

BILL OF REINFORCEMENT				
BAR	NO.	LENGTH	SHAPE	LOCATION
F801	36	14' 6"	—	FOOTING
F602	36	14' 6"	—	FOOTING
F903E	12	7' 0"	—	PEDESTAL DOWELS
F404E	1	SEE DETAIL	—	PEDESTAL SPIRAL

FOOTING TABLE				
TOWER NO.	BOTTOM OF FOOTING ELEVATION	SUBCUT DEPTH	BOTTOM OF SUBCUT ELEVATION	BACKFILL MATERIAL (SPEC)

GEOTECHNICAL REQUIREMENTS:
 REQUIRED SUBSURFACE INVESTIGATION: TAKE A MINIMUM OF ONE STANDARD PENETRATION TEST (SPT) FOUNDATION BORING OR ONE CONE PENETRATION TEST (CPT) SOUNDING AT EACH LIGHT TOWER LOCATION. ADVANCE THE BORING/SOUNDING WITHIN 30' OF THE PLANNED TOWER LOCATION AND FOLLOW THE REQUIREMENTS OF MNDOT'S GEOTECHNICAL INVESTIGATION SPECIFICATIONS. INVESTIGATE TO A MINIMUM DEPTH OF 45', OR TO TOP OF ROCK, BELOW THE PROPOSED FOOTING ELEVATION. WHERE ROCK IS ENCOUNTERED WITHIN 30' BELOW THE PROPOSED FOOTING, 10' OF ROCK CORING IS REQUIRED.

BASIS OF DESIGN:
 THE DETAILS SHOWN ON THESE STANDARD PLANS ARE BASED ON THE AASHTO LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, FIRST EDITION, 2015 AND THE 2017 AND 2018 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.
 THE MAXIMUM NUMBER OF LUMINAIRES ON THE TOP OF THE LIGHT TOWER IS SIX. THE MAXIMUM EFFECTIVE PROJECTED AREA (EPA) OF THE TOTAL LUMINAIRES AND RING ASSEMBLY AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 50 SQ. FT.
 THE FACTORED BEARING RESISTANCE OF SOIL USED IN DESIGN IS 4 KSF.
 THE WATER TABLE IS ASSUMED TO BE BELOW THE BOTTOM OF SUBCUT OR FOOTING ELEVATION.

LOAD CASE	EFFECTIVE WIDTH B' (FT)	EFFECTIVE SOIL PRESSURE (KSF)
SERVICE	9.58	0.85
STRENGTH	8.22	1.11

MATERIAL DESIGN PROPERTIES:
 CONCRETE: $f'_c = 4.5$ ksi; MNDOT MIX 3G52
 REINFORCEMENT: $F_y = 60$ ksi

WELDED WIRE REINFORCEMENT IN ACCORDANCE WITH SPEC. 3303.
 SPIRAL REINFORCEMENT IN ACCORDANCE WITH SPEC. 3305, OR DEFORMED GRADE 60 BILLET STEEL IN ACCORDANCE WITH SPEC. 3301.
 FOR BARS OTHER THAN SPIRAL ROD STOCK, USE DEFORMED STEEL BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. EPOXY COAT BARS WITH THE SUFFIX "E" IN ACCORDANCE WITH SPEC. 3301.
 DESIGNS ARE BASED ON A SOIL PROFILE WHICH MEETS OR EXCEEDS THE FOLLOWING MINIMUM SOIL PARAMETERS:
SANDY SOILS
 EFFECTIVE UNIT WEIGHT = 52.5 PCF
 FRICTION ANGLE = 30°
CLAY SOILS
 EFFECTIVE UNIT WEIGHT = 57.5 PCF
 COHESION = 1000 PSF
 FRICTION ANGLE = 0°

CONSTRUCTION NOTES:
 AFTER THE FOUNDATION SITE HAS BEEN EXCAVATED AND ANY REQUIRED SUBCUTS PERFORMED (SEE "FOOTING TABLE"), EVALUATE AND INSPECT THE SITE CONDITIONS TO ENSURE THAT BEARING SOILS ARE UNIFORM AND CONSISTENT WITH DESIGN ASSUMPTIONS. CONTACT THE MNDOT FOUNDATIONS UNIT IF SITE CONDITIONS DIFFER. AFTER THE FOUNDATION SITE HAS BEEN REVIEWED AND APPROVED, PROCEED WITH SUBCUT BACKFILLING AND FOOTING CONSTRUCTION.
 CONFIRM PEDESTAL AND FOOTING CONCRETE HAVE ATTAINED 4500 PSI COMPRESSIVE STRENGTH BEFORE INSTALLING TOWER.

- NOTES:**
- USE WELDED WIRE REINFORCEMENT 6 X 6-W2.9 X W2.9 IN ACCORDANCE WITH SPEC. 3303. PLACE REINFORCEMENT AT SLAB MID-DEPTH. CONCRETE MIX NO. 3F52. FINISH GRADING THE SITE TO BLEND WITH EXISTING SLOPES AS DIRECTED BY THE ENGINEER.
 - OBTAIN THE ENGINEER'S APPROVAL OF THE COMPLETED GROUNDING GRID BEFORE BACKFILLING AROUND THE FOOTING.
 - ENSURE BOTTOM OF FOOTING IS AT LEAST 5' BELOW FINISHED GRADE. REFER TO "FOOTING TABLE" FOR FOOTING ELEVATIONS.
 - FURNISH AND INSTALL AN ADDITIONAL 2" CONDUIT FOR FUTURE USE AT LOCATIONS SHOWN ON THE LIGHTING PLANS.

LEAD EXPERT OFFICE
 KEVIN WESTERN
 STATE BRIDGE ENGINEER

T-100 LIGHT TOWER MAT FOUNDATION DESIGN

APPROVED: 11-05-2019
 REVISED:

Peter A. Harff
 PETER A. HARFF
 STATE DESIGN ENGINEER

STANDARD PLAN
 5-297.841
 1 OF 3

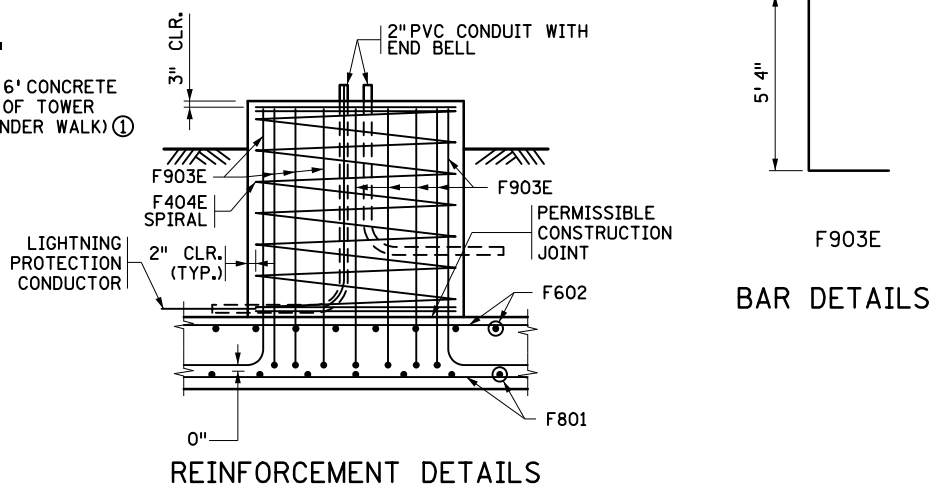
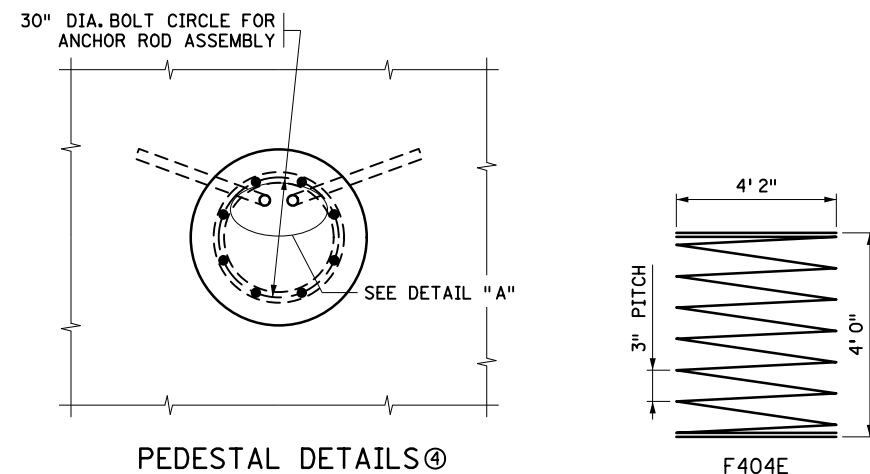
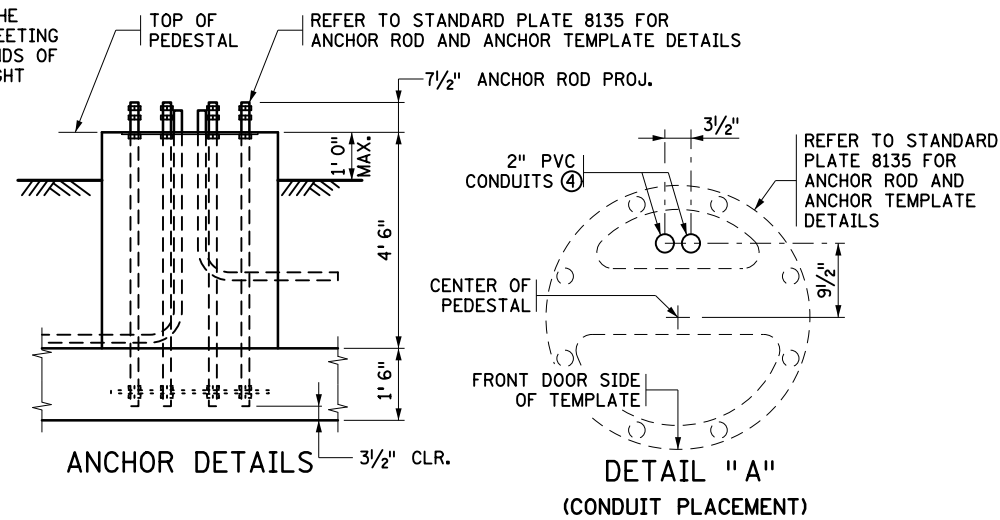
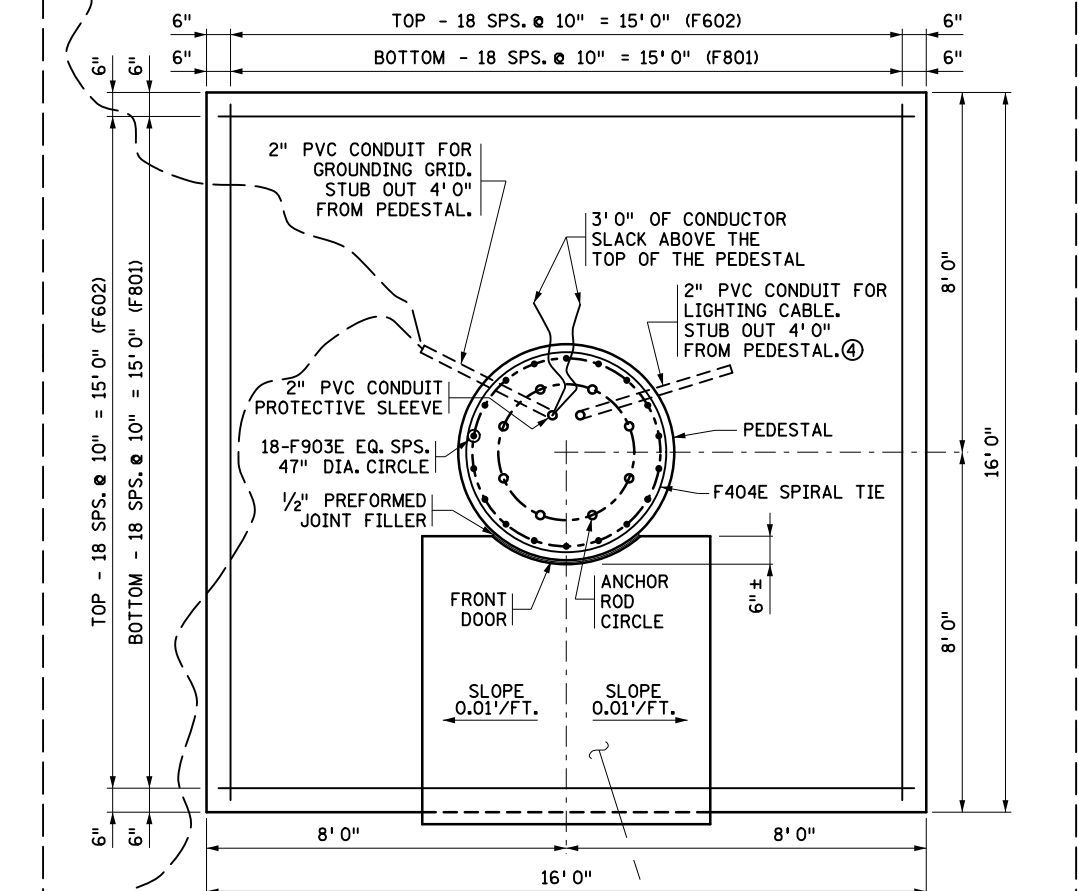


STANDARD PLAN

STATE PROJ. NO. SHEET NO.
 TRUNK HWY. TOTAL SHEETS

FURNISH AND INSTALL 5/8" DIA. 10' 0" LONG GROUND ROD ELECTRODES (4 REQUIRED). BOND CONDUCTORS TO GROUND ROD ELECTRODES USING EXOTHERMIC WELD LIGHTNING PROTECTION CONNECTIONS.

FURNISH AND INSTALL A GROUNDING GRID WITHIN 12" OF THE FOOTING EDGE USING LIGHTNING PROTECTION CONDUCTOR MEETING THE FOLLOWING: BRAIDED BARE COPPER; AT LEAST 28 STRANDS OF 14 AWG WIRE; 1/2" DIA. ROPE LAY OF 115,000 CMIL; NET WEIGHT 375 LBS PER 1000' ②



BILL OF REINFORCEMENT				
BAR	NO.	LENGTH	SHAPE	LOCATION
F801	38	15' 6"	—	FOOTING
F602	38	15' 6"	—	FOOTING
F903E	18	7' 0"	—	PEDESTAL DOWELS
F404E	1	SEE DETAIL	—	PEDESTAL SPIRAL

FOOTING TABLE				
TOWER NO.	BOTTOM OF FOOTING ELEVATION	SUBCUT DEPTH	BOTTOM OF SUBCUT ELEVATION	BACKFILL MATERIAL (SPEC)

GEOTECHNICAL REQUIREMENTS:

REQUIRED SUBSURFACE INVESTIGATION: TAKE A MINIMUM OF ONE STANDARD PENETRATION TEST (SPT) FOUNDATION BORING OR ONE CONE PENETRATION TEST (CPT) SOUNDING AT EACH LIGHT TOWER LOCATION. ADVANCE THE BORING/SOUNDING WITHIN 30' OF THE PLANNED TOWER LOCATION AND FOLLOW THE REQUIREMENTS OF MNDOT'S GEOTECHNICAL INVESTIGATION SPECIFICATIONS. INVESTIGATE TO A MINIMUM DEPTH OF 45', OR TO TOP OF ROCK, BELOW THE PROPOSED FOOTING ELEVATION. WHERE ROCK IS ENCOUNTERED WITHIN 30' BELOW THE PROPOSED FOOTING, 10' OF ROCK CORING IS REQUIRED.

BASIS OF DESIGN:

THE DETAILS SHOWN ON THESE STANDARD PLANS ARE BASED ON THE AASHTO LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, FIRST EDITION, 2015 AND THE 2017 AND 2018 INTERIM REVISIONS.

STRENGTH LIMIT WIND LOADING OF 120 MPH, SERVICE LIMIT WIND LOADING OF 76 MPH.

THE MAXIMUM NUMBER OF LUMINAIRES ON THE TOP OF THE LIGHT TOWER IS SIX. THE MAXIMUM EFFECTIVE PROJECTED AREA (EPA) OF THE TOTAL LUMINAIRES AND RING ASSEMBLY AS PROVIDED BY THE LUMINAIRE MANUFACTURER IS 50 SQ. FT.

THE FACTORED BEARING RESISTANCE OF SOIL USED IN DESIGN IS 4 KSF.

THE WATER TABLE IS ASSUMED TO BE BELOW THE BOTTOM OF SUBCUT OR FOOTING ELEVATION.

LOAD CASE	EFFECTIVE WIDTH B' (FT)	EFFECTIVE SOIL PRESSURE (KSF)
SERVICE	11.08	0.79
STRENGTH	9.86	1.00

MATERIAL DESIGN PROPERTIES:

CONCRETE: f'c = 4.5 ksi; MNDOT MIX 3G52
 REINFORCEMENT: Fy = 60 ksi

WELDED WIRE REINFORCEMENT IN ACCORDANCE WITH SPEC. 3303.

SPIRAL REINFORCEMENT IN ACCORDANCE WITH SPEC. 3305, OR DEFORMED GRADE 60 BILLET STEEL IN ACCORDANCE WITH SPEC. 3301.

FOR BARS OTHER THAN SPIRAL ROD STOCK, USE DEFORMED STEEL BARS IN ACCORDANCE WITH SPEC. 3301 GRADE 60 OR GREATER. EPOXY COAT BARS WITH THE SUFFIX "E" IN ACCORDANCE WITH SPEC. 3301.

DESIGNS ARE BASED ON A SOIL PROFILE WHICH MEETS OR EXCEEDS THE FOLLOWING MINIMUM SOIL PARAMETERS:

SANDY SOILS

EFFECTIVE UNIT WEIGHT = 52.5 PCF
 FRICTION ANGLE = 30°

CLAY SOILS

EFFECTIVE UNIT WEIGHT = 57.5 PCF
 COHESION = 1000 PSF
 FRICTION ANGLE = 0°

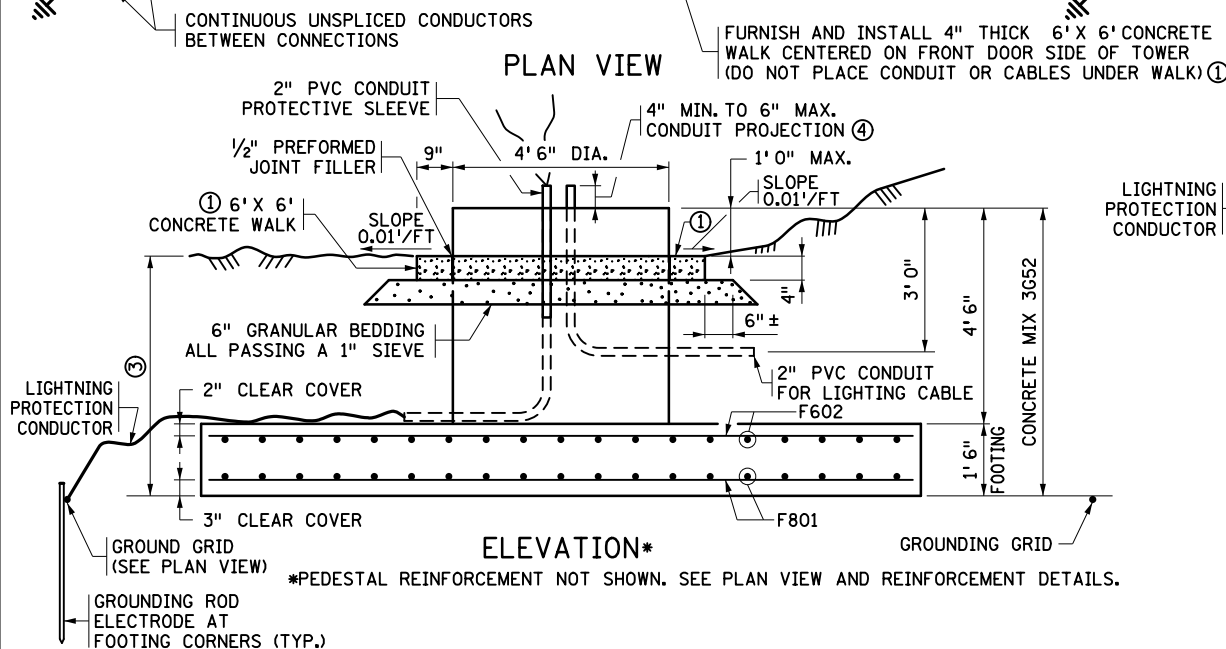
CONSTRUCTION NOTES:

AFTER THE FOUNDATION SITE HAS BEEN EXCAVATED, AND ANY REQUIRED SUBCUTS PERFORMED (SEE "FOOTING TABLE") EVALUATE AND INSPECT THE SITE CONDITIONS TO ENSURE THAT BEARING SOILS ARE UNIFORM AND CONSISTENT WITH DESIGN ASSUMPTIONS. CONTACT THE MNDOT FOUNDATIONS UNIT IF SITE CONDITIONS DIFFER. AFTER THE FOUNDATION SITE HAS BEEN REVIEWED AND APPROVED, PROCEED WITH SUBCUT BACKFILLING AND FOOTING CONSTRUCTION.

CONFIRM PEDESTAL AND FOOTING CONCRETE HAVE ATTAINED 4500 PSI COMPRESSIVE STRENGTH BEFORE INSTALLING TOWER.

NOTES:

- USE WELDED WIRE REINFORCEMENT 6 X 6-W2.9 X W2.9 IN ACCORDANCE WITH SPEC. 3303. PLACE REINFORCEMENT AT SLAB MID-DEPTH. CONCRETE MIX NO. 3F52. FINISH GRADING THE SITE TO BLEND WITH EXISTING SLOPES AS DIRECTED BY THE ENGINEER.
- OBTAIN THE ENGINEER'S APPROVAL OF THE COMPLETED GROUNDING GRID BEFORE BACKFILLING AROUND THE FOOTING.
- ENSURE BOTTOM OF FOOTING IS AT LEAST 5' BELOW FINISHED GRADE. REFER TO "FOOTING TABLE" FOR FOOTING ELEVATIONS.
- FURNISH AND INSTALL AN ADDITIONAL 2" CONDUIT FOR FUTURE USE AT LOCATIONS SHOWN ON THE LIGHTING PLANS.



LEAD EXPERT OFFICE

KEVIN WESTERN
 STATE BRIDGE ENGINEER

T-120 LIGHT TOWER MAT FOUNDATION DESIGN

APPROVED: 11-05-2019
 REVISED:

Peter A. Harff
 PETER A. HARFF
 STATE DESIGN ENGINEER

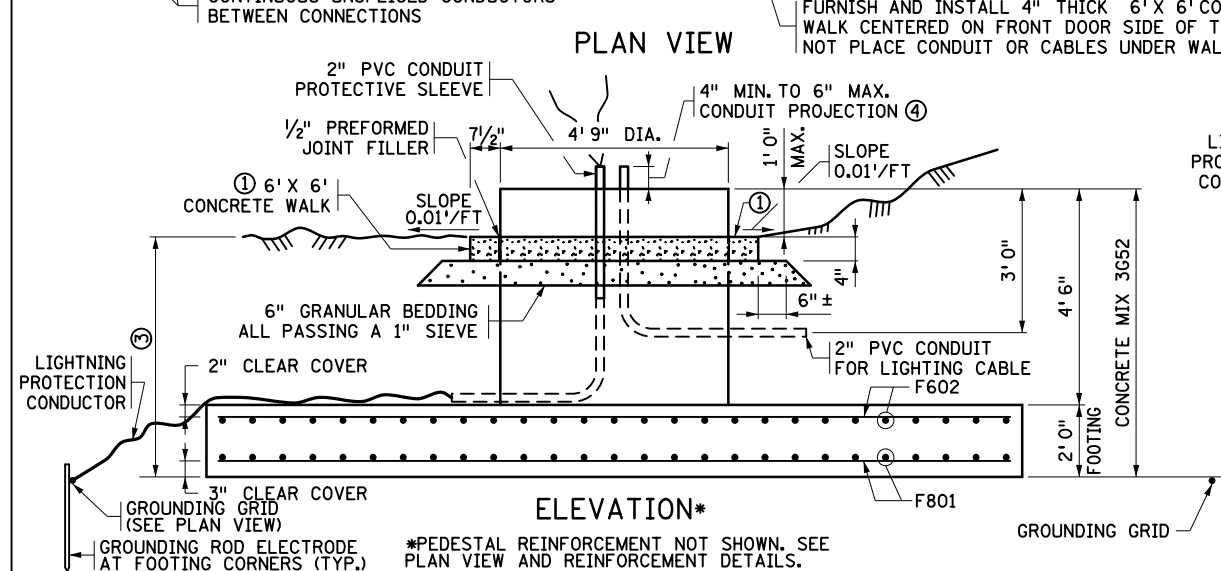
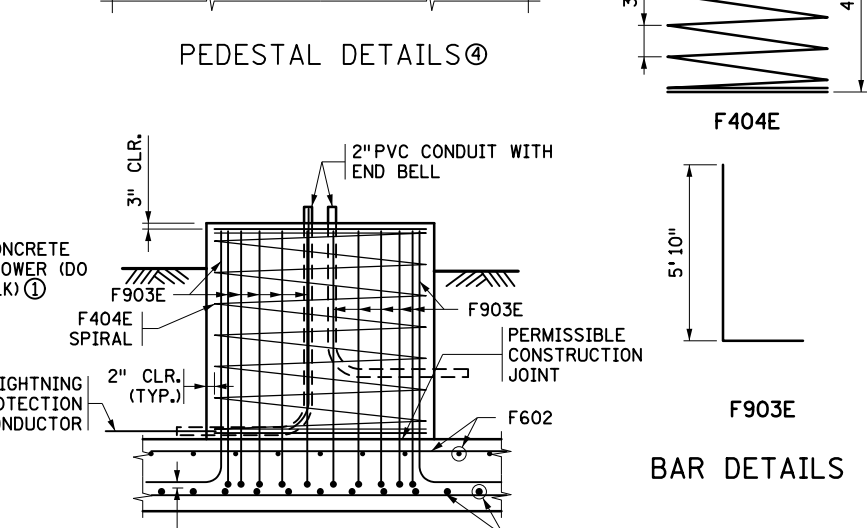
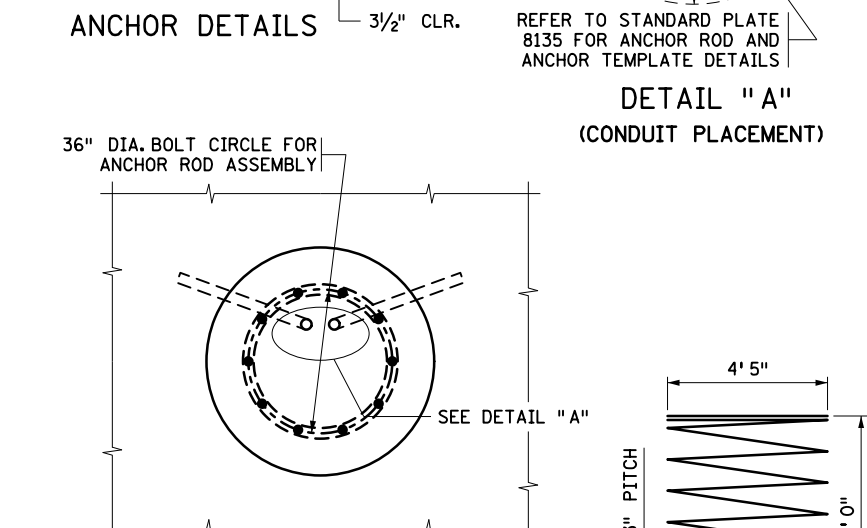
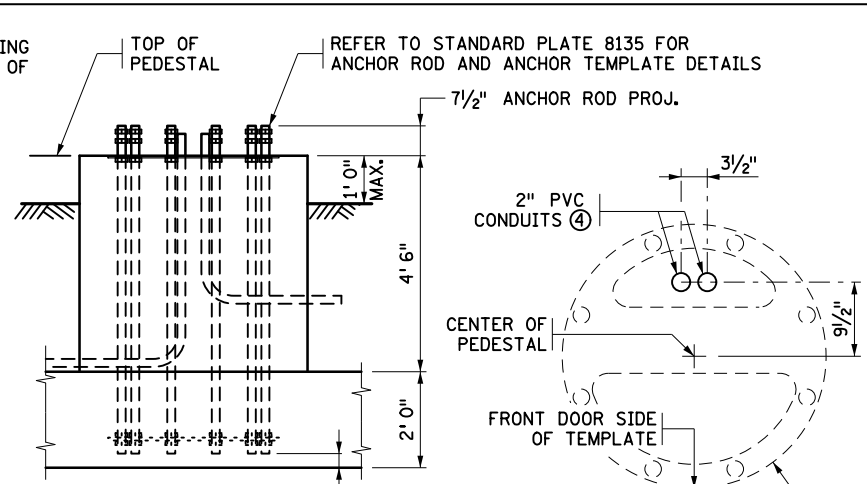
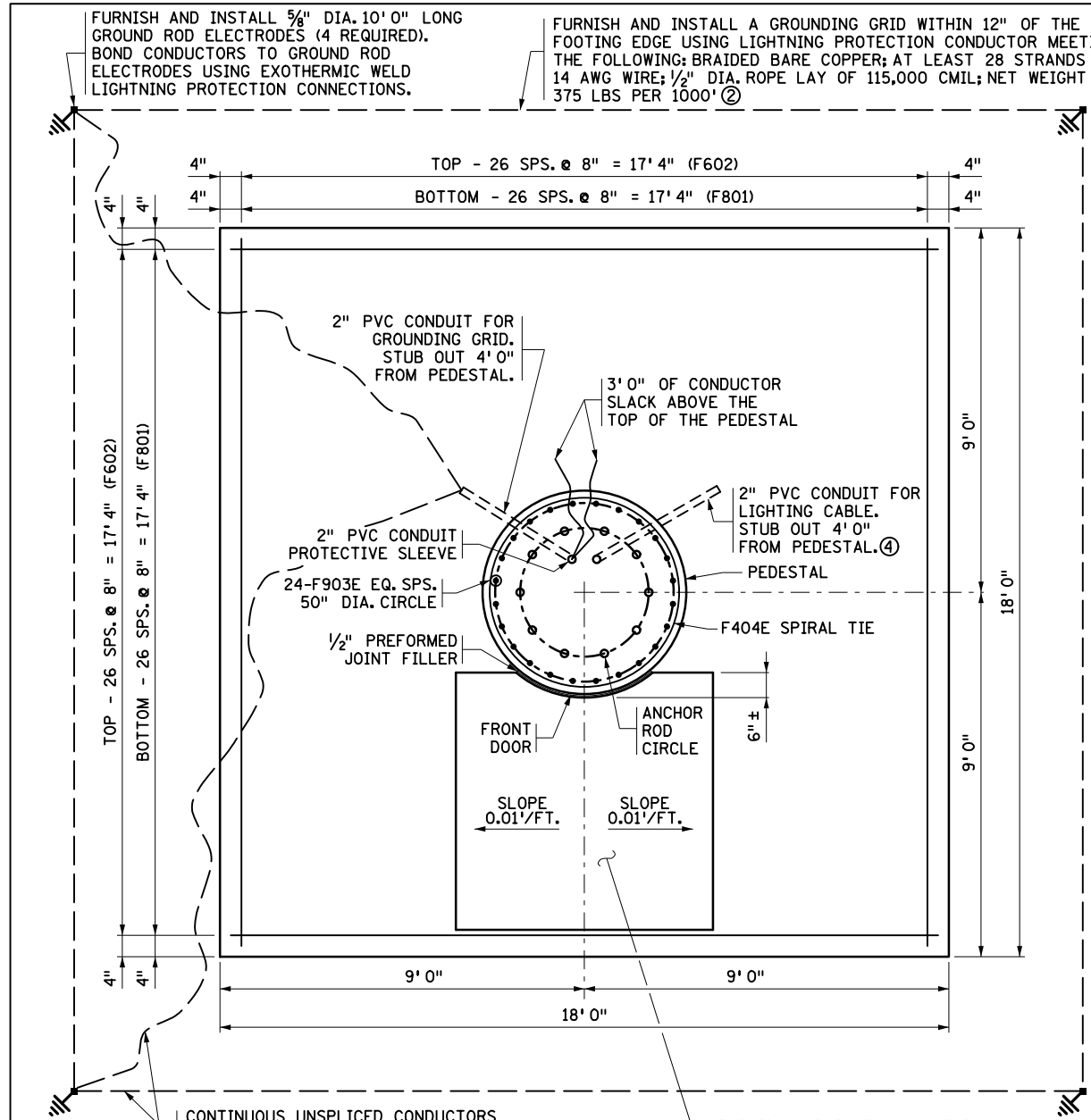
STANDARD PLAN
 5-297.841

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STANDARD PLAN

STATE PROJ. NO. SHEET NO.
 TRUNK HWY. TOTAL SHEETS



BILL OF REINFORCEMENT				
BAR	NO.	LENGTH	SHAPE	LOCATION
F801	54	17' 6"	—	FOOTING
F602	54	17' 6"	—	FOOTING
F903E	24	7' 6"	—	PEDESTAL DOWELS
F404E	1	SEE DETAIL	—	PEDESTAL SPIRAL

FOOTING TABLE				
TOWER NO.	BOTTOM OF FOOTING ELEVATION	SUBCUT DEPTH	BOTTOM OF SUBCUT ELEVATION	BACKFILL MATERIAL (SPEC)

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LOAD CASE	EFFECTIVE WIDTH B'(FT)	EFFECTIVE SOIL PRESSURE (KSF)
SERVICE	12.70	0.99
STRENGTH	11.44	1.25

MATERIAL DESIGN PROPERTIES:
 CONCRETE: f'c = 4.5 ksi; MNDOT MIX 3G52
 REINFORCEMENT: Fy = 60 ksi

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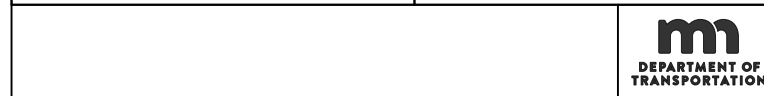
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 - FURNISH AND INSTALL AN ADDITIONAL 2" CONDUIT FOR FUTURE USE AT LOCATIONS SHOWN ON THE LIGHTING PLANS.

LEAD EXPERT OFFICE
 KEVIN WESTERN
 STATE BRIDGE ENGINEER

T-140 LIGHT TOWER MAT FOUNDATION DESIGN

APPROVED: 11-05-2019
 REVISED:
 Peter A. Harff
 PETER A. HARFF
 STATE DESIGN ENGINEER

STANDARD PLAN
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 3 OF 3



STATE PROJ. NO. SHEET NO.
 TRUNK HWY. TOTAL SHEETS