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Schneider, John A.
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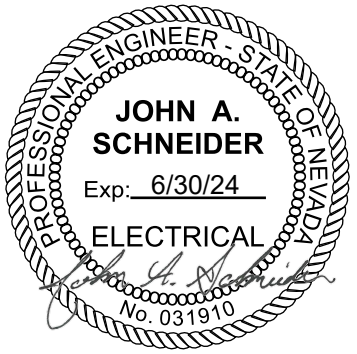

SECTION 33 72 73

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

A. These Specifications describe the types, sizes and characteristics of the various materials required for the construction of the substation for the Owner.

B. The structures for substations shall consist of manufacturer designed structural steel frame-work for mounting and connecting all equipment in accordance with attached drawings. Items supplied by others are given for information purposes only. Structures shall be provided as shown on the drawings. Arrangement of all circuits and static masts shall be as shown on the plans. Structures shall be designed for the loads given in Section 1.15.

C. Steel for structures shall conform to ASTM Specification Standards described in Section 1.15. All components shall be hot dipped galvanized after fabrication in accordance with ASTM Specifications listed in Section 1.15.

D. The Bidder shall provide unit prices for the items listed on Schedule I (attached) with the bid proposal.

E. Drawings for approval shall be submitted after the award of the contract: general arrangement drawings showing structures with all equipment, buses, etc. mounted thereon; elevation and erection drawings sufficient to show all details required to construct the substation as designed; shop drawings of the structures and equipment.

1.1 SCOPE

A. This specification describes material and equipment to be furnished for construction of a complete substation with all associated material and equipment.

1.2 DEFINITION OF TERMS

A. “Bidder”, “Supplier”, and “Seller” shall be considered synonymous terms and shall mean person, firm or corporation with whom Owner may enter into contract for execution of work specified.

B. "Owner" shall mean:

Southern Nevada Water Authority
100 City Parkway, Suite 700
Las Vegas, NV 89106
(702) 862-3786

Colorado River Commission of Nevada
Attn: Bob Reese
555 E Washington Avenue
Las Vegas, NV 89101

(702) 486-2670
breese@crc.nv.gov

C. "Engineer" shall mean:

HDR Engineering, Inc.
Attn: John Schneider
Project Manager
3231 Greensboro Drive, Suite 200
Bismarck, ND 58503
Phone: (701) 557-9711
john.schneider@hdrinc.com

D. “Work” shall mean work to be done in the course of construction and furnishing materials and equipment under the Material Contract, unless some other meaning is indicated by the context.

1.3 INTENT OF SPECIFICATIONS

A. To set forth requirements of performance, type of equipment desired, standards of materials and construction, tests to be made, and guarantees to be met.

B. To require Seller to furnish all materials and equipment and perform all work and services described in the contract documents, unless otherwise specifically indicated.

C. To require Seller to provide complete and operable equipment in spite of omission of specific reference to any minor component part.

D. To require Seller to provide new materials and equipment.

1.4 INTERPRETATION OF SPECIFICATIONS

A. Seller shall report any errors or ambiguities in specifications to the Engineer as soon as detected. Engineer will answer questions and interpret the intended meaning of the specification. Engineer’s interpretation shall be accepted as final.

1.5 METHOD OF BIDDING

A. Equivalent products:
1. Whenever specifications or plans call for item of material or equipment by manufacturer’s name and type, “or equal”, it is intended that products of equal quality and performance by other manufacturers may be substituted, subject to the approval of the Engineer.
2. Furnish drawings or other data as required to indicate all modifications resulting from use of such substitute items. Furnish general arrangement drawings, full descriptive data, and other information required to demonstrate to Engineer that material or equipment proposed is, in fact, equal to that specified. Burden of proof of equality shall in all cases remain with Seller. Final approval of the substitution shall be made by the Engineer.
3. Abide by Engineer’s decisions when proposed substitutions of material or equipment are deemed to be unacceptable.

4. Owner may consider such factors as over-all project arrangement, over-all project cost, and similar factors in determining acceptability of proposed substitutions.
5. Approval of substitutions shall not relieve Seller of responsibility for providing workmanship, material, and equipment equal to that specified.

B. Form of bid price submittal:
1. Unit prices for all items to be furnished and delivered under this specification shall be provided on Schedule I. Lump sum prices for each schedule shall be provided on Summary of Proposal.
2. Bid price shall cover complete work described in specifications, including costs incidental thereto, unless specifically indicated otherwise.

1.6 DATA TO ACCOMPANY BIDS

A. A complete Equipment Contract and Summary of Proposal, as bound in the front of this specification, shall be properly completed and submitted to the Engineer, along with all other material listed below. All items to be submitted shall be sent to the Engineer no later than the time and date specified.
1. Any exceptions taken by the Bidder to the Specifications, Equipment Contract, or Summary of Proposal at time of bid shall be clearly and simply stated or summarized, in a specially prepared letter of transmittal attached to and made a part of the Summary of Proposal. **Note: Manufacturer's "standard conditions of sale" catalog pages are not acceptable for purposes of stating exceptions to the specifications.**
2. Bidder shall complete one copy of the "Summary of Proposal" for each alternative bid or proposal submitted. Additional copies may be prepared by photocopying the blank "Summary of Proposal" pages. Bidder shall clearly identify each summary by alternate number.

B. Bidder's proposal shall also contain, as a minimum, one copy of the following:
1. Manufacturer's specifications, guarantees, and descriptive data on equipment proposed.
2. Itemized list of special tools and spare parts which Bidder proposes to furnish.
3. Outline drawings showing general arrangement, approximate dimensions, space requirements and clearance, and approximate weights of proposed equipment.
4. Standard and specified accessories and instruments to be furnished separately shall be listed in detail. List shall clearly define those items to be shipped separately. It is understood that all items not so listed shall be shipped, mounted and connected. Use Summary of Proposal for listing.
5. Complete copy of the warranty the Bidder will offer.

1.7 PROPOSAL SUBMITTAL

A. Proposals submitted by the Bidder shall be signed and dated. The proposal for supplying the equipment and material covered in this specification shall be accompanied by a list describing any substitutions, deletions, additions, or exceptions to items described in Sections 1.15 through 1.16 of this specification. Material delivery dates shall be included with the proposal.

B. Bidder's quotations shall include delivery of all equipment and materials to the job site. All correspondence, questions, subsequent drawings and transmittals shall be directed to the Engineer.

1.8 EQUIPMENT GUARANTEE

A. Without limiting any other provision of this specification regarding guarantees, guarantee the equipment as follows:
   1. Seller shall guarantee to the Owner that the complete substation, together with all parts included in the original purchase, is free of defect in workmanship and materials and is capable of continuous and satisfactory performance when operated in accordance with the instructions provided by the Seller at the specified rating and capacity.
   2. Guarantee shall cover all freight by common carrier in full and the costs of removal from the site and reinstallation after repair. If the Owner's contractor can repair any defect to the satisfaction of the Engineer, the guarantee shall cover all associated costs provided the Seller is notified in advance of the defect.

1.9 DELIVERY AND SHIPMENT

A. Bid shall include delivery F.O.B. jobsite, freight prepaid, with final destination delivery date as specified by the Seller in the Summary of Proposal.

   Project Location: Las Vegas, NV (36.308883°,-114.989844°)

B. All material shall be clearly marked as follows:

   Apex Substation
   Southern Nevada Water Authority
   Las Vegas, Nevada

C. The Seller shall notify the Owner and Engineer when equipment is ready for shipment. Such notice shall include projected routing and estimated time in transit. Notice shall be provided 48 hours prior to delivery.
   1. All equipment in this Contract with a common delivery destination shall be made in a common shipment. The Seller shall be responsible for all incidental costs incurred by the Owner due to separate shipments of such equipment.
   2. Immediately after shipment, Seller shall notify the Owner and Engineer of transportation carrier and all transfers and references to permit follow-up on status of shipment and delivery.
   3. The Seller shall investigate all limitations in regard to shipping the equipment F.O.B. destination.
   4. Equipment damaged in shipment will be refused on delivery and it will be the Seller's responsibility to arrange for prompt repair or replacement to the standards of new equipment. The Seller will not be relieved of the responsibility of delivering undamaged equipment even if the damage is internal or otherwise goes undetected and the nature of the damage remains unknown until the equipment is energized and tested.

1.10 DRAWINGS AND INSTRUCTIONAL MATERIAL

A. Specification Drawings

1. These drawings and specifications are instruments of service to be used on this project only and are to be returned to the Engineer upon completion of the work as set forth herein.

B. Shop Drawings for Review

1. "Shop Drawings" refers to all the detailed installation drawings prepared by the Seller and/or his suppliers required to construct the material as defined in the specifications, and shall include all fabrication drawings, working drawings, design calculations, material schedules, detailed layouts, and assembly information. Shop drawings shall be reviewed and approved by the Engineer before manufacturing begins.
2. The Seller agrees that submittals and shop drawings processed by the Engineer are not change orders; that the purpose of submittals and shop drawings by the Seller is to demonstrate to the Engineer that the Seller understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install, and by detailing the fabrication and installation methods he intends to use. The Seller alone accepts all responsibility for assuring that all materials furnished under these specifications meet in full all requirements of the contract documents. The Engineer's review is for the general conformance with the design concept and contract documents. Markings or comments shall not be construed as relieving the Seller from compliance with the project plans and specifications, nor departures there from. The Seller remains responsible for details and accuracy for confirming and correlating all quantities and dimensions, for selecting fabrication processes and for techniques of assembly.
3. Submit the following shop drawings to the Engineer in the manner specified hereinafter. Make initial submittal of information required on or before the date specified in the Summary of Proposal.
    a. General Arrangement Drawings, including Plan and Elevations, as well as other drawings as required to fully describe and facilitate construction. These drawings shall clearly show all materials marked so as to correspond with material list item numbers. Grounding details shall include item numbers to indicate location of all structure and subgrade grounding materials. Bolt torque requirements shall be included on the bus drawings.
    b. Detailed material list showing item number, quantity, manufacturer, and type and/or part number of all material and equipment to be furnished and installed in this station.
    c. Structural steel design calculations, including limitations and design criteria. Provide foundation loading data required to design all concrete foundations and anchor bolts.
    d. Structural steel shop drawing and erection drawings shall show all details necessary for fabrication and assembly, including Steel Bill of Materials describing all steel, bolts, etc. Drawings shall include erection view, drawn to scale, indicating individual piece marks for ease in erection. The views shall also indicate size, type and quantity of erection bolts required. These drawings shall be furnished prior to fabrication.
    e. Equipment outline, wiring and schematic drawings for all electrical power equipment and power switching apparatus furnished by the Seller. Outline drawings shall show major standard features and

required accessories. Nameplate drawings shall be furnished for power and oil-filled equipment. Wiring and schematic drawings shall show all accessories and indicate connection points for customer wiring. Equipment approval drawings shall be furnished at such time that factory construction and shipping schedules will not be interrupted.

C. Engineer's Action
1. Engineer will review shop drawings and include action taken according to the following classifications:
   a. No Exceptions Taken: Indicates that the shop drawing has been reviewed and appears to be in general agreement with the requirements. Material Seller may make further distribution of shop drawings and proceed with fabrication and/or installation of the work detailed on the drawing.
   b. Make Corrections Noted: Design revisions, deletions, additions and comments shown on these drawings shall be incorporated into the design before proceeding with fabrication of drawing distribution.
   c. Amend and Resubmit: Indicates that the shop drawing, or part thereof, does not appear to be in general agreement with the requirements. Engineer's comments are noted on the shop drawing and/or separate letter. Material Seller shall recheck and make any necessary revisions and resubmit for Engineer's review.
   d. Rejected: Indicates that the shop drawings do not conform to requirements. Reasons for rejection are noted on the shop drawing and/or separate letter.

D. Shop Drawing Submittal Distribution
1. Initial Submittal (REVIEW): Submit one (1) digital copy in PDF format of each shop drawing to the Engineer; direct mailing to the Engineer's email address given in Section 1.2, C. One (1) copy of the shop drawings indicating the Engineer's action will be returned to the Seller with in one (1) week from the date of receipt.
2. Resubmittal: If drawing is returned to the Seller with Engineer's comments and action noted "RESUBMIT", the drawing should be rechecked, revised as necessary and resubmitted in manner described in "1) Initial Submittal". Corrected submittal shall be returned to Engineer two (2) weeks after notice requiring resubmittal.
3. Final Distribution (CERTIFIED): Within the time schedule listed in the Summary of Proposal, Seller shall submit to the Engineer, one (1) digital copy in AutoCAD format of all final drawings covered in Section B above. AutoCAD drawings shall be provided on a compact disk, along with all related dependent files such as, x-refs, font files, and plot styles. Drawings shall be stamped "Certified for Construction" and contain all corrections noted by the Engineer on his review of the Drawings. Direct mail to the Engineer's address given in Section 1.2, C.

E. Instruction Manuals, Test Reports, and Parts Lists
1. Seller shall furnish complete instruction manuals covering installation, operation and maintenance for all equipment to the Engineer for distribution.

2. Submit one (1) digital PDF copy to Engineer for distribution.

F. Shop Drawing and Instructional Material Transmittal Form
1. Seller may use his own form of transmittal letter for distribution of shop drawings, clearly marked "For Review" or "Certified" as applicable.
2. Submit one (1) digital PDF copy of transmittal form with each set of drawings or instructional materials.

G. Seller's Responsibility
1. Prior to submittal, check shop drawings for errors, correctness of details, and conformance with the specifications.
2. Notify Engineer of any inconsistencies or questions regarding approval revisions or comments on the drawings.
3. Review of shop drawings by Engineer does not relieve the Seller of responsibility for errors, correctness of details, or conformance with the specifications.
4. Fabrication and shipment of materials or equipment prior to Owner's release of drawings, data and information mentioned hereinbefore shall be at Seller's risk.

1.11 MATERIAL AND DESIGN STANDARDS

A. All material used in the manufacture of these substations and their components are to be of the best available for the purposes for which used, considering strength, durability and safety, and shall conform to the latest applicable sections of the following specifications, codes, and standards:
1. American National Standards Institute (ANSI).
2. National Electrical Manufacturer's Association (NEMA).
3. American Society for Testing Materials (ASTM).
4. International Electrotechnical Commission (IEC) Standards.
5. Institute of Electrical and Electronic Engineers (IEEE).
6. National Electric Safety Code (NESC).
7. Rural Utilities Services (RUS) specifications.
8. ASCE 113, Substation Structural Steel Design
9. AISC 360-10, Steel Specifications for Structural Buildings

B. If any conflict occurs between this specification and these design standards or codes, the most stringent requirement shall apply. Nothing in this specification shall be construed to permit material not conforming to these design standards. Also, this shall not be construed as relieving the Seller from complying with any requirements in the specification which are in excess of the design standards.

C. These substations shall be designated and manufactured of standard sections and shall be completely coordinated and pre-assembled wherever possible.

D. Attached drawings shall be part of this specification. General arrangement shall be in accordance with the specification drawings.

1.12 DEFECTIVE EQUIPMENT

A. Should equipment fail to conform to specifications or to operate satisfactorily, Owner will have right to operate equipment until defects are corrected and guarantees met.

B. Owner will have right to operate rejected equipment until it is replaced without cost for depreciation, use, or wear.

C. Equipment may be removed from operation for examination, adjustment, alteration, or change, only at time approved by the Owner.

1.13 SUBSTATION RATINGS

A. The Substation covered under this specification will have the following rating in accordance with the applicable ANSI Standards:

Incoming Transmission Voltage	230 kV Phase-to-Phase
High Voltage Equipment BIL	900 kV
Incoming Transmission Conductor	954 AAC, Magnolia
Outgoing Distribution Voltage	12.47/7.2 kV Grd. Wye
Low Voltage Equipment BIL	110 kV
Frequency	60 Hz
Elevation above sea level	2300 ft.*
*For altitudes above 3,300 feet, apply Altitude Correction Factors to the voltage and continuous current ratings in accordance with ANSI Standards.	

Ambient Temperature Minimum	0°C
Ambient Temperature Maximum	50°C
Seismic Loading	
SDS:	0.522
SD1:	0.284
FPGA	1.34

1.14 MATERIAL AND EQUIPMENT NOT COVERED UNDER THIS SPECIFICATION

A. Equipment listed in this section will be provided by the Owner or under separate specifications.
1. Land, fill, and site preparation
2. Fence and Gates
3. HV Transmission Line, Hardware, and Suspension Insulators
4. MV URD Cable and Terminations
5. Power Transformers
6. Distribution Transformers
7. Power Circuit Breakers
8. Control Enclosure and Accessories
9. Foundations
10. Grounding Material
11. Control Cable, Conduit and Wiring
12. Station Lights and Accessories

1.15 SUBSTATION STRUCTURES

A. General

1. Furnish one (1) complete lot of prefabricated, hot dip galvanized steel structures as shown on the specification drawings. Assemblies, fittings, clamps, and other hardware for mounting all equipment shown on the specification drawings shall be included with the structural steel.
2. Structural material shall be in accordance with specifications ASTM-A36 for steel plates and ASTM-A500 Grade B for steel tubes with minimum yield point of 46,000 psi. Punching and drilling shall be done accurately. Center-to-center distance between end holes of a piece shall not vary more than 1/16 inch from the fabrication drawings. Burrs caused by drilling or punching shall be removed prior to galvanizing.
3. All structural material shall be hot dip galvanized in accordance with specifications ASTM A123, A143, A153, and A384. All galvanized pieces shall be free of spurs.
4. Each piece shall be plainly marked with its respective erection identification mark. Pieces shall be bundled in lots of approximately 100 lbs. with each bundle containing pieces for use on a common structure. Bundles shall be marked to identify the structure to which they belong. Larger structural pieces may be shipped separately. Welded or shop assembled sections shall be adequately braced to prevent damage in shipment. All crates, boxes and bundles shall be clearly marked with list of contents.
5. Structures are to be designed according to the latest applicable specifications of the National Electric Safety Code and NEMA Publication SG-6, Part 36.
6. Suitable tabs shall be provided at the base of each column for attaching NEMA 2-hole ground connectors. Provisions, where required, shall be made to secure ground wires extending up structures at maximum 4 ft. intervals. Structures requiring additional tabs include instrument transformer stands, deadends, and switch stands. Deadend structures shall also include tabs for mounting OPGW clamps as shown on specification drawings from the peak of the structure to the base.
7. Structures shall have mounting provisions for junction boxes noted on specification drawings.
8. Unbalanced loading due to one or more broken conductors shall be considered in design.
9. All anchor bolt patterns shall be symmetrical.

B. Bolts and Fasteners
1. High strength bolts shall meet ASTM A325 specifications, and be furnished with nuts and MF locknuts conforming to ASTM A563, Grade DH. Bolts, nuts, and washers shall be hot dip galvanized in accordance with ASTM specification A153, Class C. Galvanized bolts shall be free of spurs. **The required number of bolts, nuts, and washers shall be increased by five percent. Bolts, nuts, and washer shall be boxed and labeled separately by size and type**.

C. Anchor Bolts
1. Anchor bolts shall take the form of either headed bolts or straight rod meeting ASTM F1554 specifications, grade as required, and color coded on the end to help facilitate easy identification in the field. Bent anchor bolts are not acceptable in most cases and must be approved by the Engineer before using. Each anchor bolt shall be furnished with a

minimum of three (3) A563 heavy hex nuts, grade as required, and two (2) F436 flat circular washers unless otherwise noted.

2. Straight rod anchor bolts shall be provided with an anchoring device on one end, which is to be embedded in concrete. The anchoring device shall consist of a heavy hex nut welded at the unstressed end of the anchor bolt. This anchor nut is not included with the quantities described above.
3. All anchor bolts, nuts, and washers shall be hot dip galvanized conforming to ASTM A153, Class C specifications.

D. High Voltage Section

1. All structures, tubular bus, bus supports, bus connectors, and conductor, except line conductor, as shown on the specification drawings, are to be included in the material package. Structures shall be designed to support all wires without offsetting strain from incoming or outgoing conductors.

Voltage Rating	230 kV, 900 kV BIL
Short Circuit Current Rating (sym.)	40 kA
Ice and Wind Loading	
Structure	90 mph wind
Conductors	
Wind	90 mph wind
Ice	0 inch
NESC District	Light
Number Incoming Conductors (per deadend)	Three (3)
Maximum Incoming Conductor Tension (per phase)	4,000 lbs.
Incoming Conductor (per phase)	954 AAC, Magnolia
Number Incoming Static Wires (per deadend)	Two (2)
Maximum Incoming Static Wire Tension (per line)	2,000 lbs.
Incoming Static Wires	3/8” EHS or OPGW
Maximum Incoming Line Angle	15°

E. Low Voltage Section

1. All structures, tubular bus, bus supports, bus connectors, and conductor and any other necessary hardware for a complete low voltage installation are to be included in the material package.
2. Design loading for wind and ice shall be the same as for high voltage structures. Drilling and mountings shall be furnished for all equipment and hardware as shown on the specification drawings.

Voltage Rating	15 kV, 110 kV BIL
Short Circuit Current Rating (sym.)	25 kA

F. Static Mast Structure

1. General:
   a. Design loading for wind and ice shall be the same as for high voltage structures. Accumulated loads on structures shall be

increased by individual overload factors in accordance with the latest revision of the National Electric Safety Code.

b. Seller shall verify all dimensions to verify proper fit up of structure connections prior to fabrication. Any deviation in dimension or materials from that shown on the drawings shall be submitted to the Engineer for his written approval prior to fabrication. Such submittals shall be in the form of shop drawings, per Section 1.10 of this specification.

c. The static mast column shall be constant taper round or multi-sided (8 or 12 sides) tubular sections in accordance with applicable ASTM requirements. Structural steel shall be ASTM A36, A500 Grade B or A572. Minimum section thickness shall be 3/16 inch. Mill test reports shall be made available, if requested, at no cost to the Owner.

d. Prior to the static mast being worked in any manner, structural materials shall be cleaned of all rust and foreign particles. Material shall be straight within the tolerance allowed by ASTM Specification A6. If straightening is necessary, it may be done by mechanical means or any application of a limited amount of localized heat. Straightening shall be done in a manner that will not injure the material.

e. Arc welding electrodes shall be in accordance with the requirements of the American Welding Society Specification D1.1, latest edition. Welding electrodes shall be E-70XX or equivalent wire if semi-automatic or automatic welding is used. Welding shall be performed by operators who have been qualified by tests as prescribed by AWS D1.1 to perform the type of welding required.

2. Foundation Supported

a. Concrete foundations installed by others will have a minimum 28 day compressive strength of 4,500 psi.

b. Structure base plates shall be designed to accommodate anchor bolt size and layout. Anchor bolt embedment length shall be designed in accordance with the latest American Concrete Institute (ACI) standards.

c. Anchor bolts shall be as required by structure design and shall be in accordance with the latest ASTM standards. For high strength anchor bolts, ASTM A615 Grade 60 or Grade 75 (preferred) shall be furnished with a minimum of 3 heavy hex nuts and 2 flat washers each, unless otherwise noted.

d. Each design load case shall be considered independently to determine the maximum stress in any member as well as overall deflection of the static mast. Structures shall be analyzed for the simultaneous application of ultimate vertical, transverse and longitudinal wire loads, structure wind loads, and structure dead load.

1.16 SUBSTATION MATERIAL AND EQUIPMENT

A. Quantities for the following materials and equipment shall be determined by the Seller in accordance with the bid schedule and general arrangement drawings. Package shall include all material necessary for a complete installation as indicated on specification drawings.

B. All Group-Operated Switches (GOAB) shall be complete with insulators, operating mechanism, provisions for padlocking in either the open or closed position, operating pipe, grounding connectors and flexible grounding braid as shown in RUS Bulletin 1724E-300 (Figure 9-37:Typical Switch Grounding). Assembly of GOAB switches is indicated below. All low side disconnect switches shall be furnished completely assembled on insulators.

1. High Side GOAB Switch (Center Break)

Type	Center Break "V" w/ Arcing Horns
Voltage Class	230 kV, 900 kV BIL
Continuous Current	1,200 A
Blade	Aluminum
Operator	Worm Gear
Mounting	Vertical
Phase Spacing	16'-0"
Insulators	per Insulator specification
Assembly	Individual switch poles shall be furnished fully assembled.

2. High Side GOAB Switch (Vertical Break)

Type	Vertical Break
Voltage Class	230 kV, 900 kV BIL
Continuous Current	1,200 A
Blade	Aluminum
Operator	Worm Gear
Mounting	Horizontal
Phase Spacing	12'-0"
Insulators	per Insulator specification
Assembly	Individual switch poles shall be furnished fully assembled.

3. High Side Surge Arresters

Manufacturer	Ohio Brass
Type	EVP
Class	Station Class
Voltage Rating	140 kV MCOV
Design Requirements	ANSI Standard C62.11
Color	ANSI #70 Gray
Mounting	Tripod Base, 10" B.C.
Terminals	Ground Terminal – Clamp Type, Line Terminal – 4-hole Spade

4. High Side Insulators

Voltage Class	230 kV, 900 kV BIL
Technical Reference Number	TR-304

Type	Station Post, 5” B.C. Uniform Stack
Porcelain	ANSI #70 Gray

5. Low Side GOAB Switch

Type	Vertical Break
Voltage Rating	15 kV, 110 kV BIL
Continuous Current	1,200 Amps (min.)
Operator	Manual Swing Handle
Mounting	Horizontal
Phase Spacing	3’-0”
Insulators	per Insulator specification
Assembly	Individual switch poles shall be furnished fully assembled.

6. Low Side Fuse Disconnect Switch

Manufacturer	S&C
Type (Complete with Live Parts)	SMD-20
Terminals	2 Hole NEMA (Tinned)
Style	Station Vertical Offset
Voltage Class	15 kV, 110 kV BIL
Fuse Unit Type	SMU-20
Continuous Current-Fuse Holder	200 Amps
Fuse Unit Current Rating	5E, Std
Number of Fuse Units	Four (4)
Insulators	per Insulator specification

7. Low Side Station Service Transformers

Type	Pole mount, CSP
ANSI Standard	C57.12.20
Capacity	25 kVA
Voltage Rating	7,200-240/120 V
BIL	95 kV
Impedance	ANSI Std
Taps	None
Windings	Copper
Color	ANSI #70 Gray

8. Low Side Surge Arresters

Manufacturer	Ohio Brass
Type	PVI-LP
Class	Intermediate Class
Voltage Rating	7.65 kV MCOV

Design Requirements	ANSI Standard C62.11
Color	ANSI #70 Gray
Mounting	Tripod Base, 10” B.C.
Terminals	Ground Terminal – Clamp Type, Line Terminal – 4-hole Spade

9. Low Side Insulators

Voltage Class	15 kV, 110 kV BIL
Technical Reference Number	TR-205
Type	Station Post, 3" B.C.
Porcelain	ANSI #70 Gray

10. Conductors and Connectors

a. Type, size and quality of major bus materials are shown on the drawings. The intent is to set a standard for bus and equipment as well as to specify other necessary requirements.

1) General

a) Provide all necessary bus conductor, connectors, and other materials required to completely interconnect power equipment as shown on specification drawings. This includes all bus connectors, bus splicing material, bolts, nuts, washers, etc. Connectors for all equipment including high and low side transformer bushings (4-hole pad) shall be included.

b) For all spare distribution bays, the Supplier shall furnish all connectors necessary to allow the Owner to make jumpers to connect the bus, low voltage switches and an Owner-furnished recloser to complete the bay at a future date.

2) Bus Conductor

a) A minimum number of conductor types and sizes have been included in the design of electrical bus in this section. All sections of tubular conductor longer than eight feet between supports require damping conductors. Damping conductor shall be furnished as specified on the following table:

DAMPING CONDUCTOR REQUIREMENTS	
Nominal Tubular Bus Size (inch)	**Minimum Size ACSR Conductor (kcmil)**
1.5	211.6
2	266.8
2.5	266.8
3	336.4
4	556.5

b) High Side Bus

Rigid Bus	4” Sch 40 Al Tube
Conductor in Main Current Paths	954 AAC, Magnolia
Conductor taps	795 AAC, Dahlia

c) Low Side Bus

Rigid Bus	4” Sch 40 Al Tube
Conductor in Main Current Paths	556.5 AAC, Dahlia
Conductor taps	1/0 ACSR, Raven

d) Tubular bus conductor shall be Schedule 40 seamless electrical grade 6063-T6. Tubular buswork shall have smooth surface Industry Class IV finish. Care shall be exercised in handling and packaging bus conductor for shipment to prevent abrasion or other damage.

3) Bus Connections

a) High voltage bus connections and terminals shall be bolted-type, and low voltage shall be bolted-type unless otherwise noted. Stainless steel bus bolts shall be furnished for bolted connections. **Nuts shall be silicon bronze.**

b) Low voltage bus tee connectors shall be bolted tube-conductor or conductor-conductor connectors. Bus tee connections utilizing NEMA pads and terminals will not be accepted.

c) On copper-to-aluminum and aluminum-to-aluminum connections, each bolt shall be furnished with one Belleville and two flat washers. On copper-to-copper connections, each bolt shall have one flat and one lock washer. Copper and copper alloy composition connectors shall have tinned contact surfaces where used for copper-to-aluminum connections.

d) Stainless steel Belleville washers shall be a minimum of 0.109" thick with a 3,750 pound load required to flatten the washer. Stainless steel flat washers shall be a minimum of 0.125" thick. All washers shall be 1 5/8" diameter.

e) All bolts shall be sized to extend completely through nuts, with a minimum of 1/8” and a maximum of 3/8” thread reveal when properly torqued.

f) Contact inhibitor shall be furnished for all aluminum connections.

11. Switch Stick and Container

Stick	
Manufacturer	Hastings
Catalog Number	3120 (Includes P10431 Universal Head)
Size	Adjustable 12’-18'
Construction	Fiberglass
Quantity	One (1) per Substation

Container	
Manufacturer	Hastings
Catalog Number	01-3353
Size	6" X 13'
Mounting Accessory	Fence Mounting Kit, Cat No. 01-3200-041
Construction	Heavy Duty Plastic with Hardware for Fence Mounting

Signs	
Warning High Voltage	
Size	10" x 14"
Construction	18 ga. Steel w/Porcelain Enamel Finish
Accessories	Mounting Hardware by Others

APPENDIX
SUMMARY OF PROPOSAL

(Requires Completion by Bidder)

*Denotes required value

A. Price and Delivery

1) Total Package Price, delivered FOB jobsite: _____

2) Specified Delivery Lead Times:

Anchor bolts	16 weeks ARO
Structural steel	24 weeks ARO
Balance of package	28 weeks ARO

3) Can Bidder meet specified lead times based upon award of contract with ten (10) days from bid award? _____ (Yes/No)

4) If not, Bidder shall provide earliest guaranteed delivery lead times (weeks ARO):

Anchor bolts _____

Structural steel, less static mast(s) _____

Balance of package _____

6) Are prices quoted in A.1 above firm? _____ (Yes/No)

7) If not, what is the maximum percentage increase that will be applied to the price quoted in A.1 to meet specified lead times? _____

B. Drawings & Structure Calculations

Will Bidder meet delivery lead times as listed below for drawings & structure calculations?

1) Drawings & Structure Calculations for review, 12 weeks ARO, based on contract award date within ten (10) working days after bid award. _____* (Yes, No)

2) Certified drawings, 20 weeks ARO, based on return of reviewed drawings by Owner within ten (10) working days of receipt. _____* (Yes, No)

3) If Bidder cannot meet drawing & calculation lead times listed above, Bidder shall provide

earliest guaranteed delivery lead times
which can be met (weeks ARO):

Structure Calculations: _____

Review Drawings: _____

Certified Drawings: _____

C. Data

1) Bidder _____

2) Name & Location of Steel Fabricator _____

3) Estimated Weights and Dimensions (Shipping):

   a. Weight of largest piece of material to be shipped _____ lbs

   b. Dimensions of largest shipped item _____ x _____ x _____

4) Describe extent of any required field assembly for equipment (e.g., switches assembled or un-assembled):

_____

_____

_____

NOTE: AUTHORIZED SIGNATURE INDICATES ABOVE VALUES DENOTED WITH * ARE GUARANTEED

_____	_____
(Bidder)	(By)
_____	_____
(Address)	(Title)
_____	_____
(Address)	(Date)

Schedule I – Substation Items

Item and Description	Manufacturer	Qty.	Unit Price	Extended Price
TRANSMISSION				
1. Structural Steel		1 Lot		
a. A-frame Deadend		1		
b. Metering Stand		3		
c. Switch Stand		4		
d. Singe-phase Bus Supports		8		
e. Three-phase Bus Supports		4		
f. Static Mast		2		
g. Switch Platforms		4		
h. Breaker Platforms		2		
2. Anchor Bolts		1 Lot		
3. 230 kV GOAB Switch, CBV		1		
4. 230 kV GOAB Switch, VB		3		
5. 230 kV Surge Arresters		3		
6. 230 kV Insulators		23		
7. Electrical Bus & Connectors		1 Lot		
			Transmission Subtotal:	
DISTRIBUTION				
1. Structural Steel		1 Lot		
a. Switch Stand		2		
b. Service Transformer Stand		2		
c. Termination Stand		2		
d. Switch Platforms		2		
e. Breaker Platforms		2		
2. Anchor Bolts		1 Lot		
3. 15 kV GOAB Switch, VB		2		

Item and Description	Manufacturer	Qty.	Unit Price	Extended Price
4. 15 kV Surge Arresters		6		
5. 15 kV Fuse Disconnect Switch		2		
6. 15 kV Fuse Units		4		
7. 15 kV Service Transformer		2		
8. 15 kV Station Post Insulators		12		
9. Electrical Bus & Connectors		1 Lot		
10. Switch Stick & Container		1		
11. Warning High Voltage Signs		10		
			Distribution Subtotal:	
			Grand Total:	

END OF SECTION