, as applicable. If such tests, however, have previously been made on identical cables, these tests need not be repeated. Instead, certified reports of the original qualifying tests shall be submitted.

2.2.12 Packaging and Marking

The cables shall be furnished one length to a reel or coil. Each length, and the outside of each reel or coil, shall be plainly marked or tagged to indicate the cable length, voltage rating, conductor size, and manufacturer's lot number and reel number. Cables for exclusively dc applications shall be identified as such. Reels shall remain the property of the Contractor.

2.3 GROUNDING

Ground connections shall be exothermic or compression type. Solder type connectors shall not be permitted. Exothermic connections and taps shall be made by molded powdered metal weld similar and equal to "Cadweld" electrical connection. Compression type connections shall be made with connectors and full cycle hydraulic tools similar and equal to those used in Burndy "Hyground" system. Approved corrosion inhibiting joint compound shall be applied to all compression type connections. Ground conductors shall be bare unless routed along with the phase conductors in a motor feeder circuit. The ground conductors shall be soft, or medium hard drawn Class A or Class B stranded copper cables. One new grounding conductor shall be installed from each new gas circuit breaker to the existing embedded ground grid connection pad and shall be bolted to the ground grid connection pad.

2.4 115KV BUS AND CONNECTORS

2.4.1 Bus Material

If additional tubing is required for the 115kV bus modifications to properly connect the circuit breakers to the existing transformers and vertical disconnect switches, it shall be furnished by the Contractor and shall match the existing bus. The existing bus is round, Schedule 40, 1¼ inch IPS aluminum tubing, alloy 6063-T6.

2.4.2 Connectors

The Contractor shall provide flexible expansion type connectors to connect between the 1¼ inch IPS aluminum bus and the breaker bushing test terminals furnished by the Contractor with the Government-furnished circuit breakers. The connectors shall be rated a minimum of 2000A continuous current without exceeding a hot spot temperature rise of 65°C in an ambient air temperature of 40°C.

2.5 POWER FACTOR TEST TERMINALS

The Contractor shall supply a power factor test terminal for the upper terminal of each bushing on each circuit breaker. The power factor test terminal shall consist of a porcelain insulating structure with upper and lower terminals, disconnecting links and a guard ring, and test equipment attachment eyes, to allow power factor testing of the circuit breaker's

insulation with a 10 kV test set. The power factor test terminal's upper terminal shall be a standard flat tang, copper or bronze, minimum four inches wide, 5/8-inch thick, with four holes in a 1¼-inch square pattern, maximum hole diameter 9/16-inch, in accordance with NEMA Pub. No. CC 1, oriented with the flat face vertical. The power factor test terminal shall be a Lapp Insulator Company Doble Test Terminal, or approved equal. Each power factor test terminal shall have ample capacity to carry continuously, without overheating, the rated current of the bushing to which it is connected. All contact surfaces of external terminals shall be silver-plated.

2.6 NAMEPLATES AND ESCUTCHEONS

Identifying nameplates are in additions to manufacturer's nameplates and shall be made of 1/6-inch thick laminated sheet plastic or of 1/32-inch thick anodized aluminum engraved to provide white letters on a black background. All nameplates shall be fastened to enclosures in proper positions with black finished round-head screws. In general, each push-button station or control switch shall be provided with an identifying nameplate in addition to an escutcheon plate to show operating position as shown. Nameplate labels for cabinets shall be as shown, or as indicated by the Government when the Contractor's data is submitted for approval. Designations may be changed when shop drawings are submitted for approval.

2.7 AIR CIRCUIT BREAKERS (MOLDED-CASE TYPE)

2.7.1 General

The Contractor shall supply three new molded-case air circuit breakers and three door mounted operating mechanisms to convert one spare cubicle in each of the Ice Harbor Unit Control Boards SU1, SU2, and SU3 for use as the auxiliary power supply to 121kV breakers XW0, XW1, and XW2. The Contractor shall install the necessary air circuit breaker and operating mechanism to convert each spare compartment for such use.

2.7.2 Air Circuit Breakers

The molded-case circuit breakers shall conform to the applicable requirements of NEMA Pub. No. AB1, shall be fully rated, and shall have voltage ratings and interrupting ratings hereinafter stated. The circuit breakers shall be manually operated with a trip-free operating mechanism of the quick-make, quick-break type. All poles of each breaker shall be operated simultaneously by means of a common handle and shall be enclosed in a common molded plastic case. The contacts of multipole breakers shall be open simultaneously when the breaker is opened. The operating handles shall clearly indicate whether the breakers are in "ON", or "OFF", or "Tripped" position. Mechanical pressure type terminal lugs shall be provided. The circuit breakers shall be of the automatic type provided with combination thermal inverse-time overload and instantaneous magnetic trip units. The instantaneous magnetic trip units shall be set at approximately ten times the continuous current rating of the circuit breaker. The minimum frame size shall be 600 amperes. The circuit breakers shall be rated 600 volts ac, and shall have a minimum NEMA interrupting capacity of 22,000 amperes at 600 volts ac.

2.8 TOOLS AND ACCESSORIES

2.8.1 General

The Contractor shall supply the following tools and accessories for use in testing and commissioning the Government-furnished circuit breakers. All tools and accessories provided shall become the property of the Government.

2.8.2 Breaker Travel Transducers

Two time-travel recorder transducers for use in circuit breaker testing, compatible with Programma or Doble Engineering Company's Circuit Breaker Motion Analyzer.

2.8.3 SF₆ Leak Detector

One SF₆ gas leak detector (TIF Instruments TIF5500 or similar and equal).

PART 3 EXECUTION

3.1 REMOVAL OF EXISTING EQUIPMENT

3.1.1 Oil Circuit Breakers

The Government will drain the existing circuit breaker oil to the project's Circuit Breaker Oil tank. The Government will pump the breaker oil from the tank to a manifold near the Railroad door. The Contractor shall provide labor and equipment to receive the insulating oil from the circuit breaker oil tank and is responsible for disposal of the oil in accordance with local, state, and federal regulations. The existing circuit breakers must be drained of oil before they can be removed. The Contractor shall either remove each of the oil circuit breakers as a complete unit, including bushings and the breaker base frame, or, after removing the bushings, separate the circuit breaker into three individual tanks. Each tank weighs approximately 5,400 pounds. The Government will remove fire suppression sprinkler piping, as needed, in the vicinity of the existing oil circuit breakers. The Contractor shall coordinate requests for the removal of any needed sprinkler piping with the Government.

3.1.2 Existing Conduit and Cable

The power, control, and relaying cables connected to the existing circuit breakers and their associated conduits shall be removed. Removed materials become the property of the Contractor. After the Government-furnished circuit breakers are installed, new conduits shall be installed between the existing conduit stub-ups and the Government-furnished breakers. New cables shall then be installed to reconnect the existing plant equipment to the Government-furnished circuit breakers. The new conduits and cables shall replace those removed in kind.

3.1.3 Circuit Breaker Oil

Quantity of oil in the circuit breaker system is as follows:

There is 650 gallons of oil in each phase/tank (3 tanks per breaker) for a total of 1950 gallons of oil per breaker. Total of 13,650 gallons of oil in all seven breakers.

Storage tank holds 4,500 gallons of oil.

Grand total of 18,150 gallons of oil in all seven breakers and the storage tank. This does not include the quantity of oil in the pipelines connecting the tanks.

The oil in the circuit breaker system was sampled and tested for PCB's and for halogens. Test results from oil in the 7 circuit breakers and the storage tank varied from 3ppm to 4ppm. Test results for halogens was also well below the threshold to be considered contaminated. Therefore, all oil in the circuit breaker system shall be considered noncontaminated.

The manufacturer of the OCB bushings has indicated that PCB insulating fluids were not used during the period of time when these bushings were built. The construction of the OCB bushings prevents oil sampling to confirm this assertion. The OCB bushings shall be treated as PCB-free.

3.1.4 Disposal

All equipment removed, including the oil circuit breakers, circuit breaker bushings, and the circuit breaker oil shall become the property of the Contractor, removed from the project site, and disposed of in a legal manner.

3.2 COMPLETION OF SPARE UNIT CONTROL BOARD SPACES

The Contractor shall make modifications to three existing Ice Harbor Unit Control Board compartments to serve as permanent sources of 480V ac auxiliary power to three new SF₆ gas circuit breakers, per the following table:

121kV Gas Circuit Breaker	SU Board to be Modified	Preferred Spare Cubicle
XW0	SU3	3E2
XW1	SU1	3E2
XW2	SU2	3E2

The modification shall include furnishing and installing one new molded-case air circuit breaker (as specified in paragraph 2.6 above) in each of the SU boards, furnishing and installing appropriate an appropriate door mounted operating mechanism in each of the SU boards. The Contractor shall match the existing unit control board design and appearance in terms of operating hardware and installation details, including device wiring, to the extent practicable. The Contractor shall perform the retrofit work in a professional and craftsman-like manner.

3.3 INSTALLATION OF GOVERNMENT-FURNISHED 121 kV GAS CIRCUIT BREAKERS

3.3.1 General

The Government-furnished equipment consists of seven (7) SF₆ gas circuit breakers rated 121 kV, 2,000 amperes continuous current, and 40,000 amperes short circuit current. The Government shall supply all necessary SF₆ gas. The Contractor shall submit an installation plan for this equipment. The Contractor shall install the breakers in accordance with the contract and approved Contractor drawings. The work shall include, but is not limited to, physically installing and anchoring the breakers, connecting the 115kV buswork to the breakers, installing new conduit and cable to the breakers, grounding the breakers, furnishing all necessary equipment and materials and placing the breakers in an approved operating condition.

3.3.2 Placement and Anchoring

The Contractor shall place the breakers on the concrete deck in such a manner as to minimize the required 115kV bus work in an orientation approved by the GQAR. The Contractor shall anchor the breakers to the concrete deck using approved materials and methods.

3.4 CONDUIT SYSTEMS

All leads from devices and accessories shall be run in conduit where indicated on the contract drawings and connected to terminal blocks. All conduit runs installed shall be terminated at devices or connection boxes and at the terminal cabinet in tapped holes having not less than 3-1/2 pipe threads, or in standard pipe-threaded couplings or nipples integral with or welded to the device or cabinet. Similar pipe-threaded connections shall be provided on the terminal cabinet for attaching incoming conduit. Other conduit connections shall be made with cast metal boxes and outlet fittings having threaded outlets and gasketed covers. No running threads on conduit will be permitted.

Conduit, fittings and accessories shall be installed in accordance with details shown and as specified herein. All conduit shall be rigid galvanized steel except where specifically indicated on the drawings.

a. All conduit bends shall have a radius of not less than ten times the conduit's inside diameter.

b. No threadless fittings or running-thread couplings shall be used on conduit runs.

c. Metal conduits shall be cut only with a tool approved for the purpose. Roller type pipe cutters shall not be used on conduits. All cuts shall be square and the conduit opening shall not be constricted. After cutting and threading, conduit ends shall be reamed to remove rough edges and burrs and the entire conduit shall be thoroughly cleaned to remove all cuttings, dirt and oil from its interior. Threads shall be clean cut. Threaded joints in metal conduit and terminations in cast boxes shall have the threads coated with an approved joint compound, and shall be screwed tight to make the joint watertight and to provide electrical continuity of a given conduit system. Suitable watertight conduit hubs and bushings shall be provided where conduit terminates within a box, terminal cabinet or accessory that has no threaded hub or fitting to receive threaded conduit.

d. All conduits shall be installed in such a manner as to insure against trouble from the collection of trapped condensation and all runs shall be arranged to avoid traps wherever possible.

e. Pull boxes shall be furnished NEMA 3R and installed, complete with water-tight covers, in conduit runs as required by the NEC and good practice in the trade, regardless of whether the boxes are specified on the drawings.

f. Conduit shall be installed with a minimum of bending and cutting. Conduits not dimensioned as to location shall be installed approximately where shown with limited adjustment to avoid interference with other work. Conduit shall be rigidly attached with approved supports and anchors to the surface over which it is run. The maximum spacing of supports for the exposed conduit shall be 8 feet. Supports for exposed conduit on concrete surfaces shall be fastened securely to the concrete with approved anchors. Wooden, fibrous, or similar plugs inserted into the concrete will not be accepted.

g. The entire metallic conduit system installed by the Contractor shall be electrically continuous and thoroughly grounded. No welding or brazing of the grounding conductor to the conduit will be allowed. All grounding connections to the conduit shall be made by means of grounding bushings or by an approved pressure type connector.

3.5 WIRE AND CABLE INSTALLATION

3.5.1 General

For the purposes of this contract, the term "internal wiring" shall be used to designate the factory installed wiring furnished with the new SF₆ circuit breakers, and the term "external wiring" shall be used to designate the Contractor installed field wiring. Conduit and cable schedules for the Contractor installed field wiring are shown on the contract drawings. Although estimated cable lengths are shown on the cable schedule, the Contractor shall be responsible for determining the actual cable length required to make an installation of all new cables without splices.

3.5.2 External Wiring

All external wire and cable shall conform to paragraph INSULATED WIRE AND CABLE of these specifications. All wire and cable shall be installed in accordance with NFPA 70 requirements. All necessary materials, tools and

equipment required for proper handling and installation of wire and cable in conduits, cable trays, and elsewhere shall be furnished. Except for spares, each wire and cable shall be connected to the associated equipment at both ends, and new cable shall be continuous and without splices between the equipment termination points. All existing wire and cable runs shall be removed and replaced with new wire and cable, as indicated.

3.5.3 Wire and Cable Dress

Wires and cables shall be routed and dressed in a manner equivalent to that used in the original installation, including the number of cables in each conduit.

3.5.4 Cable Pulls

Wire and cable shall be pulled in a manner that will preclude damage to the conductor, insulation, or jacket. Any cable damaged during installation shall be removed and replaced. Wire and cable shall not be pulled into conduit runs until the conduit has been checked and determined to be clean and dry by pulling a clean, dry, tight-fitting rag through each run. Only approved lubricants may be used to facilitate pulling of conductors. Strain gauges or equal shall be furnished and used, where directed, on wire or cable pulled in long runs to monitor pulling stress to within the manufacturer's specified limits. Excessive pulling stresses on cable or conductor will not be permitted. Cable trays shall be cleaned of all dirt and trash before the pulling of cable. Cables shall be placed straight and parallel in the trays.

3.5.5 Storage and Handling

Cables on reels and wire in coils shall be stored in an area reserved for that purpose and shall be protected from damage by construction activities or handling. Reels shall be rolled only in the direction indicated by the manufacturer. Conductors shall be unreeling or uncoiled slowly to prevent damage by sudden bending. Unreeling or uncoiling shall be stopped immediately if kinks appear and shall not proceed until kinks have been satisfactorily removed. In pulling conductors into conduits, reels and coils shall be set up in such a way that the conductor may be trained into the conduit as directly as possible. Any wire or cable improperly handled will be rejected.

3.5.6 Terminations

All cable and wire connections shall be made at terminal blocks using ring-tongue indented compression connectors. The shield and shield insulating jacket of shielded signal cables and conductors, if applicable, shall be maintained to a point as close to the terminals as possible. The shield insulating jacket shall not be stripped from the shield except where necessary to make the ground connection. All signal cable shields shall be grounded at one end only. Where control and signal cables cannot be immediately terminated at both ends, the end of each cable not terminated shall be capped or taped so that conductors are insulated from each other, the equipment, and ground until connections to the associated equipment can be made.

3.5.7 Identification

All multiple-conductor cables shall be identified with the cable designation by either embossed one-inch diameter brass tags or by embossed aluminum band markers. Tags or band markers shall be securely fastened to the cables at each termination, junction box or pull box, where cables enter or leave cable trays, and as required at other points of access. At the discretion of the QCAR, the existing brass tags may be reused. Wires and individual conductors of control and power conductors shall be identified with nonmetallic tube-type markers at each termination. Markers shall be for the type of wire insulation. Where individual conductors are run in cable trays, markers shall

be securely fastened to the conductors every fifty feet, and shall be sized to fit the wire being marked and shall have black marking on a light colored background. Installed markers shall be uniform in position on the wire and legends shall be visible when wires are terminated on blocks or at equipment.

Written certification from an approved independent testing laboratory shall be furnished to indicate that the markers will not stain or discolor after 20 years' service when subjected to an accelerated aging test while in contact with wire insulating materials. Identification on markers shall match those of the removed cables and wires. Each individual conductor ID marker shall follow existing project nomenclature (wire markers indicate termination identifiers at both ends).

3.5.8 Wire and Cable Field Tests

After installation, but just prior to terminal connection, each conductor shall be tested as follows:

a. A 1000-volt "Megger" test shall be performed with all other conductors in each cable or conduit grounded. The final insulation resistance of each conductor shall not be less than one megohm.

b. A continuity test of each conductor from terminal to terminal shall be performed.

c. Suitable records shall be kept of all tests, indicating the "Megger" readings, high voltage tests, continuity test, and conductor identification markings. A duplicate record of all tests shall be furnished the Contracting Officer. Prior to testing, the test record form shall be submitted for approval.

d. Any length of wire or cable failing the above tests shall be removed and replaced.

e. The Contractor shall furnish all instruments and personnel for these tests.

f. Tests shall be witnessed by the Contracting Officer and the test form shall provide room for the Contracting Officer's signature. Test reports shall be submitted in accordance with SECTION 01330 SUBMITTALS.

3.6 GROUNDING

3.6.1 General

All structural equipment and all electrical equipment shall be grounded. Leads to the powerhouse ground system shall be provided near equipment locations and shall be installed as required to connect to the equipment with approved connectors. Ground leads shall be continuous from the point of attachment to the ground grid lead and rigidly supported. Grounding includes exposed ground cables, supports, and connections to exposed equipment. Ground connections shall be made complete to all equipment whether or not specifically shown or detailed on the drawings. Where required to make conduits and other metallic runs electrically continuous, approved copper jumpers or bonding shall be provided.

3.6.2 Ground Conductors

Ground conductors shall be bare, soft annealed copper installed as continuous pieces of cable. Ground conductors shall be Class A stranded. Exposed ground cable runs shall be supported to follow conduit, equipment or concrete contours. Support clamps or clips shall be of corrosion resistant metal and existing equipment bolts or screws shall be used where possible for fastening.

Drilling of equipment housings or frames will be permitted only when approved. Concrete anchors shall be used for wall fastening,

3.7 HIGH VOLTAGE ELECTRICAL CONNECTIONS

3.7.1 115kV Bus

If the dimensions of the Government-furnished circuit breakers allow, the existing 115kV 1¼ inch IPS aluminum bus connecting each oil circuit breaker to its respective transformer and disconnect switch shall be used to connect to the new circuit breaker. If the dimensions of the new circuit breaker are such that the existing 115kV 1¼ inch IPS aluminum bus cannot be used without joints or splices, the Contractor shall furnish and install new aluminum bus following the existing routing and reusing existing bus supports to connect the Government-furnished circuit breakers. No joints or splices shall be allowed in the 115kV bus. Whether new aluminum bus is used or the existing aluminum bus is adapted, the bus shall be installed in a manner such that no torsional or lateral strain is introduced into the existing 115kV bus supporting hardware.

3.7.2 Terminal Connectors

The Contractor shall furnish and install approved flexible expansion type terminal connectors between the 115kV tubular bus and the Contractor furnished power factor test terminals.

3.8 PAINTING OF ELECTRICAL EQUIPMENT

Interior and exterior steel surfaces of equipment enclosures shall be thoroughly cleaned and then, if not galvanized, shall receive a rust-inhibitive phosphatizing or equivalent treatment prior to painting. Interior surfaces shall receive not less than one coat of paint in accordance with the manufacturer's standard practice. Exterior surfaces shall be primed, filled where necessary, and given not less than two coats of quick air-drying lacquer or synthetic enamel with semi-gloss finish, ANSI 70 gray in color.

Any paint damaged during modifications to existing equipment shall be repaired, by degreasing, sanding, feather-edging, priming, and finishing with an approved paint of matching color. Tiny nicks and other similar damage may, if approved, be repaired with matching finish color alone.

3.9 BREAKER TESTING

3.9.1 General

All tests required herein shall be witnessed by the Contracting Officer unless waived in writing. The Contractor shall notify the Government two weeks in advance of the date of the tests so that arrangements can be made for the Contracting Officer to be present at the tests. All testing shall be performed with the approval of the erecting engineer. The costs of performing all tests shall be borne by the Contractor and shall be included in the prices bid for the installation.

3.9.2 Breaker Functional Tests

After installation the breakers shall be tested to verify accuracy and completeness of the installation. All testing shall be witnessed by the GQAR whose name and the date of test shall appear on all test documents. Testing shall include but not be limited to control and secondary wiring, timing tests by time-travel recorder, mechanical operation tests (consisting of at least five (5) close-open cycles), dielectric tests of the major insulation, contact resistance, gas tests, and power factor tests. The Contractor shall provide time-travel recorder and power factor testing equipment. During the

mechanical operation tests all control circuit functions shall be employed during the cycle of test, and the operation of all auxiliaries shall be checked throughout the test cycle.

3.9.3 Breaker Commissioning Tests

Prior to energizing any equipment supplied under this contract, the Contractor shall have performed and documented all manufacturer's standard equipment checkouts. The Contractor shall submit his final system checkout procedure to the Government, and it shall be approved prior to final checkout and energizing of the new circuit breaker. The Contractor shall supply all equipment and manpower required to implement the approved testing plan. As a minimum, the following operational tests shall be performed by the Contractor as part of the breaker commissioning tests:

- a. Circuit breaker control and annunciation tests.
- b. Functionally test all new control and alarm cables by verifying all interlocks and permissives function as shown on the approved drawings.
- c. Verify existing point-to-point wiring connections for the existing differential and line protective relaying prior to commencing the relay cable replacement work. The Contractor shall verify all connections with respect to phase rotation, polarity, and phase angle correction after completion of the relay cable replacement work.

3.10 SEQUENCE OF WORK

3.10.1 Schedule of Work

The breakers shall be replaced one at a time, with the exception of breakers XW3 and XW0 which shall be replaced simultaneously.

The breaker replacement work will be performed within the Government planned annual generator maintenance outages. Each outage is tentatively planned to be 10 calendar days in duration starting in July 2004. Between successive generator outages there is a space of between 3 and 10 calendar days, during which time the existing circuit breakers must remain operational. If the Government deems it necessary to complete its work, an individual outage may be extended beyond the scheduled completion date. The Contractor shall be kept apprised of such changes in schedule, as the delay will affect when the new breaker may be placed into service.

3.10.2 Line Relaying Coordination

Before breakers XW1-XW6 are taken out of service, the effected transmission line will be taken out of service to allow the line relaying current transformer leads for the breaker being replaced to be lifted in the Government SO or SC panels in the control room.

When the breaker is ready to be returned to service but prior to landing the line relaying current transformer leads, the effected transmission line will be taken out of service. Loop checks or other precautions shall be taken to ensure current transformer circuit integrity and polarity. Then the line will be returned to service and in-service current reads taken by the Government to ensure the correctness of the connections.

3.11 ERECTING ENGINEER SERVICES (OPTIONAL)

The Contractor shall furnish the services of one or more experienced erecting engineers to supervise and be responsible for the correct performance of this work. The erecting engineer(s) shall be fluent in the English language. On at least 2 projects in the last 5 years, the erection engineer(s) shall have satisfactorily supervised the installation of SF₆ circuit breakers rated 69kV

or above, filling of breakers with gas, initial starting and operating of equipment, and performing commissioning tests.

The erecting engineer's qualifications shall be submitted for approval by not later than the date specified in paragraph 1.3.4.3 whether or not Optional Item No. 0010 in the Bid Schedule, Section 00010 has been exercised.

The erecting engineer(s) shall give and be responsible for giving complete and correct directions during the initial starting and all subsequent operation of the equipment until the commissioning tests are completed. The erecting engineer(s) shall also keep a record of all measurements taken during erection and testing and shall submit one copy on request or on completion of installation of the assembly or part. In addition to the above the Erecting Engineer shall provide the Contracting Officer with a daily report. The report shall include inspection activities, instructions provided, test results, recommendations, and observations.

4. SUMMARY OF SUBMITTALS.

Submittal Register ENG Form 4288 to be furnished by the Contractor shall include the following:

<u>Paragraph</u>	<u>Item</u>	<u>SD</u>	<u>AEA</u>
16050-1.3.1.1a	Conduit	01	HDC
16050-1.3.1.1b	Expansion type bus connectors	01	HDC
16050-1.3.1.1c	Wire and cable	01	HDC
16050-1.3.1.1d	Wire markers	01	HDC
16050-1.3.2.1	Schematic and Connection diagrams	04	HDC
16050-1.3.2.2	Seismic anchoring diagrams	04	HDC
16050-1.3.3.1	Breaker installation plan	07	HDC
16050-1.3.3.2	Spill containment plan	07	ECC
16050-1.3.4.1	Breaker functional test procedure	08	HDC
16050-1.3.4.2	Breaker Commissioning test procedure	08	HDC
16050-1.3.4.3	Erecting Engineer's qualifications	08	HDC
16050-1.3.5.1	Wire and cable factory tests	09	HDC
16050-1.3.5.2	Wire and cable field tests	09	HDC
16050-1.3.5.3	Breaker functional test report	09	HDC
16050-1.3.5.4	Breaker commissioning test report	09	HDC

<u>Code for Submittal Description (SD)</u>	<u>Action Element for Approval (AEA)</u>
01 - Data	C - Contractor
04 - Drawings	AE - Architect Engineer
06 - Instructions	ED - Engineering Division
07 - Schedules and Plans	CD - Construction Division
08 - Statements	EDA - Engineering Division, Architectural
09 - Reports	Design
13 - Certificates	EDC - Engineering Division, Soils/Civil
14 - Samples	Design
18 - Records	EDE - Engineering Division, Electrical
19 - O & M Manuals	Design
	EDG - Engineering Division, Geology & Dam
	Safety
	EDH - Engineering Division, Hydraulic
	Design
	EDM - Engineering Division, Mechanical
	Design
	EDS - Engineering Division, Structural
	Design
	EDSP - Engineering Division, Specifications
	ECC - Environmental Compliance Coordinator
	HDC - Hydroelectric Design Center

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