

**GENERAL TECHNICAL SPECIFICATIONS
FOR THE PURCHASE OF SPUN
CONCRETE TRANSMISSION POLES**

JEA TECHNICAL SPECIFICATIONS REVISION: **1.2**
REVISION DATE: **1/16/2020**
REVISED BY: **Sebastian Chmista, JEA**

Table of Contents

1.	SCOPE.....	3
2.	DEFINITIONS	3
3.	GENERAL REQUIREMENTS.....	4
4.	DESIGN	4
5.	STRENGTH REQUIREMENTS	6
6.	PHYSICAL CHARACTERISTICS.....	7
7.	MATERIALS	9
8.	TESTING FOR CONCRETE STRENGTH.....	9
9.	INSPECTION & QUALITY ASSURANCE.....	10
10.	PACKING AND SHIPPING.....	10
11.	MANUFACTURING TOLERANCES	10
12.	POLE TESTS.....	11
13.	INFORMATION FURNISHED BY THE ENGINEER.....	12
14.	INFORMATION FURNISHED BY MANUFACTURER WHEN BIDDING	13
15.	INFORMATION FURNISHED BY MANUFACTURER PRIOR TO STARTING PRODUCTION	14

1. SCOPE

- 1.1 This specification covers the minimum requirements for the design, materials, fabrication, and delivery of spun concrete pole type structures for transmission lines. Structures furnished under this section shall be complete including pole steps, thru holes (or threaded inserts), connections for ground cable and attachments for insulator fastenings/guys necessary for a complete installation.
- 1.2 This specification is supplemented by project specific technical specifications which will include:
 - a) Pole Drawings, containing the configuration and hole drilling details of each pole
 - b) Pole Attachment Details
 - c) A PLS-POLE backup file and/or load tree drawings containing loading data and geometry of each pole
- 1.3 No exceptions to this specification will be permitted without written approval of the owner and engineer.

2. DEFINITIONS

Owner:	JEA
Engineer:	JEA Engineer as specified in the project specific technical specifications
Manufacturer/Fabricator:	The spun concrete pole producer
ACI:	American Concrete Institute
PCI:	Prestressed Concrete Institute
ANSI:	American National Standards Institute
ASTM:	American Society for Testing and Materials
P-Delta:	The effect of the vertical loads causing secondary moments due to their deflected position under transverse load
psi:	Stress, pounds per square inch
F'c	The ultimate design 28-day compressive stress test of a statically cast concrete cylinder, in psi
sqrt (F'c)	The numerical square root of F'c, in units of psi. Used in evaluating the permissible level of cracking stress in concrete.
Taper:	The total increase of pole diameter measured in inches per foot of length.
Void Taper:	The total increase if inside void diameter, in inches per foot of length
Spun Cast:	Synonymous with "centrifugally spun" or "spun". The creation of a dense concrete product by virtue of applying centrifugal force to the wet mix by spinning the entire mold for a set period of time.
Static Cast:	The casting of concrete products by pouring the wet mix into a stationary open mold and using internal vibrators to consolidate the mix.
Tip:	Synonymous with "top" when referring to the small end of a tapered pole.
Butt:	Reference to the large end of a tapered pole.

Spirals:

or, spiral wire reinforcing. Containment reinforcing steel in a spiral configuration, enclosing the main longitudinal prestressing steel. Used to prevent tip and butt cracking under transfer of prestress, as well as to provide shear and torsional reinforcing where needed.

3. GENERAL REQUIREMENTS

- 3.1 The manufacturer must be an established company which has produced poles of a similar type and height within the last two years, and has been pre-qualified by owner prior to bidding. All structural design calculations must be prepared and sealed by an engineer registered in the state where the design was performed, and who must be experienced in pre-stressed concrete design. The manufacturer shall be fully responsible for his structure design and its satisfactory performance. *Approval by JEA does not relieve the manufacturer of the responsibility to provide a reliable product which will equal or surpass the specified design and safety requirements.*
- 3.2 Except as otherwise specified, the concrete structures furnished under this Specification shall be manufactured in accordance with the requirements and/or recommendations of the following code and guides:
- 3.2.1 American Concrete Institute Standard "Building Code Requirements for Reinforced Concrete" (ACI 318 - Latest Edition).
 - 3.2.2 Pre-stressed Concrete Institute "Guide Specification for Design of Pre-stressed Concrete Poles" (JR 257) and "Guide for Design of Pre-stressed Concrete Poles" (JR 412).
 - 3.2.3 Pre-stressed Concrete Institute "Manual for Quality Control for Plants and Production of Pre-stressed Concrete Products" (MNL-116).
 - 3.2.4 American Society of Civil Engineers "Guide for the Design and Use of Concrete Poles", latest edition.
 - 3.2.5 "National Electric Safety Code" (NESC), ANSI C-2, published by the Institute of Electrical and Electronics Engineers (IEEE), Inc., current edition required by the State of Florida.

4. DESIGN

- 4.1 Design Criteria: Pole designs shall be based on the attached configuration drawings, PLS-POLE backup files (containing loads and pole geometry) and/or load tree drawings, and the design load cases specified in the project specific technical specifications. The poles shall be capable of withstanding all specified load cases, including secondary stresses induced from foundation movement and pole rotation, plus the effect of vertical loads acting on the deflected unbalance of the pole (the P-Delta effect). In addition to the dead load of the wires, the deflected pole weight, applied at its centroid above ground, shall be included in the secondary moment calculation.

The loads shown on the attached files include the wind loads acting on the wires and the pole that was modeled. However, it is the manufacturer's responsibility to apply the specified wind pressures

(provided in the PLS-POLE backup file or in the load tree drawings) onto the pole and components that it will be providing.

Unless otherwise specified in the project specific technical specifications, the total pole deflection under any of the wind loads specified plus the rotation of the foundation shall not exceed eight percent (8%) of the pole height above ground.

- 4.2 Guy Loads: For guyed structures, the cumulative effect of moments at each guy point shall be included to account for the moment couples induced by the effect of the vertical component of the guy load, using a lever arm measured horizontally from the guy attachment to the centerline of the pole. The pole shall have sufficient wall thickness to withstand the punching shear accompanying the forces induced by the guy brackets, as well as the bearing stress of the connecting bolts.
- 4.3 First Crack Moment: Poles shall be designed so that the First Crack moment of the pole exceeds 40 percent of the required ultimate strength.
- 4.4 Zero Tension Moment: Poles shall be designed so that the Zero Tension moment (second crack) of the pole exceeds 28 percent of the required ultimate strength.
- 4.5 Buckling: Guyed structures shall be checked for critical buckling to ascertain the ability to withstand the combined effect of the vertical guy component plus induced moment in the pole. The manufacturer shall advise the owner what preload guy tensions, if any, are assumed in the structure design.
- 4.6 Impact Factor: The pole design shall include allowances for loads, including a 50% impact factor, due to handling, hauling, storage, and erection without failure when handled according to the manufacturer's recommendations and instructions and reasonably accepted construction practices. The manufacturer shall not be responsible for pole damage where the handling, storage and erection procedures used in pole installation do not follow the recommendations shown on the shop drawings.
- 4.7 Handling and Erection Loads:
 - 4.7.1 Two-Point Pick Up: Hauling and handling condition shall provide for a two-point pickup located at points specified by the manufacturer such that the distance between points is minimized. In addition, the two pick points shall be placed to balance the pole with the horizontal plane.
 - 4.7.2 One-Point Pick Up: Erection design shall provide for a single-point pickup located at a point specified by the manufacturer such that the distance from the tip of the pole is minimized, with the pole butt remaining on the ground.
 - 4.7.3 Center of Gravity: None of the poles are expected to be designed for a single point pickup at the balance point. If it becomes necessary to require this condition, it will be called out specifically on the drawings or in the load table.
 - 4.7.4 Storage Points: Temporary pole storage points to prevent long term sweep from occurring shall be shown on the shop drawings.

- 4.8 Design Drawings: Detailing of erection and shop (fabrication) drawings shall be the responsibility of the fabricator. The fabricator shall be responsible for the means, methods, techniques, sequences and procedures of fabrication, including safety precautions and programs.
- 4.8.1 After the award is made but before fabrication is begun, a set of approval drawings (in electronic PDF format) shall be furnished to the owner for review and approval. One (1) PDF file shall be submitted for each specific structure. The drawings will then be reviewed and marked if necessary by JEA, and returned to the manufacturer. The Approval Drawing package shall include the Final Design calculations as well as the "Shop Drawings". The drawings shall be signed and sealed by a Professional Structural or Civil Engineer registered in the State where the design was performed.
- 4.8.2 Drawings shall show dimensions, weight and type of material of each structure.
- 4.8.3 Shop drawings shall include:
- a) All the information required to fabricate components
 - b) All fabrication tolerances (may be referenced if reference document is provided)
 - c) All shop surface preparation and finishing information.
- 4.8.4 Final drawings of all structures and attachments (in PDF format) shall be issued to the owner no more than seven (7) business days after fabrication is complete and at least seven (7) business days before scheduled delivery. All drawings shall be signed and sealed by a Professional Structural or Civil Engineer registered in the State where the design was performed.

5. STRENGTH REQUIREMENTS

- 5.1 Pole designs shall be based on the Ultimate Strength Method. Ultimate failure is defined as the point at which the pole fails, usually by crushing of the concrete when ultimate strain is reached. Factored loads found in the configuration drawings, PLS-POLE backup files (containing loads and pole geometry) and/or load tree drawings, and the design load cases specified in the project specific technical specifications will result in **Ultimate Moment, Ultimate Shear, Ultimate Vertical Force and Ultimate Torsion** applied at each level investigated or at critical points. The pole's resistance shall exceed the combined effect of these values when applying the appropriated strength reduction factor ϕ (f) as defined in ACI 318-95.
- 5.2 Free standing poles (unguyed tangent structures) shall be designed to withstand the ultimate controlling load cases as specified, including its appropriate secondary moments. The pole analysis will assume that the maximum moment (point of fixity) to occur at the location specified in the PLS-POLE backup files and/or load tree drawings of each pole. The reinforcing steel required at the point of fixity shall continue to within two (2) feet of the pole butt.
- 5.3 In sizing the cross-section of guyed poles, they shall be considered as indeterminate structures, and shall be designed as such, taking the strength and material properties of the pole (or poles) and guy wires into account as an integral part of the structure. In making the analysis for guyed structures, the maximum load applied to the guys shall not exceed ninety percent (90%) of its rated

breaking strength. The manufacturer shall advise the owner if any guy sizes initially specified are inadequate.

- 5.3.1 Structures that are guyed in one plane only shall be treated as free-standing cantilevers in the plane ninety degrees to the guyed direction and shall have the P-Delta effect considered in that direction.
- 5.3.2 For structures guyed on the bisector or in two directions, a three-dimensional stiffness analysis (or finite element analysis) shall be made in order to account for the combined effects of the various load applications.

6. PHYSICAL CHARACTERISTICS

- 6.1 Shape & Size: All poles shall be circular in cross section, centrifugal spun, and shall have a standard taper not greater than 0.216 inch per foot. The outside diameters of the pole at the tip and/or butt shall be as stipulated by paragraph 6.2. Unless shown otherwise on the drawings or load tables, all structures shall have a minimum of a three and one-half (3-1/2) inch wall thickness at the pole tip, and an outside total taper of not less than 0.216 inches per foot. The Engineer has the option of specifying other minimum wall thickness or tip diameters in cases where it is deemed necessary.
- 6.2 Diameter Limitations: The minimum tip diameter shall be fifteen (15) inches and the maximum shall not exceed twenty-one (21) inches unless otherwise specified in the project specific technical specifications. Pole butt diameter size restrictions (if any) will be specified in the project specific specifications. The Manufacturer shall notify the Owner if the strength requirements of a controlling load case dictate a greater tip diameter or butt diameter.
- 6.3 Voids & End Treatment: The pole shall contain a void designed to be consistent with the strength requirements and weight reduction. Both the top and bottom ends of the pole shall be plugged solid with an epoxy-grout or non-shrink dry-packed concrete mix. The plug shall be a minimum of twelve (12) inches thick except that the tip plug need not exceed the distance to the first through-hole. The pre-stressed steel strands at both ends of the pole shall be burned back at least 1 inch into the concrete, and the slag and carbon shall be cleaned off prior to the plugging of the resulting hole with an epoxy-grout mix. A galvanized metal pole cap, suitably fastened to prevent removal, may be used at the pole tip in lieu of plugging the void and burning the strand. If a pole tip cap is used, the strand shall be sawed off flush with the tip surface and the ends cleaned and painted with an epoxy. A 1/2 " nut welded to the cap prior to galvanizing shall be provided for grounding.
- 6.4 Finish: The pole shall have a smooth, uncolored finish with no cracks. Sharp edges shall be tooled to smooth. The outside surface along the length of the structure shall be troweled until all projections, depressions and irregularities have been removed and the entire surface has a smooth texture with neat lines. All small cavities caused by air bubbles, honeycomb, or other small voids shall be cleaned, saturated with water and then carefully pointed with mortar. A small cavity is defined as one not larger than one-half inch (1/2") in diameter nor deeper than one-quarter inch (1/4"). Large cavities not exceeding two (2) inches long shall be repaired by opening the cavity sides on a 1 to 1 slope with a mechanical grinder, cleaning thoroughly, and patching with an epoxy-grout mix in accordance with the product manufacturer's specifications. Poles damaged with cavities larger than the foregoing shall be rejected. The manufacturer shall take necessary measures to prevent mold seam leaks that may occur during the spinning process. If excessive seam leaks are detected, the pole will be further inspected to ascertain whether sufficient quantity

of cement paste has escaped to cause honeycombing or other damage to the wall. Poles exhibiting signs of honeycombing shall be rejected.

- 6.5 Holes: The manufacturer shall drill or cast holes in the pole as specified on the drawings. All holes shall contain a PVC sleeve extending through the full diameter. The diameter of all holes and the tolerances between holes shall be as specified on the drilling detail and/or as shown in the project specific specifications.
- 6.6 Threaded Inserts: The manufacturer shall provide/install threaded inserts for all the transmission phase and shield attachments on the pole as specified on the drawings. The threaded inserts shall be furnished as detailed in the attachment details section of the project specific technical specifications. The diameter and size of the threaded inserts shall be either 1" or 7/8", as indicated in the pole drawings section of the project specific technical specifications.
- 6.7 Step Bolts: Unless otherwise specified on the project specific specifications or the pole configuration drawings, all poles shall have three-quarter inch (3/4") non-corrosive step bolt inserts cast-in, spaced at a minimum distance of fifteen (15) inches, but not more than eighteen (18) inches o.c. on 90-degree planes. See the step bolt attachment found within the project specific specifications. In addition, a 3/4" step bolt is to be furnished for each step bolt insert included in each pole drilling detail.
- 6.8 Grounding: A #2 bare copper stranded ground wire and half-inch (1/2") ground rod couplings for different connection points shall be cast in poles as per the Construction Standard #G15 and concrete pole drilling details. See the grounding attachment found within the project specific specifications.
- 6.9 Marking: All poles shall have imprinted, on one face, a legible birthmark containing the manufacturer's name, the letters "JEA", year, pole length/setting depth, actual scaled weight, and ground line moment for strength identification. The ground line moment for each pole will be based on its actual, ultimate value, designed by the manufacturer. The information listed below shall also be marked on the pole, at the appropriate location for each, in legible, durable ink or paint, or they may be cast into the pole. These marks shall be kept small but conspicuous.
- 6.9.1 Dunnage points for stacking and storing.
- 6.9.2 Two-point pickup locations for handling the pole in a horizontal position.
- 6.9.3 One point pickup location for use in raising the pole to a vertical position and handling in setting operation.
- 6.10 Concrete Cover: The vertical or prestressing steel shall have a cover of concrete to the outside face or to the inside void not smaller than one inch (1"). The minimum concrete cover on spirals shall not be less than three-quarters of an inch (3/4"). This cover between the reinforcing steel and the holes that are drilled at the time when the pole is manufactured shall be one inch (1"). The centerline planes of a pole parallel to and perpendicular to the conductor arms shall be clear of embedded steel so that a one inch (1") diameter hole may be drilled in the future without interference from any steel and with a minimum of one inch (1") cover remaining between the hole and the reinforcing steel.
- 6.11 Pole Mold Supports: The mold used to form the poles shall have equally spaced supports over its entire length during the spinning operations to prevent any bending, flexing, or undo vibration.

7. MATERIALS

- 7.1 The wet concrete mix used shall contain no more than 0.40 pounds per cubic yard (lbs/cy) of total chloride ions, and shall have a maximum water cement ratio of 0.40 by weight.
- 7.2 Concrete used shall have a static compressive strength at 28 days not less than 8500 psi (known as F'_c). The cement, water, aggregates and admixtures used shall conform to the applicable ASTM standards for those materials and be of such quality as to prevent pyrite staining or damage due to sulfates or adverse aggregate alkali reaction.
- 7.3 The prestressing steel tendons shall conform to ASTM A-416 (Latest Edition) "Specification for Uncoated Seven-Wire Stress-Relieved Strand for Prestressed Concrete."
- 7.4 All inserts shall be non-corrosive material.
- 7.5 All poles shall contain spiral steel reinforcement throughout the entire pole length. The minimum diameter of the spiral wire shall be three-sixteenths inches (3/16") and the maximum design stress at ultimate load shall not exceed sixty (60) ksi (kips per square inch). The spacing shall conform to the following:
 - 7.5.1 For a distance of three feet from the tip and butt of the pole, spirals shall be spaced a maximum of 1¾ inches on center but no less than 1¼ inches.
 - 7.5.2 If torsional loads are encountered, the spiral spacing shall be adjusted, if necessary, to provide sufficient reinforcing in accordance with Section 11.6 of ACI 318-95.
 - 7.5.3 Closer spiral spacing may also be required in the region between ground line to a point three feet from the pole butt to adequately resist the increased shear encountered in developing the resisting soil pressure.
 - 7.5.4 The maximum center to center spacing (pitch) throughout the remainder of the pole shall be such that the following condition is satisfied:
 - a) $A_v * F_v / s \geq 0.48$; where " A_v " is the area of one spiral leg in inches², " F_v " is the design yield stress of the grade of steel used in ksi (≤ 60 ksi) and " s " is the center to center spacing of the spirals in inches. In no case shall the spacing " s " exceed 4 inches.

8. TESTING FOR CONCRETE STRENGTH

- 8.1 The manufacturer shall, at its expense, take four representative cylinders of each day's pour and test as follows: one at release, one at seven days, one at 28 days and one spare. A copy of the test reports shall be furnished to the Engineers upon request.
 - 8.1.1 The manufacturer shall show a correlation factor obtained by tests between the value of the ultimate concrete strength (F'_c) used in the design of spun poles and the value of the static cast cylinders. If no correlation between static cast and spun concrete is furnished, then the maximum spun concrete design strength shall not exceed the static cast cylinder test by more than 15%.

- 8.1.2 Poles may not be shipped until the static concrete strength test has achieved the 28-day value used in the design. An exception to this may be taken only with prior approval of the Engineers, and only if the manufacturer can produce statistical records showing a consistent gain in concrete strength over a predictable time period that would indicate that an earlier shipping date would still result in the design strength being achieved within the 28-day period.

9. INSPECTION & QUALITY ASSURANCE

- 9.1 Inspection: The owners' representative or authorized representative shall have access to the work at all times for inspection wherever the poles are in preparation or progress. The manufacturer shall provide proper facilities for such access and inspection without additional cost to the owner. All materials will be subject to "Job Site Inspection". Material may be rejected at the time of the first inspection or at any time defects are found during the progress of the erection or installation. Inspection by the owner or waiving of inspection shall not relieve the manufacturer from the responsibility for furnishing products that conform to the requirements of this specification, nor invalidate any claim of the owner because of defective or unsatisfactory material and workmanship.
- 9.2 Quality Assurance: The manufacturer shall have an active in-plant Quality Assurance Program and perform daily checks and tests on the products made. The program shall cover the entire production process including the delivery of the product.
- 9.3 Quality Assurance Documents: The manufacturer shall submit to the Owner one week prior to pole delivery, all Quality Assurance documents identifying actual pole dimensions, weights, wall thickness, orientations, and pick-points for each pole to be delivered. Poles that do not meet the tolerance requirements in paragraph 10 below will not be accepted. All Quality Assurance documents shall be identifiable by structure number provided.

10. PACKING AND SHIPPING

- 10.1 Each shipment shall include a detailed packing list identifying all items by part number, including hardware.
- 10.2 All material shall be carefully loaded for protection during shipment.
- 10.2.1 Small parts and fasteners shall be carefully boxed, crafted, bagged or otherwise containerized and protected for shipment.
- 10.2.2 Larger parts and assemblies shall be handled, loaded blocked and secured in such a manner to prevent damage, including damage to the finish. Blocks and straps shall be rust proof and properly padded to minimize abrasion.
- 10.2.3 All materials shall be arranged to allow safe unloading at the site.

11. MANUFACTURING TOLERANCES

Product tolerances shall be limited to the following:

- 11.1 Overall length: +3 inches / -2 inches.

- 11.2 Pole diameter: + / - $\frac{1}{4}$ (one-quarter) inch
- 11.3 Wall thickness: Allowable variation along the pole shall be not greater than +20%, with a maximum reduction in wall thickness of $\frac{1}{4}$ (one-quarter) inches provided that minimum coverage over steel is maintained. Each pole shall be inspected for uniformity of inside appearance and wall thickness. Actual wall thickness measurements shall be taken on each pole and recorded. Wall thickness measurements shall be done by drilling pilot holes through the wall beginning two (2) feet below the tip and continuing at ten (10) foot intervals on the longitudinal axis of the pole opposite the "bottom face" of the pole. The "bottom face" of the pole is defined as the face where the slurry settles after spinning of the pole is completed. Pilot hole locations may be adjusted to avoid cast in place items.
- 11.4 End squareness: + / - $\frac{1}{2}$ (one-half) inch per foot of pole diameter
- 11.5 Pole Sweep: Sweep is the deviation of a pole from straightness. Sweep will be allowed in one plane and one direction only. A straight line joining the edges of the structure at both the top and the butt shall not be distant from the pole surface at any point more than $\frac{3}{8}$ inch for each 10 feet of length between these two points.
- 11.6 Weight: + / - 10% of computed value.
- 11.7 Location of longitudinal reinforcement: + $\frac{1}{4}$ (one-quarter) inch for individual strands and + / - $\frac{1}{8}$ (one-eighth) inches for the centroid of a group of strands.
- 11.8 Spiral reinforcement: + / - 25% spacing variance, with total quantity per foot maintained.
- 11.9 Location of a group of bolt holes from pole tip: + / - two (2) inches.
- 11.10 Location of centerline between groups of bolt holes: + / - One (1) inch.
- 11.11 Location of bolt holes within a group of bolts: + / - $\frac{1}{8}$ (one-eighth) inch.
- 11.12 Bolt hole diameter: + $\frac{1}{16}$ (one-sixteenth) inch of specified hole diameter or + $\frac{1}{8}$ (one-eighth) inch greater than actual bolt diameter.
- 11.13 Bolt hole alignment within a group of bolts: within $\frac{1}{2}$ (one-half) of the hole diameter from the longitudinal pole centerline in a group.

12. POLE TESTS

- 12.1 If the manufacturer has not previously supplied concrete poles of similar types, and is unable to submit sufficient strength data from previous tests for other utility companies, the manufacturer will be required to provide pole tests at its own expense. At least one test for each pole type shall be performed. Samples shall be selected randomly by the owners' representative and be tested to failure.
- 12.2 At any time during the manufacturing process, the owner may request that certain poles, selected randomly from the production, be tested to their full design loads. If the test shows a complete satisfaction without significant permanent deflection, the tested pole shall be applied to the Purchase Order and the cost of performing the test will be paid by the owner. In case of failure, the

manufacturer shall be responsible for the total cost of the initial test, and shall undertake corrective measures or redesign of the structure, as deemed necessary, and shall re-test the structure at its own expense in the presence of the owners' representative.

- 12.3 The test shall be performed in accordance with the method recommended or approved by the owners' representative. The manufacturer shall furnish a test report for each structure tested. The test report shall include the method of application of the loads, the positions of hairline and/or failure cracks, and the deflections under various loading conditions.

13. INFORMATION FURNISHED BY THE ENGINEER

All drawings and data necessary for the manufacturer to perform the various pole designs, including, but not limited to, the following:

13.1 Configuration Requirements

- 13.1.1 Identifying which edition of the NESC Code is being used, and what grade of construction is being considered for the line in question. (See the project specific specifications)
- 13.1.2 Complete structure configuration data in the form of load trees or a PLS-POLE backup file with a referenced load file; showing conductor and shield wire attachment points, underbuild requirements if required, guy attachment points where applicable, above ground height and embedment depth. Load trees shall include longitudinal, transverse and vertical components at each wire location, as well as wind on the pole structure (in lbs/sf or kips/sf). If the wind pressure is to be graduated, the incremental amounts and elevations of each shall be shown. Gust factors, if any, shall be included in the wind pressures given.
- 13.1.3 Structure details that show hole boring location for attachments, grounding details, step-bolt locations, inserts where required

13.2 Structural Requirements

- 13.2.1 Design loads in tabular form that corresponds to loading points identified on the load trees or PLS-POLE backup file. All design loads will include overload capacity factors except those for deflection load cases, if required. The load table shall also include the wind pressure to be applied to the pole.
- 13.2.2 Specific deflection limitations, if required.
- 13.2.3 Embedment depth.
- 13.2.4 Foundation rotation and or groundline deflection limitation, if required.
- 13.2.5 Location, orientation, slope or lead distances, size, breaking strength and modulus of elasticity of all guy wires where used.

14. INFORMATION FURNISHED BY MANUFACTURER WHEN BIDDING

The manufacturer shall furnish detailed pole design calculations when submitting a bid. This submittal shall include the following data for the controlling load case and deflection load case, if any, for each different pole type, height and class:

- 14.1 The values of First Cracking moment, Zero Tension moment, Ultimate moment and shear and vertical forces shown at intervals of approximately five (5) feet along the pole.
 - 14.1.1 First Cracking moment shall be defined as the point at which the concrete just begins to crack due to exceeding the tensile strength of the concrete on the tension face of the pole.
 - 14.1.2 For any unguyed structures the Zero Tension moment (second crack) shall be defined as the moment at which a first crack re-opens.
- 14.2 Guy tensions resulting from analysis and guy anchor reactions at ground line.
- 14.3 Loads in bracing and crossarms, if applicable.
- 14.4 The design 28-day concrete static compression test and correlation factor (if not previously submitted).
- 14.5 General dimensions of the pole structures, including tip and butt diameters, wall thickness, inside and outside tapers, pole weight and center of gravity.
- 14.6 Number and size of prestress strand, dormant strand and reinforcing bars if used.
- 14.7 The maximum deflection encountered at the controlling load case, including foundation rotation.
- 14.8 Final reactions, consisting of shear, moment and vertical force at the groundline and the point of fixity in order for the owner to ascertain adequacy of embedment depth. Manufacturer should be prepared to furnish unit prices (on a per foot basis) in the event that a deeper burial is required by the owner.
- 14.9 Any variances encountered during the design process (e.g., guy tensions exceeding the allowable for the size and quantity specified, etc.).
- 14.10 Instructions to Bidders:
 - 14.10.1 Definitions:
 - a) Bidding Documents: Include, but are not limited to the call for bids, Instructions to bidders, specifications, drawings, the proposal, the bid, and addenda issued prior to receipt of bids.
 - b) Addenda: Written or graphic issued by JEA prior to execution of a contract which modify or interpret the bidding documents by addition, deletion, clarification or correction

14.10.2 Bidding Documents:

- a) Bidders shall promptly notify the JEA of any ambiguity, inconsistency or error discovered upon examination of the bidding documents.
- b) Bidders requiring clarification or interpretation of the bidding documents shall make written request to JEA four (4) business days or more prior to the time announced for the opening of the proposals or bid due date. Inquiries shall be directed to the JEA project Engineer.
- c) Addenda may be issued prior to the opening of the bids for the purpose of changing the intent of the plans and specifications
- d) Each bidder shall ascertain prior to submitting his bid that all addenda issued were received and, also acknowledge the receipt of such in his bid.

14.10.3 Form and Style of Bids:

- a) Bids shall be submitted on the forms provided by the JEA, found on the attached solicitation.
- b) All blanks on the bid form shall be filled in by computer or manually by ink.
- c) Tax Instructions: Do not include sales and use tax. JEA remits tax directly to the State of Florida. PO terms and conditions will contain additional details.
- d) No changes to the bid amount will be accepted after the bid opening

15. INFORMATION FURNISHED BY MANUFACTURER PRIOR TO STARTING PRODUCTION

15.1 Prior to commencing fabrication, the manufacturer shall furnish to the JEA engineer for approval:

- a) Detailed design shop drawings of the poles
- b) Final design calculations (revised if necessary)
- c) The submittal shall include any changes or alterations necessary to maintain compliance with these specifications and as directed by the JEA Engineer.