

**PUBLIC NOTICE
INVITATION TO BID #1164**

The City of Springfield Electric Department is accepting sealed bids for the following:

**New 69 kV to 13.2 kV Substation Class Three Phase Power Transformer.
The transformer will have a capacity of 18/24/30 MVA with a load tap charger.**

Specifications may be downloaded at www.springfieldtn.gov. For questions, please contact Steven Sax at steve.sax@Springfieldtn.gov. Perspective bidders must be vetted from Patterson and Dewar Engineers. They may be reached at vcrawford@pdengineers.com. Sealed bids must be received in the Office of the City Recorder, 405 North Main Street, Springfield, TN 37172 by 2:00 pm local time on Tuesday, April 27, 2021. Please note Bid #1164 on the outside of the sealed envelope. The City of Springfield reserves the right to reject any and all bids.

Lisa H. Crockett
City Recorder

69KV POWER TRANSFORMER PROCUREMENT

WARTRACE SUBSTATION



**SPRINGFIELD ELECTRIC DEPARTMENT
Springfield, Tennessee**

Presented by:
Patterson & Dewar Engineers, Inc.
Jack C. Wallace, III, PE
TN PE License # 116746

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REVISION HISTORY

Rev. No.	Date	Description
00	04/05/2021	Issued for bid

SECTION 1 - INVITATION TO BID

1.01 PARTIES TO CONTRACT

- A. Buyer: City of Springfield
405 North Main Street, Springfield, TN 37172
Attention: Steve Sax
Phone: (615) 384-6770 Email: Steve.Sax@springfieldtn.gov
- B. Engineer: Patterson & Dewar Engineers, Inc.
1531 Hunt Club Blvd, Suite 200, Gallatin, TN 37066
Attention: Jack Wallace, PE
Phone: (615) 527-7078 Email: jwallace@pdengineers.com

1.02 BID ITEM

- A. Buyer invites Bidder (Seller) to submit quotation for furnishing the following equipment (Goods):
- Bid Item A: one 69-13.2kV 18/24/30//33.6 MVA power transformer without LTC
 - Bid Item B: one 69-13.2kV 18/24/30//33.6 MVA power transformer with LTC
- B. Buyer will award contract for either Bid Item A or Bid Item B (not both).
- C. The contract generally consists of furnishing Goods with 5-year warranty, one set of spare parts, delivery to the Point of Destination, testing, offloading and assembling Goods, and certification that Goods are ready for energizing.

1.03 POINT OF DESTINATION

Wartrace Substation: Intersection of Bill Jones Industrial Dr. & Kelton Jackson Rd, Springfield, TN 37172.

1.04 BID SUBMITTAL

- A. Bids will be accepted until **2:00 pm on April 27, 2021**. Electronic submittal of proposals is prohibited. Submit one hard copy of bid to:
- City of Springfield
405 North Main Street, Springfield, TN 37172
Attention: Lisa Crockett, *City Recorder*
- B. Seller's proposal shall be clearly marked as "**Bid for Wartrace Substation**" on the exterior of the mailing package.
- C. Seller shall submit proposal that will remain valid for a period of sixty (60) days after the date set for opening of bids.
- D. No bid security will be required to accompany bids.

1.05 DELIVERY AND PRICING

- A. Deliver Goods and offload to substation pad by **December 31, 2021**. Field services and assembly shall be completed **within 30 calendar days** of delivery of Goods. Seller shall quote best delivery date that is as close as possible to the requested delivery time.
- B. Seller is responsible for delivering and offloading onto Buyer-furnished pad. Seller is responsible for visiting Point of Destination to confirm accessibility prior to submitting a proposal. Buyer will not consider adjustments to the Contract Price after award due to Seller's failure to recognize the conditions under which Work is to be performed.

- C. Quoted prices shall be FOB Destination; Freight shall be allowed and pre-paid. Seller has the responsibility of Goods during shipment. Title to the Goods and risk of loss or damage shall remain with Seller until the Goods are delivered in acceptable condition at the substation site. Escalated prices are not acceptable.
- D. All requested options, devices, and equipment are required and expected per the specifications, and the cost to furnish fully operational equipment with explanatory documentation shall be included in the bid process and shall not be listed as separate items.
- E. Buyer will issue a purchase order to Seller upon award.

1.06 INSTRUCTIONS TO BIDDERS

- A. Engineer will answer all matters pertaining to the project, including but not limited to, answering technical questions of prospective bidders, bid evaluation and recommendation, review and approval of fabrication drawings and similar documents, and approval of invoices prior to payment by Buyer.
- B. Seller shall provide all information requested in this RFP. Seller shall take care to complete all portions of the Bid documents and to provide all required submittals. Failure to comply may result in the rejection of the bid.
- C. Exceptions and Deviations
 - 1. Seller shall clearly state all exceptions to this specification. Unless specifically stated otherwise, Seller shall furnish equipment, material and services in exact accordance with this specification, and any modifications to equipment, material and services necessary to comply with this specification shall be made by the Seller at no additional cost to Buyer.
 - 2. If Seller recommends any changes or deviations from the documents, Seller shall describe the change fully and furnish complete information so that Buyer can make a decision based upon the alternative information provided. If these specifications call for material, equipment or manufacturing procedures different from the manufacturer's standard, Seller shall clearly identify all deviations or substitutions in this bid. When possible, Seller should bid according to the specifications with the manufacturer's standard as an option.
 - 3. Buyer invites cost saving and schedule improving alternatives. **Seller shall first complete the Bid as issued by Buyer; Seller may then submit the alternatives referenced to the base proposal.**
- D. This project shall be subject to a liquidated-damages clause.
- E. Seller shall provide Certificate of Insurance that lists Buyer and Engineer as additional insureds.
- F. Equal shall mean a satisfactory equivalent as approved solely by Buyer.
- G. Buyer does not obligate itself to accept the lowest or any other bid and specifically reserves the right to reject any and all bids and to waive any informality in bids. Buyer reserves the right to award the contract to the best Bidder, as determined by the Buyer and Engineer.

SECTION 2 – GENERAL REQUIREMENTS

1.01 SUMMARY OF WORK

Design, manufacture, assemble, and factory test Goods in accordance with attached technical specifications. Deliver Goods to Point of Destination, offload, assemble, and field test. Provide a manufacturer's field service engineer to perform field services specified under the supervision and direction of Buyer's construction contractor. Buyer will furnish a construction contractor under a separate contract to perform foundation and Sitework for which the Goods under this Contract are being furnished.

1.02 ACCEPTABLE MATERIAL AND EQUIPMENT

Seller's proposal shall be based on new equipment and materials only. No used equipment or materials are permitted. Identify any alternate item by trade name and number to enable Buyer to determine whether such alternate item is acceptable. Alternates must be approved in writing by Buyer prior to contract placement.

1.03 TESTS AND INSPECTION

- A. Goods are to be tested in accordance with latest edition or revision of ANSI, IEEE, ASCE, ASTM, NFPA, and NEMA standards.
- B. Prior to testing, Seller shall notify Buyer at least one week in advance so Buyer may have personnel at Seller's factory during testing. Seller shall furnish the results of the tests to Buyer. Inspection of material by Buyer's representative will not relieve Seller from responsibility for furnishing material to conform to the Specifications.
- C. Factory testing activities are limited to Tuesdays, Wednesdays, or Thursdays excluding observed holidays. Testing on any other day of the week is prohibited.

1.04 SHOP DRAWINGS AND SAMPLES SUBMITTAL PROCEDURES

- A. **Transmit submittals via email to Engineer with copy to Buyer.** Schedule submittals to expedite furnishing the Goods and coordinate submission of related items. Send to:
 1. Engineer's Representative: Valerie Crawford (vcrawford@pdengineers.com)
 2. Buyer's Representative: Steve Sax (steve.sax@springfieldtn.gov)
- B. Seller shall submit Shop Drawings and Samples for Engineer's review and approval as soon as possible after receipt of order.
- C. Submit the following quantities:
 1. Shop drawings - One electronic copy (in PDF format) including manufacturers' data, brochures, suppliers' information, testing reports, certifications, and manufacturer's installation and testing instructions
 2. Samples – Two of each item required for evaluation
- D. Identify variations from Contract Specification.
- E. Provide space on all drawings for Seller and Engineer review stamps.
- F. Revise and resubmit items as required. Identify changes made since previous submittal. Distribute copies of reviewed submittal items to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

- G. Engineer will complete review in a timely manner and will return reviewed items to Seller with the following provided for each item submitted:

SUBMITTAL REVIEW BY ENGINEER	
PROJECT	
SUBMITTAL NO.	
Review of this shop drawing/submittal by Engineer is for general conformance with the requirements specified and compatibility with the design concept of the completed project. This review does not extend to means, methods, sequences, or procedures of construction (except where specifically called for in the specified requirements) or to issues of safety incident thereto. This review shall not relieve the contractor from its responsibility for full compliance with the requirements specified and to determine and verify the information contained therein. Provide final disposition of the comments made prior to issuance for fabrication or construction.	
ACTION:	
<input type="checkbox"/> Approved <input type="checkbox"/> Approved, but <u>make corrections noted</u> (no resubmittal required) <input type="checkbox"/> Revise and Resubmit (see comments) <input type="checkbox"/> None <input type="checkbox"/> Not Required - <input type="checkbox"/> Information Only	
REVIEWED BY:	Date:

Where:

“Approved” indicates submittal has been reviewed and appears to be in conformance with requirements of the Contract Documents. Proceed as shown on the submittal.

“Approved, but make corrections noted” indicates submittal appears to be in conformance with requirements of the Contract Documents. Incorporate the corrections noted and proceed as shown on the submittal. No resubmittal is required.

“Revise and Resubmit” indicates submittal does not appear to be in conformance with the Contract Documents. Engineer’s comments will be noted on the submittal or in a separate, cross-referenced document. Re-check, make necessary revisions and resubmit.

“None – Not Required or Information Only” indicates that the submittal is not called for by the Contract Documents and that Engineer has not reviewed the material.

1.05 PROJECT RECORD DOCUMENTS

- A. Throughout the duration of the project, maintain one set of the following documents for record purposes. Record actual revisions made to the Goods.
1. Drawings
 2. Specifications
 3. Changes to the Contract Documents
 4. Reviewed Shop Drawings and Samples
- B. Include description of actual equipment and material furnished, including the following:
1. Manufacturer's name and equipment and material model and number
 2. Material and equipment substitutions or alternates utilized

C. As-built drawings

1. Prior to submitting to Engineer the claim for final invoice, transmit to Engineer via email PDF copies of final drawings, as well as electronic files in AutoCAD 2019 (or earlier) format.
2. Engineer requests that all final drawings be sent as soon as available (email is preferred). These are used for creating connection diagrams that are needed shortly after delivery of the unit(s).
3. After the equipment has been placed into satisfactory operation, revise drawings to reflect field changes, if any, made to the Goods and submit to Engineer copies of revised drawings for the Operations and Maintenance Manuals.

D. Operation, Maintenance and Installation Manuals

1. Upon shipment of Goods, **deliver to Buyer two printed copies and one electronic copy on USB-drive** of complete Operation, Maintenance and Installation Manuals. Manuals shall identify material, equipment, and system description and include, at minimum, the following information:
 - a. Directory, listing names, addresses, and telephone numbers of Engineer, Seller, subcontractors, and major component suppliers.
 - b. Operation, maintenance, and installation instructions. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
 - Significant design criteria
 - List of equipment
 - Parts list for each component
 - Operating instructions
 - Maintenance instructions
 - Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents
 - Installation instructions
 - Material Safety Data Sheets
 - c. Project documents and certificates, including the following:
 - Certified drawings, manufacturer-prepared technical literature material, and equipment data/catalog cuts of all miscellaneous material
 - Certified factory test results
 - Photocopies of warranties for Goods
 - Duplicate copies of warranty documents which are executed and transferable from subcontractors, suppliers, and manufacturers.

1.06 SHIPMENT

- A. Before shipping Goods, give 48-hrs notice via email to Buyer and Engineer. No shipments shall be accepted or received without authorization from Buyer.
- B. Seller shall be responsible for obtaining necessary permits, providing and verifying routing and, in general, making all the necessary arrangements for transporting the equipment provided to Buyer's destination.
- C. Buyer will accept shipments between 8:00a.m. and 3:00p.m. local time Monday through Thursday excluding observed holidays.

- D. Ship Goods only after receiving written acknowledgment by Buyer of receipt of certified test reports. Accompany each shipment with a packing list of articles included in the shipment. Mark parts for ease of field assembly
- E. Attach impact recorder to the transformers during transportation periods. Unseal impact recorder only in presence of Buyer or Engineer.
- F. Deliver transformer oil to Buyer's site including all necessary equipment for the oil filling operation.

1.07 TRANSPORTATION, PROTECTION, AND HANDLING

- A. Store and protect Goods in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive Goods in weather-tight, climate controlled enclosures.
- B. Furnish equipment and personnel to handle Goods by methods to prevent soiling, disfigurement, or damage.
- C. Transport and handle Goods in accordance with manufacturer's instructions.
- D. Cover Goods subject to deterioration with impervious sheet covering. Furnish ventilation to avoid condensation or potential degradation of Goods.
- E. Uncrate Goods and dispose of packing material properly.
- F. Assume responsibility for loss and damage including but not limited to breakage, corrosion, weather damage, and distortion until delivered to Buyer.
- G. Promptly inspect shipments to assure that Goods comply with requirements, quantities are correct, and Goods are undamaged.
- H. Arrange storage of Goods to permit access for inspection. Periodically inspect to assure Goods is undamaged and is maintained in acceptable conditions.

SECTION 3 – TERMS AND CONDITIONS

1.01 NOTIFICATION

Seller shall acknowledge in writing to the Buyer that the Buyer's Purchase Order has been received within 5 days ARO. The acknowledgement shall include the date that the Purchase Order or acceptance is received and the date that equipment delivery is expected.

1.02 ACCEPTANCE; ENTIRE AGREEMENT

Acceptance of this order by acknowledgement, shipment or other performance shall be expressly limited to the terms and conditions contained in this order. Any additional or different terms or conditions proposed by Seller are objected to and are hereby rejected. Upon acceptance, the terms contained in this order shall constitute the entire agreement between Seller and Buyer with respect to the subject matter of this agreement (hereinafter referred to as the "Agreement") and may not be modified, added to, or rescinded except by a written document signed by Seller and Buyer.

1.03 CHOICE OF LAW

The construction, interpretation and performance of this Agreement and all transactions under it shall be governed and resolved in accordance with the laws of the State of Tennessee.

1.04 TERMINOLOGY

The terms "shall" and "will" which appear in the Bid and specifications place an absolute obligation on Seller to do that which is designated and/or specified.

1.05 TAXES

Buyer is exempt from sales tax.

1.06 TIME OF PERFORMANCE

Time is of the essence of this Agreement. If tender of conforming goods is not made by the agreed delivery date, Buyer may treat such failure as a breach hereof and will have all remedies afforded to it by law including, but not limited to, the rights to cover.

1.07 ASSIGNMENT AND SETOFF

Seller shall not assign any right or interest under this Agreement nor delegate any work or other obligation to be performed or owned under this Agreement without the prior written consent of Buyer. Any attempted assignment or delegation in contravention of this provision shall be void. Buyer shall be entitled to set off any amounts owed by Seller to Buyer against any amounts payable to Seller.

1.08 PAYMENT TERMS

Upon the shipment of any material hereunder, Seller shall submit to Buyer a detailed invoice of the materials shipped. Within 30 days after delivery, Buyer shall make payment of no more than **90-percent** of total purchase price to Seller. Upon completion of field assembly and certification by Seller that the materials provided are complete and ready for external connections, Seller shall invoice the Purchaser for the remaining **10-percent**. Within 30 days after receiving invoice, Buyer shall make payment thereof to Seller.

1.09 REJECTED GOODS

Buyer shall give notice to Seller of any rejection of goods, and goods rejected will, at Seller's expense, be returned to Seller or otherwise disposed of as Seller may reasonably request. Payment for the goods prior to inspection and approval shall not constitute acceptance thereof. Neither Buyer's inspection nor its failure to inspect the goods delivered hereunder shall release Seller from its warranties and obligations under this Agreement.

1.10 INSURANCE

Seller shall obtain and maintain coverage from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Seller shall provide blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Seller's contractual indemnity obligations. The insurance and insurance limits required herein shall not be deemed as a limitation on Seller's liability under the indemnities granted to Buyer and other individuals and entities in this Agreement. The limits of liability for the insurance required shall provide coverage for not less than the following amounts (or greater where required by Laws and Regulations):

- Commercial General Liability: \$1,000,000
- Professional Liability: \$1,000,000

Seller's insurance policies shall include and list as additional insureds Buyer and Engineer. Seller shall deliver to Buyer certificates of insurance establishing that Seller has obtained and is maintaining the policies, coverages, and endorsements required by this Agreement.

1.11 WARRANTIES

Seller warrants that all materials, equipment, and work furnished pursuant to this contract comply in all respects with the contract; that they are free from latent and patent defects in design, materials and workmanship; that they are suitable and adequate for the purposes for which they were designed and for such other purposes, if any, as are specified in the contract; and that they will give efficient and satisfactory service under such conditions as may be specified, for a period of **five years** after its first operation or use by the Buyer, in actual service, or, if the contract provides for an acceptance test, for a period of **five years** after they have passed such test.

Seller shall, at its own expense, repair, replace, transport, and install any materials, equipment, or work or parts thereof, which prove defective or deficient during the warranty period.

This means that Seller will be responsible during the warranty period for the direct cost of (A) removing Goods or parts from service; (B) transporting said Goods or parts from substation site to manufacturer or repair facility and back to the substation site; and (C) reinstalling Goods or parts for service after completing the required acceptance testing. If, however, it is impractical for Buyer to wait for the manufacturer, Buyer may perform such work at Seller's expense.

Any materials, equipment, work, or parts thereof, which fail to meet the guarantees or other requirements of the contract may be rejected; provided, however that if correction of the defects or deficiencies can be made through minor alterations or replacements of minor parts, and Seller proceeds immediately to complete such alterations, or to furnish and install such new parts as are necessary to meet the guarantees or other requirements of the contract, then the materials, equipment, or work shall not be rejected on account of defects or deficiencies so corrected. Any correction of a defect or deficiency will be guaranteed for a period of one year after such correction is effected. The correction of defects or deficiencies shall not operate to extend the time for performance of the contract as specified thereunder or to waive any claim for damages resulting from delay in performance or from any other cause.

Buyer shall give Seller prompt notice of any breach of this warranty. Operation or use by Buyer of the materials, equipment or work, or any part thereof shall not constitute a waiver of any of Buyer's rights under this contract. Seller warrants that the materials, equipment or work furnished hereunder are free from any and all claims, demands, and encumbrances; and that Seller will defend the title thereto. The foregoing warranties or guarantees contained in this contract shall supersede any and all others.

1.12 IDENTIFICATION; RISK OF LOSS

Identification of the goods ordered herein shall occur at the moment this order is accepted by Seller. Risk of loss shall pass to the Buyer at the time that conforming goods to the Agreement are confirmed received at the Point of Destination.

1.13 LIQUIDATED DAMAGES

If Seller fails to deliver the Goods on or before December 31, 2021, Buyer may choose to invoke a liquidated-damages charge of **\$500.00** for each calendar day that the Goods are delayed. Liquidated damages will be limited to ten percent of the amount of the contract. This charge will be assessed to Seller when the delay is caused by any reason other than an act of God, purchaser, embargo or other governmental act or authority regulation or request, fire, theft, accident, strike, war, or riot. The time of delivery shall include the time for drawing approval.

1.14 INFRINGEMENT

Seller shall indemnify Buyer and Buyer's customers for any and all loss, damage, expense, (including but not limited to attorney's fees) claims or liability arising out of any infringement or claim of infringement of any patent, trademark, copyright, trade secret or other proprietary interest based on the manufacture, installation, normal use, lease, or sale of any service of material furnished to Buyer under this Agreement. Buyer shall notify Seller promptly of any such claim or infringement and Seller shall, at its own cost, defend, compromise, or settle, any such action or actions to satisfy and discharge the same without any cost or expense whatsoever to the Buyer.

1.15 TERMINATION

Buyer may terminate this Agreement for default upon notice to Seller if: 1) Seller fails to comply with any of the terms and conditions of this Agreement, including failure to deliver goods or perform services required within the time specified in this Agreement; 2) at any time reasonable grounds for insecurity arise with respect to Seller's expected performance and Seller fails to furnish adequate assurance of due performance within ten (10) days after a written demand by Buyer for such adequate assurance; 3) Seller shall become insolvent or make an assignment for the benefit of creditors; or 4) Seller shall file a voluntary petition in bankruptcy or insolvency or shall be involuntarily petitioned into bankruptcy or insolvency.

Buyer may terminate this Agreement, in whole or in part, for its convenience, at any time by giving written notice to Seller, and Seller shall promptly comply with the directions contained in such notice. In such event, Buyer shall make payment to Seller for all costs incurred by Seller prior to such termination reasonably allocable to this Agreement under recognized accounting practices, less any scrap or salvage value.

1.16 LIENS

Seller shall promptly pay for all materials, supplies and labor employed by it in manufacturing the ordered goods to the end that such goods may be kept free from Materialmen's, Warehousemen's and Mechanics' liens. Seller shall promptly discharge any such liens arising from the performance of this Agreement.

1.17 INDEMNITY OF THE BUYER

Seller shall indemnify and hold Buyer and its officers, employees, and agents harmless from and against all suits or claims that may be based upon any alleged injury to or the death of any person or damage to property that may occur or that may be alleged to have occurred in the course of performance of this Agreement whether or not such claim is made by a third person, except when it shall be proved that the alleged injury was caused solely by a negligent act or omission of the Buyer. Seller shall, at its own cost and expense, pay all costs and expenses or such suit or claim, including attorney's fees in connection therewith, and if any judgement shall be rendered against the Buyer in any such action or actions Seller shall satisfy and discharge the same without cost or expense to Buyer.

1.18 COMPLIANCE WITH LAWS

Seller and all material furnished by Seller shall fully comply with all federal, state, and local laws, ordinances, regulations, orders and codes, including identification and procurement of required permits, certificates, approvals and inspections in performance hereunder. Any provision required to be included in this Agreement by any such law, rule or regulation shall be deemed to be included herein. Seller also certifies that it does not engage in and requires that its subcontractor's (if any) employees or agents not

engage in, any form of discrimination based on race, color, religion, sex or national origin. Seller agrees to indemnify Buyer for any loss or damage that may be sustained by reason of any failure to do so.

1.19 PATENTS

Seller shall at its own expense defend any suit instituted by any party against Buyer so far as it is based on the claim that any apparatus or part thereof furnished under this contract or Buyer's use of such apparatus or part for the purpose for which it was designed or for such purposes, if any, specified in this contract constitutes infringement of any United States patent.

Buyer shall give to Seller immediate notice in writing of the institution of such suit, and shall permit Seller, through its counsel, to defend the same, and shall give all requisite authority and all needed and available information and assistance to enable Seller to do so. Seller shall pay all damages and costs finally awarded therein against Buyer by reason of such infringement, however Seller shall not be liable under any compromise made without its consent.

If in any such suit said apparatus or part or such use thereof by Buyer is held to constitute infringement and such use is enjoined, Seller shall at its own expense procure for Buyer forthwith the right to use or continue using the said apparatus or part; provided, however, that subject to Buyer's approval Seller may at its sole expense replace said apparatus or part with non-infringing apparatus or parts, or modify it so that it becomes non-infringing.

1.20 CLAIMS BY THIRD PARTIES

Seller shall, at its own expense, assure the defense of and save harmless Buyer from all claims for materials furnished or work done; shall promptly discharge the same and not suffer any mechanics or other liens to remain outstanding against any of the property. Satisfactory evidence must be presented that all persons who have done work or furnished materials have been fully paid. If Seller fails to comply with its obligations as above, Buyer may take such steps as it may deem appropriate to discharge such liens or claims and may withhold from any moneys due Seller such amount as may be necessary to satisfy and discharge the same and any expense incident thereto.

1.21 LABELING

All goods and materials to be supplied by Seller under this Agreement shall be labeled in accordance with the requirements of the Federal Occupational Safety and Health Act Hazard Communication Standard and/or applicable State law or standard of similar effect. Seller shall immediately send to the Buyer, referencing this purchase order number, all required written safety information materials including without limitation, Material Safety Data Sheets, required under said standards.

1.22 NON-WAIVER

No course of dealing or failure of either party to strictly enforce any term, right or condition of this Agreement shall be construed as a waiver of such term, right, or condition

SECTION 4 – SPECIFICATION FOR 69kV POWER TRANSFORMER**1.01 GENERAL CHARACTERISTICS**

- A. Number of units One
- B. Single phase _____; or Three phase X
- C. MVA Ratings
1. MVA (self-cooled) 18 at 55 degrees C by resistance.
 2. MVA (1st stage cooling) 24 at 55 degrees C by resistance.
 3. MVA (2nd stage cooling) 30 at 55 degrees C by resistance.
 4. MVA (self-cooled) 33.6 at 65 degrees C by resistance.
- D. Supplemental cooling:
- Fans-ONAF;
 - X Fans-ONAN/ONAF/ONAF;
 - Future Fans-ONAF/FONAF;
 - Future Fans-ONAN/FONAF/FONAF;
 - Fan and Oil Pump-ONAN/ONAF/OFAP;
 - Future Fan and Oil Pump-ONAN/FONAF/FOFAP.
- E. The hottest spot temperature rise for the 65 °C average temperature rise ratings shall not exceed 80 °C.
- F. Voltage rating 69-13.2kV, 60 Hertz.
- G. Design Impedance:
1. Bid Item A (without LTC): 8.0% Based on high voltage BIL and low voltage rating at self-cooled (ONAN) rating per IEEE C57.12.10 -2010 Table 3 or latest revision.
 2. Bid Item B (with LTC): 8.5% Based on high voltage BIL and low voltage rating at self-cooled (ONAN) rating per IEEE C57.12.10 -2010 Table 3 or latest revision.
- H. All electrical characteristics and mechanical features not herein specified shall be in accordance with applicable ANSI and NEMA standards.

1.02 OPERATING CONDITIONS

- A. Elevation above sea level is less than 3,300 feet (standard).
- B. Winding connections:
1. High voltage winding rated 69 kV and connected Delta
 2. Low voltage winding rated 13.2 kV and connected Wye
 3. Tertiary winding rated N/A kV and connected N/A
- C. Auxiliary supply voltages:
1. 120/240 volts 3 wire 1 phase
60 Hertz AC will be supplied for all motors and heaters.
 2. 125 volts DC will be used for alarms and control circuits.

1.03 TESTING

- A. Factory tests shall include all tests as specified in applicable ANSI and NEMA standards.
- B. Factory Acceptance Tests (FAT)

Std. C57.12.00-2000 and C57.12.90-1999 Tests		Required
1.	Resistance measurements of all windings at rated and extreme tap positions.	X
2.	Winding insulation resistance	X
3.	Core insulation resistance	X
4.	Ratio tests on the rated voltage connection and all tap connections <i>(respective to appropriate Bid Item)</i>	X
a.	Non-LTC - on the rated voltage connection and all tap connections	X
b.	LTC – 4.a and all tap positions of the LTC at rated high voltage tap	X
5.	Polarity and phase relationship on the rated voltage connection	X
6.	Current transformers, including polarity and ratio on all taps after final complete factory wiring.	X
7.	Insulation power factor – Doble test equipment	X
	<i>Comments: Insulation power factor tests shall be performed on all winding-to-winding insulation, winding-to-ground insulation and all bushing taps (C₁ only). All measurements shall be less than or equal to 0.5% corrected to 20°C.</i>	
8.	Frequency Response Analysis (FRA) all units (Doble or Framit approved)	X
	<i>Comments: FRA shall be performed prior to impedance and load loss tests and repeated prior to undressing the unit for shipment. Paper and electronic files are to be included in the final report.</i>	
9.	Auxiliary losses	X
10.	No-Load losses and excitation current at 100% and 110% rated voltage and frequency at the rated tap.	X
11.	Impedance voltage and load losses at rated current and frequency at rated tap and at both tap extremes	X
12.	Zero sequence impedance test	
a.	First unit	
b.	All units	
13.	Temperature rise at minimum and maximum ratings.	
a.	All units in the order	X
b.	Temperature rise test to be performed prior to dielectrics	X
14.	Dielectric Tests:	X
a.	Low frequency	X
b.	Low frequency on auxiliaries, controls & CT circuits	X
c.	Lightning impulse – Full wave & chopped wave	X
d.	Switching impulse – phase to ground (Special units only)	
e.	Partial discharge	X
	<i>Comments:</i> <ul style="list-style-type: none"> <i>Impulse Tests - The neutral current method of fault detection will be employed. Current and Voltage waveforms will be supplied.</i> <i>Partial discharge tests - The transformer(s) shall be corona tested at the full induced test voltage level. The RIV (Radio Influence Voltage) shall not exceed 200 μV at full induced voltage level, 173%. The RIV shall be 75 μV or below when tested at 150% of the maximum tap operating voltage for a period of 60 minutes and the delta PD should not exceed 30 μV. The partial discharge values shall also not exceed 300 pC @ 130% and 500 pC @ 150% voltage. This test is to run in conjunction with the above RIV tests.</i> 	

Std. C57.12.00-2000 and C57.12.90-1999 Tests		Required
15.	Excitation test after dielectrics	
	a. One hour	
	b. Twelve hour	
	c. Twenty-four hour	
16.	Sound level (Special units)	X
17.	Short circuit capability	
	<i>Comment: The transformer short-circuit strength shall meet the requirements set forth in IEEE Paper No. 71TP536-PWR, IEEE Std. 262A-1974, Short Circuit Test Code ANSI/IEEE C57.12.90A. Buyer has the right to request through-fault testing (at extra cost) at any time prior to final testing of assembled unit.</i>	
18.	Operation test of all devices	X
	<i>Comment: All controls and protective devices shall be functionally operated at their designed operating voltages.</i>	

- C. Dissolved gas-in-oil tests will be performed prior to any testing to establish a base line and after the following tests that are applicable to this unit:
1. Temperature rise (13) – both base load and maximum load tests
 2. Dielectrics (14)
 3. Excitation (15)
 4. Short circuit (17)
- D. The above table of tests does not release Seller of any other tests that may be relevant and/or required by the applicable standards to ensure the quality of the design.
- E. A schedule of all Factory Acceptance Tests (FAT) as well as Core and Coil Inspection shall be submitted to Buyer and Engineer a minimum of four weeks prior to the performance of such tests. Buyer and/or Engineer reserve the right to attend any and/or all of these tests/inspections.
- F. Time and date stamps as well as testing person's name shall be clearly indicated in the reports for each test performed.
- G. Buyer and Engineer shall be immediately notified of any unusual damage occurring during construction of the transformer and of all tests which do not meet specified or standard values. Notifications will be followed up in writing and include a summary of problems encountered, failed test results, and corrective action taken. All details of such damage or failed tests shall be included in the final report that is sent to Buyer and Engineer. Buyer and/or Engineer shall be permitted, at its option, to personally inspect such damages and/or test failures.
- H. Buyer and Engineer shall be provided with all FAT results within 5 days of completion of all tests.

1.04 HIGH VOLTAGE WINDING

- A. Rated tap 69,000 volts connected Delta.
- B. Full capacity taps (in addition to rated tap) at 2.5% steps (2 above center, 2 below center):
- 72,450 volts
- 70,725 volts
- 67,275 volts
- 65,550 volts
- C. Delta-Wye connections available at terminal board: No.

D. Insulation ratings:

69 kV Class

350 kV BIL

E. The transformer shall be constructed using only power transformer class construction practices and materials. **Only copper, circular windings of disk and/or helical construction are acceptable. Rectangular windings, oval windings or layered windings are not acceptable.** The core shall be of circular, multistep, cruciform construction.

1.05 LOW VOLTAGE WINDING

A. Rated volts 13.2 kV; connections Wye.

B. Delta-Wye connections available at terminal board: (yes, no) No.

C. If dual voltage, external de-energized series-parallel switch required: (yes, no). n/a.

D. Insulation ratings:

15 kV Class

110 kV BIL

110 kV BIL at neutral end.

E. The angular displacement between the high and low voltage winding vectors shall be 30 electrical degrees with the low voltage lagging the high voltage assuming H1, H2, H3 rotation.

F. Winding shall be of copper circular construction. See Paragraph 1.04 E of this Section.

1.06 TERTIARY WINDING (IF REQUIRED) - NOT REQUIRED

A. Minimum capacity for harmonic suppression shall be 35% of the physical kVA of the largest winding.

B. Insulating rating: N/A kV Class N/A kV BIL.

C. Low frequency test voltage N/A kV applied, N/A kV induced.

D. Winding shall be of copper circular construction. See section 1.04E.

1.07 CORE GROUND

The core ground shall be externally located so as to be readily accessible and easily removable for test purposes. The location shall be shown on the outline drawing.

1.08 SUPPLEMENTARY COOLING EQUIPMENT

A. Initial facilities shall include:

 provision only for future cooling

 one stage of cooling

 X two stages of cooling

B. Control of cooling equipment whether provided initially or in the future shall be by single phase winding temperature equipment.

- C. The control shall be readily accessible for adjusting the temperature at which the cooling equipment starts. Dial type indicators shall be provided on the temperature relays. The relays shall provide for four separate contacts to accomplish the following function:
- 1st Contact - 1st Stage Cooling
 - 2nd Contact - 2nd Stage Cooling
 - 3rd Contact - Alarm
 - 4th Contact - Tripping
- D. The temperature relay nameplate shall give Seller's temperature settings for each level.
- E. Manual/auto selector switch for fan control relay and a Bank 1, Bank 2 first stage selector switch.
- F. All of these shall be calculated on the basis of operation at 65 degrees C winding temperature rise by resistance.
- G. The fans shall be manufactured by Krenz.
- H. The fans shall be individually connected to the power supply through a flexible rubber covered cord with weatherproof plugs and receptacles. The motors shall be totally enclosed and furnished without centrifugal switches.

1.09 DE-ENERGIZED TAP CHANGING EQUIPMENT

The transformer high-voltage winding shall be tapped at only one location (typically the center of winding). The mechanism shall be externally operated by a single operating handle extended through the wall of tank at height convenient to transformer design and operation from ground-level. The changer shall be complete with position indicator and an operating handle with provisions for locking.

1.10 LOAD TAP CHANGING EQUIPMENT – “BID ITEM B” ONLY

- A. Automatic Load Tap Changer (LTC)
1. Location: Low voltage winding
 2. Type: Reinhausen Type RMV-II complete with tank and motor operator. No substitution allowed.
 3. Regulating range: 10-percent above to 10-percent below rated voltage in thirty-two 5/8-percent steps, with a total of 33 positions.
 4. Rating: Deliver full kVA capacity for normal and emergency ratings at all LTC positions and at all combinations of LTC and NLTC positions.
 5. Tap Selector Switch and Mechanism
 - a. Mount in oil-filled compartment separate from main transformer tank.
 - b. Maintain physical isolation so it is not necessary to drain oil or break seal of main transformer tank when servicing LTC.
 - c. Type: Vacuum
 - d. Tap Step Changes: Smooth transition with no low voltage circuit interruption due to contact bounce or failure to maintain contact bypass bridging.
 - e. Replacement Ratings:
 - 1) Contacts: Capable of 500,000 operations without contact replacement.
 - 2) Mechanical Rating: Capable of 1,000,000 operations.

- f. Tank Accessories
 - 1) Hinged maintenance door with oil-resistant gasket
 - 2) Drain, filter, and sampling valves
 - 3) Magnetic liquid level indicator with low level alarm contacts at 125 VDC
 - 4) Breather
 - 5) Manhole for inspection of contacts without lowering oil level
 - g. Tap switch, motor drive mechanism, control devices, position indicator, and operation counter, in accordance with ANSI C57.12.10
 - h. Seller shall furnish an LTC nameplate mounted on the control cabinet with the following information:
 - 1) Manufacturer of the mechanism
 - 2) Model number of the mechanism
 - 3) Year of manufacture
 - 4) Maximum rated through current of the mechanism
 - 5) Type of transition impedance: reactor or resistor
 - 6) Method of arc interruption (type of mechanism) - Arcing tap switch; or Tap selector with separate arcing switch; or Tap selector with separate vacuum interrupter.
 - 7) Type of drive mechanism: direct or energy spring
 - 8) Amount of oil in the mechanism compartment
 - i. Seller shall furnish a complete description of the LTC equipment including the referenced nameplate information indicated above.
6. Controls
- a. Type: Automatic, microprocessor-based, Beckwith 2001D with DNP communications protocols.
 - b. Features:
 - 1) Controls for parallel operation by the circulating current method or master/follower
 - 2) All controls to facilitate independent or parallel operation with an identical unit purchased under this contract, including parallel balancing module, and AC current relay
 - 3) Communication interfaces serial RS 232, RS 485, and fiber optic Ethernet
 - c. Equipment
 - 1) Voltage reduction control switch with three positions: off; step one; step two
 - 2) Provisions for testing control mechanism
 - 3) Overcurrent relay for inhibit of LTC
 - 4) One copy of software for settings and communications included

- 5) All indication lamps shall be LED type
 - 6) Current transformer for line drop compensation
 - 7) Position indicator with upper and lower drag hands to indicate maximum travel and electrical reset button mounted in the control cabinet
 - 8) Limit switches and stops to prevent travel beyond extreme tap position
 - 9) Crank or handwheel for manual operation during maintenance
 - 10) Position indication to LTC control and transformer monitor using potentiometer or 4-20ma analog input.
 - 11) Operations counter
 - 12) Form B dry contacts wired to local monitoring device for lower limit, upper limit, and hung-up alarms
 - 13) Control circuit protective devices
 - 14) Control switches for RAISE/LOWER, AUTOMATIC/ MANUAL, and LOCAL/REMOTE (Device 69). Mounted in the main control cabinet. Provisions for external mounted raise/lower/automatic/ manual switch
 - 15) OFF-position contact: Wired to indicating light and transformer monitor in main cabinet
 - 16) Wired to provide LTC operation counts
 - i) Operations counts shall also be made available to the LTC controller
 - 17) Indicating light showing NEUTRAL position
 - 18) DNP control shall be available when the control is set to 'Remote' and 'Auto' via the selector switches.
- d. Mounting: In easily accessible control cabinet
- e. Wiring: Extended to main terminal cabinet and connected to terminal blocks. Wire power supply switch, light and convenience outlet, space heater, and switch to main terminal cabinet.
- f. Using a three-position selector switch, provide provisions for powering controller off of the cabinet AC supply in the event the PT source is unavailable due to an outage and a test set utilizing voltage test terminals mounted to the control swing panel.

1.11 BUSHINGS

- A. High voltage bushings: 69 kV Class, 350 kV BIL.
- B. Low voltage bushings: 13.2 kV Class, 110 kV BIL.
- C. Tertiary bushings: N/A kV Class, N/A kV BIL.
- D. Neutral bushings:

High voltage neutral N/A kV Class, 110 kV BIL.

E. The bushing arrangement shall be as follows:

The H2 and X2 bushings shall be located on the same centerline but on opposite sides of the tank cover.

1. The Segment 1 and Segment 3 centerline shall be located in the center of the tank cover.
2. The H1 and H3 bushings shall be properly spaced on each side of this centerline and parallel to the Segment 3 side.
3. High Voltage bushings shall be equally spaced along a straight line.
4. The X1 and X3 bushings shall be properly spaced on each side of the X2 bushing and parallel to the Segment 1 side. Minimum Spacing 30"
5. All low voltage bushings including the neutral bushing shall be equally spaced along a straight line.
6. Low Voltage bushings shall be located on Segment 1
7. High Voltage bushings shall be on Segment 3

F. The porcelain glaze shall be Gray (ANSI 70).

G. Stud connectors **are to be provided**. Connectors should be stud to 4-hole pad similar to Anderson type HDSF.

H. Bushings shall be manufactured by ABB or PCORE. No exceptions.

1.12 BUSHING CURRENT TRANSFORMERS

A. The following multi-ratio bushing current transformers will be provided. They shall have five secondary ANSI Standard tap positions and should be provided with CT type terminal blocks with shorting bar and **four** shorting screws all equal to Penn-Union Series 6006 SCS.

B. All secondary leads from CT shall be brought through conduit to terminal blocks mounted in control cabinet.

C. Location and Number Required:

<u>Bushing</u>	<u>Letter Designation *</u>	=	<u>Total Each Bushing</u>
<u>H1</u>	<u>A</u> _____	=	<u>3</u>
<u>H2</u>	<u>A</u> _____	=	<u>3</u>
<u>H3</u>	<u>A</u> _____	=	<u>3</u>
<u>X1</u>	<u>B</u> _____	=	<u>3</u>
<u>X2</u>	<u>B</u> _____ <u>D</u> <u>E</u>	=	<u>5</u>
<u>X3</u>	<u>B</u> _____	=	<u>3</u>
<u>X0</u>	<u>C</u> _____	=	<u>2</u>
	TOTAL	=	<u>22</u>

* From bushing terminal to winding (left to right above).

<u>DESIGNATION</u>	<u>FUNCTION</u>
A	Substation Protective Relaying - HV
B	Substation Protective Relaying - LV
C	Back-up Ground OC relay
D	Line-Drop-Compensation Circuit
E	Hot-Spot Winding Temperature Gauge
F	Substation Breaker Failure – Spare LV

D. Ratios

A =	<u> X </u>	600/5	<u> </u>	1200/5	<u> </u>	2000/5	<u> </u>	By Seller
B =	<u> </u>	600/5	<u> </u>	1200/5	<u> X </u>	2000/5	<u> </u>	By Seller
C =	<u> X </u>	600/5	<u> </u>	1200/5	<u> </u>	2000/5	<u> </u>	By Seller
D =	<u> </u>	600/5	<u> </u>	1200/5	<u> </u>	2000/5	<u> X </u>	By Seller
E =	<u> </u>	600/5	<u> </u>	1200/5	<u> </u>	2000/5	<u> X </u>	By Seller
F =	<u> </u>	600/5	<u> </u>	1200/5	<u> X </u>	2000/5	<u> </u>	By Seller

E. Accuracy Classes:

A =	<u> </u>	C200	<u> X </u>	C400	<u> </u>	C800	<u> </u>	By Seller
B =	<u> </u>	C200	<u> X </u>	C400	<u> </u>	C800	<u> </u>	By Seller
C =	<u> </u>	C200	<u> X </u>	C400	<u> </u>	C800	<u> </u>	By Seller
D =	<u> </u>	C200	<u> </u>	C400	<u> </u>	C800	<u> X </u>	By Seller
E =	<u> </u>	C200	<u> </u>	C400	<u> </u>	C800	<u> X </u>	By Seller
F =	<u> </u>	C200	<u> X </u>	C400	<u> </u>	C800	<u> </u>	By Seller

F. Rating Factor – All CTs shall have a minimum rating factor of 1.5.

G. Wiring – All CT wiring shall be #10AWG with 90°C temperature rating.

1.13 SURGE PROTECTION

A. Arresters shall be in accordance with the current ANSI/IEEE Standard C62.11.

B. Furnish a total of 6 surge arrester mounting brackets located adjacent to the following bushings:

 3 H1, H2, H3
 3 X1, X2, X3

C. Furnish a total of 6 surge arresters:

 3 System High L-L Voltage 69 kV, MCOV >= 104 kV, S Class
 3 System Low L-L Voltage 13.2 kV, MCOV >= 8.4 kV, S Class
 System Tertiary L-L Voltage kV, MCOV > kV, Class

CLASS CODES: S = Station; I = Intermediate; D = Distribution

* Arresters shall be stacked (2 each phase), with one set shorted for 12kV operation.

D. Arresters shall be polymer type.

E. Arresters shall be manufactured by ABB, Cooper, GE or Ohio Brass. No exceptions.

1.14 OIL PRESERVATION

- A. Oil shall be protected by: _____ Sealed Tank X Automatic Nitrogen System
- B. A bleed tube for gas blanket dew point measurement shall be provided from the gas space to an elevation of six feet above the base of the transformer via a flexible metal-reinforced hose. It is preferred that this valve be mounted near or inside the nitrogen cabinet.
- C. Suitable valves shall be provided to permit purging the gas space and testing the seal on the tank by admitting dry nitrogen under pressure.
- D. Pressure relief device shall be of the mechanical automatic resealing type with alarm contacts. See Paragraph 1.16.A.9 of this Section.
- E. The system should also include the following:
- X 200 cubic foot Nitrogen cylinder mounted less than 2 feet above base.
 - X Pressure Regulator
 - X Cylinder Pressure Gauge (w/alarm contacts - 10% volume remaining).
 - X Transformer Pressure Gauge (w/alarm contacts - High & Low).
 - _____ Other _____
- F. The normal transformer tank pressure is to be between plus (+) 1/2 and plus (+) 8 psig.
- G. The system gauges, valves, regulators, etc., shall be contained within a separate steel housing with single handled, lockable access door with sight glass.

1.15 TANK DESIGN

- A. Tank shall have welded steel plate construction with welded cover and lifting lugs. Top and bottom shall be minimum 3/8" steel. All welds shall be ground to a smooth finish.
- B. Lifting lugs shall be provided for lifting complete transformers. Pulling eyes shall also be provided.
- C. Jack bosses with at least 13" clearance to bottoms of base shall be provided.
- D. The base shall be of the welded steel shape (i.e. "I" beam, channel, etc.), built to provide a rigid support and designed to permit the completely assembled and filled transformer to be skidded, rolled, etc. along either axis.
- E. Manhole covers shall be bolted.
- F. The center of gravity of the assembled transformer shall be as near to the tank centerlines as practical.
- G. The exterior tank finish shall be minimum three mil ANSI #70 Gray.
- H. The interior tank finish shall be painted white.
- I. Transformer shall be constructed for rail shipment.
- J. Transformer shall have skid-proof top.
- K. Transformer shall be equipped with OSHA approved fall protection system for workers on the top of the transformer (prefer tether pole system).
- L. All tank corners must be folded. Welds shall not be in the corners.
- M. All conduit and boxes must be painted the same as the tank.

1.16 TANK ACCESSORIES

- A. The following accessories are to be provided with the transformer:
1. A NEMA 3R or 4 control cabinet with a hinged door complete with single padlocking handle, hinged front panel and removable bottom plate.
 2. Magnet oil gauge (Qualitrol type 032 or Messko equivalent) with double low level contacts for the main tank and LTC tank, located so to be easily visible from the ground. The first set of contacts shall be for alarm and the second set for tripping.
 3. Dial-type thermometers (Qualitrol type 104 or Messko equivalent) with maximum reading pointer, one for top oil temperature and one for hot-spot temperature, with closed oil well, located no higher than 6'-6" above transformer base with contacts as follows:
 - Oil temperature thermometer with three alarm contacts.
 - Hot-spot winding temperature thermometer with four separate contacts.
 - 2 for cooling fan control
 - 1 for alarm
 - 1 for tripping
 - Provide RTD input of all three LV phases to SEL-2414
 4. Sudden pressure relay (Qualitrol type 900) with auxiliary seal-in relay (Qualitrol type 909 – Device 63X) only as recommended by the Seller for use with this sudden pressure switch. Both 63X contacts shall be brought out to terminal blocks located in the control cabinet.
 5. Lower filter press connection with 2" valve and Ohio Brass Co. No. 5700, or equal, disc sampling device main tank and tap changing compartment. Valve to be arranged so that sample can be taken only with valve open.
 6. Drain valve for main tank (and load tap changing compartment, if required).
 7. Copper-faced or stainless steel ground pads with two 1/2" tapped holes on 1 3/4" centers (NEMA Standard), welded to tank for attaching ground connectors on the HV and LV sides as well as the tank top.

(Total required = 20 : 6 Low voltage side
6 High voltage side
8 Tank top)
 8. Diagram nameplate located no higher than 6' above transformer base.
 9. Pressure relief device with alarm contacts and semaphore. Both "Normally Open" and "Normally Closed" contact leads shall be brought down to the terminal blocks in the control cabinet. (Qualitrol type LPRD or Messko equivalent)
 10. Upper filter press connection with 2" valve main tank (and load tap changing compartment, if required).
 11. All relay and alarm contacts including spares shall be wired to terminal block in control housing. Terminal blocks are to be rated for 600 volts.
 12. Control cabinet 120 volts AC convenience outlet, incandescent light and heater protected by a circuit breaker.
 13. Items 2 and 3 of this "Paragraph A" shall be located under drip shields welded to the tank wall to prevent moisture collection inside face plate.

- B. Bolts, cap screws, nuts, unpainted metal, etc., that is exposed to weather shall be made of non-corrosive metal.
- C. Radiators shall be bolted and equipped with drain plugs. Cut-off valves shall be at both top and bottom of tank, near flange connection.
- D. Radiators shall be on Segment 3 only.

1.17 CONTROL AND MONITORING EQUIPMENT

- A. All wiring shall terminate on terminal blocks suitable for #9 conductor.
- B. Current transformers conductors shall terminate on Penn-Union series 6006 SCS terminal blocks or equal. All other wiring shall terminate on Penn-Union series 6000 - wide slotted blocks or equal.
- C. All wiring shall be labeled at termination with designation of opposite end termination.
- D. All devices requiring external connections to transformer shall be factory wired to terminal strips located in control cabinet.
- E. Any enclosure containing terminal blocks, alarm contacts, etc., shall be in a weatherproof and dust-tight-NEMA 3R or 4.
- F. All required conduit shall be galvanized rigid steel or galvanized intermediate metal. (IMC with 0.083 inch wall thickness). Conduit shall be supported with conduit clamps as required.
- G. There shall be no splices in control wiring. This includes butt splices. Control cables shall be provided long enough to reach from the control apparatus to the control cabinet or intermediate wiring cabinets with terminal blocks may be required.
- H. Transformer Alarm Monitor
 - 1. See Exhibit B for communication equipment to be provided by Seller.
 - 2. See Exhibit C (Transformer Monitor Input map) for I/O usage
 - 3. Manufacturer: Schweitzer Engineering Laboratories (SEL)
 - 4. Model: SEL 2414
 - 5. Part Number: 241421A3A9X3A3A1030 (TM-1)
241421A3A2X3A5X1030 (TM-2) **"BID ITEM B" ONLY**
 - 6. Features:
 - a. Three Phase Winding Temp Monitors
 - i. RTD
 - b. Three stage fan controls
 - c. Temperature monitoring of oil in main tank
 - i. RTD
 - 7. Provide sensors to accomplish monitoring
 - a. Sensors: Install according to Seller's recommendations
 - 8. Provide interconnection of IED according to transformer information system, as shown in Exhibit D and Exhibit E.

9. Seller shall program monitors prior to delivery to Buyer.
 - a. All analog inputs and RTDs shall be properly scaled.
 - b. Display points shall include alarm statuses, temperature information, and LTC position.
 - c. Front panel LEDs shall be used for alarm targeting.
- I. Dissolved Gas Analyzer
 1. Model: GE Transfix DGA 500
 2. Part No.: DGA500-E0-CA5-CB3-M0-S0-X0-X0-X0-H0-A0-W0

1.18 NAMEPLATE DATA

- A. The nameplate for any power transformer shall conform to C57.12.00-2010 (or latest edition) standards and shall contain the following information at a minimum:
 1. Name of Manufacturer
 2. MVA ratings and Classes at Temperature Rise
 3. Voltages and Associated BIL levels
 4. Schematic Connection of Windings including CTs, LTC, DETC, etc.
 5. Phasor Diagram
 6. Impedances at Base MVA and Voltage
 7. All possible tap positions with associated voltage and current (at given MVA)
 8. Weights and gallons of oil.
 9. Nitrogen system operating pressure and information
 10. CT locations with polarity shown.
 11. CT ratio charts with CT type, purpose if specific, tap ratings, Accuracy Class and Rating Factor.
 12. Serial Number and Date of Manufacture
 13. LTC Manufacturer and type (if applicable)
 14. Note that windings are copper

1.19 SHIPMENT

- A. The transformer core and coils shall be shipped upright, completely assembled in their tank and if not in oil, dry air with dew point -60°F or lower at atmospheric pressure. The dry air must meet the requirements of less than 0.5% by volume of impurities and less than 0.03 percent by weight of moisture.
- B. Two 3-way digital impact recorders shall be utilized for shipment – rail or truck. Both Buyer and Engineer shall be provided internet access to the information sent out by these recorders, and shall be notified immediately upon impact recorder activation via email. If the recorder registers an event or there is visual evidence of damage the Seller shall perform an SFRA test and inspection prior to unloading.
- C. Seller is to arrange for loading/unloading of transformer to the foundation pad.
- D. Seller shall coordinate shipping date with Buyer to ensure pads are ready and substation site is attended.
- E. The transformer exterior finish must be protected during shipment using a tarp or other protective wrap.

1.20 ERECTION

- A. Services of an erecting engineer shall be provided by Seller to erect and prepare the transformer for service.
- B. Seller shall provide labor, tools, material and equipment for erection, necessary warranty testing and preparation of transformer for service.
- C. Seller's erecting engineer shall check transformer thoroughly for gas and oil leaks, proper and adequate assembly of radiators, bushings and other components.

1.21 FIELD ACCEPTANCE TESTS

- A. Seller is required to perform the following field acceptance tests on the transformer:

- 1. Power factor test.
 - a. Winding Insulation
 - b. Bushings with capacitance taps
- 2. Turns ratio test (All tap positions)
- 3. Oil tests as follows:
 - a. Color number (D1500)
 - b. Dielectric breakdown (D877)
 - c. Moisture content (D1533)
 - d. Interfacial tension (D971)
 - e. Acid (neutralization) number (D974)
 - f. Gas-in-Oil Analysis
 - g. Power factor @ 25° C (D924)
- 4. Current Transformers as follows:
 - a. Ratio
 - b. Polarity
 - c. Insulation tests at 1,000 volts
 - d. Saturation
- 5. SFRA (tested at same tap as factory test)

NOTE: It is recommend that the final test be a TTR test at the tap positions intended for initial operation. Please consult Buyer for these taps and have Buyer witness these results.

- B. The following field tests are to be accomplished on the LTC unit (if applicable):

- 1. Oil Test as follows:
 - a. Power Factor, 60 hertz @ 25° C.
 - b. Dielectric breakdown
 - c. Moisture content
 - d. Interfacial tension
 - e. Acid number

- C. Reports of all Field Acceptance Tests shall be provided to Buyer and Engineer no later than one week after such tests are performed. **A letter from the Seller stating that the transformer is approved for energization must also be included with this report.** Delivery via email is acceptable since manuals have already been prepared and delivered by this time.

1.22 SPARE PARTS LIST

- A. Seller shall furnish a list of spare parts with each transformer supplied. This list shall include the following information:
1. Bushing-High Voltage, Low Voltage and Neutral: catalog number.
 2. Cooling equipment: Complete ordering information to include motor H.P., voltage, phase and RPM, diameter of blade and capacity in CFM. Include model number and catalog number where applicable.
 3. LTC Equipment (if applicable): Complete ordering information to include part description and catalog number for all moving parts, bearing supports and stationary and moving contacts.
 4. Station Arresters: Complete ordering information to include Seller, class, voltage, and catalog number.
- B. The distribution of this list shall be the same as required for final as-built drawings.

SECTION 5 – BID FORM

1.01 BIDDER

A. This Bid is hereby submitted by: _____ (Seller)

1.02 BID PRICE

- A. Buyer will award purchase order for either Bid Item A or Bid Item B, but not both.
B. Seller shall perform Work for the following price(s):

Goods	Total Price
BID ITEM A: One 69-13.2kV 18/24/30//33.6 MVA power transformer <u>without</u> LTC	\$
BID ITEM B: One 69-13.2kV 18/24/30//33.6 MVA power transformer <u>with</u> LTC	\$

- C. "Total Price" quoted above **shall include:**
1. Freight (allowed and pre-paid FOB Destination), offloading onto Buyer's concrete foundation, assembly on pad with provision of field services by Seller's field service engineer, testing, and certification that Goods are ready for energizing
 2. 5-year warranty on Goods
 3. One spare high voltage bushing
 4. One spare low voltage bushing
 5. One spare set of gaskets for cover, case, manhole and handhole

1.03 BID PRICE DETAILS

- A. Has Seller included freight and offloading in the Total Price? (*circle answer*) **YES** **NO**
- B. Has Seller included required spare parts in the Total Price? (*circle answer*) **YES** **NO**

1.04 WARRANTY

Buyer requests 5-year warranty on Goods, which shall be included in the Bid Price. If Seller includes alternate warranty period in Total Price, Seller shall state here the additional cost to provide a 5-year warranty.

- A. Seller's proposed warranty period: _____ (*Attach detail of warranty*).
- B. Adder for 5-year warranty (*if not included in base bid*): _____.

1.05 PAYMENT TERMS FOR EVALUATION PURPOSES

Buyer requests payment terms of 90/10, Net 30, per Section 3 - Terms and Conditions. Seller's proposal shall state whether these terms are accepted or whether the proposal is based on alternate payment terms. For bid evaluation purposes, if Seller proposes alternate payment terms, the time value of money (3%) calculation will be factored into the evaluated cost of Goods.

A. Seller's proposed payment terms: _____.

1.06 DELIVERY OF GOODS AND SUBMITTAL OF DRAWINGS

Buyer requests submittal of drawings for approval within **10 weeks** and delivery of Goods by **December 31, 2021**. Seller agrees to the following delivery schedule:

	Drawings for Approval	Delivery of Goods
Bid Item A:		
Bid Item B:		

1.07 GUARANTEES: TRANSFORMER GUARANTEED PERFORMANCE

A. All bids will be evaluated on the same basis as far as is possible. Losses will be capitalized. The total losses quoted (load + no load) shall be considered guaranteed maximum values. If the test values exceed those quoted, a penalty equal to the difference between the values times the applicable \$ per kW capitalized costs given above shall be invoked. No adjustment shall be made for losses better than guaranteed maximums. For bid comparison, losses will be evaluated on the following basis:

- Load Losses \$7,660 per kW
- No-Load Losses \$13,505 per kW
- Auxiliary Losses \$1,500 per kW

1. **BID ITEM A** - Seller's maximum losses when transformer is operated at rated voltage and frequency and at 20° C ambient temperature:

- No load losses: _____ (kW)
- Load losses (at base MVA rating) _____ (kW) @ _____
 - Rated average winding temperature rise by resistance, plus 20° C
- Auxiliary Load: _____ (kW)

2. **BID ITEM B** - Seller's maximum losses when transformer is operated at rated voltage and frequency and at 20° C ambient temperature:

- No load losses: _____ (kW)
- Load losses (at base MVA rating) _____ (kW) @ _____
 - Rated average winding temperature rise by resistance, plus 20° C
- Auxiliary Load: _____ (kW)

1.08 BID ITEM A DETAILS – 69-13.2KV TRANSFORMER WITHOUT LTC

- A. Name of manufacturer: _____
- B. Location of manufacturing facility: _____
- C. Method of shipment (Truck/Rail/Other): _____
- D. Parts removed for shipment: _____
- E. Ship oil, nitrogen, or dry air filled: _____
- F. Weight/Mass:

Total Weight	Shipping Weight	Weight of core and coils	Weight of tank and fittings

1.09 BID ITEM B DETAILS – 69-13.2KV TRANSFORMER WITH LTC

- A. Name of manufacturer: _____
- B. Location of manufacturing facility: _____
- C. LTC type, make and model: _____
- D. Is LTC: FCBN or RCBN: _____
- E. Method of shipment (Truck/Rail/Other): _____
- F. Parts removed for shipment: _____
- G. Ship oil, nitrogen, or dry air filled: _____
- H. Weight/Mass:

Total Weight	Shipping Weight	Weight of core and coils	Weight of tank and fittings

1.10 LIST OF EXCEPTIONS AND CLARIFICATIONS

_____ (Attach additional sheets as necessary)

1.11 ACKNOWLEDGEMENTS

- A. By submitting this proposal, Seller:
 - 1. Acknowledges receipt of addenda as follows: _____
 - 2. Acknowledges and accepts the terms of liquidated damages as outlined in Section 3 - Terms and Conditions, or has included in Paragraph 1.10 above proposed exceptions to the liquidated damages for Buyer's consideration.

1.12 SELLER’S ATTACHMENTS TO BID

- A. Provide outline drawing of transformer.
- B. Provide certification of insurance with proposed limits.
- C. Provide completed ANSI Transformer Specification Form (attached).
- D. Seller's proposal shall be complete including a detailed description of the electrical and mechanical design features and a detailed description of all accessories, including:
 - 1. Transformer tank and radiators
 - 2. Transformer core and coils
 - 3. High and low voltage tap changers
 - 4. Bushings
 - 5. Bushings current transformers
 - 6. Transformer oil and oil preservation equipment
 - 7. Temperature indicating and control equipment
 - 8. Liquid level indicating and alarm equipment
 - 9. Pressure relief device
 - 10. Forced cooling equipment including description
 - 11. Lightning arresters
 - 12. Bushing stud sizes and threads per inch
 - 13. Load tap changing mechanism (if applicable)
 - 14. Load tap changing inspection & maintenance (if applicable)

1.13 BIDDER (SELLER) INFORMATION

Provide the contact information and details to where a purchase order should be issued:

Company	
Name/ Phone/ Email	
Address	
Date Submitted	

BID ITEM A - ANSI TRANSFORMER SPECIFICATION FORM

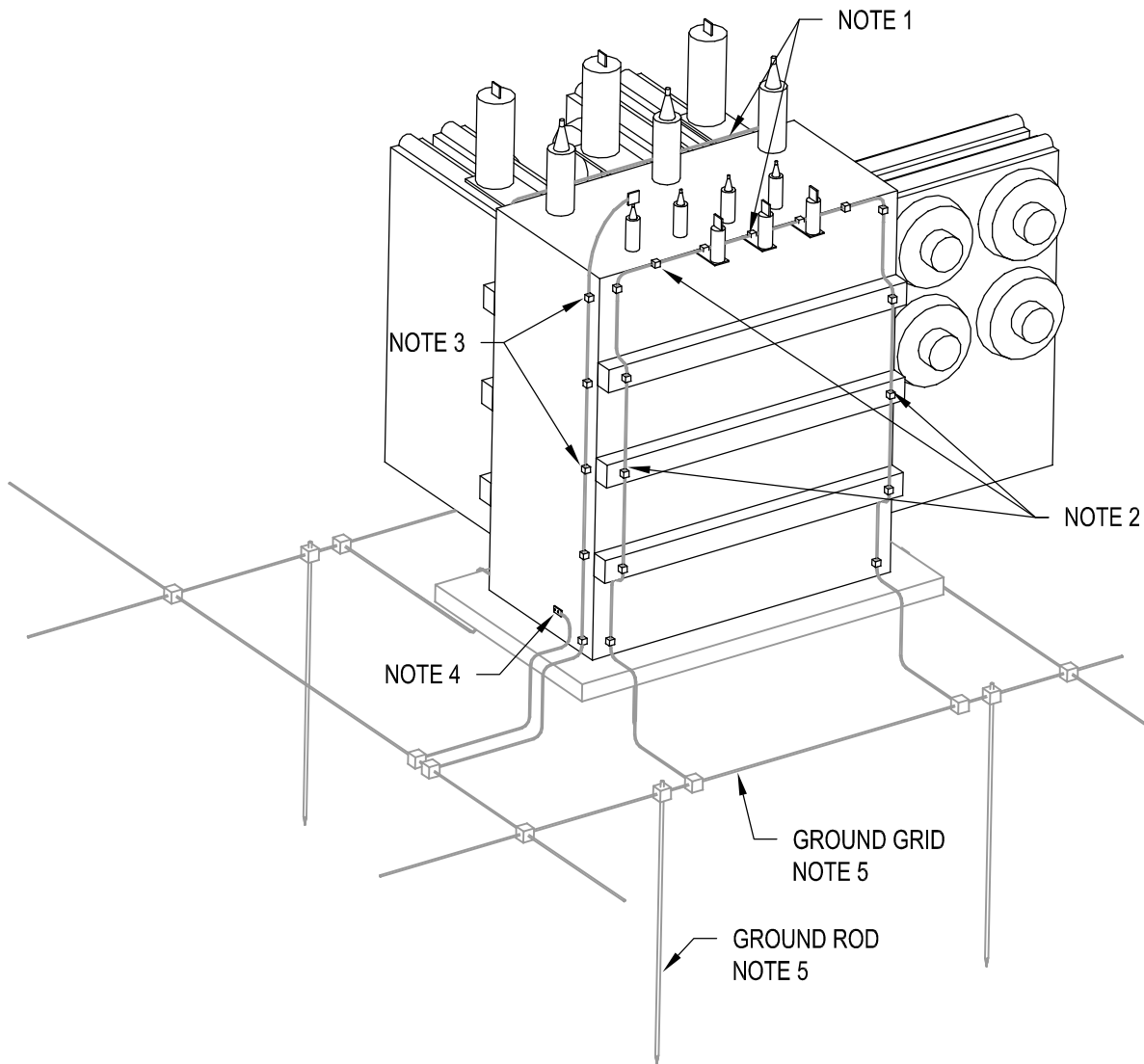
RATING							
Type		Class	H Winding	X Winding	Y Winding		
Phase			V	V	V		
Hertz			kVA	kVA	kVA		
Temp Rise			kVA	kVA	kVA		
Insul Liquid			kVA	kVA	kVA		
ADDITIONAL TAP VOLTAGES							
H Winding							
X Winding							
CONNECTIONS FOR OPERATION							
Transformers in Bank	To Transformer From	Phase	Connected	To Transformer From	Phase	Connected	
PERFORMANCE BASED ON A LOADING OF		DIELECTRIC TESTS			INSULATION LEVELS		
					ITEMS	Basic Lightning Impulse Insulation Level	Low Frequency Voltage Insulation Level
H Winding		Applied Voltage (To other windings and ground)	H Winding	kV	H Line		
X Winding			X Winding	kV	H neutral		
Y Winding	kV kVA		Y Winding	kV	X line		
		Induced Voltage	Line to Line	kV	X neutral		
			Line to Ground	kV	Y line		
PERFORMANCE DATA, Based on _____ degrees C reference temperature							
Losses and Exciting Current				Regulation*			
Excitation	% Ex. 1	No Load	Total Loss	Power Factor	% Regulation		
100 %				1.0			
110 %				0.8			
AUXILIARY LOSSES*					MECHANICAL DATA		
Transformer kVA	Class	Watts Aux Loss			Outline Dwg No.		
	W				Dimensions (Approximate) Ft (m)		
	W				Height		
	W				Width		
Average Sound Level					Depth		
PERCENT IMPEDANCE VOLTS					Height over Cover		
% IZ	B/W Windings	At kVA	% IZ	B/W Windings	At kVA	Untanking (plus slings)	
	H-X					Masses (Approximate) pound (kg)	
	H-Y					Core and Coils	
	X-Y					Tank and Fittings	
EFFICIENCIES*					Liquid ___ Gallons (m ³)		
Load		Full Load	3/4 Load	1/2 Load	1/4 Load	Total Mass	
%						Shipping Mass lb (kg)	
						Shipped lb (kg)	

BID ITEM B - ANSI TRANSFORMER SPECIFICATION FORM

RATING							
Type		Class	H Winding	X Winding	Y Winding		
Phase			V	V	V		
Hertz			kVA	kVA	kVA		
Temp Rise			kVA	kVA	kVA		
Insul Liquid			kVA	kVA	kVA		
ADDITIONAL TAP VOLTAGES							
H Winding							
X Winding							
CONNECTIONS FOR OPERATION							
Transformers in Bank	To Transformer From	Phase	Connected	To Transformer From	Phase	Connected	
PERFORMANCE BASED ON A LOADING OF		DIELECTRIC TESTS			INSULATION LEVELS		
					ITEMS	Basic Lightning Impulse Insulation Level	Low Frequency Voltage Insulation Level
H Winding		Applied Voltage (To other windings and ground)	H Winding	kV	H Line		
X Winding			X Winding	kV	H neutral		
Y Winding	kV kVA		Y Winding	kV	X line		
		Induced Voltage	Line to Line	kV	X neutral		
			Line to Ground	kV	Y line		
PERFORMANCE DATA, Based on _____ degrees C reference temperature							
Losses and Exciting Current				Regulation*			
Excitation	% Ex. 1	No Load	Total Loss	Power Factor	% Regulation		
100 %				1.0			
110 %				0.8			
AUXILIARY LOSSES*					MECHANICAL DATA		
Transformer kVA	Class	Watts Aux Loss			Outline Dwg No.		
	W				Dimensions (Approximate) Ft (m)		
	W				Height		
	W				Width		
Average Sound Level					Depth		
PERCENT IMPEDANCE VOLTS					Height over Cover		
% IZ	B/W Windings	At kVA	% IZ	B/W Windings	At kVA	Untanking (plus slings)	
	H-X					Masses (Approximate) pound (kg)	
	H-Y					Core and Coils	
	X-Y					Tank and Fittings	
EFFICIENCIES*					Liquid ___ Gallons (m ³)		
Load		Full Load	3/4 Load	1/2 Load	1/4 Load	Total Mass	
%						Shipping Mass lb (kg)	
						Shipped lb (kg)	

EXHIBIT A

Power Transformer Tank, Arrestor, and Neutral Grounding Details



NOTES:

1. PROVIDE BRONZE GROUNDING CONDUCTOR CLAMPS FOR TWO 4/0 STR CU AND PROVISIONS FOR ATTACHING CONDUCTOR CLAMPS TO ARRESTOR BRACKETS.
2. PROVIDE BRONZE GROUNDING CONDUCTOR CLAMPS AND PROVISIONS FOR ATTACHING THE CLAMPS TO THE TRANSFORMER TANK ON BOTH THE "H" AND "X" SIDES OF THE TRANSFORMER, TO PROVIDE A CONTINUOUS INSTALLATION OF GROUNDING CONDUCTOR FROM THE GROUND GRID, UP AND ACROSS TRANSFORMER TANK , AND BACK DOWN TO THE GROUND GRID.
3. PROVIDE BRONZE GROUNDING CONDUCTOR CLAMPS FOR 500 MCM STR CU AND PROVISIONS FOR MOUNTING CONDUCTOR CLAMPS TO SIDE OF TRANSFORMER TANK NEAREST TO NEUTRAL BUSHING TO PROVIDE A CONTINUOUS INSTALLATION OF GROUNDING CONDUCTOR FROM GROUND GRID TO NEUTRAL BUSHING.
4. PROVIDE 2 COPPER FACED 2 HOLE NEMA SPACED GROUNDING PADS ON OPPOSITE DIAGONAL CORNERS OF TRANSFORMER TANK FOR TANK GROUNDING. BRONZE CONDUCTOR TERMINALS BY OTHERS.
5. ALL GROUNDING CONDUCTOR, BELOW GRADE GROUNDING CONNECTORS, AND GROUND RODS BY OTHERS.

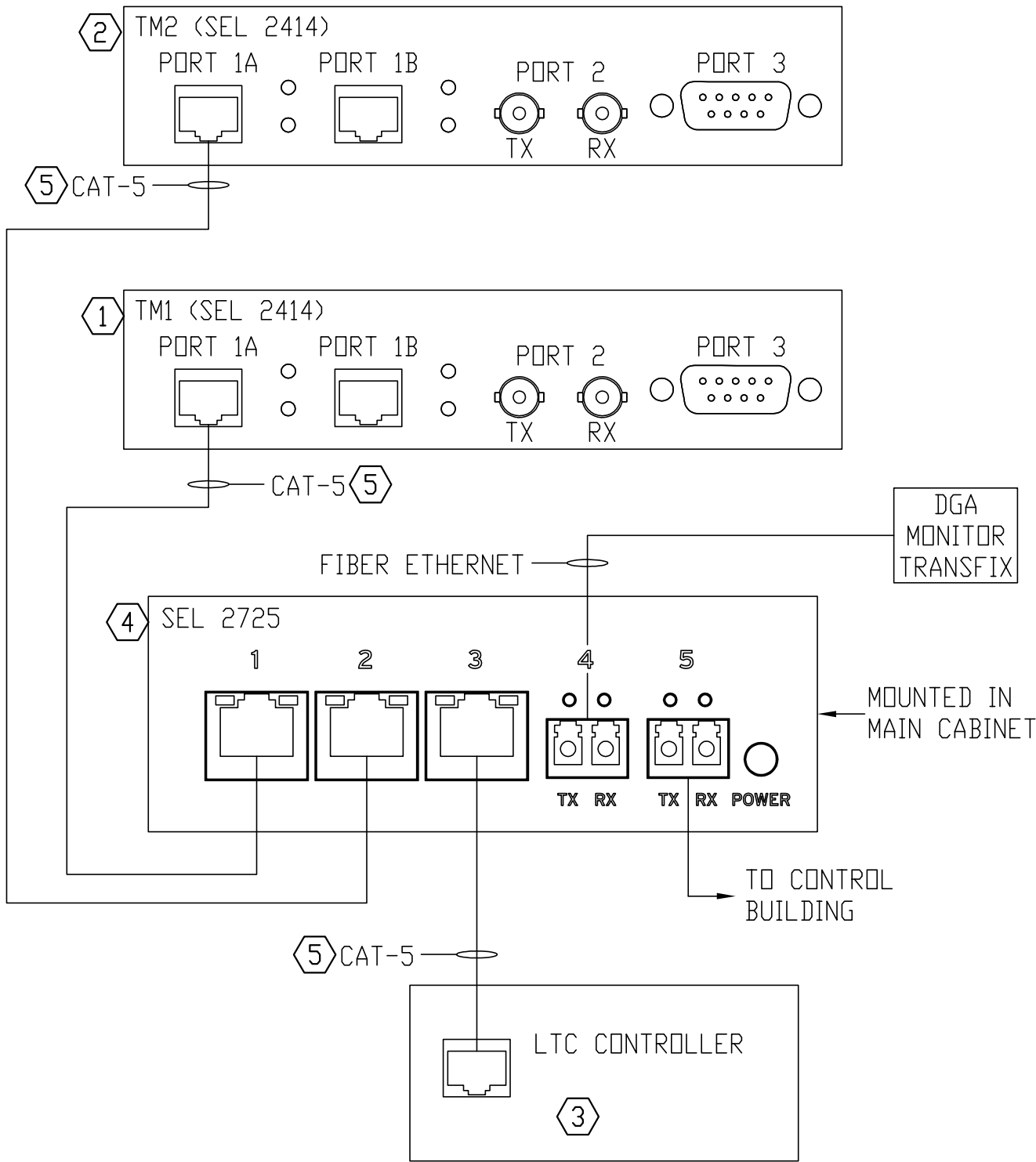


**POWER TRANSFORMER
TANK, ARRESTOR, AND NEUTRAL GROUNDING**

SCALE: NONE	
DWN: EED	CKD: PAH
DATE: 08-17-15	
DRAWING NO.	REV.
STD0008	0

EXHIBIT B

Power Transformer Communication



BOM#	DESCRIPTION	MANUFACTURER	PART#
1	TRANSFORMER MONITOR (TM1)	SCHWEITZER	SEL-2414, 241421A3A9X3A3A0630 KEY: 0701
2	TRANSFORMER MONITOR (TM2)	SCHWEITZER	SEL-2414, 241421A3A2X3A5X0630 KEY: 1004
3	LTC CONTROLLER	PER CONTRACT DOCUMENT	
4	ETHERNET SWITCH	SCHWEITZER	SEL-2725, 2725#0201 (2725D22X0)
5	ETHERNET CABLE	SCHWEITZER	CA605 OR EQUIVALENT

STD009-7 PWR TRF COMMUNICATION.DWG



POWER TRANSFORMER COMMUNICATION

SCALE: NONE	
DWN: EED	CKD: PAH
DATE: 04-01-21	
DRAWING NO.	REV.
STD0009-7	0

EXHIBIT C

Transformer Monitor Input Map

TRANSFORMER MONITORS INPUT MAP

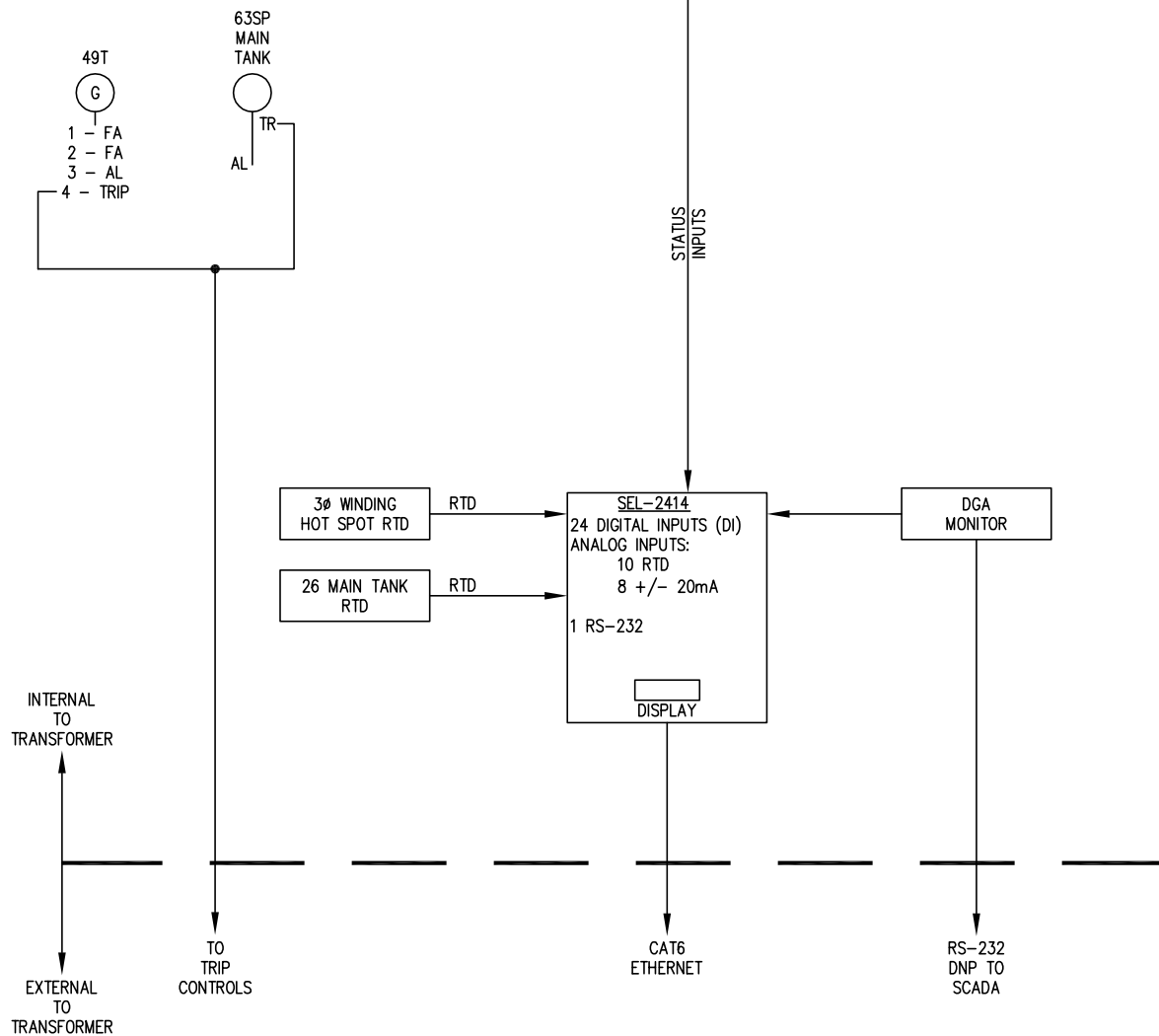
TRANSFORMER MONITOR #1				
STATUS INPUTS	OIL LEVEL MAIN TANK	TM-1	SEL-2414	IN301
	OIL LEVEL LTC TANK	TM-1	SEL-2414	IN302
	PRESSURE RELIEF DEVICE MAIN	TM-1	SEL-2414	IN303
	PRESSURE RELIEF DEVICE LTC	TM-1	SEL-2414	IN304
	INERT-AIR SYSTEM HP	TM-1	SEL-2414	IN305
	INERT-AIR SYSTEM LP	TM-1	SEL-2414	IN306
	INERT-AIR SYSTEM EC	TM-1	SEL-2414	IN307
	63 SEAL IN RELAY MAIN TANK	TM-1	SEL-2414	IN308
	63 SEAL IN RELAY LTC TANK	TM-1	SEL-2414	IN501
	LIQUID TEMP. MAIN TANK 95°C	TM-1	SEL-2414	IN502
	LIQUID TEMP. LTC TANK 95°C	TM-1	SEL-2414	IN503
	WINDING TEMP. ALARM 105°C	TM-1	SEL-2414	IN504
	SPARE	TM-1	SEL-2414	IN505
	SPARE	TM-1	SEL-2414	IN506
	SPARE	TM-1	SEL-2414	IN507
	FAN BANK STATUS #1	TM-1	SEL-2414	IN601
	FAN BANK STATUS #2	TM-1	SEL-2414	IN602
	FAN STAGE #1 OVERLOAD STATUS	TM-1	SEL-2414	IN603
	FAN STAGE #2 OVERLOAD STATUS	TM-1	SEL-2414	IN604
	43-1 AUTO STAGE 1 COOLING	TM-1	SEL-2414	IN605
	43-1 MANUAL STAGE 1 COOLING	TM-1	SEL-2414	IN606
	43-2 AUTO STAGE 2 COOLING	TM-1	SEL-2414	IN607
	43-2 MANUAL STAGE 2 COOLING	TM-1	SEL-2414	IN608
ANALOG INPUTS / RTD	A PH WINDING TEMP (IF RTD)	TM-1	SEL-2414	INTRTD01
	B PH WINDING TEMP (IF RTD)	TM-1	SEL-2414	INTRTD02
	C PH WINDING TEMP (IF RTD)	TM-1	SEL-2414	INTRTD03
	MAIN TANK OIL TEMP	TM-1	SEL-2414	INTRTD04
	LTC TANK OIL TEMP	TM-1	SEL-2414	INTRTD05
TRANSFORMER MONITOR #2				
STATUS INPUTS	LOSS AC	TM-2	SEL-2414	IN301
	LOSS OF POWER IN STAGE #1	TM-2	SEL-2414	IN302
	LOSS OF POWER IN STAGE #2	TM-2	SEL-2414	IN303
	LOSS OF POWER IN COOLING CONTROL	TM-2	SEL-2414	IN304
	LOSS OF DC	TM-2	SEL-2414	IN306
	LTC IN LOCAL (43L)	TM-2	SEL-2414	IN307
	LTC IN REMOTE (43R)	TM-2	SEL-2414	IN308
	43AUTO	TM-2	SEL-2414	IN501
	LTC FAILURE	TM-2	SEL-2414	IN502
	LTC TAP CNTLR SELF TEST	TM-2	SEL-2414	IN503
	LTC ALM	TM-2	SEL-2414	IN504
	BACKUP LTC TAP CNTLR ALARM	TM-2	SEL-2414	IN505
	LTC LOWER LIMIT	TM-2	SEL-2414	IN506
	LTC MAX RAISE LIMIT	TM-2	SEL-2414	IN507
	LTC ON POSITION	TM-2	SEL-2414	IN508
	LTC HUNG UP ALARM	TM-2	SEL-2414	IN401
TAPCON IN MANUAL	TM-2	SEL-2414	IN402	
TAPCON IN AUTO	TM-2	SEL-2414	IN403	
ANALOG INPUTS / RTD	A PH WINDING TEMP (IF ANALOG IN)	TM-2	SEL-2414	AI601
	B PH WINDING TEMP (IF ANALOG IN)	TM-2	SEL-2414	AI602
	C PH WINDING TEMP (IF ANALOG IN)	TM-2	SEL-2414	AI603

EXHIBIT D

Standard Transformer Information System (Non-LTC)

BID ITEM A ONLY

OIL LEVEL-MAIN TANK PRESSURE RELIEF DEVICE-MAIN TANK PRESERVATION SYSTEM-HP PRESERVATION SYSTEM-LP PRESERVATION SYSTEM-EC	63SP SEAL IN RELAY-MAIN TANK LIQUID TEMP. ALARM-MAIN TANK WINDING TEMP. ALARM DGA HIGH ALARM DGA MOISTURE HIGH DGA SYSTEM ALARM	FAN STAGE #1 RUNNING FAN STAGE #2 RUNNING FAN STAGE #1 OVERLOAD FAN STAGE #2 OVERLOAD FAN STAGE #1 AUTO FAN STAGE #1 MANUAL FAN STAGE #2 AUTO FAN STAGE #2 MANUAL	LOSS OF MAIN AC LOSS OF POWER IN FAN STAGE #1 LOSS OF POWER IN FAN STAGE #2 LOSS OF POWER IN COOLING CONTROL LOSS OF DC
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NOTES:

1. TRIP CONTACTS TO BE WIRED TO TERMINAL BLOCKS.
2. AUTOMATIC FAN CONTROL TO BE CONTROLLED BY 49T DEVICE DIRECTLY.

STD005-3- LTC TRF INFO SYSTEM-NO LTC.DWG



TRANSFORMER INFORMATION SYSTEM
NO LTC

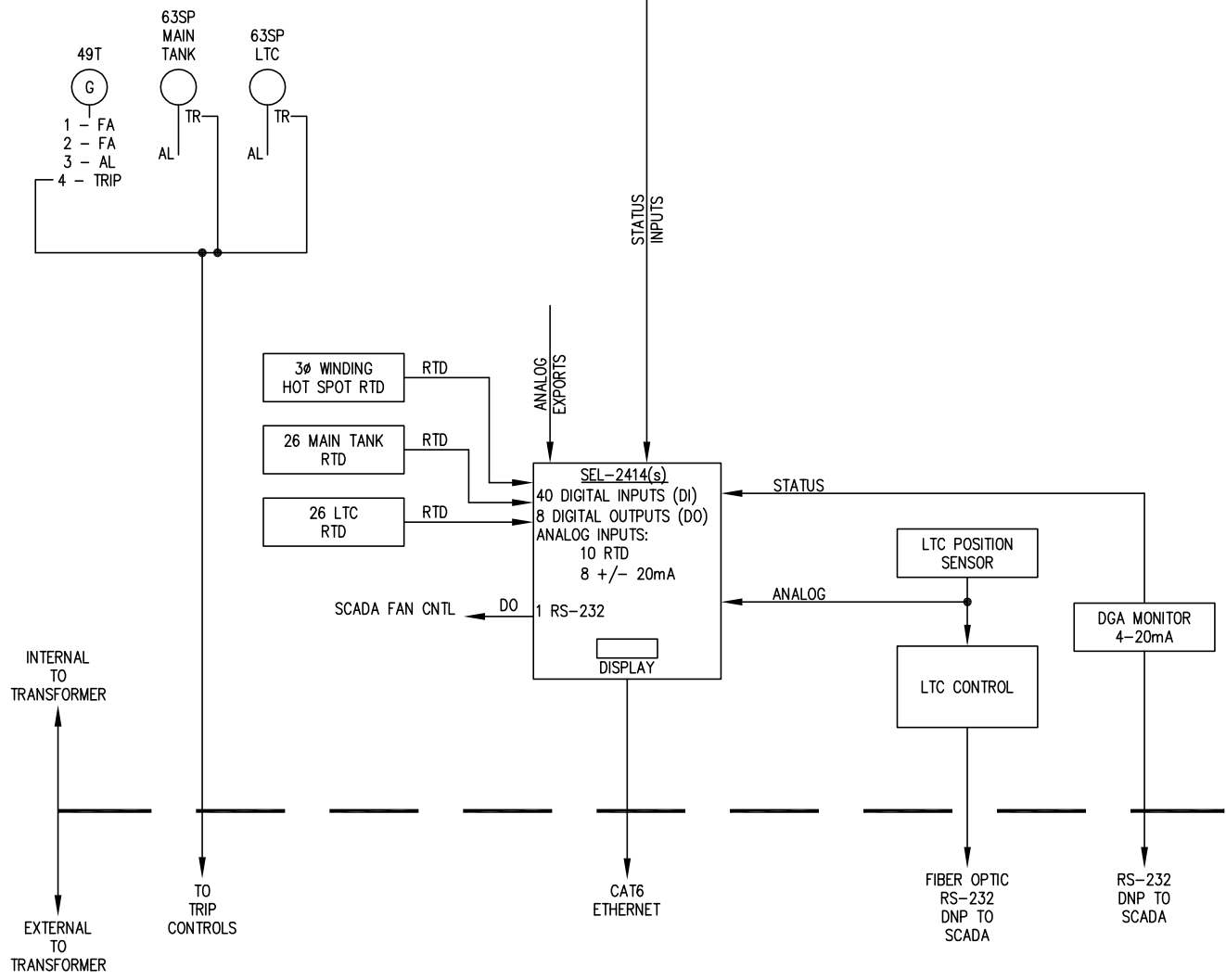
SCALE: NONE	
DWN: EED	CKD: PAH
DATE: 04-01-21	
DRAWING NO.	REV.
STD0005-3	0

EXHIBIT E

Standard Transformer Information System (LTC)

BID ITEM B ONLY

OIL LEVEL-MAIN TANK OIL LEVEL-LTC TANK PRESSURE RELIEF DEVICE-MAIN TANK PRESSURE RELIEF DEVICE-LTC TANK PRESERVATION SYSTEM-HP PRESERVATION SYSTEM-LP PRESERVATION SYSTEM-EC	63SP SEAL IN RELAY-MAIN TANK 63SP SEAL IN RELAY-LTC TANK LIQUID TEMP. ALARM-MAIN TANK LIQUID TEMP. ALARM-LTC TANK WINDING TEMP. ALARM DGA HIGH ALARM DGA MOISTURE HIGH DGA SYSTEM ALARM	FAN STAGE #1 RUNNING FAN STAGE #2 RUNNING FAN STAGE #1 OVERLOAD FAN STAGE #2 OVERLOAD FAN STAGE #1 AUTO FAN STAGE #1 MANUAL FAN STAGE #2 AUTO FAN STAGE #2 MANUAL	LOSS OF MAIN AC LOSS OF POWER IN FAN STAGE #1 LOSS OF POWER IN FAN STAGE #2 LOSS OF POWER IN COOLING CONTROL LOSS OF POWER IN LTC	LTC IN LOCAL (SW POS) LTC IN REMOTE (SW POS) LTC IN AUTO (SW POS) LTC FAILURE LTC CNTLR SELF TEST ALARM BACKUP LTC TAP CNTLR ALARM LTC LOWER LIMIT LTC MAX RAISE LIMIT LTC ON POSITION LTC HUNG UP ALARM
--	--	--	---	---



NOTES:

1. TRIP CONTACTS TO BE WIRED TO TERMINAL BLOCKS.
2. AUTOMATIC FAN CONTROL TO BE CONTROLLED BY 49T DEVICE DIRECTLY.
3. LTC POSITION TO BE ANALOG OUTPUT FROM LTC CONTROL OR OTHER INDICATING DEVICE



LTC TRANSFORMER INFORMATION SYSTEM

SCALE: NONE	
DWN: EED	CKD: PAH
DATE: 04-01-21	
DRAWING NO.	REV.
STD005-4	0

STD005-4 LTC TRF INFO SYSTEM.DWG

IRAN DIVESTMENT ACT NOTICE

Tenn. Code Ann. § 12-12-106 requires the chief procurement officer to publish, using credible information freely available to the public, a list of persons it determines engage in investment activities in Iran, as described in § 12-12-105.

For these purposes, the State intends to use the attached list of “Entities determined to be non-responsive bidders/offerers pursuant to the New York State Iran Divestment Act of 2012.”

While inclusion on this list would make a person ineligible to contract with the state of Tennessee, if a person ceases its engagement in investment activities in Iran, it may be removed from the list.

If you feel as though you have been erroneously included on this list please contact the Central Procurement Office at CPO.Website@tn.gov.

List Date: April 15, 2020

Source: <https://www.ogs.ny.gov/iran-divestment-act-2012>

1. Ak Makina, Ltd.
2. Amona
3. Bank Markazi Iran (Central Bank of Iran)
4. Bank Mellat
5. Bank Melli Iran
6. Bank Saderat Iran
7. Bank Sepah
8. Bank Tejarat
9. China Precision Machinery Import- Export Corporation (CPMIEC)
10. ChinaOil (China National United Oil Corporation)
11. China National Offshore Oil Corporation (CNOOC)
12. China National Petroleum Corporation (CNPC)
13. Indian Oil Corporation
14. Kingdream PLC
15. Naftiran Intertrade Co. (NICO)
16. National Iranian Tanker Co. (NITC)
17. Oil and Natural Gas Corporation (ONGC)
18. Oil India, Ltd.
19. Persia International Bank
20. Petroleos de Venezuela (PDVSA Petróleo, SA)
21. PetroChina Co., Ltd.
22. Petronet LNG, Ltd.
23. Sameh Afzar Tajak Co. (SATCO)
24. Shandong FIN CNC Machine Co., Ltd.
25. Sinohydro Co., Ltd.
26. Sinopec Corp. (China Petroleum & Chemical Corporation)
27. SKS Ventures
28. SK Energy Co., Ltd.
29. Som Petrol AS
30. Unipecc (China International United Petroleum & Chemicals Co., Ltd.)
31. Zhuhai Zhenrong Co.

IRAN DIVESTMENT ACT

“By the submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not a person included within the list created pursuant to § 12-12-106.”

Signature: _____

Date: _____

Title: _____