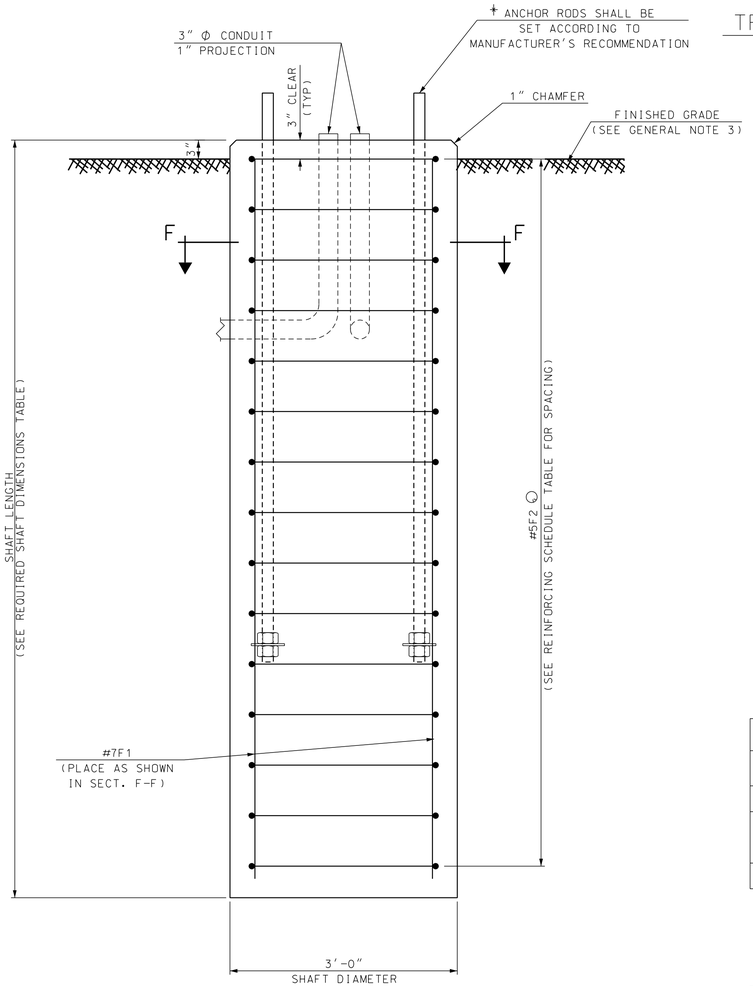
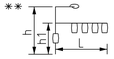
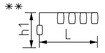
TRAFFIC SIGNAL MAST ARM FOUNDATION – TYPE 2



ELEVATION VIEW

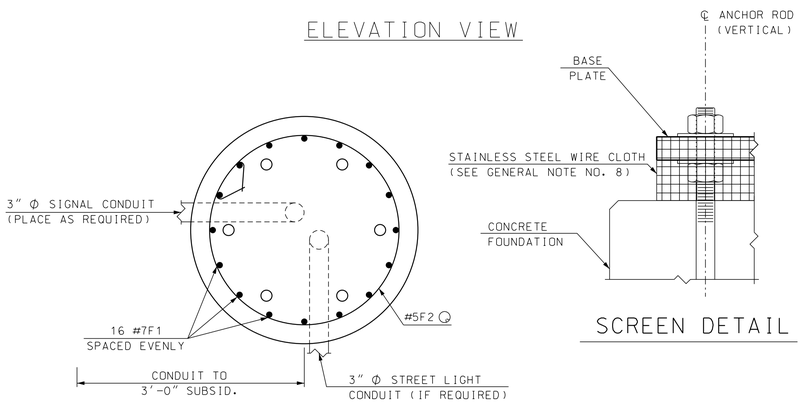
REQUIRED SHAFT DIMENSIONS		
SHAFT DIAMETER AND LENGTH	CASE 1 WITH LUMINAIRE	CASE 2 WITHOUT LUMINAIRE
	**  MAX h = 40'-0" MAX h1 = 20'-0"	**  MAX h1 = 20'-0"
3'-0"x8'-0"	-	MAX L = 20'-0"
3'-0"x9'-0"	MAX L = 20'-0"	MAX L = 25'-0"
3'-0"x10'-0"	MAX L = 35'-0"	MAX L = 40'-0"
3'-0"x11'-0"	MAX L = 50'-0"	MAX L = 55'-0"
3'-0"x12'-0"	MAX L = 60'-0"	MAX L = 60'-0"

** NOTE: SEE TRAFFIC SIGNAL MAST ARM LAYOUT STANDARD PLAN TS-7 FOR ATTACHMENT LAYOUTS. ATTACHMENT COMBINATIONS OTHER THAN THOSE SHOWN ON THE SPECIAL DETAIL SHALL NOT BE USED WITHOUT DESIGN APPROVAL FROM EITHER THE BUREAU OF BRIDGE DESIGN OR THE BUREAU OF TRAFFIC.

TYPICAL QUANTITIES FOR SHAFT LENGTH							
ITEM NUMBER	ITEM	UNIT	QUANTITY PER SHAFT LENGTH (MIN)				
			8'-0"	9'-0"	10'-0"	11'-0"	12'-0"
▲508*	STRUCTURAL FILL	CY	20	22	24	26	28
520.1* OR ▲520.001*	CONCRETE CLASS A OR CONCRETE CLASS AAA	CY	2.1	2.4	2.6	2.9	3.1
544*	REINFORCING STEEL	LB	342	384	455	556	608

* ITEM NUMBERS ARE FOR SPECIFICATION REFERENCE ONLY. NO SEPARATE PAYMENT WILL BE MADE FOR THESE ITEMS.

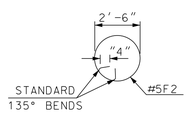
▲ DENOTES EXCAVATED HOLE METHOD OF CONSTRUCTION FOR CIRCULAR SHAFTS



SCREEN DETAIL

SECTION F-F

REINFORCING SCHEDULE					
SHAFT LENGTH	MARK	TYPE	BAR #	# OF BARS	UNBENT LENGTH
8'-0"	F1	——	#7	16	7'-6"
	F2	◯	#5	10 @ 10"	9'-3"
9'-0"	F1	——	#7	16	8'-6"
	F2	◯	#5	11 @ 10"	9'-3"
10'-0"	F1	——	#7	16	9'-6"
	F2	◯	#5	15 @ 8"	9'-3"
11'-0"	F1	——	#7	16	10'-6"
	F2	◯	#5	22 @ 6"	9'-3"
12'-0"	F1	——	#7	16	11'-6"
	F2	◯	#5	24 @ 6"	9'-3"



† ANCHOR RODS SHALL BE STRAIGHT RODS AND CONFORM TO ASTM F1554 GRADE 50 (MIN.). GALVANIZE THE ENITRE ROD PER ASTM A153. EACH ANCHOR ROD SHALL BE SUPPLIED WITH A MINIMUM OF THREE HEX NUTS (ASTM A563 OR ASTM A194) AND A MINIMUM OF TWO FLAT HARDENED WASHERS (ASTM F436). LOCK WASHERS SHALL NOT BE USED. THE EMBEDDED END OF THE ANCHOR ROD SHALL HAVE EITHER ONE NUT TACKED WELDED OR DOUBLE NUTS. BENT (HOOKED OR J-BOLT) ANCHOR RODS SHALL NOT BE USED.

GENERAL NOTES (TYPE 2 FOUNDATION)

1. THERE SHALL BE A MINIMUM OF ONE TEST BORING REQUIRED, AT THE APPROXIMATE FOUNDATION LOCATION, TO CONFIRM THE ENGINEERING PROPERTIES OF THE SOILS PROVIDING FOUNDATION SUPPORT. THE ENGINEER MAY REQUIRE ADDITIONAL BORINGS IF CONSIDERED NECESSARY.
2. THE CIRCULAR SHAFT FOUNDATION SHALL BE CONSTRUCTED IN EITHER A DRILLED HOLE OR IN AN EXCAVATED HOLE PER THE NOTES PROVIDED BELOW FOR EACH METHOD. CAST IN PLACE CONCRETE SHALL BE AN OPTION FOR EITHER EXCAVATION METHOD. PRECAST CONCRETE SHALL ONLY BE USED WITH THE EXCAVATED HOLE METHOD.
3. THE EVALUATION OF GEOTECHNICAL LATERAL CAPACITY IS BASED ON A SOIL MODEL COMPRISED OF HOMOGENEOUS GRANULAR (COHESIONLESS) SOILS HAVING A FRICTION ANGLE OF 32 DEGRESS, MAXIMUM GROUND SURFACE STEEPNESS OF 4H:1V, AND NEAR SURFACE GROUNDWATER TABLE. IF THE SOIL PROVIDING FOUNDATION SUPPORT CANNOT GENERATE AN EQUIVALENT OR GREATER LATERAL CAPACITY, AS COMPARED TO THIS SOIL MODEL, THEN THE ENGINEER WILL REVIEW THE FOUNDATION CONDITIONS WITH THE GEOTECHNICAL SECTION AND EVALUATE WHETHER A REDESIGN IS REQUIRED.
4. TRENCHES FOR THE CONDUITS SHALL BE HAND DUG NEAR THE PROPOSED FOUNDATION, DISTURBING AS LITTLE SOIL AS POSSIBLE IN PLACING OF THE CONDUITS (APPROXIMATELY 2.5 FT MAXIMUM DOWN FROM THE EXISTING GROUND SURFACE). THE RESULTING TRENCHES SHALL BE BACKFILLED WITH STRUCTURAL FILL CONFORMING TO SECTION 508.
5. WHERE BEDROCK IS ENCOUNTERED, A REDUCTION IN CIRCULAR SHAFT LENGTH MAY BE POSSIBLE FOR THE DRILLED HOLE METHOD ONLY, AS DESCRIBED IN THE DRILLED HOLE NOTES.
6. CAST IN PLACE CONCRETE SHALL BE CLASS A HAVING A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI AND BE PLACED IN CONFORMANCE WITH SECTION 520. CYLINDERS FOR STRENGTH TESTING SHALL BE TAKEN DURING CONCRETE PLACEMENT.
7. CONCRETE FOR A PRECAST CIRCULAR SHAFT FOUNDATION SHALL BE CLASS AAA WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 5000 PSI CONSTRUCTED IN CONFORMANCE WITH SECTION 520. INSPECTION BY A DEPARTMENT REPRESENTATIVE DURING THE PRECASTING AT THE PLANT IS REQUIRED. CONTACT THE BUREAU OF MATERIALS AND RESEARCH AT 271-1656 TO ARRANGE FOR PLANT INSPECTION AT LEAST 14 DAYS PRIOR TO CASTING.
8. STAINLESS STEEL STD. GR. WIRE CLOTH. 1/4" MAX. OPENING WITH MIN. WIRE DIA. OF AWG NO. 16 WITH 2" LAP. SECURE WITH 3/4" STAINLESS STEEL BANDING AFTER ANCHOR RODS ARE FULLY TIGHTENED.
9. NO GROUT SHALL BE PLACED BETWEEN THE FOUNDATION AND BOTTOM OF THE BASE PLATE.
10. THE EXPOSED LENGTH OF THE ANCHOR ROD BETWEEN THE TOP OF THE FOUNDATION AND THE BOTTOM OF THE LEVELING NUT SHOULD NOT EXCEED ONE ROD DIAMETER (MAXIMUM) OR 1-INCH (PREFERRED).
11. FOR THE INSTALLATION, PRETENSIONING AND ULTRASONIC TESTING OF ANCHOR RODS, SEE THE SPECIAL PROVISION AMENDMENT TO SECTION 616, TRAFFIC SIGNALS.
12. ALL REINFORCING STEEL SHALL CONFORM TO AASHTO M31/M31M, GRADE 60 (420). ALL REINFORCING STEEL SHALL BE A MINIMUM OF 3 INCHES FROM CONCRETE SURFACES, UNLESS NOTED OTHERWISE, AND MEET THE REQUIREMENTS OF SECTION 544.
13. TYPE 2 FOUNDATIONS SHALL BE PAID FOR UNDER ITEM 616.1XX.

DRILLED HOLES

1. THE CIRCULAR SHAFT FOUNDATION SHALL BE CONSTRUCTED OF CAST IN PLACE CONCRETE AGAINST UNDISTURBED MATERIAL USING TEMPORARY CASING IF NECESSARY. THE CONCRETE MIX SHALL BE CAPABLE OF FLOWING THROUGH THE REINFORCING CAGE TO THE EXCAVATION SIDES WITH MINIMAL USE OF VIBRATION EQUIPMENT WHETHER THE METHOD OF PLACEMENT IS FREEFALL OR UNDERWATER. THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER FOR VISUAL INSPECTION OF THE EXCAVATION, THE ARRANGEMENT OF THE REINFORCING BARS, AND THE ANCHOR BOLTS PRIOR TO CONCRETE PLACEMENT.
2. THE EXPOSED PORTION OF THE SHAFT AND TO A DEPTH OF AT LEAST 12 INCHES SHALL HAVE A FORMED APPEARANCE WITH THE TOP HAVING A SMOOTH LEVEL FINISH.
3. UNDERWATER PLACEMENT PROCEDURES (TREMIE OR PUMPING METHODS) SHALL BE REQUIRED WITHIN A DRILLED HOLE WHERE THE STANDARDS FOR A DRY EXCAVATION AND FREE FALL PLACEMENT METHOD CANNOT BE MET. THE WATER LEVEL WITHIN A DRILLED HOLE SHALL BE AT A STABILIZED, STATIC LEVEL AT THE TIME OF CONCRETE PLACEMENT.
4. WHERE BEDROCK IS ENCOUNTERED, THE DRILL SHALL PENETRATE THE BEDROCK A MINIMUM OF 3 FEET AND IN ALL CASES A MINIMUM SHAFT LENGTH OF 5 FEET SHALL BE OBTAINED. IT IS NOT NECESSARY TO EXTEND THE SHAFT IN BEDROCK BEYOND THE SPECIFIED SOIL-BASED LENGTH GIVEN ON THE PLANS.
5. WHERE FILL EMBANKMENT IS TO BE CONSTRUCTED ABOVE THE EXISTING GROUND, THE EMBANKMENT SHALL BE BUILT PRIOR TO CONSTRUCTING THE SHAFT. PLACEMENT AND COMPACTION OF THE FILL SHALL BE IN ACCORDANCE WITH SECTION 203.
6. IF THE DRILLED HOLE METHOD IS PERFORMED AND THE SOILS ARE FOUND TO BE UNSUITABLE, AN EXCAVATED HOLE SHALL BE COMPLETED AS APPROVED BY THE ENGINEER.

EXCAVATED HOLES

▲ 1. AS AN ALTERNATIVE TO A DRILLED HOLE, THE CIRCULAR SHAFT FOUNDATION CONCRETE SHALL BE CONSTRUCTED IN AN EXCAVATED HOLE. THE FOUNDATION SHALL BE CAST IN PLACE USING FORMS (WHICH MUST BE REMOVED) OR ALTERNATIVELY A PRECAST CIRCULAR SHAFT FOUNDATION SHALL BE INSTALLED.

2. THE EXCAVATED HOLE SHALL BE AT LEAST 3 FT CLEAR OF THE FOUNDATION SIDES AND 1 FT DEEPER THAN THE FOUNDATION.
3. ANY BEDROCK ENCOUNTERED SHALL BE REMOVED TO THE SAME LIMITS AS DESCRIBED FOR SOIL (SEE PREVIOUS NOTE). IF THIS IS NOT POSSIBLE THEN THE ENGINEER SHALL REQUEST A REDESIGN.
4. THE EXCAVATED HOLE SHALL BE BACKFILLED TO THE LIMITS OF EXCAVATION WITH STRUCTURAL FILL ACCORDING TO SECTION 508. NO PAYMENT SHALL BE MADE FOR STRUCTURAL FILL OR EXCAVATION.

STANDARD NO. TS-4

REVISION DATE
07-13-01
02-26-10
10-09-17
01-17-19

*.DGN FILE NAME
TS-4

STANDARD PLAN

New Hampshire DOT Department of Transportation

TRAFFIC SIGNAL STANDARD

Traffic Signal Mast Arm Foundation - Type 2

STANDARD NO. TS-4