



CITY OF OAKDALE NO.2545

ELECTRICAL LIGHTING SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Luminaires.
2. Standards.
3. Conductors.
4. Conduit Systems.
5. Feed Points.

B. Method of Measurement:

1. Lighting Units:
 - a. Measure as individual units.
 - b. Measure each type of combination of components separately.
2. Install Lighting Unit:
 - a. Measure as a unit for installing lighting units furnished by Owner.
 - b. Includes furnishing all connections, bases, lamps, and other material necessary to install units.
3. Connect to Existing Lighting Unit:
 - a. Measure as a unit for connections to existing lighting used as a source of power.
 - b. Includes all materials and labor.
4. Conductors:
 - a. Measure by length in linear feet.
 - b. Measure each type and size separately.
 - c. Measure between terminal point centers along the centerline of the conductor.
 - d. Add 5 feet at each terminal point for connections.
5. Conduit Systems:
 - a. Conduit:
 - 1) Measure by length in linear feet.
 - 2) Measure each type and diameter separately.
 - 3) Measure the centerline of the conduit.
 - 4) Includes jacking/augering or directional boring under existing permanent surfaces.
 - b. Handholes:



- 1) Measure as individual units.
- 2) Measure each type separately.

6. Feed Points:
 - a. Measure as individual units.
 - b. Measure each type separately.

C. Basis of Payment:

1. System Components:
 - a. Lighting unit item includes lamp, ballast, luminaire, pole, brackets, mounting accessories, anchor bolts and cover, base, excavation and backfill, fusing, internal wiring, photo cell and accessories as required to provide a complete unit.
 - b. Install lighting unit item includes installing City furnished lighting units, furnishing lamps, mounting accessories, excavation, backfill and compaction, fusing, internal wiring, and accessories as required to provide a complete unit.
 - c. Conductor item includes wire, cable, trenching, backfill, pulling, splicing, connections, accessories and testing as required to provide a complete installation.
 - d. Conduit item includes conduit, trenching, backfill, jacking, directional boring, fittings, drainage tees, sealing and accessories as required to provide a complete installation.
 - e. Handhold item includes handhold, cover, excavation, backfill, sealing and accessories as required to provide a complete installation.
 - f. Feed point item includes feed point unit service cabinet, weatherhead, conduit extensions between weatherhead and feed point service cabinet, wiring, excavation, photo cell, backfill and accessories as required to provide a complete installation.
2. Payment for the electric lighting system shall be at the contract unit price as listed on the Bid Form. All associated work items will be considered incidental.

1.02 REFERENCES

- A. National Electric Code.
- B. State and Local Electrical Code.
- C. NECA – Standards of Installation
- D. Underwriters Laboratories, Inc. (UL)
- E. NEMA



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F. MN/DOT 2545 – Electric Lighting Systems.

1.03 SUBMITTALS

- A. Shop Drawings:
 - 1. Luminaires (if required).
 - 2. Standards (if required).
 - 3. Handholes.
 - 4. Feed Points.
- B. Product Data:
 - 1. Conductors
 - 2. Conduits
- C. Design Calculations:
 - 1. Wind Load Design for Standards (if required).

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Obtain approval of completed system from state of local electrical inspector.
 - 2. Provide all necessary permit and inspection fees.

1.05 PROJECT CONDITIONS

- A. Energy Supplier:
 - 1. Coordinate with the energy supplier for connection to the source.
 - 2. Energy will be supplied by Xcel Energy and the City of North St.Paul.
- B. Current Characteristics:
 - 1. 120/240 Volt, A.C.
 - 2. 1 Phase
 - 3. 60 Hertz
 - 4. 3 Wire
- C. Drawings do not purport to show actual field dimensions, but are intended only to establish location and scope of Work. Field verify dimensions and assume full responsibility for their accuracy.

1.06 SEQUENCING AND SCHEDULING



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- A. Do not perform excavation or trenching under this section until final boulevard grading is completed.
- B. Install all items under this section prior to final boulevard restoration.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

- A. Luminaire – Type A:
 - 1. Weatherproof.
 - 2. Lamp: 100-watt high-pressure sodium.
 - 3. Ballast: 240 volt for operation to -20 degrees F
 - 4. Cast aluminum capital.
 - 5. Solid spun aluminum top with finial.
 - 6. Factory Finish:
 - a. Powder coat finish.
 - b. Factory finish.
 - c. Color: Black
 - 7. All integral parts to be readily accessible.
 - 8. Enclose lamp in globe housing.
 - 9. Include refractor to provide an IES Type III distribution pattern.
 - 10. Provide easy twist lock refractor removal.
 - 11. Mount ballast and capacitor with quick disconnect in wiring.
 - 12. Shall accommodate a 3" O.D. tenon.
 - 13. Acceptable Units:
 - a. K424R-EAR-III- 100 (MOG)-HPS-240-K10-SST-BLK

- B. Luminaire – Type B:
 - 1. Weatherproof.
 - 2. Lamp: 250-watt high-pressure sodium.
 - 3. Ballast: 240 volt for operation to -20 degrees F
 - 4. Factory Finish:
 - a. Finish Coat: Acrylic Enamel.
 - b. Color: Black
 - c. Phosphate coat all parts prior to priming.
 - 5. All integral parts to be readily accessible.
 - 6. Enclose lamp in rectangular housing.
 - 7. Include reflector to provide an IES Type III – cutoff distribution pattern.
 - 8. Provide hinged refractor door with "one-hand" latch.
 - 9. Mount ballast and capacitor to a hinged removable door with quick disconnect in wiring.
 - 10. Acceptable Units:
 - a. General Electric DSMT 25S3AGMC3 BL
 - b. Sterner Lighting EX25-A10-3-250S240D



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C. Standards – Type A:

1. Length: 13-foot 1 inch shaft length.
2. Material: Prestressed concrete.
3. Finish: Exposed aggregate.
4. Color:
 - a. Ameron 333
 - b. Stresscrete E40 Pearl Gray
 - c. Apply anti-graffiti, salt intrusion and freeze/thaw cycles.
5. Direct embedded pole.
6. 3" O.D. tenon
7. Design for 100 mph wind loading (including luminaire, ice and all mounting devices).
8. Include handhole in base with Teflon screws for access plate.
9. Acceptable Units:
 - a. Ameron VEF-4-333 A5MOD (1 ½ H).
 - b. Stresscrete KD13-G-T-E40

D. Standards – Type B:

1. Length: 30 feet.
2. Material: 201L Stainless Steel.
3. Finish: Aliphatic polyurea (Millerbernd).
4. Color: Black.
5. Bolt Circle Diameter: 15 inches.
6. Design for 100 mph wind loading (including luminaire, ice and all mounting devices).
7. Provide anchor bolt assembly and template from same source as standard.
8. Base cover to conceal anchor bolts.
9. Include handhole in base with grounding lug.
10. Acceptable Units:
 - a. General Electric DS220-641A300-FP-HH-FBC-AB; or
 - b. Millerbernd TSA 6237300 Tapered Square

D. Feed Point:

1. Manufactured weatherproof, NEMA 4 assembly with dimensions, construction, and components as indicated on attached "Feed Point Service Cabinet" standard drawing.
2. Install on concrete base.
3. Completed assembly shall bear "UL" label and shall be labeled as "Suitable for use as service entrance equipment".
4. Manufacturer:
 - a. States Electric Manufacturing.
 - b. American Midwest Power.
 - c. Electro-mechanical Industries.
 - d. Povolny Specialties, Inc.



- e. Or approved equal.
5. 30 Ampere
6. 2-pole main circuit breakers.
7. Lighting arrestors.
8. Mounted and prewired components.
9. Cabinet:
 - a. Weatherproof, NEMA IV
 - b. Pedestal type
 - c. .125 – inch sheet aluminum.
 - d. Freestanding.
 - e. 1-hour clear anodizing.
 - f. ¼ inch mounting flange.
 - g. Lockable
 - h. Non-corroding hardware
 - i. Neoprene gasketed door openings.
10. Install on concrete base.
11. Permanently attach “Danger – High Voltage” sign to cabinet face.

2.02 COMPONENTS

- A. Conductors:
 1. Standard copper with 600-volt insulation.
 2. Insulation (for use within conduit) Type XHHW-2.
 3. Insulation (for direct bury cable) Type USE-2 or UF cross-linked polyethylene or equal.
 4. Size and type: As shown on Drawing.
- B. Conduit Systems: Conduit shall have marking indicating the manufacturer's name, size, type, UL listing and any other markings required by the N.E.C.
 1. Polyvinyl Chloride Nonmetallic Conduit and Fittings:
 - a. Polyvinyl Chloride, schedule 40, UL Label.
 - b. Type II, heavy wall, rigid.
 - c. Conform to MN/DOT 3803
 - d. Carlon PV DUIT 40 Plus, 90 C or approved equal.
 2. Continuous length (HDPE)
 - a. Conduit shall be red in color.
 - b. Fittings shall be appropriate for use with HDPE conduit.
- C. Handholes:
 1. Designed to carry light vehicular traffic.
 2. Covers:
 - a. Bolt down type.
 - b. Mold the word “Street Lighting” into cover.
 3. Provide a drain opening in the bottom.
 4. Materials: Plastic or Cast Iron:



a. Plastic:

1. Conform to ASTM D635.
2. Self-extinguishing material.
3. Test to -50 degrees F.
4. No change in physical properties due to weather exposure.
5. Color: Gray.
6. Top dimensions shall not exceed bottom dimensions by more than 25 mm 1 inch.
7. Extensions shall be of same material.
8. Carlon No.PC1324N, or equal.

b. Cast Iron:

1. OZ, Type YR, or equal.

2.03 ACCESSORIES

A. Lighting Unit:

1. Fuses: Bussman Type FNM, 5 amp, dual element fuse.
2. Fuse Holders: Bussman Type HEB, in-the-line, waterproof.
3. Steel screw in base foundations.

B. Conductors:

1. Splicing Connectors: Burndy Multi-tap, or equal.

C. Conduit Systems:

1. Grounding Lugs: OZ Type BLG, or equal.

D. Grounding Equipment:

1. Grounding Conductors: Bare copper wire.
2. Ground Rods: 5/8 inch by 10 foot, copper clad, Copperweld, or equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify rules and procedures of the energy supplier for connection to the existing system.
- B. Verify locations for making connections to existing facilities.
- C. Verify location of existing underground facilities prior to installation.

3.02 PROTECTION

- A. Protect all existing surface and underground facilities that are scheduled to remain Inplace.



3.03 INSTALLATION

A. General:

1. Conform to NECA "Standards of Installation" except as modified herein.
2. Install all equipment based on the locations and dimensions shown on the drawings.
3. The distribution circuits shall consist of 2 ungrounded conductors and 1 grounding conductor.
4. The 2 ungrounded conductors shall constitute one 240 volt circuit.
5. Conduit shall be directionally bored.

B. Excavation, Trenching and Backfill:

1. Excavate trenches to a uniform depth below the finished grade.
2. Maintain uniform alignment based on dimensions shown on the drawings.
3. Use excavated trench materials for backfill.
4. Remove sod, roots, clod, debris, and stones over 1 inch in diameter from the backfill material.
5. Compact backfill material in maximum 12 inch lifts.
6. Continue compaction until there is no further evidence of consolidation.
7. Dispose of surplus excavated materials on the site as directed by the Engineer.
8. Do not place backfill materials on foundations frozen deeper than 3 inches.

C. Lighting Units:

1. Bases and Anchorage:
 - a. Steel screw in base foundations.
 - b. Provide forms to a minimum depth of 6 inches below the finished surface.
 - c. Allow 14 days cure time for concrete base before placing standard.
 - d. Cast one ground rod into each foundation.
 - e. Set anchor bolts plumb and level.
 - f. Install standards with $\frac{1}{4}$ inch to $\frac{1}{2}$ inch clearance from top of concrete base.
2. Direct Embed Lighting Units:
 - a. Perform excavation, backfill and compaction in accordance with manufacturer's recommendations.
3. Luminaire and Pole Assembly:
 - a. All threaded stainless steel hardware and dissimilar metal, threaded hardware shall be coated with an approved zinc-based anti-seize compound by the Contractor during assembly.



4. Wiring and Grounding:
 - a. Extend two No. 12 AWG Type XHHW feeder and one No. 12 XHHW ground conductors to the luminaires from the cables in the standard base.
 - b. Install two in-the-line fuse holders and fuses, one of each on each feeder lead.
 - c. Connect grounding conductor to each standard at the grounding lug or grounding strap.
 - d. Connect grounding lug and foundation ground rod with a No. 6 A.W.E. bare copper wire.
 - e. Attach grounding conductor to the energy suppliers neutral at the service point.
 - f. Terminate grounding conductor with a 25-ohm ground at the service points and at the end of each distribution run.
 - g. Establish 25 ohm ground with a minimum two driven ground rods.
 - h. Provide minimum 2 feet of cover over all wiring.
 - i. Install electrical line identification tape in trench approximately 6 inches above conductors.
 - j. Butt splices within poles, bases or handholes are not acceptable.
 - k. Splicing within handholes is not acceptable. Splicing shall be performed within pole bases only.

D. Feed Points:

1. Install on concrete foundation, 30 inches by 30 inches by 30 inches nominal size.
2. Furnish adequate length of service conductors from the feed point to reach energy source.
3. Energy supplier will install service conductors between feed point and source.
4. Provide 25-ohm ground at each feed point.
5. Establish 25-ohm ground with minimum two driven ground rods.
6. Install ground conductor between service entrance and ground rod.

E. Conductors:

1. Install cable in conduit as shown on the drawings.
2. Install complete cable (3 conductors) to each lighting unit.
3. Do not splice cable between connection points.
4. Use insulation of greater rating at the connection of 2 unlike types.

F. Conduit Systems:

1. General:
 - a. Install conduit by directional bore method in finished areas.
 - b. Conduit may be installed by direct bury method within roadways prior to installation of permanent surfaces.



- c. Provide minimum 2-foot cover over conduit.
 - d. Jack or auger rigid steel conduit under permanent surfaces.
 - e. Grout all resultant voids from abandoned augering or jacking attempts.
 - f. Maintain conduit runs on grade to provide definite low points in the system.
 - g. Temporarily cap conduit ends during construction.
2. Rigid Steel Conduit:
 - a. Joints: Cut square, threaded, reamed smooth and drawn up tight.
 - b. Bends and Offsets: Standard Ells; field bends made with an approved bender; hub type conduit bodies.
 - c. Terminate conduit at cabinet and boxes with locknuts and insulated bushings with grounding lugs.
 - d. Install insulating bushing on all conduits 1-1/4 inch and larger.
 3. Nonmetallic Conduit:
 - a. Solvent weld all P.V.C. conduit and fittings in accordance with manufacturer's instructions.
 - b. Weld or use mechanical fittings for HDPE conduit.
 - c. Install ground conductor in all nonmetallic conduit.
 4. Handholes:
 - a. Install handholes in raceway runs as required to facilitate pulling of conductors.
 - b. Excavate minimum 24 inches below base depth and refill with pea gravel.
 - c. Secure boxes in place with grout after alignment and raceway installation.
 5. Drain Tees:
 - a. Install drain tees at low points of the system.
 - b. Excavate under drain tees 12 inches by 6 inches 12 inches by 24 inches deep and refill with gravel.

G. Grounding:

1. Ground all metallic conduits, supports, cabinets, non-current carrying equipment parts and the neutral conductor in accordance with the National Electrical Code.
2. Provide continuous unspliced grounding conductor from neutral conductor connection to the grounding electrode.

3.04 FIELD QUALITY CONTROL

A. Testing:



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1. Test completed system for unwanted grounds in accordance with MN/DOT 2545.3.J.
2. Conduct megohm meter test (at 500 volts D.C.) indicating resistance of each circuit.
3. Allowable Results:
 - a. Phase Conductor Insulation Resistance: Not less than 100 megohms.
 - b. Neutral Conductor Insulation Resistance; Not less than 5 megohms.
 - c. Circuit Insulation Resistance: Not less than 5 megohms.
4. Provide necessary corrections and retest.

B. Demonstration:

1. Demonstrate proper operation of completed system.

C. Manufacturers Field Service:

1. Provide full instruction and demonstration in the adjustment, operation and maintenance of all components of the system.
2. Provide instruction and demonstration to the Owner's employees during regular working hours.

3.04 PAINTING

- A. Paint all exposed metal surfaces or areas damaged during construction.
- B. Match original paint type and color.

(Note: See Luminaire Specification detail drawing attached – 2 pages)

END OF SECTION

REV.	ALTERATION	E.C.	DATE	BY

LUMINAIRE SPECIFICATIONS

CATALOGUE NO.: K424R-EAR-III-100(MDG)
 -HPS-240-K10-SST-BLK

QUANTITY: TBA

IP RATING: IP66

OPTIONS: SOLID SPUN TOP-BLK

GLOBE MAT'L: ACRYLIC

IES CLASSIFIC: TYPE III

WATTAGE: 100W

LIGHT SOURCE: HIGH PRESSURE SODIUM

LINE VOLTAGE: 240

POLE ADAPTOR: K10 WITH SLEEVE TO FIT 3" OD TENON

COLOR: BLACK CAPITAL - BLACK FINIAL

BALLAST INFORMATION:

BALLAST TYPE: HX-HPF

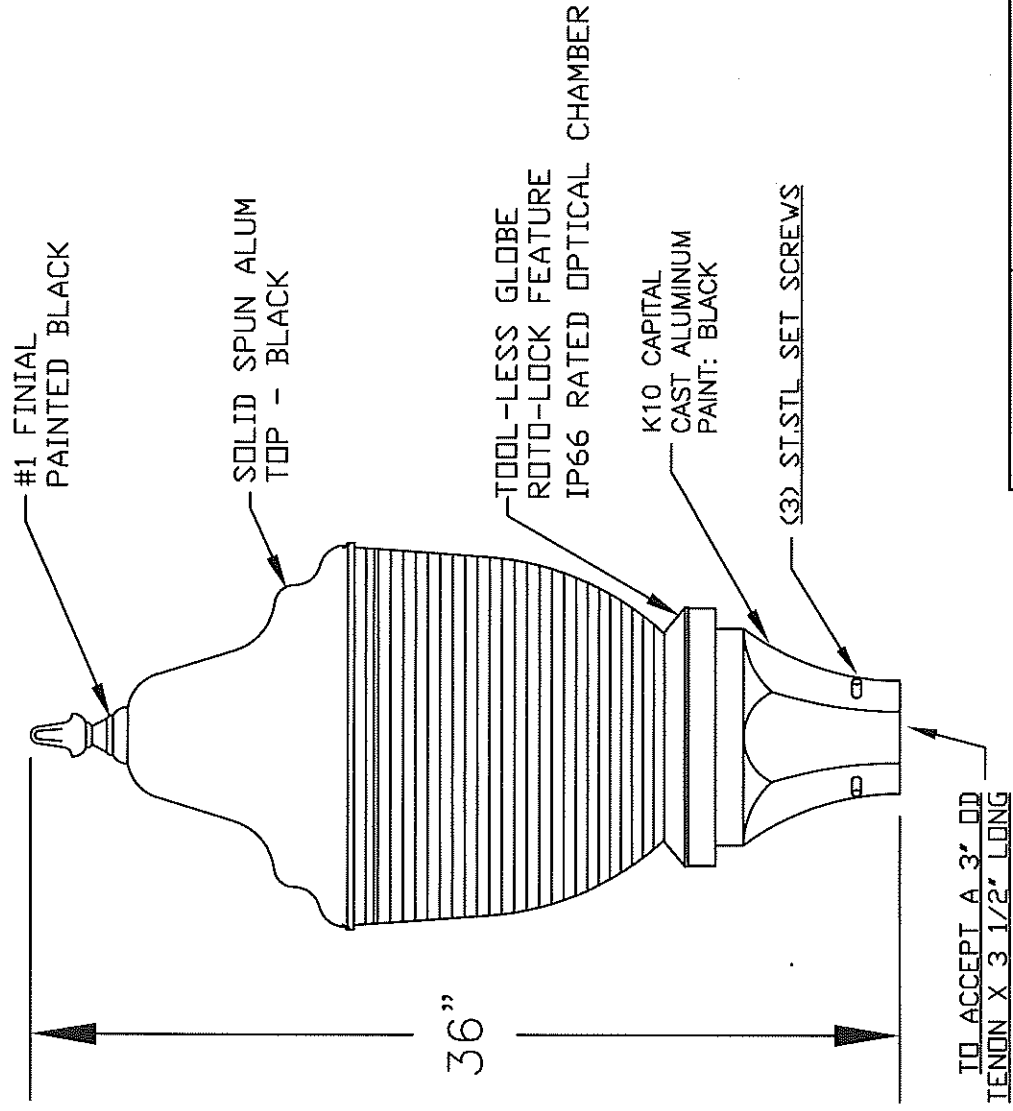
BALLAST MANUFACTURER: MAGNETEK / ADVANCE

CATALOG NUMBER:

OPTIONS:

QUICK DISCONNECT

TERMINAL BLOCK



PART	PLANT REFERENCE DWG. #'S	REVISION
GLOBE		
CAPITAL		
OPTICS		
BALLAST		
FINIAL		
OTHERS		
CERT. I.D. CS <input type="checkbox"/> ET <input type="checkbox"/>		

CUSTOMER APPROVAL: _____

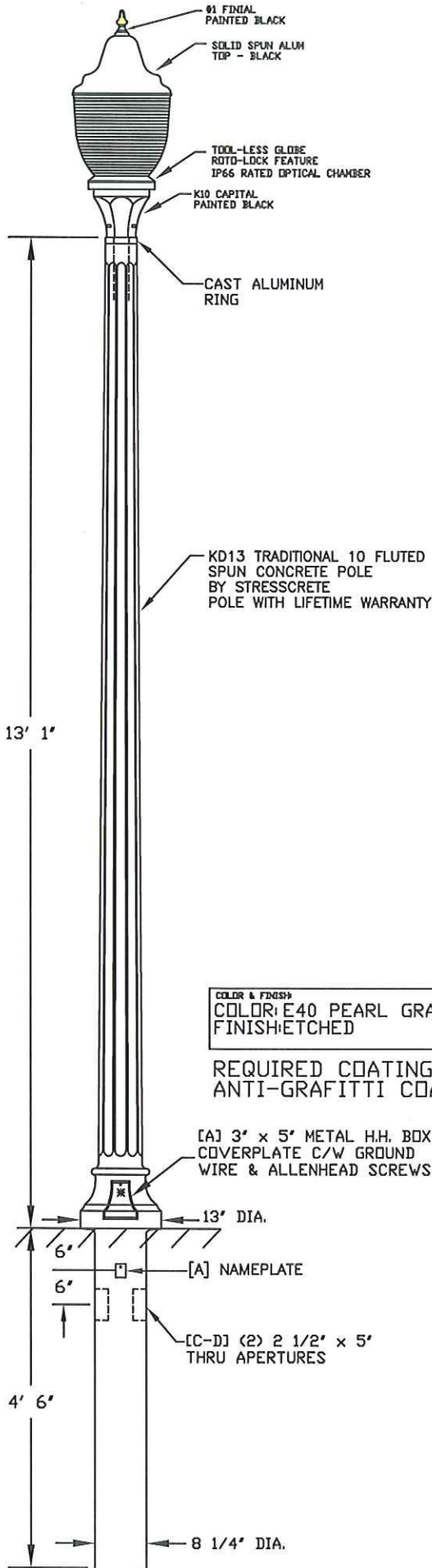


KING LUMINAIRE
 COMPANY INC.

840 WALKER'S LINE, P.O. BOX 7,
 BURLINGTON, ONTARIO, CANADA L7R 3V9
 P.O. BOX 298 JEFFERSON, OHIO
 1153 STATE ROUTE 48N
 U.S.A. 44047

DRAWING NAME: APPROVAL DWG	DWG NUMBER: DAKDALE-3B	DATE: 9-26-06	DWG BY: RF	REV. A
PROJECT/CUSTOMER: XCEL ENERGY - DAKDALE LUMINAIRE DETAIL			CHK BY:	

REV.	ALTERATION	E.C.N.	DATE	BY



COLOR & FINISH:
 COLOR: E40 PEARL GRAY
 FINISH: ETCHED

REQUIRED COATINGS:
 ANTI-GRAFFITI COATING

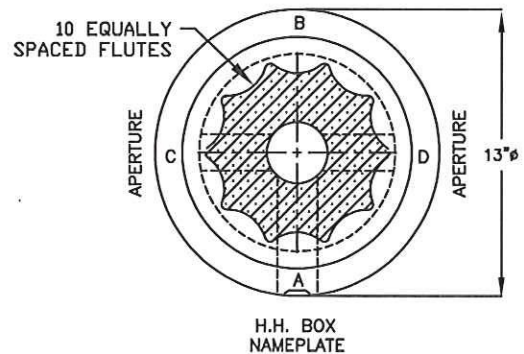
[A] 3' x 5' METAL H.H. BOX &
 COVERPLATE C/W GROUND
 WIRE & ALLENHEAD SCREWS

[A] NAMEPLATE


[C-D] (2) 2 1/2' x 5'
 THRU APERTURES

LUMINAIRE SPECIFICATIONS
 CATALOGUE NO.: K424R-EAR-III-100(MDG)
 -HPS-240-K10-SST-BLK
 QUANTITY: TBA
 IP RATING: IP66
 OPTIONS: SOLID SPUN TOP-BLK
 GLOBE MAT'L: ACRYLIC
 IES CLASSIFIC.: TYPE III
 WATTAGE: 100W
 LIGHT SOURCE: HIGH PRESSURE SODIUM
 LINE VOLTAGE: 240
 POLE ADAPTOR: K10 WITH SLEEVE
 TO FIT 3" OD TENON
 COLOR: BLACK CAPITAL - BLACK FINIAL

SPECIFICATIONS
 CATALOGUE NO.: KD13-G-T-E40
 QUANTITY: TBA
 SECTION: ROUND FLUTED
 COLOR: E40 PEARL GRAY
 FINISH: ETCHED
 POLE TOP: 5" ϕ
 POLE BUTT: 8 1/4" ϕ
 POLE LENGTH: 17' 7"
 APPROX WEIGHT: 615 lbs.
 MIN RACEWAY: 1 1/8" DIA AT TOP



TYPICAL CROSS-SECTION

 StressCrete Inc. 14503 Wallick Road Atchison, Kansas, 66002 PHONE (913) 255-3112 FAX (913) 255-3124				
DRAWING NAME: APPROVAL/MFG DWG	DWG. NO.: DAKDALE1B	DATE: 9/25/06	DRN. BY: RF	REV.
PROJECT/CUSTOMER: XCEL ENERGY OAKDALE, MN			CAD\ORDERS\TRAD\OAKDALE CHK. BY:	