CITY OF WILSON
WILSON, NORTH CAROLINA

TECHNICAL SPECIFICATIONS AND BID DOCUMENTS

TUBULAR STEEL STRUCTURES FOR THE 115 kV TRANSMISSION LINE POD #13 REQUE

FOR PRICES

SEALED BID # 2023-43

Due Date: 10/25/2023

Time: 2:00pm

Address: Booth & Associates

2300 Rexwoods Drive Ste. 300

Raleigh, NC. 27607

CITY OF WILSON
WILSON, NORTH CAROLINA

TECHNICAL SPECIFICATIONS
AND
BID DOCUMENTS

TUBULAR STEEL STRUCTURES
FOR THE
115 kV TRANSMISSION LINE POD #13

REQUEST FOR PRICES

Booth & Associates, LLC
Consulting Engineers
2300 Rexwoods Drive, Suite 300
Raleigh, North Carolina 27607
Firm COA No.: F-0221

© September 2023

CITY OF WILSON
WILSON, NORTH CAROLINA

TECHNICAL SPECIFICATIONS
AND
BID DOCUMENTS

TUBULAR STEEL STRUCTURES
FOR THE
115 kV TRANSMISSION LINE POD #13

TABLE OF CONTENTS

©September 2023

CITY OF WILSON
WILSON, NORTH CAROLINA

TECHNICAL SPECIFICATIONS
AND
BID DOCUMENTS

TUBULAR STEEL STRUCTURES
FOR THE
115 kV TRANSMISSION LINE POD #13

TABLE OF CONTENTS *(Continued)*

©September 2023

SECTION 1.0

INSTRUCTIONS TO BIDDERS

1.1 Bid Submission

1.1.1 Proposals to be entitled for consideration must be in accordance with these instructions.

1.1.2 Proposals must be made on the Manufacturer's Proposal provided herein and must not be altered, erased, or interlined in any manner. The Bidder shall follow the Manufacturer's Proposal as detailed in the instructions. The Bidder may retain one (1) copy, but the fully-executed original must be inserted in or be attached to the Specification Documents. In addition, one (1) extra copy of all executed forms and supporting information shall be supplied.

1.1.3 The Bidder shall furnish certain information, as required by the Specifications, regarding the material on which he is bidding. Two (2) copies of the information, together with the manufacturer's literature setting forth the guarantees and describing the material on which he is bidding, shall be included as part of the Manufacturer's Proposal. If one manufacturer is bidding through two or more agents or representatives, then descriptive literature, guarantees, etc., may be submitted in duplicate in one (1) sealed envelope, said envelope to be considered and treated as though it contained a sealed bid, in which shall be listed the names of Bidders to whom the information applies. Each sealed bid without this information shall state the manufacturer who is furnishing the information. Additional sets of these Specifications may be obtained upon request and a non-refundable deposit of One Hundred Dollars ($100.00) by approved Bidders.

1.1.4 Initial Design Calculations and data in PDF or Electronic format shall be submitted with manufacturer's proposal. These shall include:

1.1.4.1 General dimensions, plate sizes, and weights of all component parts of the structure and anchor bolts.

1.1.4.2 The total ultimate moments, section modulus required and section modulus furnished at all splices and a minimum of every twenty feet along the pole shaft.

1.1.4.3 Deflections, including magnitude and direction, at the top of each structure due to loading conditions specified. Provide a pre-camber and/or rake table summary, if applicable.

1.1.4.4 For a frame structure, a sketch showing joint coordinates and load application points.

1.1.4.5 Any revisions to the initial design calculations shall also be submitted as

"PDF" files.

1.1.4.6 The total ultimate moments, section modulus required and furnished at the base of the arms.

1.1.4.7 Crossbrace calculations including sketch of crossbrace connection to pole shaft (i.e. single vs. double shear) and where crossbraces intersect (i.e. thru bolt, u-bolt, strap, etc.).

1.1.4.8 Computation of stresses in base plates, flange-plates, connections, attachments, and anchor bolts.

1.1.4.9 Bend line base plate calculations including a detailed sketch of the bend lines in relationship to the pole base, baseplate, and anchor bolts.

1.1.5 Proposals shall include a Form of Exceptions which shall itemize each and every exception from the Specifications. The Form of Exceptions shall state the section, subsection, and paragraph designations from the part of the Specifications to which exception is taken and explain in detail the nature of the exception. A copy of the Form of Exceptions is included (See pages 16 and 17). Exceptions will not necessarily eliminate a Bidder from consideration, even if bids without exceptions are received from others. The treatment of exceptions will be based entirely on the overall best interest of the Owner. Failure to state exceptions assumes complete compliance with Specifications.

1.1.6 Modifications to bids must be by removal of the Bidder's original bid and the submittal of a completely revised bid package in full compliance with the Plans, Specifications, and Bid Documents. This is required prior to the time of opening bids.

1.1.7 Should the Bidder find discrepancies in the documents or should he be in doubt as to their meaning, he shall at once notify the Engineer who will send written instructions to all Bidders. Neither the Owner nor the Engineer will be responsible for any oral instructions.

1.2 Bid Price

1.2.1 Manufacturer's Proposal Form

Those bids not received on the Proposal Forms contained herein will be considered unresponsive. The forms shall be filled out completely. Any omissions may cause the entire Proposal to be rejected.

1.2.2 Delivery of Poles

The prices quoted shall include delivery of the poles F.O.B. project site/laydown yard. The materials shall be quoted including delivery to the site. See the Vicinity Map included in the Appendix. Final location will be decided by the Contractor.

The Manufacturer shall be responsible for securing all permits required for transportation of the material. Delivery of all items of material shall be made at such time as to permit unloading between the hours of 9:00 a.m. and 3:00 p.m., Monday through Thursday, holidays excluded. The Manufacturer shall give forty-eight (48) hours' notice of all deliveries to the Owner's and Engineer's designated representative.

Receipt of "Approval Drawings" by the Manufacturer constitutes authorization for manufacture only, predicated upon the Drawings and corrections found thereon. Release for shipment is to be granted by either the Owner or the Owner's Engineer, based upon the following:

a. Furnishing of the requested number of copies of the Final Drawings as called for in the Specifications.

b. Thirty (30) days notification of tentative shipping schedule and forty-eight (48) hours notification prior to delivery.

1.3 Schedule

1.3.1 The time to be allowed for delivery shall be stated in the Proposal. The Manufacturer, upon notice of award of Contract, shall prepare a delivery schedule based on the allowed time and submit the schedule to the Engineer for approval.

1.3.2 If Manufacturer should be delayed at any time in the progress of the work by any act of negligence by the Owner or the Engineer, by any separate Contractor employed by the Owner, or by changes ordered in the work, then the time of completion shall be extended for such reasonable time as the Engineer may decide.

1.3.3 No extension of time for completion will be made for ordinary delays and accidents. Extensions may be granted for delays ordered by the Engineer if the request has been made in writing to the Engineer within forty-eight (48) hours after such request.

1.4 Bid Acceptance Period

1.4.1 Bids to be Retained

No bid may be withdrawn after the scheduled closing time for the receipt of bids for a period of sixty (60) days pending the execution of a Contract by the Successful Bidder. Should the Successful Bidder default and not execute a Contract, then the Contract may be offered to the next lowest responsible Bidder whose Proposal is evaluated as acceptable.

1.4.2 Award of Contract

1.4.2.1 The award of the Contract will be made to the lowest acceptable Bidder as soon as practicable, provided that in the selection of materials a Contract may be awarded to a responsible Bidder other than the lowest in

the interest of standardization or ultimate economy if the advantage of such standardization or ultimate economy is clearly evident. The Owner reserves the right to reject any and all bids.

1.4.2.2 The Owner reserves the right to waive minor irregularities or minor errors in any Proposal if it appears to the Owner that such irregularities or errors were made through inadvertence. Any such irregularities or errors so waived must be corrected on the Proposal prior to its acceptance by the Owner.

1.4.2.3 The Owner will consider, in addition to the prices quoted in the Manufacturer's Proposal, the following factors in estimating the lowest cost to the Owner:

a. Delivery days for material
b. Adherence to the Bid Documents and Specifications
c. Suitability of material
d. Structure weight
e. Structure flexibility
f. Firm prices
g. Past experience with manufacturer
h. Installation costs

1.4.2.4 A form is provided as part of the Manufacturer's Proposal in which the Bidder shall indicate the delivery schedule for his materials. Strict adherence is expected to these quoted days.

1.5 Bid Requirements

1.5.1 Bid Security

1.5.1.1 Each Proposal shall be accompanied by cash, cashier's check, or a certified check drawn on a bank or trust company insured by the Federal Deposit Insurance Corporation, the National Credit Union Insurance Fund, or a Bid Bond in an amount equal to not less than ten percent (10%) of the Proposal, said deposit to be retained by the ~~Owner~~ Engineer as liquidated damages in event of failure of the Successful Bidder to accept the Contract within ten (10) days after the award.

1.5.1.2 Bid Bond shall be conditioned that the Surety will upon demand forthwith make payment to the Obligee upon said Bond if the Bidder fails to accept the Contract in accordance with the Bid Bond; and upon failure to forthwith make payment, the Surety shall pay to the Obligee an amount equal to double the amount of said Bond.

1.5.1.3 Only one (1) Bid Surety is required, the amount of which shall be based on the total amount of the bid.

1.5.2 Performance Bond

1.5.2.1 For a Contract in excess of $100,000, the Bidder agrees to furnish a Performance Bond in triplicate in the form attached hereto with sureties listed by the United States Treasury Department as Acceptable Sureties, in a penal sum not less than the contract price.

1.5.2.2 Failure to Furnish Performance Bond. Should the successful Bidder fail or refuse to execute such counterparts or to furnish a Performance Bond (where required) within ten (10) days after written notification of the acceptance of the Proposal by the Owner, the Bidder will be considered to have abandoned the Proposal. In such event, the Owner shall be entitled (a) to enforce the Bid Bond in accordance with its terms, or (b) if a certified check has been delivered with the Proposal, to retain from the proceeds of the certified check, the difference (not exceeding the amount of the certified check) between the amount of the Proposal and such larger amount for which the Owner may in good faith contract with another party to construct the project. The term "Successful Bidder" shall be deemed to include any Bidder whose Proposal is accepted after another Bidder has previously refused or has been unable to execute the counterparts or to furnish a satisfactory Performance Bond (where required.)

1.5.3 Liquidated Damages

The time of the Completion of Delivery of all items of material is of the essence of the Contract. Should the Bidder neglect, refuse or fail to complete the delivery within the time herein agreed upon, after giving effect to extensions of time, if any, herein provided, then, in that event and in view of the difficulty of estimating with exactness damages caused by such delay, the Owner shall have the right to deduct from and retain out of such moneys which may be then due, or which may become due and payable to the Bidder the sum of One Thousand Dollars ($1,000.00) per calendar day for each and every day that such construction is delayed in its completion beyond the specified time, as liquidated damages and not as a penalty; if the amount due and to become due from the Owner to the Bidder is insufficient to pay in full any such liquidated damages, the Bidder shall pay to the Owner the amount necessary to effect such payment in full: Provided, however, that the Owner shall promptly notify the Bidder in writing of the manner in which the amount retained, deducted or claimed as liquidated damages was computed.

1.6 Bid Data

1.6.1 Examination of Conditions

Prior to the submission of the Proposal, the Bidder shall make and shall be deemed to have made a careful examination of the Plans and Specifications on file with the Owner and with the Engineer and all other matters that may affect the cost or the

time of completion of the work.

1.6.2 Qualification of Bidders

Bids will be accepted only from Bidders deemed by the Engineer to be qualified to provide the materials, equipment, and services described by these Specifications. The experience of Bidders in providing the same or similar materials, equipment, and services will be a major factor in determining qualification. The Bidder shall include information to establish qualifications.

SECTION 2.0

GENERAL CONDITIONS

2.1 Definition of Terms

Whenever in these "Instructions to Bidders," "Manufacturer's Proposal," "Technical Specifications," "Contract," "Bond," etc., the following terms or pronouns in place of them are used, the intent and meaning shall be interpreted as follows:

"Owner"	City of Wilson Wilson, North Carolina
"Engineer"	Booth & Associates, LLC Raleigh, North Carolina
"Observer"	An authorized representative of the Owner, assigned to make any or all necessary observations of work performed, equipment and/or apparatus furnished by the Manufacturer.
"Manufacturer" or "Bidder"	Any individual, firm, or corporation submitting a Proposal for the work contemplated, acting directly or through a duly-authorized representative.
"Manufacturer" or "Bidder"	Party of the second part of the Contract, acting directly or through a duly-authorized representative.
"Subcontractor"	An individual, firm, or corporation who contracts with the Manufacturer to perform part of or all of the latter's Contract.
"Surety"	The body, corporate or individual, approved by the Owner which is bound with and for the Manufacturer, who is primarily liable, and which engages to be responsible for his acceptable performance of the work for which he has contracted.
"Manufacturer's Proposal"	The approved prepared form on which the Bidder is to or has submitted his Proposal for the work contemplated.

"Bid Deposit"	To all bids there shall be attached cash, cashier's check, or a certified check of the Bidder, drawn upon a bank authorized to do business in South Carolina, or in lieu thereof, a Bid Bond.
"Plans"	All Drawings or reproductions of Drawings pertaining to the construction under the Contract.
"Technical Specifications"	The directions, provisions, and requirements contained herein, pertaining to the method and manner of performing the work, or to the quantities and qualities of materials to be furnished under the Contract.
"Contract"	The agreement covering the furnishing of equipment and/or apparatus and the performance of the work. The Contract shall include the "Manufacturer's Proposal," "Plans," "Technical Specifications," and "Acknowledgements."
"Performance Bond"	The approved form of security, to be approved by the Owner, furnished by the Manufacturer and his Surety as a guarantee of good faith on the part of the Manufacturer to execute the work in accordance with the terms of the Specifications and Contract.
"Work"	The performance of the project covered by the Specifications for the furnishing of labor, machinery, equipment, tools, or any other item being purchased by the Owner.
"Emergency"	A temporary unforeseen occurrence or combination of circumstances which endangers life and property and calls for immediate action or remedy.
"Work at Site of Project"	Work to be performed, including work normally done on the location of the project.
"Completion of Delivery"	Full performance by the Manufacturer of the Manufacturer's obligations under the Contract and all amendments and revisions thereof. Final date of delivery and acceptance by Owner or Owner's Representative on site F.O.B. of all items of material shall be the sole conclusive evidence as to the date of Completion of Delivery.

The subheadings in these Specifications are intended for convenience or reference only and shall not be considered as having any bearing on the interpretations thereof.

2.2 Interpretation of Bid Documents

2.2.1 Drawings and Specifications

The Drawings and Specifications are complementary, one to the other. That which is shown on the Drawings or called for in the Specifications shall be as binding as if it were both called for and shown. The intention of the Drawings and Specifications is to include all labor, materials, transportation, equipment, and any and all other things necessary to do a complete job. In case of discrepancy or disagreement in the Contract Documents, the order of precedence shall be: Contract, Technical Specifications and Small Scale Drawings.

2.2.2 Clarifications and Detail Drawings

In such cases where the nature of the work requires clarification by the Engineer, such clarification shall be furnished by the Engineer with reasonable promptness by means of written instructions or Detail Drawings or both. Clarifications and Drawings shall be consistent with the intent of Contract Documents and shall become a part thereof.

2.2.3 Copies of Drawings and Specifications

The Engineer will furnish free of charge to the Manufacturer one (1) copy of Plans and Specifications.

2.2.4 Ownership of Drawings and Specifications

All Drawings and Specifications are instruments of service and remain the property of the Engineer whose name appears thereon. The use of these instruments on work other than this Contract without permission is prohibited. All copies of Drawings and Specifications other than Contract copies shall be returned to the Engineer upon request after completion of the work.

2.2.5 Royalties, Licenses, and Patents

It is the intention of the Contract Documents that the work covered herein will not constitute in any way an infringement on any patent whatsoever. The Manufacturer shall protect and save harmless the Owner against suit on account of alleged or actual infringement. The Manufacturer shall pay all royalties and/or license fees required on account of patented articles or processes, whether or not the patent rights are evidenced hereinafter.

2.3 Addenda to the Bid Documents

2.3.1 Any bulletins issued during the time of bidding or addenda to Specifications are to be considered covered in the Manufacturer's Proposal; and in accepting a Contract, they will become a part thereof. Receipt of addenda shall be acknowledged by the Bidder on the Manufacturer's Proposal.

2.3.2 The Owner, or the Engineer on behalf of the Owner, may make changes to Plans and/or Specifications after award of the Contract or while construction is in progress. The compensation for such changes shall be agreed upon in writing between the Manufacturer and the Owner prior to commencement of work involving the change. No payment shall be made to the Manufacturer for correcting work not in compliance with Specifications.

2.4 Insurance

The Manufacturer shall maintain Workmen's Compensation Insurance and Liability Insurance appropriate for the level of exposure involved in the Contract. The Manufacturer shall furnish certification of the appropriate insurance.

2.5 Guarantee

The Manufacturer shall guarantee his materials and workmanship against defect due to faulty materials, faulty workmanship, or negligence for a period of one (1) year following final acceptance of the work. He shall make good such defective materials or workmanship and any damage resulting therefrom without cost to the Owner.

CITY OF WILSON
WILSON, NORTH CAROLINA

TECHNICAL SPECIFICATIONS
AND
BID DOCUMENTS

TUBULAR STEEL STRUCTURES
FOR THE
115 kV TRANSMISSION LINE POD #13

FORM OF EXCEPTIONS

BIDDER: _____

_____

MANUFACTURER: _____

_____

INSTRUCTIONS: The following is a list of exceptions to the Bidding Documents and/or Technical Specifications pertaining to the furnishing of the subject materials. Bidders shall identify each exception by Specification page and paragraph number on this form. The omission of exception implies complete compliance with Plans and Specifications.

BID DOCUMENT/ SPECIFICATION PAGE NO. AND PARAGRAPH	EXCEPTION/VARIATION

BID DOCUMENT/ SPECIFICATION PAGE NO. AND PARAGRAPH	EXCEPTION/VARIATION

CITY OF WILSON
WILSON, NORTH CAROLINA

TECHNICAL SPECIFICATIONS
AND
BID DOCUMENTS

TUBULAR STEEL STRUCTURES
FOR THE
115 kV TRANSMISSION LINE POD #13

SCHEDULE 1

STEEL TRANSMISSION STRUCTURES
GALVANIZED STEEL A572, GRADE 65 WITH
GROUND SLEEVE AND CORROCOTE BELOW GRADE PROTECTION

Structure Number	Pole Ht./Class (1)	Min. Moment Capacity 5′ From Top (ft-kips)	Direct Embedment Depth	Design Reference Drawing	Quantity	Unit Weight (lbs)	Unit Price	Extended Price
Transmission Poles – Direct Embedment								
1 LP	40/S-03.5	27	13’-6”	SPFD-1	1		$	$
1 MP	40/S-03.5	27	12’-0”	SPFD-1	1		$	$
1 RP	40/S-03.5	27	10’-6”	SPFD-1	1		$	$
4 LP / RP	65/S-04.2	32	15’-0”	SPFD-4A	2		$	$
4 MP	65/S-04.2	32	15’-0”	SPFD-4B	1		$	$

Notes:

1) Pole class designation will be defined by either the current RUS Standard Steel Pole Class or as an “ENG” Engineered Designation.

CITY OF WILSON
WILSON, NORTH CAROLINA

TECHNICAL SPECIFICATIONS
AND
BID DOCUMENTS

TUBULAR STEEL STRUCTURES
FOR THE
115 kV TRANSMISSION LINE POD #13

SCHEDULE 1

STEEL TRANSMISSION STRUCTURES
GALVANIZED STEEL A572, GRADE 65

Structure Number	Pole Ht./Class *	Min. Moment Capacity 5′ From Top (ft-kips)	Design Reference Drawing	Quantity	Unit Weight (lbs)	Unit Price	Extended Price
Transmission Poles – Self-Supporting							
2 LP	46/ENG	*See Attach. B*	SPFD-2A	1		$	$
2 MP	48/ENG	*See Attach. B*	SPFD-2B	1		$	$
2 RP	50/ENG	*See Attach. B*	SPFD-2A	1		$	$
3 LP	48/ENG	*See Attach. B*	SPFD-3	1		$	$
3 RP	48/ENG	*See Attach. B*	SPFD-3	1		$	$

**** Pole class designation will be defined by either the current RUS Standard Steel Pole Class or as an Engineered Designation.***
***** Ground sleeve is to be applied to direct embedment structures at the appropriate height per the "embedment depth" column.***

FLANGE-MOUNTED STEEL VIBRATORY CAISSON
GALVANIZED STEEL A572, GRADE 65 WITH BELOW GRADE PROTECTION,

Structure Number	Overall Length	Embedment Length	Minimum Diameter (Flat-Flat)	Minimum Wall Thickness	Framing Drawing*	Qty.	Unit Weight (lbs)	Unit Price	Extended Price
Vibratory Caisson Foundation, Flange-Mounted									
2LP	17'-6"	16'-0"	3'-0"	3/8"	VCFD-1	1		$	$
2MP	16'-6"	15'-0"	3'-0"	3/8"	VCFD-1	1		$	$
2RP	17'-6"	16'-0"	3'-0"	3/8"	VCFD-1	1		$	$
3LP	14'-6"	13'-0"	3'-0"	3/8"	VCFD-1	1		$	$
3RP	14'-6"	13'-0"	3'-0"	3/8"	VCFD-1	1		$	$

**** VCFD Type is flexible per manufacturer's optimal design for Poles and Caissons.***
The shown designation is anticipated by the engineer but not final.

CITY OF WILSON
WILSON, NORTH CAROLINA

TECHNICAL SPECIFICATIONS
AND
BID DOCUMENTS

TUBULAR STEEL STRUCTURES
FOR THE
115 kV TRANSMISSION LINE POD #13

TABULATION OF UNIT PRICES

SCHEDULE NO. 1 – TOTAL PRICE $ _____

NOTE: *City of Wilson reserves the right to accept or reject, at its sole discretion, the material prices quoted for Schedule 1, based on the unit prices quoted and/or the Total Proposal Price.*

CITY OF WILSON
WILSON, NORTH CAROLINA

TECHNICAL SPECIFICATIONS
AND
BID DOCUMENTS

TUBULAR STEEL STRUCTURES
FOR THE
115 kV TRANSMISSION LINE POD #13

DELIVERY SCHEDULE

Shop Drawings		Delivery		
For Approval	Engineer's Approval	Start	Complete	Total

Schedule 1

_____ Wks. + 1 Wks. + _____ Wks. + _____ Wks. = _____ Wks.

If the undersigned is the Successful Bidder, the shipping points shall be the designated structure locations or as designated otherwise by the Owner (See Appendix – Vicinity Map) and the materials and equipment will be delivered to the Owner in _____ calendar days after notification of the Award of Purchase Order by the Owner. The Bidder shall include one (1) week for Engineer to review and return approval drawings.

Note: City of Wilson is requesting delivery completion on September 1, 2024.

The Materialman further declares that he has examined the site of the work and informed himself fully regarding all conditions pertaining to the locations where the work is to be done, examined the Specifications for the work and the Purchase Order Documents relative thereto, read all special provisions furnished prior to the opening of the bids, and satisfied himself relative to the work to be performed.

The Materialman proposes and agrees that if the following schedule or schedules of this Proposal are accepted, he will contract with the Owner in the Form of a Purchase Order specified, to furnish all necessary materials and equipment, except materials and equipment specified to be furnished by the Owner or others, complete and in accordance with the Plans, Specifications, and Purchase Order Documents, to the full and entire satisfaction of the Owner, with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and Purchase Order Documents, and as cited on Change Order Forms.

The following information should be supplied regarding the materials and equipment on which this bid is based:

Manufacturer: _____

Location or Manufacturing Facility: _____

Other Utilities Purchasing Recent Units of Similar Design: _____

_____

_____

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0572–0107. The time required to complete this information collection is estimated to average 1 minute per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

U.S. Department of Agriculture
Rural Utilities Service

BID BOND

1. *KNOW ALL PERSONS that we, _____*

   _____as Principal, and

   _____,

   as Surety, are held and firmly bound unto City of Wilson

   _____(hereafter called the "Owner") in the penal sum of ten percent (10%) of the amount of the bid referred to in paragraph 2 below, but not to exceed _____dollars ($ _____), as hereinafter set forth and for the payment of which sum well and truly to be made we bind ourselves, our executors, administrators, successors and assigns, jointly and severally, by these presents;

2. *WHEREAS, the Principal has submitted a bid to the Owner for the construction of the Rural Utilities Service project known as _____.*

3. *NOW, THEREFORE, the condition of this obligation is such that if the Owner shall accept the bid of the Principal, and*

   a. *the Principal shall execute such contract documents, if any, as may be required by the terms of the bid and give such Contractor's Bond or Bonds for the performance of the contract and for the prompt payment of labor and material furnished for the project as may be specified in the bid, or*

   b. *in the event of the failure of the Principal to execute such contract documents, if any, and give such Contractor's Bond or Bonds, if the Principal shall pay to the Owner the difference, not to exceed the penal sum hereof, between the amount specified in the bid and such larger amount for which the Owner may in good faith contract with another party to construct the project, then this obligation shall be void, otherwise to remain in full force and effect.*

IN WITNESS WHEREOF, the undersigned have caused this instrument to be executed and their respective corporate seals to be affixed and attested by their duly authorized representatives this

_____day of _____, 20_____.

_____
(Seal) Principle

ATTEST: *By*_____

_____ _____
Secretary *Title*

_____
(Seal) Surety

ATTEST: *By*_____

_____ _____
Secretary *Title*

RUS FORM 307 (Rev. 2-04)

SPACE FOR ATTACHING BID BOND

PERFORMANCE BOND

Date of Execution: _____

Name of Principal: _____
(Contractor)

_____

_____

Name of Surety: _____

Name of Contracting Body: City of Wilson

Wilson, North Carolina

Amount of Bond: $ _____

Project: Tubular Steel Structures for the

115kV Transmission Line

POD #13

KNOW ALL THESE MEN BY THESE PRESENTS, That We, the Principal and Surety above named, are held and firmly bound unto the above named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal entered into a certain Contract with the Contracting Body, identified as shown above and hereto attached.

NOW, THEREFORE, if the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said Contract during the original term of said Contract and any extensions there of that may be granted by the Contracting Body, with or without notice to the Surety, and during the life of any guaranty required under the Contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under the several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in Four (4) counterparts.

Witness:

_____
(Proprietorship or Partnership)

ATTEST:

By: _____

Title: _____
(Corporate Secretary or Assistant Secretary, Only)

CONTRACTOR:

_____
(Trade or Corporate Name)

By: _____

Title: _____
(Owner, Partner, or Corporate President or Vice President, Only)

(CORPORATE SEAL)

SURETY COMPANY:

_____

By: _____

Title: _____
(Attorney-in-Fact)

(SURETY SEAL)

Witness:

_____

Countersigned:

_____

_____
N.C. Licensed Resident Agent

_____

_____
(Name and Address – Surety Agent)

_____

_____
Surety Company Name and N.C. Regional or Branch Office Address

SPACE FOR ATTACHING POWER OF ATTORNEY

CITY OF WILSON
WILSON, NORTH CAROLINA

TECHNICAL SPECIFICATIONS
AND
BID DOCUMENTS

TUBULAR STEEL STRUCTURES
FOR THE
115 kV TRANSMISSION LINE POD #13

TECHNICAL SPECIFICATIONS

1.0 SCOPE

This specification covers the design, materials, welding, inspection, protective coatings, drawings, and delivery of steel transmission structures including pipe piles, drop-in plates, thru-vangs, leveling bolts, crossarms, ladders and anchor bolt cages used for constructing overhead transmission lines. The proposal submitted by the manufacturer shall include field bolts, locknuts, vangs, attachment provisions for arms and/or insulators, anchor bolts, base plates, and other necessary items to make a complete structure per the following specifications:

1.1 Quotations

Quotations will be received by Booth & Associates in Raleigh, North Carolina.

Ms. Gracyn Bancroft, PE, PMP
Booth & Associates, LLC
2300 Rexwoods Ave., Suite 300
Raleigh, North Carolina 27607
(919) 851-8770 (ext. 120)
(919) 859-5918 (Fax)
g.bancroft@booth-assoc.com

1.2 The Manufacturer shall provide quotations for the following schedules:

Schedule 1: Steel Transmission Structures and Steel Vibratory Caissons – Galvanized Steel A572, Grade 65

1.3 Drawings

All poles shall conform to the Drawings included herewith, all of which form a part of these Specifications.

2.0 DEFINITIONS

a. Cambering – the fabricating of a slight convex curve in a pole or crossarm

b. D/t – the ratio of the diameter of a tubular pole to the steel plate thickness

c. Engineer – a registered or licensed person, who may be a staff employee or an outside consultant, and who provides engineering services. Engineer also includes duly authorized assistants and representatives of the licensed person.

d. Ground line – a designated location on the pole where the surface of the ground will be after installation of a direct embedded pole

e. Overload factors (OLF) – a multiplier which is applied to each of the vertical, transverse and longitudinal structure loads to obtain an ultimate load

f. P-delta moment – secondary moment created by the vertical loads acting on the structure when the structure deflects from its unloaded position

g. Point-of-fixity – location on the pole at ground line or below ground line where the maximum moment occurs

h. Raking – the practice of installing a straight pole out of plumb, or at an inclined angle

i. W/t – ratio of the width of the pole (flat-to-flat) to the plate thickness

j. Ultimate load – the maximum design load which includes the appropriate overload factor specified

3.0 CODES AND STANDARDS

Codes, standards, or other documents referred to in this specification shall be considered as part of this specification. The following codes and standards are referenced:

a. American Institute of Steel Construction (AISC), *Specification for the Design, Fabrication and Erection of Structural Steel for Buildings*, latest edition.

b. American Society of Civil Engineers (ASCE) Standard, *Design of Steel Transmission Pole Structures*, Manual 48, latest edition.

c. American Society for Testing and Materials (ASTM), various standards, latest version.

d. American Concrete Institute (ACI), *Building Code Requirements for Reinforced Concrete*, ACI 318, latest edition.

e. American Welding Society (AWS), *Structural Welding Code*, AWS D1.1, latest edition.

f. American National Standards Institute (ANSI), *National Electrical Safety Code*, ANSI C2, latest edition.

g. Steel Structure Painting Council (SSPC), *Surface Preparation Specification*, SSPC-SP6, latest edition.

4.0 CONFLICT BETWEEN THIS SPECIFICATION, DRAWINGS, AND REFERENCED DOCUMENTS

In the event of conflict between this specification and the above referenced documents, the requirements of this specification shall take precedence. In the case of conflict between several referenced documents, the more stringent requirement shall be followed. If a conflict exists between this specification or the referenced documents and the attached drawings, the attached drawings shall be followed. If clarification is necessary, contact the Owner or Owner's representative.

5.0 GENERAL REQUIREMENTS

The design, fabrication, allowable stresses, processes, tolerances, and inspection shall conform to the American Society of Civil Engineers (ASCE) Standard, *Design of Steel Transmission Pole Structures, Manual 48,* latest edition, with the following additions and/or exceptions:

5.1 Pole Structure Design

5.1.1 Pole designs shall be prepared from the attached specification, configuration drawings and design loads. PLS-CADD files may be provided as part of these specifications with minimum design loads shown in the 'Structure Loads' column. The structure shall be capable of withstanding all specified loading cases including secondary stresses from foundation movements when specified in Attachment C, but not considering the possible restraining effect of conductors or shield wires. The structure shall withstand the loads without failure, permanent distortion, or exceeding any specified deflection limitations. Loads are in pounds (lbs.) and include all appropriate overload factors. PLS-CADD "LCA" files may be supplied in lieu of or in addition to Attachment B charts.

5.1.2 Vibratory Pole Bases diameter for the non-tapered section shall be as indicated on Drawing No. VCFD-1 in Attachment D. A circumferential weld shall connect the tapered section to the non-tapered section. See Drawing No. VCFD-1 in Attachment D. Tapered section of Vibratory Pole Bases shall match up with pole taper. Permanent identifiable marks are required on the Vibratory Pole Bases including nameplate, angle bisect and/or transverse axis orientation for proper alignment prior to implanting into ground.

a. Vibratory Pole Base design shall meet ASCE Manual 48 for local buckling.

b. Vibratory Pole Base shall have a minimum wall thickness of three-

eighths inches (3/8″).

c. The Vibratory Pole Base shall be capable of withstanding all specified load cases including secondary stresses.

d. Vibratory Pole Bases of angled structures shall have a permanent identifiable mark indicating the bisect of the associated structure. Vibratory Pole Bases of tangent structures shall have a permanent identifiable mark indicating the transverse axis of the associated structure. This will help facilitate proper orientation.

e. Frequency and stroke amplitude ranges for the vibratory hammer shall be provided by the manufacturer.

5.1.3 Wind pressures shown in the loading criteria shall be multiplied by the appropriate shape factor applied to the poles. Pressures in psf shall be computed as follows:

$$p = W \times C_d$$

Where p = pressure on projected area of the pole normal to wind, W = wind pressure, and C_d = shape (or drag) factor.
Shape factors for computing the wind on poles are:

Round	1.0
Hexagon	1.4
Octagon	1.4
Dodecagon	1.0
Square	1.6

5.1.4 The maximum design unit stress under full design load shall be the minimum yield strength as stated in applicable ASTM specifications for the particular application and types of loads, including load factors.

5.1.5 Poles shall be designed with a minimum number of joints. Field welding shall not be allowed as part of the design of a new pole. The shaft joints to be made in the field shall be slip joints or bolted flange joints. Slip joint length shall be at least one and one-half (1-1/2) times the largest inside diameter of the female section. Bolted flange joints may be used for medium angle and heavy angle guyed structures and X-braced H-frame structures. If approved by the Owner or Owner's representative, a strap across the pole splice to prevent separation of the male and female sections of the pole may be used for X-braced H-frame structures. Approval must be obtained prior to bid.

a. Manufacturer shall verify slip joint fit before shipment. Joints should

not interfere with vangs, through holes, ladder clips, or jacking nuts.

b. Sufficient jacking lugs and permanent orientation marks shall be provided at all slip joints to ensure proper alignment and complete overlap of the joint.

5.1.6 Design of anchor bolts shall be in accordance with the latest edition of ACI-318, *Building Code Requirements for Reinforced Concrete*, assuming a concrete strength as specified ~~by the Owner~~ in Attachment C "Application Requirements".

5.1.6.1 When anchor bolts are specified, they shall have the top two feet (2′-0″) galvanized. Anchor bolts shall be threaded at the top end a distance equal to the base plate thickness, plus the thickness of two (2) anchor bolt nuts, plus two and one-half inches (2-1/2″). Each anchor bolt shall include two (2) heavy hex nuts.

5.1.6.2 Welding on anchor bolts will only be allowed in the bottom twelve inches (12″). Only one length of anchor bolt shall be used on each pole. Anchor bolts/clusters shall have a permanent mark indicating the structure type, structure number, orientation, and top of concrete.

5.1.6.3 Anchor bolts shall be designed to be shipped as a rigid cage with top and bottom plates holding the anchor bolts in place. The anchor bolt thread shall be protected during shipping. The anchor bolts shall be welded to the holding plate in the bottom of the cage. The top template shall be designed to be removable and to support the assembled cage during lifting and setting operations without detrimental deformations. Bolt clusters shall be designed to be rigid enough to withstand the normal jolts of shipping, handling and installation with no displacement of bolts from the proper positions within the cluster.

5.1.6.4 The removable template at the top shall have a set of marks to show the centerline for tangent structures and the angle bisector for angle structures. If the angle bisector is unclear due to multiple line angles on the structure, the anchor bolt drawings must clearly denote the anchor bolt orientation in relationship to the line angles. The set of marks shall be (2) marks along the same line 180º to each other. Matching marks are to be on the base plate of the structure so proper alignment can be made.

5.1.7 Minimum plate thickness for all pole components shall be three-sixteenths inch (3/16″). Minimum tip diameter for all poles shall be nine and a half inches (9.5″).

5.1.8 Structures which are to be direct embedded shall have bearing plates. Bearing plates shall have a diameter not more than two inches (2″) greater than the

maximum pole diameter.

5.1.8.1 Galvanized poles shall have a drain hole at the bottom. The drain hole shall not be more than 20% of the bottom plate surface area.

5.1.8.2 Direct embedded steel poles shall have ground sleeves. Ground sleeves shall have a minimum length of four feet (4′-0″) centered at groundline.

5.1.8.3 The Ground sleeve shall have a minimum thickness of three-sixteenths inch (3/16″) and shall be centered at the ground line. A seal weld shall be provided around the ground sleeve. The ground sleeve shall not be considered in strength calculations.

5.1.9 Poles shall have nearly a uniform taper throughout their entire length. The maximum difference in tapers between two (2) pole sections measured by the diameters shall be .20 inch/ft. for poles with variable taper.

5.1.10 Poles with elliptical cross sections shall have a minor axis dimension equal to at least seventy-five percent (75%) of the major axis dimension.

5.1.11 Engineered/Unguyed Structures

Structure deflections at pole top shall be calculated under camber loading. Structure height shall be the height of the pole from the top of the base plate, or designated ground line, to the top. See load diagrams or PLS-CADD files, 'Structure Loads' column for camber loading.

5.1.11.1 Structures may be pre-cambered if the pole deflection exceeds twelve (12") inches. Deflections less than twelve (12") inches shall be raked as necessary in the field. The Materialman shall provide a pre-cambered summary and clearly denote the pre-camber/rake orientation on the structure drawings.

5.1.11.2 The Materialman shall use the Loading Diagrams provided in Attachment B or PLS-CADD files to design the designated unguyed structures. The Materialman is responsible for determining the "worst-case" orientation of the wind load in combination with the tension and apply it in the design calculations.

5.1.11.3 The Materialman shall calculate the deflections for the sixty degrees Fahrenheit (60ºF) initial tension and sixty degrees Fahrenheit (60ºF) final tension load cases. The Materialman shall limit the difference in deflection produced by these two (2) load cases to six inches (6″) or less.

5.1.11.4 Deflections of single-shaft structures under camber loading shall not exceed one (1.0%) percent of the structure height.

5.1.11.5 Deflections of H-Frame structures due to the wire tension change across the structure and any angle resultant tension, under camber loading, shall be no more than one half (1/2) the top diameter of the designed tubular steel pole.

5.1.11.6 Deflections of switch structures under factored loading shall not exceed two (2%) percent of the structure height under all loading conditions.

Switch support beams shall be checked for deflection. Engineer's drawings will show deflection limitations and/or minimum switch support beam diameter.

5.1.11.7 The manufacturer is responsible for repairing or replacing any structures which are delivered to the site with manufacturing errors. Repair and/or replacement costs shall include the structure itself, as well as any associated construction costs.

5.1.11.8 If pole raking is necessary due to deflection, the raking dimension and orientation shall be clearly marked on the Materialman's Detail Drawings.

5.1.11.9 Switch structure equipment loadings and attachment details shall be obtained by the Pole Manufacturer through coordination with the specified Switch Manufacturer.

5.1.12 Standard Class Designations

5.1.12.1 Tangent and guyed angle structures have been specified using RUS Standard Steel Pole Class Designations shown in Table 1 unless noted otherwise.

5.1.12.2 Pole designs shall be prepared for the attached Standard Class design loads. The poles shall be designed to meet ASCE Manual No. 48, "Design of Steel Transmission Pole Structures," design methods. The point-of-fixity shall be considered to be located at a distance from the pole bottom that is equal to seven percent (7%) of the pole length.
The pole shall be symmetrically designed such that the strength required in any one direction shall be required in all directions about the longitudinal axis.

5.1.12.3 Using the corresponding values in Table 1, the poles shall be designed for the following requirements.

a. The pole shall develop the minimum ultimate moment capacity required in Table 1 at a distance of five feet (5′-0″) from the pole top.

b. The pole shall develop the minimum ultimate moment capacity above the point-of-fixity that is calculated by multiplying the tip load in Table 1 by the distance to the tip load.

c. The geometry and taper of the pole shall be uniform throughout their entire length (top to butt).

5.1.12.4 The poles shall be designed to withstand the specified tip loading in Table 1 without exceeding a pole deflection of ten percent (10%) of the pole length above the point-of-fixity when tested in accordance with ASCE Manual No. 48.

5.1.12.5 Overall length of poles shall be designed and manufactured in incremental lengths of five feet (5′-0″).

TABLE 1
Strength Requirements

Standard Class Designations for Steel Poles	Minimum Ultimate Moment Capacity at 5 ft from Pole Top (ft. Kips)	Horizontal Tip Load Applied 2 ft from Pole Top (lbs.)
S-20.0	160	20000
S-19.0	152	19000
S-18.0	144	18000
S-17.0	136	17000
S-16.0	128	16000
S-15.0	120	15000
S-14.0	112	14000
S-13.0	104	13000
S-12.0	96	12000
S-11.0	88	11000
S-10.0	80	10000
S-09.0	72	9000
S-08.0	64	8000
S-07.4	57	7410
S-06.5	50	6500
S-05.7	44	5655
S-04.9	38	4875
S-04.2	32	4160
S-03.5	27	3510
S-02.9	23	2925
S-02.4	19	2405
S-02.0	15	1950

5.1.12.6 Poles shall be designed for the loads generated from handling and erecting without causing permanent deformation or damage to the pole when handled according to the manufacturer's instructions. Handling and erecting loads shall include but not be limited to, a one (1) point (tilting) pickup and a two (2) point (horizontal) pickup.

5.1.12.7 The maximum design unit stress shall be the minimum yield strength as stated in applicable ASTM specifications for the particular application and types of loads, including overload factors.

5.1.12.8 The top of the pole shall be permanently covered with a structural steel plate that is welded to the top of the pole. The pole shall be delivered with the pole cover attached in place.

5.1.12.9 Pole design and design calculations shall be the responsibility of the manufacturer.

5.1.13 Arms shall be designed so the end of the arm is at the specified height under a loading of initial conductor tension, sixty degrees Fahrenheit (60ºF), no wind, and no overload factors. Arms shall not deflect vertically more than two inches (2″) at the end of the arm under heavy ice conditions (without any overload factors applied). See Attachment B for Design Loads and Guide Drawings.

5.1.13.1 Arms shall be upswept or straight, tapered, steel tubular members, of any cross-sectional type, which meet the dimensions shown on the attached drawings.

5.1.13.2 Arm end plate connection details for hardware attachment shall be typical of those shown on the attached drawings. The arms shall be hermetically sealed when a painted finish is specified. Galvanized arms shall have drain holes where appropriate

5.1.14 Lifting lugs are optional. The manufacturer shall supply all instructions for handling and erection of poles and arms.

5.1.15 Deadend plates or vangs shall be designed/checked for the maximum resultant loading from the appropriate Vertical, Transverse, and Longitudinal components in the load trees and/or columns labeled "Loads From Back Span" or "Loads From Ahead Span" in Attachment B or the PLS-CADD files. All load cases shall be considered. Do not use the loads from the column labeled "Structure Loads" for designing/checking vang designs.

5.1.16 In the design of connections for vangs, brackets, or stiffeners attached to the pole shaft, care shall be taken to distribute the loads sufficiently to protect the wall of the pole from local buckling.

5.1.17 Thru-vang shall penetrate both sides of the pole with attachment holes on both sides.

5.1.18 Each pole shall be permanently marked on the pole shaft seventy-two inches (72″) above ground line and on the bottom of base plate or bearing plate with the following identifying information:

- Manufacturer's Identification
- Structure Type
- Height and Class
- Structure Number
- Ultimate Ground Line Moment
- Owner's Name
- Date Manufactured

The method of identification shall be approved by the Owner. In addition, there shall be clear indication or marks for handling or sling points, storage rack points, and lifting joints for standing the pole and vibratory pole base.

5.1.19 Grounding Attachments

5.1.19.1 One (1), two (2)-hole NEMA grounding pad shall be provided on the side of each pole as specified in the Structure Dimensions (Framing Drawings) located in Attachment A.

5.1.19.2 See Attachments for NEMA Grounding Pad Detail.

5.1.19.3 Grounding pads and threads shall not be painted or covered with other coatings.

5.1.19.4 Poles shall be pre-drilled with a nine-sixteenth inch (9/16″) hole behind each threaded hole of a two (2)-hole NEMA pad to permit the use of various bolt lengths in completing a grounding connection.

5.1.19.5 One (1) heavy hex, stainless steel grounding nut shall be provided where indicated on Structure Dimensions (Framing Drawings). The grounding nut shall have standard one-half inch (1/2″), thirteen (13) UNC threads. Threads shall not be painted or covered with other coatings.

5.1.20 Clips for removable ladders shall be located as shown on the enclosed Framing Drawings or as indicated in the specification. Each ladder clip shall be designed to support a minimum 1,200 lb. shear working load. The clips shall be welded to the pole surface. Ladder clips shall be located to avoid interference between ladders, other attachments, material and equipment to be mounted on the pole (See Attachments for Ladder Clip Drawings).

5.1.21 Removable step bolts shall be provided with spacing as indicated beginning eight feet (8′-0″) above ground line and extending to the structure top. Each step lug and step bolts shall be capable of withstanding a minimum of 600 lb. working load. Step bolts mounting nuts shall be spaced at one foot-three inches (1′-3″) and oriented to provide maximum ease of climbing.

5.1.22 Removable pole steps with permanent clips shall be provided as indicated (Drawing No. PS-1) beginning at ground line and extending to eight feet (8′-0″) above ground line. Pole steps and clips shall be spaced at one foot-three inches (1′-3″) and oriented to provide maximum ease of climbing.

5.1.23 Weathering steel structures shall be designed to eliminate water and refuse traps.

5.1.23.1 Tubular sections shall be sealed from moisture entering the inside of the pole. Factory drilled pole holes shall be plugged to prevent moisture intrusion during shipping. For field drilled poles and factory drilled poles, manufacturer shall provide silicon sealant to seal all through-bolt holes. Non-drilled poles when assembled shall be effectively sealed to prevent moisture intrusion.

5.1.23.2 Connections shall be designed to reduce the effect of pack-out by preventing moisture from entering the joint or by designing the connection to allow moisture to easily drain off.

5.1.23.3 Plastic plugs shall be installed in all nuts welded to the structure and all tapped holes.

5.1.24 Application requirements: (See Attachment C)

5.2 Pipe Pile Design

The design, fabrication, allowable stresses, processes, tolerances, and inspection shall conform to the latest edition ASTM 252, “Welded and Seamless Steel Pipe Piles” for the steel pipe pile and the latest edition ASTM A36 for the other associated steel material. Grade 2 shall be used for the pipe piles.

5.2.1 The pipe pile diameter shall be as indicated on Drawing No. TMF-SPPF in Attachment A. Piles shall be fabricated as round or 12-sided. The 12-sided pipe pile diameter shall be measured flat-to-flat.

5.2.2 All welding to be in accordance with the latest edition of AWS D1.1. Use appropriate electrode for steel grade types (E70 Min.). Circumferential and longitudinal welds are to be complete-penetration.

5.2.3 After fabrication, hot dip galvanize the pile as specified per ASTM A123. Provide additional holes if needed for handling during galvanizing.

5.2.4 Corrocote shall be applied to pipe pile from top of pile to ten (10') feet below top of pile. See paragraph 5.5.1.d Coatings for the Embedded Portion of the Pole for details.

5.2.5 Pipe piles shall be stamped with one-inch (1") lettering indicating the structure number. Stamping shall be done at both ends of the pipe pile.

5.2.6 Pipe pile vendor shall provide the six (6) one-inch (1") diameter heavy hex galvanized nuts and six (6) one-inch (1") diameter by twelve inch (12") long galvanized leveling bolts and ensure these nuts and bolts are compatible with each other. This hardware shall be hot dip galvanized per ASTM A307.

5.2.7 Two (2) hole NEMA grounding pads shall be provided on opposite sides at two levels of the pipe piles as shown on Drawing TMF-SPPF located in Attachment A (Total of 4 grounding pads).

5.2.8 Reference Drawing TMF-SPPF for steel pipe pile fabrication details and all associated materials and hardware.

5.3 Materials

5.3.1 All materials shall comply with the applicable requirements of ASTM specifications. Any modifications to ASTM specifications must be approved by the Owner's representative prior to bidding.

5.3.2 Poles, arms, and conductor brackets shall conform with ASTM A36, ASTM A572, ASTM 581, ASTM A588, ASTM A871, or ASTM A595.

5.3.3 Base plate shall conform with ASTM A572, ASTM A588, ASTM A633, or ASTM A595.

5.3.4 Anchor bolts shall conform to ASTM A615, Grade 60 or 75.

5.3.5 Other bolts and nuts shall conform, as applicable, to ASTM A307, ASTM A325, ASTM A354, ASTM A394, or ASTM A687. Locknuts shall be provided for each structure bolt, or American Nut Company (ANCO) type self-locking nuts may be used. Locknuts shall be the galvanized MF or ANCO type.

5.3.6 Anchor bolts, structural plate, and weld material, shall meet ASCE requirements for Charpy tests.

5.3.7 For galvanized structures, steel used for the pole shaft and arms shall have a silicon content less than .06 percent.

5.3.8 Steel pipe piles shall conform, as applicable, to ASTM A252. All other steel material associated with the pipe pile shall conform to ASTM A36.

5.4 Fabrication

5.4.1 All welding shall be in accordance with the American Welding Society Code AWS D1.1, latest edition. Welders shall be qualified in accordance with AWS .1 welding procedures.

5.4.2 One hundred percent (100%) penetration welds shall be required in, but not limited to, the following areas:

- circumferential welds (C-welds) joining structural members,
- longitudinal welds in the female portion of the joint within the slip joint area,
- welds at the butt joints of back-up strips,
- base plate to shaft weld,
- longitudinal welds for a minimum length of three inches (3″) where there are adjacent C-welds, flange welds, base welds and ends of tubes.

5.4.3 Full penetration or equivalent ninety percent (90%) partial penetration with fillet overlap shall be used for vang-to-plate shaft, and arm box joints.

5.4.4 Quality and acceptability of every inch of the full penetration welds shall be determined by visual and ultrasonic inspection.

5.4.5 All other penetration welds shall have sixty percent (60%) minimum penetration. Quality and acceptability of all welds other than full penetration welds shall be determined by visual inspection, supplemented by magnetic particle, ultrasonic or dye penetrant inspection.

5.4.6 All weld back-up strips shall be continuous the full length of the welds. Care shall be exercised in the design of welded connections to avoid areas of high stress concentration which could be subject to fatigue or brittle fractures.

5.4.7 Field welding shall not be permitted except with the Engineer's and Owner's approval and with the manufacturer's direction in repairing a pole.

5.4.8 All parts of the structure shall be neatly finished and free from kinks or twists. All holes, blocks, and clips shall be made with sharp tools and shall be clean-cut without torn or ragged edges.

5.4.9 Before being laid out or worked in any manner, structural material shall be straight and clean. If straightening is necessary, it shall be done by methods that will not injure the metal.

5.4.10 Shearing and cutting shall be performed carefully and all portions of the work shall be finished neatly. Copes and re-entrant cuts shall be filleted before cutting.

5.4.11 All forming or bending during fabrication shall be done by methods that will prevent embrittlement or loss of strength in the material being worked.

5.4.12 Holes for connection bolts shall be one-sixteenth inch (1/16″) larger than the nominal diameter of the bolts. Holes in the flange plates for bolted splices shall be one-eighth inch (1/8″) larger than the bolt diameter. Holes in the base plates for anchor bolts shall be three-eighths inch (3/8″) larger than the nominal diameter of the anchor bolts. The details of all connections and splices shall be subject to the approval of the Owner or his representatives.

5.4.13 Holes in steel plates which are punched must be smooth and cylindrical without excessive tear out or depressions. Any burrs that remain after punching shall be removed by grinding, reaming, etc.

5.4.14 Holes of any diameter may be drilled in plate of any thickness. Care shall be taken to maintain accuracy when drilling stacks of plates.

5.4.15 Holes may be made by use of a machine guided oxygen torch. Flame cut edges shall be reasonably smooth and suitable for the stresses transmitted to them.

5.4.16 The overall length of the assembled structure should not be less than six inches (6″) of the specified length and not more than twelve inches (12″).

5.4.17 Tolerances

Fabrication tolerances shall be as follows:

a. Length of single piece or flanged poles ± 3″

b. Cross section of poles: Diameter of 36″ or less +1/4″, -1/8″. Diameter greater than 36″ +1/2″, -1/4″, circumference of all poles -0″

c. Spacing between “arm to pole” connections vertically ± 3/4″

d. Location of hardware with respect to top of pole ± 2″

e. Pole Butt plate perpendicular to pole 1/16″ for 12″ as measured on a perpendicular axis

f. Straightness of pole ± 1/2″ from center line

g. Location of a drilled hole in a piece ± 1/8″

h. Spacing between holes: Base plates ± 1/8″, same connection ± 1/16″ (non-accumulative)

i. Anchor bolts: Length +3″, -0″; thread length +2″, -0″

j. Length of coated portion on anchor bolts +12″, -0″

k. Distance between anchor bolt in cluster ± 1/8″ (non-accumulative)

l. Arms: Length ± 1″, Rise ("W" dimension ± 1″ per 10′ of arm length)

m. Angles shown ± 2°

n. Length of overlap of slip joint, +5″, - 10% of slip joint length

o. Thru Vang Vertical Spacing ± 1/4″

p. Thru Vang Angle and Orientation ± 2°.

5.5 Finishes

5.5.1 The following finishes are acceptable: galvanizing, zinc primer and painting, weathering steel, and below grade coating.

a. Galvanizing – All structures and structural components which are hot-dip galvanized shall meet all the requirements of ASTM A123 or ASTM A153. Measures shall be taken to prevent warping and distortion according to ASTM A384 and to prevent embrittlement according to ASTM A143. Poles made of ASTM A588 steel shall not be galvanized due to the high silicon content of the steel. One (1) gallon of zinc enriched paint shall be provided with each five (5) poles. Provide detailed instructions of proper application and use of zinc enriched paint.

b. Zinc Primer and Painting – Poles which are to be painted shall be hermetically sealed to prevent corrosion of interior surfaces. After shot or sand blasting and cleaning in accordance with the *Steel Structure Painting Council's Surface Preparation Specification*, SSPC-SP6, a zinc primer of three (3) mils dry film thickness (DFT) and two (2) coats of finish paint, each three (3) mils DFT shall be applied to all exterior surfaces in accordance with the paint supplier's recommendations. One (1) gallon each of primer and finish paint shall be supplied with each five (5) poles. A guarantee against flaking or fading of the paint for a minimum of five (5) years shall be provided.

c. Weathering Steel – Steel shall conform to ASTM A588 or A871. After fabrication, poles made of weathering steel shall be cleaned of oil, scale, etc. in accordance with the *Steel Structure Painting Council's Surface Preparation Specification*, SSPC-SP6, to ensure uniform and rapid formation of the protective oxide layer.

d. Coatings for the Embedded Portion of the Pole – When poles are to

be directly embedded, or use a vibratory pole base, a sixteen (16) mil (minimum dry film thickness), two (2) component hydrocarbon extended polyurethane coating that is resistant to ultraviolet light shall be applied on the exposed surface of the embedded portion of the pole. The coating shall extend from the butt to five feet (5′-0″) above ground line or to the top jacking nut on the vibratory pole base, whichever is lower. Other coatings shall be approved by the Owner prior to their use.

5.5.2 Bolts and nuts with yield strengths under 100,000 psi shall be hot-dip galvanized per ASTM A153 and ASTM A143, or mechanically coated with zinc in accordance with ASTM B454, Class 50. Bolting materials with yield strengths in excess of 100,000 psi shall not be hot-dip galvanized. Instead, they shall be painted with zinc enriched paint or mechanically coated with zinc per ASTM B454, Class 50.

5.5.3 Compliance with coating thickness requirements shall be checked with a magnetic thickness gauge.

5.6 Inspection and Testing

5.6.1 The Owner and the Owner's designated agents shall have free entry at all times while work is being carried on, to all parts of the manufacturer's plant to inspect any part of the production of the poles covered by this specification.

5.6.2 Steel members which are bent or warped or otherwise improperly fabricated shall be properly repaired or replaced at the manufacturer's expense.

5.6.3 The cost of tests made by the manufacturer (except full scale load tests on poles), including cost of the certified test reports, shall be considered included in the price.

5.6.4 The manufacturer shall make tests in accordance with ASTM A370 and ASTM A673 to verify that the material used in the structures meets the impact properties.

5.6.5 Mill test reports showing chemical and physical properties of all material furnished under this specification shall be maintained by the manufacturer for a period of five (5) years and shall be traceable to the structure.

5.6.6 All plates over one and one-half inch (1-1/2″) thick shall be ultrasonically tested to assure against defects which could lead to lamellar tearing.

5.6.7 Welders or welding operators shall be qualified in accordance with the provisions of AWS D1.1.

5.6.8 The manufacturer shall make certified welding reports for each structure. The reports covering welding shall include all welds of a structure. Each weld shall be clearly identified; and the report shall consist of the method of

testing, whether the weld is acceptable, the identification of the structure, the date, and the name and signature of the inspector. Records of welding procedure and welding operator test results shall be kept for six (6) years by the Materialman and shall be available for review by the Engineer or Owner.

5.7 Structure Testing

5.7.1 The structures which are to have full-scale load tests performed on them are listed in Attachment C.

5.7.2 Details of the test procedures and methods of measuring and recording test loads and deflections shall be specified by the manufacturer prior to testing and shall be subject to the review and approval of the Owner or his representative.

5.7.3 Deflections shall be recorded in the transverse and longitudinal directions when applicable. Deflection measurements shall be taken under the no load condition both before and after testing.

5.7.4 Material procurement for test poles shall be identical to material procurement procedures for regular production run poles.

5.7.5 A full report listing the results shall be submitted after completion of all testing. Copies of mill test reports shall be included in the load test report. The report shall also include a complete description of the load tests with diagrams and photographs.

5.7.6 The Owner or his representative reserves the right to be present during testing and shall be notified two (2) weeks prior to the start of structure fabrication.

5.8 Shipping

5.8.1 Each shipment shall be accompanied by a checklist of all parts, identifiable by structure type and number. Bolts and miscellaneous hardware will be identified by the list for match up with the respective pole shaft and shall be boxed or bundled. All parts required for any one structure shall be in one (1) shipment, if possible.

5.8.2 The Owner and Owner's representative shall be notified prior to shipment that such shipment is to take place, and they reserve the right to inspect the components prior to shipment. The notification shall give quantities, weight, name of common carrier used, and expected time of arrival with at least two (2) working days' notice of delivery. Delivery of all items of material shall be made at such time as to permit unloading between the hours of 9:00 a.m. and 3:00 p.m., Monday through Thursday, holidays excluded.

5.8.3 The anchor bolts shall be welded to the holding plate in the bottom of the cage. A removable template shall be used at the top of the cage and shall be

marked to show the centerline for tangent structures and the angle bisector for angle structures. Matching marks are to be on the base plate so proper alignment can be made. Bolt clusters shall be rigid enough to withstand the normal jolts of shipping and handling with no displacement of bolts from the proper positions within the cluster.

5.8.4 Unless otherwise agreed to by the Owner, the anchor bolt cage shall be shipped at least thirty (30) days prior to pole shipment.

5.8.5 Salt-treated wood blocking and urethane foams shall not be used when shipping or storing weathering steel poles.

5.8.6 Delivery shall be made either to a single designated location or to the individual structure locations.

6.0 INFORMATION TO BE SUPPLIED BY THE MANUFACTURER

6.1 Information to be Supplied with the Proposal

a. Calculated shipping weight of each structure and pipe pile excluding anchor bolts. Separate weights shall be given for crossarms and poles.

b. Calculated shipping weight of anchor bolts,

c. Ultimate ground line reactions (including overload factors) in poles and guy wires,

d. Anchor bolt size, length, and locations (bolt circle diameters)

e. Type of material of major components (ASTM number),

f. Description of pole and pipe pile shaft, including thickness, length, diameter, cross-sectional geometry, and method of fastening each shaft component,

g. Data showing the design of the arm, arm connections, arm attachment plates, and brackets,

h. Design exceptions,

i. Manufacturer's standards, physical and mechanical dimensions for all steel pole height and class combinations used in the project being bid on.

6.2 Documentation to be Supplied for the Owner's Approval Prior to Fabrication

Documentation includes final design calculations for pole shaft, base plate, anchor bolts, crossarms, and other appurtenances, including their connections for all structures. The following information shall be supplied:

a. For the loading cases with overload factors, the total shear, axial forces, moments, stresses or stress ratios, moments of inertia furnished, section moduli, cross-sectional areas, deflections w/t's for polygonal and d/t's for

round cross sections at all splices, at arm attachment points (top and bottom), and at least every ten feet (10′-0″) along the pole.

b. For the critical loading case, shear and axial forces, moments, stresses, section moduli, cross-sectional areas at the arm connections, bolt stresses in the arm connection, and deflection at the end of the arm.

c. Anticipated deflections at the top of the pole and at the ends of the arms shall be indicated for each pole for the normal, everyday loading condition of sixty degrees Fahrenheit (60ºF), no wind, no overload factors.

d. For all specified loading cases, reactions and ground line moments shall be supplied.

e. Detail drawings for each structure type giving weights of structure components, dimensions, and bill of materials.

f. Assembly instructions and erection drawings. Slip joint lengths and allowable tolerances. Special handling instructions.

6.3 Final Documents shall be supplied to the Owner for the items in paragraph 6.2.e. after erection of all structures and prior to final payment

6.4 Test Reports (as requested)

a. Certified mill test reports for all structural material,

b. Certified welding reports for each structure,

c. Impact property test reports showing that the material used in the structures meets the impact properties,

d. Test reports on coating thickness,

e. Report of structure testing, when required, including photographs, diagrams, load trees, etc.,

f. Material, workmanship, inspection travelers, and material certified mill test reports shall be maintained on file for a minimum of six (6) years by the Materialman, and shall be made available to Owner or the Engineer upon request at no charge.

7.0 APPROVAL, ACCEPTANCE, AND OWNERSHIP

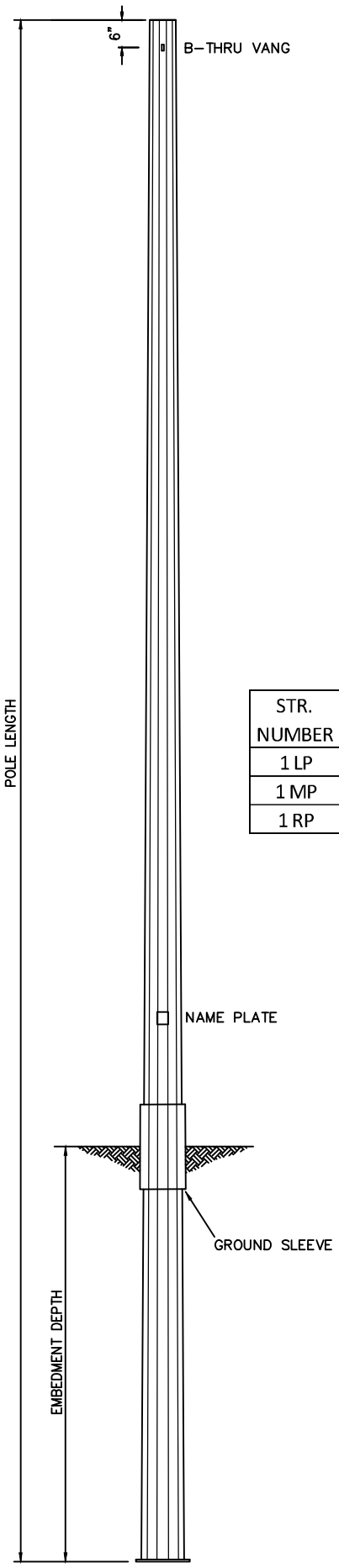
7.1 Final designs must be approved by the Engineer before material ordering and fabrication. Material ordering and fabrication prior to approval will be at supplier's risk. It is understood that award of this contract does not constitute acceptance of design calculations submitted with the bid, if corrections are required in the final structure designs due to manufacturer's errors, omissions, or misinterpretations of

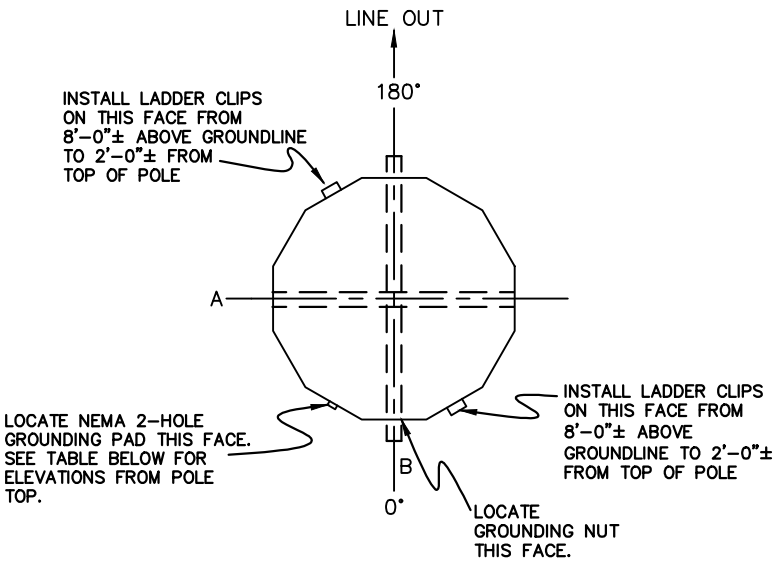
the specifications, the quoted price shall not change. Approval of the drawings and calculations by the Engineer does not relieve the supplier of responsibility for the adequacy of the design, correctness of dimensions, details on the drawings, and the proper fit of parts.

7.2 After delivery, the poles will be inspected and shall be free of dirt, oil blisters, flux, black spots, dross, tear-drop edges, flaking paint or zinc; and in general, shall be smooth, attractive, and unscarred. Poles not meeting this requirement shall be repaired or replaced by the fabricator at no additional cost to the Owner.

ATTACHMENT A

STRUCTURE DETAILS & DRAWINGS





STR. NUMBER	HEIGHT/ CLASS*	EMBEDMENT DEPTH	LINE ANGLE θ	NEMA 2-HOLE PAD POLE GROUND	GROUNDING NUT TOP
1 LP	40/S-03.5	13'-6"	N/A	24'-0"	2'-6"
1 MP	40/S-03.5	12'-0"	N/A	25'-6"	2'-6"
1 RP	40/S-03.5	10'-6"	N/A	27'-0"	2'-6"

* POLE CLASS DEFINED BY RUS STANDARD STEEL POLE DESIGNATION

NOTES:

1) LETTERS (i.e. "A" & "B") INDICATE THRU-VANG AND/OR THROUGH HOLE LOCATIONS AND ORIENTATION.

2) LETTERS WITH DIMENSIONS (i.e. "A-13/16") INDICATE THROUGH HOLES WITH DIAMETER FOR DRILLING.

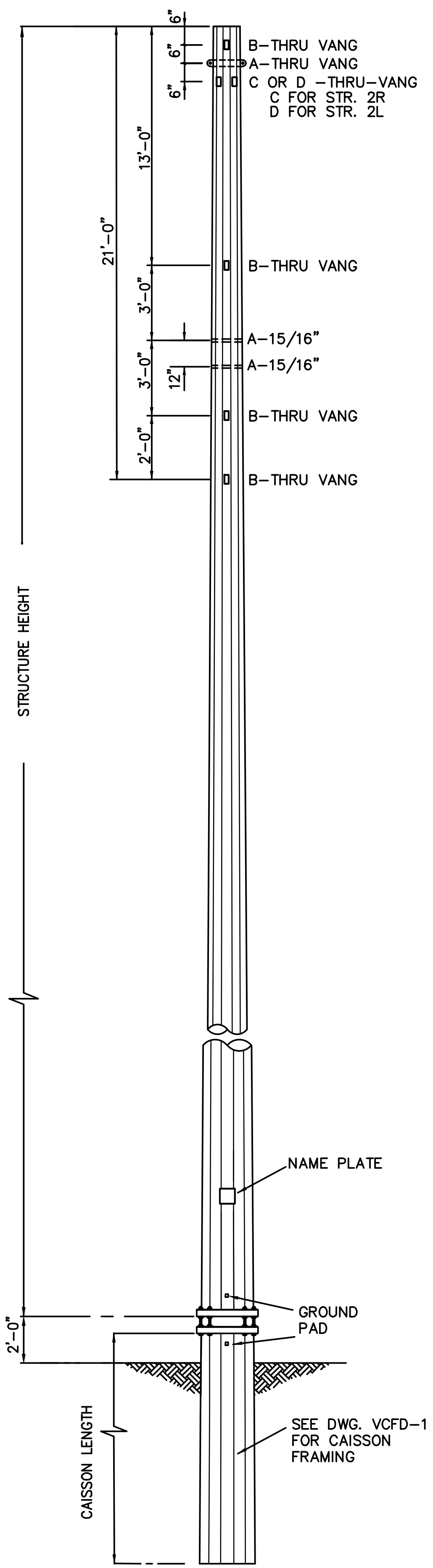
3) REFERENCE "DETAILS" SHEET FOR STANDARD DETAIL DRAWINGS.

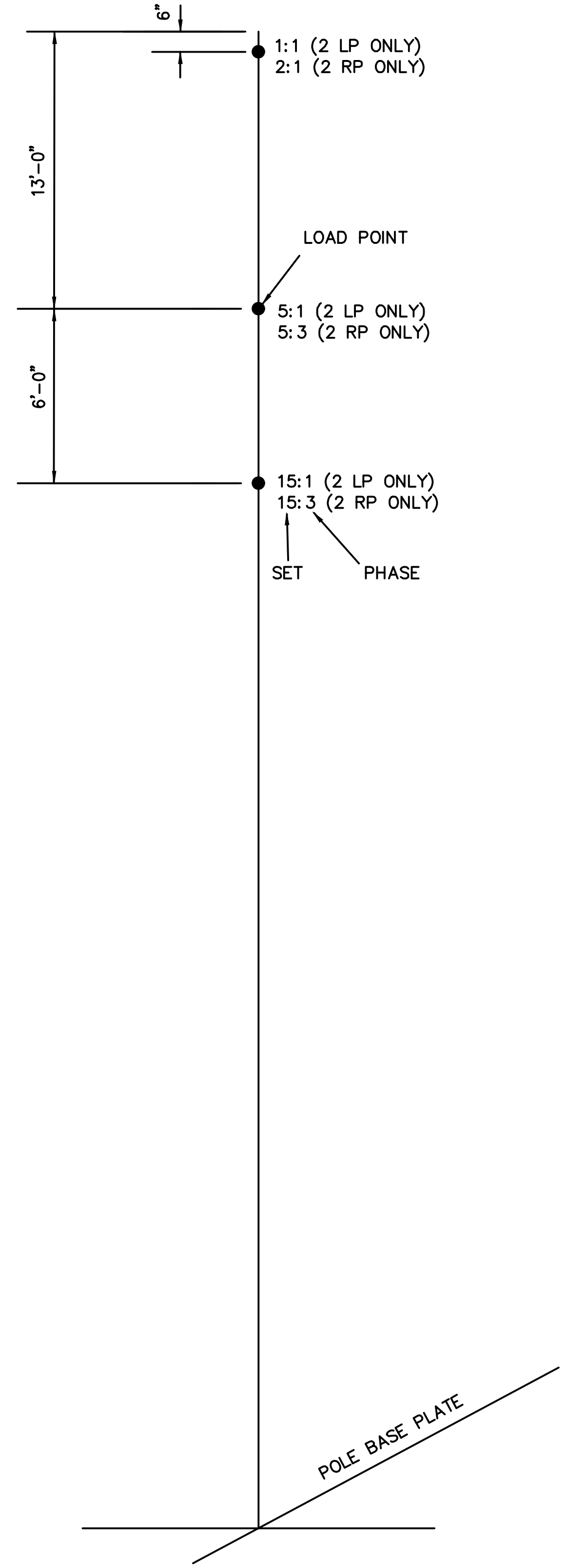
STEEL POLE FRAMING DRAWING
115 kV TRANSMISSION LINE
TH-TAP(S) - STR. 1

Booth & Associates
2300 Rexwoods Drive Suite 300, Raleigh NC 27607
NC F-0221

DWN.	TSL	DATE:	09/18/2023	DWG. NO. SPFD-1
CKD.	GSB	APPD.	GSB	
SCALE:	NTS			

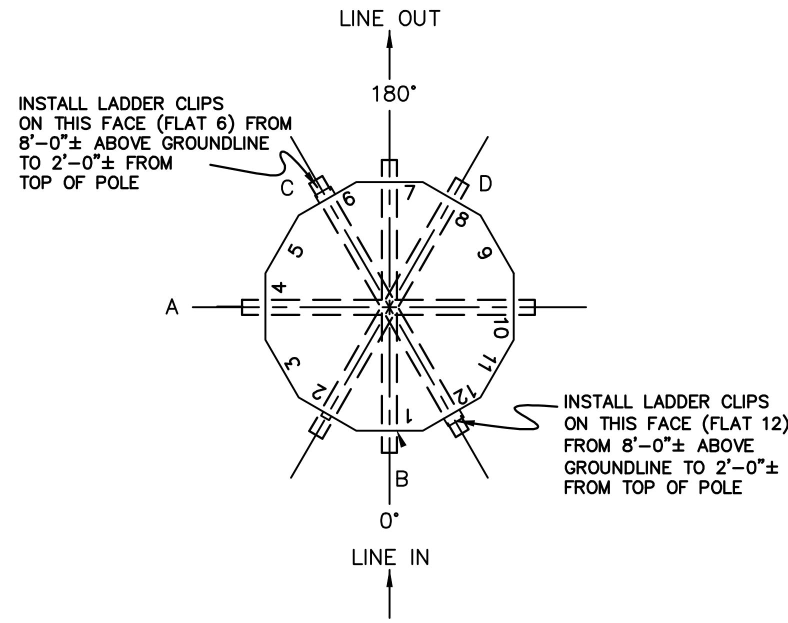
DATE	REVISION	SHEET NO.
		1 OF 1

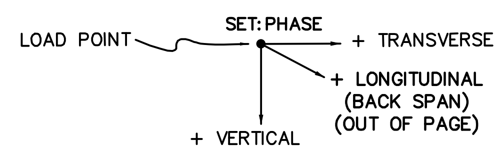




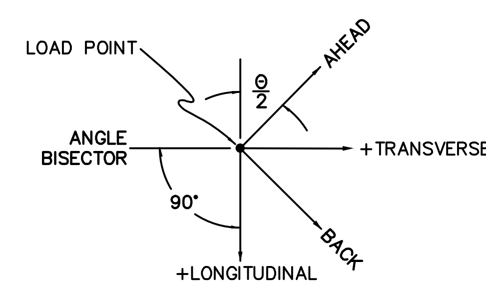
LOAD TREE DIAGRAM

STR. NUMBER	HEIGHT/ CLASS*	STR. TYPE	FOUNDATION	LOAD TABLE REF. NO.	LINE ANGLE θ	NEMA 2-HOLE PADS		GROUNDING NUT	
						OHGW (FLAT #)	POLE GROUND (FLAT #)	SW/TIE (FLAT #)	GUY (FLAT #)
2 LP	46'/ENG	TH-5AA(S)M	TMF-VC1	LT-1	N/A	1'-6" (FLAT 7)	44'-6" (FLAT 1)	3'-0" (FLAT 11)	23'-0" (FLAT 1)
2 RP	50'/ ENG	TH-5AA(S)M	TMF-VC1	LT-1	N/A	1'-6" (FLAT 7)	48'-6" (FLAT 1)	3'-0" (FLAT 3)	23'-0" (FLAT 1)





SET & PHASE DIAGRAM PROFILE VIEW



SET & PHASE DIAGRAM PLAN VIEW

CONDUCTOR DESCRIPTION

SET	WIRE TYPE
1, 2	OHGW: 7 NO. 6 ALUMOWELD
5, 15	TRANSMISSION: 1272 KCMIL 61/0 AAC – NARCISSUS

FRAMING NOTES:

1. ANCHOR BOLT HOLES IN POLE BASE PLATES SHALL BE 3/8" OVERSIZE.
2. LETTERS WITH DIMENSIONS (i.e. A–1") INDICATE THROUGH HOLES WITH DIAMETER FOR DRILLING. ALL HOLES ARE TO BE LOCATED ON THE CENTER OF A FLAT.
3. ALL POLES TO BE ASTM A572 GRADE 65 GALVANIZED STEEL.
4. REFER TO STRUCTURE TABLE FOR A LIST OF STRUCTURES DESIGNED WITH THIS FRAMING AND FOR INDIVIDUAL STRUCTURE–SPECIFIC HEIGHT, LINE ANGLE, FOUNDATION TYPE, AND LOAD TABLES.
5. REFERENCE "DETAILS" SHEETS FOR LADDER CLIP, GROUNDING, AND VANG DETAILS.

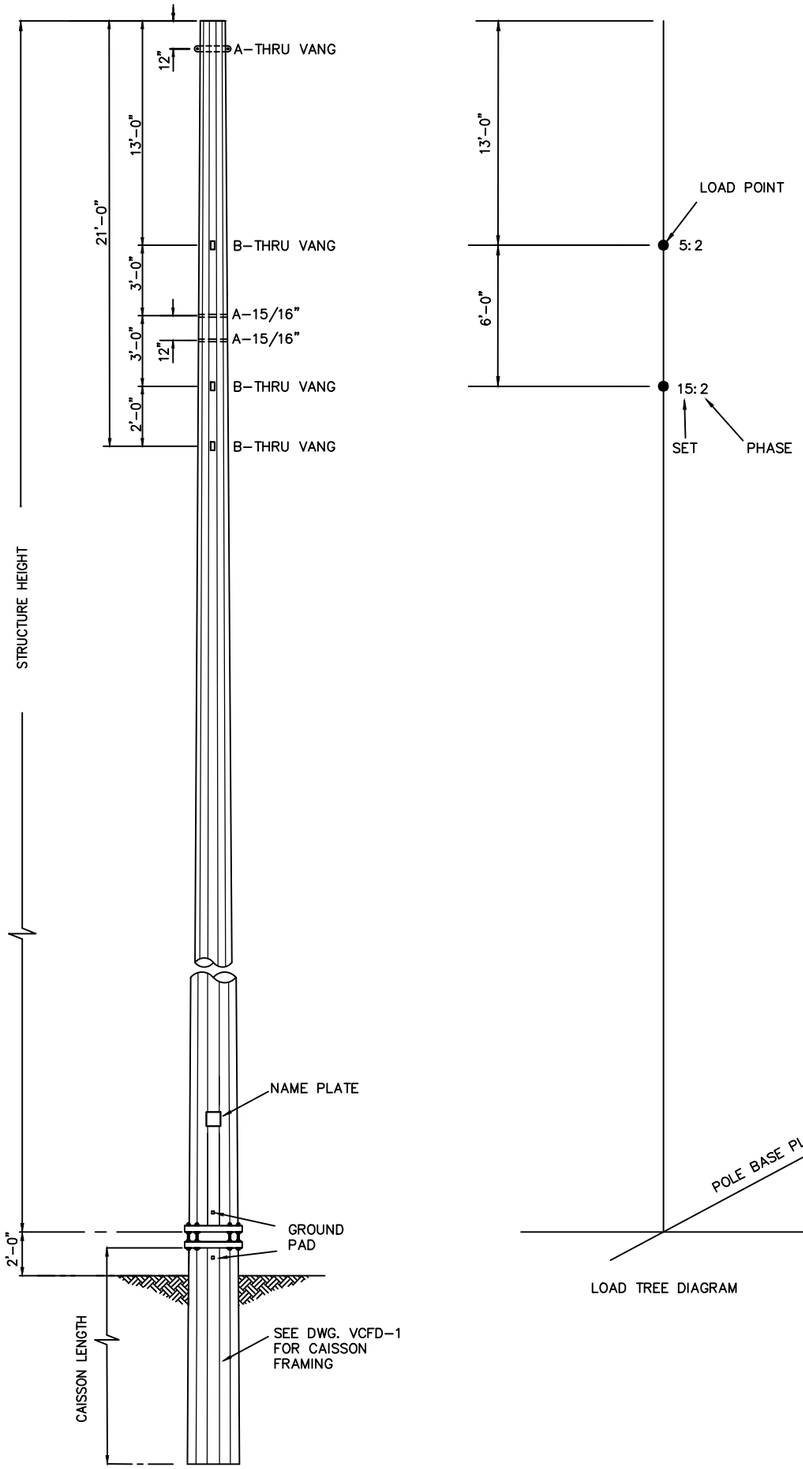
LOADING NOTES:

1. THE TRANSVERSE, VERTICAL, AND LONGITUDINAL LOADS FOR THE TRANSMISSION STRUCTURES FOR EACH LOAD CASE ARE LISTED IN LOAD TABLES 'LT–XX'. LOADS ARE DISTINGUISHED BY THEIR RESPECTIVE SET AND PHASE NUMBER REFERENCED IN THIS DRAWING.
2. THE LOCATION OF THESE LOADS ON THE STRUCTURE IS DEFINED BY THEIR RESPECTIVE SET: PHASE PLACEMENT ON THE LOAD TREE.
3. LONGITUDINAL AND TRANSVERSE LOADS ARE SPECIFIED IN THE STRUCTURE COORDINATE SYSTEM. REFERENCE THE SET AND PHASE DIAGRAM FOR APPLICATION OF VECTOR LOADS.
4. REFER TO "LOAD TREE WIND LOADS AND DIRECTION" FOR DESIGN WIND PRESSURES. WIND LOADS ON THE STRUCTURE SHALL BE APPLIED IN THE DIRECTION THAT PRODUCES THE MOST SEVERE EFFECT.

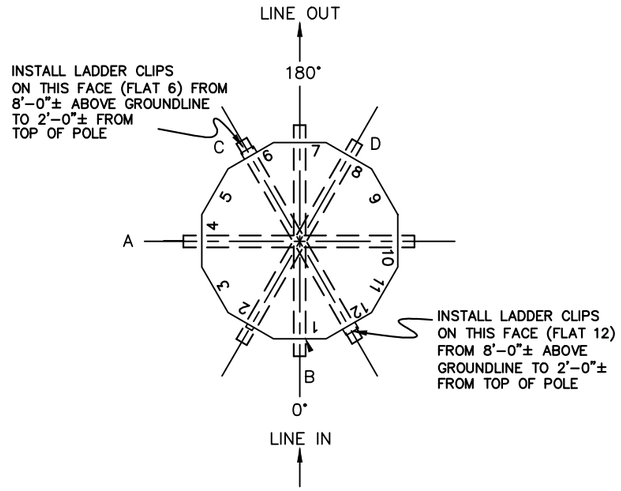
STEEL POLE FRAMING DRAWING
115 kV TRANSMISSION LINE
TH–5AA(S)M – LEFT AND RIGHT POLES (STR.2)

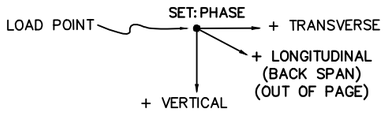
Booth & Associates

DWN.	TSL	DATE:	09/18/2023	DWG. NO. SPFD–2A
CKD.	GSB	APPD.	GSB	
SCALE:	NTS			
DATE	REVISION			SHEET NO. 1 OF 1

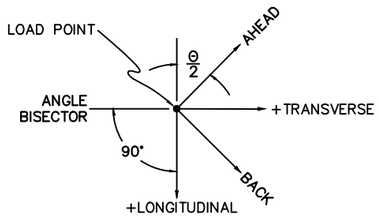


STR. NUMBER	HEIGHT/ CLASS*	STR. TYPE	FOUNDATION	LOAD TABLE REF. NO.	LINE ANGLE θ	NEMA 2-HOLE PADS		GROUNDING NUT	
						OHGW (FLAT #)	POLE GROUND (FLAT #)	SW/TIE (FLAT #)	GUY (FLAT #)
2 MP	48'/ENG	TH-5AA(S)M	TMF-VC1	LT-1	N/A	N/A	46'-6" (FLAT 1)	3'-0" (FLAT 1)	23'-0" (FLAT 1)





SET & PHASE DIAGRAM PROFILE VIEW



SET & PHASE DIAGRAM PLAN VIEW

CONDUCTOR DESCRIPTION

SET	WIRE TYPE
5, 15	TRANSMISSION: 1272 KCMIL 61/0 AAC – NARCISSUS

FRAMING NOTES:

1. ANCHOR BOLT HOLES IN POLE BASE PLATES SHALL BE 3/8" OVERSIZE.
2. LETTERS WITH DIMENSIONS (i.e. A–1") INDICATE THROUGH HOLES WITH DIAMETER FOR DRILLING. ALL HOLES ARE TO BE LOCATED ON THE CENTER OF A FLAT.
3. ALL POLES TO BE ASTM A572 GRADE 65 GALVANIZED STEEL.
4. REFER TO STRUCTURE TABLE FOR A LIST OF STRUCTURES DESIGNED WITH THIS FRAMING AND FOR INDIVIDUAL STRUCTURE–SPECIFIC HEIGHT, LINE ANGLE, FOUNDATION TYPE, AND LOAD TABLES.
5. REFERENCE "DETAILS" SHEETS FOR LADDER CLIP, GROUNDING, AND VANG DETAILS.

LOADING NOTES:

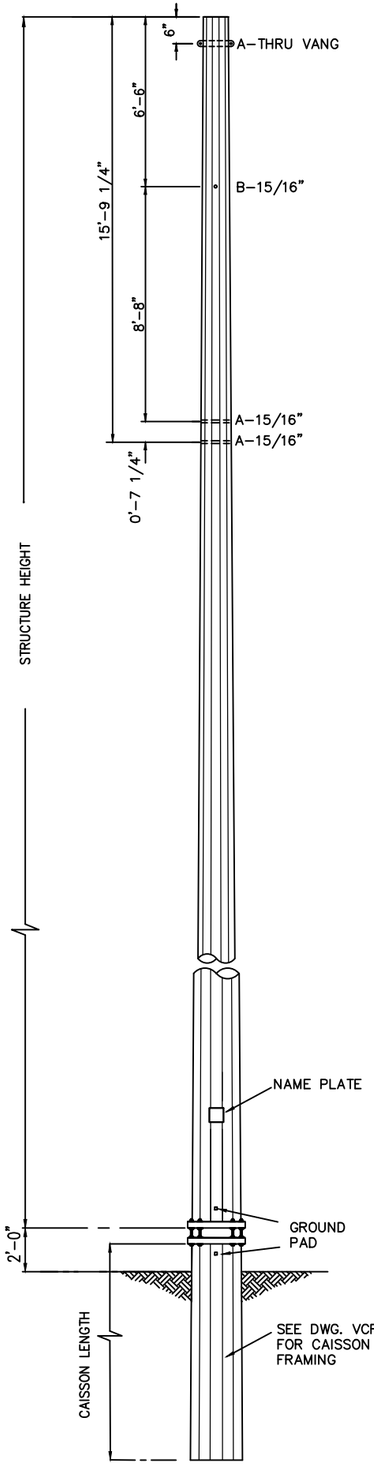
1. THE TRANSVERSE, VERTICAL, AND LONGITUDINAL LOADS FOR THE TRANSMISSION STRUCTURES FOR EACH LOAD CASE ARE LISTED IN LOAD TABLES 'LT–XX'. LOADS ARE DISTINGUISHED BY THEIR RESPECTIVE SET AND PHASE NUMBER REFERENCED IN THIS DRAWING.
2. THE LOCATION OF THESE LOADS ON THE STRUCTURE IS DEFINED BY THEIR RESPECTIVE SET: PHASE PLACEMENT ON THE LOAD TREE.
3. LONGITUDINAL AND TRANSVERSE LOADS ARE SPECIFIED IN THE STRUCTURE COORDINATE SYSTEM. REFERENCE THE SET AND PHASE DIAGRAM FOR APPLICATION OF VECTOR LOADS.
4. REFER TO "LOAD TREE WIND LOADS AND DIRECTION" FOR DESIGN WIND PRESSURES. WIND LOADS ON THE STRUCTURE SHALL BE APPLIED IN THE DIRECTION THAT PRODUCES THE MOST SEVERE EFFECT.

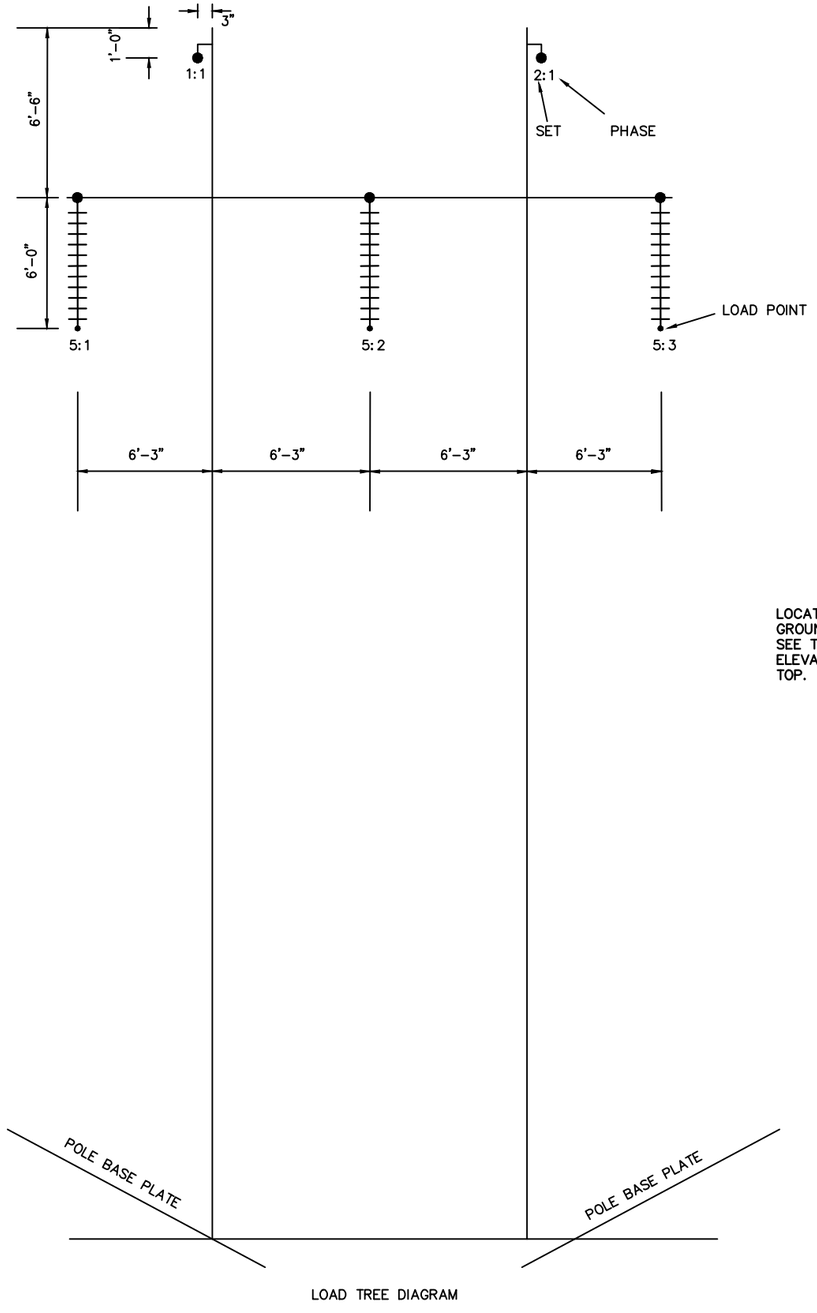
STEEL POLE FRAMING DRAWING
115 kV TRANSMISSION LINE
TH–5AA(S)M – MIDDLE POLE (STR.2)

Booth & Associates

DWN.	TSL	DATE:	09/18/2023	DWG. NO. SPFD–2B
CKD.	GSB	APPD.	GSB	
SCALE:	NTS			

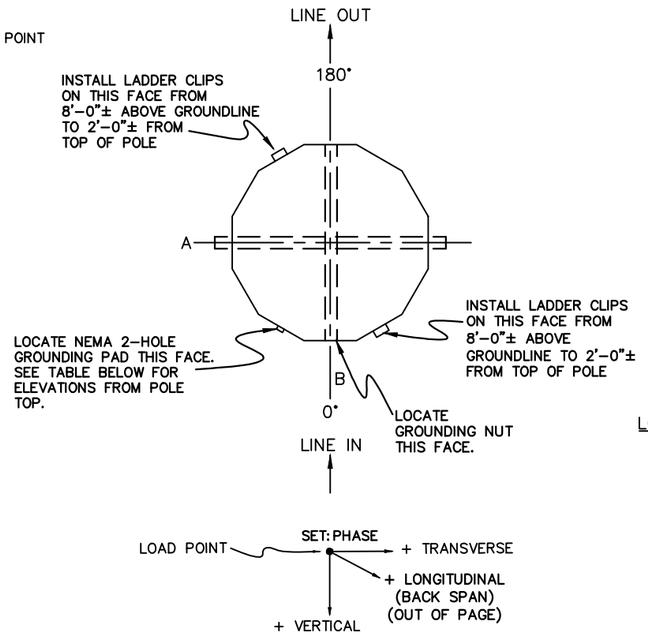
DATE	REVISION	SHEET NO. 1 OF 1



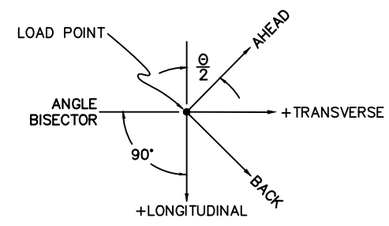


LOAD TREE DIAGRAM

STR. NUMBER	HEIGHT/ CLASS*	STR. TYPE	FOUNDATION	LOAD TABLE REF. NO.	LINE ANGLE θ	NEMA 2-HOLE PADS	
						OHGW	POLE GROUND
3LP	48'/ENG	TH-115(S)	TMF-VC1	LT-2	N/A	1'-6"	46'-6"
3RP	48'/ENG	TH-115(S)	TMF-VC1	LT-2	N/A	1'-6"	46'-6"



SET & PHASE DIAGRAM PROFILE VIEW



SET & PHASE DIAGRAM PLAN VIEW

FRAMING NOTES:

1. ANCHOR BOLT HOLES IN POLE BASE PLATES SHALL BE 3/8" OVERSIZE.
2. LETTERS WITH DIMENSIONS (i.e. A–1") INDICATE THROUGH HOLES WITH DIAMETER FOR DRILLING. ALL HOLES ARE TO BE LOCATED ON THE CENTER OF A FLAT.
3. ALL POLES TO BE ASTM A572 GRADE 65 GALVANIZED STEEL.
4. REFER TO STRUCTURE TABLE FOR A LIST OF STRUCTURES DESIGNED WITH THIS FRAMING AND FOR INDIVIDUAL STRUCTURE–SPECIFIC HEIGHT, LINE ANGLE, FOUNDATION TYPE, AND LOAD TABLES.
5. REFERENCE "DETAILS" SHEETS FOR LADDER CLIP, GROUNDING, AND VANG DETAILS.

LOADING NOTES:

1. THE TRANSVERSE, VERTICAL, AND LONGITUDINAL LOADS FOR THE TRANSMISSION STRUCTURES FOR EACH LOAD CASE ARE LISTED IN LOAD TABLES 'LT–XX'. LOADS ARE DISTINGUISHED BY THEIR RESPECTIVE SET AND PHASE NUMBER REFERENCED IN THIS DRAWING.
2. THE LOCATION OF THESE LOADS ON THE STRUCTURE IS DEFINED BY THEIR RESPECTIVE SET:PHASE PLACEMENT ON THE LOAD TREE.
3. LONGITUDINAL AND TRANSVERSE LOADS ARE SPECIFIED IN THE STRUCTURE COORDINATE SYSTEM. REFERENCE THE SET AND PHASE DIAGRAM FOR APPLICATION OF VECTOR LOADS.
4. REFER TO "LOAD TREE WIND LOADS AND DIRECTION" FOR DESIGN WIND PRESSURES. WIND LOADS ON THE STRUCTURE SHALL BE APPLIED IN THE DIRECTION THAT PRODUCES THE MOST SEVERE EFFECT.

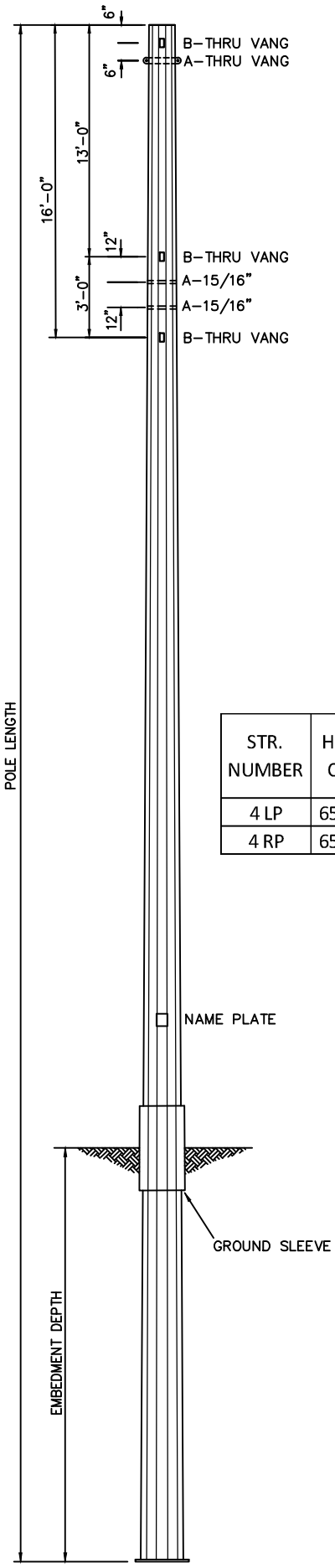
CONDUCTOR DESCRIPTION

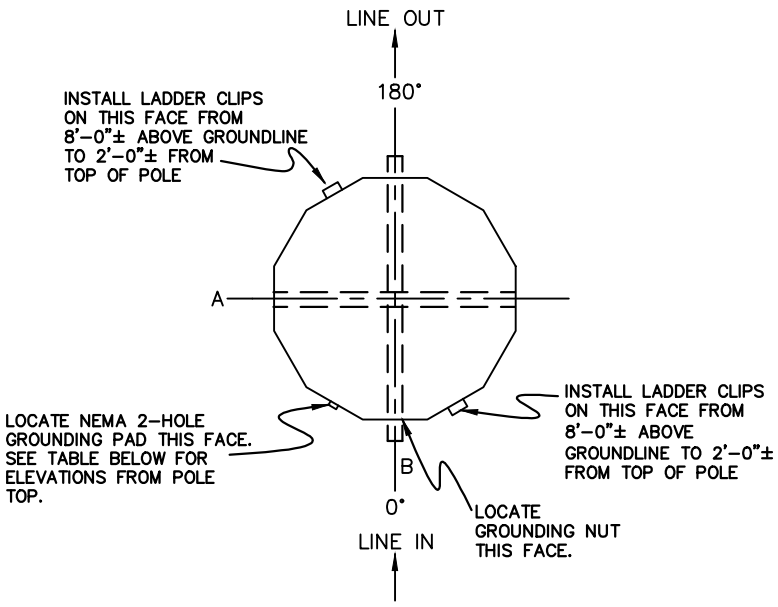
SET	WIRE TYPE
1, 2 5	OHGW: 7 NO. 6 ALUMOWELD TRANSMISSION: 1272 KCMIL 61/0 AAC – NARCISSUS

STEEL POLE FRAMING DRAWING
115 kV TRANSMISSION LINE
TH–115(S) – STR. 3

Booth & Associates

DWN.	TSL	DATE:	09/18/2023	DWG. NO. SPFD–3
CKD.	GSB	APPD.	GSB	
SCALE:	NTS			
DATE	REVISION			SHEET NO. 1 OF 1





STR. NUMBER	HEIGHT/ CLASS*	EMBEDMENT DEPTH	LINE ANGLE θ	NEMA 2-HOLE PADS		GROUNDING NUT	
				OHGW	POLE GROUND	SW/TIE	GUY
4 LP	65/S-04.2	15'-0"	N/A	1'-6"	47'-6"	2'-0"	18'-0"
4 RP	65/S-04.2	15'-0"	N/A	1'-6"	47'-6"	2'-0"	18'-0"

* POLE CLASS DEFINED BY RUS STANDARD STEEL POLE DESIGNATION

NOTES:

1) LETTERS (i.e. "A" & "B") INDICATE THRU–VANG AND/OR THROUGH HOLE LOCATIONS AND ORIENTATION.

2) LETTERS WITH DIMENSIONS (i.e. "A–13/16") INDICATE THROUGH HOLES WITH DIAMETER FOR DRILLING.

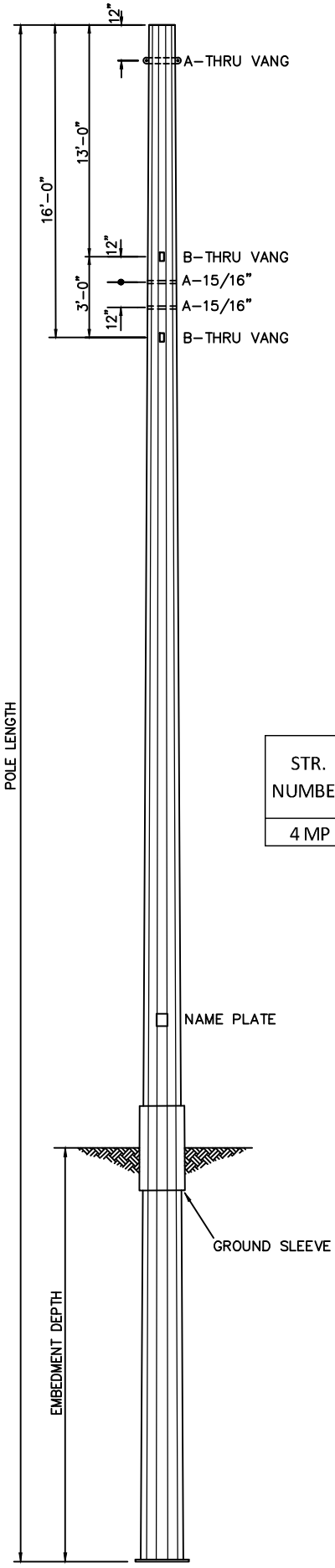
3) REFERENCE "DETAILS" SHEET FOR STANDARD DETAIL DRAWINGS.

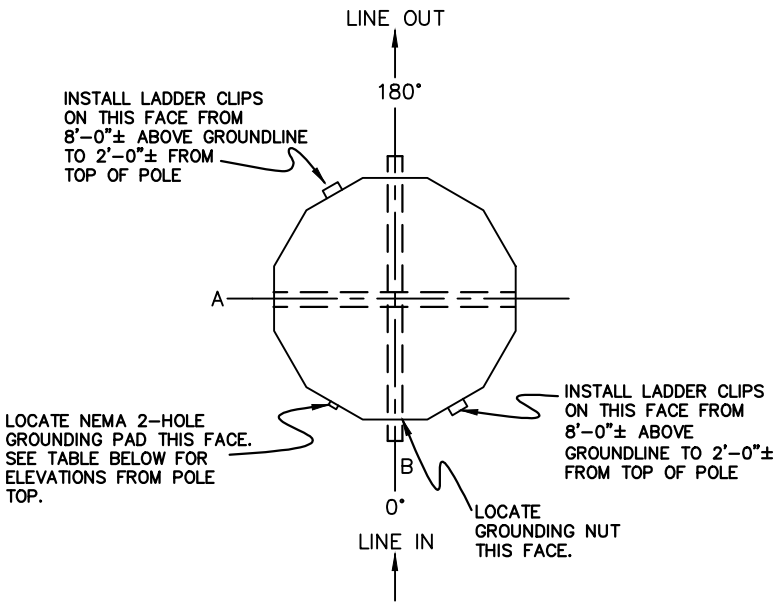
STEEL POLE FRAMING DRAWING
115 kV TRANSMISSION LINE
TH–5AA(S) – LEFT AND RIGHT POLES

Booth & Associates
2300 Rexwoods Drive Suite 300, Raleigh NC 27607
NC F-0221

DWN.	TSL	DATE:	09/18/2023	DWG. NO. SPFD–4A
CKD.	GSB	APPD.	GSB	
SCALE:	NTS			

DATE	REVISION	SHEET NO.
		1 OF 1





STR. NUMBER	HEIGHT/ CLASS*	EMBEDMENT DEPTH	LINE ANGLE θ	NEMA 2-HOLE PADS		GROUNDING NUT	
				OHGW	POLE GROUND	SW/TIE	GUY
4 MP	65/S-04.2	15'-0"	N/A	N/A	47'-6"	2'-0"	18'-0"

* POLE CLASS DEFINED BY RUS STANDARD STEEL POLE DESIGNATION

NOTES:

1) LETTERS (i.e. "A" & "B") INDICATE THRU–VANG AND/OR THROUGH HOLE LOCATIONS AND ORIENTATION.

2) LETTERS WITH DIMENSIONS (i.e. "A–13/16") INDICATE THROUGH HOLES WITH DIAMETER FOR DRILLING.

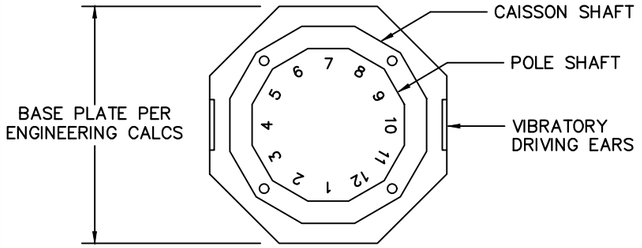
3) REFERENCE "DETAILS" SHEET FOR STANDARD DETAIL DRAWINGS.

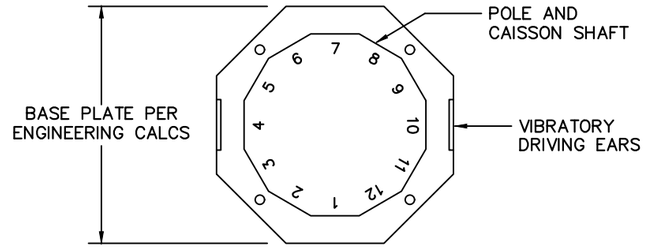
STEEL POLE FRAMING DRAWING
115 kV TRANSMISSION LINE
TH–5AA(S) – MIDDLE POLE

Booth & Associates
2300 Rexwoods Drive Suite 300, Raleigh NC 27607
NC F-0221

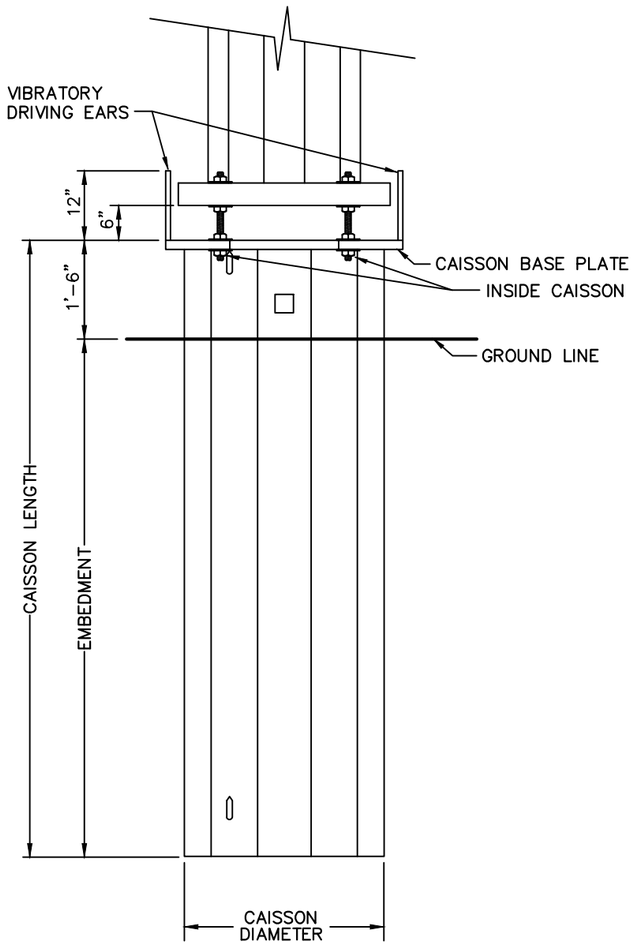
DWN.	TSL	DATE:	09/18/2023	DWG. NO. SPFD–4B
CKD.	GSB	APPD.	GSB	
SCALE:	NTS			

DATE	REVISION	SHEET NO.
		1 OF 1

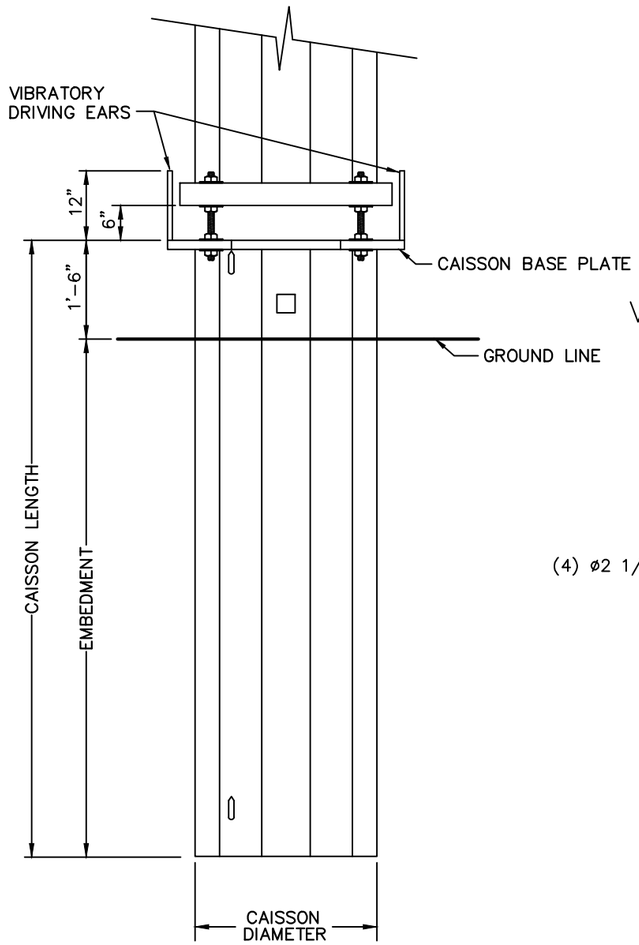




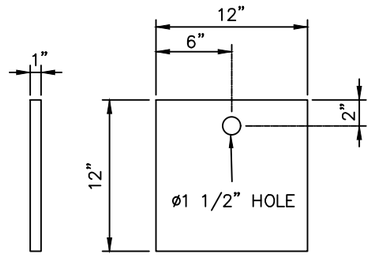
STR. NUMBER	CAISSON LENGTH (FT)	EMBEDMENT DEPTH (FT)	DWG. REFERENCE	MIN. DIAMETER (FT)	MIN. WALL THICKNESS (IN)	GROUNDING NUT FROM TOP OF BASE PLATE
2 LP	17'-6"	16'-0"	TMF-VC1	3'-0"	3/8"	0'-6"
2 MP	16'-6"	15'-0"	TMF-VC1	3'-0"	3/8"	0'-6"
2 RP	17'-6"	16'-0"	TMF-VC1	3'-0"	3/8"	0'-6"
3 LP	14'-6"	13'-0"	TMF-VC1	3'-0"	3/8"	0'-6"
3 RP	14'-6"	13'-0"	TMF-VC1	3'-0"	3/8"	0'-6"



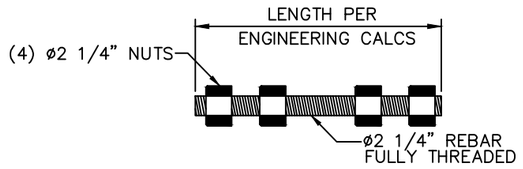
VIBRATORY DRIVEN CAISSON FOUNDATION BASE PLATED INSIDE BOLT CIRCLE TMF–VC1



VIBRATORY DRIVEN CAISSON FOUNDATION BASE PLATED OUTSIDE BOLT CIRCLE TMF–VC2



VIBRATORY DRIVING "EAR"



CAISSON BOLT ASSEMBLY

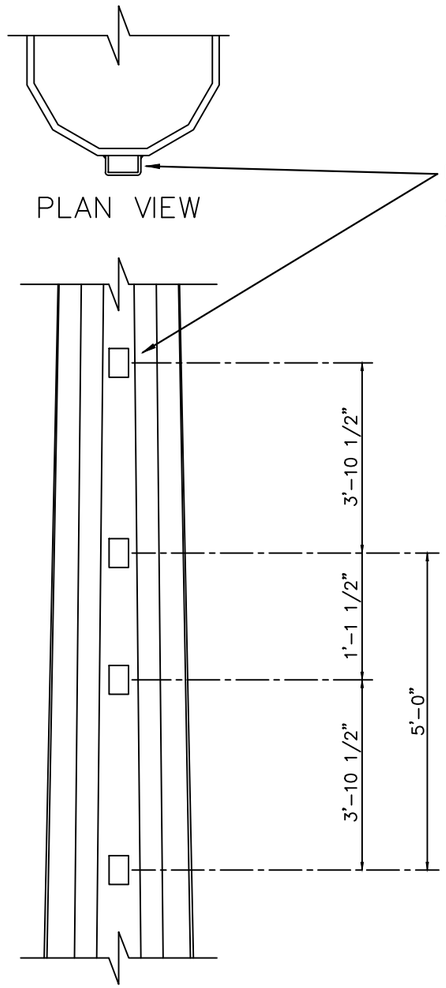
NOTES:

1. VIBRATORY CAISSON DIAMETERS SHOWN IN TABLE ARE MINIMUM DIAMETERS MEASURED FLAT TO FLAT. POLE MANUFACTURER IS TO VERIFY VIBRATORY CAISSON IS ADEQUATE FOR DESIGN LOADS.
2. PLATE THICKNESS OF VIBRATORY CAISSON TO BE 3/8" MINIMUM.
3. CORROCOTE OR EQUIVALENT CORROSION PROTECTION COATING SHALL BE APPLIED 10FT BELOW THE TOP OF CAISSON. DO NOT COAT NAME PLATE OR GROUND NUT.
4. VIBRATORY CAISSON TO BE HOT DIP GALVANIZED.
5. FOR STRUCTURES WITH CAISSON TYPE TMF–VC2, MANUFACTURER SHALL MATCH CAISSON SHAFT DIAMETER AND POLE BASE DIAMETER. MINIMUM CAISSON DIAMETER SHALL ADHERE TO THE TABULATED VALUES ABOVE.
6. 1/2"–13 UNC STAINLESS STEEL GROUNDING NUT SHALL BE INSTALLED ON FLAT 1 OF EACH CAISSON DIRECTLY BELOW THE NEMA PAD ON THE CORRESPONDING POLE.
7. ANCHOR BOLT HOLES IN POLE BASE PLATES SHALL BE 3/8" OVERSIZE AND ANCHOR BOLT HOLES IN CAISSON TOP PLATES SHALL BE 1/8" OVERSIZE.
8. MANUFACTURER SHALL CLEARLY MARK ALL MATCHING POLES AND CAISSONS WITH CORRESPONDING STRUCTURE NUMBERS. ORIENTATION MARKINGS SHALL BE PROVIDED IN ORDER TO ENSURE PROPER POLE–TO–CAISSON ALIGNMENT AND TO ORIENT CAISSON ON LINE ANGLE BISECTOR DURING INSTALLATION.

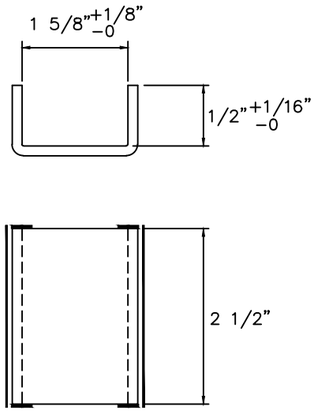
VIBRATORY DRIVEN FLANGED CAISSON

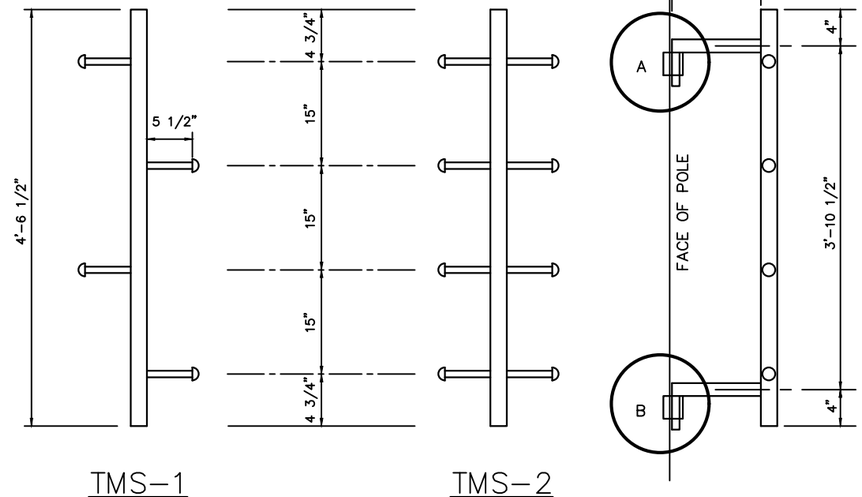
Booth & Associates
2500 Beaverdam Drive Suite 300, Raleigh NC 27607
NC-F-0501

DWN.	TSL	DATE:	09/18/2023	DWG. NO. VCFD–1
CKD.	GSB	APPD.	GSB	
SCALE:	NTS			
DATE	REVISION			SHEET NO. 1 OF 1



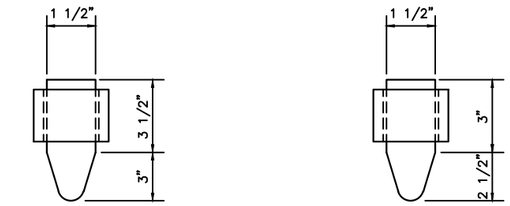
TMS-3
LADDER CLIP DETAIL





TMS-1
CLIMBING LADDER

TMS-2
WORKING LADDER



CLIP DETAIL
"A"

CLIP DETAIL
"B"

POLE LADDER ASSEMBLY DETAIL

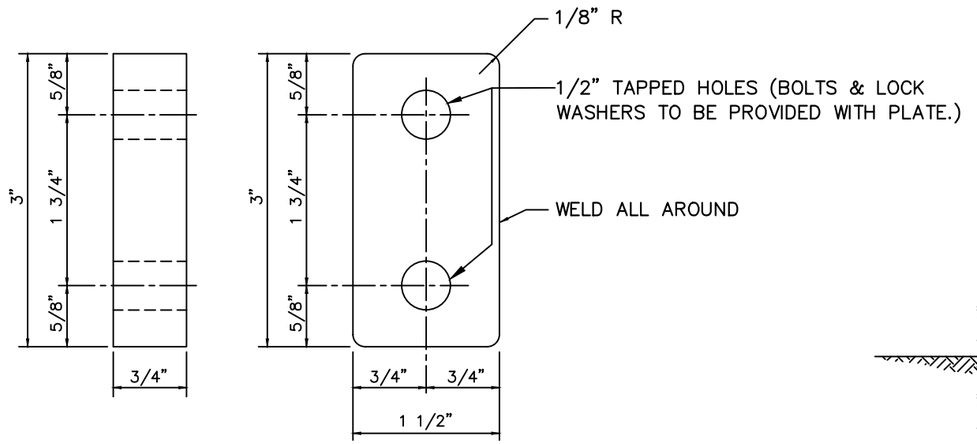
NOTES:

1. MATERIAL TO BE A36-62T FLAT STEEL STOCK 3/16"x 2 1/2"x 2 7/8".
2. LADDER CLIPS TO BE PROVIDED AS PART OF THE POLE, INSTALLED ON THE SPECIFIED FLATS FROM 8'-0" ABOVE GROUNDLINE TO 2'-0" FROM TOP OF POLE.
3. LADDER CLIPS TO BE DESIGNED TO FIT WORKING AND CLIMBING LADDERS - SEE TMS-1, 2.
4. LADDERS SHALL BE MANUFACTURED BY McGREGOR ARCHITECTURAL IRON CO. OR APPROVED EQUAL. LADDERS CLIPS AND INSERTS SHALL BE DESIGNED BY POLE MANUFACTURER AND INCLUDED AS PART OF THE POLE.

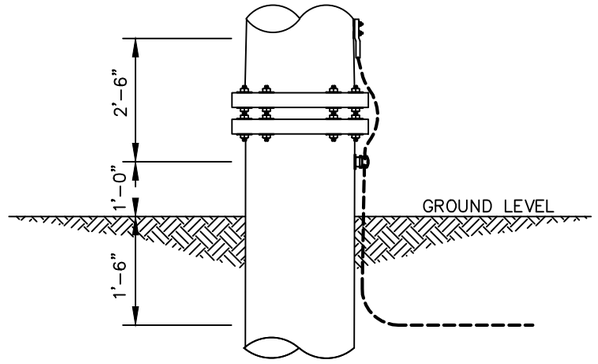
POLE LADDER ASSEMBLY AND
LADDER CLIP DETAIL

Booth & Associates
2009 Rennaissance Drive Suite 300, Raleigh NC 27607
NC C-2121

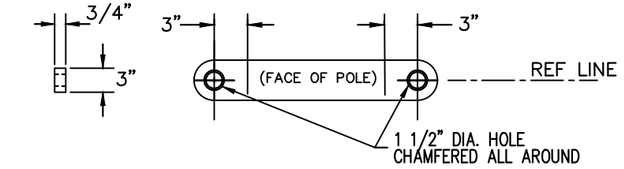
DWN.	BLP	DATE:	05/01/2023	DWG. NO. DETAILS
CKD.	CGO	APPD.	GSB	
SCALE:	NTS			
DATE	REVISION			SHEET NO. 1 OF 2



NEMA PAD DETAIL



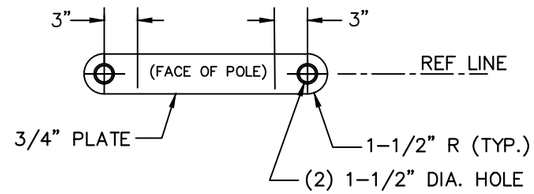
STEEL CAISSON GROUNDING DETAIL



VANG DETAIL – STANDARD CLASS POLES

NTS

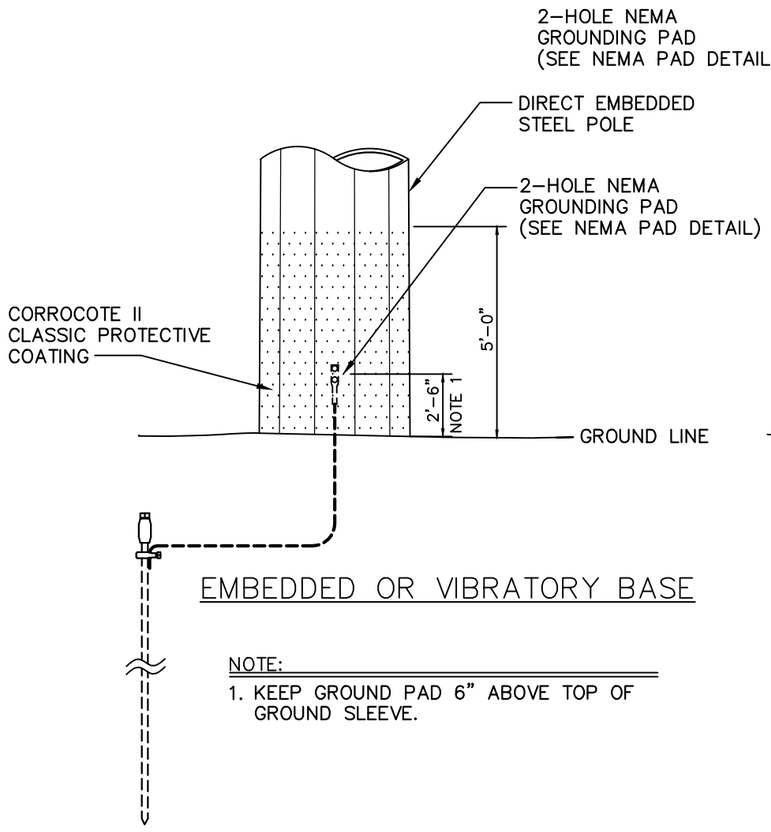
MINIMUM 30,000 LBS.
ULTIMATE STRENGTH VANG
REQUIRED 90° OR 45° LOAD



VANG DETAIL – ENGINEERED POLES

NTS

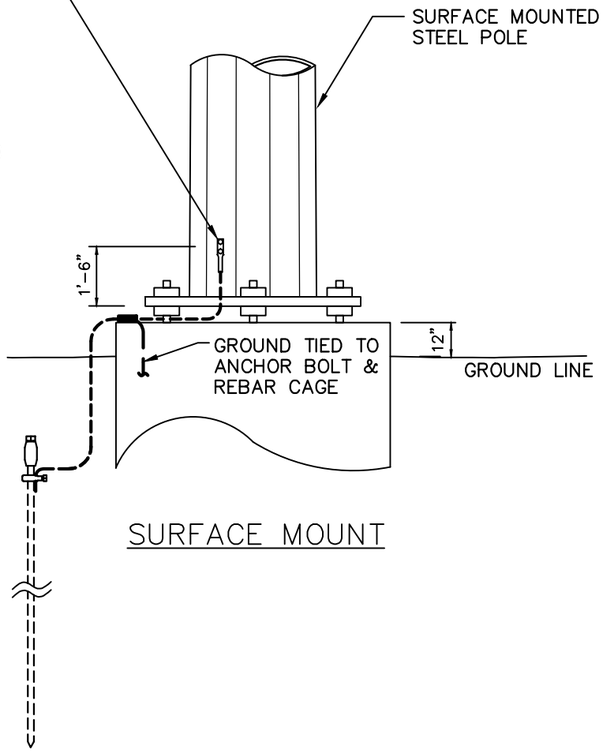
MINIMUM 30,000 LBS.
ULTIMATE STRENGTH VANG
REQUIRED 90° OR 45° LOAD



EMBEDDED OR VIBRATORY BASE

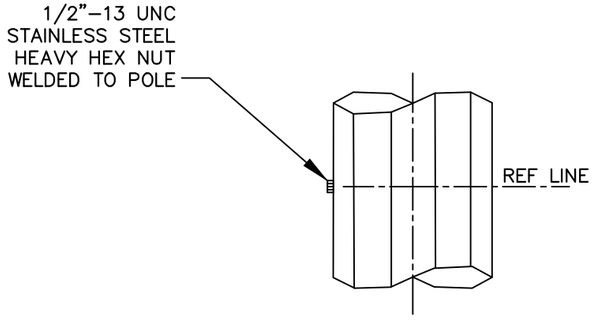
NOTE:

1. KEEP GROUND PAD 6" ABOVE TOP OF GROUND SLEEVE.



SURFACE MOUNT

STEEL POLE GROUNDING DETAILS



POLE GROUND NUT DETAIL

STEEL POLE DETAILS

Booth & Associates
2500 Riverbirch Drive Suite 300, Raleigh NC 27607
NC F-0102

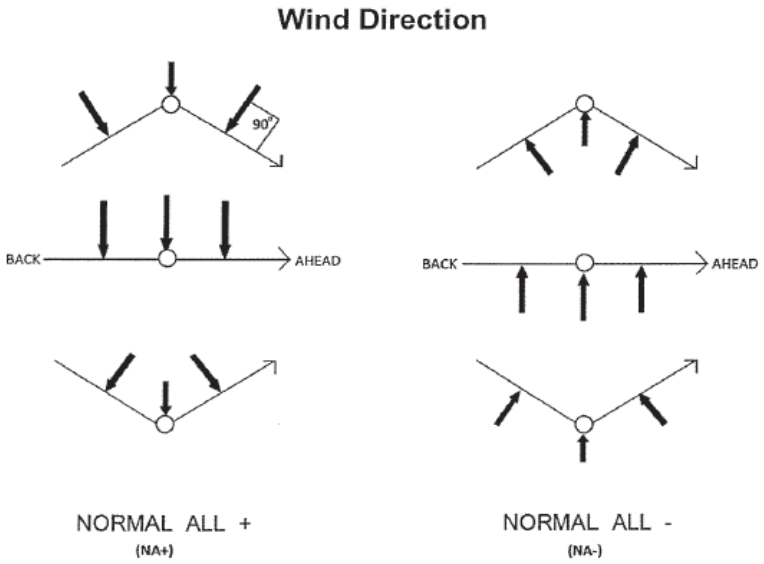
DWN. BLP	DATE: 05/01/2023	DWG. NO. DETAILS
CKD. CGO	APPD. GSB	
SCALE: NTS		
DATE	REVISION	SHEET NO. 2 OF 2

ATTACHMENT B

DESIGN LOADS

Structure Wind Loading (Factored)

LOAD CASE	WIND PRESSURE
NESC RULE 250B	4.4 PSF
NESC RULE 250C	34.0 PSF
NESC RULE 250D	2.5 PSF
DEFL - MOD WIND	6.6 PSF
STRINGING LOAD	4.4 PSF



There are two (2) wind situations applicaple to the load cases shown in the table above, NA+ and NA-. The arrows in the diagram above represent the wind direction, and the loads in the table above represent the psf load applied to the structure and spans. The wind blows perpendicular to each span individually, and on the structure at the angle bisector.

LT-1

Str. 2 (SPFD-2)

LC #	WC #	Load Case Description	Set No.	Phase No.	Attach. Joint Labels	Structure Loads			Loads from back span			Loads from ahead span		
						Vert. (lbs)	Trans. (lbs)	Long. (lbs)	Vert. (lbs)	Trans. (lbs)	Long. (lbs)	Vert. (lbs)	Trans. (lbs)	Long. (lbs)
1	1	RULE 250B NA+	1	1	SW1_A	134	214	-4926	0	0	0	134	214	-4926
1	1	RULE 250B NA+	2	1	SW2_A	134	-2	-4931	0	0	0	134	-2	-4931
1	1	RULE 250B NA+	5	1	T1_A	282	193	-11529	0	0	0	282	193	-11529
1	1	RULE 250B NA+	5	2	T2_A	282	193	-11529	0	0	0	282	193	-11529
1	1	RULE 250B NA+	5	3	T3_A	282	193	-11529	0	0	0	282	193	-11529
1	1	RULE 250B NA+	15	1	T1_B	1003	104	4535	1003	104	4535	0	0	0
1	1	RULE 250B NA+	15	2	T2_B	1003	104	4535	1003	104	4535	0	0	0
1	1	RULE 250B NA+	15	3	T3_B	1003	104	4535	1003	104	4535	0	0	0
2	1	RULE 250B NA-	1	1	SW1_A	134	2	-4931	0	0	0	134	2	-4931
2	1	RULE 250B NA-	2	1	SW2_A	134	-214	-4926	0	0	0	134	-214	-4926
2	1	RULE 250B NA-	5	1	T1_A	282	-193	-11529	0	0	0	282	-193	-11529
2	1	RULE 250B NA-	5	2	T2_A	282	-193	-11529	0	0	0	282	-193	-11529
2	1	RULE 250B NA-	5	3	T3_A	282	-193	-11529	0	0	0	282	-193	-11529
2	1	RULE 250B NA-	15	1	T1_B	1003	-104	4535	1003	-104	4535	0	0	0
2	1	RULE 250B NA-	15	2	T2_B	1003	-104	4535	1003	-104	4535	0	0	0
2	1	RULE 250B NA-	15	3	T3_B	1003	-104	4535	1003	-104	4535	0	0	0
3	1	RULE 250B Uplift NA+	1	1	SW1_A	94	214	-4926	0	0	0	94	214	-4926
3	1	RULE 250B Uplift NA+	2	1	SW2_A	94	-2	-4931	0	0	0	94	-2	-4931
3	1	RULE 250B Uplift NA+	5	1	T1_A	194	193	-11529	0	0	0	194	193	-11529
3	1	RULE 250B Uplift NA+	5	2	T2_A	194	193	-11529	0	0	0	194	193	-11529
3	1	RULE 250B Uplift NA+	5	3	T3_A	194	193	-11529	0	0	0	194	193	-11529
3	1	RULE 250B Uplift NA+	15	1	T1_B	675	104	4535	675	104	4535	0	0	0
3	1	RULE 250B Uplift NA+	15	2	T2_B	675	104	4535	675	104	4535	0	0	0
3	1	RULE 250B Uplift NA+	15	3	T3_B	675	104	4535	675	104	4535	0	0	0
4	1	RULE 250B Uplift NA-	1	1	SW1_A	94	2	-4931	0	0	0	94	2	-4931
4	1	RULE 250B Uplift NA-	2	1	SW2_A	94	-214	-4926	0	0	0	94	-214	-4926
4	1	RULE 250B Uplift NA-	5	1	T1_A	194	-193	-11529	0	0	0	194	-193	-11529
4	1	RULE 250B Uplift NA-	5	2	T2_A	194	-193	-11529	0	0	0	194	-193	-11529
4	1	RULE 250B Uplift NA-	5	3	T3_A	194	-193	-11529	0	0	0	194	-193	-11529
4	1	RULE 250B Uplift NA-	15	1	T1_B	675	-104	4535	675	-104	4535	0	0	0
4	1	RULE 250B Uplift NA-	15	2	T2_B	675	-104	4535	675	-104	4535	0	0	0
4	1	RULE 250B Uplift NA-	15	3	T3_B	675	-104	4535	675	-104	4535	0	0	0
5	2	RULE 250C NA+	1	1	SW1_A	66	213	-2923	0	0	0	66	213	-2923
5	2	RULE 250C NA+	2	1	SW2_A	66	85	-2929	0	0	0	66	85	-2929
5	2	RULE 250C NA+	5	1	T1_A	141	371	-6609	0	0	0	141	371	-6609
5	2	RULE 250C NA+	5	2	T2_A	141	371	-6609	0	0	0	141	371	-6609
5	2	RULE 250C NA+	5	3	T3_A	141	371	-6609	0	0	0	141	371	-6609
5	2	RULE 250C NA+	15	1	T1_B	710	206	2765	710	206	2765	0	0	0
5	2	RULE 250C NA+	15	2	T2_B	710	206	2765	710	206	2765	0	0	0
5	2	RULE 250C NA+	15	3	T3_B	710	206	2765	710	206	2765	0	0	0
6	2	RULE 250C NA-	1	1	SW1_A	66	-85	-2929	0	0	0	66	-85	-2929
6	2	RULE 250C NA-	2	1	SW2_A	66	-213	-2923	0	0	0	66	-213	-2923
6	2	RULE 250C NA-	5	1	T1_A	141	-371	-6609	0	0	0	141	-371	-6609
6	2	RULE 250C NA-	5	2	T2_A	141	-371	-6609	0	0	0	141	-371	-6609
6	2	RULE 250C NA-	5	3	T3_A	141	-371	-6609	0	0	0	141	-371	-6609
6	2	RULE 250C NA-	15	1	T1_B	710	-206	2765	710	-206	2765	0	0	0
6	2	RULE 250C NA-	15	2	T2_B	710	-206	2765	710	-206	2765	0	0	0
6	2	RULE 250C NA-	15	3	T3_B	710	-206	2765	710	-206	2765	0	0	0
7	3	RULE 250D NA+	1	1	SW1_A	227	144	-4117	0	0	0	227	144	-4117
7	3	RULE 250D NA+	2	1	SW2_A	227	-36	-4119	0	0	0	227	-36	-4119
7	3	RULE 250D NA+	5	1	T1_A	396	76	-8833	0	0	0	396	76	-8833
7	3	RULE 250D NA+	5	2	T2_A	396	76	-8833	0	0	0	396	76	-8833
7	3	RULE 250D NA+	5	3	T3_A	396	76	-8833	0	0	0	396	76	-8833
7	3	RULE 250D NA+	15	1	T1_B	1138	41	4062	1138	41	4062	0	0	0
7	3	RULE 250D NA+	15	2	T2_B	1138	41	4062	1138	41	4062	0	0	0
7	3	RULE 250D NA+	15	3	T3_B	1138	41	4062	1138	41	4062	0	0	0
8	3	RULE 250D NA-	1	1	SW1_A	227	36	-4119	0	0	0	227	36	-4119
8	3	RULE 250D NA-	2	1	SW2_A	227	-144	-4117	0	0	0	227	-144	-4117
8	3	RULE 250D NA-	5	1	T1_A	396	-76	-8833	0	0	0	396	-76	-8833
8	3	RULE 250D NA-	5	2	T2_A	396	-76	-8833	0	0	0	396	-76	-8833

LT-1

Str. 2 (SPFD-2)

LC #	WC #	Load Case Description	Set No.	Phase No.	Attach. Joint Labels	Structure Loads			Loads from back span			Loads from ahead span		
						Vert. (lbs)	Trans. (lbs)	Long. (lbs)	Vert. (lbs)	Trans. (lbs)	Long. (lbs)	Vert. (lbs)	Trans. (lbs)	Long. (lbs)
8	3	RULE 250D NA-	5	3	T3_A	396	-76	-8833	0	0	0	396	-76	-8833
8	3	RULE 250D NA-	15	1	T1_B	1138	-41	4062	1138	-41	4062	0	0	0
8	3	RULE 250D NA-	15	2	T2_B	1138	-41	4062	1138	-41	4062	0	0	0
8	3	RULE 250D NA-	15	3	T3_B	1138	-41	4062	1138	-41	4062	0	0	0
9	1	RULE 277 Insulators NA+ 250B	1	1	SW1_A	89	108	-2986	0	0	0	89	108	-2986
9	1	RULE 277 Insulators NA+ 250B	2	1	SW2_A	89	-23	-2988	0	0	0	89	-23	-2988
9	1	RULE 277 Insulators NA+ 250B	5	1	T1_A	188	77	-6987	0	0	0	188	77	-6987
9	1	RULE 277 Insulators NA+ 250B	5	2	T2_A	188	77	-6987	0	0	0	188	77	-6987
9	1	RULE 277 Insulators NA+ 250B	5	3	T3_A	188	77	-6987	0	0	0	188	77	-6987
9	1	RULE 277 Insulators NA+ 250B	15	1	T1_B	669	42	2748	669	42	2748	0	0	0
9	1	RULE 277 Insulators NA+ 250B	15	2	T2_B	669	42	2748	669	42	2748	0	0	0
9	1	RULE 277 Insulators NA+ 250B	15	3	T3_B	669	42	2748	669	42	2748	0	0	0
10	1	RULE 277 Insulators NA- 250B	1	1	SW1_A	89	23	-2988	0	0	0	89	23	-2988
10	1	RULE 277 Insulators NA- 250B	2	1	SW2_A	89	-108	-2986	0	0	0	89	-108	-2986
10	1	RULE 277 Insulators NA- 250B	5	1	T1_A	188	-77	-6987	0	0	0	188	-77	-6987
10	1	RULE 277 Insulators NA- 250B	5	2	T2_A	188	-77	-6987	0	0	0	188	-77	-6987
10	1	RULE 277 Insulators NA- 250B	5	3	T3_A	188	-77	-6987	0	0	0	188	-77	-6987
10	1	RULE 277 Insulators NA- 250B	15	1	T1_B	669	-42	2748	669	-42	2748	0	0	0
10	1	RULE 277 Insulators NA- 250B	15	2	T2_B	669	-42	2748	669	-42	2748	0	0	0
10	1	RULE 277 Insulators NA- 250B	15	3	T3_B	669	-42	2748	669	-42	2748	0	0	0
11	2	RULE 277 Insulators NA+ 250C	1	1	SW1_A	60	194	-2657	0	0	0	60	194	-2657
11	2	RULE 277 Insulators NA+ 250C	2	1	SW2_A	60	78	-2663	0	0	0	60	78	-2663
11	2	RULE 277 Insulators NA+ 250C	5	1	T1_A	128	337	-6008	0	0	0	128	337	-6008
11	2	RULE 277 Insulators NA+ 250C	5	2	T2_A	128	337	-6008	0	0	0	128	337	-6008
11	2	RULE 277 Insulators NA+ 250C	5	3	T3_A	128	337	-6008	0	0	0	128	337	-6008
11	2	RULE 277 Insulators NA+ 250C	15	1	T1_B	645	188	2514	645	188	2514	0	0	0
11	2	RULE 277 Insulators NA+ 250C	15	2	T2_B	645	188	2514	645	188	2514	0	0	0
11	2	RULE 277 Insulators NA+ 250C	15	3	T3_B	645	188	2514	645	188	2514	0	0	0
12	2	RULE 277 Insulators NA- 250C	1	1	SW1_A	60	-78	-2663	0	0	0	60	-78	-2663
12	2	RULE 277 Insulators NA- 250C	2	1	SW2_A	60	-194	-2657	0	0	0	60	-194	-2657
12	2	RULE 277 Insulators NA- 250C	5	1	T1_A	128	-337	-6008	0	0	0	128	-337	-6008
12	2	RULE 277 Insulators NA- 250C	5	2	T2_A	128	-337	-6008	0	0	0	128	-337	-6008
12	2	RULE 277 Insulators NA- 250C	5	3	T3_A	128	-337	-6008	0	0	0	128	-337	-6008
12	2	RULE 277 Insulators NA- 250C	15	1	T1_B	645	-188	2514	645	-188	2514	0	0	0
12	2	RULE 277 Insulators NA- 250C	15	2	T2_B	645	-188	2514	645	-188	2514	0	0	0
12	2	RULE 277 Insulators NA- 250C	15	3	T3_B	645	-188	2514	645	-188	2514	0	0	0
13	3	RULE 277 Insulators NA+ 250D	1	1	SW1_A	206	131	-3743	0	0	0	206	131	-3743
13	3	RULE 277 Insulators NA+ 250D	2	1	SW2_A	206	-33	-3745	0	0	0	206	-33	-3745
13	3	RULE 277 Insulators NA+ 250D	5	1	T1_A	360	69	-8030	0	0	0	360	69	-8030
13	3	RULE 277 Insulators NA+ 250D	5	2	T2_A	360	69	-8030	0	0	0	360	69	-8030
13	3	RULE 277 Insulators NA+ 250D	5	3	T3_A	360	69	-8030	0	0	0	360	69	-8030
13	3	RULE 277 Insulators NA+ 250D	15	1	T1_B	1035	37	3692	1035	37	3692	0	0	0
13	3	RULE 277 Insulators NA+ 250D	15	2	T2_B	1035	37	3692	1035	37	3692	0	0	0
13	3	RULE 277 Insulators NA+ 250D	15	3	T3_B	1035	37	3692	1035	37	3692	0	0	0
14	3	RULE 277 Insulators NA- 250D	1	1	SW1_A	206	33	-3745	0	0	0	206	33	-3745
14	3	RULE 277 Insulators NA- 250D	2	1	SW2_A	206	-131	-3743	0	0	0	206	-131	-3743
14	3	RULE 277 Insulators NA- 250D	5	1	T1_A	360	-69	-8030	0	0	0	360	-69	-8030
14	3	RULE 277 Insulators NA- 250D	5	2	T2_A	360	-69	-8030	0	0	0	360	-69	-8030
14	3	RULE 277 Insulators NA- 250D	5	3	T3_A	360	-69	-8030	0	0	0	360	-69	-8030
14	3	RULE 277 Insulators NA- 250D	15	1	T1_B	1035	-37	3692	1035	-37	3692	0	0	0
14	3	RULE 277 Insulators NA- 250D	15	2	T2_B	1035	-37	3692	1035	-37	3692	0	0	0
14	3	RULE 277 Insulators NA- 250D	15	3	T3_B	1035	-37	3692	1035	-37	3692	0	0	0
15	4	Extreme Ice NA+	1	1	SW1_A	207	76	-3497	0	0	0	207	76	-3497
15	4	Extreme Ice NA+	2	1	SW2_A	207	-76	-3497	0	0	0	207	-76	-3497
15	4	Extreme Ice NA+	5	1	T1_A	365	0	-7292	0	0	0	365	0	-7292
15	4	Extreme Ice NA+	5	2	T2_A	365	0	-7292	0	0	0	365	0	-7292
15	4	Extreme Ice NA+	5	3	T3_A	365	0	-7292	0	0	0	365	0	-7292
15	4	Extreme Ice NA+	15	1	T1_B	931	0	3220	931	0	3220	0	0	0
15	4	Extreme Ice NA+	15	2	T2_B	931	0	3220	931	0	3220	0	0	0
15	4	Extreme Ice NA+	15	3	T3_B	931	0	3220	931	0	3220	0	0	0

LT-1

Str. 2 (SPFD-2)

LC #	WC #	Load Case Description	Set No.	Phase No.	Attach. Joint Labels	Structure Loads			Loads from back span			Loads from ahead span		
						Vert. (lbs)	Trans. (lbs)	Long. (lbs)	Vert. (lbs)	Trans. (lbs)	Long. (lbs)	Vert. (lbs)	Trans. (lbs)	Long. (lbs)
16	4	Extreme Ice NA-	1	1	SW1_A	207	76	-3497	0	0	0	207	76	-3497
16	4	Extreme Ice NA-	2	1	SW2_A	207	-76	-3497	0	0	0	207	-76	-3497
16	4	Extreme Ice NA-	5	1	T1_A	365	0	-7292	0	0	0	365	0	-7292
16	4	Extreme Ice NA-	5	2	T2_A	365	0	-7292	0	0	0	365	0	-7292
16	4	Extreme Ice NA-	5	3	T3_A	365	0	-7292	0	0	0	365	0	-7292
16	4	Extreme Ice NA-	15	1	T1_B	931	0	3220	931	0	3220	0	0	0
16	4	Extreme Ice NA-	15	2	T2_B	931	0	3220	931	0	3220	0	0	0
16	4	Extreme Ice NA-	15	3	T3_B	931	0	3220	931	0	3220	0	0	0
17	5	Uplift NA+	1	1	SW1_A	60	57	-2619	0	0	0	60	57	-2619
17	5	Uplift NA+	2	1	SW2_A	60	-57	-2619	0	0	0	60	-57	-2619
17	5	Uplift NA+	5	1	T1_A	123	0	-6935	0	0	0	123	0	-6935
17	5	Uplift NA+	5	2	T2_A	123	0	-6935	0	0	0	123	0	-6935
17	5	Uplift NA+	5	3	T3_A	123	0	-6935	0	0	0	123	0	-6935
17	5	Uplift NA+	15	1	T1_B	617	0	2382	617	0	2382	0	0	0
17	5	Uplift NA+	15	2	T2_B	617	0	2382	617	0	2382	0	0	0
17	5	Uplift NA+	15	3	T3_B	616	0	2382	616	0	2382	0	0	0
18	5	Uplift NA-	1	1	SW1_A	60	57	-2619	0	0	0	60	57	-2619
18	5	Uplift NA-	2	1	SW2_A	60	-57	-2619	0	0	0	60	-57	-2619
18	5	Uplift NA-	5	1	T1_A	123	0	-6935	0	0	0	123	0	-6935
18	5	Uplift NA-	5	2	T2_A	123	0	-6935	0	0	0	123	0	-6935
18	5	Uplift NA-	5	3	T3_A	123	0	-6935	0	0	0	123	0	-6935
18	5	Uplift NA-	15	1	T1_B	617	0	2382	617	0	2382	0	0	0
18	5	Uplift NA-	15	2	T2_B	617	0	2382	617	0	2382	0	0	0
18	5	Uplift NA-	15	3	T3_B	616	0	2382	616	0	2382	0	0	0
19	23	Camber NA+	1	1	SW1_A	61	37	-1704	0	0	0	61	37	-1704
19	23	Camber NA+	2	1	SW2_A	61	-37	-1704	0	0	0	61	-37	-1704
19	23	Camber NA+	5	1	T1_A	141	0	-3907	0	0	0	141	0	-3907
19	23	Camber NA+	5	2	T2_A	141	0	-3907	0	0	0	141	0	-3907
19	23	Camber NA+	5	3	T3_A	141	0	-3907	0	0	0	141	0	-3907
19	23	Camber NA+	15	1	T1_B	356	0	1194	356	0	1194	0	0	0
19	23	Camber NA+	15	2	T2_B	356	0	1194	356	0	1194	0	0	0
19	23	Camber NA+	15	3	T3_B	356	0	1194	356	0	1194	0	0	0
20	23	Camber NA-	1	1	SW1_A	61	37	-1704	0	0	0	61	37	-1704
20	23	Camber NA-	2	1	SW2_A	61	-37	-1704	0	0	0	61	-37	-1704
20	23	Camber NA-	5	1	T1_A	141	0	-3907	0	0	0	141	0	-3907
20	23	Camber NA-	5	2	T2_A	141	0	-3907	0	0	0	141	0	-3907
20	23	Camber NA-	5	3	T3_A	141	0	-3907	0	0	0	141	0	-3907
20	23	Camber NA-	15	1	T1_B	356	0	1194	356	0	1194	0	0	0
20	23	Camber NA-	15	2	T2_B	356	0	1194	356	0	1194	0	0	0
20	23	Camber NA-	15	3	T3_B	356	0	1194	356	0	1194	0	0	0
21	23	Camber NA+ TANGENT	1	1	SW1_A	61	37	-1704	0	0	0	61	37	-1704
21	23	Camber NA+ TANGENT	2	1	SW2_A	61	-37	-1704	0	0	0	61	-37	-1704
21	23	Camber NA+ TANGENT	5	1	T1_A	141	0	-3907	0	0	0	141	0	-3907
21	23	Camber NA+ TANGENT	5	2	T2_A	141	0	-3907	0	0	0	141	0	-3907
21	23	Camber NA+ TANGENT	5	3	T3_A	141	0	-3907	0	0	0	141	0	-3907
21	23	Camber NA+ TANGENT	15	1	T1_B	356	0	1194	356	0	1194	0	0	0
21	23	Camber NA+ TANGENT	15	2	T2_B	356	0	1194	356	0	1194	0	0	0
21	23	Camber NA+ TANGENT	15	3	T3_B	356	0	1194	356	0	1194	0	0	0
22	23	Camber NA- TANGENT	1	1	SW1_A	61	37	-1704	0	0	0	61	37	-1704
22	23	Camber NA- TANGENT	2	1	SW2_A	61	-37	-1704	0	0	0	61	-37	-1704
22	23	Camber NA- TANGENT	5	1	T1_A	141	0	-3907	0	0	0	141	0	-3907
22	23	Camber NA- TANGENT	5	2	T2_A	141	0	-3907	0	0	0	141	0	-3907
22	23	Camber NA- TANGENT	5	3	T3_A	141	0	-3907	0	0	0	141	0	-3907
22	23	Camber NA- TANGENT	15	1	T1_B	356	0	1194	356	0	1194	0	0	0
22	23	Camber NA- TANGENT	15	2	T2_B	356	0	1194	356	0	1194	0	0	0
22	23	Camber NA- TANGENT	15	3	T3_B	356	0	1194	356	0	1194	0	0	0
23	8	DEFL - Mod Wind NA+	1	1	SW1_A	61	71	-1799	0	0	0	61	71	-1799
23	8	DEFL - Mod Wind NA+	2	1	SW2_A	61	-8	-1800	0	0	0	61	-8	-1800
23	8	DEFL - Mod Wind NA+	5	1	T1_A	140	84	-4146	0	0	0	140	84	-4146
23	8	DEFL - Mod Wind NA+	5	2	T2_A	140	84	-4146	0	0	0	140	84	-4146

LT-1

Str. 2 (SPFD-2)

LC #	WC #	Load Case Description	Set No.	Phase No.	Attach. Joint Labels	Structure Loads			Loads from back span			Loads from ahead span		
						Vert. (lbs)	Trans. (lbs)	Long. (lbs)	Vert. (lbs)	Trans. (lbs)	Long. (lbs)	Vert. (lbs)	Trans. (lbs)	Long. (lbs)
23	8	DEFL - Mod Wind NA+	5	3	T3_A	140	84	-4146	0	0	0	140	84	-4146
23	8	DEFL - Mod Wind NA+	15	1	T1_B	386	46	1332	386	46	1332	0	0	0
23	8	DEFL - Mod Wind NA+	15	2	T2_B	386	46	1332	386	46	1332	0	0	0
23	8	DEFL - Mod Wind NA+	15	3	T3_B	386	46	1332	386	46	1332	0	0	0
24	8	DEFL - Mod Wind NA-	1	1	SW1_A	61	8	-1800	0	0	0	61	8	-1800
24	8	DEFL - Mod Wind NA-	2	1	SW2_A	61	-71	-1799	0	0	0	61	-71	-1799
24	8	DEFL - Mod Wind NA-	5	1	T1_A	140	-84	-4146	0	0	0	140	-84	-4146
24	8	DEFL - Mod Wind NA-	5	2	T2_A	140	-84	-4146	0	0	0	140	-84	-4146
24	8	DEFL - Mod Wind NA-	5	3	T3_A	140	-84	-4146	0	0	0	140	-84	-4146
24	8	DEFL - Mod Wind NA-	15	1	T1_B	386	-46	1332	386	-46	1332	0	0	0
24	8	DEFL - Mod Wind NA-	15	2	T2_B	386	-46	1332	386	-46	1332	0	0	0
24	8	DEFL - Mod Wind NA-	15	3	T3_B	386	-46	1332	386	-46	1332	0	0	0
25	2	RULE 250C NA+ DE Back	15	1	T1_B	645	188	2514	645	188	2514	0	0	0
25	2	RULE 250C NA+ DE Back	15	2	T2_B	645	188	2514	645	188	2514	0	0	0
25	2	RULE 250C NA+ DE Back	15	3	T3_B	645	188	2514	645	188	2514	0	0	0
26	2	RULE 250C NA- DE Back	15	1	T1_B	645	-188	2514	645	-188	2514	0	0	0
26	2	RULE 250C NA- DE Back	15	2	T2_B	645	-188	2514	645	-188	2514	0	0	0
26	2	RULE 250C NA- DE Back	15	3	T3_B	645	-188	2514	645	-188	2514	0	0	0
27	2	RULE 250C NA+ DE Ahead	1	1	SW1_A	60	194	-2657	0	0	0	60	194	-2657
27	2	RULE 250C NA+ DE Ahead	2	1	SW2_A	60	78	-2663	0	0	0	60	78	-2663
27	2	RULE 250C NA+ DE Ahead	5	1	T1_A	128	337	-6008	0	0	0	128	337	-6008
27	2	RULE 250C NA+ DE Ahead	5	2	T2_A	128	337	-6008	0	0	0	128	337	-6008
27	2	RULE 250C NA+ DE Ahead	5	3	T3_A	128	337	-6008	0	0	0	128	337	-6008
28	2	RULE 250C NA- DE Ahead	1	1	SW1_A	60	-78	-2663	0	0	0	60	-78	-2663
28	2	RULE 250C NA- DE Ahead	2	1	SW2_A	60	-194	-2657	0	0	0	60	-194	-2657
28	2	RULE 250C NA- DE Ahead	5	1	T1_A	128	-337	-6008	0	0	0	128	-337	-6008
28	2	RULE 250C NA- DE Ahead	5	2	T2_A	128	-337	-6008	0	0	0	128	-337	-6008
28	2	RULE 250C NA- DE Ahead	5	3	T3_A	128	-337	-6008	0	0	0	128	-337	-6008
29	23	Construction NA+ DE Back	15	1	T1_B	356	0	1194	356	0	1194	0	0	0
29	23	Construction NA+ DE Back	15	2	T2_B	356	0	1194	356	0	1194	0	0	0
29	23	Construction NA+ DE Back	15	3	T3_B	356	0	1194	356	0	1194	0	0	0
30	23	Construction NA- DE Back	15	1	T1_B	356	0	1194	356	0	1194	0	0	0
30	23	Construction NA- DE Back	15	2	T2_B	356	0	1194	356	0	1194	0	0	0
30	23	Construction NA- DE Back	15	3	T3_B	356	0	1194	356	0	1194	0	0	0
31	23	Construction NA+ DE Ahead	1	1	SW1_A	61	37	-1704	0	0	0	61	37	-1704
31	23	Construction NA+ DE Ahead	2	1	SW2_A	61	-37	-1704	0	0	0	61	-37	-1704
31	23	Construction NA+ DE Ahead	5	1	T1_A	141	0	-3907	0	0	0	141	0	-3907
31	23	Construction NA+ DE Ahead	5	2	T2_A	141	0	-3907	0	0	0	141	0	-3907
31	23	Construction NA+ DE Ahead	5	3	T3_A	141	0	-3907	0	0	0	141	0	-3907
32	23	Construction NA- DE Ahead	1	1	SW1_A	61	37	-1704	0	0	0	61	37	-1704
32	23	Construction NA- DE Ahead	2	1	SW2_A	61	-37	-1704	0	0	0	61	-37	-1704
32	23	Construction NA- DE Ahead	5	1	T1_A	141	0	-3907	0	0	0	141	0	-3907
32	23	Construction NA- DE Ahead	5	2	T2_A	141	0	-3907	0	0	0	141	0	-3907
32	23	Construction NA- DE Ahead	5	3	T3_A	141	0	-3907	0	0	0	141	0	-3907

LT-2

Str. 3 (SPFD-3)

LC #	WC #	Load Case Description	Set No.	Phase No.	Attach. Joint Labels	Structure Loads			Loads from back span			Loads from ahead span		
						Vert. (lbs)	Trans. (lbs)	Long. (lbs)	Vert. (lbs)	Trans. (lbs)	Long. (lbs)	Vert. (lbs)	Trans. (lbs)	Long. (lbs)
1	1	RULE 250B NA+	1	1	SW1	237	-5	0	132	-3	4931	105	-3	-4931
1	1	RULE 250B NA+	2	1	SW2	237	426	0	132	213	4926	105	213	-4926
1	1	RULE 250B NA+	5	1	T1	705	386	0	388	193	11529	317	193	-11529
1	1	RULE 250B NA+	5	2	T2	705	386	0	388	193	11529	317	193	-11529
1	1	RULE 250B NA+	5	3	T3	705	386	0	388	193	11529	317	193	-11529
2	1	RULE 250B NA-	1	1	SW1	237	-426	0	132	-213	4926	105	-213	-4926
2	1	RULE 250B NA-	2	1	SW2	237	5	0	132	3	4931	105	3	-4931
2	1	RULE 250B NA-	5	1	T1	705	-386	0	388	-193	11529	317	-193	-11529
2	1	RULE 250B NA-	5	2	T2	705	-386	0	388	-193	11529	317	-193	-11529
2	1	RULE 250B NA-	5	3	T3	705	-386	0	388	-193	11529	317	-193	-11529
3	1	RULE 250B Uplift NA+	1	1	SW1	161	-5	0	89	-3	4931	71	-3	-4931
3	1	RULE 250B Uplift NA+	2	1	SW2	161	426	0	89	213	4926	71	213	-4926
3	1	RULE 250B Uplift NA+	5	1	T1	477	386	0	262	193	11529	215	193	-11529
3	1	RULE 250B Uplift NA+	5	2	T2	477	386	0	262	193	11529	215	193	-11529
3	1	RULE 250B Uplift NA+	5	3	T3	477	386	0	262	193	11529	215	193	-11529
4	1	RULE 250B Uplift NA-	1	1	SW1	161	-426	0	89	-213	4926	71	-213	-4926
4	1	RULE 250B Uplift NA-	2	1	SW2	161	5	0	89	3	4931	71	3	-4931
4	1	RULE 250B Uplift NA-	5	1	T1	477	-386	0	262	-193	11529	215	-193	-11529
4	1	RULE 250B Uplift NA-	5	2	T2	477	-386	0	262	-193	11529	215	-193	-11529
4	1	RULE 250B Uplift NA-	5	3	T3	477	-386	0	262	-193	11529	215	-193	-11529
5	2	RULE 250C NA+	1	1	SW1	107	163	0	65	82	2929	42	82	-2929
5	2	RULE 250C NA+	2	1	SW2	107	419	0	65	210	2923	42	210	-2922
5	2	RULE 250C NA+	5	1	T1	380	737	0	215	368	6609	165	369	-6609
5	2	RULE 250C NA+	5	2	T2	380	737	0	215	368	6609	165	369	-6609
5	2	RULE 250C NA+	5	3	T3	380	737	0	215	368	6609	165	369	-6609
6	2	RULE 250C NA-	1	1	SW1	107	-419	0	65	-210	2923	42	-210	-2922
6	2	RULE 250C NA-	2	1	SW2	107	-163	0	65	-82	2929	42	-82	-2929
6	2	RULE 250C NA-	5	1	T1	380	-737	0	215	-368	6609	165	-369	-6609
6	2	RULE 250C NA-	5	2	T2	380	-737	0	215	-368	6609	165	-369	-6609
6	2	RULE 250C NA-	5	3	T3	380	-737	0	215	-368	6609	165	-369	-6609
7	3	RULE 250D NA+	1	1	SW1	425	-73	0	229	-36	4119	197	-36	-4119
7	3	RULE 250D NA+	2	1	SW2	425	288	0	229	144	4117	197	144	-4117
7	3	RULE 250D NA+	5	1	T1	929	152	0	497	76	8833	431	76	-8833
7	3	RULE 250D NA+	5	2	T2	929	152	0	497	76	8833	431	76	-8833
7	3	RULE 250D NA+	5	3	T3	929	152	0	497	76	8833	431	76	-8833
8	3	RULE 250D NA-	1	1	SW1	425	-288	0	229	-144	4117	197	-144	-4117
8	3	RULE 250D NA-	2	1	SW2	425	73	0	229	36	4119	197	36	-4119
8	3	RULE 250D NA-	5	1	T1	929	-152	0	497	-76	8833	431	-76	-8833
8	3	RULE 250D NA-	5	2	T2	929	-152	0	497	-76	8833	431	-76	-8833
8	3	RULE 250D NA-	5	3	T3	929	-152	0	497	-76	8833	431	-76	-8833
9	1	RULE 277 Insulators NA+ 250B	1	1	SW1	158	-47	0	88	-23	2988	70	-23	-2988
9	1	RULE 277 Insulators NA+ 250B	2	1	SW2	158	215	0	88	107	2986	70	107	-2986
9	1	RULE 277 Insulators NA+ 250B	5	1	T1	470	154	0	259	77	6987	211	77	-6987
9	1	RULE 277 Insulators NA+ 250B	5	2	T2	470	154	0	259	77	6987	211	77	-6987
9	1	RULE 277 Insulators NA+ 250B	5	3	T3	470	154	0	259	77	6987	211	77	-6987
10	1	RULE 277 Insulators NA- 250B	1	1	SW1	158	-215	0	88	-107	2986	70	-107	-2986
10	1	RULE 277 Insulators NA- 250B	2	1	SW2	158	47	0	88	23	2988	70	23	-2988
10	1	RULE 277 Insulators NA- 250B	5	1	T1	470	-154	0	259	-77	6987	211	-77	-6987
10	1	RULE 277 Insulators NA- 250B	5	2	T2	470	-154	0	259	-77	6987	211	-77	-6987
10	1	RULE 277 Insulators NA- 250B	5	3	T3	470	-154	0	259	-77	6987	211	-77	-6987
11	2	RULE 277 Insulators NA+ 250C	1	1	SW1	98	148	0	59	74	2663	39	74	-2663
11	2	RULE 277 Insulators NA+ 250C	2	1	SW2	98	381	0	59	191	2657	39	191	-2657
11	2	RULE 277 Insulators NA+ 250C	5	1	T1	346	670	0	196	334	6008	150	336	-6008
11	2	RULE 277 Insulators NA+ 250C	5	2	T2	346	670	0	196	334	6008	150	336	-6008
11	2	RULE 277 Insulators NA+ 250C	5	3	T3	346	670	0	196	334	6008	150	336	-6008
12	2	RULE 277 Insulators NA- 250C	1	1	SW1	98	-381	0	59	-191	2657	39	-191	-2657
12	2	RULE 277 Insulators NA- 250C	2	1	SW2	98	-148	0	59	-74	2663	39	-74	-2663
12	2	RULE 277 Insulators NA- 250C	5	1	T1	346	-670	0	196	-334	6008	150	-336	-6008
12	2	RULE 277 Insulators NA- 250C	5	2	T2	346	-670	0	196	-334	6008	150	-336	-6008
12	2	RULE 277 Insulators NA- 250C	5	3	T3	346	-670	0	196	-334	6008	150	-336	-6008

LT-2

Str. 3 (SPFD-3)

LC #	WC #	Load Case Description	Set No.	Phase No.	Attach. Joint Labels	Structure Loads			Loads from back span			Loads from ahead span		
						Vert. (lbs)	Trans. (lbs)	Long. (lbs)	Vert. (lbs)	Trans. (lbs)	Long. (lbs)	Vert. (lbs)	Trans. (lbs)	Long. (lbs)
13	3	RULE 277 Insulators NA+ 250D	1	1	SW1	387	-66	0	208	-33	3745	179	-33	-3745
13	3	RULE 277 Insulators NA+ 250D	2	1	SW2	387	261	0	208	131	3743	179	131	-3743
13	3	RULE 277 Insulators NA+ 250D	5	1	T1	844	138	0	452	69	8030	392	69	-8030
13	3	RULE 277 Insulators NA+ 250D	5	2	T2	844	138	0	452	69	8030	392	69	-8030
13	3	RULE 277 Insulators NA+ 250D	5	3	T3	844	138	0	452	69	8030	392	69	-8030
14	3	RULE 277 Insulators NA- 250D	1	1	SW1	387	-261	0	208	-131	3743	179	-131	-3743
14	3	RULE 277 Insulators NA- 250D	2	1	SW2	387	66	0	208	33	3745	179	33	-3745
14	3	RULE 277 Insulators NA- 250D	5	1	T1	844	-138	0	452	-69	8030	392	-69	-8030
14	3	RULE 277 Insulators NA- 250D	5	2	T2	844	-138	0	452	-69	8030	392	-69	-8030
14	3	RULE 277 Insulators NA- 250D	5	3	T3	844	-138	0	452	-69	8030	392	-69	-8030
15	4	Extreme Ice NA+	1	1	SW1	388	-153	0	207	-76	3497	181	-77	-3497
15	4	Extreme Ice NA+	2	1	SW2	388	153	0	207	76	3497	181	77	-3497
15	4	Extreme Ice NA+	5	1	T1	841	0	0	448	0	7292	393	0	-7292
15	4	Extreme Ice NA+	5	2	T2	841	0	0	448	0	7292	393	0	-7292
15	4	Extreme Ice NA+	5	3	T3	841	0	0	448	0	7292	393	0	-7292
16	4	Extreme Ice NA-	1	1	SW1	388	-153	0	207	-76	3497	181	-77	-3497
16	4	Extreme Ice NA-	2	1	SW2	388	153	0	207	76	3497	181	77	-3497
16	4	Extreme Ice NA-	5	1	T1	841	0	0	448	0	7292	393	0	-7292
16	4	Extreme Ice NA-	5	2	T2	841	0	0	448	0	7292	393	0	-7292
16	4	Extreme Ice NA-	5	3	T3	841	0	0	448	0	7292	393	0	-7292
17	5	Uplift NA+	1	1	SW1	98	-115	0	59	-57	2619	39	-57	-2619
17	5	Uplift NA+	2	1	SW2	98	115	0	59	57	2619	39	57	-2619
17	5	Uplift NA+	5	1	T1	350	0	0	201	0	6935	149	0	-6935
17	5	Uplift NA+	5	2	T2	350	0	0	201	0	6935	149	0	-6935
17	5	Uplift NA+	5	3	T3	350	0	0	201	0	6935	149	0	-6935
18	5	Uplift NA-	1	1	SW1	98	-115	0	59	-57	2619	39	-57	-2619
18	5	Uplift NA-	2	1	SW2	98	115	0	59	57	2619	39	57	-2619
18	5	Uplift NA-	5	1	T1	350	0	0	201	0	6935	149	0	-6935
18	5	Uplift NA-	5	2	T2	350	0	0	201	0	6935	149	0	-6935
18	5	Uplift NA-	5	3	T3	350	0	0	201	0	6935	149	0	-6935
21	23	Camber NA+ TANGENT	1	1	SW1	103	-75	0	58	-37	1704	45	-37	-1704
21	23	Camber NA+ TANGENT	2	1	SW2	103	75	0	58	37	1704	45	37	-1704
21	23	Camber NA+ TANGENT	5	1	T1	336	0	0	183	0	3907	153	0	-3907
21	23	Camber NA+ TANGENT	5	2	T2	336	0	0	183	0	3907	153	0	-3907
21	23	Camber NA+ TANGENT	5	3	T3	336	0	0	183	0	3907	153	0	-3907
22	23	Camber NA- TANGENT	1	1	SW1	103	-75	0	58	-37	1704	45	-37	-1704
22	23	Camber NA- TANGENT	2	1	SW2	103	75	0	58	37	1704	45	37	-1704
22	23	Camber NA- TANGENT	5	1	T1	336	0	0	183	0	3907	153	0	-3907
22	23	Camber NA- TANGENT	5	2	T2	336	0	0	183	0	3907	153	0	-3907
22	23	Camber NA- TANGENT	5	3	T3	336	0	0	183	0	3907	153	0	-3907
23	8	DEFL - Mod Wind NA+	1	1	SW1	102	-17	0	58	-8	1800	44	-8	-1800
23	8	DEFL - Mod Wind NA+	2	1	SW2	102	141	0	58	70	1799	44	70	-1799
23	8	DEFL - Mod Wind NA+	5	1	T1	337	168	0	184	84	4146	153	84	-4146
23	8	DEFL - Mod Wind NA+	5	2	T2	337	168	0	184	84	4146	153	84	-4146
23	8	DEFL - Mod Wind NA+	5	3	T3	337	168	0	184	84	4146	153	84	-4146
24	8	DEFL - Mod Wind NA-	1	1	SW1	102	-141	0	58	-70	1799	44	-70	-1799
24	8	DEFL - Mod Wind NA-	2	1	SW2	102	17	0	58	8	1800	44	8	-1800
24	8	DEFL - Mod Wind NA-	5	1	T1	337	-168	0	184	-84	4146	153	-84	-4146
24	8	DEFL - Mod Wind NA-	5	2	T2	337	-168	0	184	-84	4146	153	-84	-4146
24	8	DEFL - Mod Wind NA-	5	3	T3	337	-168	0	184	-84	4146	153	-84	-4146

ATTACHMENT C

APPLICATION REQUIREMENTS

- **Steel Structures**

Application Requirements

PRE-ENGINEERED STEEL POLE REQUIREMENTS

1. Type of finish of the pole (indicate by checking one)
   - Weathering _____
   - Galvanized **Steel Pole**
   - Zinc primer and paint _____

2. Special Charpy requirements **15ft-lbs @ -20°F**

3. Surface protection desired for embedded portion of the pole (indicate by checking one or both)
   - Polyurethane Coating **Ref. Details Drawings and Specification**
   - Anodes _____

4. Climbing device type (indicate by checking one)
   - Step Bolts _____
   - Ladder **Clips Only**
   - Removable Steps _____

5. Location of climbing device **Ref. Details Drawing**

6. Length of ground collar **3/16" Sleeve, 4'-0" Length**

7. Grounding plate or nut **Ref. SPFD and Details Drawing**

8. Delivery schedule **Owner to Provide**

9. Free on board destination **See Vicinity Map**

10. Pole test (if required) **N/A**

11. Additional Requirements (below) **N/A**

Attachment C. Application Requirements

ENGINEERED STEEL POLE REQUIREMENTS

1. Pole deflection limitations
   a. Means of achieving..... **Raking**
   b. Amount of..... **0.5% of Pole Height**
   c. Loading conditions for..... **60°F, Initial Sag**

2. Foundation type..... **Steel Vibratory Caisson, Flange Mounted**

   a. Design concrete compressive strength (psi).. **N/A**
   b. Maximum anticipated foundation rotation measured from the vertical axis(degrees) and maximum anticipated deflection at the groundline (inches)..... **1.0° Rotation/ 2.5" Deflection**

3. Special Charpy requirements..... **15ft-lbs @ -20°F**

4. Maximum diameter (flat-to-flat) at groundline (inches).....a. Tangent: **N/A**

   b. Angle: **N/A**

   c. Deadend: **78"**

5. Maximum taper (inches/foot) based on total difference between top and bottom diameters. **0.45 in/ft**

6. Guy wire modulus of elasticity..... **N/A**

7. a. Surface protection desired..... **Pole: Galv. Steel**
   b. If painted, color desire..... **Caisson: Galv. Steel w/ Below grade Coating**

8. a. Climbing device desired..... **Ladder Clips**
   b. Quantity of removable ladders or step bolts. **None**

9. Unguyed angle poles to be raked or precambered..... **Raked**

10. Unguyed tangent deadends to be raked or precambered..... **Raked**

11. Grounding plate or nut..... **1/2"-13 UNC SS Ground Pad**

Attachment C. Application Requirements (Cont'd)

12. Component weight restrictions..... **N/A**
13. Pole length restrictions..... **N/A**
14. Delivery schedule..... **Owner to Provide**
15. Free on board destination..... **See Vicinity Map**

16. Structures to be tested: **N/A**

Structure Type	Load Cases to be Tested
a.	
b.	
c.	

17. Miscellaneous

1. Vendor shall rake poles a maximum of 6" to achieve required deflection performance and provide raking details including pole top rake magnitude and direction such that the pole will remain plumb under the following conditions:
- Loading at 60°F, Initial Sag

2. Poles shall be designed to withstand all specified load cases assuming a 1.0° foundation rotation under ultimate loading.

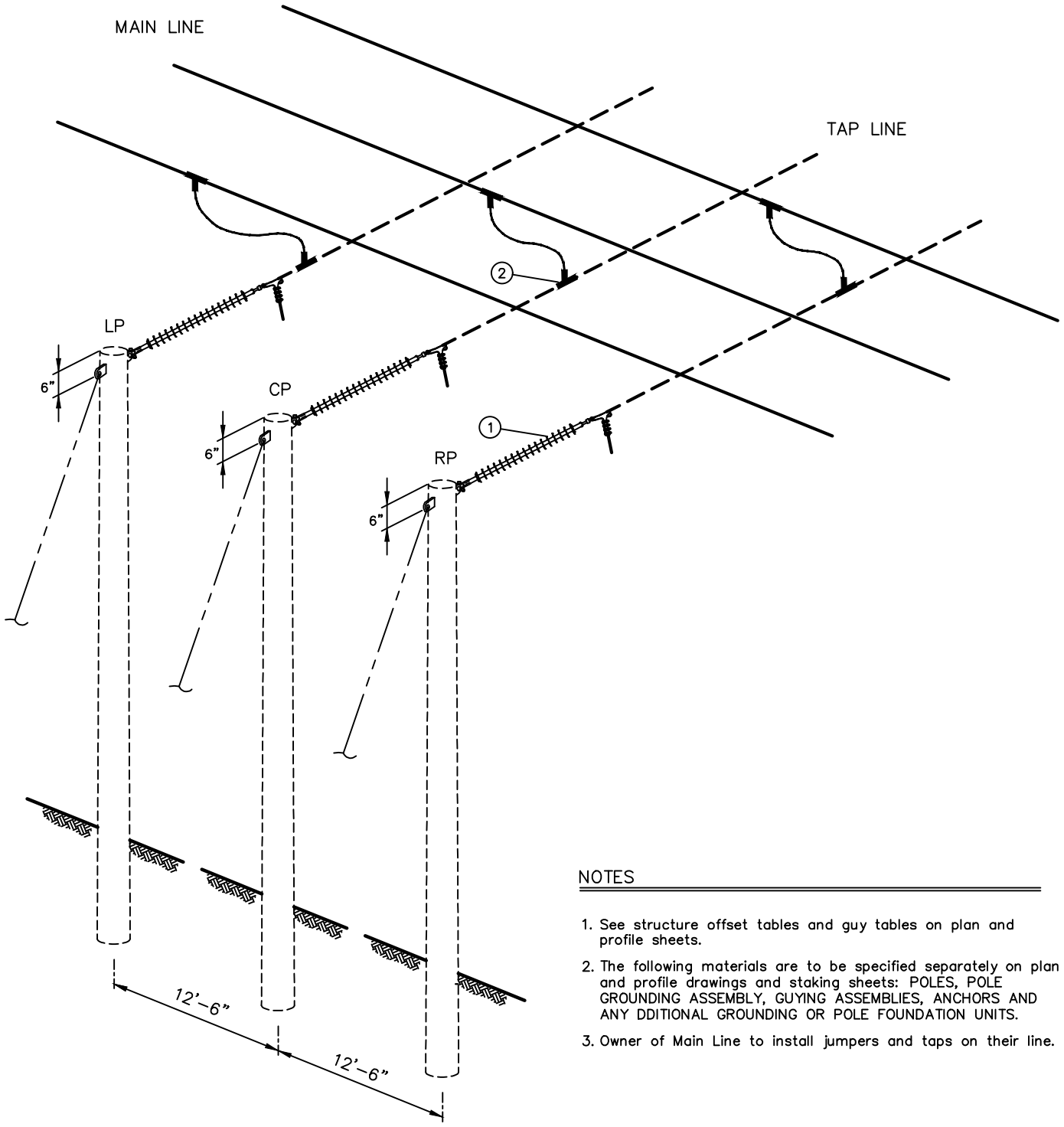
3. Pole base diameter, anchor bolt arrangement, and pole base plate dimensions shall be designed to avoid driving ear removal in the field if possible. Driving ears shall be located directly over caisson shaft wall.

4. Vendor shall design caisson shaft to withstand the enclosed design loadings.

5. Maximum self-supporting engineered deadend pole top diameter is 3.0% of structure height.

ATTACHMENT D

MISCELLANEOUS DRAWINGS



NOTES

1. See structure offset tables and guy tables on plan and profile sheets.
2. The following materials are to be specified separately on plan and profile drawings and staking sheets: POLES, POLE GROUNDING ASSEMBLY, GUYING ASSEMBLIES, ANCHORS AND ANY DDITIONAL GROUNDING OR POLE FOUNDATION UNITS.
3. Owner of Main Line to install jumpers and taps on their line.

LIST OF MATERIALS

ITEM	QTY.	DESCRIPTION	DET.
1	3	INSULATOR ASSEMBLY, DEADEND	TM-1EM
2	3	TEE TAP, 4-HOLE NEMA PAD TO 1272 AAC "NARCISSUS"	

TRANSMISSION LINE STRUCTURE
115 kV THREE POLE DEADEND
STEEL POLES

Booth & Associates
2300 Reswoods Drive Suite 300, Raleigh NC 27607
NC F-0221

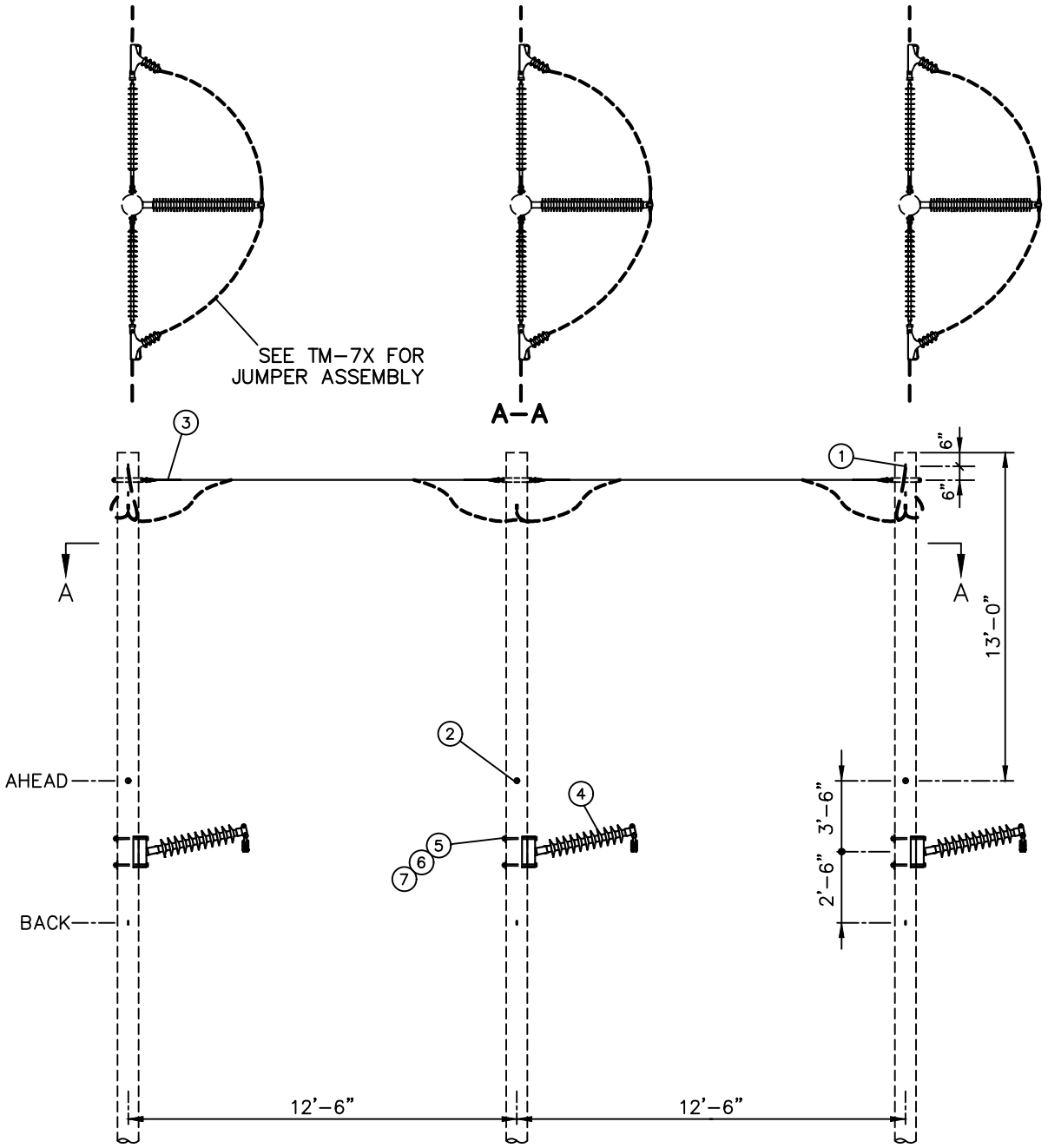
DWN.	AVS	DATE:	08/01/2023
CKD.	JMC	APPD.	GSB
SCALE:	NTS		

DATE	REVISION

DWG. NO.

TH-TAP(S)

© 08/2023



NOTES

1. See structure offset tables and guy tables on plan and profile sheets.
2. The following materials are to be specified separately on plan and profile drawings and staking sheets: POLES, POLE GROUNDING ASSEMBLY, GUYING ASSEMBLIES, ANCHORS AND ANY ADDITIONAL GROUNDING OR POLE FOUNDATION UNITS.

LIST OF MATERIALS

ITEM	QTY.	DESCRIPTION	DET.
1	2	OHGW ASSEMBLY, DEADEND	TM-4GM
2	6	DEADEND ASSEMBLY, PRIMARY	TM-1EM
3	2	SPAN GUY ASSEMBLY	TG-21D
4	3	INSULATOR ASSEMBLY, HORIZONTAL POST	TM-3BM
5	6	BOLT, 7/8" x XX" LENGTH	
6	6	NUT, LOCK 7/8"	
7	6	WASHER, FLAT, 4"x4"x1/4" w/15/16" HOLE	

115 kV THREE POLE DOUBLE DEADEND WITH OVERHEAD GROUND WIRE (TANGENT & SMALL ANGLE)

Booth & Associates
2300 Reswoods Drive Suite 300, Raleigh NC 27607
NC F-0221

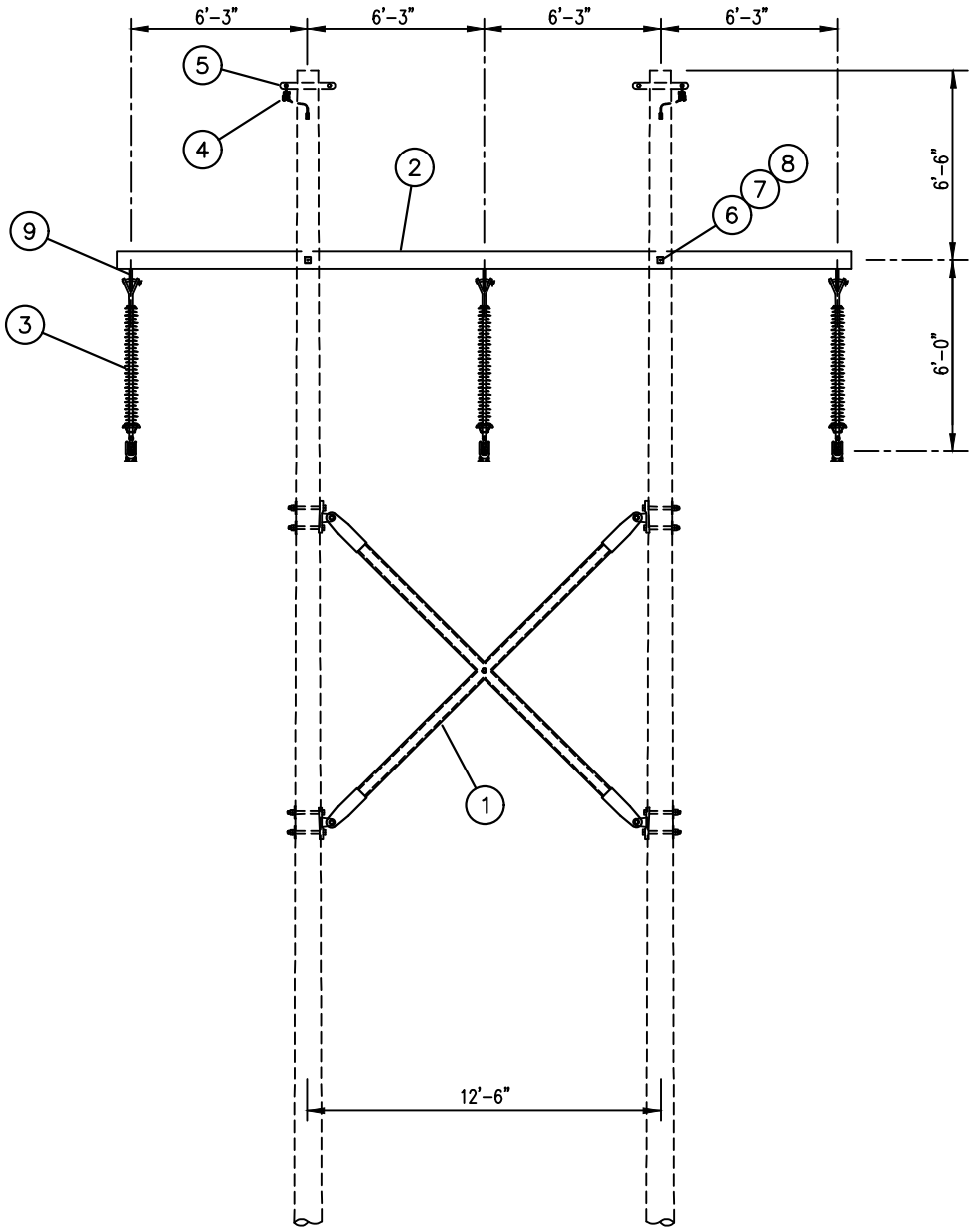
DWN.	BLP	DATE:	08/01/2023
CKD.	JMC	APPD.	GSB
SCALE:	NTS		

DATE	REVISION

DWG. NO.

TH-5AA(S)M

© 08/2023



NOTES

1. See structure offset tables and guy tables on plan and profile sheets.
2. The following materials are to be specified separately on plan and profile drawings and staking sheets: POLES, POLE GROUNDING ASSEMBLY, GUYING ASSEMBLIES, ANCHORS AND ANY ADDITIONAL GROUNDING OR POLE FOUNDATION UNITS.

LIST OF MATERIALS

ITEM	QTY.	DESCRIPTION	DET.
1	1	X-BRACE, FIBERGLASS (12'-6") POLE SPACING	
2	1	CROSSARM, FIBERGLASS, 26' LENGTH	
3	3	INSULATOR ASSEMBLY, TANGENT	TM-1AM
4	2	OHGW SUSPENSION ASSEMBLY	TM-4A
5	2	Y-CLEVIS, EYE	
6	10	BOLT, MACHINE, 7/8" X REQ'D LENGTH	
		(INCLUDES NUT)	
7	10	NUT, LOCK 7/8"	
8	10	WASHER, FLAT, 7/8", 4"x4"x1/4" W/ 15/16" HOLE	
9	3	EYEBOLT, 3/4" WITH WASHER, NUT, LOCKNUT	

115 kV TRANSMISSION
TANGENT H-FRAME - SINGLE ARM
SINGLE CROSS BRACE (115 kV MAXIMUM)

Booth & Associates
2300 Rexwoods Drive Suite 300, Raleigh NC 27607
NC F-0221

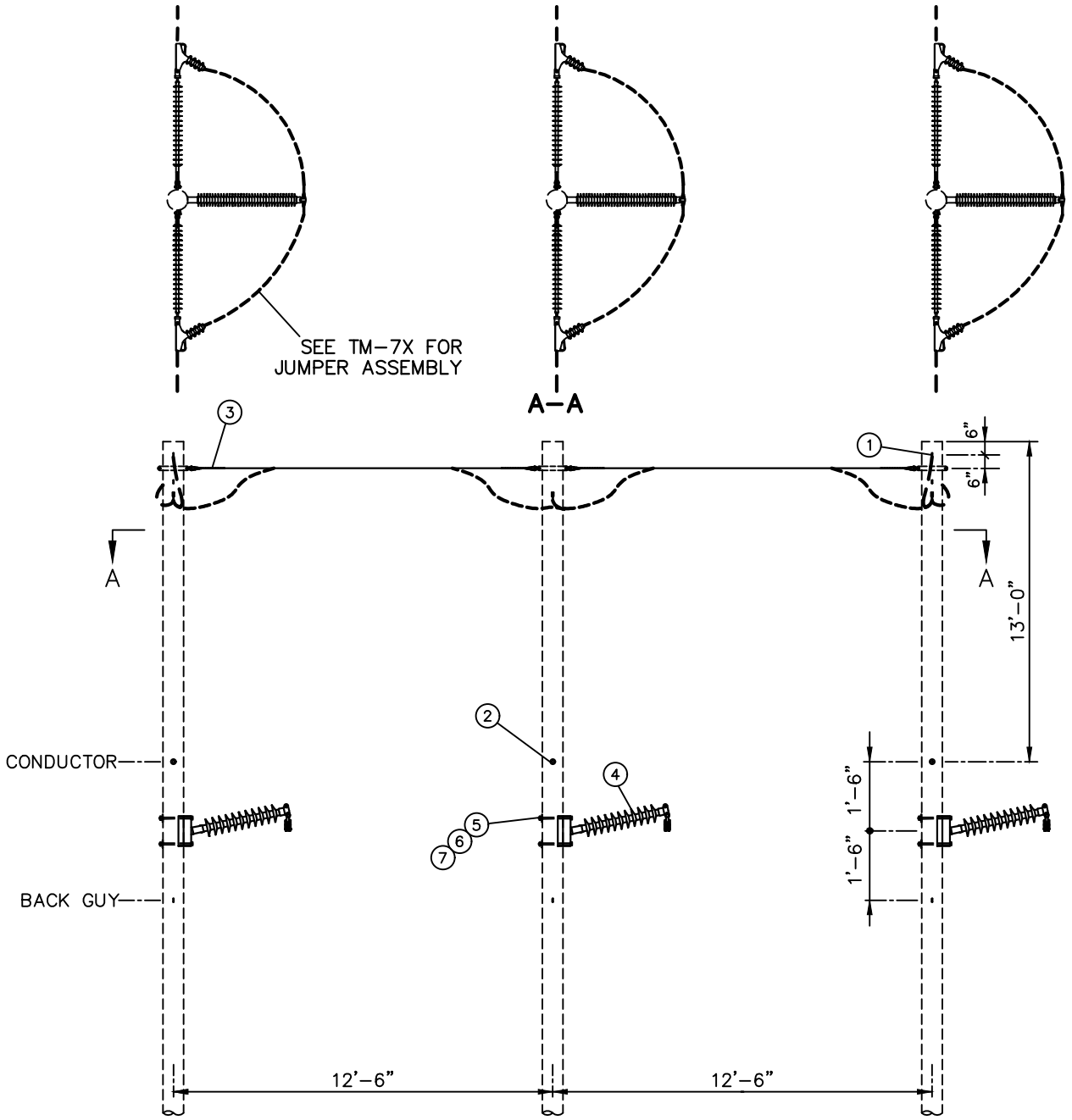
DWN.	BLP	DATE:	08/01/2023
CKD.	JMC	APPD.	GSB
SCALE:	NTS		

DATE	REVISION

DWG. NO.

TH-115(S)

© 08/2023



NOTES

1. See structure offset tables and guy tables on plan and profile sheets.
2. The following materials are to be specified separately on plan and profile drawings and staking sheets: POLES, POLE GROUNDING ASSEMBLY, GUYING ASSEMBLIES, ANCHORS AND ANY ADDITIONAL GROUNDING OR POLE FOUNDATION UNITS.

LIST OF MATERIALS

ITEM	QTY.	DESCRIPTION	DET.
1	4	OHGW ASSEMBLY, DEADEND	TM-4GM
2	6	DEADEND ASSEMBLY, PRIMARY	TM-1EM
3	2	SPAN GUY ASSEMBLY	TG-21D
4	3	INSULATOR ASSEMBLY, HORIZONTAL POST	TM-3BM
5	6	BOLT, 7/8" x XX" LENGTH	
6	6	NUT, LOCK 7/8"	
7	6	WASHER, FLAT, 4"x4"x1/4" w/15/16" HOLE	

115 kV THREE POLE DOUBLE DEADEND WITH OVERHEAD GROUND WIRE (TANGENT & SMALL ANGLE)

Booth & Associates
2300 Reswoods Drive Suite 300, Raleigh NC 27607
NC F-0221

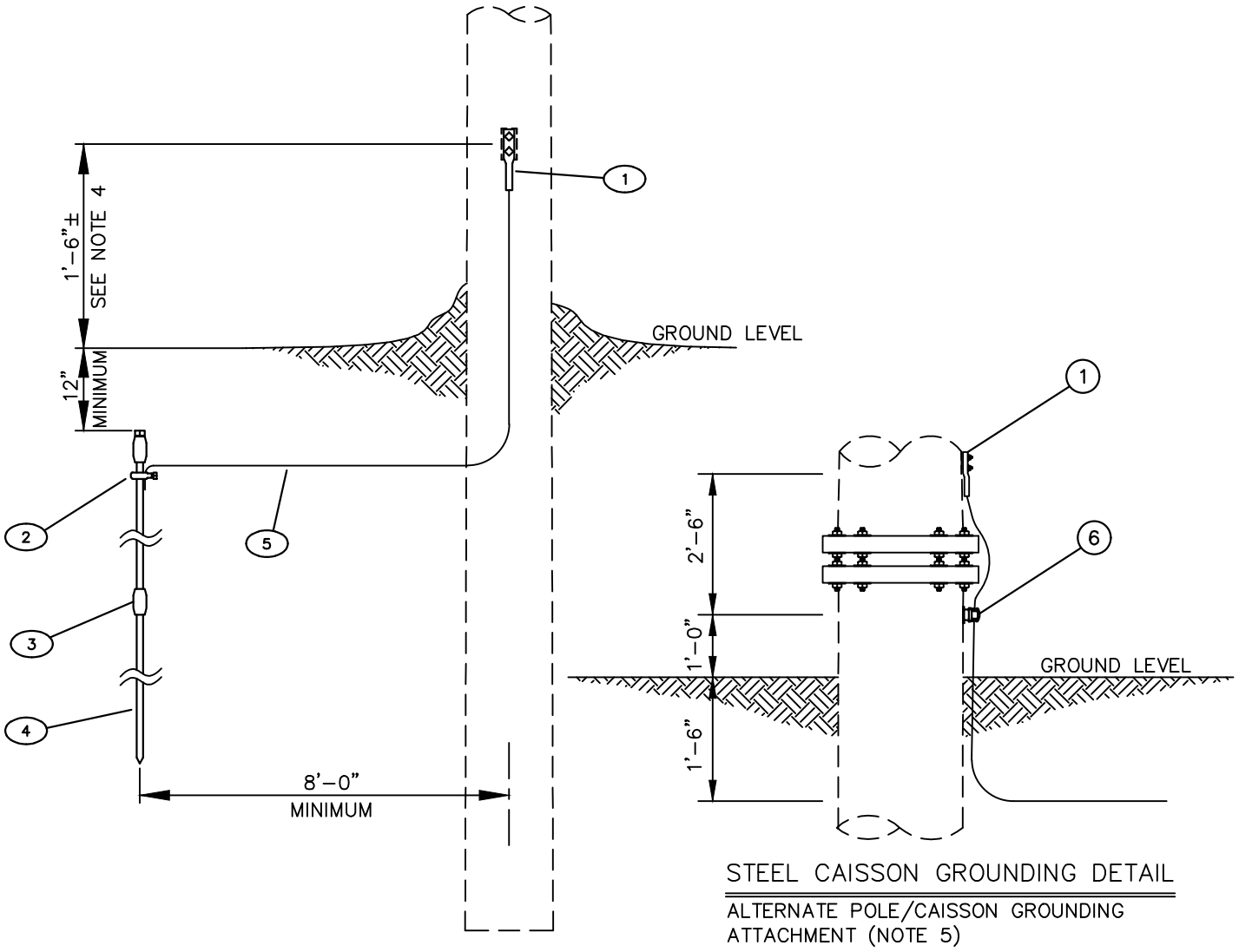
DWN.	BLP	DATE:	08/01/2023
CKD.	JMC	APPD.	GSB
SCALE:	NTS		

DATE	REVISION

DWG. NO.

TH-5AA(S)

© 08/2023



STEEL CAISSON GROUNDING DETAIL

ALTERNATE POLE/CAISSON GROUNDING ATTACHMENT (NOTE 5)

NOTES

1. Maximum ground resistance reading shall be 25 Ohms. If the clamp–on resistance measurement method is used, the ground rod shall be installed and temporarily bonded until the ground resistance reading is taken. Additional rod sections shall be added as necessary to reduce resistance to 25 Ohms maximum.
2. Specify TM–9R for additional ground rod section and coupling.
3. Ground rod to be installed in undisturbed soil.
4. Ground pad to be 6" above top of ground sleeve, if present.
5. For steel flange–mounted caisson foundations, utilize NEMA 2–hole on pole and 1/2" tap lug terminal. Reference alternate steel caisson grounding detail and pole/caisson drawings.

LIST OF MATERIALS

ITEM	QTY. 9SP	QTY. 9R	DESCRIPTION
1	1		Connector – Compression Terminal, NEMA 2–Hole
			for #4 S.D. Tinned Copper
2	1		Ground – Rod Clamp, Copper, 5/8"
3	1	1	Ground – Rod Coupling, Copper, 5/8"
4	1	1	Ground – Rod, Copper, 5/8" x 8'–0"
5	10		Ground – Wire, #4 S.D. Tinned Copper (Feet)
6	1		1/2" Tap Lug Terminal for #4 S.D. Tinned Copper

DRIVEN GROUND ROD GROUNDING ASSEMBLY – STEEL POLE

Booth & Associates
2300 Reswoods Drive Suite 300, Raleigh NC 27607
NC F-0221

DWN.	AVS	DATE:	08/01/23
CKD.	JMC	APPD.	GSB
SCALE:	NONE		

DATE	REVISION

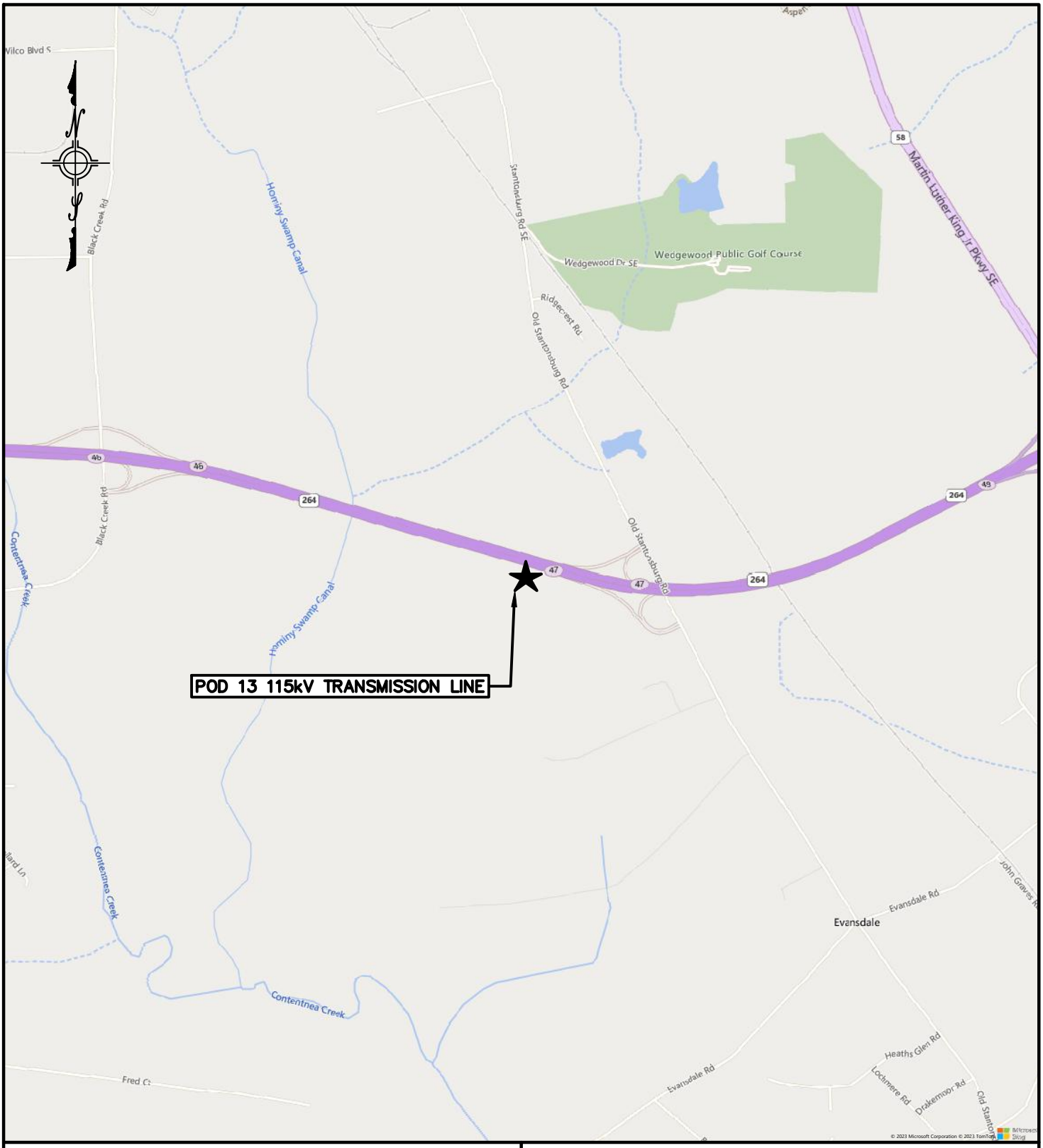
DWG. NO.

TM–9SP
TM–9R

© 08/23

APPENDIX

VICINITY MAP



SITE LOCATION:
5557 Old Stantonsburg Rd,
Stantonsburg, NC 27883

COORDINATES:
35°40'08.3981"N
077°53'09.4493"W

CITY OF WILSON
WILSON, NORTH CAROLINA

POD 13 115kV TRANSMISSION LINE
VICINITY MAP

Booth & Associates
2500 Blue Woods Drive Suite 350, Raleigh NC 27607
NC F-0201

DWN. AAI	DATE: 07/31/23	DWG. NO.
CKD. JC	APPD. GSB	
SCALE: 1" = 2000'	FILE: 1415656VM	
JOB NO. P0595656	DATE / REVISION	VM-1
© 07/2023		