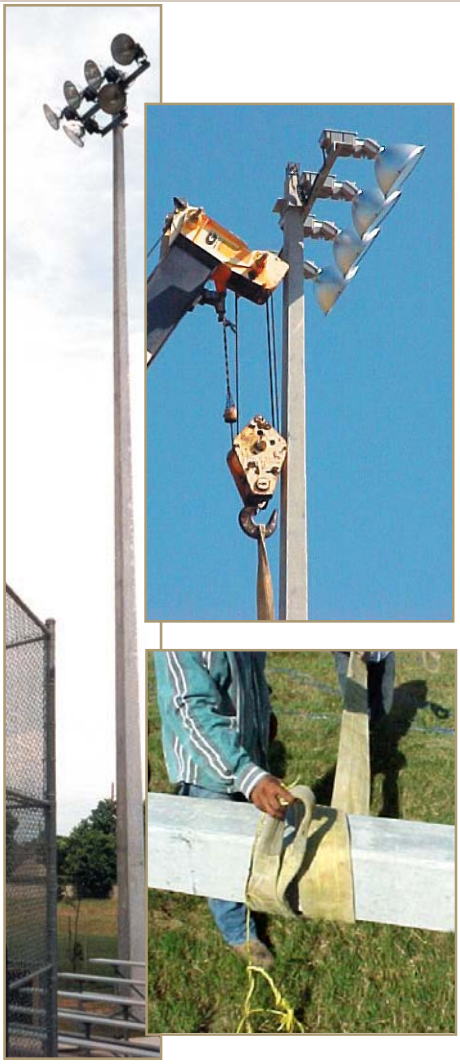
Technical Information



Strength

Ultimate strength design theory is used to determine the ultimate groundline moments shown in the technical charts. The location of the ultimate ground line moment is determined using an assumed embedment of 10% of the overall length of the pole plus 2 ft. In many cases a higher groundline moment may be attained without going to a larger pole. Please contact our technical staff for special requests.

Wind Loads

Wind loads for determining the maximum effective projected areas (EPA) presented in this catalog were determined in accordance with ASCE 7-02, *Minimum Design Loads for Buildings and Other structures.* The effective projected area is the actual projected area subjected to wind times the appropriate coefficient of drag (Cd). Please note our catalog features EPA's for 90 mph, 110 mph, 130 mph and 140 mph wind zones. EPA's for higher wind velocities can be attained by special design. Please contact our technical staff for special requests.

Wind pressures determined using the criteria of ASCE 7-02 are based on gust wind speeds. Editions previous to ASCE 7-95 were based on fastest mile (sustained) wind speeds. For example, if your specification calls for the design of a prestressed concrete pole to be based on a wind velocity of 100 mph with a 1.3 gust factor then you would select a pole from our catalog based on a gust wind speed of 130 mph. The following table provides a quick conversion of sustained wind speeds to gust wind speeds using a typical gust factor of 1.3:

Sustained Wind Speed Per ASCE 7-93 (mph)	Sustained Wind Speed Per ASCE 7-93 with 1.3 Gust Factor (mph)	Gust Wind Speed Per ASCE 7-02 (mph)
80	104	110
90	117	120
100	130	130

"10% plus 2 foot" Rule of Thumb for the Direct Embedment of Concrete Poles

Pole Length (Ft.)	Embedment (Ft.)	Height Above Grade (Ft.)
15	3.5	11.5
20	4.0	16.0
25	4.5	20.5
30	5.0	25.0
35	5.5	29.5
40	6.0	34.0
45	6.5	38.5
50	7.0	43.0
55	7.5	47.5
60	8.0	52.0
65	8.5	56.5
70	9.0	61.0

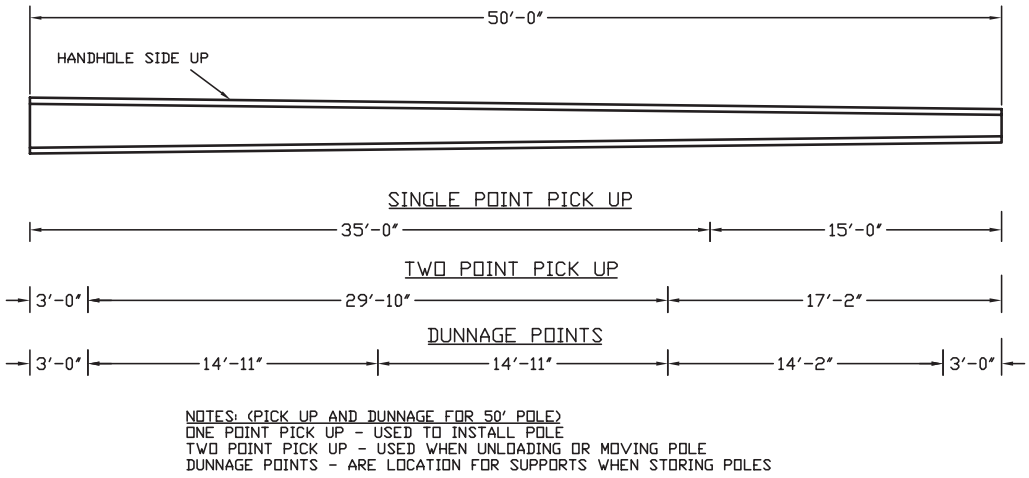
The hole diameter selected for the embedment should allow a minimum clearance around the corners of the pole butt of 4 to 6 inches. Hole sizes are generally specified in 6 inch increments to accommodate standard auger sizes. The hole diameter for octagonal poles may be determined by adding 8 to 12 inches to the width of the pole butt.

Handling and Installation Procedures E-2

Handling Instructions

- Prestressed concrete poles will withstand a considerable amount of bending but should not be shock loaded while under load.
- Prestressed concrete poles should never be handled or picked up by the tip.
- When shipping poles, the poles should be supported at a minimum of 3 points for poles up to and including 40 feet and 4 points for poles over 40 feet.
- Poles up to 50 feet in length may be unloaded using a one-point pickup at the balance point but should never be transported in this manner. A two-point pickup must be used to transport a pole at the job site.

Example



NOTES: (PICK UP AND DUNNAGE FOR 50′ POLE)
ONE POINT PICK UP - USED TO INSTALL POLE
TWO POINT PICK UP - USED WHEN UNLOADING OR MOVING POLE
DUNNAGE POINTS - ARE LOCATION FOR SUPPORTS WHEN STORING POLES

Installation Procedure

- Prior to installation of the pole, electrical wiring, brackets and luminaries can be installed while the pole is lying horizontally on the ground.
- Excavate the proper diameter and depth hole. The preferred method of excavation is by auger type drilling.
- To install, choke the pole with one end of a nylon sling 25% to 30% of the pole length from the top (see Handling section for location). Attach the other end of the sling to the lifting hook of the crane.
- Lift the pole allowing the butt to rest on the ground until vertical.
- Lift the pole over hole and lower until butt rests on bottom center of hole.
- While holding pole, add backfill in 4 to 6 inch layers, tamping between placement of each layer. Check for plumbness through out the backfilling process.
- If the pole is equipped for an underground connection, stop backfilling to a point 6 inches below the connection. Make the connection and then finish backfilling the hole to a point 2 inches above grade.

Direct Embedment

Direct embedment is the most common and recommended method of installation of prestressed concrete poles. Soil conditions vary from location to location and should be investigated by an engineer prior to designing the foundation. The "rule of thumb" for the depth of embedment is 10% of the overall length plus two feet. The table on the preceding page is based on the "rule of thumb." Depending upon the type of soil, an appropriate backfill should be selected. The chart below contains suggested guidelines for the selection of backfill:

Good Soil: Compacted well graded sand and gravel, hard clay or well graded fine and course sand.	The excavated soil may be used as the backfill.
Medium Soil: Compacted fine sand and clay, compact sandy loam, losse coarse sand and gravel.	Requires select backfill. Clean, washed sand or minus 1/2 inch well graded gravel may be used.
Poor Soil: Soft clay, clay loam, poorly compacted sand or clays containing large amounts of silt.	Requires one of the following: cementitious earth, cement stabilized sand, limestone screenings, or urethane foam.

E-3 Concrete Pole Specifications

1.00 SCOPE

1.10 This specification is to establish design and quality standards for static cast concrete poles for power distribution or lighting. All pole design structural calculations shall be prepared by a licensed engineer experienced in prestressed concrete design.

2.00 GENERAL

2.10 The concrete poles furnished under these specifications shall be designed and manufactured in accordance with requirements and/or recommendations of the American Concrete Institute Standard "Building Code Requirements for Structural Concrete" (ACI 318 - Latest Edition), unless otherwise specified.

2.20 Poles shall be designed in accordance with the Prestressed Concrete Institute "Guide for Design of Prestressed Concrete Poles."

3.00 PHYSICAL CHARACTERISTICS

3.10 All poles shall be prestressed concrete and suitable for direct embedment into the ground without special foundations.

3.20 Shape and Length: Poles shall be square in cross-section, with chamfered corners, and shall have a standard taper of 0.162 inch per foot. Cross-sectional dimensions shall not deviate by more than 3/8 inch. The allowable tolerance for overall length shall be +3 inches and -2 inches. The width of the bottom face of the pole (as it is cast) may be less than the top face.

3.30 Finish: The pole shall have a smooth uncolored finish with no cracks. The top surface of each pole shall be troweled until all projections, depressions, and irregularities have been removed and the entire surface has a smooth texture and neat lines. Square corners and sharp edges shall be tooled to form smooth, chamfered corners.

All small cavities shall be cleaned, saturated with water and then filled with mortar. A small cavity is defined as one larger than 1/4 inch but smaller than 3/4 inch in diameter, and less than 3/8 inch deep. Larger non-structural cavities and spalls shall be repaired by opening the side of the damaged area on a 1 to 1 slope using a mechanical grinder, cleaning thoroughly and filling with a high-strength non-shrink concrete repair material. Poles with other defects may be repaired only upon authorization of, and using the method prescribed by the Design Engineer.

3.40 Sealing Steel Strands: The end of each steel reinforcing strand (in the top and butt) shall be burned back to a minimum depth of 1/2 inch. The holes left by the removal of the strand shall be thoroughly cleaned of any loose residue. The holes shall then be completely filled with non-shrink grout and smoothed evenly with tip or butt surface.

3.50 Cover: The prestressing strands shall have a minimum concrete cover of 1 inch, except that Type I poles will have a minimum cover of 3/4 inch. The centerline axis along the faces of the poles shall be clear of embedded steel except for stirrups, spiral reinforcement and fabrication devices, so that 3/4 inch diameter holes may be drilled without interference from the strands.

3.60 Sweep: Sweep is the deviation of a pole from straightness. A straight line joining the edge of the pole at the butt and the edge of the pole at the top shall not be distant from the surface of the pole at any point by more than 3/8 inch for each 10 feet of length.

3.70 Hole Drilling: Poles shall be drilled in accordance with approved drawings. The location of holes shall not deviate by more than 3/8 inch. Holes drilled after removal from molds shall be drilled from both sides of the pole and shall be uniform in entrance and exit. Holes drilled from opposing sides of the pole must be in the same plane and be centered on both faces.

3.80 Cable Entrances: Two cable entrances with couplings shall be cast in all poles 90 degrees to the handhole unless otherwise specified by the customer.

4.00 MATERIALS

4.10 Chloride Content: The chloride content of the concrete mix, including all ingredients, shall be 0.4 pounds per cubic yard, or less.

4.20 Corrosion Resistance: All inserts or attachments, if required, shall be of noncorrosive material or galvanized.

4.30 Concrete: Concrete used in poles shall have a compressive strength at transfer of not less than 4,000 PSI, and a 28-day compressive strength of not less than 7,000 PSI, unless otherwise specified.

4.40 Material shall comply with the most recent revision of the following ASTM Standards:

a) Portland Cement	ASTM C105
b) Admixtures	ASTM C494
c) Aggregates	ASTM C33 or C330
d) Reinforcing Bars	ASTM A615
e) Cold Drawn Spiral Wire	ASTM A82
f) Prestressing Strand, 270K	ASTM A416

5.00 STRENGTH REQUIREMENTS

5.10 Poles of each standard type, unless otherwise specified, shall be designed to withstand the rated design (cracking) and ultimate strength shown in the following tables, with modifications to accommodate allowances for handling, transportation and erection. The rated strength is that load which, if applied, in a direction perpendicular to the axis 2 feet below the pole tip and with the bottom of the pole (ten percent of its length plus two feet from the butt) held firm, will produce the first sign of hairline cracks. The ultimate strength is the load at which point failure occurs.

5.20 All poles shall be capable of withstanding single point pickup from the horizontal position when lifting from a point 30% of the overall length down from the tip.

6.00 GROUNDING

6.10 A PVC conduit for customer to pull a ground wire through can be cast in poles if required by the customer and included with bid to customer.

7.00 QUALITY CONTROL

7.10 Tests shall be made and records shall be maintained in accordance with the requirements of Prestressed Concrete Institute MNL-116, “Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products.”

8.00 DRAWING AND DESIGN INFORMATION

8.10 Upon request, Lonestar Prestress Mfg., Inc. will furnish detailed design drawings and computations for the poles bid or supplied, including but not limited to the following:

1) Total weight and center of gravity of each pole.
2) Calculations of cracking and ultimate moment capacities at not more than 5 foot intervals.
3) Dunnage and pickup points, including both one-point and two-point pickup locations.
4) Detail of cross section and all points where reinforcing changes.

9.00 INSTALLATION

9.10 Poles shall be supported and protected during site storage, lifting and setting to prevent damage to the pole. Spalls or other damage incurred during these operations shall be repaired to restore the pole to “as new” condition.