1. **Description.** Furnish and install concrete light poles as shown on the plans.

The term, “Concrete Light Poles” means the complete assemblage of poles, parts, equipment, and miscellaneous components, erected as shown on the plans and in accordance with these specifications.

Provide cast concrete poles for lighting. Ensure pole design structural calculations are prepared by a licensed engineer experienced in prestressed concrete design.

2. **Materials.** Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.

   A. **Shape and Length.** Provide poles square in cross-section, with chamfered corners, and standard taper of 0.162 in. per ft. The maximum deviation of cross-sectional dimensions is 3/8 in. The allowable tolerance for overall length is +3 in. and -2 in. The width of the bottom face of the pole (as it is cast) may be less than the top face.

   B. **Finish.** Provide poles with a smooth, uncolored finish with no cracks. Trowel the top surface of each pole until projections, depressions, and irregularities are removed and the entire surface has a smooth texture and neat lines. Tool square corners and sharp edges to form smooth, chamfered corners. Clean cavities, saturated them with water, then fill with water, and fill with mortar. A small cavity is larger than 1/4 in. but smaller than 3/4 in. in diameter, and less then 3/8 in. deep. Repair larger non-structural cavities and spalls by opening the side of the damaged area on a 1 to 1 slope using a mechanical grinder, clean thoroughly and fill with a high-strength non-shrink concrete repair material. Poles with other defects may be repaired only upon authorization, and using the prescribed method, as directed.

   C. **Sealing Steel Strands.** Burn back the end of each steel reinforcing strand (in the top and butt) to a minimum depth of 1/2 in. Thoroughly clean the holes left by the removal of the strand, of any loose residue. Then completely fill the holes with non-shrink grout and smooth evenly with tip or butt surface.

   D. **Cover.** Ensure the prestressing strands have a minimum concrete cover of 3/4 in. Ensure the centerline axis along the faces of the poles is clear of embedded steel except for stirrups, spiral reinforcement, and fabrication devices, so that 3/4 in. diameter holes may be drilled without interference from the strands.

   E. **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 must not be distant from the surface of the pole at any point by more than 3/8 in. for each 10 ft. of length.
F. **Drilling.** Drill poles in accordance with approved drawings. The maximum deviation of the location of holes is 3/8 in. After removal from molds, drill holes from both sides of the pole, that are 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.

G. **Cable Entrances.** Cast two cable entrances with couplings in the poles 90 degrees to the handhole unless otherwise directed.

H. **Chloride Content.** The maximum chloride content of the concrete mix, including ingredients, is 0.40 lb. per cu. yd.

I. **Corrosion Resistance.** Provide inserts or attachments, if required, of non-corrosive material or that are galvanized.

J. **Concrete.** Use concrete in poles having a minimum compressive strength at transfer of 4,000 psi, and a minimum 28-day compressive strength of 7,000 psi, unless otherwise specified.

K. **ASTM Material Standards.** Supply material complying with the most recent revision of the following ASTM standards:
   - Portland Cement ASTM C105
   - Admixtures ASTM C494
   - Aggregates ASTM C33 of C330
   - Reinforcing Bars ASTM A615
   - Cold Drawn Spiral Wire ASTM A82
   - Pre-stressing Strand, 270K ASTM A416

Design poles of each standard type, unless otherwise specified, to withstand the rated design (cracking) and ultimate strength shown in the following descriptions, with modifications to accommodate allowances for handling, transportation, and erection:

- The rated strength is the load which, if applied in a direction perpendicular to the axis 2 ft. below the pole tip and with the bottom of the pole (ten percent of its length plus 2 ft. from the butt) held firm, produces the first sign of hairline cracks.
- The ultimate strength is the load at which point failure occurs.

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

A PVC conduit to pull a ground wire through may be cast in the poles, and included in the bid, if required.

Conduct tests and maintain records in accordance with the requirements of the Pre-stressed Concrete Institute MNL-116, “Manual for Quality Control for Plants and Production of Pre-cast Pre-stressed Concrete Products.”


3. **General.**

   **A. Options.** Furnish materials that are new, UL-listed, and meet NEMA, NEC, AASHTO, and the Electrical Detail standard sheet requirements.

   Provide materials and employ construction methods in accordance with the details shown on the plans, the requirements of this Item, and the pertinent requirements of the following Items:
   
   - Item 616, “Performance Testing of Lighting Systems”
   - Item 620, “Electrical Conductors”

   Ensure the concrete poles furnished under these specifications are designed and manufactured in accordance with requirements and recommendations of the American Concrete Institute Standard “Building Code Requirements for Structural Concrete” (ACI 318 – Latest Edition), unless otherwise specified.

   Design poles in accordance with the Pre-stressed Concrete Institute “Guide for Design of Pre-stressed Concrete Poles.”

   **B. Shop Drawings.** Before fabricating, prepare and submit shop drawings and design calculations for the proposed pre-stressed concrete pole and fixture for approval. Electronically submit the drawings in accordance with the shop drawing distribution list shown in the note under Item 5 for review and distribution. Submit 2 sets of design calculations. Upon completing construction, submit 1 set of reproducible as-built drawings.

   Before beginning fabrication, furnish 2 copies of the completed material identification form to the Engineer.

   Ensure the design calculations include a summary of design parameters used, including material types, strength values, allowable stresses, assumed loads, and load combinations. Submit calculations covering a range of heights and loading conditions on the project.

   Submit only drawings and design calculations bearing the seal of a Professional Engineer who is licensed in the State of Texas.

4. **Construction.** Fabricate and install concrete light poles in accordance with this specification and the details and dimensions shown on the plans or approved in writing by the Engineer. Install pole-mounted light fixtures to concrete light poles as part of this installation. See plans and special specification Pole-Mounted Light Fixtures for types.

   Locate concrete light poles as shown on the plans, except that the Engineer may shift the assembly locations when necessary, to secure a more desirable location or to avoid conflicts with utilities. Perform staking unless otherwise shown on the plans. The Engineer will verify and approve concrete light poles locations.

   Erect poles and luminaires located near any overhead or underground utilities using established industry and utility practices. Consult with the appropriate utility company before beginning such work. Erect and align the roadway illumination assemblies carefully.
Upon request, the pre-stressed concrete pole manufacturer will furnish detailed design drawings and computations for the poles bid or supplied, including, but not limited to the following:

- Total weight and center of gravity of each pole.
- Calculations of cracking and ultimate moment capacities at maximum 5 ft. intervals.
- Dunnage and pickup points, including both one-point and two-point pickup locations.
- Detail of cross section and points where reinforcing changes.

Support and protect poles during site storage, lifting, and setting, to prevent damage to the pole. Repair spalls or other damage incurred during these operations to restore the pole to “as new” condition, at no expense to the Department.

5. **Measurement.** This Item will be measured by each unit complete in place.

6. **Payment.** The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Concrete Light Poles” of the specified length. This price is full compensation for furnishing, installing, and testing poles; and for labor, tools, equipment, and incidentals.