LOWERING SYSTEM SPECIFICATIONS

The lowering system shall consist of the following:

A. Head frame and cover
B. Luminaire ring
C. Cables
D. Winch
E. Parkable power unit (1 per project)

The head frame unit shall rigidly mate the top of the pole to the head frame platform. The platform with its associated sheaves, etc., shall be covered and raintight. The head frame structure shall be zinc coated steel, attached to the pole by means of a steel slinky. Head frame shall encompass six 6" nominal/2"cable sheaves grooved to the exact cable diameter, for 180° cable bearing surface. The sheave shall be zinc electroplated to ASTM 164 and dipped in yellow chromate for corrosion resistance. Bearings and cable keepers shall have permanent lubrication. Three (3) stainless steel 7 x 19 aircraft cables or 9/16" or greater diameter shall be provided.

The pole cable shall be attached to the luminaire ring with a waterproof connector capable of withstanding the pull of the weight of the pole cable. Where the wire ropes are required to bend over sheaves or over the winch drum, the maximum working stress in the outer fibers of wire rope shall not exceed 25% of the wire rope manufacturer's rated ultimate stress.

Drum design shall cause level wind of wire rope. The power cord shall travel on sheaves (s) or a combination of rollers providing a radius for the cord of 6" or larger. Each end of the sheave (s) or rollers shall have a keeper to prevent the cable from jumping out of the roller track.

The head frame shall also include three (3) latching devices to support the luminaire ring assembly when the lowering device is not in operation. The latches shall be actuated by alternate raising and lowering of the hoisting cables. Locking of luminaire ring shall be indicated by indicators visible from ground. All moving parts of the latch mechanism shall be serviceable from the ground. Each of the three latches shall be strong enough, by itself, to support twice the weight of the ring and all the luminaires. Latching mechanisms which depend primarily upon spring operation or contact dissimilar metals are not acceptable. The latching mechanism shall not require adjustment after the original installation.

The luminaire ring shall be constructed of a minimum of 6 x 2" x 7 gauge steel channel galvanized in accordance with ASTM A36 Class “B” steel channel with the appropriate number of 2" steel pipe mounting arms. The luminaire ring shall be prewired with Type “W” or specially reinforced Type “S” power cables with suitable conductor gauge and size for proper operation and Type “ST” distribution wiring with insulation suitable for at least 105°C. All power cables shall be attached to the aluminum weatherproof wiring chamber with weatherproof cable connectors. A 600 volt terminal block, completely prewired shall be included in the weatherproof wiring chamber. A weatherproof electrical outlet prewired shall be provided on the luminaire ring to allow testing of the luminaire while in the lowered position. The power outlet shall face away from the pole for easy access. Raising speed of the luminaire ring shall be a minimum of 12" per minute.

The ultimate support of the luminaire ring shall be dependent upon the lowering and raising cables.

The system shall be provided with a circuit breaker assembly with a lightning arrester on the circuit breaker enclosure. A zigzag cord and receptacle shall be supplied from the circuit breaker assembly. The receptacle on the zigzag cord shall be of drop construction. The receptacle shall have a push button switch which will switch the plug to the receptacle and when secure shall provide a NEMA 3R rating. The plug and receptacle shall be UL/CSA switch rated.

The which shall be a reversible worm gear self-locking type with an integral hydraulic brake to prevent free-spooling. The winch shall be designed for hard operation or for operation by means of a 1/2" heavy duty reversing electric drive. The winch shall be designed to be mounted on any standard 12" diameter round 7 x 19 aircraft cables or 9/16" or greater diameter equal to MIL-W-83402C shall be supplied on the winch. The winch shall be provided with keepers above the drum to force the cable away from the ends of the drum for spooling. The drum shall have a guard to prevent the cable from contacting the sides of the drum.

The winch shall be mounted in such a way that the cable terminator and the riser cable connector may be reached and worked on by a person with a firm grasp on the handle. Roller contact spring-loaded centering arms shall be provided to center the luminaire ring while ascending or descending the pole.

The rollers for the centering arm shall be made of a water resistant nonmarking composition material. All sheave mounts for arms and rollers shall be 304 stainless steel. The rollers shall be in contact with the pole at all times. The centering arm shall be interconnected and loaded with stainless steel springs to uniformly apply equal centering force from the arms.

LUMINAIRE SPECIFICATIONS

The reflector with its aluminum cover shall be firmly attached to a cast ring. The ring shall have keyholes in its upper surface such that the reflector/reflector assembly may be readily attached to, or detached from, the luminaire bracket entry and lamp support assembly without completely removing the support bolts.

Each luminaire shall contain an integral auto-regulator type ballast connected for 480 volts input = 120° and a power factor of more than 0.92. The regulator shall be enclosed within an aluminum housing which integrally attaches to the luminaire bracket and lamp support assembly. It shall be readily removable without removing the luminaire from the bracket arm.

The luminaire shall be attached to the bracket arm by means of a bracket entry and lamp support assembly. The assembly shall include a side entry switch designed for 2" pipe with provision for 3" adjustment for leveling the luminaire. An enclosed terminal block shall be included such that electrical connections shall be protected from exposure to weather.

All electrical connections shall be made waterproof or be made inside a weather resistant enclosure. All luminaires shall ANSI/IES light distribution as indicated in plans. Each luminaire shall be tested and labeled with a permanent label which provides the type of lamp, voltage input, power input, power factor, ballast type, socket position, ANSI/IES light distribution, and such other information that a complete replacement can be readily ordered.

The contractor's attention is directed to those plans sheets detailing the mounting of luminaries at the pole top. Particular attention is directed to alignment of luminaire light distributions. Special attention must be exercised in the physical alignment of these luminaries to ensure that the approved photometric layout is physically produced at each lighting standard in the field. A marking shall be placed on the external face of the reflector to allow visual inspection of alignment. The marking shall correspond to the 0° axis of the reflector.
See legend for number of luminaires, lamp wattage and light distribution.

Lift cables (3/16" stainless steel aircraft cable) 3 minimum

Lift cable sheaves

Head plate

Cover

Lift Cable Terminator

Spring supported centering arms provided to center the luminaire ring,

2" slip fitter easy (equally spaced around ring)

Centering guide pins (3 minimum)

Luminaire support ring

Pole cable & sheaves

Cover

Pole Cable

600 Volt rated Pole Cable with 4WG Stranded Copper Conductors size of conductors to be determined by luminaire load.

600 Volt rated Pole Cable with 4WG Stranded Copper Conductors size of conductors to be determined by luminaire load.

Positive drive reversible winch. The complete enclosed drum gear shall directly mesh with the worm gear train in the same enclosure.

Winch cable (1/4" stainless steel/aircraft cable)

Hand hole

Winch

Pitot with Receptacle

Lift cable terminator

Base plate

& surge protector shall be located in the pole with the circuit breaker. The surge protector shall be mounted at the front near hand hole for easy access.

25' minimum remote control cable same as Pole Cable.

1.5 KVA dry type transformer mounted in NEMA 3R portable enclosure, provide 120V, grounded receptacle for electric drill/receptacle for supply cable. (See schematic)

1/2" heavy duty reversible drill 120 Volts (1) per project.

Portable drill

Slip clutch

Schematic of Remote Auxiliary Power Unit

All hardware for mounting heavy duty drill to pole shall be Stainless Steel.

2010 FDOT Design Standards

High mast pole

Winch

Lock nuts

Base plate

Lowering Details

2010 FDOT Design Standards

High Mast Lighting

Sheet No.

Index No.

2010 FDOT Design Standards

Revision

Last
HIGHMAST LIGHTING NOTES:

1. High Mast materials:
   a. Pole: ASTM A416 Grade 50, 55, 60, or 65 (Less than 6") or ASTM A572 Grade 50, 55, 60, or 65 (6" and over) or ASTM A585 Grade A 65 ksi/yard or Grade B (60 ksi/yard).
   b. Steel Plates: ASTM A709 Grade 36 or ASTM A36
   c. Weld Metal: E70XX

2. Anchor Bolts: ASTM F1554 Grade 55 with ASTM A563 Grade A heavy-hex nuts and ASTM F436 Type 1 washers.

3. Handholes: ASTM A709 Grade 36 or ASTM A36 Frame with ASTM A36 cover.

4. Caps: ASTM A416 Grade 50, 55, 60, or 65 or ASTM A809.


6. Stainless Steel Screws: 410 Type 316

2) Reinforcing steel: ASTM A416, Grade 60.

3) Concrete: Class IV (Delled Shaft) with a minimum 4,000 psi/compressive strength at 28 days for all environmental classifications.


5) Galvanization:
   b. Other Items (Including Pole): ASTM A133

5) Hole diameters for anchor bolts not greater than the bolt diameter plus 0.5".

7) Poles: Tapered with the diameter changing at a rate of 0.14 inch per foot with a minimum 16-sided pole shank and only one longitudinal seam weld. Circumferentially welded pole shank butt splices and laminated pole shanks are not permitted. Longitudinal seam welds within 6 inches of pole to base must be complete penetration welds. Longitudinal seam welds at telescopic field joints must be complete penetration welds for the splice length plus 6 inches.

8) One hundred percent of full-penetration groove welds and a random 25 percent of partial-penetration groove welds shall be inspected. Full-penetration groove weld inspections shall be performed by nondestructive methods of radiography or ultrasonics.

9) Furnish each pole with a 2"x4" (max.) aluminum identification tag. Submit details for approval. Secure to pole with 0.124" stainless steel rivets or screws. Locate identification tag on the inside of pole and visible from the top.

10) Manufacturers seeking approval of a Highmast Lighting structural assembly (exclude lowering system) for inclusion on the Qualified Products List must submit a DPL Production Evaluation Application along with drawings showing the product meets all specified requirements of this Table.

11) Verify CSL access tubes will not interfere with anchor bolt installation before excavating the shaft. When CSL access tube locations conflict with anchor bolt locations, move the CSL access tube location to two inches along the lower circumference of the reinforcing cage. Notify the Engineer before excavating the shaft if the CSL access tube locations cannot be moved out of conflict with anchor bolt locations.

DESIGN CRITERIA:

1. Designed in accordance with the FDOT Structures Manual.

2. Poles are designed to support the following:
   a. (1) cylindrical head assembly with a maximum effective projected area of 6 Sq. ft. (Class 1) and 340 lbs. (Max).
   b. (8) cylindrical luminaires with a maximum effective projected area of 3.0 Sq. ft. (Class 0.5) and 77 lbs. each.

3. Foundation design based upon the following soil-criteria:
   a. Classification = Cohesionless (Koe Sand)
   b. Friction Angle = 30 Degrees (30°)
   c. Unit Weight = 50 lbs./cu. ft. (Assumed saturated)

4. Only in cases where the Designer considers the soil types at the specific site location to be of lesser strength properties should an analysis be required. Auger borings, DPT borings or CPT soundings may be utilized as needed to verify the assumed soil properties, and at relatively uniform sites, a single boring or sounding may cover several foundations. Furthermore, borings in the area that were performed for other purposes may be used to confirm the assumed soil properties.

5. Foundation applies only to slopes of 1:4 or flatter. Provide a minimum 24" shaft projection on the high side.

6. Poles are designed for 6 mil galvanization thickness.
### Pole Design Table

<table>
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<td>0.375°</td>
<td>3.75°</td>
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<td>0.250°</td>
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<tr>
<td>110 mph</td>
<td>100 ft</td>
<td>24.6° ± 0.175°</td>
<td>6.400°</td>
<td>9.844°</td>
<td>40.0°</td>
<td>0.250°</td>
<td>9.188°</td>
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<tr>
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<td>40.0°</td>
<td>0.250°</td>
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* Diameter Measured Flat to Flat

### Base Plate and Bolts Design Table

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<th>Pole Overall Height</th>
<th>Base Plate Diameter</th>
<th>Base Plate Thickness</th>
<th>TW</th>
<th>BW</th>
<th>Bolt Circle</th>
<th>No. Bolts</th>
<th>Bolt Diameter</th>
<th>Bolt Embedment</th>
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<td>0.169°</td>
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<td>130 mph</td>
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<td>23.0°</td>
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<td>39°</td>
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### Shaft Design Table

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<th>Shaft Length</th>
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<td>4.6°</td>
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<td>16 = II</td>
<td></td>
</tr>
<tr>
<td>130 mph</td>
<td>80 ft</td>
<td>4.0°</td>
<td>14.0°</td>
<td>14 = II</td>
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<tr>
<td>120 ft</td>
<td>4.6°</td>
<td>16.0°</td>
<td>16 = II</td>
<td></td>
</tr>
<tr>
<td>150 mph</td>
<td>80 ft</td>
<td>4.0°</td>
<td>16.0°</td>
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<td>120 ft</td>
<td>4.6°</td>
<td>17.0°</td>
<td>16 = II</td>
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<td>120 ft</td>
<td>4.6°</td>
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<td>16 = II</td>
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</table>

### POLE DESIGN TABLES

**2010 FDOT Design Standards**

**Page 4 of 7**

**HIGHMAST LIGHTING**
1. All pullboxes and pole bases, ends of conduit shall be sealed in accordance with Section 5.30 of the Standard Specifications For Road And Bridge Construction.

2. Slides to be placed around all Poles and Pullboxes.

3. For Pullboxes between Poles refer to Index 17500.

NOTE:

- Minimum of 6" x 20' approved ground rods.
- 4/0 AWG stranded CU bare ground wire connected to grounding lug inside pole.
- 4/0 AWG insulated (TW Green) stranded CU bond wire connecting all poles, and insulated (THW or THWN) stranded copper circuit conductors in schedule 40 PVC conduit. Circuit conductors and conduit size as shown in plans. (Typical).

Wiring Details:

- 1/2" bed of peacock or crushed stone for drainage.
- U L approved ground rod 3/8" diameter 20' long copper clad with approved ground connection at all poles and pullboxes.
- 1 AWG insulated (TW Green) stranded CU bond wire connecting all poles, and insulated (THW or THWN) stranded copper circuit conductors in schedule 40 PVC conduit. Circuit conductors and conduit size as shown in plans. (Typical).

Circuit Breaker PanelBox with removable face plate & Corner Screws with Surge Arrester mounted to top of Circuit Breaker PanelBox for easy access. Service entrance fittings shall be used on all conductors entering Circuit Breaker PanelBox.
REINFORCEMENT LAYOUT

SLAB DIMENSIONS

Shaft Location

Pull Box Location

SECTION C-C

NOTES:
1. Use clean free draining sand less than 5% passing No. 200 sieve for base (1"").
2. Welded wire fabric shall meet the requirements of ASTM A985.
3. Concrete shall be Class NS with a minimum strength at 28 days of f'c=2.5 ksi.
4. Outside edges of slab shall be cast against formwork.
5. The pullbox shown is 1'-5" x 1'-5"; others approved under Section 635 of the Standard Specifications may be used.
6. Slabs to be placed around poles and pullboxes in rural locations. In urban areas or where space is limited slab dimensions may be adjusted as shown in the plans.
7. Concrete and reinforcing for slabs around poles and pullboxes shall be included in the price of pole or pullbox.
8. The 1/2" thick expansion joint between the pole shaft and slab and the pullbox and slab shall be sealed with a hot poured elastic joint sealer.