

CITY OF LAKELAND
ELECTRIC SYSTEM ENGINEERING
SPECIFICATION

FOR

POWER TRANSFORMERS

SPECIFICATION NO. ENG98-04

APRIL 24, 1998

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**SECTION I
CITY OF LAKELAND**

1.0 INSTRUCTION TO BIDDERS AND GENERAL CONDITIONS

1.1 BID INSTRUCTIONS: The bid may not be given full consideration unless it is firm and includes all of the information requested in this specification, and on the City of Lakeland Invitation to Bid. A satisfactory explanation must be given for not complying with our instructions. Failure to provide all applicable information, or to submit bid by due date, may be cause for disqualification as non responsive.

To allow the OWNER the opportunity to properly evaluate the Bids, and in order to become the successful bidder, Bidders must be able to provide a proven ability to perform the type of work described herein. Bidders should include at the time of bid submittal, a minimum of:

- a. A list of a minimum of five (5) references that the Bidder has supplied with similar equipment within the past three years which are of equal magnitude and complexity as the type of work to be done for the City of Lakeland. The list should include the name of the entity, name and phone number of a responsible individual qualified to respond to questions concerning the Bidder's abilities, costs, schedules, etc.

Prior successful accomplishment of such equal work will be a consideration in determining whether the Bidder is qualified to perform the work specified herein.

- b. Complete design, performance data and materials of construction for the service and conditions specified.
- c. Statement of performance guarantee, if any.
- d. Data such as weights, loadings, size of major components and special installation requirements.
- e. Operating performance or efficiency curves, in triplicate.
- f. Descriptive literature, bulletins and other data covering system or equipment proposed. (6 copies)

1.1.1 BIDDER'S QUALIFICATIONS: An award, if made, will only be made to a responsive, responsible Bidder, in a financial position and with the organizational ability and/or manufacturing facilities to do the work specified herein and qualified by experience.

1.2 Bid: The Bidder shall submit three (3) copies of his bid on the bidding sheets

provided in the invitation to bid. Any exceptions taken to the Contract Documents shall be set forth with particulars.

Unauthorized conditions, limitations or provisions attached to a bid may render it unresponsive and may cause its rejection. Alterations by erasure or interlineation must be explained or noted in the bid over the signature of the Bidder, with such erasures or interlineation initialed by the bidder.

The Bidder shall understand that any provisions in his bid inconsistent with provisions in this specification, which are not expressly described or referred to in the Bidding Sheet will be interpreted and considered as though such inconsistent provisions had not been included in the bid.

The Owner requires that Bidder's bid shall remain in force for a minimum period of sixty (60) calendar days from the day appointed for which bids are due, so as to have sufficient time to evaluate all bids for the Apparatus covered by this Specification. Notice of Award of Contract may be given at any time within the sixty (60) day period.

If the bid is made by an individual, it shall be signed with his full name, and his address given. If it is made by a partnership, it shall be signed with the partnership name by a partner of the firm, who shall also sign his full name and his address, and the names and addresses of all other partners of the firm shall also be given. If it is made by a corporation, the name of the corporation shall be signed and attested to by its duly authorized officer or officers, and the corporate seal affixed.

The bid shall be enclosed in a sealed package. Bidders Qualifications must be attached to bid as described in 1.1 and submitted in accordance with Bid submittal Instructions in the Invitation to Bid.

- 1.3 **STANDARD PRODUCTS:** The apparatus furnished hereunder, except that which is manufactured only to meet a specific requirement, shall be essentially of the Bidder's standard products or manufacture and shall be of the types, sizes, capacities and for the kinds of service specified. If the Bidder's standard equipment does not meet the requirements of the Contract Documents, it shall be so stated in the bid.
- 1.4 **STANDARD OF DESIGN AND WORKMANSHIP:** The finished work shall be complete in all respects and shall fully conform to the description thereof set forth in the Contract Documents. The intent of the Contract Documents is to secure for the Owner, apparatus of first class workmanship in all respects. All components shall be manufactured, fabricated, assembled, and finished with workmanship of the highest quality throughout, and in accordance with the best of recognized correct practices. All materials shall be new and suitable for the conditions specified.

- 1.5 ACCEPTANCE OF PURCHASE ORDER: The Bidder to whom the award is made shall promptly execute the agreement acceptable to the City whereupon the Owner shall issue its Purchase Order which shall incorporate by reference the Contract Documents. If the award is made to a corporation, the corporation may be required to furnish evidence of its corporate existence, and in the case of an intrastate transaction in the State of Florida, of its right to do business in the State of Florida, and of the authority of the officers signing the contract.
- 1.6 LOCATION OF DELIVERY SITE: Delivery of the transformer and accessories shall be computed f.o.b. McIntosh Power Plant with full freight allowed. The McIntosh Power Plant address is 3030 East Lake Parker Drive, Lakeland, Florida. 33801. Carrier shall call the Electric Systems Operations, (941) 499-6550 at least twenty-four (24) hours prior to delivery to the job site to give a detailed delivery time.
- 1.7 GENERAL SHIPPING INFORMATION: The apparatus shall be shipped in assembled units, insofar as is consistent with good shipping practice. When items must be disassembled for shipment they shall be match marked. All units and their containers shall be piece marked and show the Purchase Order number. Machined and other unpainted surfaces shall be fully protected from impact and weather damage with all holes, nozzles and openings plugged or covered.
- 1.8 FINAL ROUTING AND DESTINATION INSTRUCTIONS: Final routing and destination instructions on all shipments must be coordinated with the Owner prior to shipment. The Bidder shall notify the Owner's Representative, Steve Jackson at (941) 499-6491 seventy two (72) hours prior to shipment date.
- 1.9 BIDDER'S RESPONSIBILITY: Transformer shall be shipped f.o.b. Destination(s) and properly placed on Owner's pad(s). The Bidder's responsibility for the shipping of this equipment shall terminate at the time the unit is properly placed on Owner's pad. Title to equipment shall vest in Owner upon delivery in an undamaged condition at this point. Any damage to the equipment while in transit to the destination above and during off-loading, shall be the responsibility of the Bidder. The Purchaser shall not be required to file any claim or demand upon a common carrier for such damage, if any.
- 1.10 INSURANCE:
- A. See attached "INSURANCE REQUIREMENTS", Pages 1 & 2
 - B. See attached "HOLD HARMLESS/INDEMNIFICATION", Pages 7 & 8.

1.11 SAFETY:

- A. See attached "ELECTRIC AND WATER SPECIFICATION SAFETY REQUIREMENTS", Pages 1 through 4.

1.12 DEFINITIONS: The following terms used in this contract document are identified as follows:

- A. "Contract Documents" - The Contract Documents shall mean, collectively, all the covenants, terms and stipulations contained in the various portions of this Contract including the Purchase Order, the General Conditions, the Specifications, Public Construction Bond, Invitation to Bid, Instructions to Bidders, Bidding sheets, any Drawings, and CONTRACTOR'S Bid. These Contract Documents are complementary and what is required by any one of them shall be as binding as if required by all.
- B. "Owner" - The City of Lakeland Department of Electric and Water Utilities or its authorized representatives, successors or assigns. As used herein, the words "purchaser" or "City" shall mean the OWNER.
- C. "Bidder" - Any authorized person, firm, or corporation submitting a Bid for the work.
- D. "Engineer" - City of Lakeland, Electric System Engineering, 501 East Lemon Street, Lakeland, Florida, 33801.
- E. "Apparatus" - Any and all equipment, machinery, material, transportation accessories and supplies purchased hereunder, together with all usual and appropriate fittings, attachments, appurtenances, appliances and special tools necessary for erection, installation, operation and maintenance.
- F. "Work" - The apparatus, together with any erection or supervision or erection apparatus at the job site contracted for hereunder.
- G. "Date of Commercial Operation" - The date established by the Owner which will immediately follow the period of preliminary operation of the apparatus, during which any necessary adjustments and/or alterations will be made to provide for its safe and dependable operations, and which is the date on which the Substation is determined to be reliable.

1.13 ACCEPTANCE OF BID: The right is reserved by the OWNER to reject any or all bids. The OWNER does not obligate himself to accept the lowest cost or any other bid.

- 1.14 **INTENT OF CONTRACT DOCUMENTS:** The Bidder shall make his bid with the understanding that the Contract Documents are intended to encompass all of the work to be done. Any and all labor and materials necessary to complete any part of the work required in the Contract Documents in a substantial workmanlike manner is to be furnished by the successful bidder without additional charge or cost to the Owner. Any intended omissions or exceptions to the requirements of this Contract Document must be stated in writing in the bid. Otherwise, it will be understood that all work is included.
- 1.15 **DRAWINGS:** All drawings submitted by the Bidder shall become the property of the Owner and will not be used for any purpose other than the evaluation of bids and the performance of any resulting Purchase Order.
- 1.16 **RIGHT TO USE APPARATUS/WORK REQUIRING CORRECTION:** If, after the apparatus and/or work has been installed, it is discovered that it or any part thereof or the process performed thereby may require correction as herein elsewhere provided, the Owner shall nevertheless have the right to use such apparatus until such time as it is convenient to the Owner that such apparatus be removed from service for correction.
- 1.17 **ACCEPTANCE OF APPARATUS:** The Owner shall not be deemed to have accepted the apparatus until sufficient tests and inspections have been made by the Owner to determine that the Apparatus meets all requirements of the Contract Documents. Such tests and inspections of the Apparatus shall be made within thirty (30) days after delivery of the unit. The Bidder, at his written request, shall be notified of and may be represented at all tests that may be made. If inspection and or tests show the Apparatus or any part thereof not to be as warranted and/or contracted for, the Owner may refuse to accept it, and the Bidder shall be so advised and shall advise owner within 15 days of a plan to correct the Apparatus at his own expense. Such repairs must take place within (30) days, or such other time as owner may provide.
- 1.18 **COMPLETE AGREEMENT:** The Purchase Order, including these terms and conditions, the Contract Documents, hereto and any additional terms and conditions incorporated into and attached hereto constitutes the sole and entire agreement between the parties hereto. The Bidder's bid is incorporated in and made a part of the Purchase order only to the extent of specifying the nature and description of the goods and services ordered, and then only to the extent that such items are consistent with the other terms of the Purchase Order. No other terms or conditions shall be binding upon the Owner unless accepted by the Owner in writing.
- 1.19 **CHANGES - TERMINATIONS:** Owner may by written change order, make any changes, including additions to or deletions from the quantities originally ordered, or in the Contract Documents or drawings. If any such

changes affect the amount due or the time of performance hereunder, upon written request of the Bidder, an equitable adjustment shall be made. Owner may at any time by written change order terminate this agreement as to all or any portion of the goods then not shipped, subject to an equitable adjustment between the parties as to any work or materials then in progress; provided that no such adjustment be made in favor of Bidder with respect to any goods which are Bidder's standard stock. No such termination shall relieve Owner or Bidder of any of their obligations as to any goods delivered hereunder. Any claim for adjustment hereunder must be asserted within thirty (30) days from the date when the change or termination is ordered.

- 1.20 PAYMENT: Final payment shall be made within thirty (30) days after acceptance by the Owner. Such final payment does not relieve the Bidder of his responsibility for replacing without additional cost, any faulty part or parts due to improper materials and/or workmanship either on his part or the part of his suppliers. This provision shall remain in effect for the full warranty or guarantee period. The Bidder shall furnish supervision and inspection, if required, and replace faulty equipment or make necessary adjustments to obtain satisfactory performance without additional cost to the Owner. The time for payment of invoices or for accepting any discounts offered shall run only from the date correct invoices are furnished to the Owner.
- 1.21 LIQUIDATED DAMAGES: In the sole discretion of the Owner, if the Contractor fails to deliver the equipment in the time agreed upon, or in such extra time as may have been agreed to the Contractor shall reimburse the Owner for the additional expense and damage for each calendar day that the equipment remains undelivered after the scheduled delivery date. It is agreed by the parties hereto that liquidated damages shall be credited to Owner's account by Contractor in the amount of \$500.00 per calendar day. It is further agreed that the \$500.00 per day is the agreed cost to the Owner for any delay and shall not be construed in any way as a penalty. The Owner shall be entitled to withhold final payment plus any unpaid adjustments until such time as the total amount of delay damages is determined and such damages shall be withheld from the final payment and any unpaid adjustments then due.
- 1.22 DELAYS: Bidder shall not be liable for delays in delivery or failure to manufacture or deliver due to causes beyond its reasonable controls, such as acts of God, acts of civil or military authority, fires, strikes, floods, epidemics, war or riot. In the event of any such delay, the date of delivery shall be extended for the period equal to the time actually lost by reason of the delay. Owner may at any time request written assurance that Bidder will in good faith attempt to complete its performance on time. If Bidder fails to give Owner adequate assurance of performance after such written

demand, then Owner shall be entitled to cancel the order in whole or in part. As to goods unshipped and not substantially completed at the time of that event, Owner may procure elsewhere and Bidder shall be liable for the difference between the cost of such goods and the price set forth in this order for the goods involved.

- 1.23 **NON-WAIVER:** Failure of Owner to insist upon strict performance of any of the terms and conditions hereof, or failure or delay to exercise any rights or remedies provided herein or by law or to properly notify Bidder in the event of breach, or the acceptance of or payment for any goods hereunder, or approval of design, shall not release Bidder of any of the warranties or obligations of this contract and shall not be deemed a waiver of any right of Owner to insist upon strict performance hereof or any of its rights or remedies as to any such prior or subsequent default hereunder, nor shall any purported oral modification or cancellation of this Purchase Order by Owner operate as a waiver of any of the terms hereof.
- 1.24 **INSPECTION:** Authorized agents of the OWNER shall be allowed free and ready access to the BIDDER'S work area, shops and the shops of his suppliers, at all reasonable times, for the purpose of inspecting the equipment or material, or any of its parts and to obtain information as to the progress of the work. Failure on the part of the OWNER to discover or reject materials or work not in accordance with the specified requirements shall not be deemed an acceptance thereof nor a waiver of defects therein.
- 1.25 **WARRANTIES-GUARANTEES:** Bidder warrants to Owner that the goods and services shall be of the quality specified or of the best grade of their respective kinds if no quality is specified, and shall conform to the contract Documents. Bidder guarantees Owner against any and all defects in workmanship and materials for twelve (12) months after placing in service. The goods and services are ordered by Owner in reliance on each and all of the warranties and guarantees specified herein and implied by law or usage of trade, and unless otherwise expressly stated herein, said warranties and guarantees shall control. Any repairs necessary during the warranty will be completed at the owner's site, if possible. However, regardless of the repair or repair site, all repairs shall be made without cost to the Owner.
- 1.26 **COMPLIANCE:** Bidder warrants that all goods sold and services furnished hereunder shall have been produced, sold, delivered and furnished in strict compliance with all applicable laws, regulations, labor agreements and working conditions to which the goods and services are subject. Bidder shall execute and deliver such documents as may be required to effect or to evidence compliance. All laws and regulations required to be incorporated in agreements of this character are hereby incorporated herein by this reference.

- 1.27 **NO ASSIGNMENT:** Any assignment of the contract or of any rights hereunder or hypothecation thereof in any manner, in whole or in part, by operation of law or otherwise, without the prior written consent of Owner shall be void.
- 1.28 **LITIGATION AND ASSIGNMENT:** Venue for any litigation shall be Polk County, Florida. The entire agreement shall be governed by the laws of the State of Florida. Neither party shall assign any of its rights, obligations, or duties under the terms and conditions of this agreement without the express written consent of the other party.
- 1.29 **ROYALTIES AND PATENTS:** By accepting this order, the BIDDER agrees to indemnify the OWNER and to hold the OWNER harmless in respect to any and all claims that material sold hereunder infringes any U.S. or foreign letters patent, copyright or trademark and, provided the OWNER gives the BIDDER prompt notice in writing of any suit or action at law or in equity brought the OWNER or any claim for infringement and gives the BIDDER necessary information, assistance, and authority to do so, the BIDDER agrees to defend at the BIDDER'S expense any and all such suits, and to satisfy any judgment entered therein. If, as the result of such suit, the equipment or any part thereof is held to constitute infringement the BIDDER at his option and expense shall either procure for the OWNER the right to continue using the equipment, or replace same with non-infringing equipment, or modify the equipment so that it becomes non-infringing.
- 1.30 **BEGINNING, PROGRESS, AND COMPLETION OF THE WORK:** Time is of the essence of this Contract. The work shall be prosecuted to completion in accordance with the specified schedule, subject to adjustment as provided in these contract documents. If at any time the Contractor's work is behind schedule, he shall immediately put into effect definite procedures for getting the work back on schedule. The procedures shall be subject to review and modification by the Owner.

**SECTION II
CITY OF LAKELAND**

2.0 GENERAL REQUIREMENTS

2.1 SUMMARY OF WORK

A. WORK COVERED BY CONTRACT DOCUMENTS:

1. DESCRIPTION OF PROJECT:

- a) The City of Lakeland, Florida, Department of Electric and Water desires to purchase one (1) medium voltage power transformer.
- b) This transformer will be rated as follows:
 - 69 /4.16kV
 - 12/16-17.92 MVA
 - 55/65 degrees C OA/FA

B. COPIES OF DOCUMENTS:

- 1. FURNISHED COPIES: Bidder will be provided at no cost to him one set of the Bid Documents.
- 2. ADDITIONAL COPIES: Additional copies of above documents will be supplied at printing and delivery cost upon request.

2.2 SCHEDULE AND REPORTS

A. INITIAL COORDINATION SUBMITTALS: Within ten days after the Effective Date of Procurement Agreement, Bidder shall submit to Owner for review and acceptance:

- 1. A preliminary Work Progress Schedule.

B. WORK PROGRESS SCHEDULE:

- 1. After submittal of preliminary Work Progress Schedule, submit detailed Work Progress Schedule within thirty days after the Effective Date of Procurement Agreement. Submit to Owner for acceptance.
- 2. The schedule shall show the work in a graphic format suitable for displaying scheduled and actual progress. Submit a reproducible media.
 - (a) Prepare schedules as a horizontal bar chart with separate bar for each major portion of the work or operation and for each transformer.

- (b) Scale and spacing shall allow space for notations and revisions.
- 3. Owner will review and comment on schedule and, upon agreement with Bidder on any necessary changes, Owner will furnish Bidder prints of the accepted schedule. Bidder shall not change the accepted Work Progress Schedule without prior concurrence of Owner. Upon completion of the Work Progress Schedule, this document shall become included and deemed to be a Contract Document. Failure to comply with the Work Progress Schedule shall constitute a material breach of the contract.

2.3 SUBMITTALS

A. DESCRIPTION:

- 1. This section includes definitions, description, transmittal and review of Document Submittals.

B. GENERAL INFORMATION:

1. DEFINITIONS

- a. Document submittals include shop drawings, product data and samples which are prepared and submitted by the Bidder to the Engineer as a basis for approval of the use of equipment and materials proposed for incorporation in the work or needed to describe installation, operation, maintenance or technical properties.

- (1) Shop drawings include custom-prepared data of all types including drawings, diagrams, performance curves, material schedules, templates, instructions and similar information not in standard printed form applicable to other projects.

- (2) Product data includes standard printed information on materials, products and systems; not custom-prepared for this project, other than the designation of selections from available choices.

- (3) Samples include both fabricated and not fabricated physical examples of materials, products and work; both as complete units and as smaller portions of units of work; either for more detailed and testing analysis. Mockups are a special form of samples which are too large to be handled in the specified manner for transmittal of sample submittals.

- b. Miscellaneous submittals are those technical reports,

administrative submittals, certificates and guarantees, not defined as shop drawings, product data or samples.

- (1) Technical reports include laboratory reports, tests, technical procedures, technical records, and Bidder's design analysis.
 - (2) Administrative submittals are those nontechnical submittals required by the Contract Documents or deemed necessary for administrative records. These submittals include maintenance agreements, workmanship bonds, physical work records, statements of applicability, copies of industry standards, and similar type submittals.
 - (3) Certificates and guarantees are those submittals on equipment and materials where a written certificate or guarantee form the manufacturer or supplier is included as called for in the Contract Documents.
- c. Refer to ARTICLE C of this section for detailed lists of documents and specific requirements.

2. QUALITY REQUIREMENTS:

- a. Submittals such as drawings and data submitted to Engineer shall be the quality for legibility and reproduction purposes, with every line, character and letter clearly legible, and for such drawings as reproducible usable for further reproduction to yield legible hard copy. All drawings created specifically for this contract shall be done on "Intergraph Microstation" and a 3 ½ inch floppy disk copy shall be furnished to owner upon completion of contract.
- b. Documents submitted to the Engineer that do not conform to these requirements shall be subject to rejection, and upon request, Bidder shall resubmit conforming documents. If conforming submittals cannot be obtained such documents shall be retraced, redrawn or photographically restored as may be necessary to meet such requirements. Bidder's (or his subcontractor's) failure to initially satisfy the legibility quality requirements will not relieve Bidder (or his subcontractors) from meeting the required schedule for submittal of drawings.

3. LANGUAGE AND DIMENSIONS:

- a. All words and dimensional units shall be in the English language.
- b. Metric dimensional unit equivalents may be stated in addition to the English units.

4. SUBMITTAL COMPLETENESS:

- a. Submittals shall be complete with respect to dimensions, design criteria, materials of construction and other information specified to enable Engineer to review the information effectively.
- b. Where standard drawings are furnished which cover a number of variations of the general class of equipment, each such drawing shall be individually annotated to describe exactly which parts of the drawing apply to the equipment being furnished. Such annotation shall also include proper identification of the submittal permanently attached to the drawing.
- c. Reproduction or copies of Contract Drawings or portions thereof will not be accepted as complete fabrication or erection drawings, but will be acceptable when used by Contractor as a drawing upon which to indicate information on erection or to identify detail drawings.

C. DOCUMENT SUBMITTALS:

1. INCLUDED INFORMATION: Items shall include but not be limited to, the following:
 - a. Bidder's specifications.
 - b. Catalogs, or parts thereof, of manufactured equipment.
 - c. Shop fabrication and erection drawings.
 - d. General outline drawings of equipment showing overall dimensions, location of major components, weights, and location of hand holes and man holes.
 - e. Detailed equipment installation drawings, showing foundation details, base plate sizes, location of Owner's connections; and all clearances required for erection, operation, and disassembly for maintenance.
 - f. Schematic diagrams for electrical items, showing external connections, terminal block numbers, internal wiring diagrams, one-line diagrams and nameplate drawing.
 - g. Bills of material and spare parts list.
 - h. Instruction books and operating manuals.
 - i. Material lists or schedules.

- j. Performance tests on equipment by manufacturers.
- k. Samples and color charts.
- l. All drawings, catalogs or parts thereof, manufacturer's specifications and data, samples, instructions, and other information specified or necessary:
 - (1) For Engineer to determine that the equipment and materials conform with the design concept and comply with the intent of the Contract Documents.
 - (2) For the proper erection, installation, operation and maintenance of the equipment and materials which Engineer will review for general content but not for substance.
 - (3) For Engineer to determine what supports, anchorages, structural details, connections and services are required for the equipment and materials, and the effects on contiguous or related structures, equipment and materials.

2. SCHEDULE OF DOCUMENT SUBMITTALS:

- a. Prepare a schedule for submission of all document submittals specified or necessary for Engineer's approval of the use of equipment and materials proposed for incorporation in the work or needed for proper installation, operation or maintenance. Submit the schedule with the Work Progress Schedule.
- b. In establishing schedule for submittals allow 10 days in Engineer's office for reviewing original submittals and 5 days in Engineer's office for reviewing resubmits.
- c. The schedule shall indicate the anticipated dates of original submission for each item and Engineer's acceptance thereof, and shall be based upon at least one resubmission of each item.
- d. Schedule all submittals required prior to fabrication or manufacture for submission within the time specified for each. Schedule submittals pertaining to storage, installation and operation at the site for Owner's acceptance prior to delivery of the equipment or materials.
- e. Resubmit submittals the number of times required for Engineer's approval. However, any need for resubmits in excess of the number set forth in the accepted schedule or any other delay in obtaining acceptance of submittals, will not be grounds for

extension of the Contract time provided Engineer completes his reviews within the times stated above.

3. TRANSMITTAL OF DOCUMENT SUBMITTALS:

- a. All document submittals for equipment and materials furnished by Subcontractors, manufacturers and suppliers shall be submitted to Engineer by Bidder.
- b. Transmit all submittals to Engineer for acceptance as follows:
 - (1) Identify each document submittal by project name, Transformer serial number, Owner's bid number, Owner's Purchase Order number and Bidder's work order number or Bidder's reference number. Unidentifiable submittals will be returned for proper identification.
 - (2) Check and stamp document submittals of subcontractors, suppliers and manufacturers with his approval prior to transmitting them to Engineer. Bidder's stamp of approval shall constitute a representation to Engineer that Bidder has either determined and verified all quantities, dimensions, materials, catalog numbers and similar data or he assumes full responsibility for doing so, and that he has coordinated each document submittal with the requirements of the work and Contract Documents.
 - (3) At the time of each submission, call to the attention of Owner in the letter of transmittal any deviations from the requirements of the Contract Documents.
 - (4) Make all modifications noted or indicated by Engineer and return revised prints, copies or samples until accepted. Direct specific attention in wiring, or on revised submittals, to changes other than the modifications called for by Engineer on previous submittals. After submittals have been accepted, submit copies thereof for final distribution. Prints of accepted drawings transmitted for final distribution will not be further reviewed and are not to be revised. If errors are discovered during manufacture or fabrication, correct the submittal and resubmit for review.
 - (5) Following completion of the work and prior to final payment, furnish those drawings necessary to indicate "as constructed" conditions, including field modifications, in the number of copies specified. Furnish additional copies for insertion in equipment instruction books as required. All such copies

shall be clearly marked "AS CONSTRUCTED".

- (6) Work requiring a document submittal shall not be commenced or shipped until the submittal has been stamped "APPROVED".

c. Quantity Requirements:

- (1) Except as otherwise specified, transmit all manufacturer's or fabricator's shop drawings in the quantity as follows

- (a) Initial submittal - Three copies to Engineer. One copy will be returned to Bidder.

- (b) Resubmits - Three copies to Engineer. One copy will be returned to Bidder.

- (c) Submittal for final distribution - Three copies to Engineer.

- (d) As-constructed prints - Three copies to Engineer.

- (2) Transmit submittals of product data as follows:

- (a) Initial submittal - Three copies to Engineer. One copy will be returned to Bidder.

- (b) Resubmits - Three copies to Engineer. One copy will be returned to Bidder.

- (c) Submittal for final distribution - Three copies to Engineer.

- (3) Transmit submittals of equipment instruction books as follows:

- (a) Initial submittal - Three copies to Engineer. One copy will be returned to Bidder.

- (b) Resubmits - Three copies to Engineer. One copy will be returned to Bidder.

- (c) Submittal for final distribution - Three copies to Engineer.

- d. Information to Bidder's district office: Manufacturers and suppliers of equipment or materials shall furnish copies of all agreements, drawings, specifications, operating instructions,

correspondence and other matters associated with this contract to the Bidder's district office servicing the Owner. In so far as practicable, all business matters relative to equipment and materials included in this contract shall be conducted through such local district offices.

4. OWNER/ENGINEER REVIEW:

- a. Owner and Engineer will review document submittals and return to Bidder with appropriate notations. Instruction books and similar submittals will be reviewed by Owner and Engineer for general content but not for substance.
- b. Owner's acceptance of document submittals will not relieve Bidder from his responsibility as stated in these Contract Documents.

5. INSTRUCTION BOOKS:

- a. Equipment instruction books shall be prepared by the Bidder and shall include the following:
 - (1) Index and tabs.
 - (2) Instructions for installation, start-up, operations, inspection, maintenance, parts lists and recommended spare parts, and data sheets showing model numbers.
 - (3) Applicable drawings.
 - (4) Warranties and guarantees.
 - (5) Name and address of nearest Bidder-authorized service facility.
 - (6) All additional data specified.
- b. Information listed above shall be bound into hard back binders of three-ring type. Binder may be any color.
 - (1) The following information shall be imprinted or affixed by label on the binder front cover:
 - (a) Instruction Book.
 - (b) Equipment name.
 - (c) Bidder's name.

(d) Specification Number: ENG98-04

(e) Owners purchase order number.

(2) The following information shall be imprinted or affixed by label on the binder spine.

(a) Equipment name.

(b) Bidder's name.

(c) Volume number (if applicable).

D. MISCELLANEOUS SUBMITTALS:

1. INCLUDED INFORMATION:

a. Miscellaneous submittals are comprised of technical reports, administrative submittals and guarantees which related to the work, but do not require Owner approval prior to proceeding with the work. Miscellaneous submittals include:

(1) Test reports.

(2) Certification on materials.

(a) Steel mill tests.

(3) Shipping and/or packing lists.

(4) Job progress schedules.

(5) Equipment and material delivery schedules.

(6) Warranties and guarantees.

2. TRANSMITTAL OF MISCELLANEOUS SUBMITTALS:

a. All miscellaneous submittals furnished by Subcontractors, manufacturers and suppliers shall be submitted to Engineer by Bidder unless otherwise specified.

(1) Identify each miscellaneous submittal by project name and number, contract title and number, transformer identification and the specification division and article number marked thereon or in the letter of transmittal. Unidentifiable submittals will be returned for proper identification.

(2) At the time of each submission, call to the attention of Owner

in the letter of transmittal any deviations from the requirements of the Contract Documents.

b. Quantity Requirements:

(1) The party specified responsible for testing or inspection shall in each case, unless otherwise specified, arrange for the testing laboratory or reporting agency to distribute test reports as follows:

(1) Engineer - Three copies.

(2) Bidder - Two copies.

(3) Manufacturer or supplier - one copy

3. OWNER/ENGINEER REVIEW:

a. Owner and Engineer will review miscellaneous submittals for indications of work or material deficiencies.

b. Owner will respond to Bidder on those miscellaneous submittals which indicate work or material deficiency.

2.4 EQUIPMENT AND MATERIALS

A. GENERAL:

1. EQUIPMENT AND MATERIAL INCORPORATED INTO THE WORK:

a. Conform to applicable specifications and standards.

b. Comply with size, make, type and quality specified, or as specifically approved in writing by the Owner.

c. Manufactured and fabricated products.

(1) Design, fabricate and assemble in accordance with the best engineering and shop practices.

(2) Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.

(3) Two or more items of the same kind shall be identical, by the same manufacturers.

(4) Products shall be suitable for service conditions.

- (5) Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
- d. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

B. QUALITY ASSURANCE:

1. Applicable Codes and Standards: Design, fabricate, assemble, and test the transformer to conform to the latest edition of the following codes and standards:
 - a. American National Standards Institute (ANSI):
 - (1) C2 (1997) - National Electrical Safety Code (NESC).
 - (2) C39.1 - Electric Analog Indicating Instrument.
 - (3) C39.2 - Direct Acting Electrical Recording Instruments.
 - (4) C57.12.00 - Standard General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers.
 - (5) C57.12.10 - Safety Requirements for Transformers 230,000 Volts and Below, 833/958 through 8333/10.417 kVA, single phase and 750/862 through 60,000/80,000/100,000 kVA, three phase without load tap changing; and 3750/4687 through 60,000/80,000/100,000 kVA with load tap changing.
 - (6) C57.12.70 - Terminal Markings and Connections for Distribution and Power Transformers.
 - (7) C57.12.80 - Standard Terminology for Power and Distribution Transformers.
 - (8) C57.12.90 - Standard Test Code for Liquid-Immersed Distribution, Power and Regulating Transformers.
 - (9) C57.13 - Standard Requirements for Instrument Transformers.
 - (10) C62.1 Surge Arresters for Alternating - Current Power Circuits.
 - (11) C76.1 Requirements and Test Code for Outdoor Apparatus Bushings.

- b. American Society for Testing and Materials (ASTM).
 - (1) D877 - Dielectric Breakdown voltage of Insulating Liquids Using Disk Electrodes.
 - (2) D1816 - Dielectric Breakdown Voltage of Insulating Oils of Petroleum Origin Using VDE Electrodes.
 - c. Institute of Electrical and Electronics Engineers (IEEE):
 - (1) 21 - General Requirements and Test Procedure for Outdoor Apparatus Bushings.
 - (2) 24 - Electrical, Dimensional and Related Requirements for Outdoor Apparatus Bushings.
 - (3) 28 - Lightning Arresters for AC Power Circuits.
 - d. National Fire Protection Association (NFPA) 70-National Electrical Code (NEC).
 - e. National Electrical Manufacturer's Association (NEMA):
 - (1) CC1 - Electric Power Connectors for Substations.
 - (2) ICS - Industrial Controls and Systems.
 - (3) LA 1 - Surge Arresters.
 - (4) TR 1 - Transformers, Regulators and Reactors.
 - (5) 107 - Methods of Measurement of Radio Influence Voltage (RIV) of High-Voltage Apparatus.
2. Equipment Qualification:
- a. All equipment and material designs furnished shall be identical to equipment and material designs having an acceptable history of service in similar applications for a period of not less than 3 years at comparable temperature, voltage and design stress levels.
 - b. Equipment and material designs with less than 3 years of actual service will be considered from established manufacturers, but shall be furnished only if accepted by the Owner. Bidder shall state in his Bid the number of years transformers of the design proposed have been in acceptable service. Bidder shall include a listing of the number of domestic units made, dates shipped and Purchaser's name and the bid.

- c. All equipment except minor auxiliary items shall be manufactured at the Bidder's own plants.
- d. Except as otherwise specified, the Bidder's standard design shall be used. This standard must meet all ASTM Standard's requirements concerning through-faults. (Test data must be available upon request).

C. JOB CONDITIONS

1. Altitude: Approximately 130 feet above mean sea level.
2. Maximum Ambient Temperature: 40 degrees C.
3. Minimum Ambient Temperature: Minus 20 degree C.
4. Seismic Coefficient - 0
5. Isokeraunic Level - 100 Thunderstorm Days per year
6. Atmosphere - Humid
7. Average Winter Temperature - 52 F
8. Average Summer Temperature - 90 F
9. The Bidder shall furnish equipment and materials which will be capable of meeting the specified ratings and performance under the altitude and ambient temperature conditions specified.

D. MATERIALS: Materials shall be suitable for their application and for the mechanical and electrical stresses to which they will be subjected.

E. BASE: Construct the base of structural steel shapes and/or plate to provide a rigid base on which the transformer can be skidded or rolled in the directions of the centerline of the segments.

F. TANK ASSEMBLY:

1. Welded steel plate construction.
2. Absolutely oil and gas tight with all fittings in place.
3. Capable of withstanding without permanent deformation pressure 25 percent greater than the maximum operating pressure resulting from the oil preservation system, ANSI C57.12.10.
4. Suitable for full vacuum filling and drying in the field.

5. Provided with tanking guides for centering core and coil assembly.
6. Furnish each gasketed joint with machined surfaces on both sides, gasket retainers, and metal-to-metal stop, or lock washers (if needed) to assure even and effective pressure to avoid over stressing the gasket and to maintain oil and gas tightness of the joints under all service conditions.
7. Provide a minimum of two manholes with bolted covers in the transformer cover for access to lower ends of bushings, to upper portions of coils, and to the core ground connection to the tank; and to permit replacement of current transformers and other auxiliaries without removing the tank cover. Locate manholes to permit removal of the manhole covers and access to the manholes without removing other transformer equipment. Furnish each manhole cover with handles.
8. Provide permanent brackets for removable OSHA - approved hand rails around top of transformer.

G. CORE AND COIL ASSEMBLY.

1. Laminations: High-grade "non-aging" cold-rolled, grain oriented, highly permeable silicon alloy steel of low-hysteresis loss, free of burrs and sharp projections.
2. Conductors: All winding conductors, including all connections to tap changers and bushings, shall be high-conductivity copper for the transformer.
3. Conductor Joints and Connections: All joints and connections in winding conductors, including joints in windings and connections to bushings, shall be brazed, compression, or bolted, not soldered. Silver plate or tin plate all bolted and compression joints and connections; bolted joints and connections shall be locking type.
4. Insulation: Insulating material, varnishes, and compounds in contact with oil shall not affect the oil nor be affected by the oil. Core bolt insulation shall be high temperature resistant.
5. Rigidity: The assembly shall be braced or bolted adequately to prevent displacement or distortion under all normal conditions of shipping and handling and to prevent displacement or distortion under short circuit conditions.
6. Serial Number: Stamped on the core in a conspicuous place.

7. The core ground shall be brought out through a porcelain bushing (minimum 5kV) and connected to a resistor ground unit mounted on the tank by means of an easily removed flexible lead (at bushing end) for checking core ground without opening the transformer tank. The bushing shall be mounted on a raised boss and equipped with metal gasket stops to prevent over compression of the gasket.
8. The windings shall be so designed and constructed that the corona discharge during any of the standard ANSI impulse tests will not exceed 250 microvolt.
9. The Engineer shall be notified (14) days in advance of the tank top being put into place. The C.T.'S along with the core and coil assembly will be inspected prior to the tanking operation.

H. INSULATING OIL:

1. Furnish in a sufficient quantity to place the transformer into operation and meet the Doble Engineering TOPS specification.
2. High-quality, high-dielectric strength, stable, pure mineral oil suitable for the operating temperatures specified.
3. Obtained by fractional distillation of petroleum unmixed with any substance other than an inhibitor. Inhibited oil is required.
4. Meet the following minimum dielectric strength requirements:
 - a. 30,000 volts between disc electrodes when tested in conformance with ASTM D877.
 - b. 20,000 volts between spherical electrodes when tested in conformance with ASTM D1816.
5. Insulating oil shall contain no detectable PCBs and shall meet all other EPA regulations.

I. OIL PRESERVATION SYSTEM:

1. Conform to ANSI C57.12.10.
2. Inert-gas pressure system or conservator system.
3. Inert-gas pressure system:
 - a. Positive pressure nitrogen shall be automatically maintained above the insulating oil.

- b. Furnish with all accessories, alarms, valves, and piping required for operation; and with one completely filled nitrogen cylinder.
 - c. Nitrogen bottle to be D.O.T. 3AA2400, 3000 PSIG and housed in an enclosed moisture resistant hinged-door cabinet with gauges inside this cabinet.
4. Conservator System:
- a. Sealed bladder, sealed air cell, or sealed diaphragm type.
 - b. Furnish with an auxiliary tank; air bladder, cell, or diaphragm; air breather; valves piping; drains, and all other accessories required for operation.
 - c. The capacity of the auxiliary tank and the air bladder, cell, or diaphragm shall be as follows, when the transformer is filled in accordance with the manufacturer's recommendations:
 - (1) Air shall not be admitted through the conservator system pressure vacuum relief device when the transformer is continuously de-energized in the minimum ambient temperature specified.
 - (2) Oil shall not be expelled through the conservator system pressure-vacuum relief device when the transformer is operating continuously at the maximum 65 degrees C kVA rating in the maximum ambient temperature specified.
 - d. The system shall be General Electric Company "Atmoseal," McGraw-Edison "Low-Height Diaphragm-Sealed Conservator System," or Westinghouse "Constant Oil Pressure System (COPS), OR APPROVED EQUAL.
- J. DIAL TYPE INDICATORS: Dial type indicators, where specified shall be as follows:
- 1. Located for easy readability; each indicator located more than 90 inches above the bottom of the transformer base shall have the indicator face inclined downward at a 30 degree angle. The liquid level gauge may be mounted at zero degrees from the vertical. Temperature indicator shall be located at or near the five (5) foot level.
 - 2. All alarm contacts shall be electrically isolated, and shall conform to ANSI C57.12.10.
 - 3. Wire all alarm contacts to the transformer control cabinet.

K. CONDUIT AND WIRING:

1. Furnish all conduit and wiring required to interconnect equipment and devices on the transformer. Factory install all conduit and wiring other than connections to equipment shipped separate from the transformer tank assembly. Conduit must enter the control cabinet at the bottom or the sides. No top entry is allowed.
2. Make all internal wiring connections at equipment terminals or terminal blocks; splices in wiring will not be acceptable.
3. All points requiring external wiring connections, and all spare contacts on control switches, auxiliary switches, and lockout relays shall be wired to terminal blocks located in the transformer control cabinet.
4. Group terminal blocks to conveniently receive the Owner's cables. All current transformer secondary leads must be terminated on six pole short circuiting type terminal blocks (One per CT); terminate all other control leads on "sliding link type" terminal blocks. No more than two wires shall be terminated at any one terminal point. Where possible, the Owner's cable schedules will be furnished to the contractor at the time of schematic drawing approval.
5. Connections to fans shall be plug type and easily removable for maintenance.
6. Locate auxiliary power supply main circuit breakers in the transformer control cabinet and wire to terminal blocks suitable for owners connections.
7. Circuit breakers, contactors, starters, terminal blocks and all other equipment in the transformer control cabinet having exposed terminals with a potential difference above 240 volts shall be enclosed in a NEMA 1 enclosure or shielded from contact by easily removable plexiglass or other rigid insulating material, or otherwise protected from accidental contact by a means approved by the Owner. Clearly mark protected equipment, such as "Danger 480 volts.
8. Furnish all wire with stranded tinned copper conductor sized in conformance with NEC, but not smaller than 14 AWG, insulated for 600-volt ac, 90 degrees C copper temperature, equal to General Electric "Vulkense" insulation Type SIS, Specification SI-57275.
9. Furnish extra flexible wire in areas subject to flexing, such as across hinge points.
10. Terminate all control wiring with "seamless" ring tongue type terminal

lugs.

11. Terminal Blocks:

- a. Heavy-duty type, rated not less than 20 amperes, 600 volts and will accommodate conductor up to #10 AWG.
- b. Terminal blocks for external circuit connection, except the short-circuiting type, shall be sliding link test disconnect type equal to States Company Type ZWM or Poweright Products, Inc. of Garland, Texas Type SLD.
- c. Identify each terminal block by engraving or otherwise permanently marking the terminal designation on the terminal block marking strip.
- d. Mount terminal blocks vertically in rows in interior sides of or on divider panels in the transformer control cabinet, with provisions for clearing external control cables entering from the bottom or the top. Terminal blocks for external connection shall include not less than 12 spare grouped terminal points having no designated connections.

12. Connect all internal grounds required to the transformer control cabinet ground bus.

13. Enclose all wiring interconnecting transformer equipment enclosures in rigid steel conduit, with flexible conduit connections to motors. The conduit system shall conform to NEC and shall be watertight.

14. All wiring internal to the transformer control cabinet shall be routed in horizontal and vertical wiring bundles located to provide access to equipment terminals and to allow removal of individual items of equipment.

15. Permanently label all equipment and devices mounted in the control cabinet to describe their functions, and identify on the Bidder's drawings.

16. Point to point wiring design with wire markings showing other terminal end marking.

L. FINISH:

1. Apply finish to all steel surfaces of equipment.
2. Clean and treat surfaces with an approved standard process and apply all necessary filler before application of finish.

3. Finish shall meet ANSI Specification 57.12.32 or an approved equal and shall be ANSI #70 (Light Gray).
4. Transformer top shall be painted with an anti-skid material in ANSI Z55.1, No. 70 (Light Gray).
5. Supply one quart of touch-up paint per transformer for each type of paint used.

M. TRANSPORTATION AND HANDLING:

1. SHIPMENT PREPARATION: Contractor shall prepare equipment and materials for shipment in a manner to facilitate unloading and handling, and to protect against damage or unnecessary exposure in transit and storage. Provisions for protection shall include the following:
 - a. Crates or other suitable packaging materials.
 - b. Covers and other means to prevent corrosion, moisture damage, mechanical injury and accumulation of dirt in motors, electrical equipment and machinery.
 - c. Suitable rust-preventive compound on exposed machined surfaces and unpainted iron and steel.
 - d. Grease packing or oil lubrication in all bearings and similar items.
2. MARKING: Tag or mark each item of equipment and material as identified in the delivery schedule or on document submittals with and include complete packing lists and bills of material with each shipment. Each piece of every item need not be marked separately provided that all pieces of each item are packed or bundled together and the packages or bundles are properly tagged.
3. BILLS OF MATERIAL: Bidder shall mail bill of material to Owner prior to delivery of each shipment and shall include bills of material with each shipment.
4. DELIVERY:
 - a. The contractor shall be responsible for delivery and off loading unit on Owner's pad. **Shipping to be by truck only.** No rail shipping is allowed for this transformer.
 - b. Deliver equipment and materials in an undamaged condition, in original containers or packaging, with identifying labels intact and legible.

- c. If shipping covers are required, the covers shall remain the property of the Owner.
- d. Mark partial deliveries of component parts to identify the equipment of material, to permit easy accumulation of parts, and to facilitate assembly.

6. RECEIPT AND UNLOADING:

- a. Deliver all miscellaneous equipment and materials to the site complete with packing lists and bills of material.
- b. Owner shall receive, check, inventory, accept and store all miscellaneous equipment and materials delivered to the site in accordance with proper notice. The Owner will notify the Bidder of any damages or shortages.
- c. Bidder shall be responsible for proper location of railroad cars for unloading, any additional switching operations required, all demurrage charges and substantiated claims for damage to cars or trucks resulting from unloading operations and all permits necessary for delivery of unit to Owner's pad.
- d. A megger test for grounded core will be made by Owner before the transformer is unloaded by utilizing the core ground bushing (2.4.G.7).

N. STORAGE AND PROTECTION:

1. STORAGE REQUIREMENTS:

- a. Furnish Owner all requirements for storage and protection of all equipment and materials sufficiently in advance of delivery to allow Owner sufficient preparation time.
- b. Owner will furnish all facilities needed for storage of equipment and materials at the project site.
- c. Owner will assume responsibility for and protect all equipment and materials in accordance with Bidder's recommendations.

O. BIDDER'S INSTRUCTION:

1. INSTALLATION:

- a. When Contract Documents require that installation of work shall comply with Bidder's printed instructions, obtain and distribute copies of such instructions (if not a part of submittals, containers

or packaging) to Owner.

2.5 BIDDER'S FIELD SERVICES

A. DESCRIPTION: This Section includes requirements of manufacturers of goods for services to be performed at the project site in regards to erection, start-up and testing of equipment. This section is to be adhered to if a qualified bidder's representative is necessary for warranty purposes. If bidder declares that the owner may perform such duties with full warranty in effect thereafter, then Section "B" below may be ignored by the bidder. The City of Lakeland will then assume all responsibilities in "B".

B. SERVICES REQUIRED:

1. SERVICES WITH EQUIPMENT AND MATERIALS FURNISHED UNDER THIS CONTRACT:

- a. Furnish the services of qualified, competent field representative and necessary assistants for equipment and materials furnished under this Contract, as required to perform all Bidder's field services called for in the Contract Documents.
- b. Where such service is specified, Owner shall not perform any work related to the installation or operation of equipment or materials furnished under this contract without direct observation and guidance of the suppliers or Bidder's field personnel unless Owner concurs otherwise.
- c. The Bidder's field personnel shall perform the following:
 - (1) Observe the erection, installation, start-up and testing of equipment.
 - (2) Instruct and guide installation personnel in proper procedures.
 - (3) Supervise the initial start-up, operational check, and any required adjustments of equipment.
 - (4) Instruct Owner's designated personnel in proper operation and maintenance of all equipment and materials.
- d. Bidder's Field representative shall report to the site at times designated by Owner and advise Owner of their arrival at the site and furnish him a written report covering all work done at least once each week and when completed.
- e. Bidder's Field representative shall be acceptable to Owner and

shall not be changed during the installation operations without Owner's consent unless he proves unsatisfactory to Bidder or Owner.

- f. Bidder's Field Representative shall represent Bidder at the site and all instructions given to him shall be as binding as if given to Bidder.
- g. All work by Owner in connection with the installation of equipment and materials shall be subject to approval of the Bidder's Field Representative, but the direct responsibility for planning, supervising, and executing the installation work shall remain with the Owner.
- h. All start-up, adjustments and testing of equipment will be performed in the presence of Bidder's field representative, unless otherwise agreed, and such operations will be in accordance with Bidder's instructions. No start-up or testing will be undertaken without Bidder's approval.

C. OPERATION AND TESTING:

1. DUTIES OF THE FIELD REPRESENTATIVE DURING ERECTION OR INSTALLATION:

- a. Instructing and guiding the installing contractor concerning proper methods and procedures in all technical phases of installation.
- b. Inspecting and indicating approval or disapproval of each phase of the work as it progresses.
- c. Reporting his observations in writing to the installing contractor, with copies to the Owner at least once each week unless otherwise agreed.
- d. Determining when equipment is ready for start-up and operational checks.

2. PLACING EQUIPMENT IN OPERATION:

- a. Tools and test equipment: All normal tools and test equipment required for the transformer will be furnished by the Owner. Service personnel shall report to the site with all special tools and test equipment required specifically for the transformer furnished by the Bidder.
- b. Perform and record the following field inspections and

observations upon delivery of the transformer to the site and before removing from the carrier:

- (1) Impact recorder.
 - (2) Blocking and tie rods.
 - (3) Transformer tank and fitting.
 - (a) External damage.
 - (b) Paint Finish.
 - (c) Attached fittings.
 - (d) Oil leakage, if shipped oil-filled.
 - (e) Positive pressure or vacuum in tank.
 - (f) Remove ground from core ground bushing and check core ground insulation with Megger.
 - (4) Bushings, when shipped attached.
 - (a) Porcelain.
 - (b) Oil level, if oil-filled type.
 - (5) Inspect other items shipped loose with the transformer.
 - (6) Assuming there is no apparent physical external damage, core insulation Megger reading is good and impact recorder chart has no abnormal readings, the transformer should be removed from the carrier, placed on its foundation and the following detailed internal inspections performed:
 - (a) Moisture.
 - (b) Coil and lead supports.
 - (c) Visible insulation damage.
 - (d) Check for any loose parts.
- c. Provide technical direction of and report on the unloading of the transformer.
 - d. Check that all parts have been delivered and report any missing.
 - e. If the transformer is to be placed in storage, provide technical direction of and record procedure.
 - f. Provide technical direction of transformer hauling, unloading, assembly and accessory installation.

- g. Provide technical direction of and record oil filling, including the following items:
 - (1) Proper vacuum and holding time.
 - (2) Dew point measurements.
 - (3) Piping arrangement and proper equipment.
 - (4) Proper filling rate.
 - (5) Insulation power factor.
 - (6) Oil quality and dielectric strength.

- h. Provide technical direction of and record the following field tests:
 - (1) Insulation resistance (Megger type).
 - (a) Each winding-to-ground and to other windings.
 - (b) Core-to-ground.
 - (2) Insulation losses (Doble test).
 - (a) Windings.
 - (b) Bushings.
 - (3) Winding ratio tests on all tap positions.
 - (4) CT ratio and polarity tests. Compare results with factory test report and inform Owner of any discrepancies.

- i. Check and report on all accessories for proper operations, including the following:
 - (1) Cooling Fans:
 - (a) Direction of air flow.
 - (b) Current.
 - (c) Oil level, if oil-filled type.
 - (2) Cooling Controls:
 - (a) Auto-manual switch.
 - (b) Thermal indicator relay.
 - (c) Top oil temperature indicator.
 - (d) Winding Temperature indicator.
 - 1. Proper indication.
 - 2. Settings.

- (e) Under voltage relays.
 - (f) Cooler sequence switch.
 - (3) Pressure relief device.
 - (4) Sudden pressure relay.
 - (5) Magnetic liquid level indicator.
 - (6) De-energized tap changer.
 - (7) For inert gas oil preservation system:
 - (a) Regulator and relief valve assembly.
 - (b) Pressure gauge and switch.
 - (8) For conservator oil preservation system:
 - (a) Air breather.
 - (b) Pressure-vacuum relief device.
 - (c) Gas detector relay.
 - (9) Annunciator.
 - j. Provide technical direction of all additional field inspection, adjustment and tests recommended by the transformer manufacturer.
 - k. Following completion of the field inspections, adjustments, and tests, the Bidder's service personnel shall submit 3 copies of a signed statement to the Owner stating that the transformer has been properly installed, adjusted, and tested, and is ready for energization.
3. PERFORMANCE TESTS:
- a. Equipment and materials furnished under this contract:
 - (1) Owner will conduct acceptance tests after installation to determine if equipment and materials installed as part of the work performs in accordance with Contract Documents (and as guaranteed). Final acceptance (or substantial completion) will be based on acceptable results of such tests.
 - (2) No tests will be conducted on equipment or materials for which Bidder's field service is specified unless Bidder's field representative is present and declares in writing that the

equipment and materials are ready for such tests.

- (3) Bidder will be notified by Owner so that he can have a representative, or Bidder's representative, present during any tests of equipment or materials for which Bidder's field service is not specified.
- (4) The tests will be made as set forth in the Contract Documents unless the interested parties mutually agree upon some other manner of testing.

**SECTION III
CITY OF LAKELAND**

3.0 SPECIFIC REQUIREMENTS

3.1 GENERAL

A. QUALITY ASSURANCE

1. Factory Tests:

a. The following factory tests shall be made on all transformers. All tests shall conform to ANSI C57.12.90. The Bidder shall state by which method the test was made if method is not specifically stated below:

(1) Insulation Resistance (Megger)

(a) Each winding to ground and other windings

(b) Core to ground (Core form transformers only)

(2) Insulation power factor and losses (Doble Test):

(a) Each winding-to-ground and to other windings

(b) Bushings

(3) Winding ratio on rated voltage connection and on all tap positions

(4) Winding polarity and phase relation on the rated voltage connection

(5) No-load (Excitation) loss at 100% of specified excitation voltage and specified frequency on the rated nominal voltage tap

(6) Excitation current curve from 90% to 115% in steps of 5% and shall be determined by actual test and not by mathematical model.

(7) Impedance at the 55-degree C OA rating

(8) Load loss with and without auxiliary power at the maximum 55-degree C rating

(9) Temperature indicator accuracy test

- (10) Applied potential test
- (11) Induced potential test with the transformer's own bushings in place
- (12) Impulse tests on all winding terminals with the transformer's own bushings in place
- (13) Test all control wiring for continuity, grounds, and correct connections and test operation of all relays, indicators, switches, lights, and interlocks.
- (14) Efficiency at all kVA ratings
- (15) Perform the following factory tests on each surge arrester:
 - (a) RIV at rated system voltage
 - (b) Leakage current check
- (16) An oil sample shall be removed from the transformer prior to test program and a second sample removed immediately after the tests are completed. The samples are to be contained in the oil sample syringes available from Doble Engineering Company. The samples shall be identified and sent to the Doble Engineering Company (address below) for a dissolved gas-in-oil analysis.

Doble Engineering
Materials Laboratory
85 Walnut Street
Watertown, MA 02172

The completed dissolved gas-in-oil test report shall be forwarded to the Engineer.

- (17) Bushing Current Transformer Tests - Bushing current transformers shall be tested per applicable sections of ANSI C57.13 and shall be checked for proper nameplate and polarity markings. To ensure correct installation they shall be given a polarity check and current ratio check after mounting in the transformer. The following performance data shall be furnished to the Engineer
 - a. Typical excitation curves for each turn ratio
 - b. Typical ratio correction factor curves for each turn ratio

- c. The resistance of the secondary winding at 75 degrees C, including the approximate resistance of the secondary leads internal to the transformer
 - d. The thermal and mechanical short-time current ratings
 - b. The following factory tests shall be made on one unit of each specific design built from the same shop drawings under this contract. Tests performed under other contracts, whether duplicate or not, will not be acceptable.
 - (1) Heat run (temperature rise) tests: Temperature Rise at the minimum and maximum ratings of the transformer. If more than one unit is purchased of identical design, there needs to be only one heat run test for all units.
 - (2) Sound Level Test
 - c. Notify Engineer not less than three weeks prior to the starting date of the factory tests to permit observers to be present during the factory tests
 - d. All test data and engineering analysis of data to be forwarded to the Owner prior to shipment of transformer.
 - e. Submit to the Owner the following at time of delivery of the transformer:
 - (1) Certified NEMA test report
 - (2) Certified NEMA transformer impulse test report
 - (3) Certified test report for all surge arresters
 - (4) Winding temperature settings used for control of the transformer cooling equipment and all other information required to check or calibrate accurately the cooling equipment control devices, including current transformer ratios, heater-coil circuit resistances, and calibration curves.

3.2 EQUIPMENT AND MATERIALS

All transformer components shall be constructed for loading in accordance with the latest revision of ANSI C57.92 "Guide for Loading Oil-Immersed Distribution and Power Transformers." The current carrying capability of the transformers shall be limited only by the capacity of the core and coils, not by the capacity of other current carrying components, such as bushings and tap changers.

A. RATINGS:

1. Type: Outdoor, oil filled
2. Class: Oil-immersed, self-cooled/forced-air-cooled/forced-air-cooled.
3. Number of Windings: Two
4. Number of Phases: Three
5. Duty: Continuous
6. Limits of temperature rise: Dual rated 55/65 degrees C average winding temperature rise and 65/80 degrees C hottest-spot winding temperature rise to conform to ANSI C57.12.00.
7. Capacity:
 - a. At 55 degrees C average winding temperature rise: 12/16MVA
 - b. At 65 degrees C average winding temperature rise: 13.44/17.92MVA
8. Rated voltages, phase to phase/phase to ground:
 - a. Primary (high-voltage) winding (H): 69,000 Volts Delta connected
 - b. Secondary (low-voltage) winding (X): 4,160 Volts Wye resistive grounded.
9. Impedance: 8.0 percent and a tolerance ± 7.5 percent of the specified value.
10. No load taps: Full capacity taps on high-voltage windings:
 - a. Two (2) 2-1/2 percent above rated voltage
 - b. Two (2) 2-1/2 percent below rated voltage
 - c. One (1) rated voltage
11. Winding Insulation:
 - a. High voltage: 350 kV B.I.L.
 - b. Low voltage: 75 kV B.I.L.

- c. Neutral: 75 kV B.I.L.
- 12. Power Factor of windings:
 - a. The power factor of each winding to ground and between the various windings shall not exceed 0.5 percent corrected to 20 degrees C.
- 13. Frequency: 60 hertz
- 14. Phase displacement: Standard 30 degrees, per ANSI C57.12.00-5.7.2 with the line-to-neutral low-voltage lagging the corresponding line-to-neutral high-voltage.
- 15. Short-circuit capability:
 - a. The transformer shall be capable of withstanding without damage the stresses caused by three-phase, phase-to-phase, or single or double phase-to-ground short circuits limited only by the transformer impedance on the external terminals of either winding, with rated voltage maintained across the terminals of the other winding.
 - b. The multiplying factor "K" for the first cycle asymmetrical peak current shall conform to ANSI C57.12.00- 7.1.5 and shall be based on the transformer K/R ratio.
 - c. Short-circuit current duration and temperature limitations shall conform to ANSI C57.12.00
- 16. Radio influence: Meet requirements of NEMA TR1-1980
- 17. Audible sound level: Transformers shall be so designed that the average sound level will not exceed the limits listed in the appropriate tables when measured at the factory in accordance with the conditions outlined in IEEE C57.12.90 dated 1993.

B. COOLING EQUIPMENT AND CONTROLS:

- 1. Furnish the transformer with cooler units as follows:
 - a. Each cooler unit shall include one or more radiators and fan forced-air cooling. The self-cooled ratings specified shall be obtainable without the operation of any fans. The size and quantity of cooler units furnished shall be such that the transformer ratings specified will not be reduced more than 15 percent if a cooler unit is removed from service.

- b. Each cooler unit shall be capable of withstanding, without damage or permanent deformation, the vacuum and pressure conditions specified for the tank assembly.
 - c. Each cooler unit shall be designed to be accessible for cleaning and painting, to prevent accumulation of water on the outer surfaces, to completely drain oil from the cooler but not the tank, and to prevent formation of gas pockets when the transformer is being filled. Each cooler unit be equipped with a lifting eye, an oil drain at the bottom, an a vent at the top.
 - d. Each cooler unit shall be designed for mounting on the transformer tank, connected with machined steel flanges welded to the cooler unit and to the tank, and furnished with gaskets between the flanges. Indicating shutoff valves which can be fastened in either the open or closed position, located on the tank at each cooler unit connection shall be furnished. A separate oil tight blank flange shall be furnished for each tank connection for use when the cooler unit is detached.
 - e. Radiators and fans, shall be completely interchangeable among cooler units.
 - f. Cooling fans shall be located to be readily accessible for inspection and repair. Fan motors shall be single phase, rated 240 or 120 volts. Each fan motor shall be furnished with a disconnecting device to permit removal of the fan without de-energizing the entire cooler group.
2. Control and Indication:
- a. Cooler units shall be separated into not less than two cooler groups with separate power supply contactors, and with controls to operate the cooler groups manually or in automatic sequence.
 - b. Automatic control of cooler groups shall be based on winding temperature and shall conform to ANSI C57.12.10. Temperature control settings shall be as recommended by the transformer manufacturer, except that the winding hottest-spot temperature shall not exceed 90 degrees C unless all forced cooling equipment is in operation.
 - c. No less than one Winding Temperature (per winding) Indicator conforming to ANSI C57.12.10.
 - (1) Each indicator shall utilize a current transformer and thermometer well heater, and shall be calibrated to measure

accurately the hottest spot temperature under all conditions of ambient temperature and forced cooling.

- (2) Each indicator shall include two alarm contacts in addition to the contacts required for cooling equipment control.
 - (3) All contacts shall be individually adjustable to any temperature from 50 to 120 degrees C.
 - (4) The alarm contacts shall be factory set at 110 and 120 degrees C unless a different setting is agreed to in writing.
- d. Furnish a control switch to alternate the starting sequence of cooler groups.
 - e. Provide external connections to de-energize all cooler units on operation of the Owner's protective relays.
 - f. Furnish all control equipment required, including contactors, motor running protection, relays, and switches. Group mount control equipment in the transformer control cabinet.
 - g. All AC under voltage relays shall be time delay and similar to the Agastat mechanical bellows type, Diversified Electronics type TDT-240-ALA-030 or an approved equal.

C. DE-ENERGIZED TAP CHANGER (NLTC):

1. Conform to ANSI C57.12.10.
2. Operable with a single external operating handle not more than 5 feet above top of foundation
3. The tap setting indicator shall be visible from ground level
4. Capable of withstanding without damage the short-circuit duty specified for the transformer
5. Capable of being padlocked to prevent inadvertent operation

D. BUSHINGS:

1. General
 - a. Conform to all sections of ANSI C57.(19.00 - 19.101) pertaining to bushings.
 - b. All porcelain used in bushings shall be wet-process,

homogeneous, nonporous, and free from cavities or other flaws. The glazing shall be uniform in color and free from blisters, burns and other defects.

- c. The puncture strength of each bushing shall be greater than the dry flash over value.
 - d. Locate bushings to utilize full flash over strength, and to provide clearances to conform to NEMA TR1- 1980
 - e. If located on a flat horizontal surface, each bushing shall be mounted on a raised base to prevent water standing in contact with the bushing gasket.
 - f. Additional requirements for each oil-filled bushing:
 - (1) Condenser type (46kV and above)
 - (2) Oil shall be the same type as that used in the transformer tank
 - (3) Furnish a sight glass or magnetic liquid level indicator to indicate oil level (46kV and above)
 - (4) Furnish a potential, capacitance, or power factor test tap suitable for performing bushing power factor tests without disconnecting main leads on condenser type.
 - g. Bushings shall be furnished with tinned bronze connectors having Standard NEMA 4-hole drilling for flat surface terminal pads.
 - h. Bushings shall be ABB/Westinghouse or Haefely Trench.
2. High Voltage Phase Bushings:
- a. Quantity: Three
 - b. Type: Oil filled, condenser type, ANSI C76.2, Table 4
 - c. B.I.L.: 350 kV
 - d. Rated voltage: 69/72 kV
 - e. Continuous current: Not less than 300 amperes RMS
 - f. Bushing mounting angle with respect to the vertical shall not exceed 30 degrees
 - g. Color: ANSI No. 70 light gray

3. Low Voltage Phase and Neutral Bushings
 - a. Quantity: Four
 - b. Type: ANSI Std. C76.2, Table 4, except current rating
 - c. Rated Voltage: 8.7 kV
 - d. B.I.L.: 95kV
 - e. Continuous current: Not less than 3000 amperes RMS
 - f. Bushing mounting angle with respect to the vertical shall not exceed 30 degrees. Minimum phase spacing 3 feet, centerline to centerline
 - g. Color: ANSI No. 70 light gray

E. SURGE ARRESTERS:

1. Furnish six surge arresters, one for each high and low voltage line terminal as follows:
 - a. Locate adjacent to the bushings
 - b. Furnish all mounting brackets, bases, caps, mounting bolts, and lockwashers required for installation, and grounding connectors.
 - c. Ratings shall be coordinated with the transformer insulation to provide complete protection of the transformer.
 - d. Porcelain Color: ANSI No. 70 light gray
 - e. High capacity gapless MOV, station class
2. High Voltage Arresters:
 - a. Metal oxide type station class
 - b. Unless otherwise required for complete protection of the transformer, arrester maximum continuous operating voltage (MCOV) rating shall be 42 KV

F. CURRENT TRANSFORMERS:

1. General:
 - a. Conform to ANSI C57.13

- b. The continuous thermal current rating factors of all current transformers shall be 2.0
 - c. All current transformer secondary leads shall be wired to the transformer control cabinet.
 - d. Each multi ratio current transformer shall have fully distributed windings, 5 secondary leads, and shall be terminated on a six (6) pole short circuiting type terminal block located in the transformer control cabinet.
2. High Voltage Phase Bushings:
- a. Quantity: Six total, two per bushing
 - b. Bushing type.
 - c. Ratio: Multi ratio, (6) 600:5 Amperes
 - d. Accuracy Class: Relaying, C400
3. Low Voltage Phase Bushings:
- a. Quantity: Six total, two per bushing
 - b. Bushing type.
 - c. Ratio: Multi ratio, (6) 3000:5 Amperes
 - d. Accuracy class: Relaying, C400
4. Furnish a low voltage neutral bushing current transformer with a ratio of 1200/5 and an accuracy class of C400.
5. Furnish additional current transformers as required for the Winding Temperature Indicators

G. TRANSFORMER CONTROL CABINET:

1. General: Furnish as follows:
- a. Weatherproof, dead front construction
 - b. Removable bottom plate, hinged doors with guide to hold the doors open, and provisions for padlocking
 - c. Integral ground bus not less than 1 inch by 1/8 inch cross-section. (The ground bus shall be drilled and tapped on 1 inch centers, and furnished with termination bolts for Owner-furnished

connections)

- d. Thermostatically controlled 120 volt ac space heater to prevent condensation
 - e. Grounded 240 volt ac, 50A, range type receptacle (Hubbell #7962 or equal) for external use with metal cover in a weather proof installation
 - f. Fluorescent light with guard and a door-operated switch
 - g. Factory mount and interconnect all equipment and devices to be installed in the cabinet
 - h. Permanently label all equipment and devices mounted in the cabinet to describe their function, and identify on the Bidder's drawings
 - i. Inside of control cabinet shall be painted white.
 - j. Exterior handles of pistol grip design that latch and unlatch doors with a turning motion of the handle.
2. Power Supplies:
- a. The Owner will furnish one source of 125 volt dc power to the cabinet for the sudden pressure relay and the annunciator; and one source of 240/120 volt ac, 1-phase, 3-wire, 60 hertz power to the cabinet for all other transformer controls and auxiliaries.
 - b. The Contractor shall furnish the following in the cabinet:
 - (1) Properly sized 240-volt ac main circuit breakers.
 - (2) Separate branch circuit breakers for the control power supply, for the space heater power supply, for the convenience light and receptacle power supply, for each cooler group contractor, and for each cooler unit within a cooler group.
 - (3) One alarm relay to signal loss of any leg by monitoring the control power supply voltages in each branch circuit.
3. Annunciator:
- a. Furnish a 125 VDC, 12 point annunciator in the cabinet, connected to monitor the transformer alarms specified.
 - b. Each point shall include a retransmitting normally open alarm

contact which will close if the input to the point is abnormal. Alarm contact outputs shall be wired out to terminal blocks for external connection. Each alarm contact output shall be electrically separate from all other alarm contact outputs.

- c. Alarm inputs to the annunciator shall include the following:
 - (1) Main tank low oil level
 - (2) High voltage and low voltage winding temperature high
 - (3) Top oil temperature high
 - (4) Operation of pressure relief device
 - (5) Where furnished with a conservator oil preservation system, operation of vacuum bleeder device
 - (6) Operation of sudden pressure relay
 - (7) Where furnished with a conservator oil preservation system, operation of gas detector relay
 - (8) Loss of cooling system control power or main auxiliary power
 - (9) Where furnished with an inert gas oil preservation system, low nitrogen cylinder pressure
- d. The annunciator shall be Rochester Instrument Systems, Inc., type SM-100U, or owner approved equal.
- e. The annunciator shall be protected by adequately sized fuses and a loss of voltage alarm relay with contacts wired to the external terminal blocks.

H. GROUNDING RESISTOR:

- a. A bracket for mounting the resistor unit to the outside tank wall will be needed and welded to the tank wall.
- b. Resistor will be 2400 volt, 6.0 ohm, 400 amps for 10 seconds.

I. OTHER CONSTRUCTION DETAILS: Other construction details shall conform to ANSI C57.12.00 and ANSI C57.12.10, and shall be as follows:

1. Dial type magnetic liquid level indicator:
 - a. Furnish an alarm contact for low oil level
 - b. Furnish a tripping contact for low-low oil level
 - c. If an inert-gas oil preservation system is used, the indicator shall be mounted on the transformer tank.
 - d. If a conservator oil preservation system is furnished, the indicator shall be mounted on the auxiliary tank.
2. Winding RTD:
 - a. For remote indication of winding temperature (Taken form the X winding).
 - b. Rated 10 ohms at 25 degrees C
3. Dial Type Winding Temperature Indicator:
 - a. Furnish two contacts for control of cooling fans
 - b. Furnish minimum of two contacts for alarms
 - c. All contacts are to be individually adjustable to any temperature from 50 to 120 degrees C
4. Dial type liquid temperature indicator:
 - a. Furnish with at least two alarm contacts for high top oil temperature
 - b. Alarm contacts shall be individually adjustable to any temperature from 50 to 120 degrees C
5. Dial type pressure-vacuum indicator: Conform to ANSI C57.12.10.
6. Drain and filter valves:
 - a. Conform to ANSI C57.12.10.
 - b. Furnish separate drain or lower filter valve and upper filter valve. The lower drain valve shall be equipped with a plug and an integral sampling valve on the downstream side of the main valve.
 - c. The drain valve and other valves located near the tank bottom shall be suitable for locking closed with a padlock.

7. Vacuum connection: Furnish a connection separate from the upper filter valve for a vacuum pump line, four inch minimum
8. Lifting, moving, and jacking facilities: Conform to ANSI C57.12.10.
9. Transformer nameplate: Conform to ANSI C57.12.00. and ANSI C57.12.10.
10. Device nameplates: Furnish each indicator and control device mounted on the transformer with an engraved laminated plastic nameplate, yellow with black letters, or with a service legend acceptable to the Owner.
11. Tank ground pads:
 - a. Conform to ANSI C57.12.10.
 - b. Furnish with connectors and other grounding hardware.
12. Pressure relief device:
 - a. Furnish a reusable mechanical or diaphragm type pressure relief device with visual indication of operation, and with an alarm contact wired to the transformer control cabinet. The device shall be weatherproof after operation.
13. Pressure-vacuum bleeder: Where a conservator oil preservation system is furnished, furnish a pressure-vacuum bleeder in addition to the pressure relief device specified. The bleeder shall include an alarm contact wired to the transformer control cabinet for operation of the vacuum bleeder.
14. Sudden pressure relay (Qualitrol model # 930-008-02), or owner approved equal that will operate in oil space with a 125 VDC power supply.
 - a. Designed to operate on a sudden abnormal change of pressure in the transformer due to an internal fault. Include provisions for field testing the pressure sensing device with a separate pressure source.

**SECTION IV
CITY OF LAKELAND**

4.0 INFORMATION TO BE SUBMITTED WITH BID

4.1 GENERAL

A. GENERAL REQUIREMENTS

1. Completely detailed bids are requested to allow evaluation prior to award of contract. It is desired that the following information be tabulated in each bid. With each copy of his bid, each bidder shall return two (2) copies of the Bidding Sheets as furnished with the invitation to bid, with all data recorded in the spaces provided.

B. PRICING

1. **PRICE:** Price or prices shall be submitted on the following basis:
 - a. Price for the equipment as specified. Any price for alternates shall be stated separately and in addition to price for the equipment as specified. Unless otherwise clearly stated, all prices shall be understood to be firm prices.
 - b. A statement of policy, covering inspection and services by manufacturer's qualified service engineer shall be a part of the bid and shall include the following:
 - (1) Number of days service at no extra charge, if any.
 - (2) Per diem charge for service rendered at request of Owner beyond the no extra charge period.
 - (3) Provide itemized list of recommended spare parts and furnish prices for same.
 - c. Pricing to send a representative to contractor's facility. This is to include all transportation (Air and ground), lodging and meals. Lodging and meals shall be based on a per day cost. Air transportation is to be based on round trip from the City of Lakeland.

C. COMPLIANCE WITH SPECIFICATION

1. The bidder shall state that his bid agrees and complies with the terms and conditions of these specifications or list his exceptions as specified elsewhere herein. Failure to comply with this requirement may be

cause for elimination of the Bid from consideration. If the Bidder has reservations as to the successful operation of the equipment and/or the various parts by following the specifications, and alternate bid shall be submitted together with the requested bid stating such changes and the reasons therefore as may be necessary to satisfy the Bidder that successful operation shall result from such changes. In the absence of any such alternate bid qualifying the Bidder's acceptance of the specifications, it shall be assumed that by submission of a bid the Bidder, upon becoming the Bidder, shall accept the responsibility for the successful operation of the equipment and its various parts as furnished by the Bidder.

D. SPECIFIC INFORMATION REQUIREMENTS:

1. Descriptive catalogs and literature complete with appropriate illustrations describing the equipment shall be included.
2. Drawings:
 - a. Dimensioned preliminary outline prints of the specified equipment and accessories, suitable for use in preliminary layout work.
 - b. Sectional arrangement drawing showing general design of equipment and method of operations.
3. Itemized list of all tools furnished with equipment.
4. Itemized list of any difference between Bidder's equipment and the equipment as specified herein, together with the reason for the differences. Each Bidder will be required to furnish the specified equipment in exact accordance with these specifications except for the itemized differences included in this required list in his bid.

E. BID EVALUATION:

1. In addition to economic considerations, the bids will be evaluated for compliance with this Specification; therefore, it is intended that the base bid shall be equipment with the specified characteristics. Any exceptions which are intended as an improvement technically or economically should be submitted with sufficient substantiating information as an alternate. Exceptions submitted without sufficient information to substantiate their suitability for this application may not be considered.
2. The economic evaluation will be based on the following penalty factors for guaranteed losses based on maximum FA rating at 55

degrees C rise at 100% rated voltage.

\$ 3936.00	/kW Core Loss
\$ 678.00	/kW Load Loss
\$ 321.00	/kW Auxiliary Power Loss

- a. The evaluation price will be the base price plus the above loss penalties. Failure to provide the loss information in the form specified will result in rejection of the bid. Other penalties may be used to compute the evaluated price whenever a bid varies from this specification.
3. Firm shipping dates as bid by bidder will be considered in the evaluation.
 4. Loss Adjustment Procedures:
 - a. The manufacturer is expected to supply a power transformer that does not exceed the bid values for losses as submitted in the bid. Any unit(s) that possesses any parameter as tested at manufacturer's test facility outside the bid values as specified shall, at the option of the Owner.
 - (1) Be denied acceptance of transformer(s) by Owner should actual tested loss values exceed bid values by 15 percent and require replacement with unit(s) meeting bid values.
 - (2) The total tested loss evaluation for the transformer shall be calculated by multiplying each factory tested loss (excitation, load and auxiliary power) by the applicable dollars/kW loss evaluation values specified, and totaling the individual tested loss evaluations (excitation, load and auxiliary power) for the transformer. The total guaranteed loss evaluation shall be calculated by multiplying each guaranteed loss (excitation, load, and auxiliary power) listed in the General Information Sheets by the applicable dollars/kW loss evaluation value specified in 5.1.E.2, and totaling the individual guaranteed loss evaluations (excitation, load, and auxiliary power) for the transformer. Where the total tested loss evaluation for a transformer exceeds the guaranteed value, the contract price shall be reduced by the difference between the total tested loss evaluation and the total guaranteed loss evaluation for the transformer. The total contract price reduction shall be the sum of the individual transformer price reductions thus calculated. No adjustments to the contract price nor to the price reductions calculated will be permitted where the total tested loss evaluation for a transformer is less than the total

guaranteed loss evaluation.

F. SCHEDULE OF DRAWINGS AND WORK:

1. Firm delivery dates as bid will be considered in evaluation. Each Bidder shall list in his bid the number of calendar days required after notification of award for a firm delivery of the Palmetto Substation transformer.

G. See attached information sheets.