

CITY OF NORTH LITTLE ROCK, ARKANSAS
COMMERCE DEPARTMENT
Mary Beth Bowman, Director
Amy Smith, Assistant Director for Procurement
Crystal Willis, Assistant Purchasing Agent/Admin Sect.



120 Main Street, North Little Rock, AR 72114
P.O. Box 5757 North Little Rock, AR 72119
501-975-8881 Phone
501-975-8885 Fax

INVITATION TO BID

Bid Number: 16-3379 Date Issued: February 22, 2016

Date & Time Bid Opening: Tuesday, March 8, 2016 @ 2:00 pm

Power Transformer for McCain Substation Expansion

(1) 115/13.8kV 30/40/50//56 MVA, LTC Power Transformer:

\$ _____

For technical questions and/or comments, contact Eric Heinrichs, P.E. at 501-992-4086.

If you are obtaining this bid from our website, please be reminded that addendums may occur. It is therefore advisable that you review our listings for attachments including any changes to the bid.

The City of North Little Rock encourages participation of small, minority, and woman own business enterprises in the procurement of goods, services, professional services, and construction, either as a general contractor or sub-contractor. It is further requested that whenever possible, majority contractors who require sub-contractors, seek qualified small, minority, and woman businesses to partner with them.

EXECUTION OF BID

Upon signing this page, the organization certifies that they have read and agree to the requirements set forth in this bid including conditions set forth and pertinent information requests.

Name of Firm: _____ Phone No.: _____

Tax Identification No.: _____

Business Address: _____

Signature of Authorized Person: _____

Title: _____ Date: _____

UNSIGNED BID COVER SHEET WILL BE REJECTED.

**TERMS AND STANDARD CONDITIONS
CITY OF NORTH LITTLE ROCK, ARKANSAS**

PLEASE READ CAREFULLY

1. When submitting an "Invitation to Bid," the bidder warrants that the commodities covered by the bid shall be free from defects in material and workmanship under normal use and service. In addition, bidder must deliver new commodities of the latest design and model, unless otherwise specified in the "Invitation to Bid."
2. Prices quoted are to be net process, and when an error is made in extending total prices, the City may accept the bid for the lesser amount whether reflected by extension or by the correct multiple of the unit price.
3. Discounts offered will be taken when the City qualifies for such. The beginning date for computing discounts will be the date of invoice or the date of delivery and acceptance, whichever is later.
4. When bidding other than the brand and/or model specified in the "Invitation to Bid," the brand and/or model number must be stated by that item in the "Invitation to Bid," and descriptive literature be submitted with the bid.
5. The City reserves the right to reject any and all bids.
6. The Purchasing office reserves the right to award items, all or none, or by line item(s).
7. Quality, time and probability of performance may be factors in making an award.
8. Bid quotes submitted will remain firm for 30 calendar days from bid opening date; however, the prices may remain firm for a longer period of time if mutually agreeable between bidder and the Department of Commerce and Governmental Relations.
9. Bidder must submit a completed signed copy of the front page of the "Invitation to Bid" and must submit any other information required in the "Invitation to Bid."
10. In the event a contract is entered into pursuant to the "Invitation to Bid," the bidder shall not discriminate against any qualified employee or qualified applicant for employment because of race, sex, color, creed, national origin or ancestry. The bidder must include in any and all subcontracts a provision similar to the above.
11. Sales or use tax is not to be included in the bid price, but is to be added by the vendor to the invoice billing to the City. Although use tax is not to be included in this bid, vendors are to register and pay tax direct to the Arkansas State Revenue Department.
12. Prices quoted shall be "Free on Board" (F.O.B.) to destination at designated facility in North Little Rock. Charges may not be added after the bid is opened.
13. In the event of two or more identical low bids, the contract may be awarded arbitrarily or for any reason to any of such bidders or split in any proportion between them at the discretion of the Department of Commerce and Governmental Relations.
14. Specifications furnished with this Invitation are intended to establish a desired quality or performance level, or other minimum dimensions and capacities, which will provide the best product available at the lowest possible price. Other than designated brands and/or models approved as equal to designated products shall receive an equal consideration.
15. Samples of items when required, must be furnished free, and, if not called for within 30 days from date of bid opening, will become property of the City.
16. Bids will not be considered if they are: 1. Submitted after the bid's opening time. 2. Submitted electronically or faxed (unless authorized by Purchasing Agent).
17. Guarantees and warranties should be submitted with the bid, as they may be a consideration in making an award.
18. **CONSTRUCTION**
 - A. Contractor is to supply the City with evidence of having and maintaining proper and complete insurance, specifically Workman's Compensation Insurance in accordance with the laws of the State of Arkansas, Public Liability and Property Damage. All premiums and cost shall be paid by the Contractor. In no way will the City be responsible in case of accident.
 - B. When noted, a Certified check or bid bond in the amount of 5% of total bid shall accompany bid.
 - C. A Performance Bond equaling the total amount of any bid exceeding \$10,000.00 must be provided for any contract for the repair, alteration or erection of any public building, public structure or public improvement (pursuant to Act 351 or 1953 as amended by Act 539 of 1979).
19. **LIQUIDATED DAMAGES** - Liquidated damages shall be assessed beginning on the first day following the maximum delivery or completion time entered on this bid form and/or provided for by the plans and specifications.
20. **AMBIGUITY IN BID** - Any ambiguity in any bid as the result of omission, error, lack of clarity or non-compliance by the bidder with specifications, instructions, and all conditions of bidding shall be construed in the light most favorable to the City.
21. The bid number should be stated on the face of the sealed bid envelope. If it is not, the envelope will have to be opened to identify.
22. Whenever a bid is sought seeking a source of supply for a specified period of time for materials and services, the quantities of usage shown are estimated ONLY. No guarantee or warranty is given or implied by the participants as to the total amount that may or may not be purchased from any resulting contracts. These quantities are for the bidders information ONLY and will be used for tabulation and presentation of bid and the participant reserves the right to increase or decrease quantities as required.
23. The City of North Little Rock reserves the right to reject any and all bids, to accept in whole or in part, to waive any informalities in bids received, to accept bids on materials or equipment with variations from specifications in those cases where efficiency of operation will not be impaired, and unless otherwise specified by the bidder, to accept any item in the bid. If unit prices and extensions thereof do not coincide, the City of North Little Rock may accept the bid for the lesser amount whether reflected by the extension or by the correct multiple of the unit price.
24. Additional information or bid forms may be obtained from:
COMMERCE DEPARTMENT, 120 Main Street, P.O. Box 5757, North Little Rock, Arkansas 72119 (501) 975-8881 www.nlr.ar.gov

Bidding documents must be submitted on or before the bid's opening date and time. Unless noted, sealed bids must be submitted to the Commerce Department at 120 Main Street, North Little Rock, AR 72114 or PO Box 5757, North Little Rock, AR 72119

**INVITATION TO BIDDERS
POWER TRANSFORMER
NORTH LITTLE ROCK ELECTRIC DEPARTMENT**

Sealed proposals for one (1) Power Transformer for McCain Substation Expansion will be received by North Little Rock Electric Department at its offices in North Little Rock, Arkansas, until 2:00 PM on March 8, 2016. Proposals requested are for one (1) 115/13.8kV, 30/40/50//56 MVA, LTC Power Transformer.

Proposals will be received by:

Ms. Amy Smith
Commerce Department
North Little Rock Electric Department
120 Main Street
North Little Rock, AR 72114

North Little Rock Electric Department reserves the right to reject any or all bids, to waive any irregularities or technicalities therein and to award in the best interest of North Little Rock Electric Department.

No Bidder may withdraw a bid for a period of sixty (60) days after the date set for opening of bids.

INSTRUCTIONS TO BIDDERS

Each bidder will examine carefully all specifications to become familiar with all the requirements, terms, and conditions thereof. Any information relating to the work furnished by the Owner or others, or failure to make these examinations will in no way relieve any bidder from the responsibility of fulfilling all the terms of the contract, if awarded a contract.

The proposal shall provide for quotation of a price for one or more bid items, which may be lump sum bid prices, alternate bid prices, or a combination thereof and will include delivery times. No payment will be made for items not set up in the proposal, unless otherwise provided by contract amendment.

Bidder is cautioned to verify the completeness of this specification package.

Bids that are sent by U.S. Postal Service or private carrier will be clearly marked "BID ENVELOPE ENCLOSED". The bid will be sealed in a separate envelope and will have the following information shown on the outside of the envelope.

BID FOR:	Power Transformer for McCain Substation Expansion.
BID DUE:	2:00 P.M. March 8, 2016
OWNER:	North Little Rock Electric Department 1400 West Maryland Avenue P.O. Box 159 North Little Rock, Arkansas 72116

A copy of the sealed bids shall be sent to the Engineer at the address below.

The Engineer for this project is:	Fisher Arnold, Inc. 9180 Crestwyn Hills Drive Memphis, TN 38125
PHONE:	(901) 748-1811
FAX:	(901) 748-3115
CONTACT:	Marks Atkinson, PE Project Manager matkinson@fisherarnold.com

The Engineer will represent the Owner in all matters pertaining to this project, including, but not limited to, answering technical questions of prospective bidders, recommendation of awards, acceptance of shop drawings and similar documents, and approval of invoices prior to payment by the Owner.

Submit all questions about the specification to the Engineer in writing. Replies will be issued to all prospective bidders of record. Questions or clarifications will not be answered within five days of bid opening. Neither the Engineer nor the Owner will be responsible for oral clarifications.

Proposals from approved manufacturing plants not in the United States shall be evaluated using a 20% adder to the base price of the transformer.

Suppliers may in certain circumstances be allowed to submit a proposal prior to plant and process being approved by the Owner and/or Engineer. The Owner will, in this instance require an inspection of the facility proposed for construction of these transformers prior to acceptance of the proposal. **Any costs associated with the performance of this inspection will be included in the evaluated cost of the transformers.**

Bidder will insert the price for supplying one (1) 115/13.8kV, 30/40/50//56 MVA LTC transformer for McCain Substation Expansion, as detailed under the terms and conditions specified herein, in the Unit Price blank and in the Total Price blank of the "Supplier's Proposal" form. Bidder will supply all information requested in the blanks provided on the "Supplier's Proposal" form for the equipment.

Transformer Specification

1.0 Scope

- 1.1 The transformer will be designed, constructed, and tested in accordance with the latest revisions of all applicable IEEE, ANSI, and NEMA standards, except where specific requirements conflict with these standards. In such cases, these specifications will take precedence.
- 1.2 Quoting will be in accordance with this specification. Any exceptions will be clearly noted in the proposal.

2.0 Requirements

- 2.1 This specification includes the fabrication and delivery of one (1) three-phase power transformer to be installed outdoors at an approximate elevation of 260 feet above mean sea level and will be subject to a maximum ambient temperature of 43° C, a minimum ambient temperature of -18° C and a maximum 24-hour average ambient temperature of 37° C.
- 2.2 The Supplier will insert the price for supplying one (1) power transformer as specified herein and under the terms and conditions specified herein in the unit and total price blanks on the "Supplier's Proposal" form bound herein. The Supplier will supply all information requested in the blanks provided.
- 2.3 The Supplier will provide with his proposal, a minimum of two (2) copies of descriptive literature describing the proposed equipment. This literature will include, but is not limited to the following: typical dimensions and weight, approximate gallons of oil, any special installation requirements, external wiring requirements, and a typical instruction manual.
- 2.4 The total price will be firm if accepted by the Owner within sixty (60) days and will include the cost of delivery to McCain Substation in North Little Rock, Arkansas as specified in Section 8.0. The price will also include the cost of the Manufacturer's warranty described herein.
- 2.5 The Supplier will acknowledge in writing to the Engineer that the Owner's purchase order or acceptance has been received. The acknowledgment will include the date that the acceptance was received and the expected delivery date.

2.6 Drawing Approval

2.6.1 As soon as practical after receipt of the Owner's acceptance of the Supplier's Proposal, the Supplier shall submit, in AutoCAD 2013 DWG format, shop drawings of the specified equipment *to the Engineer*. The submittal will consist of, but is not limited to the following:

1. Outline Dimension Drawing with Weights
2. Schematics
3. Wiring Connection Diagrams
4. C.T. Data
5. Bushing Data / Drawings
6. Nameplate Drawing
7. Component Manufacturer and Part Number Information
8. Installation Instructions

2.6.2 If satisfactory, one electronic PDF copy will be returned to the Supplier marked as accepted and dated. If the shop drawings are not acceptable, one hard copy will be returned to the Supplier with the required corrections or changes marked. Supplier will resubmit shop drawings as specified above until accepted. Corrections or changes will not be considered as extra work.

2.6.3 Acceptance by the Engineer will be general only. Such acceptance will not relieve the Supplier of the responsibility for accuracy, proper fit, coordination of work, construction, or supply of materials specified but not on drawings. Any requests for modifications to the specification will be specifically called to the attention of the Engineer in writing. Shop drawings that are submitted for approvals do not constitute "in writing" unless any changes being requested on such drawings are specifically called to the attention of the Engineer. Acceptance of these shop drawings will not be construed as approving departures from specifications.

2.6.4 Four (4) bound copies of the final drawings will be provided to the Owner prior to the shipment of the transformer. Final drawings will be provided to the Engineer in AutoCAD 2013 DWG format.

2.7 Invoices

Invoices for equipment will be submitted only after all items have been received and accepted by the Owner. The Owner will pay no more than 90% of the bid price until the Supplier's obligations have been completed. Under no circumstances will the time frame for completion of these obligations exceed 30 days from the date of shipment without the specific approval of the Owner.

2.8 Warranties

- 2.8.1 All materials, oil, and equipment supplied under this specification will be warranted to the Owner against failure due to the Supplier's design or to defects in materials or workmanship for a period of one (1) year after the transformer is first energized by the Owner or one and one half (1 1/2) years from the date of delivery, whichever comes first. Should any failure to conform to this warranty occur within the specified time, the Supplier will correct such non-conformity at no cost to the Owner, including in and out transportation from the substation site, as well as Owner's cost to remove and reinstall said equipment.
- 2.8.2 An extended warranty will be offered for up to four (4) additional years covering failures from defects in design, materials, or workmanship. Transportation costs, and removal and installation costs will not be included in this "extended" warranty. The price for such a warranty must be quoted as a separate item in the bid package.

2.9 Loss Evaluation

The guaranteed no-load and load losses will be stated in the proposal. An amount in dollars will be added to the quoted price for loss evaluation according to the following factors:

- | | | |
|-------|-------------------------|--------------------|
| 2.9.1 | No-Load Losses | \$5,000.00 per KW |
| 2.9.2 | Load Losses ONAN Rating | \$ 1,800.00 per KW |
| 2.9.3 | Auxiliary Losses (Fans) | \$750.00 per KW |

- 2.9.4 Test system accuracy must be verified for conformance with the requirements of ANSI / IEEE C57.12.00 section 9.4. *The proposal must include documentation that verifies the accuracy of the loss measurement system.* Unsupported individual instrument accuracies will not be accepted. The documentation provided will include sufficient identification of the test system to enable the Engineer to confirm that it is the system used to test the transformer. The date of the last calibration and re-calibration interval will also be supplied.

2.9.5 Guarantees

Should the tested losses plus losses due to quoted maximum test system percentage error exceed the guaranteed losses, a loss penalty will be computed using the values stated in Sections 2.9.1 and 2.9.2. The penalty will be computed in the same manner as bid evaluation. In no case will a unit price be increased for loss costs less than guaranteed. The final payment will be reduced by the amount of the penalty calculated by the Engineer. No-load losses and load losses shall be evaluated and compared individually against guarantees. No summary of total losses for evaluation shall apply.

3.0 Transformer

3.1 Windings

3.1.1	Number of Phases	Three (3)
3.1.2	Number of windings	Two (2)
3.1.3	Winding Material	Copper
3.1.4	Winding construction	Circular
3.1.5	High voltage winding connection	Delta
3.1.6	Low voltage winding connection	Wye

3.2 Capacity

3.2.1	55 °C Rise	30/40/50 MVA
3.2.2	65 °C Rise (12% increase)	33.6/44.8/56 MVA

3.3 Cooling Class

3.3.1	Cooling Class	ONAN/ONAF/ONAF
3.3.2	Coolant	Insulating oil

3.4 Frequency

60 Hertz

- 3.5 Voltage Rating
 - 3.5.1 High voltage 115,000 Volts
 - 3.5.2 High Voltage Basic Impulse Level 550,000 Volts
 - 3.5.3 Low Voltage 13,800 Volts
 - 3.5.4 Low Voltage Basic Impulse Level 110,000 Volts
- 3.6 Impedance is to be 9.5% on a 30 MVA base.
 - 3.6.1 Supplier shall state the guaranteed impedance in the quotation. Transformer design and construction will ensure that a short circuit test of the transformer will not result in an impedance change exceeding 2% of the impedance value measured prior to short circuit testing.
- 3.7 De-energized taps: 2 1/2 % steps, two (2) above and two (2) below rated voltage, full capacity taps. A tap changer for de-energized operation will be provided with the operating handle brought outside the tank. The operating handle for the de-energized tap changer will include a position indicator with the highest voltage tap designated as “A” and provision for a padlock to secure the operating handle in each tap position. The operating handle shall be readily accessible by an operator standing on the base upon which the transformer is installed.
- 3.8 Neutral of low voltage windings to be fully insulated to line voltage.
- 3.9 The transformer unit shall be manufactured in accordance with the ANSI / IEEE standard C57.12 or NEMA TR-1 values, whichever is lower. The maximum acceptable average sound power levels shall not exceed 75 dB at maximum cooling.

4.0 Load Tap Changer (LTC)

- 4.1 Transformer will be complete with an automatic load tap changer. A Reinhausen Type RMV-II automatic load tap changer having a range of 10% above and 10% below nominal voltage in 32 equal 5/8% steps is preferred. Proposals shall be made based on having a Reinhausen tap changer. A line is provided in the “Supplier’s Proposal” to show reduction in cost if an alternate manufacturer’s tap changer is used. Full descriptive information on any alternate tap changer shall be included with the “Supplier’s Proposal.”

- 4.1.1 The LTC mechanism will conform to the requirements of ANSI / IEEE standards.
- 4.1.2 The LTC regulating winding will be a fully distributed, separate winding.
- 4.1.3 The LTC controls will have provision for accepting manual/automatic and raise/lower commands from SCADA. The LTC shall provide position indication for each raise/lower position and neutral to the SCADA interface.
- 4.2 The LTC shall be rated for full rated KVA on taps above normal and have a current rating corresponding to the full load current at rated voltage on taps below normal voltage. The LTC shall be connected to and regulate the low voltage winding.
- 4.3 The LTC mechanism shall be Vacuum Reactive and designed for 500,000 electrical and mechanical operations before contact replacement is required. Sufficient information to evaluate the number of operations, contact current, maintenance requirements, and contact life of the LTC being provided will be supplied with the bid documents.
- 4.4 If the tap changing system quoted requires a preventive autotransformer or a series transformer, they will be power class, round core/coil design and constructed with copper windings.
- 4.5 The tap changing mechanism will be mounted in a separate oil compartment, capable of withstanding full vacuum in the main tank without the use of bypass piping.
- 4.6 The LTC compartment will be equipped with the following:
 - 4.6.1 Liquid level gauge with alarm contacts
 - 4.6.2 Pressure relief device
 - 4.6.3 Drain valve with sampling device
 - 4.6.4 Tap selector with 33 positions
 - 4.6.5 Filling plug located at the top of the compartment
 - 4.6.6 Tank bottom will be sloped to drain oil away from the door

- 4.6.7 The oil compartment will include a lip to prevent oil spills after draining the compartment and opening the door. The cover will be hinged to support itself when open.
- 4.6.8 An operating mechanism equipped with a motor drive whose motor will be at operator height, easily accessible, and not immersed in oil
- 4.6.9 Mechanical position indicator with maximum and minimum drag hands equipped with electronic reset operable from the control compartment
- 4.6.10 Operation counter
- 4.6.11 Two separate contact deck rows with resistors, one for local or remote position indication, the other for Reinhausen TAPCON automatic voltage control use in paralleling operations
- 4.6.12 LTC oil filtration system
- 4.7 The following will be supplied and mounted in a cabinet attached to the transformer tank at operator height:
 - 4.7.1 Line drop compensator with resistance and reactance adjustments
 - 4.7.2 Reactance reversing switch
 - 4.7.3 Reinhausen TAPCON voltage regulation system to control the LTC. The system shall provide automatic LTC control for voltage regulation and control parallel transformer operations by either minimum circulating current or master/follower method (coordinate position input from LTC motor drive) and be capable of EIA-232 and/or EIA-485 communication.
 - 4.7.4 Automatic-Manual selector switch
 - 4.7.5 Raise and lower switches for manual operation
 - 4.7.6 Motor and controls (rated 120/240 VAC) protected by circuit breakers. The control circuit will include electrical and mechanical position limit switches.
 - 4.7.7 Voltage testing terminals
 - 4.7.8 Equipment for parallel operation

- 4.7.9 Equipped with a thermostatically controlled heater: 85 °F and below – ON, 100 °F and above – OFF. Rating of heater to be determined by Supplier to prevent condensation from forming in cabinet.
- 4.7.10 GFCI convenience receptacle, 120 VAC, 15 Ampere
- 4.7.11 Terminal boards in control compartment for termination of control wiring
- 4.7.12 Conduit entrance in bottom of cabinet for attachment of Owner's conduit.
- 4.8 The transformer will include a current transformer for input to the line drop compensator in the controls. Control voltage of 120 VAC or 240 VAC will be provided to the voltage control relay by the Owner. If an isolating or sensing transformer is required, it will be mounted in the control compartment.
- 4.9 LTC performance will be based on the entire range of operations and maximum nameplate rating.
- 4.10 Automatic and manual operation of the tap changer shall not permit stalling in the “off tap” position if this condition causes the ratings of any component of the transformer to be exceeded, is detrimental to the expected life of the transformer tap changer, or places the operator in danger.

5.0 Transformer Accessories

- 5.1 Bushings
 - 5.1.1 High voltage bushings will be of the 115 kV Class and have a BIL rating of 550 kV.
 - 5.1.2 Low voltage bushings will be of the 15 kV Class and have a BIL rating of 110 kV.
 - 5.1.3 Neutral bushing will be of the 15 kV Class and have a BIL rating of 110 kV.
 - 5.1.4 All bushings will be porcelain and will be ANSI #70, Sky Gray.
 - 5.1.5 Supplier will provide tinned NEMA 4-hole pad connectors for each bushing.

5.2 Lightning Arresters

5.2.1 A set of three high voltage surge arresters, 70 kV MCOV, 90 kV rated voltage metal oxide station class, will be supplied for each transformer and tank mounted adjacent to the high voltage bushings.

5.2.2 A set of three low voltage surge arresters, 8.4 kV MCOV, 10 kV rated voltage metal oxide station class will be supplied for each transformer and tank mounted adjacent to the low voltage bushings.

5.2.3 Studs will be welded to the transformer tank, cover, and arrester brackets to secure grounding cables for lightning arresters.

5.3 Bushing Current Transformers - All protective relaying class bushing current transformers to be five lead, multi-ratio (MR) with fully distributed windings and a thermal rating factor of no less than 1.5.

5.3.1 Each high voltage bushing (H1, H2, H3) will have one (1) 600/5 MR, Accuracy Class C800, bushing current transformer

5.3.2 Each low voltage bushing (X1, X2, X3) will have one (1) 3000/5 MR, Accuracy Class C400, bushing current transformer

5.3.3 Neutral bushing (X0) will have one (1) 1200/5 MR, Accuracy Class C400, bushing current transformer.

5.4 Auxiliary Equipment Ratings

5.4.1 Control equipment - 125 volts DC

5.4.2 Control cabinet heater - 240 VAC, single phase

5.4.3 Cooling equipment - 120/240 VAC, single phase

5.4.4 Power will be supplied by the Owner from external sources.

5.5 Cooling Equipment and Controls

5.5.1 Cooling equipment will be furnished as required to provide the transformer's rated capacity without exceeding the guaranteed temperature rise.

5.5.2 All forced air cooling fans will be of the sealed, totally enclosed, individually protected type. Fan blades will be of one-piece cast aluminum. Fan guards will be galvanized.

- 5.5.3 Cooling equipment will be automatically controlled from the winding hot spot temperature gauge.
- 5.5.4 Selector switches will be provided to alternate fan banks between stage one and stage two service.
- 5.5.5 A manual control switch will be provided to allow testing of the cooling fans at any time.

5.6 Accessories

- 5.6.1 A nitrogen oil preservation system with a new nitrogen tank and all necessary accessories to maintain a positive nitrogen pressure on the tank will be provided for each transformer. The system will consist of the following:
 - 5.6.1.1 New tank and cylinder pressure gauges with alarm contacts measuring low and high tank pressure and low cylinder pressure. Contacts will be wired to terminal blocks located in the main transformer control cabinet.
 - 5.6.1.2 Supply cylinder with a control valve
 - 5.6.1.3 Three stage pressure reducers
 - 5.6.1.4 Pressure relief valve
 - 5.6.1.5 Piping and valves necessary to control the flow of gas to and from the transformer tank
 - 5.6.1.6 A weatherproof cabinet for the oil preservation system will be attached to the main transformer tank and be sized to include the nitrogen bottle. A sight glass will be provided in the door at the level of the gauges.
- 5.6.2 Pressure / Vacuum bleeder equipped with a sampling valve
- 5.6.3 Oil drain valves with sampling device
- 5.6.4 Top oil fill valve
- 5.6.5 Stainless steel diagrammatic nameplate for the transformer showing KVA rating, voltage ratings, operating temperature, maximum current, year of manufacture, % impedance, weight, gallons of oil, and power circuit diagrams

- 5.6.6 Stainless steel diagrammatic nameplate for the Load Tap Changer showing KVA rating, voltage ratings, power circuit diagrams, mechanism type, drive type, transition impedance type, arc interrupting mechanism, and amount of oil
- 5.6.7 Stainless steel bushing current transformer nameplate mounted to inside of control cabinet door showing, at a minimum, available taps, ratios, accuracy class and thermal rating factor for each type of bushing current transformer installed
- 5.6.8 Control Cabinet
 - 5.6.8.1 Equipped with a thermostatically controlled heater: 85 °F and below – ON, 100 °F and above – OFF. The rating of heater to be determined by Supplier to prevent condensation from forming in cabinet.
 - 5.6.8.2 Equipped with lighting designed to be automatically turned on when control cabinet door is opened.
 - 5.6.8.3 Equipped with a 120 volt, 15 amp GFCI receptacle.
 - 5.6.8.4 All hardware to be stainless steel.

5.7 Radiators

- 5.7.1 Radiators will be detachable with shut-off valves located on the transformer tank and will be constructed to withstand tank operating pressure and full vacuum. Valves will be mounted far enough away from the tank-side flanges to allow full range operation with the flanges capped.
- 5.7.2 Radiators will be flushed thoroughly with transformer oil prior to shipment to remove contamination.
- 5.7.3 Each radiator will have upper and lower drain plugs.
- 5.7.4 Radiators will be interchangeable to expedite field repair.
- 5.7.5 Radiators will be painted according to Section 6.8 or galvanized.

6.0 Design Features

6.1 Tank

- 6.1.1 The tank will be suitable for vacuum filling. It will be designed to withstand an internal operating pressure of 8 PSI with a 25% over pressure margin as well as full vacuum capability.
- 6.1.2 All joints of the tank and the radiators are to be oil tight and gas tight welding inside and out. Seams on the tank wall corners are not acceptable.
- 6.1.3 All external tank bracing will be tubular, sealed type construction.
- 6.1.4 Base will be suitable for rolling or skidding in any direction.
- 6.1.5 There will be jacking provisions for lifting the complete transformer assembly.
- 6.1.6 There will be lifting lugs on the tank cover for lifting the tank cover. There will be lifting lugs for the tank to lift the complete transformer assembly. If the transformer cannot be lifted filled with oil, this will be clearly stated on the nameplate.
- 6.1.7 There will be pulling eyes for pulling the complete transformer assembly.
- 6.1.8 The cover will be welded to the tank and designed to allow removal and reinstallation. During welding, an inorganic gasket will be permanently located between the cover and the tank flange to prevent the entrance of weld splatter into the tank. Cover will be sloping to facilitate water shedding.
- 6.1.9 All gasketed openings will be designed with a means provided for controlled compression of the gasket, utilizing metal-to-metal stops, and reusable gaskets of oil resistant material. All gasketed joints on top of the transformer will utilize flanges that are raised at least 3/4 inch above the cover surface.
- 6.1.10 The tank cover shall have in the approximate center, a device suitable for mounting a safety device capable of supporting hardware including harnesses utilizing gravity brakes for use during maintenance and test operations. The removable device (mast) shall be supplied by the manufacturer.

- 6.2 Cabinets will be weatherproof with a hinged access door complete with a 3-point handle type latching mechanism and provisions for padlocking in the closed position.
- 6.3 Core ground connections will be readily accessible for test purposes without removal of any oil, or opening of the main tank.
- 6.4 Bushing Current Transformer Wiring
 - 6.4.1 Leads will be pre-wired to “shorting” type terminal blocks located in the control cabinet for connection to external circuits, so as to allow CT wiring and tap changes without opening or de-energizing the transformer. All taps and ratios will be labeled at the terminal strips. The CT’s will be shorted at the control cabinet terminal strips prior to shipment.
- 6.5 All alarm and trip contacts will be wired to terminal blocks located in the main control cabinet for connection to external circuits.
- 6.6 Conduits
 - 6.6.1 All circuits required for operation and control of the transformer and its accessories will be installed in rigid, galvanized steel conduit securely fastened to the transformer.
 - 6.6.2 Liquid tight flexible conduit will be used to connect all rigid conduits to cooling devices, shock mounted cabinets, instruments, and devices.
 - 6.6.3 All conduit fittings will have weatherproof, oil resistant gaskets.
 - 6.6.4 Conduits will be grouped together as much as is practical.
 - 6.6.5 There will be no exposed wire or cable on the transformer, except as approved by the Engineer.
 - 6.6.6 Tank brace bands that normally contain atmospheric air may only be used in lieu of conduit if adequate hand holes with covers are provided for access.
 - 6.6.7 Use of adequately designed and protected power cable in lieu of flexible conduit for connection to cooling fan motors is acceptable.

6.7 Grounding

- 6.7.1 Two grounding pads will be located on diagonally opposite corners of the tank base for grounding of the transformer with bolt type connectors suitable for use with conductors of 2/0 to 500 KCMIL stranded copper conductor. The connectors will be provided by the transformer manufacturer.
- 6.7.2 Studs will be welded to the transformer tank walls, cover, and arrester brackets to secure tie down clamps for grounding cables for neutral bushings and lightning arresters.
 - 6.7.2.1 The transformer will be equipped with tie down clamps to attach an Owner supplied 4/0 copper conductor loop from the ground pad location at the base of the low voltage face, up the face of the transformer, connecting the low voltage surge arresters and looping down the opposing side of that face.
 - 6.7.2.2 The transformer will be equipped with tie down clamps to attach an Owner supplied 4/0 copper cable loop from the ground pad location at the base of the high voltage face, up the face of the transformer, connecting the high voltage surge arresters and looping down the opposing side of that face.
 - 6.7.2.3 The low voltage face and cover of the transformer shall include tie down clamps to attach a 500MCM copper ground from the ground grid to the neutral bushing.

6.8 Paint

- 6.8.1 The transformer tank and all auxiliary equipment will be painted with a rust inhibiting primer and topcoat to provide a minimum 3 MIL film thickness. External paint color will be ANSI #70, Sky Gray.
- 6.8.2 The inside of the main transformer tank as well as the inside of all control cabinets will be painted white.
 - 6.8.2.1 Accelerated aging tests will be performed on the paint to be used inside the tank. A plate steel sample coated with this paint will be submerged in transformer insulating oil and heated to 130 °C. After 1000 hours, there may not be any change in the painted surface, or in the power factor of the oil used for the test. Results of previous testing for this type

of paint are acceptable.

6.8.3 A skid resistant coating will be applied to the horizontal surface of the cover.

6.9 Instrumentation

6.9.1 The winding temperature thermometer – MESSKO, latest version - will be a four switch, responsive type and be indicative of the winding temperature of the transformer. The dial will have calibrations in degrees Celsius and have a temperature pointer and a maximum temperature reset pointer. The device will operate the fans with switches #1 and #2. Switches #3 and #4 will be utilized for alarm or tripping circuits. All switches will have adjustable set points set as recommended by the manufacturer. The fans will operate so as to achieve the desired ONAN/ONAF/ONAF transformer rating.

6.9.2 The transformer will be equipped with a two switch, responsive type thermometer – MESSKO, latest version - and be indicative of the liquid temperature of the transformer. The dial will have calibrations in degrees Celsius and have a temperature pointer and a maximum temperature reset pointer. Two sets of contacts will be provided, for tripping or alarm functions. The settings will be adjustable and set as recommended by the manufacturer.

6.9.3 A liquid level gauge – MESSKO, latest version - will be installed with dial markings to show 25 °C and the maximum and minimum oil levels. Low oil level alarm contacts will be included with the gauge.

6.9.4 A pressure / vacuum gauge will be installed with scale range of plus or minus 10 PSI.

6.9.5 A rapid pressure rise relay (63) Qualitrol 910-013-03 or approved equivalent will be installed.

6.9.5.1 Relay will be connected through an auxiliary sudden pressure seal - in relay (63X) Qualitrol 909-300-1 or approved equivalent. Seal-in relay will have one set of isolated alarm contacts and one set of isolated trip contacts.

6.9.5.2 Leads for all alarm and trip circuits will be pre-wired to terminal blocks located in the transformer control cabinet for connection to external circuits.

- 6.9.6 A mechanically operated pressure relief device – MESSKO, latest version - mounted such that the signal indicator is visible from the ground will be installed. One set of isolated alarm contacts will be provided and wired to the terminal blocks in the transformer control cabinet.
- 6.9.7 An SEL-2414 Transformer Monitor shall be installed in the control cabinet. The Monitor shall be powered by a 125 VDC supply, separate from the 125 VDC supply of the sudden pressure seal-in relay. Alarm contacts shall be wired to terminals in the cabinet, identified and marked, then wired as inputs to the Monitor: oil level, oil temperature, winding temperature, sudden pressure relay, pressure relief valve, low tank pressure, nitrogen system alarms and loss of auxiliary power. The Monitor will have an RTD input to monitor transformer hot-spot winding temperature. A dedicated thermometer well mounted RTD shall be installed. The monitor shall have DNP3 Protocol and have a 10/100 Base-T Ethernet port.
- 6.9.8 The transformer shall be equipped with a dedicated thermometer well and RTD for monitoring the Top Oil Temperature by the SEL 2414.
- 6.9.9 The transformer shall be equipped with a device to provide an analog oil level value to the SEL-2414.
- 6.9.10 Other standard alarms and analog quantities shall be wired to the SEL-2414 as recommended by the transformer manufacturer.

7.0 Testing

- 7.1 The Owner reserves the right to witness core and coil assembly tanking and final testing. The manufacturer will provide two weeks' notice of the schedule for both. Photographs shall be provided of the completed core and coil assemblies.
- 7.2 Tests will be performed in accordance with the latest revision of ANSI / IEEE standards C57.12.00, C57.12.90, and C57.98.
- 7.3 Required Tests
 - 7.3.1 Tests designated as routine in the latest revision of ANSI / IEEE Standard C57.12.00
 - 7.3.2 Dissolved gas-in-oil tests: The initial sample may be drawn after preliminary tests but before load loss, impulse, power factor, corona, and temperature tests. The sample required at completion of these

energization tests will be drawn from 2” to 6” below the top of the oil.

- 7.3.3 An applied potential test in accordance with IEEE C57.12.90
- 7.3.4 The partial discharge test shall be made during the induced voltage test to demonstrate the absence of damaging discharge. The test shall consist of the measurement of the radio influence voltage (RIV) during the full-induced voltage test for a period of one (1) hour, in general accordance with ANSI/IEEE Standard C57.12.90. Partial discharge shall be measured in both microvolts and Pico coulombs. The not to exceed values are 100 μ V and 500pC for microvolts and picocoulombs, respectively.
- 7.3.5 Impulse Test shall be as described in IEEE C57.12.90. Neutral bushings are to be impulse tested at their appropriate levels. **All bushings are to be individually impulse tested.**
- 7.3.6 Insulation power factor test - Measured values exceeding 0.5% (corrected to 20 °C) will not be accepted.
- 7.3.7 Temperature rise test as described by IEEE C57.12.90
- 7.3.8 Bound certified copies of the test data will be furnished to the Owner before delivery and will include but not be limited to: *data sheets from all specified tests; copies of impulse test oscillograms with necessary scale factors and winding and data sheet identifications; and positive, negative, and zero sequence impedances showing R and X values.*

Unsupported pass or fail statements will not be accepted.
- 7.3.9 Insulating oil will be tested in accordance with the latest revision of ANSI/ IEEE C57.106 and the Supplier’s instructions, which will be submitted with approval drawings.
- 7.3.10 Tested losses will include load losses of the regulating winding and auxiliary losses required to provide the ONAF and ONAF/ONAF rating of the transformer. Each transformer is to be evaluated separately.
- 7.3.11 Sweep Frequency Response Analysis: SFRA testing shall be performed on the fully assembled oil filled transformer. This test shall be repeated in the field after the transformer is fully assembled and oil filled in its service location. Result of these tests shall be

recorded and furnished to the Owner.

- 7.4 The specified transformer will meet the short circuit qualification requirements given in the latest revision of ANSI / IEEE C57.12.90 modified to include only the impedance of the transformer.
- 7.5 The unit will be fully assembled at the factory prior to shipping to assure fit. Actual bushings and radiators to be shipped with the unit, even if shipped separately, will be used in the tests specified. No test bushings or radiators are to be used.

8.0 Shipping

- 8.1 Shipping to be F.O.B. destination.
 - 8.1.1 Destination is defined to be the transformer pad at the substation site, off loaded by manufacturer.
 - 8.1.2 North Little Rock Electric Department's McCain Substation is located at 4500 43rd Street, North Little Rock, Arkansas. Approximate latitude and longitude for the substation are:
34° 47' 36.85" N, 92° 12' 52.04" W
- 8.2 The transformer will be shipped oil filled if weight limitations allow.
- 8.3 On site assembly of the transformer and any required processing and testing will be quoted separately.
- 8.4 If transformer must be partially assembled, i.e., shipped without oil, radiators, and/or bushings), the manufacturer shall provide, at no additional cost, qualified personnel, equipment, and tools as necessary to complete assembly of the transformer at the substation site.
- 8.5 A digital reporting type impact recorder will be provided for shipment. It will be mounted at the factory and removed by the manufacturer's representative and witnessed by the Owner's representative. This unit shall record three axis impact with time and location information. The unit shall also provide scheduled location and travel log in its report. The reporting monitor access shall be made available to the Owner during shipping.
- 8.6 North Little Rock Electric Department shall inspect transformer prior to off-loading at destination. Intent of inspection is to determine if any external damage to transformer or any of its components has occurred during shipment.

END OF SECTION

Supplier's Proposal

115/13.8 kV, 30/40/50//56 MVA LTC Transformer

Power Transformer for
McCain Substation Expansion

TO: Ms. Amy Smith
Commerce Department
North Little Rock Electrical Department
120 Main Street
North Little Rock, AR 72114

The Undersigned (hereafter called **Supplier**) acknowledges by his signature that he has received and examined the documents entitled **Transformer Specification** dated February 2016, and has included the provisions of the specification in his proposal. The Supplier further acknowledges receipt of the following addenda, if applicable:

Addendum No. _____ Dated _____
Addendum No. _____ Dated _____

The Supplier hereby proposes to sell and deliver to North Little Rock Electric Department (hereafter called the **Owner**), upon the terms and conditions herein stated, the equipment specified for the following sum:

<u>Description</u>	<u>Number Required</u>	<u>Unit Price</u>	<u>Total Price</u>
3-phase 115/13.8 kV 30/40/50//56 MVA LTC Transformer	1	_____	_____
Extended Warranty	1	_____	_____
Storage Cost for up to three (3) months	1	_____	_____
On site assembly, processing, and testing	1	_____	_____
No Load Losses	_____	KW	
Load Losses	_____	KW @ 30 MVA	
Load Losses of regulating winding	_____	KW	
Auxiliary losses @ ONAF rating	_____	KW	

Auxiliary losses @ ONAF/ONAF rating _____ KW

Guaranteed Impedance _____ % On 30 MVA base

Load tap changer manufacturer and model number _____

Alternate load tap changer manufacturer and model number _____

Total Price Reduction for alternate tap changer manufacturer _____

1. The prices set forth above will include delivery to the designated site as described in Sections 2.4 and 8.0 of the Transformer Specification.
2. The prices set forth herein do not include any sums which are or which may be payable by the Supplier on account of taxes imposed by any taxing authority upon the sale, purchase, or use of the equipment. If any tax is applicable to the sale, purchase, or use of the equipment, the amount will be added to the purchase price and paid by the owner.
3. The prices set forth herein will be firm if accepted by the Owner within sixty (60) days.
4. The delivery date will be no later than 4th Quarter 2016.

Proposed Delivery Date: _____

5. Title of the equipment will pass to the Owner upon:
 - A. Delivery to designated location
 - B. Satisfactory inspection for in-transit damage
 - C. Satisfactory tests and reports, including field tests reports
 - D. Certification that the transformer is ready to be placed in service
 - E. Acceptance by the Owner
6. The Supplier will include engineering data with his proposal as specified and as required to evaluate the bid.

7. Exceptions:

It is understood by the undersigned that the Owner retains the right of accepting or rejecting all or any part of this proposal and to waive any irregularities or technicalities therein. Counter - proposals or qualified bids will be subject to rejection at the discretion of the Owner. It is also understood by the undersigned that the Owner reserves the right to conduct investigations as deemed necessary to evaluate the proposals received and to award the bid for this equipment to the best bidder, who in the Owner's evaluation will provide equipment which will be in the best interest of the Owner's project.

SUPPLIER: _____

BY: _____

TITLE: _____

ADDRESS: _____

TELEPHONE NO: _____

E-MAIL ADDRESS: _____

DATE SIGNED: _____