



Document Title:  
**Precast Concrete Foundations for Pre-Stressed Concrete Poles**

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**Related/Referenced Documents**

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**Document History**

Version	Date	Revision Comments
1	June 09, 2022	Initial Release.
2	November 20, 2023	General formatting changes in various sections.
3	December 20, 2024	Modification Sections and Add Drawing.



## Item Version History

Warehouse Catalog #	Asset Suite #	Version	Date
026-82595	82595	6	12/20/2024
026-82596	82596	6	12/20/2024
026-82597	82597	5	12/20/2024
026-82598	82598	5	12/20/2024



## 1. Introduction

This is a general specification that covers the minimum requirements for precast concrete foundations for pre-stressed concrete poles to be used in the distribution system in Puerto Rico. Further information will be provided by LUMA Energy at the time of order placement and will provide information on site specific conditions, quantity, and other requirements. This document includes the general electrical and mechanical characteristics of the equipment/material.

## 2. Special Requirements

Samples shall be furnished as requested by LUMA Energy. Vendors that have supplied this equipment/material to LUMA on previous orders will not have to furnish samples at bid opening. The equipment/material will be received at the LUMA's general warehouse (011) at Palo Seco, Puerto Rico. Shipping will include transportation and unloading at the indicated warehouse.

## 3. Literature

Descriptive and technical literature must be supplied by the vendor at time of bidding. This literature may include, but is not limited to details of material, drawings, documented testing, and instructions for use and installation. Failure to submit documents on time will cause bidder disqualification. If required by LUMA, final drawings shall be submitted by the vendor before the manufacturing and shipping process for approval.

## 4. Markings

- 4.1. Containers shall be marked outside with LUMA Energy's purchase order and item number.
- 4.2. Packaging labels and tags shall be waterproof.

## 5. Packaging

All equipment/material shall be packaged and marked in such a way as to facilitate handling and protection from damage and that the receiving warehouse can readily identify it and send it, in one complete unit, to a field location without opening crates or boxes to sort items and/or parts.

## 6. Number per package (Logistics)

Each manufacturer shall define the number of precast concrete foundations per package depending on the shipping containers and platforms for delivery according to LUMA requirements.

## 7. Acceptance criteria

7.1. Latest applicable codes, standards, and other regulations: ACI, ASCE, ASTM, IBC.

7.2. Product shall be manufactured in accordance with the latest issue below (section 7.3). When conflicts occur between purchaser's specifications and the latest issue below, the purchaser's specification shall prevail

7.3. International Codes and References Standards:

ACI 318-11/318R-11	American Concrete Institute (2011), Building Code Requirements for Structural Concrete and Commentary
ASCE/SEI 7-10 Institute Structures	American Society of Civil Engineers Structural Engineering (2010), Minimum Design Loads for Buildings and Other Structures
IBC 2009	International Building Code, International Code Council, Inc. (2009)
ASTM A36/A36M	Specification for Carbon Structural Steel
ASTM A615/A615M concrete	Specification for Deformed and Plain Carbon-Steel Bars for Reinforcement
ASTM A775/A775M	Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A934/A934M Reinforcing Bars	Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM C33/C33M	Specification for Concrete Aggregates
ASTM C1611/C1611M	Standard Test Method for Slump Flow of Self-Consolidating Concrete
ASTM A706/A706M	Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement
ASTM C95	Specification for Ready-Mixed Concrete
ASTM C39	Concrete Testing
ASTM C494	Chemical Admixtures

7.4. If any other standard different from the ones indicated in this document are used, the supplier must provide information showing compatibility with the required ones.

## 8. Description

### 8.1. Technical Characteristics

#### a. Design

1. The supplier is responsible of the design considering the parameters set by LUMA.
2. The bidder will have to deliver the final computations, and all design parameters considered.
3. If the design was performed by a computer program, the supplier shall submit the runs generated by the program.
4. The Precast concrete foundations for pre-stressed concrete poles consisting of a formed concrete cylinder to be embedded in the earth below grade that serve as a special load-bearing foundation for the support of electrical utility poles.
5. The design of the precast concrete base unit shall consider soil parameters appropriate to the project site conditions and the specific loading requirements for the poles to be supported in accordance with local building codes and manufacturer recommendations.
6. The precast concrete base shall be cast as a single, continuous monolithic unit complete with all structural reinforcement (Drawing 1).

#### b. Material

1. Concrete used in the production of the precast units shall be fresh, first purpose, production mix concrete.
2. No returned, reconstituted, or waste concrete shall be allowed.
3. The concrete shall be manufactured in accordance with the requirements of ASTM C95 and ASTM C39.
4. Minimum 28-day compressive strength of 4,500 psi.
5. Maximum water to cementitious materials ratio = 0.50.
6. Maximum slump of 8 inches +/- 1½ inches per ASTM C143 for conventional concrete mix designs before the addition of any water-reducing admixtures.
7. For Self-Consolidating Concrete (SCC) mix designs, the slump flow shall be between 18 and 32 inches as tested per ASTM C1611.
8. All steel reinforcing bars provided as reinforcement in the precast concrete base shall exhibit a minimum yield strength of 60 ksi.
9. Deformed or plain bars used as reinforcement in precast concrete foundation shall meet the requirements of ASTM A615.

10. Reinforcing from bars manufactured in accordance with ASTM A615 shall not be welded.
11. Low-Alloy reinforcing bars that are connected in the desired reinforcement configurations by arc welding shall meet the requirements of ASTM A706.
12. Zinc coated (galvanized) steel reinforcing bars shall meet the requirements of specification ASTM A767 and epoxy-coated steel reinforcing bars shall meet the requirements of specification ASTM A775.
13. The minimum concrete cover over steel reinforcing bars shall be 2 inches for reinforcing bars that are size #6 and larger, and 1-1/2 inches for reinforcing bars that are size #5 and smaller.
14. For precast concrete bases to be installed in coastal areas, reinforcing steel must be epoxy coated in accordance with ASTM 775 and ASTM 934.
15. Lifting device(s) embedded in the concrete for use in handling of the precast concrete base shall be manufactured from smooth, round carbon steel rod and shall be capable of supporting at least four times the maximum intended load applied or transmitted to them.
16. Two opposite exterior sides at the top of the precast concrete base must be chamfered to accommodate the riser's conduits.
17. Special consideration must be taken for the reinforcement at the top part of the base where the chamfer reduces the concrete section.

**c. Drawings**

The supplier shall submit any applicable drawing for the bid proposal at PDF format and it shall include the following information:

1. General dimensions of all the structural components.
2. Weight for each arm (if Applicable).
3. A bill of material (if applicable).
4. Details of all accessories (if applicable).

**d. Final Approval before Manufacture**

1. Final design calculations shall be submitted before fabrication commences together with the shop drawing for LUMA approval.
2. After approval, one final set of drawings and design calculations in PDF format plus a digital copy of drawings in AutoCAD 3D (.DWG) shall be sent for our files.
3. All drawings will include our order number, Warehouse Number, RFQ, or any identifying description.

**e. Failure to Meet Guarantees**

1. Should any piece of equipment fail to meet the guarantees and the requirements of these specifications within the time covered by the guarantee, it shall be optional to the engineer/technical by LUMA to accept the material or reject it and direct the manufacturer to at once proceed to make alterations or furnish such new parts as may be necessary to make it meet the guarantees and requirements.
2. All expenses of furnishing and installing new parts by failure of the material to meet the guarantees and other requirements of the specifications will be manufacturer's responsibility.

8.2. Special Conditions

**a. The Minimum Bending Moment and Minimum Ultimate Force of the poles**

Item	Description	Minimum Bending Moment of the ground level (ft.-kips)	Minimum Ultimate Force applied horizontally 2 ft. from the top. (pounds)
1	45-H6	281	7,700
2	50-H6	316	7,700
3	50-H8	385	9,400
4	55-H6	349	7,700
5	55-H8	426	9,400
6	60-H6	382	7,700
7	60-H8	466	9,400
8	65-H6	415	7,700
9	65-H8	507	9,400

**9. Formwork**

- 9.1. All forms shall be built mortar-tight, of sufficient rigidity and adequately supported to prevent distortion or displacement due to the pressure of the concrete and other loads incidental to the construction operations. Forms shall be constructed and maintained to prevent warping and the opening of joints due to shrinkage of the timber.
- 9.2. Forms shall be built with provision for easy inspection and cleaning out immediately before concrete is placed.
- 9.3. A high standard of finish is required, and surfaces of precast, spun, and prestressed concrete members shall be true, hard, smooth, and free from any defects due to leakage of mortar from the molds.
- 9.4. Molds should preferably be made of steel.
- 9.5. Every care shall be taken to ensure that no marks or fins appear on the finished surface.

- 9.6. The inside of forms shall be thoroughly wetted or coated with non-staining form release oil or other approved material. Where oil or surfacing material is used, it shall be applied before the reinforcement is placed.
- 9.7. When forms have become warped, damaged, or burred so that in the opinion of the Superintendent the surface or dimensional tolerances of the concrete will not be satisfactory, the manufacturer shall, when so directed by LUMA, remove such forms, and replace them with forms or form panels satisfactory in all respects.
- 9.8. Forms shall be removed so as not to damage the concrete.

## **10. Placing of Reinforcement**

- 10.1. Steel shall be free from all loose rust, grease, tar, paint, oil, mud, mill scale or other coating which would tend to destroy its bond with the concrete.
- 10.2. All reinforcing bars shall be accurately bent and positioned and secured either by tie wiring or welding if permitted, so that no displacement can occur during concrete placement.
- 10.3. The specified clear cover shall be maintained. Tie wire of at least 18 s.w.g. soft iron wire shall be bent inwards or cut off.
- 10.4. Care shall be taken to ensure that the cage is correctly aligned and positioned in relation to the through-bolt holes, ferrules, and the pole axis, and that the cage reinforcement is not spirally deformed or displaced.
- 10.5. Bending and splicing of reinforcing shall be carried out as required by ASTM. Splices shall be of length sufficient to fully develop the capacity of the bars.
- 10.6. The acceptance of any material or equipment shall in no way relieve the vendor from his responsibility to meet all the requirements of this specification, and it would not prevent subsequent rejection if such materials were found later to be defective.
- 10.7. Compressions tests on every concrete served.
- 10.8. Each manufacturer shall have equipment to run their own tests.
- 10.9. Mixing water shall be free of oils, organic matter and other substances in amounts that may be harmful to concrete or reinforcement.
- 10.10. In general, water from normal drinking supply will meet the requirements necessary to produce quality concretes.
- 10.11. Admixtures shall not contain chloride ions in quantities that will cause the total water-soluble chloride ion content of the concrete to exceed 0.06% of the weight of the cement.
- 10.12. Every manufacturer will submit the mix design including admixture.



## 11. Inspection

The acceptance of any equipment/material shall in no way relieve the vendor from his responsibility to meet all the requirements of this specification, and it would not prevent subsequent rejection if such equipment/material were found later to be defective.

## 12. Proposal Information

12.1. Submitted proposals must include:

- a. Technical information
- b. Table of Compliance completed by the bidder with reference (See Appendix 1).

## 13. Table 1: Warehouse and Asset Suite Identification Number

Warehouse Number	Asset Suite	Description	Minimum Diameter (in.)	Minimum Length (ft.)	Approx. Weight (pounds)	Compatible Manufacturer
026-82595	82595	Precast Concrete Base for 45-50-55-60-65-H6	40	14.5	14,600	Power Precast Products Corp. and Power Poles Inc.
026-82596	82596	<b>Epoxy Coated</b> Reinforcing Steel Precast Concrete Base for 45-50-55-60-65-H6	40	14.5	14,600	Power Precast Products Corp. and Power Poles Inc.
026-82597	82597	Precast Concrete Base for 50-55-60-65-H8,	48	16	26,000	Power Precast Products Corp. and Power Poles Inc.
026-82598	82598	<b>Epoxy Coated</b> Reinforcing Steel Precast Concrete Base for 50-55-60-65-H8	48	16	26,000	Power Precast Products Corp. and Power Poles Inc.

The minimum rectangular for the use of all base pole openings shall be 23x23 inches. Concrete Poles to be considered shall be trapezoidal. **Warehouse Numbers 026-82596 and 026-82598 are recommended for projects in coastal areas or as required by LUMA project.**

— End of Specification —



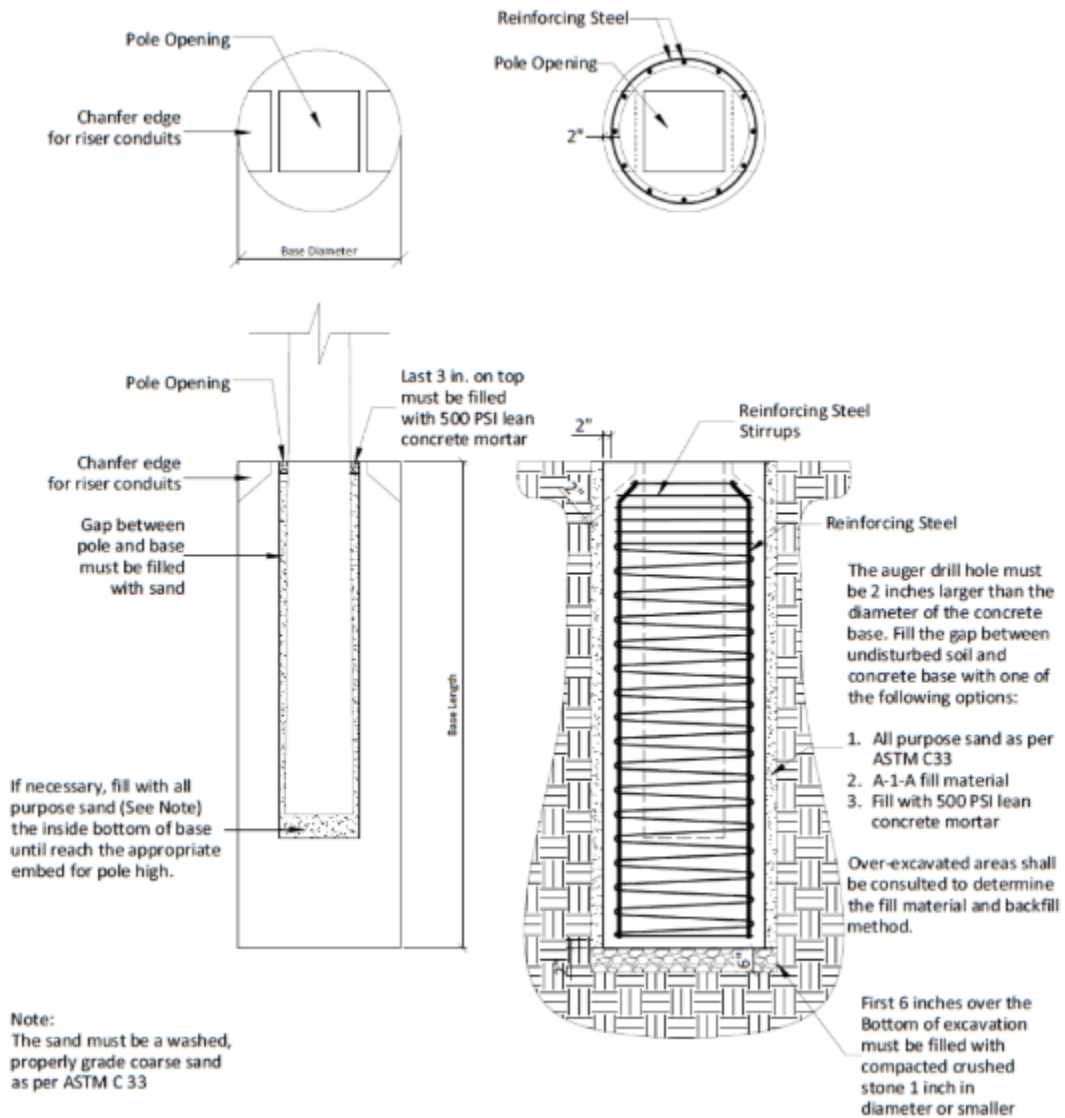
## Appendix

## Appendix 1: Table of Compliance

Line	Criteria	Description	Pass/Fail (P/F)	Comments
1	Specification	The Proponent complies with the corresponding specification document. (4350.101)		
2	Industry Standards	The Proponent complies with the industry standards established in the specification document. (ACI, ASCE, ASTM, and IBC)		
3	Type	Precast Concrete Base for 45-50-55-60-65-H6		
		Precast Concrete Base for 50-55-60-65-H8		
4	Dimensions	Minimum Diameter: 40 in. (45-50-55-60-65-H6) Minimum Length: 14.5 ft.		
		Minimum Diameter: 48 in. (50-55-60-65-H8) Minimum Length: 16 ft.		
		The minimum rectangular for the use of all base pole openings shall be 23x23 inches.		
5	Weight	Approx. Weight: 14,600 pounds Approx. Weight: 26,000 pounds		
6	Material	The precast concrete base shall be cast as a single, continuous monolithic unit complete with all structural reinforcement.		
		Minimum 28-day compressive strength of 4,500 psi.		
		Maximum water to cementitious materials ratio = 0.50		
7	Physical Characteristics	Cylindrical shape with a trapes pole opening and two chamfered top sides.		
8	Reinforcing Steel	All steel reinforcing bars provided as reinforcement in the precast concrete base shall exhibit a minimum yield strength of 60 ksi.		

**NOTE: This table is only a checklist for reference. The compliance shall be with the complete document. Marking a PASS in the table won't be accepted as a compliance without the technical information required to certify it.**

## Drawing 1













# 4350.101 Precast Concrete Foundations for Pre-Stressed Concrete Poles (12-20-2024)

Final Audit Report

2024-12-23

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