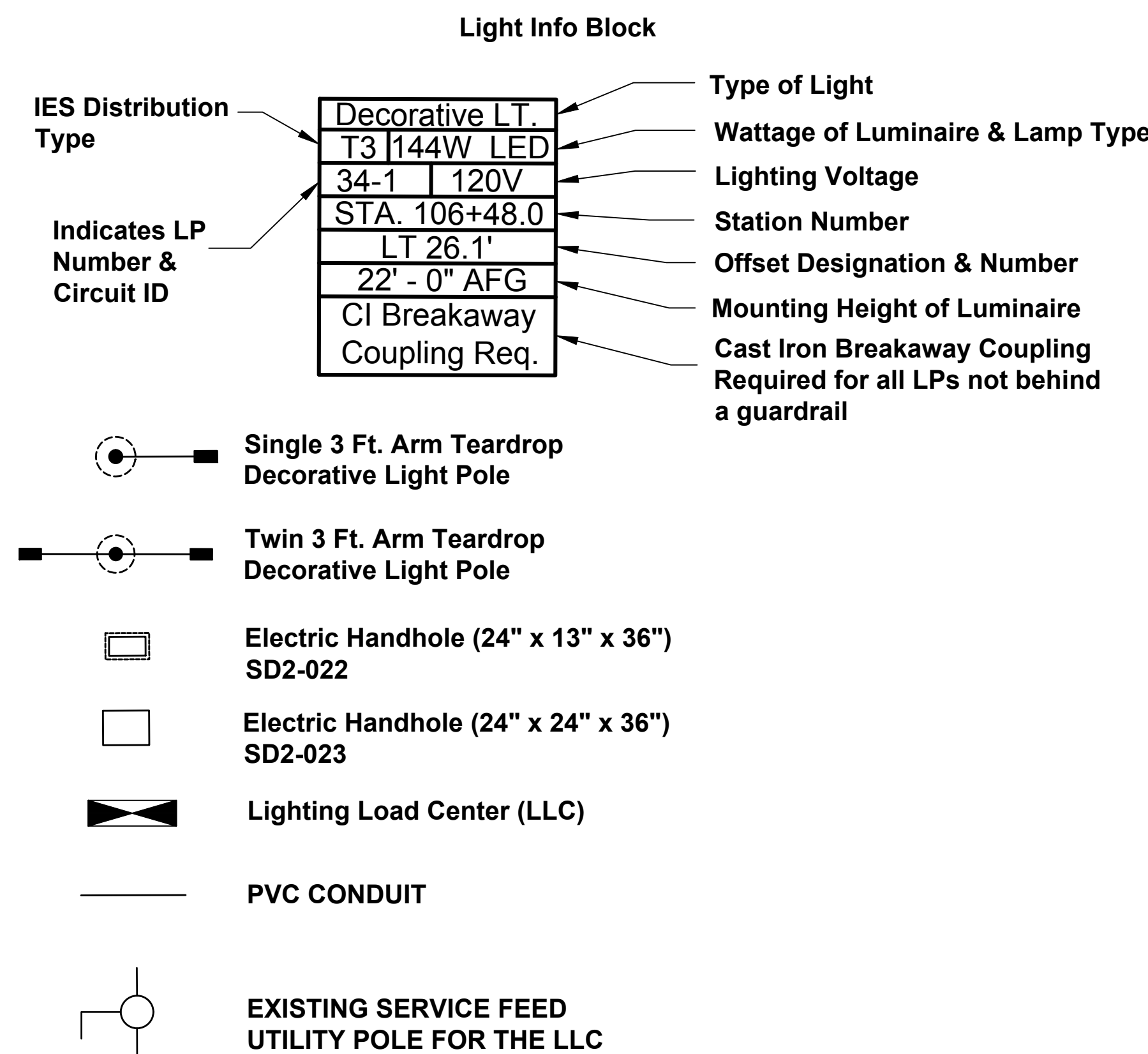


STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	NFP(N/I)-0032(200)	149	238
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SYMBOLS

GENERAL NOTES

LIGHTING DRAWING INDEX



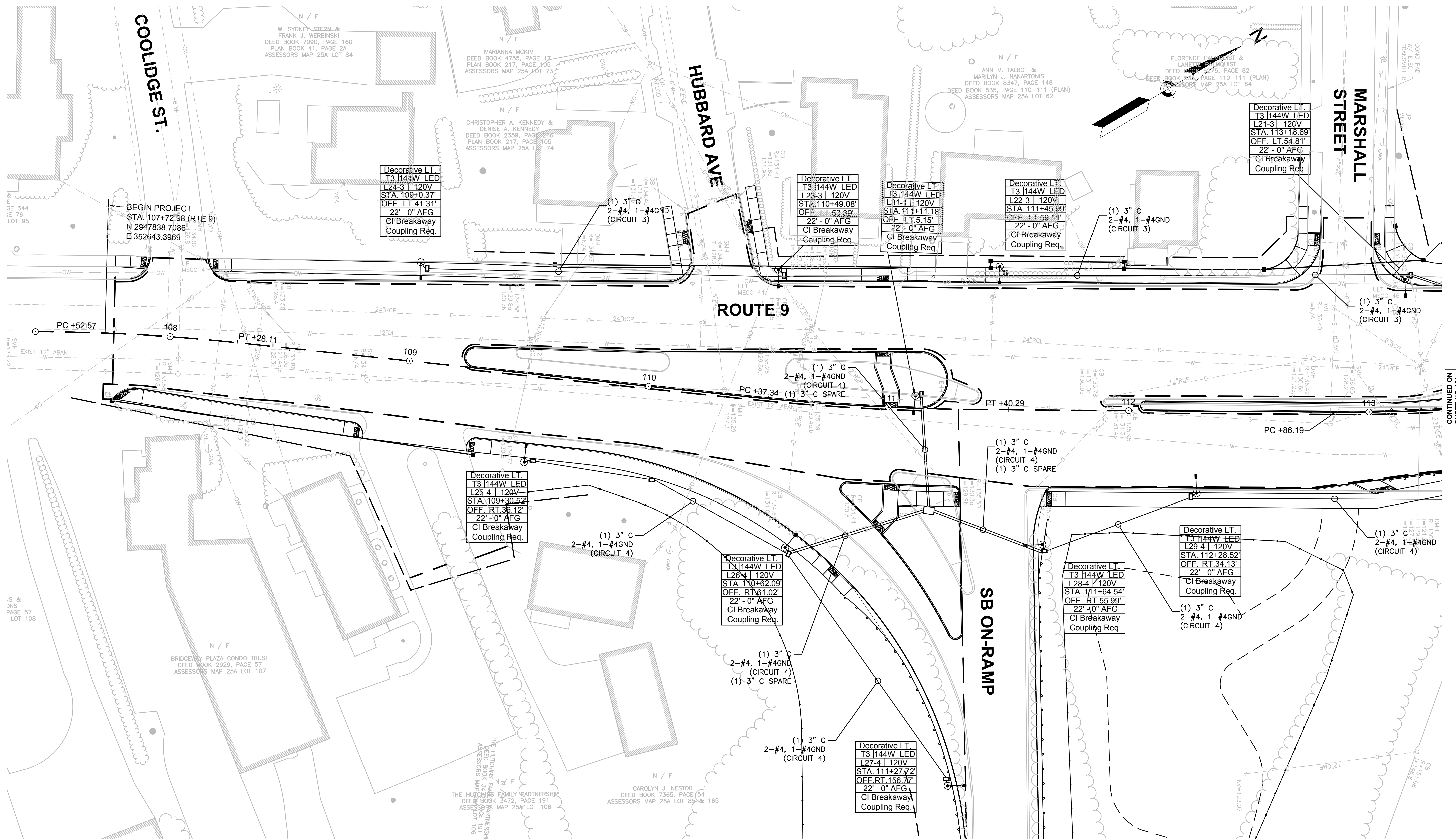
1. The design of the lighting system for the roundabout at I-91 Interchange and Route 9 in Northampton shall conform to Illumination Engineering Society Publication IES DG-19-08, Design Guide for Roundabout Lighting.
2. The roundabout lighting system shall include LED fixtures mounted on decorative aluminum poles, pull boxes and a conduit system. Illumination levels shall be per Illumination Engineering Society Publication IES DG-19-08, Design Guide for Roundabout Lighting.
3. Functional Classification for this roundabout per IES guidelines shall be major /collector with a pedestrian area classification of medium. Therefore the maintained average illuminance shall be not less than 2.2 foot candles (FC) and the uniformity shall be 3:1 (Eavg/Emin).
4. Reference MassDOT Standard Specification Section 820 for furnishing and installing Roadway Lighting.
5. Conduit runs are shown approximate. Locations may be adjusted to match existing and proposed conditions as directed by the resident engineer.
6. All wiring in the Handholes, Panelboards, and Cabinets shall be permanently labeled and neatly installed.
7. All conduit and equipment to be installed and grounded in accordance with the latest edition of the National Electric Code (NEC), Massachusetts electrical code and applicable local codes.
8. All equipment and materials shall be UL Listed for its intended purpose.
9. Wire size shall be based on American Wire Gauge (AWG), as applied to copper conductors. The conductor insulation shall be type Use-2 or RHH-RHW-2.
10. All wires shall be continuous from Handhole to Handhole without running splices in conduits. All wires shall extend 24" above the Handhole, connected at ends, and rolled back into the Handhole.
11. Splices shall be in accordance with section 813 of the MassDOT Standard Specifications.
12. The Hot Line and Neutral connection in the pole Handhole shall be with an approved breakaway street light fuse connector.
13. Utilities including drainage, sewer, water, gas, telecommunications and electrics are shown for reference only; see utility sheets and drainage sheets for details.
14. The locations of existing subsurface utilities shown on the plans were compiled from available record drawings and are not warranted to be correct. The locations are approximate only and in some cases may be incomplete. The contractor shall notify all agencies required and verify the location of all existing subsurface utilities prior to performing any work.
15. All splices in Handholes shall be made with waterproof molds similar to CMS/ESP Utility Products Cat. #SSBC350-4S.
16. Wire and cable furnished and used shall be new. Wire and cable shall be protected from weather and damage during storage and handling.
17. No wire shall be drawn in to any conduit until all work which may cause cable damage is complete.
18. The contractor shall carefully mark the proposed location of the concrete foundation and then shall determine if any utilities, or underground or overhead obstruction will prevent the installation at this location. Similar marking shall be done for the conduit runs to the foundation. If such an obstruction is evident, the contractor shall request permission from the engineer to move or adjust the location of the foundation.
19. The contractor shall perform the work in a manner acceptable to the engineer so that interference with or inconvenience to business concerns or abutters on account of the construction work is kept to a minimum. The contractor shall maintain safe and reasonable access to and egress from abutting properties at all times.
20. The contractor shall be required to adhere to all regulations imposed by the city of Northampton.
21. Electrical service to the Lighting Load Center (LLC) will be provided by National Grid. Contractor shall provide conduit and wire up pole with enough slack for service connection. Contractor shall coordinate with National Grid for service connection. Contractor is responsible for all electric service connection and related fees from National Grid.
22. Install the photocell electric switch on top of the Lighting Load Center. Coordinate the location to be in the top left or top right corner with the photocell eye aimed in the northwest direction.
23. The contractor shall maintain areas in and around the work zone free and clear of debris at all times. No stock piling of equipment or material shall be permitted outside of fixed work zones.
24. All Light Poles that are not behind a guardrail shall have a Breakaway Coupling. The Breakaway Coupling shall be of cast iron.
25. Reference the Commonwealth of Massachusetts, Department of Public Works, Standard Drawings for Traffic Signals and Highway Lighting, 1968.
26. Follow pole manufacturer's standard provisions for protecting pole finishes during transport, storage and installation. Do not store poles on ground. Store poles so they are at least 12 in above ground level and growing vegetation. Do not remove factory-applied pole wrappings until just before installing pole.
27. Materials and equipment shall be in accordance with NEC, UL, ANSI and as shown on the drawings and specified.

SHEET 149	LIGHTING COVER SHEET
SHEET 150	LIGHTING POLE LOCATIONS AND CONDUIT LAYOUT PLAN 01
SHEET 151	LIGHTING POLE LOCATIONS AND CONDUIT LAYOUT PLAN 02
SHEET 152	LIGHTING POLE LOCATIONS AND CONDUIT LAYOUT PLAN 03
SHEET 153	LIGHTING POLE LOCATIONS AND CONDUIT LAYOUT PLAN 04
SHEET 154	ROUNDBOUT VERTICAL CALCULATION AT 0 FT PLAN 01
SHEET 155	ROUNDBOUT VERTICAL CALCULATION AT 3 FT PLAN 02
SHEET 156	ROUNDBOUT VERTICAL CALCULATION AT 5 FT PLAN 03
SHEET 157	SINGLE LINE DIAGRAM
SHEET 158	LIGHTING DETAILS 01
SHEET 159	LIGHTING DETAILS 02
SHEET 160	LIGHTING DETAILS 03

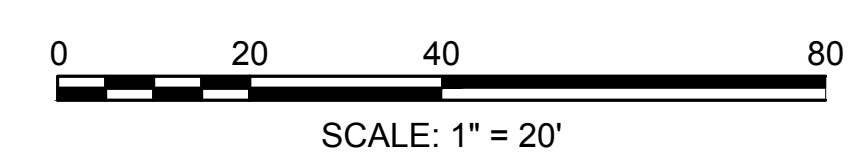
NORTHAMPTON  
I-91 INTERCHANGE 19

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PROJECT FILE NO.		604597	

LIGHTING POLE  
LOCATIONS AND CONDUIT  
LAYOUT PLAN 01



CONTINUED ON  
SHEET NO. 151



NORTHAMPTON  
I-91 INTERCHANGE 19

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	NFP(N/I)-0032(200)	151	238

PROJECT FILE NO. 604597

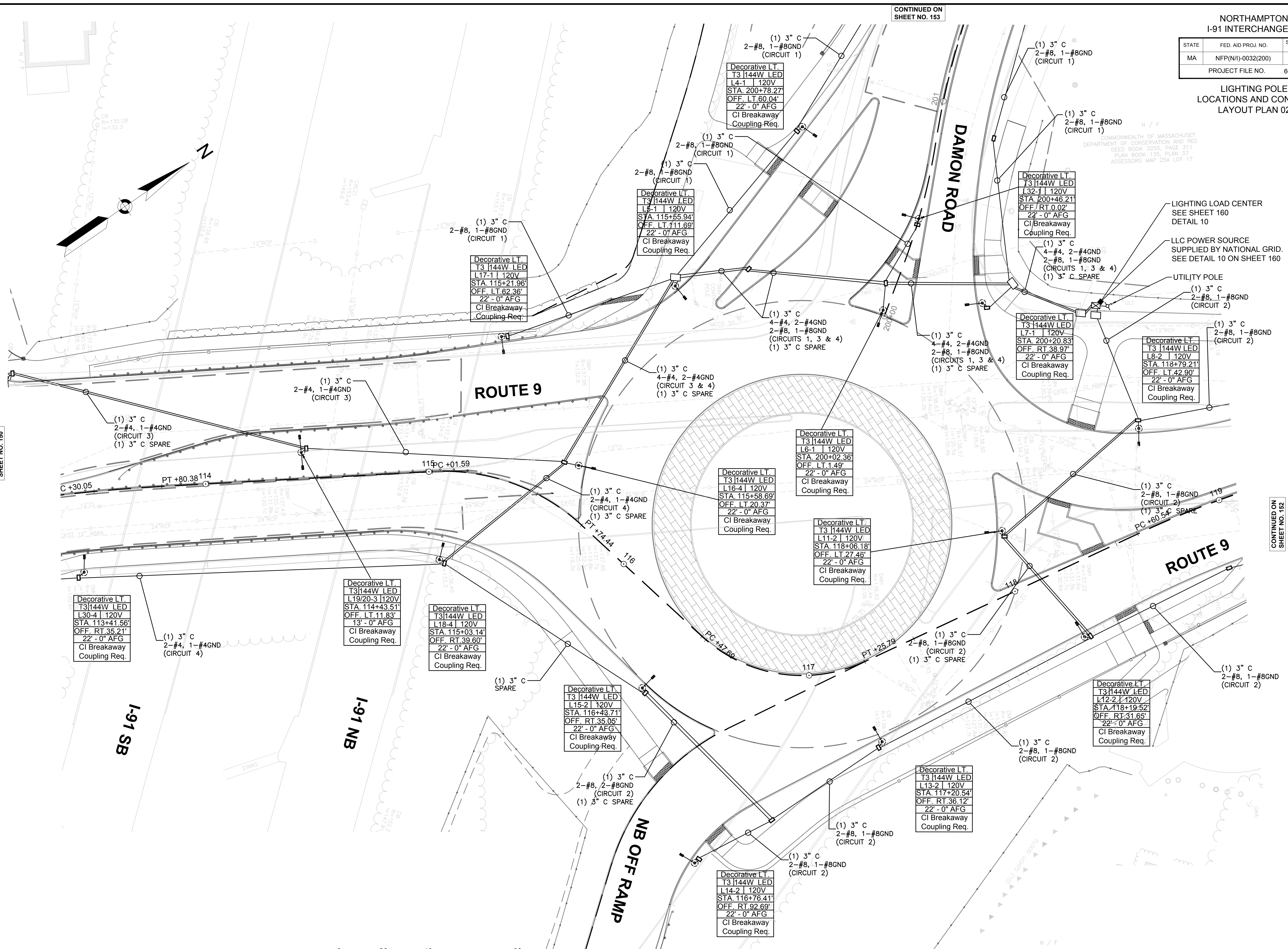
LIGHTING POLE  
LOCATIONS AND CONDUIT  
LAYOUT PLAN 02

COMMONWEALTH OF MASSACHUSETTS  
DEPARTMENT OF CONSERVATION AND RECREATION  
DEED BOOK 3255, PAGE 311  
PLAN BOOK 135, PLAN 371  
ASSESSORS MAP 25A LOT 17

LIGHTING LOAD CENTER  
SEE SHEET 160  
DETAIL 10

LLC POWER SOURCE  
SUPPLIED BY NATIONAL GRID.  
SEE DETAIL 10 ON SHEET 160

UTILITY POLE  
(1) 3" C  
2-#8, 1-#8GND  
(CIRCUIT 2)



CONTINUED ON  
SHEET NO. 153

CONTINUED ON  
SHEET NO. 150

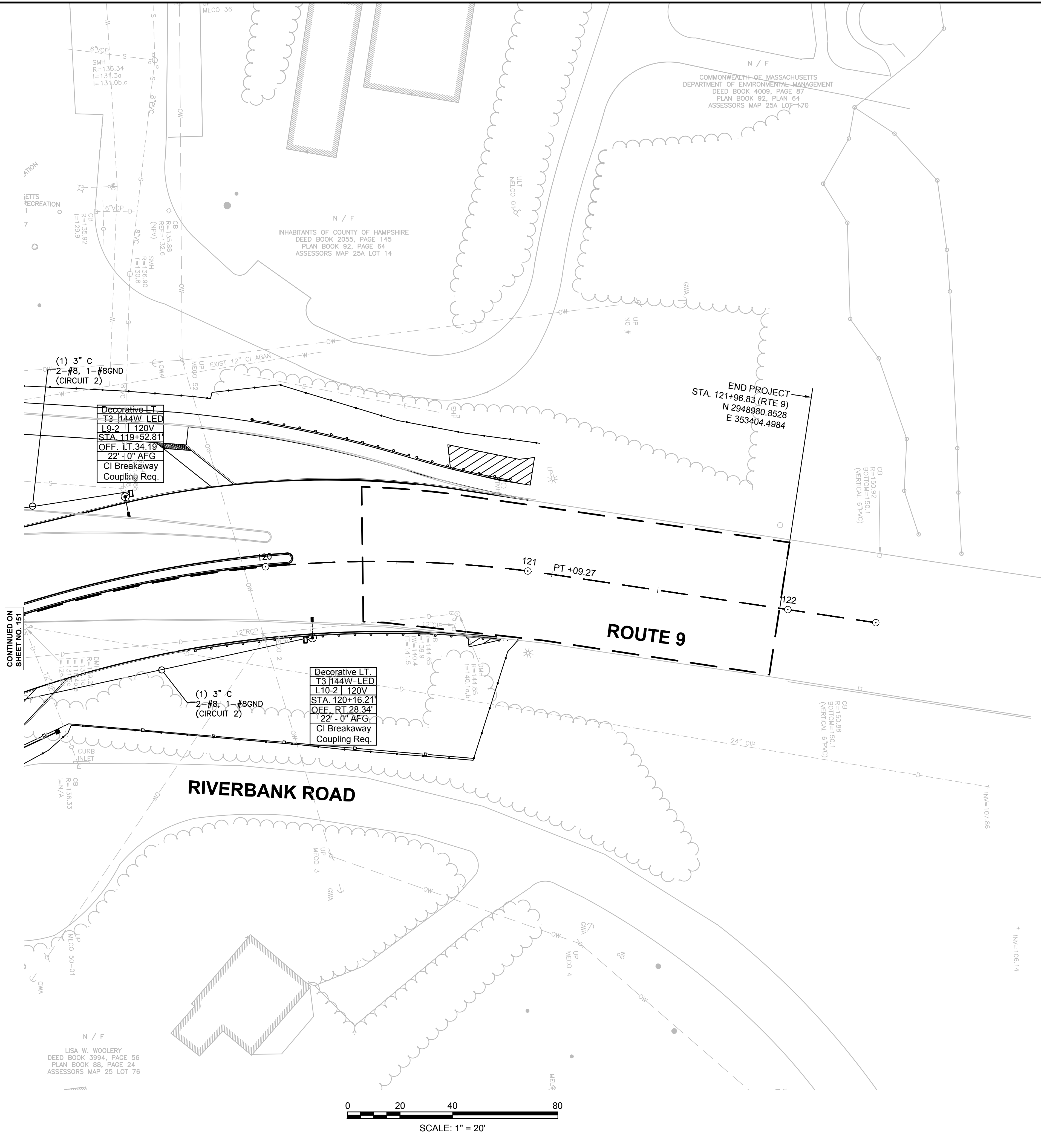
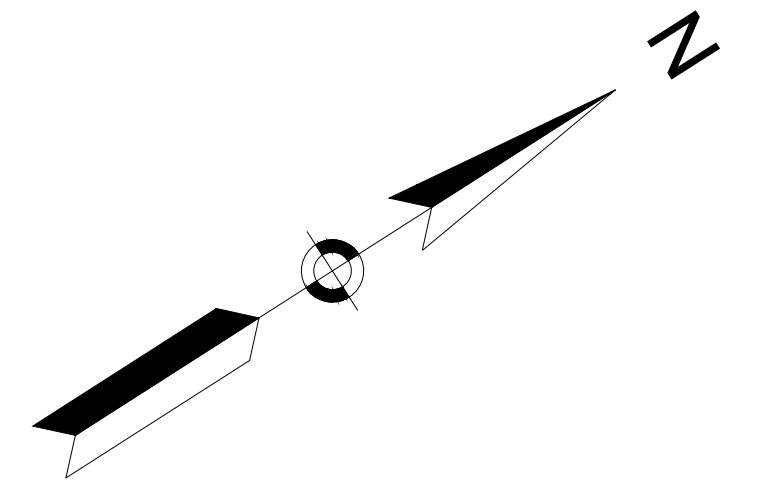
CONTINUED ON  
SHEET NO. 152

0 20 40 80  
SCALE: 1" = 20'

NORTHAMPTON  
I-91 INTERCHANGE 19

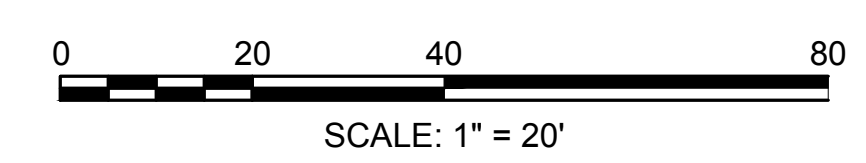
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	NFP(NI)-0032(200)	152	238
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LIGHTING POLE  
LOCATIONS AND CONDUIT  
LAYOUT PLAN 03



CONTINUED ON  
SHEET NO. 151

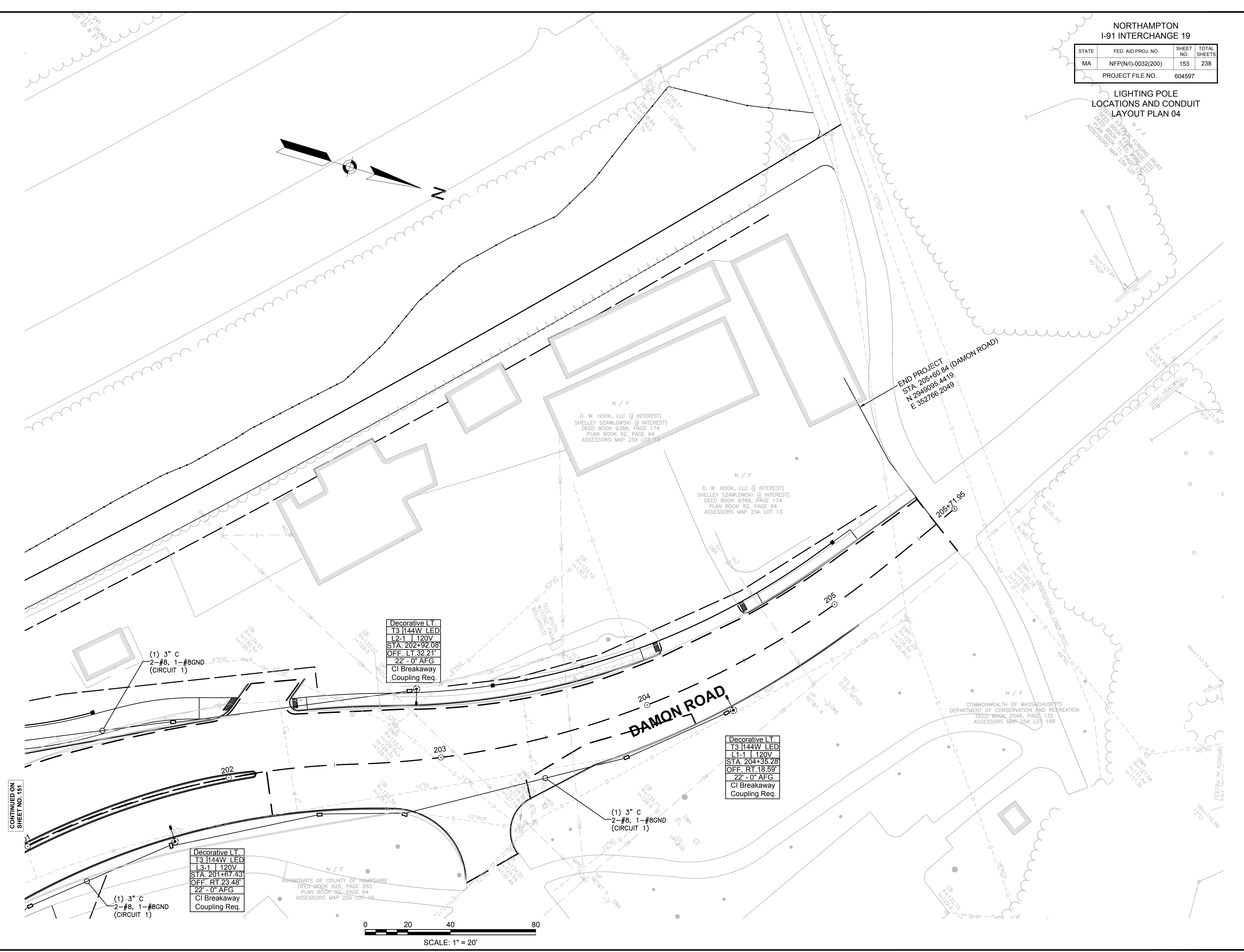
N / F  
LISA W. WOOLERY  
DEED BOOK 3994, PAGE 56  
PLAN BOOK 88, PAGE 24  
ASSESSORS MAP 25 LOT 76



NORTHAMPTON  
I-91 INTERCHANGE 19

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LIGHTING POLE  
LOCATIONS AND CONDUIT  
LAYOUT PLAN 04



Decorative LT.  
T3 I144W LED  
L2-1 | 120V  
STA. 202+92.08'  
OFF. LT. 32.21'  
22' - 0" AFG  
CI Breakaway  
Coupling Req.

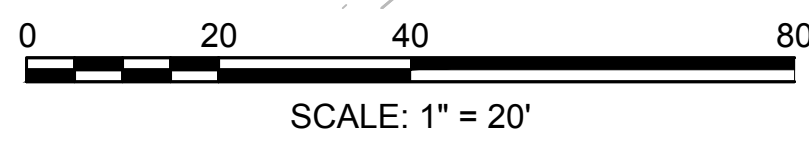
(1) 3" C  
2-#8, 1-#8GND  
(CIRCUIT 1)

Decorative LT.  
T3 I144W LED  
L1-1 | 120V  
STA. 204+35.28'  
OFF. RT. 18.59'  
22' - 0" AFG  
CI Breakaway  
Coupling Req.

(1) 3" C  
2-#8, 1-#8GND  
(CIRCUIT 1)

Decorative LT.  
T3 I144W LED  
L3-1 | 120V  
STA. 201+67.43'  
OFF. RT. 23.48'  
22' - 0" AFG  
CI Breakaway  
Coupling Req.

(1) 3" C  
2-#8, 1-#8GND  
(CIRCUIT 1)

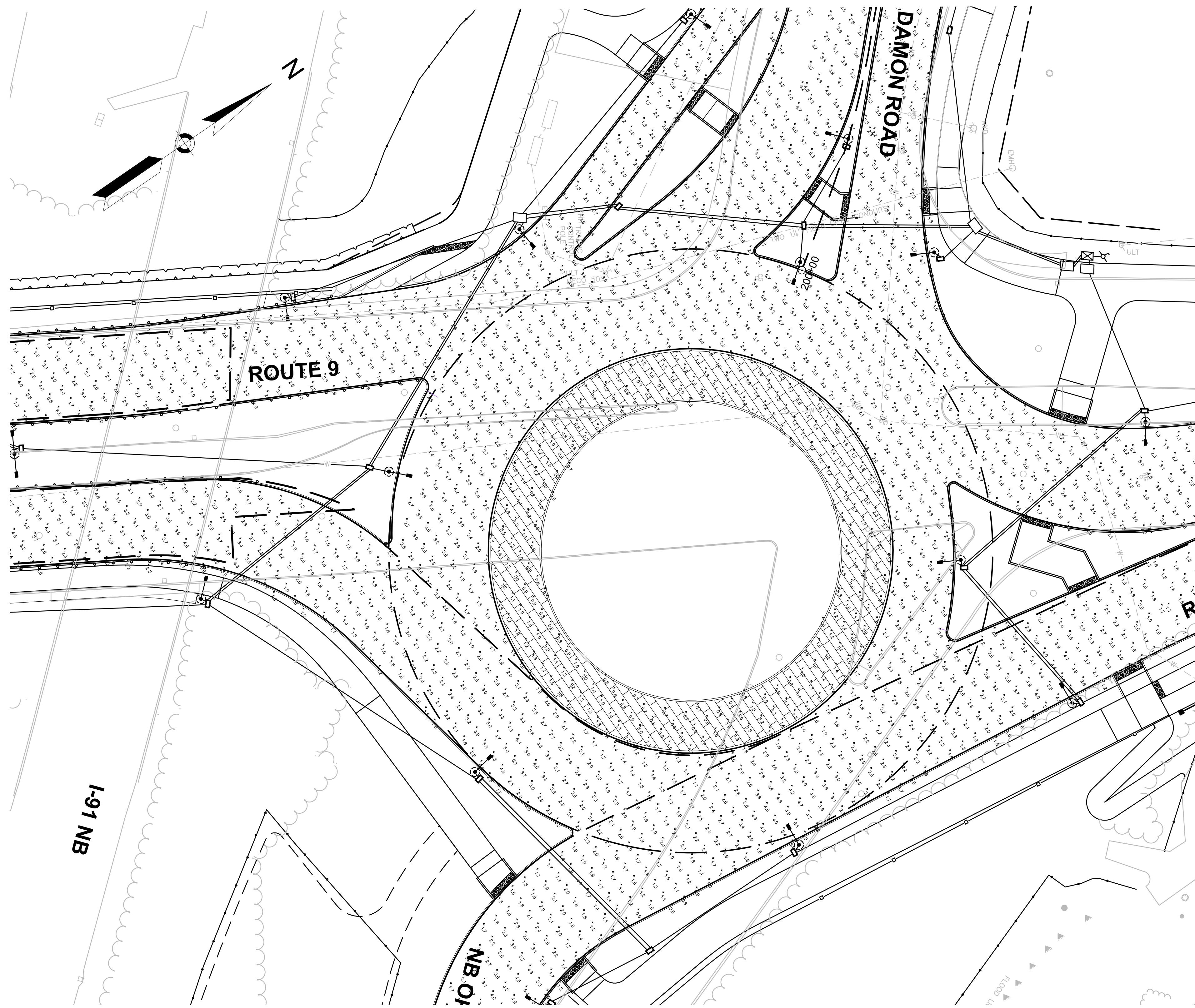


CONTINUED ON  
SHEET NO. 161

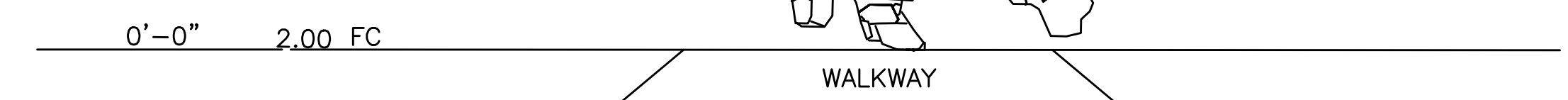
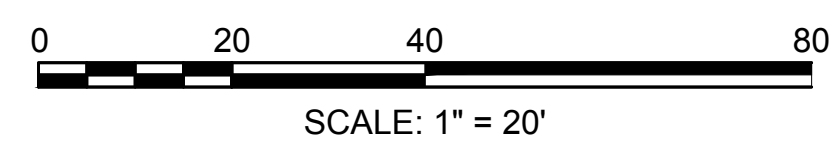
NORTHAMPTON  
I-91 INTERCHANGE 19

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MA	NFP(N/I)-0032(200)	154	238
PROJECT FILE NO.		604597	

ROUNDBOUT VERTICAL  
CALCULATION AT 0 FT  
PLAN 01



1 PHOTOMETRICS @ 0 FEET ABOVE GRADE  
SCALE: 1" = 20'



2 VERTICAL ILLUMINANCE DETAIL (AVERAGE FC AT WALKWAYS)  
SCALE: N.T.S.

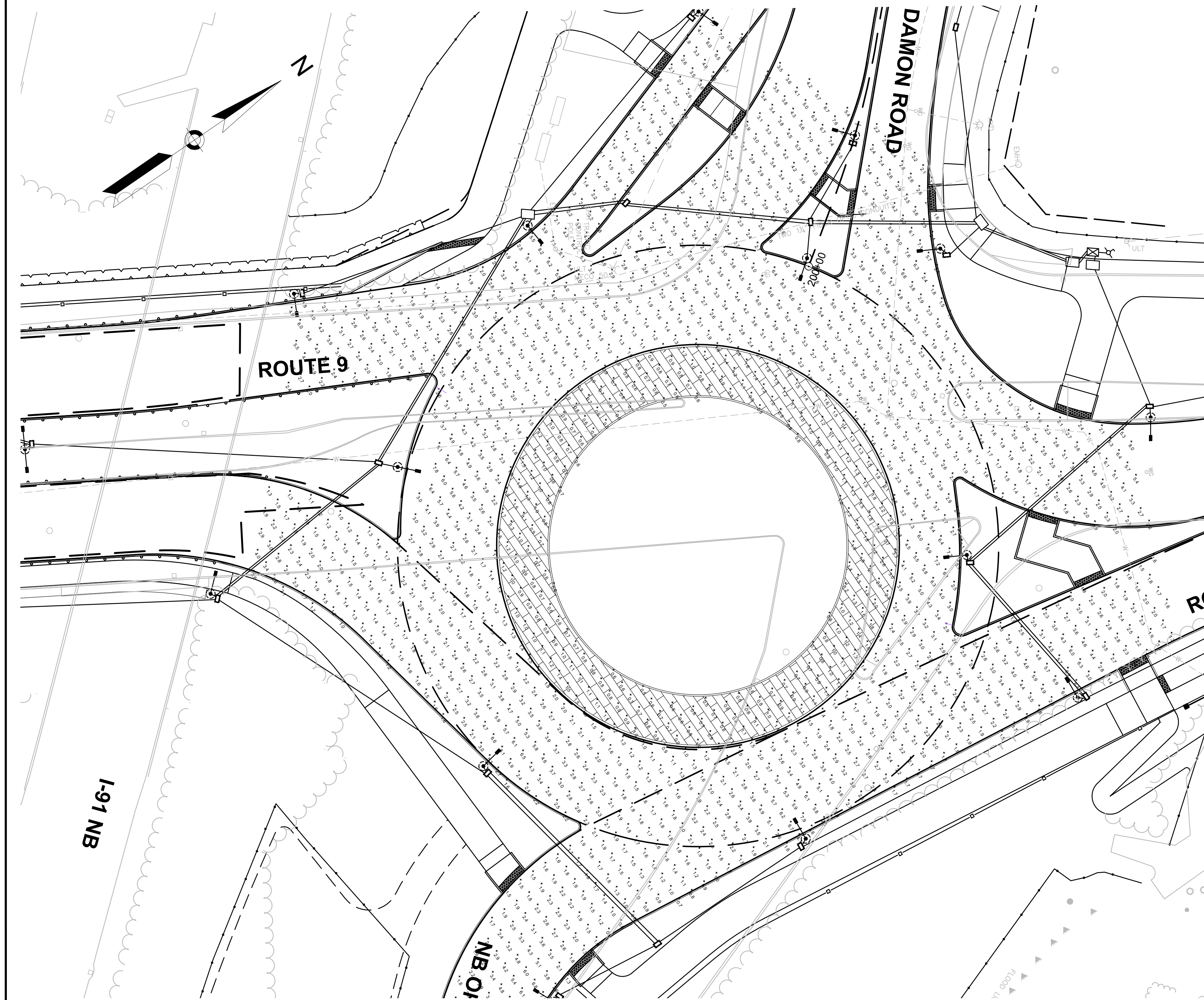
NOTE:

1.) Design and installation based from horizontal and vertical guidelines as expressed in IES DG-19-08.

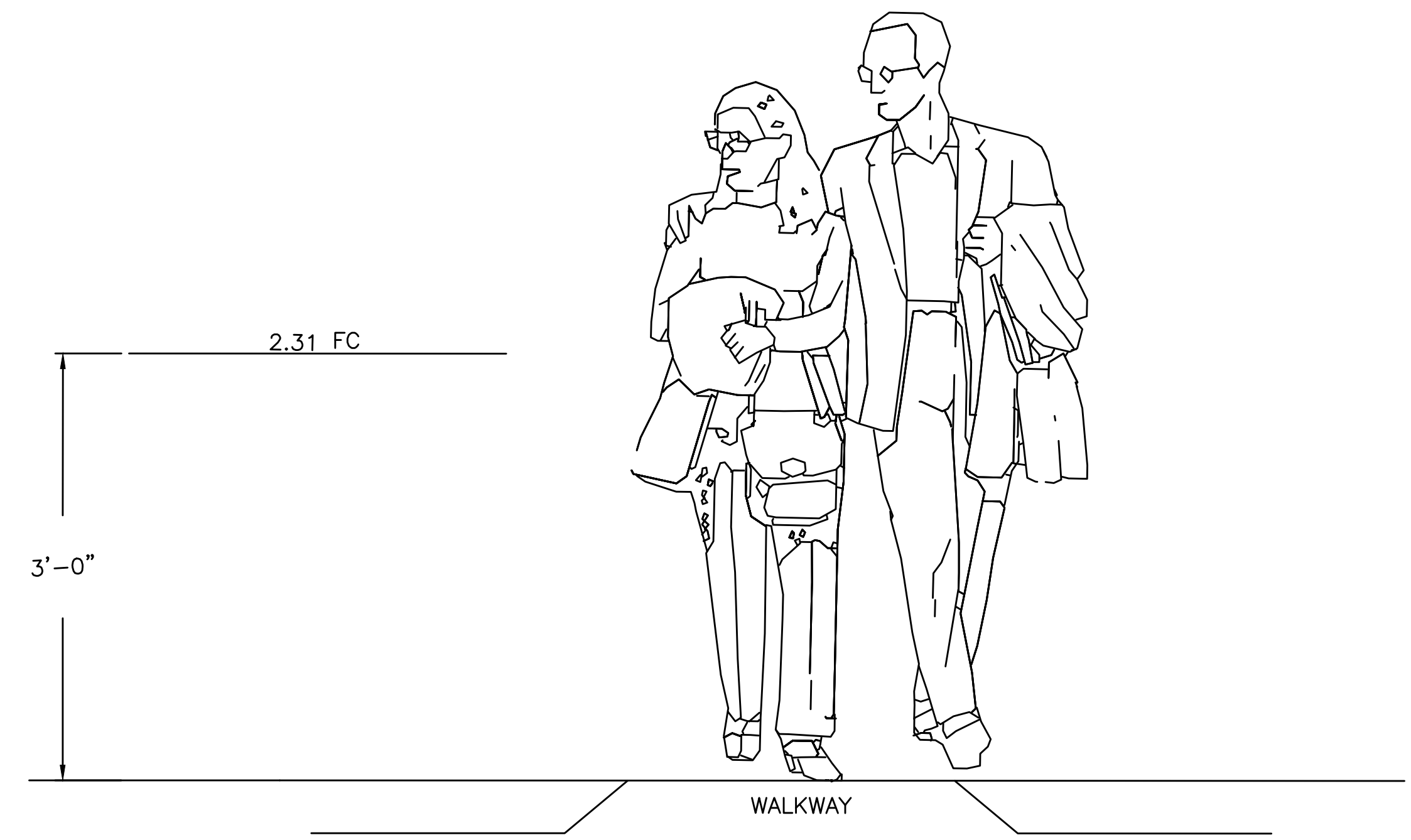
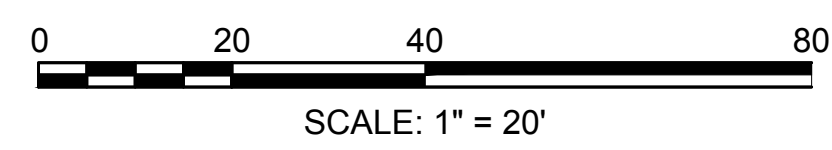
NORTHAMPTON  
I-91 INTERCHANGE 19

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
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PROJECT FILE NO.		604597	

ROUNDBOULT VERTICAL  
CALCULATION AT 3 FT  
PLAN 02



1 PHOTOMETRICS @ 3 FEET ABOVE GRADE  
SCALE: 1" = 20'



2 VERTICAL ILLUMINANCE DETAIL (AVERAGE FC AT WALKWAYS)  
SCALE: N.T.S.

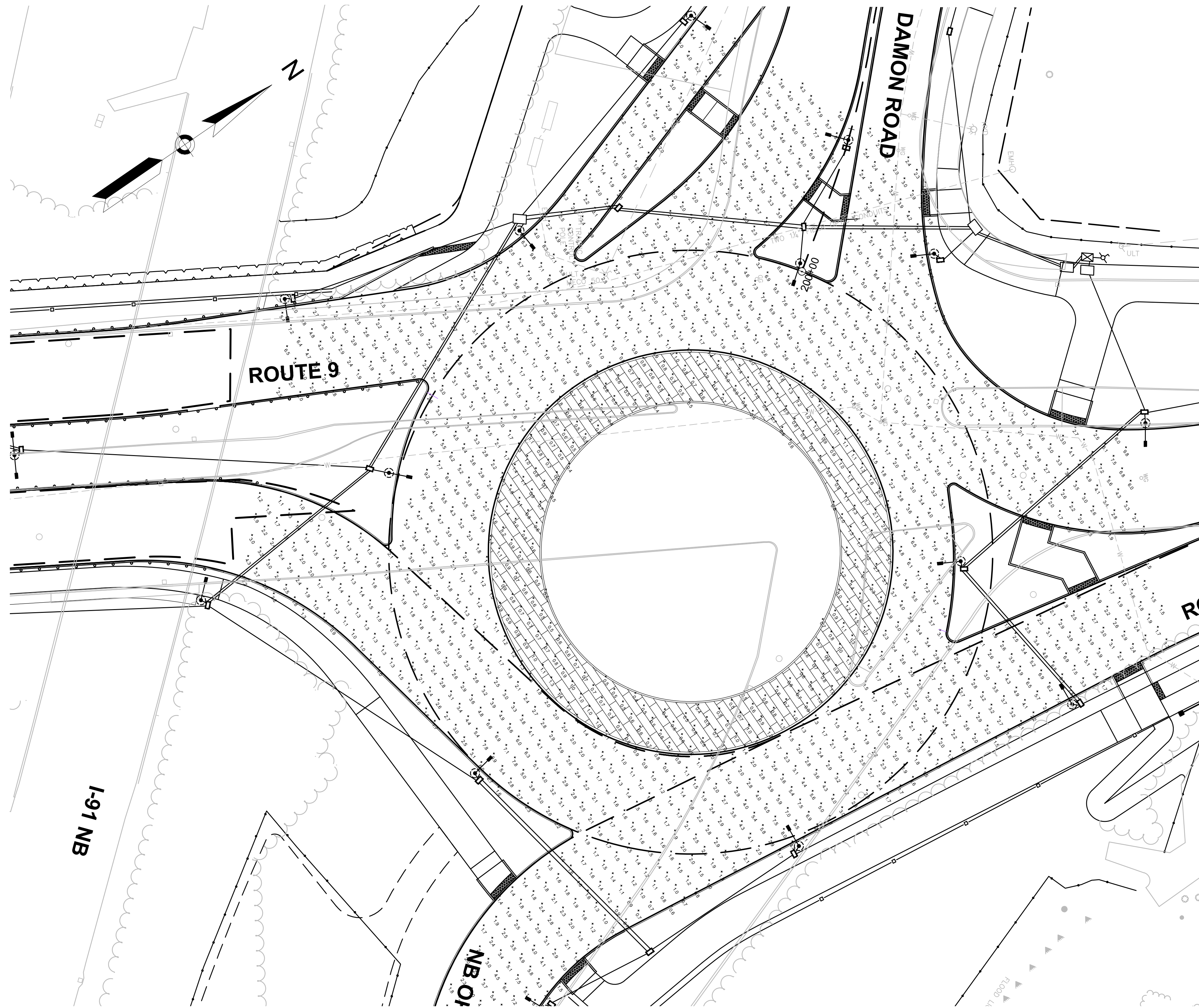
NOTE:

1.) Design and installation based from horizontal and vertical guidelines as expressed in IES DG-19-08.

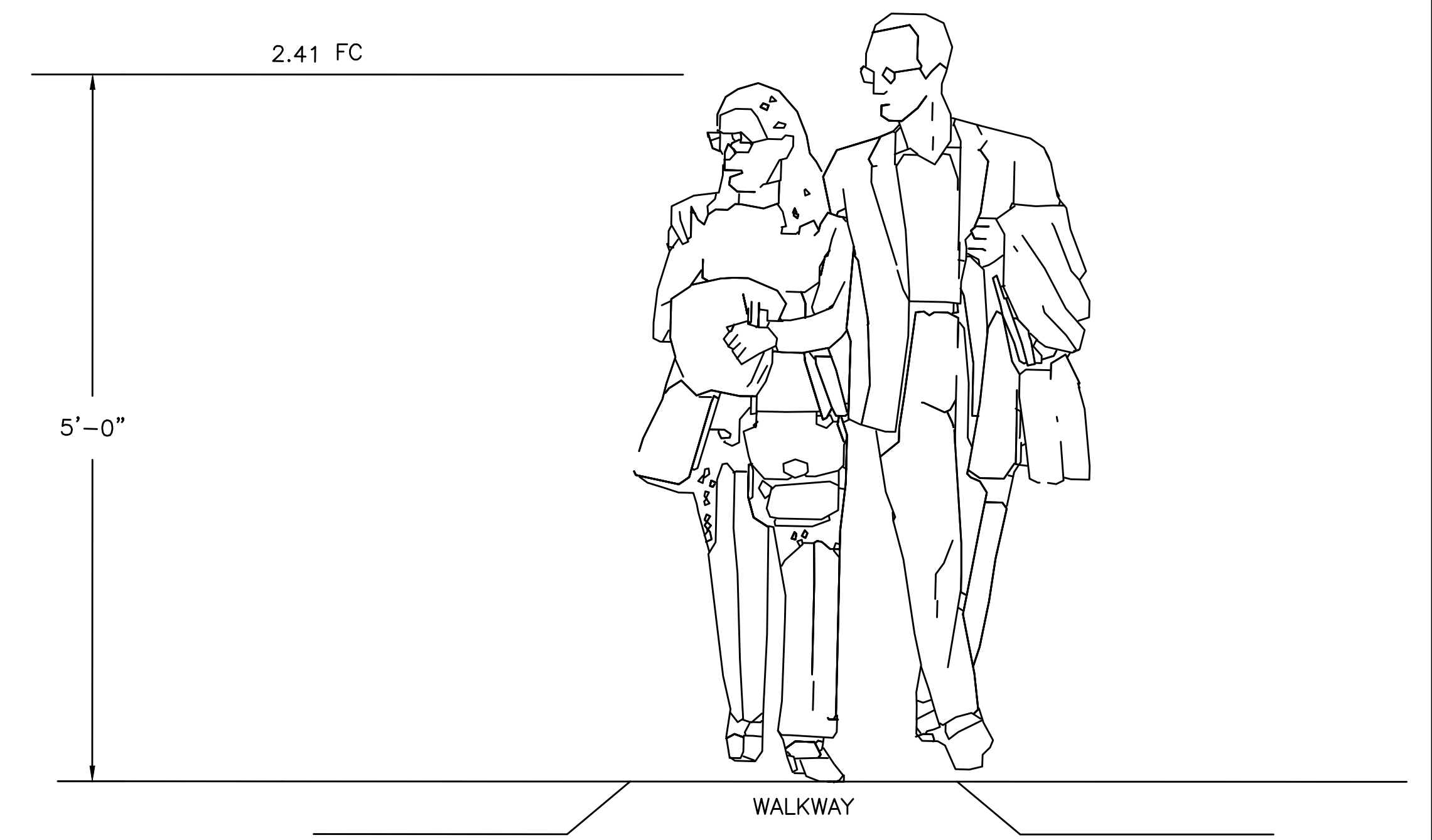
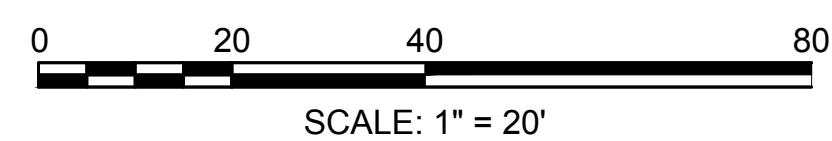
NORTHAMPTON  
I-91 INTERCHANGE 19

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PROJECT FILE NO.		604597	

ROUNDBOUT VERTICAL  
CALCULATION AT 5 FT  
PLAN 03



1 PHOTOMETRICS @ 5 FEET ABOVE GRADE  
SCALE: 1" = 20'



2 VERTICAL ILLUMINANCE DETAIL (AVERAGE FC AT WALKWAYS)  
SCALE: N.T.S.

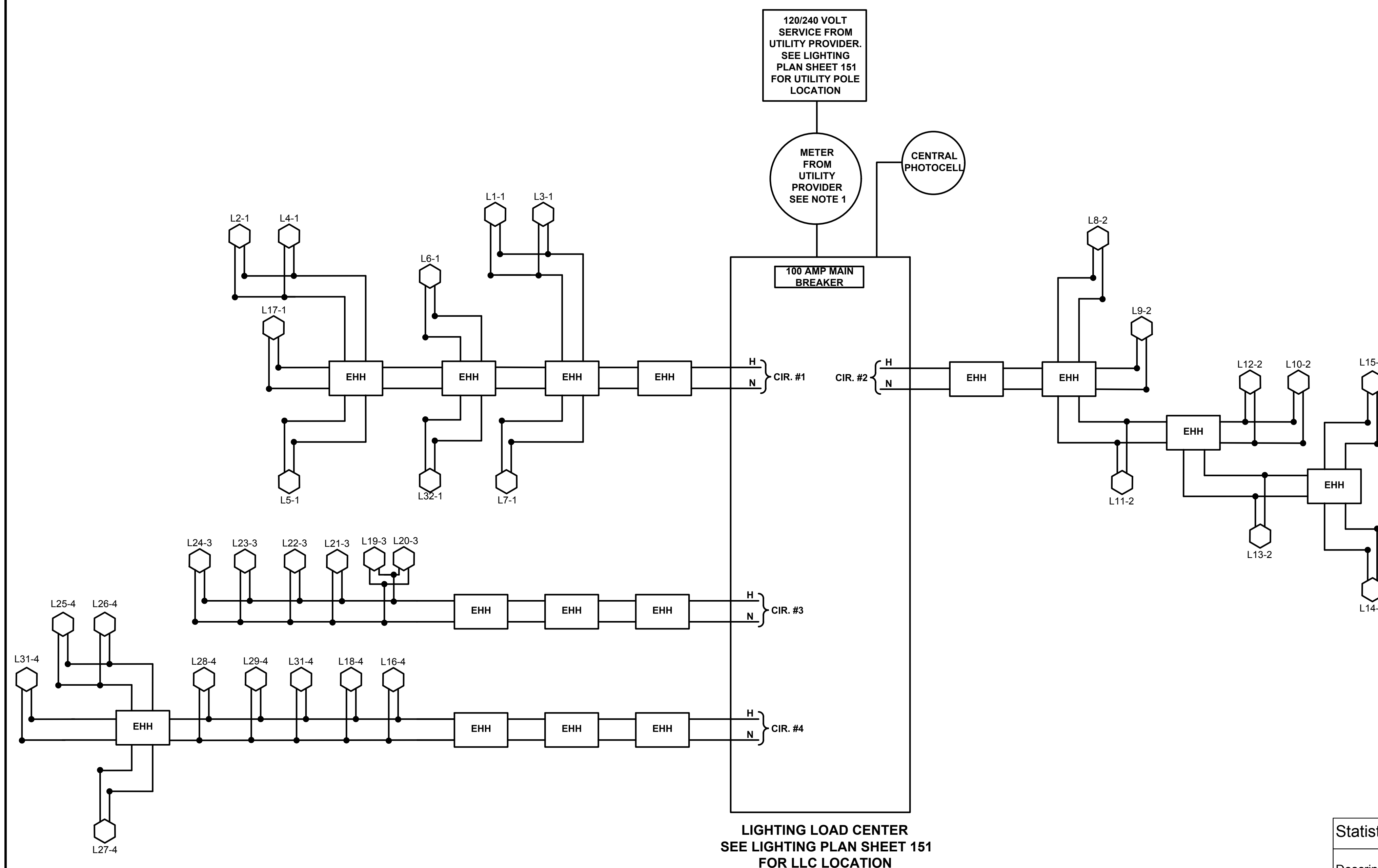
NOTE:

1.) Design and installation based from horizontal and vertical guidelines as expressed in IES DG-19-08.



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SINGLE LINE DIAGRAM



1 SINGLE LINE DIAGRAM  
SCALE: N.T.S

NOTE:

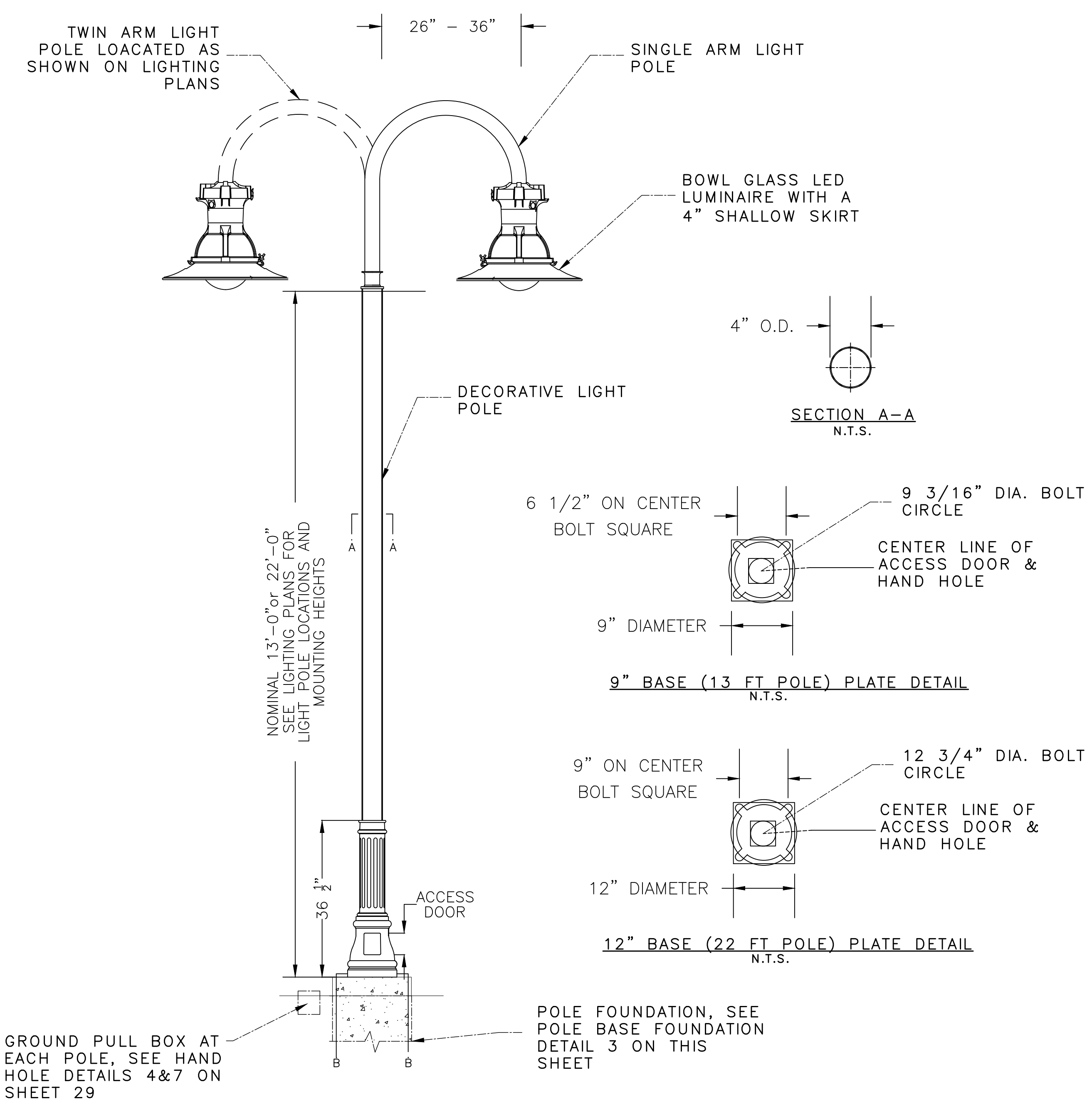
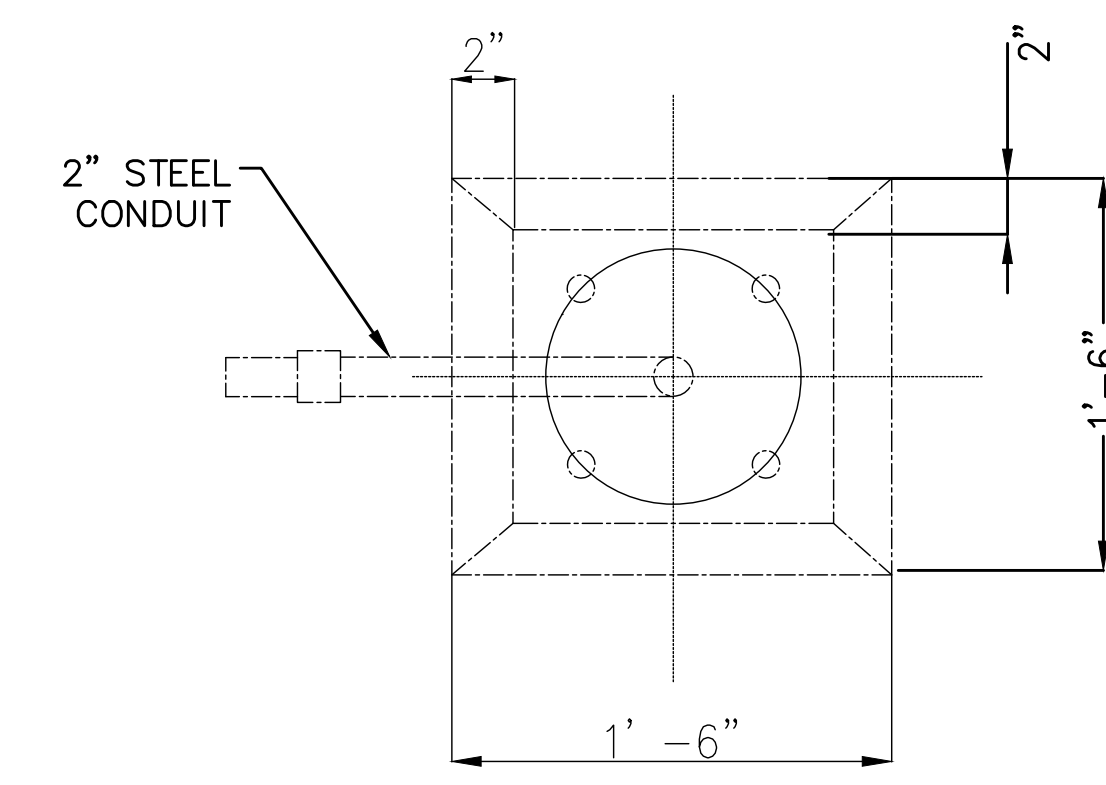
- Based on the International Dark-Sky Association's (IDA) Model Lighting Ordinance (MLO) and in partnership with the Illuminating Engineering Society (IES), the City of Northampton, MA is determined to be within Zone 3, based on the location, as well as the night time safety requirements. Zone 3 allows for a "U3" BUG rating which allows for up to 500 lumens in the UL and UH zones, and 1,000 lumens total. This Lumark luminaire is Dark Sky Compliant based on independent testing data.
- Based on the Roadway and Pedestrian Area Functional Classifications per the IES Design Guidelines DG-19-08 and RP-8-14, the calculated roundabout illuminance and roadway luminance levels meet and exceed the minimum maintained average requirements stated below.  
 IES Illumination Standards for Roundabouts:  
 Major/Collector Classification with Medium Pedestrian Activity = 2.2 fc  
 IES Illumination Standards for Roadways:  
 Major Classification with Medium Pedestrian Activity = 0.9 cd/sq. m  
 Collector Classification with Medium Pedestrian Activity = 0.6 cd/sq. m
- Contractor shall provide meter socket and wire into panel prior to contacting National Grid for meter connection.

Statistics							
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min	Avg/Max
Bridge Street (luminance)	+	1.2 cd/sq m	4.1 cd/sq m	0.5 cd/sq m	8.2:1	2.4:1	0.3:1
Damon Road (luminance)	+	1.0 cd/sq m	4.1 cd/sq m	0.3 cd/sq m	13.7:1	3.3:1	0.2:1
Roundabout (illuminance)	+	2.4 fc	6.9 fc	0.7 fc	9.9:1	3.4:1	0.3:1
Russell St (luminance)	+	1.6 cd/sq m	3.9 cd/sq m	0.6 cd/sq m	6.5:1	2.7:1	0.3:1

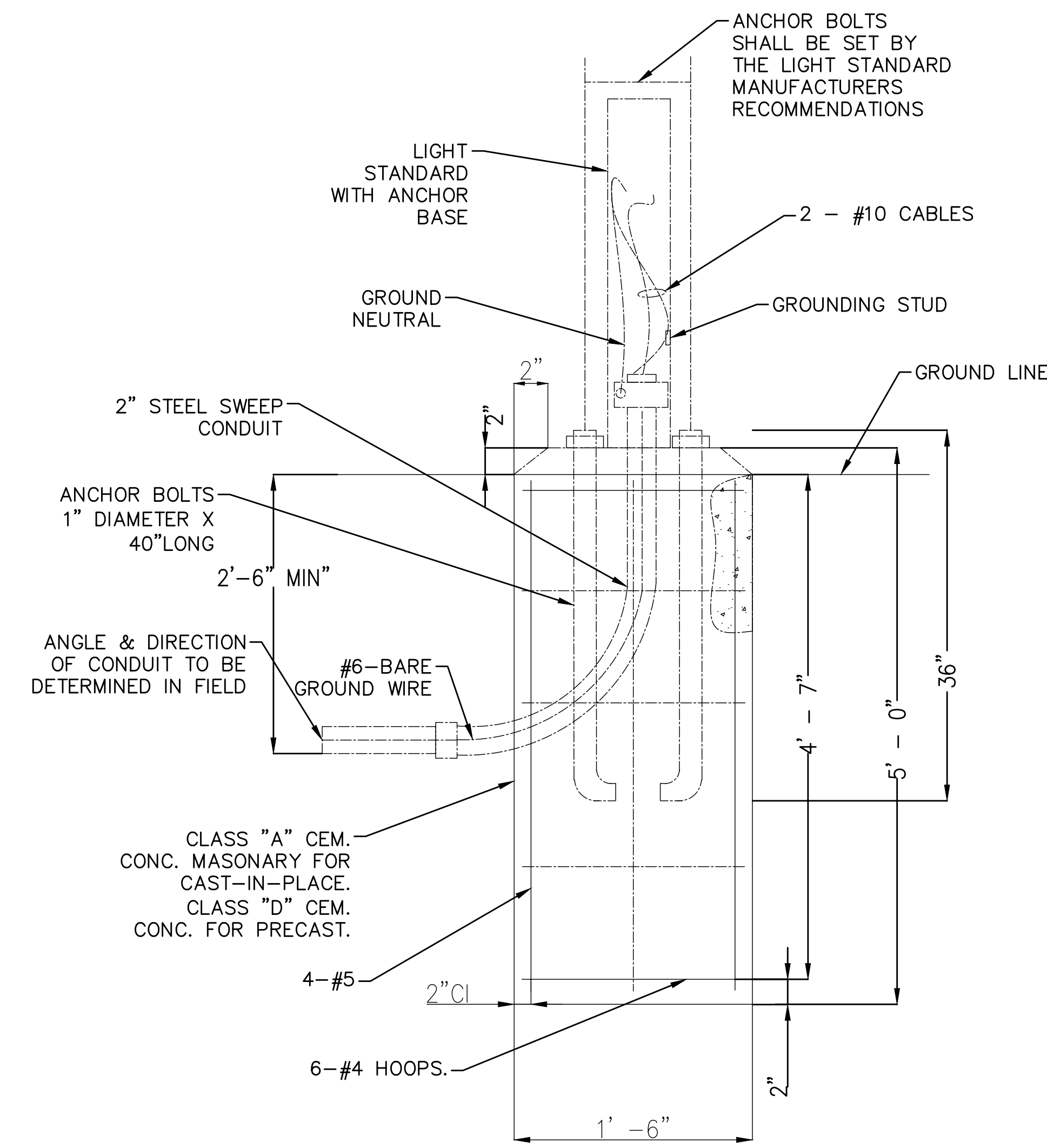
Luminaire Schedule						
Symbol	QTY	Catalog Number	Number Lamps	Lumens per Lamp	LLF	Wattage
	31	ESL2 P35S 40K XX BG 3 SS	1	13199.4	0.90	144
	1	ESL2 P35S 40K XX BG 3 SS	2	13199.4	0.90	288

2 Lighting Statistics & Luminaire Schedule  
SCALE: N.T.S

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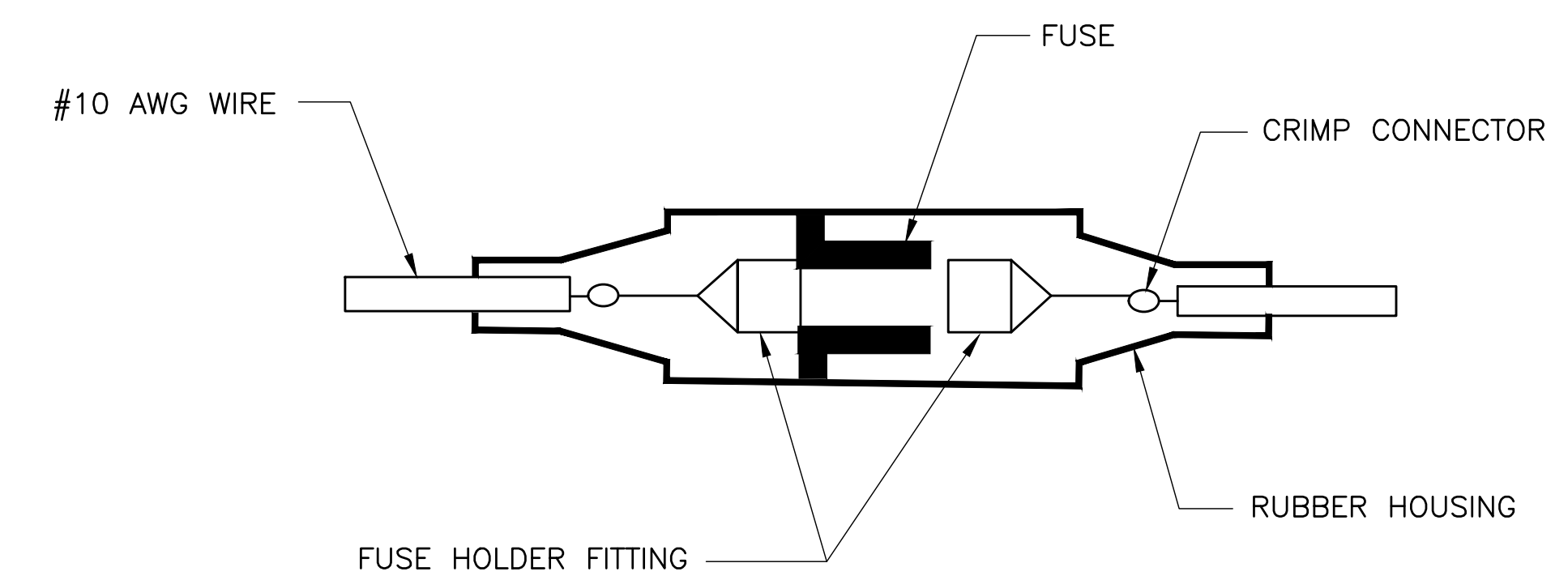


**1** STREET LIGHTING POLE DETAIL  
SCALE: N.T.S.



**2** POLE BASE FOUNDATION DETAIL  
SCALE: N.T.S.

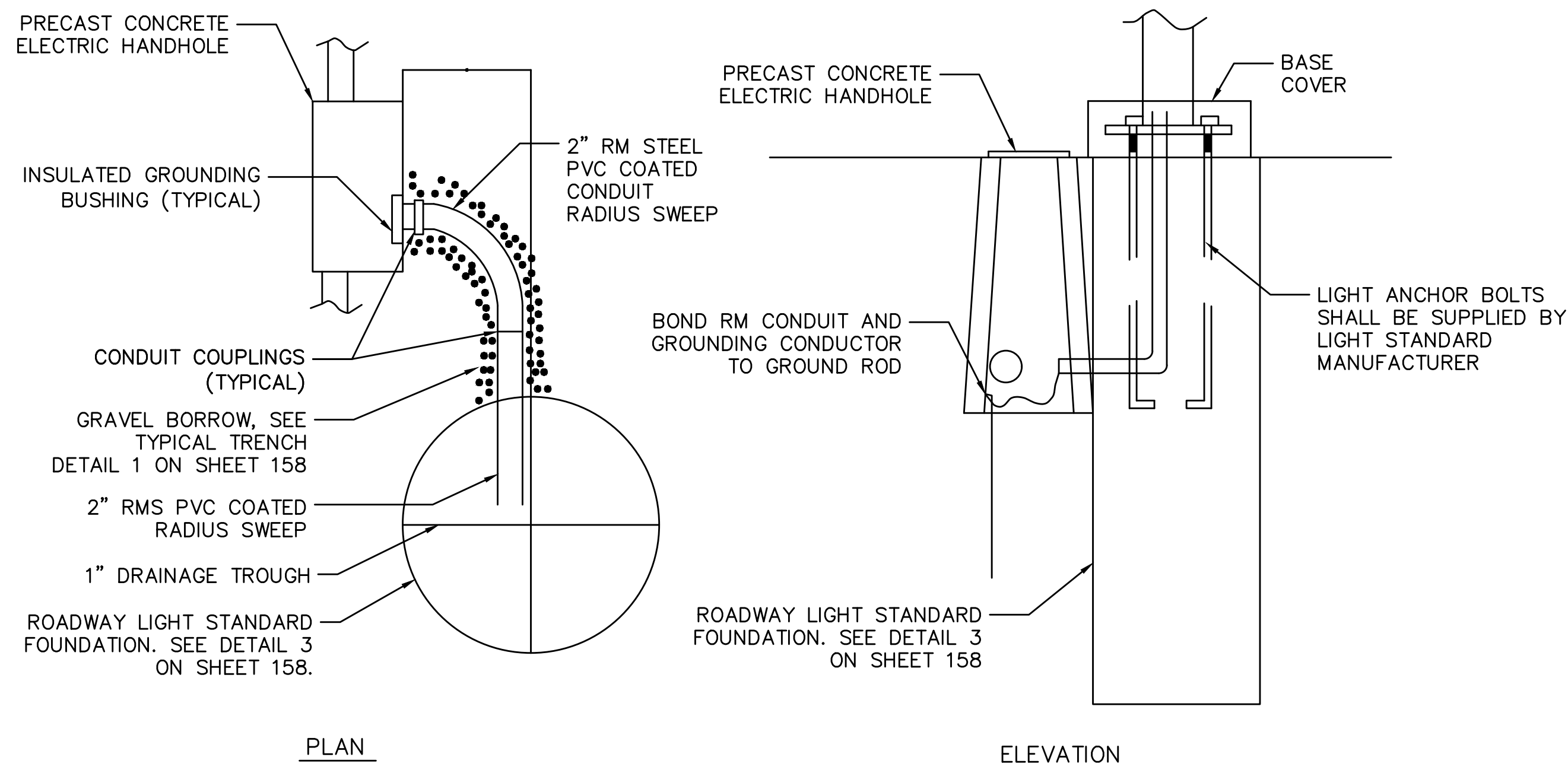
- LIGHT STANDARD FOUNDATION NOTES:**
1. THE CONSTRUCTION METHODS FOR PRE-CAST CONCRETE AND CEMENT CONCRETE MASONRY SHALL CONFORM TO THE RELEVANT PROVISIONS OF SECTION 901.
  2. CEMENT CONCRETE FOR FOUNDATIONS TO BE 4000 PSI, 1.5 IN., 565 CEMENT CONCRETE.
  3. A MINIMUM SLOPE OF 1/8" PER FOOT FROM EDGE OF BASE PLATE TO FACE OF CONCRETE.
  4. THE ANCHOR BOLTS SHALL BE SUPPLIED BY THE LIGHT STANDARD MANUFACTURER. THE MANUFACTURER SHALL ALSO SUPPLY A TEMPLATE FOR SETTING THE BOLTS AND SHALL INDICATE THE NECESSARY PROJECTION.
  5. USE 4-#5 BARS (ONE FOR EACH CORNER)
  6. WEATHER PRECAST FOUNDATION IS ACCEPTABLE IN PLACE OF POURED FOUNDATIONS. ALL PRECASTS MUST BE MADE AT A MASSDOT APPROVED PRECASTING COMPANY AND INSPECTED BY MASSDOT PERSONNEL.
  7. REFERENCE MASSDOT DWG D3.010, (1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING)



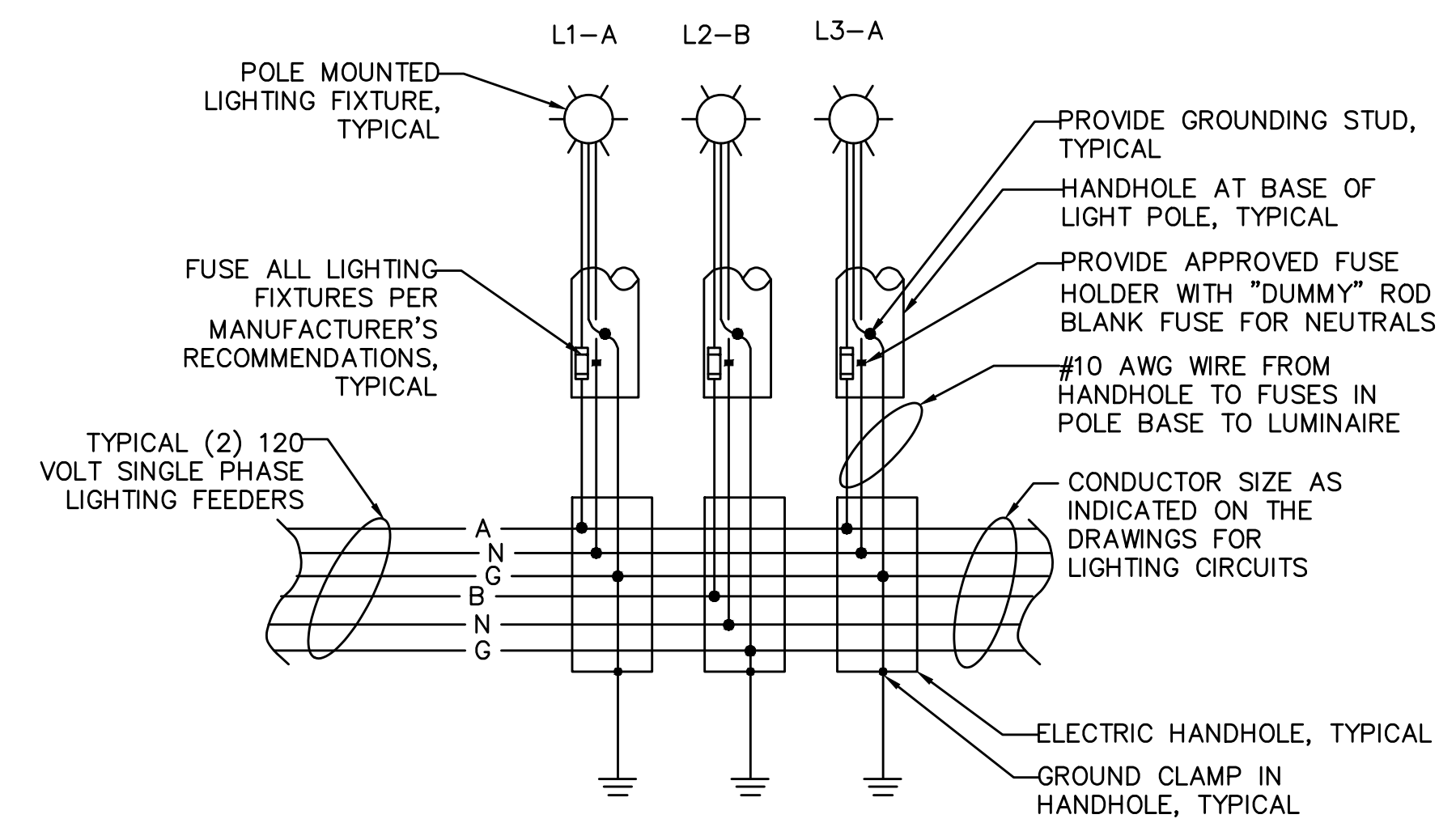
**3** FUSE FOR LUMINAIRE DETAIL  
SCALE: N.T.S.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
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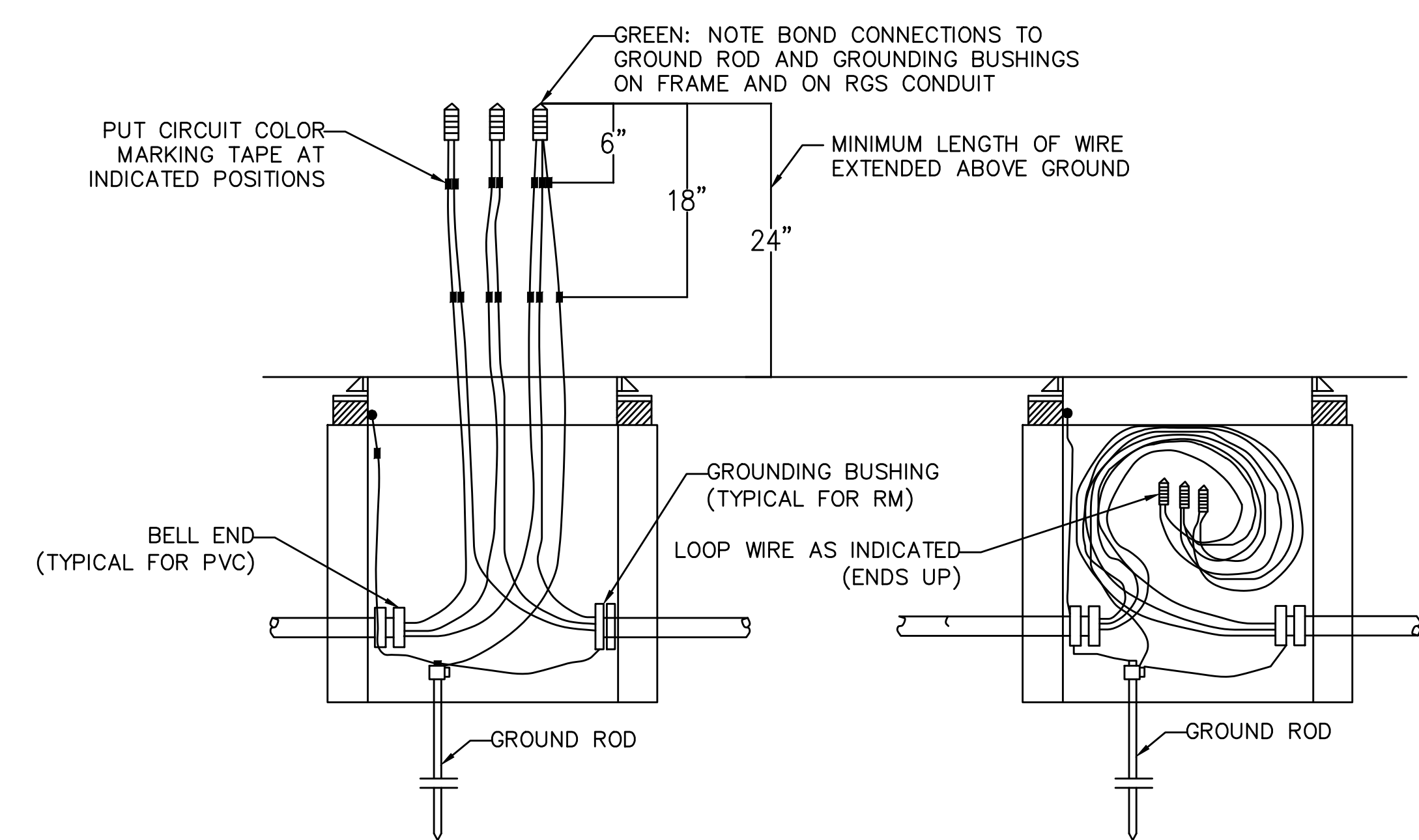
LIGHTING DETAILS 02



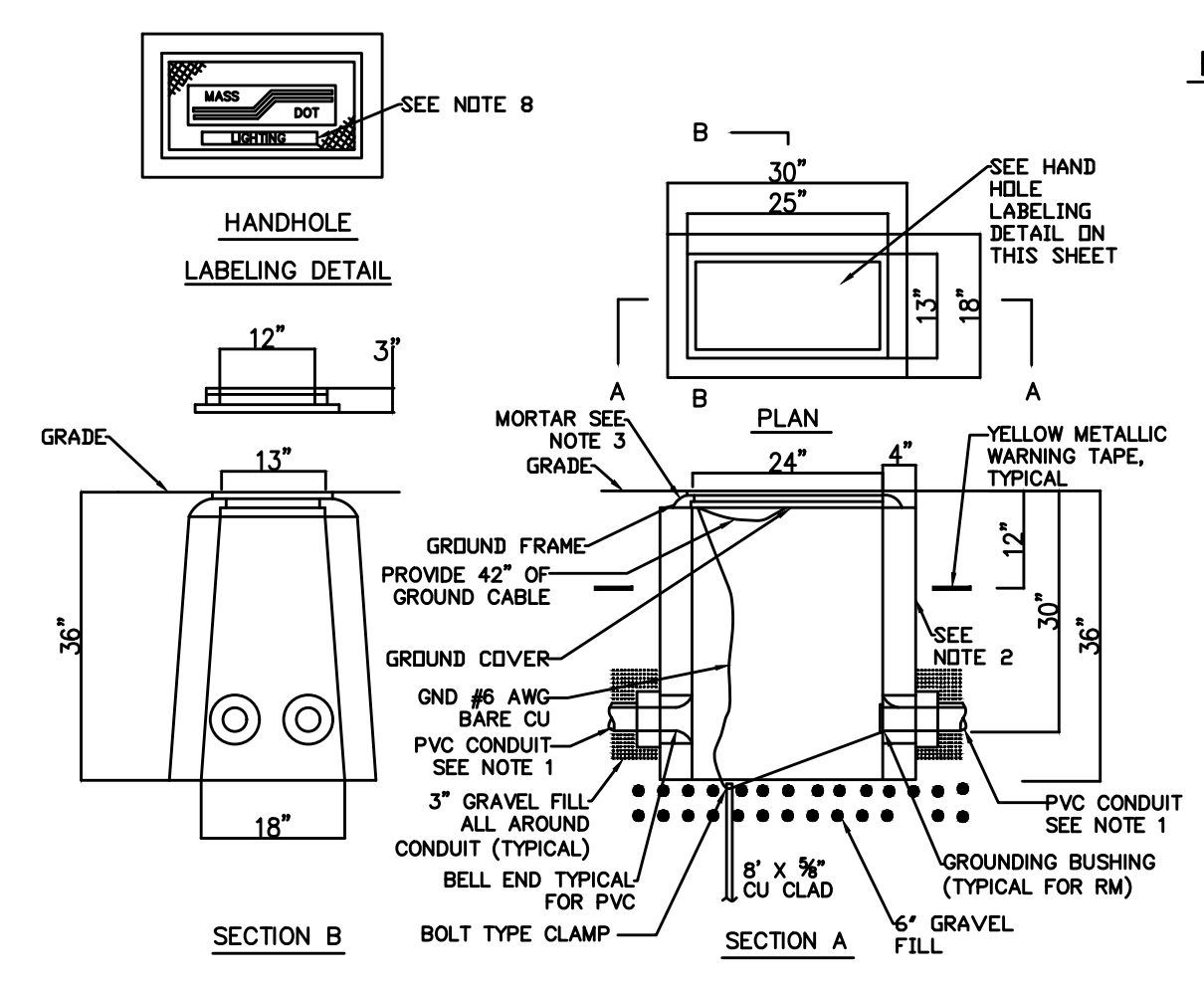
4 LIGHTING HAND HOLE AT POLE BASE  
SCALE: N.T.S.



5 STANDARD POLE WIRING DETAIL  
SCALE: N.T.S.

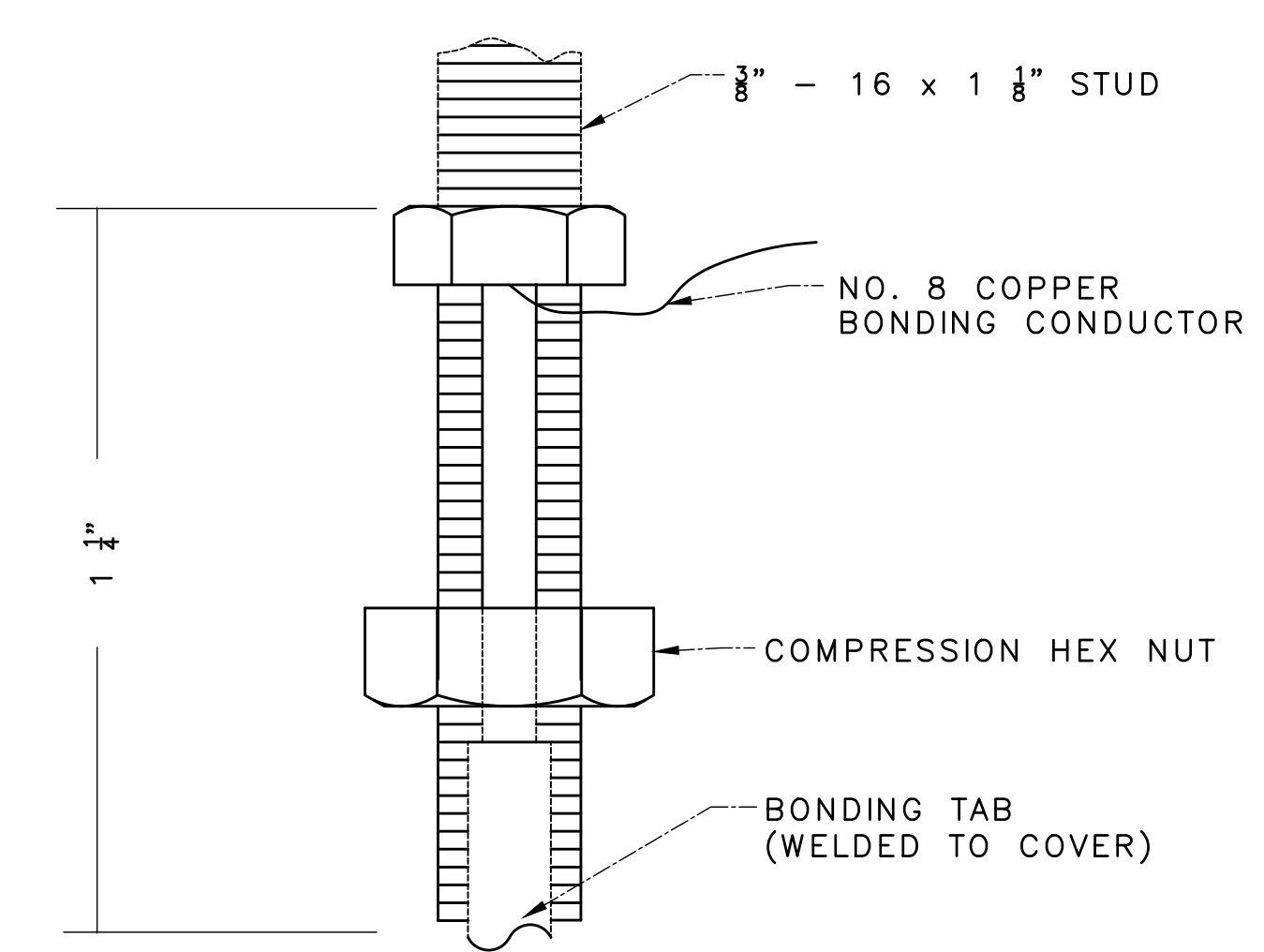


6 TYPICAL HAND HOLE WIRING DIAGRAM  
SCALE: N.T.S.



7 TYPICAL HAND HOLE PHYSICAL DETAIL  
SCALE: N.T.S.

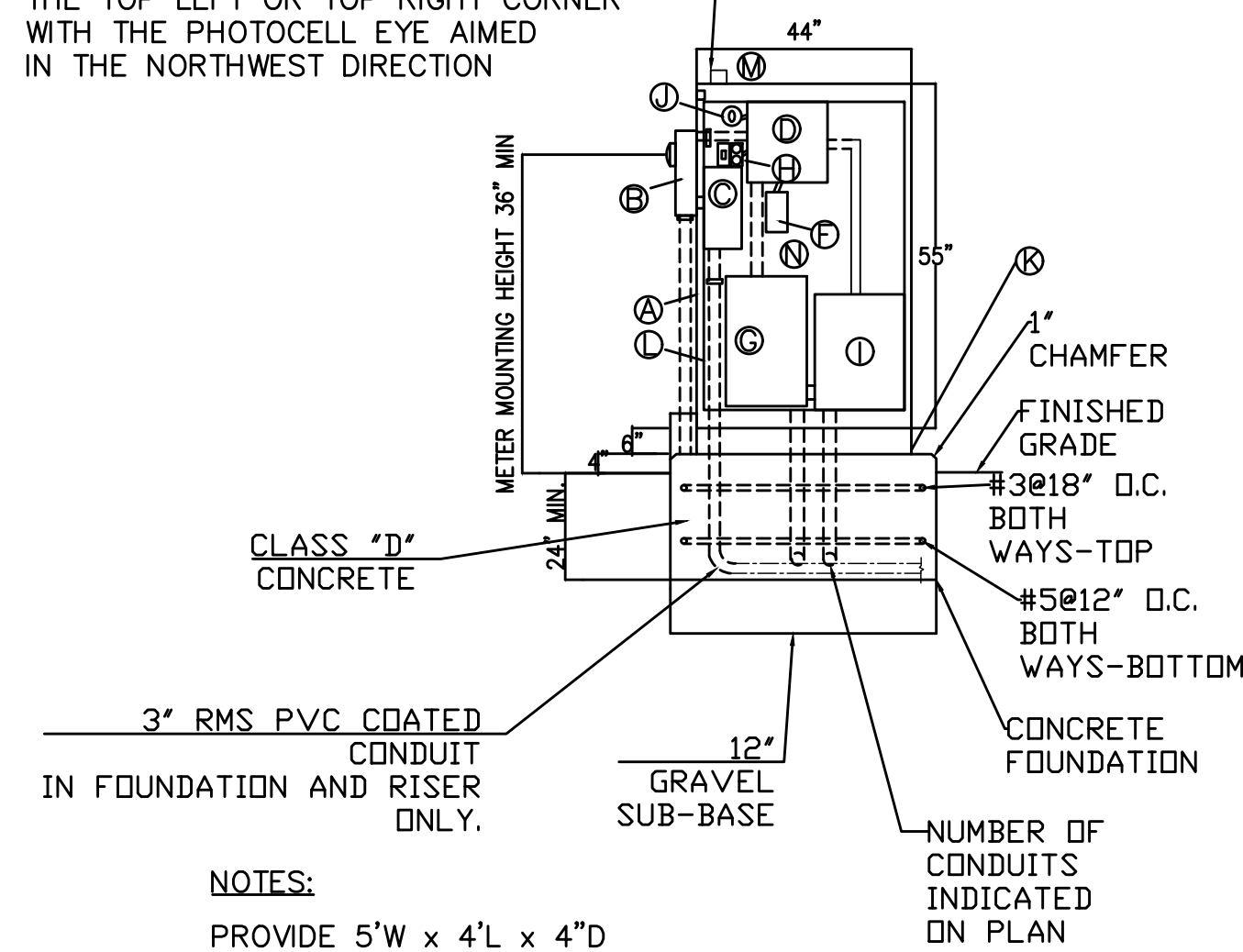
- ELECTRIC HANDHOLE GENERAL NOTES:**
1. ALL CONDUIT ENTERING HANDHOLES SHALL EXTEND INTO THE HANDHOLE CAVITY BY AT LEAST 2".
  2. ALL HANDHOLES SHALL BE PRECAST CONCRETE, AND SHALL BE FREE OF CRACKS OR OTHER DEFECTS. CONCRETE FOR PRECAST CONCRETE HANDHOLES SHALL BE 5000 PSI, 3/8 IN., 660 CEMENT CONCRETE MASONRY.
  3. CAST IRON FRAME SHALL BE MORTARED TO THE SURFACE OF THE PRECAST HANDHOLE.
  4. ALL CONDUIT INSTALLED IN HANDHOLES SHALL BE INSTALLED IN KNOCKOUTS PROVIDED IN THE BOX AND NO EXCESS KNOCKOUTS SHALL BE MADE. THE KNOCKOUTS ARE DESIGNED TO BE MADE PRIOR TO BACKFILLING AROUND THE HANDHOLES. AFTER THE CONDUIT HAS BEEN INSTALLED IN THE HANDHOLE, THE OPEN SPACE BETWEEN THE BOX AND THE CONDUIT WILL BE SEALED WITH CLASS B CEMENT CONCRETE MASONRY. AND CONDUIT INSTALLED IN SUCH A MANNER AS TO BLOCK COMPLETE. ACCESS TO ANY OTHER CONDUIT SHALL BE REMOVED AND RESET.
  5. FOR THE EXACT NUMBER, SIZE, AND ORIENTATION OF THE CONDUITS ENTERING THE HANDHOLE, SEE PLAN SHEETS.
  6. CAST IRON HANDHOLE COVERS AND FRAMES SHALL BE PRODUCED BY THE SAME MANUFACTURERS AND IN ACCORDANCE WITH MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS.
  7. METAL HANDHOLE COVER AND FRAME ARE TO BE BONDED (GROUNDED). DRILL AND TAP FRAME FOR MECHANICAL GROUND LUG CONNECTION. INSTALL A POST TOP SERVIT GROUNDING CONNECTOR SUITABLE TO ACCOMMODATE ONE BARE #6 CONDUCTOR. EXTEND #6 GROUND CONDUCTOR THROUGH FRAME LUG TO BOND COVER. PROVIDE 42" OF SLACK FROM FRAME LUG TO BOND COVER. EXOTHERMICALLY WELD GROUND CONDUCTOR TO COVER.
  8. FUNCTION DESIGNATION ON THE HANDHOLE SHALL BE LABELED AS FOLLOWS PER NEC ARTICLE 314.30D:  
"LIGHTING" FOR LIGHTING CONDUIT



8 BONDING LUG DETAIL  
SCALE: N.T.S.

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PROVIDE AND INSTALL PHOTOCELL EYE ON TOP OF CABINET. COORDINATE THE LOCATION OF PHOTOCELL ON CABINET TO BE IN THE TOP LEFT OR TOP RIGHT CORNER WITH THE PHOTOCELL EYE AIMED IN THE NORTHWEST DIRECTION



NOTES:

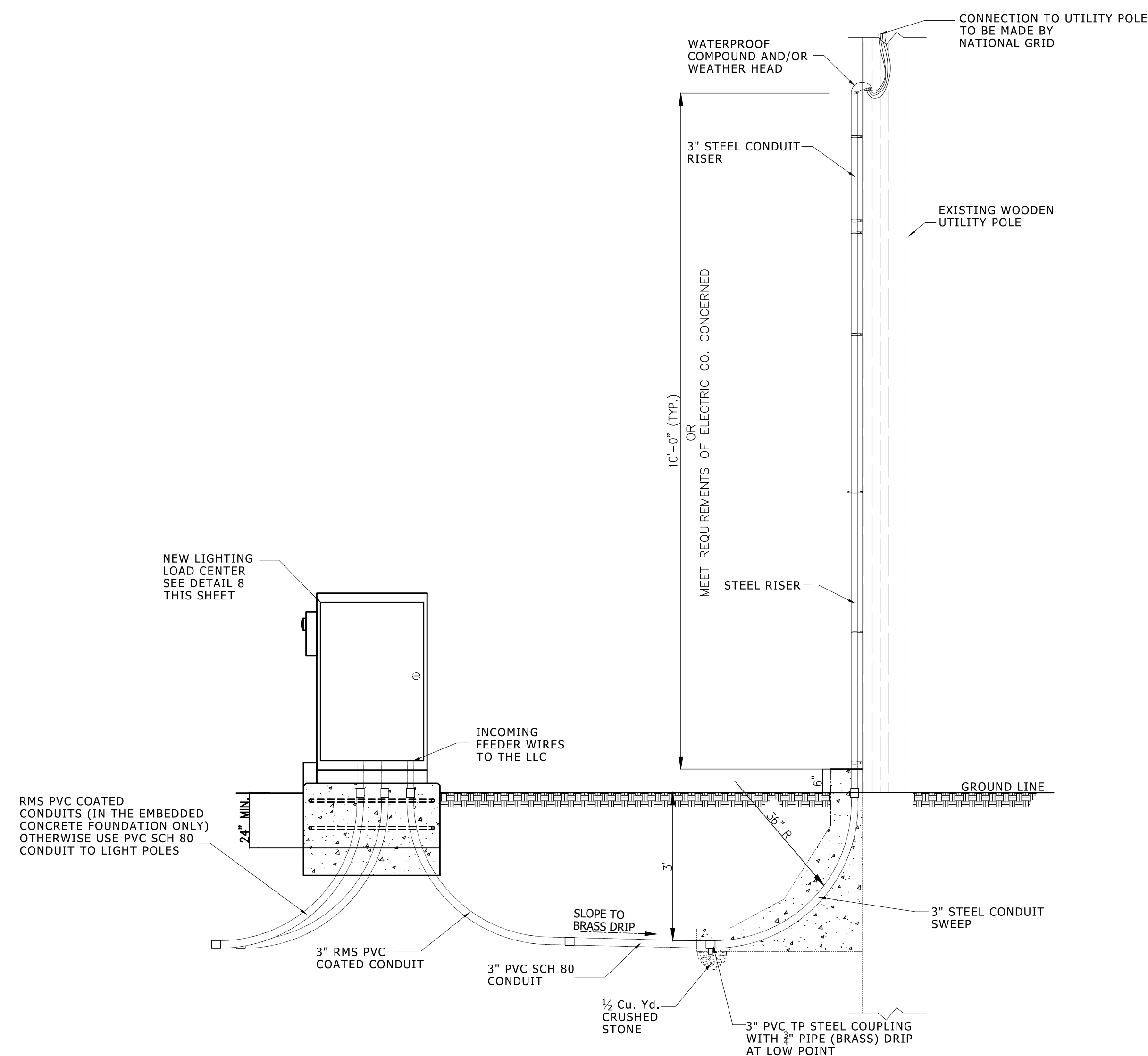
PROVIDE 5'W x 4'L x 4"D CEM. CONC. SERVICE PAD ON 8" GRAVEL FOUNDATION AT FINISHED GRADE AT DOOR SIDE

REFERENCE MASSDOT SPECIFICATION 812.20

- (A) NEMA 4X ENCLOSURE (55"H x 44"W x 26"D) GRADE 316 STAINLESS STEEL W/ FLUSH 42"W DOOR
- (B) WATT HOUR METER SOCKET; 200 AMP, 5 TERMINALS, WITH BYPASS, 240V
- (C) MAIN SERVICE ENCLOSED CIRCUIT BREAKER; (18.2"H x 8.7"W x 4.2"D) 100A, 2 POLE
- (D) JUNCTION BOX (18" x 18" x 6")
- (E) TIME CLOCK; (9"H x 5"W x 4.5"D) 20 AMP, ASTRONOMICAL TIME SWITCH, 120 VOLT, SPST
- (F) LIGHT CONTACTOR; (29"H x 18"W x 9"D) NEMA TYPE 1 ENCLOSURE 30A PER POLE, 4P, MECHANICALLY HELD WITH TWO WIRE CONTROL RELAY AND THREE POSITION SELECTOR SWITCH
- (H) DUPLEX CONVENIENCE RECEPTACLE; (5"H x 5"W x 3"D), 125V, 20 AMP, GFCI (NEMA 5-20R) IN HANDY BOX W/COVER
- (I) LOAD CENTER; 120/240V, 20 CIRCUITS (26"H x 20"W x 6"D)
- (J) SINGLE POLE SINGLE THROW SWITCH AND LIGHT SOCKET WITH 10W LED LAMP
- (K) STEEL BASE
- (L) ENCLOSURE BACKBOARD (69"H x 45"W)
- (M) PHOTOCELL
- (N) 500 WATT HEATING ELEMENT, EXHAUST FAN (min. 100 cfm) WITH THERMOSTATICALLY CONTROLLED AND DOOR FILTER

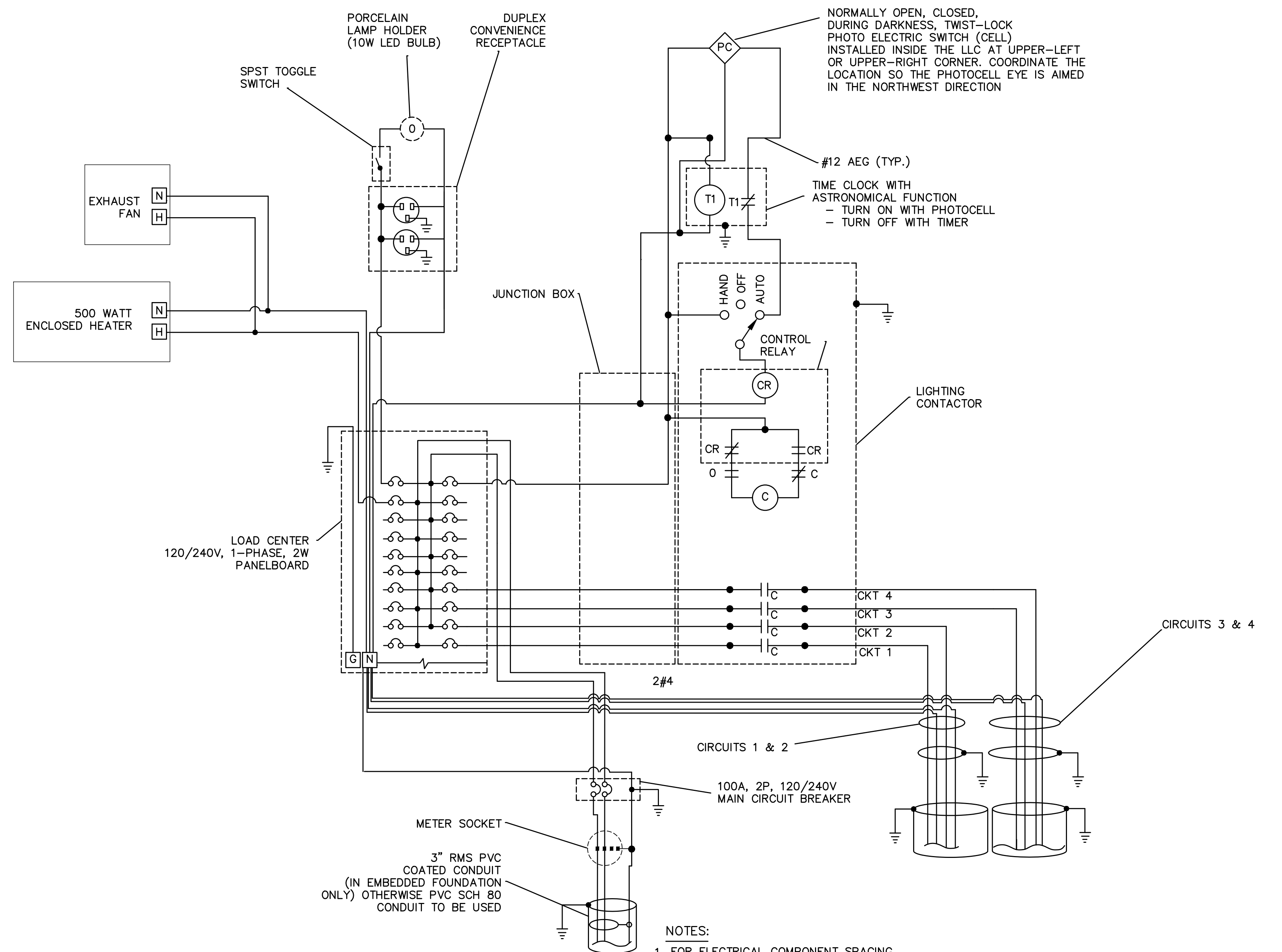
9 LIGHTING LOAD CENTER DETAIL

SCALE: N.T.S.



10 INCOMING SERVICE - UTILITY POLE TO LIGHTING LOAD CENTER DETAIL

SCALE: N.T.S.



NOTES:

1. FOR ELECTRICAL COMPONENT SPACING REQUIREMENTS ON THE CONTROL PANEL, PLEASE REFERENCE NEC ARTICLE 409.

11 WIRE DIAGRAM FOR LIGHTING LOAD CENTER

SCALE: N.T.S.