

MISSOURI HIGHWAYS and TRANSPORTATION COMMISSION

JEFFERSON CITY, MISSOURI

**SUPPLEMENTAL PLANS TO JULY 2017 MISSOURI STANDARD
PLANS FOR HIGHWAY CONSTRUCTION**

EFFECTIVE October 1, 2018

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

MISSOURI STANDARD PLANS FOR HIGHWAY CONSTRUCTION

TABLE OF CONTENTS

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

STANDARD NO.	DRAWING TITLE	NO. OF SHEETS	EFFECTIVE DATE	STANDARD NO.	DRAWING TITLE	NO. OF SHEETS	EFFECTIVE DATE
203.00E	EXCAVATION AND EMBANKMENT - TYPICAL DETAILS	1	08/01/1998	606.60B	MIDWEST GUARDRAIL SYSTEM (MGS) - VERTICAL BARRIER TRNSITIONS	6	04/01/2018
203.02F	UNDERGRADING - TYPICAL DETAILS	2	01/01/2004	606.70B	MIDWEST GUARDRAIL SYSTEM (MGS) - THRIE BEAM RAIL ON BRIDGE	5	04/01/2018
203.10D	TABULATED EARTHWORK AND SECTION DATA	1	02/01/2009	606.80C	MIDWEST GUARDRAIL SYSTEM (MGS) - TERMINAL ANCHOR ENDS	7	07/01/2017
203.20G	SUPERELEVATION, SPIRALS AND WIDENING (UNDIVIDED HIGHWAY)	4	07/01/2017	606.81	MASH - CRASHWORTHY END TERMINALS - TYPE A - GRADING LIMITS	1	01/01/2017
203.21K	SUPERELEVATION, SPIRALS AND WIDENING (DIVIDED HIGHWAY)	3	07/01/2017	607.10V	CHAIN-LINK FENCE	1	02/01/2007
203.22	SUPERELEVATION, SPIRALS AND WIDENING	2	07/01/2017	607.11H	CHAIN-LINK FENCE FOR RETAINING WALLS	1	06/01/2009
203.35A	MAILBOX TURNOUTS	1	08/01/1981	607.20G	WOVEN WIRE FENCE	2	07/01/2016
203.40G	TYPICAL DETAILS ON AND OFF RAMPS	2	10/01/2007	608.00H	PAVED APPROACHES	2	10/01/2009
203.41F	TYPICAL DETAILS ON AND OFF RAMPS (ROADWAY WITH 6:1 FORESLOPE)	2	01/01/1995	608.10P	CONCRETE SIDEWALK	1	04/01/2015
203.50N	TYPICAL MEDIAN OPENINGS (DIVIDED HIGHWAYS)	2	04/01/2016	608.20E	CONCRETE STAIRS	2	04/01/2015
203.61A	DRIVEWAY - TYPE I	1	07/01/2004	608.30A	CONCRETE MEDIAN STRIP	1	02/01/2011
203.62D	DRIVEWAY - TYPE II	2	04/01/2017	608.40	HANDRAILING	4	04/01/2015
203.63B	DRIVEWAY - TYPE III	2	04/01/2017	608.50	CURB RAMPS	4	04/01/2015
203.64D	DRIVEWAY - TYPE IV	2	04/01/2017	609.00P	CONCRETE CURB, CURB AND GUTTER AND GUTTER	2	08/01/2008
203.65A	DRIVEWAY - TYPE V	1	10/01/1998	609.15D	PAVED DITCHES	1	07/01/2016
204.00D	EMBANKMENT CONTROL - MEASURING DEVICES	1	04/01/1983	609.40S	DRAIN BASIN, SHOULDER PAVING AND FILL SLOPES AT BRIDGE ENDS	3	01/01/2017
204.30	PORE PRESSURE MEASUREMENT DEVICES	1	03/01/1996	609.60C	ROCK DITCH LINER	1	03/01/1993
401.00B	TYPE A2 AND A3 SHOULDERS, SAFETY EDGE SM	3	04/01/2018	609.70C	ROCK LINING FOR CULVERT OUTLET	1	10/01/1981
413.20	SCRUB SEAL BROOM CONFIGURATION	1	07/01/2004	611.60R	CONCRETE SLOPE PROTECTION	1	07/01/2015
502.05N	CONCRETE PAVEMENT AND BASE APPURTENANCES FOR 15 FT. JOINT SPACING	4	07/01/2015	612.20E	SAND FILLED IMPACT ATTENUATORS	*	10/01/2018
502.10K	DOWEL SUPPORTING UNITS	2	06/01/2010	613.00S	PAVEMENT REPAIR	4	04/01/2017
504.00J	CONCRETE APPROACH PAVEMENT	3	07/01/2015	614.10T	GRATES AND BEARING PLATES	1	12/01/2005
602.00D	RIGHT-OF-WAY AND DRAIN MARKERS	2	01/01/2003	614.11C	CURVED VANE GRATE AND FRAME	1	06/01/2010
604.05D	PIPE CULVERT HEADWALLS - TYPE S	2	08/01/2006	614.30E	MANHOLE FRAMES AND COVERS	2	03/01/1996
604.10E	PIPE CULVERT HEADWALL - ENERGY DISSIPATOR FOR 18" CONCRETE PIPE	1	07/01/2001	616.10AU	TEMPORARY TRAFFIC CONTROL DEVICES	9	04/01/2018
604.11E	PIPE CULVERT HEADWALL - ENERGY DISSIPATOR FOR 24" CONCRETE PIPE	1	07/01/2001	617.10K	PERMANENT CONCRETE TRAFFIC BARRIER	11	01/01/2018
604.12E	PIPE CULVERT HEADWALL - ENERGY DISSIPATOR FOR 30" CONCRETE PIPE	1	07/01/2001	617.20D	TEMPORARY CONCRETE TRAFFIC BARRIER	8	10/01/2018
604.13E	PIPE CULVERT HEADWALL - ENERGY DISSIPATOR FOR 36" CONCRETE PIPE	1	07/01/2001	619.10J	PAVEMENT EDGE TREATMENT	1	10/01/2017
604.14E	PIPE CULVERT HEADWALL - ENERGY DISSIPATOR FOR 42" CONCRETE PIPE	1	07/01/2001	620.00L	PAVEMENT MARKING	5	10/01/2016
604.15E	PIPE CULVERT HEADWALL - ENERGY DISSIPATOR FOR 48" CONCRETE PIPE	1	07/01/2001	620.10G	TEMPORARY PAVEMENT MARKING	5	07/01/2017
604.29C	DROP INLET - TYPE X	2	04/01/2018	625.00	HOLE PATTERN FOR PAVEMENT SLAB STABILIZATION	1	10/01/1998
604.30G	CONCRETE MANHOLES	2	02/01/2009	626.00H	RUMBLE STRIPS	2	04/01/2009
604.40F	PIPE COLLARS	2	10/01/2000				
604.70	SLOTTED DRAIN	2	03/01/1994				
605.10I	PAVEMENT UNDERDRAINAGE	4	06/01/2013				
606.00AY	GUARDRAIL	7	04/01/2018				
606.01F	MEDIAN PIER PROTECTION	9	08/01/2012				
606.22U	BRIDGE ANCHOR SECTION - SAFETY BARRIER CURB ON BRIDGE	6	07/01/2016				
606.23J	BRIDGE ANCHOR SECTION (THRIE BEAM RAIL ON BRIDGE)	5	07/01/2016				
606.30K	GUARDRAIL - TERMINAL ANCHOR ENDS	7	04/01/2017				
606.31	CRASHWORTHY END TERMINALS - TYPE A - GRADING LIMITS	1	01/01/2017				
606.40D	ONE-STRAND ACCESS RESTRAINT CABLE	2	07/01/2004				
606.41L	THREE-STRAND GUARD CABLE	7	10/01/2017				
606.50C	MIDWEST GUARDRAIL SYSTEM (MGS)	8	04/01/2018				
606.51	MIDWEST GUARDRAIL SYSTEM (MGS) - MEDIAN PIER PROTECTION	2	04/01/2018				

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

EFFECTIVE: 10/01/2018

MISSOURI STANDARD PLANS FOR HIGHWAY CONSTRUCTION TABLE OF CONTENTS

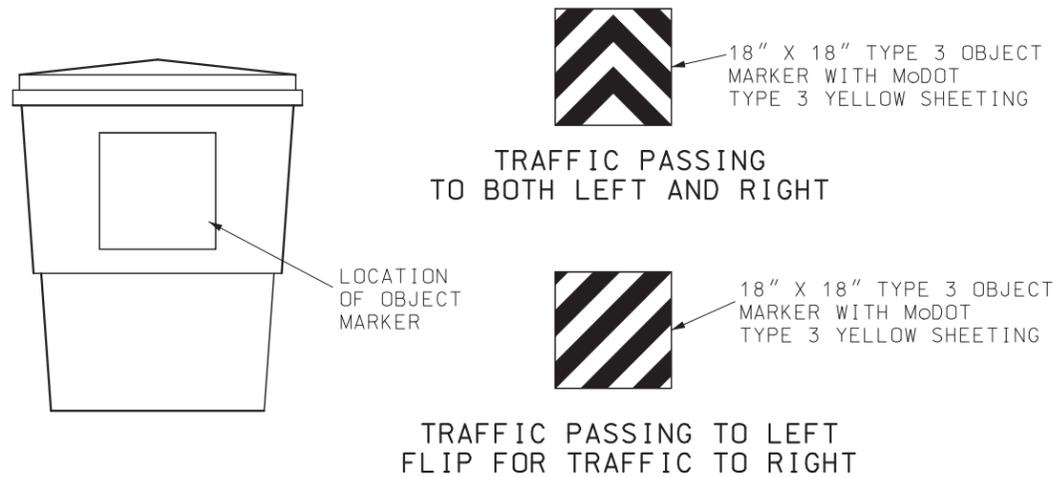
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

STANDARD NO.	DRAWING TITLE	NO. OF SHEETS	EFFECTIVE DATE	STANDARD NO.	DRAWING TITLE	NO. OF SHEETS	EFFECTIVE DATE
703.10J	CONCRETE SINGLE BOX CULVERT - STRAIGHT WINGS (SQUARED)	3	07/01/2015	901.30F	HIGHWAY LIGHTING - BASE MOUNTED CONTROL STATION	2	04/01/2005
703.11J	CONCRETE SINGLE BOX CULVERT - FLARED WINGS (SQUARED)	3	07/01/2015	901.80D	HIGHWAY LIGHTING - POWER SUPPLY ASSEMBLY - SECONDARY SERVICE	2	04/01/2002
703.12J	CONCRETE SINGLE BOX CULVERT - STRAIGHT WINGS (LEFT ADVANCE)	3	07/01/2015	901.85B	HIGHWAY LIGHTING SYMBOLS	1	04/01/2018
703.13J	CONCRETE SINGLE BOX CULVERT - FLARED WINGS (LEFT ADVANCE)	3	07/01/2015	902.00P	TRAFFIC SIGNALS	2	04/01/2018
703.14J	CONCRETE SINGLE BOX CULVERT - STRAIGHT WINGS (RIGHT ADVANCE)	3	07/01/2015	902.10Q	TRAFFIC SIGNALS - CONTROLLERS CONDUIT LOCATION	1	04/01/2005
703.15E	CONCRETE SINGLE BOX CULVERT - FLARED WINGS (RIGHT ADVANCE)	3	07/01/2015	902.15K	TRAFFIC SIGNALS - POWER SUPPLY ASSEMBLY	3	07/01/2004
703.16	CONCRETE SINGLE BOX CULVERT - CUT SECTION	1	04/01/2011	902.20G	TRAFFIC SIGNALS - CONCRETE PULL BOXES	3	11/01/2010
703.17	CONCRETE SINGLE BOX CULVERT - MEMBER SIZES AND REINFORCEMENT	14	04/01/2011	902.21C	TRAFFIC SIGNALS - TELEPHONE INTERCONNECT	1	03/01/1996
703.37C	CONCRETE BOX CULVERT - EXTERIOR WING REINFORCEMENT	2	04/01/2011	902.30P	TRAFFIC SIGNALS - POST BASES	*	10/01/2018
703.38A	CONCRETE BOX CULVERT - CUTTING DETAILS	2	10/01/2009	902.40R	TRAFFIC SIGNALS - TUBULAR STEEL POSTS	3	04/01/2018
703.40H	CONCRETE DOUBLE BOX CULVERT - STRAIGHT WINGS (SQUARED)	3	10/01/2011	902.50L	TRAFFIC SIGNALS - INDUCTION LOOP DETECTORS	2	06/01/2009
703.41H	CONCRETE DOUBLE BOX CULVERT - FLARED WINGS (SQUARED)	3	10/01/2011	902.70P	TRAFFIC SIGNALS - RIGID SPAN WIRE DETAILS	2	04/01/2018
703.42H	CONCRETE DOUBLE BOX CULVERT - STRAIGHT WINGS (LEFT ADVANCE)	3	10/01/2011	902.80L	TRAFFIC SIGNALS - TRAFFIC SIGNAL SYMBOLS	1	07/01/2017
703.43H	CONCRETE DOUBLE BOX CULVERT - FLARED WINGS (LEFT ADVANCE)	3	10/01/2011	903.01J	STANDARD ARROW DETAILS	2	10/01/2016
703.44H	CONCRETE DOUBLE BOX CULVERT - STRAIGHT WINGS (RIGHT ADVANCE)	3	10/01/2011	903.02AN	HIGHWAY SIGNING	8	01/01/2017
703.45C	CONCRETE DOUBLE BOX CULVERT - FLARED WINGS (RIGHT ADVANCE)	3	10/01/2011	903.03BL	POST INSTALLATIONS AND SIGN MOUNTING DETAILS	16	01/01/2018
703.46	CONCRETE BOX CULVERT - CUT SECTION	1	10/01/2011	903.04F	HIGHWAY SIGNING - WEIGH STATION	1	02/01/2012
703.47	CONCRETE BOX CULVERT - MEMBER SIZES AND REINFORCEMENT	27	10/01/2011	903.05J	HIGHWAY SIGNING - TUBULAR SUPPORT STEEL - TYPE S, ONE TUBE	2	10/01/2016
703.60E	CONCRETE BOX STRUCTURE - PIPE INLET	1	07/01/2001	903.06J	HIGHWAY SIGNING - TUBULAR SUPPORT STEEL - TYPE S, TWO TUBE	2	10/01/2016
703.80H	CONCRETE TRIPLE BOX CULVERT - STRAIGHT WINGS (SQUARED)	3	12/01/2011	903.07J	HIGHWAY SIGNING - TUBULAR SUPPORT STEEL - TYPE C	2	10/01/2016
703.81H	CONCRETE TRIPLE BOX CULVERT - FLARED WINGS (SQUARED)	3	12/01/2011	903.08H	HIGHWAY SIGNING - TUBULAR SUPPORT STEEL - TYPE B	2	10/01/2016
703.82H	CONCRETE TRIPLE BOX CULVERT - STRAIGHT WINGS (LEFT ADVANCE)	3	12/01/2011	903.10BC	OVERHEAD SIGN TRUSSES - ALUMINUM	6	10/01/2016
703.83H	CONCRETE TRIPLE BOX CULVERT - FLARED WINGS (LEFT ADVANCE)	3	12/01/2011	903.12Z	OVERHEAD SIGN TRUSSES - BUTTERFLY AND CANTILEVER STRUCTURAL STEEL	7	10/01/2016
703.84H	CONCRETE TRIPLE BOX CULVERT - STRAIGHT WINGS (RIGHT ADVANCE)	3	12/01/2011	903.60AB	OVERHEAD SIGN TRUSSES - STRUCTURAL STEEL	5	10/01/2016
703.85C	CONCRETE TRIPLE BOX CULVERT - FLARED WINGS (RIGHT ADVANCE)	3	12/01/2011				
703.86	CONCRETE TRIPLE BOX CULVERT - CUT SECTION	1	12/01/2011				
703.87	CONCRETE TRIPLE BOX CULVERT - MEMBER SIZES AND REINFORCEMENT	27	12/01/2011				
706.35H	BAR SUPPORTS FOR CONCRETE REINFORCEMENT	1	07/01/2004				
712.40K	STEEL DAMS AT EXPANSION DEVICES	1	04/01/2016				
725.00C	CORRUGATED METAL PIPE INSTALLATION METHODS	5	04/01/2011				
725.31C	METAL CURTAIN WALL AND METAL INLETS	1	07/01/2004				
726.30J	RIGID CULVERT INSTALLATION METHODS	2	04/01/2015				
730.00E	THERMOPLASTIC PIPE INSTALLATION METHODS	1	04/01/2015				
731.00U	PRECAST MANHOLES	2	07/01/2016				
731.10S	PRECAST DROP INLET	8	07/01/2016				
732.00S	FLARED END SECTION	3	04/01/2016				
732.05C	BEVELED PIPE END TREATMENT	2	07/01/2004				
732.10H	SAFETY SLOPE END SECTION	3	06/01/2013				
733.00	PRECAST CONCRETE BOX CULVERT TIES	1	04/01/2018				
806.10J	TEMPORARY EROSION CONTROL MEASURES	6	04/01/2015				
808.00	TYPICAL PLANTING ILLUSTRATIONS	3	07/01/2004				
901.00AB	HIGHWAY LIGHTING - POLES, FOUNDATIONS & APPURTENANCES FOR 30' M.H.	4	04/01/2018				
901.01AJ	HIGHWAY LIGHTING - POLES, FOUNDATIONS & APPURTENANCES FOR 45' M.H.	6	04/01/2018				
901.02B	HIGHWAY LIGHTING - CABLE, CONDUIT AND TRENCHING	1	04/01/2002				

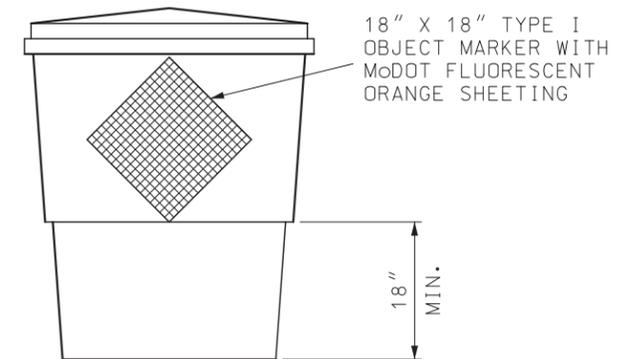
* REVISED OR ADDED SINCE JULY 2018

ATTENUATOR LAYOUT:

ALL SAND FILLED ATTENUATORS SHOULD MEET MANUFACTURER'S RECOMMENDATIONS FOR THE ARRAY AND SAND WEIGHT.



TYPE 3 OBJECT MARKER PLACEMENT FOR PERMANENT INSTALLATIONS



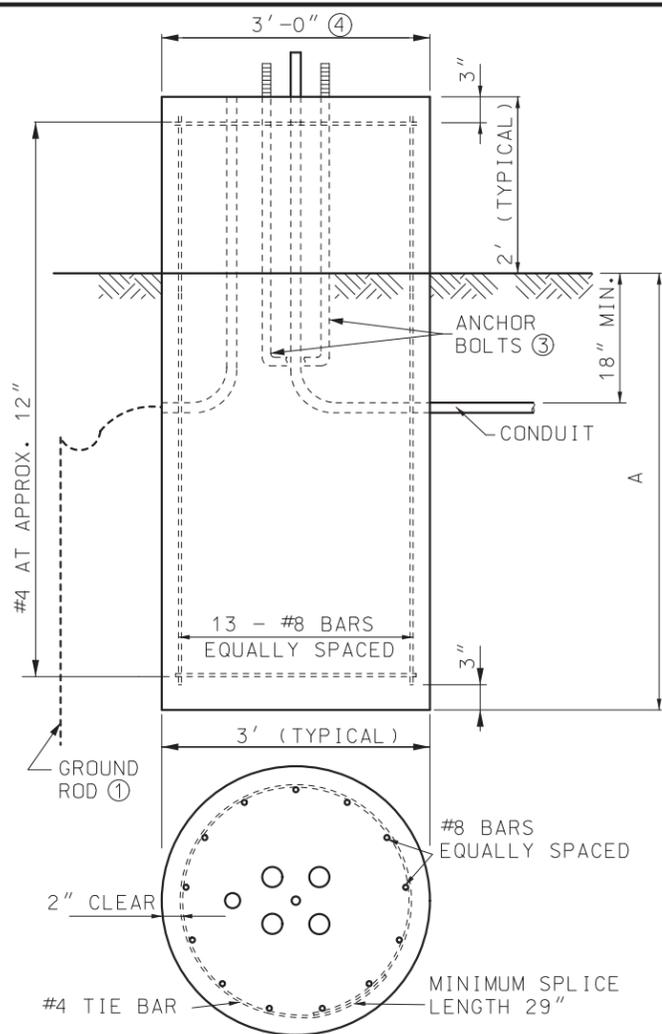
TYPE I OBJECT MARKER PLACEMENT FOR TEMPORARY INSTALLATIONS

GENERAL NOTES:

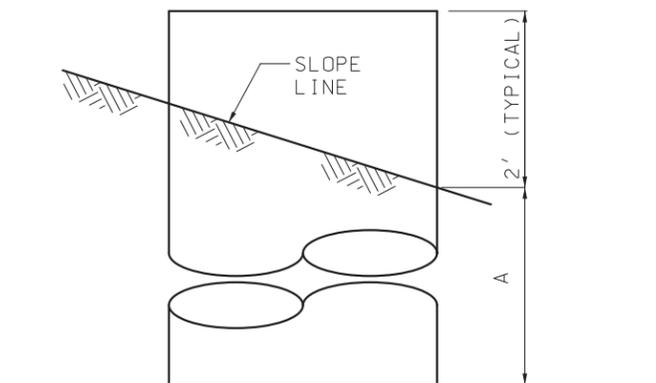
OBJECT MARKERS SHALL BE CENTERED VERTICALLY OR PLACED AS DIRECTED BY THE ENGINEER.

	MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION 105 WEST CAPITOL JEFFERSON CITY, MO 65102 1-888-ASK-MODOT (1-888-275-6636)	
		<p align="center">SAND FILLED IMPACT ATTENUATORS</p>
DATE EFFECTIVE: 10/01/2018 DATE PREPARED: 7/31/2018	<p align="center">612.20E</p>	SHEET NO. 1 OF 1

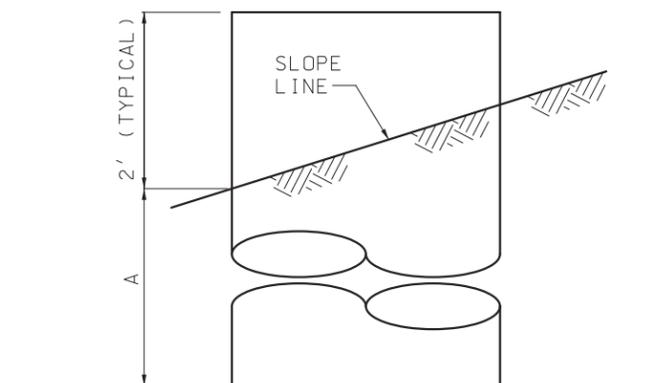
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



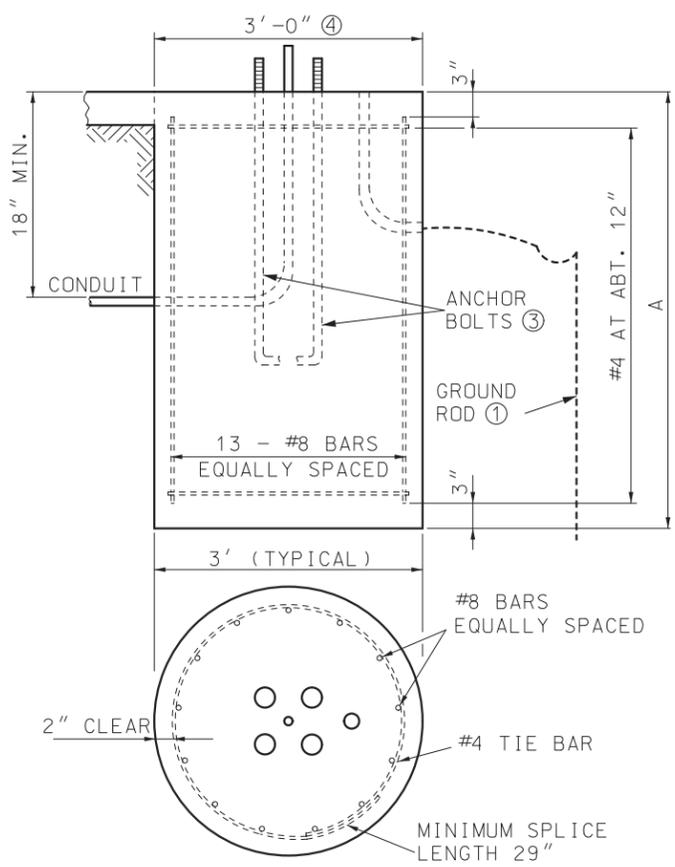
TYPE A (FLAT GROUND)



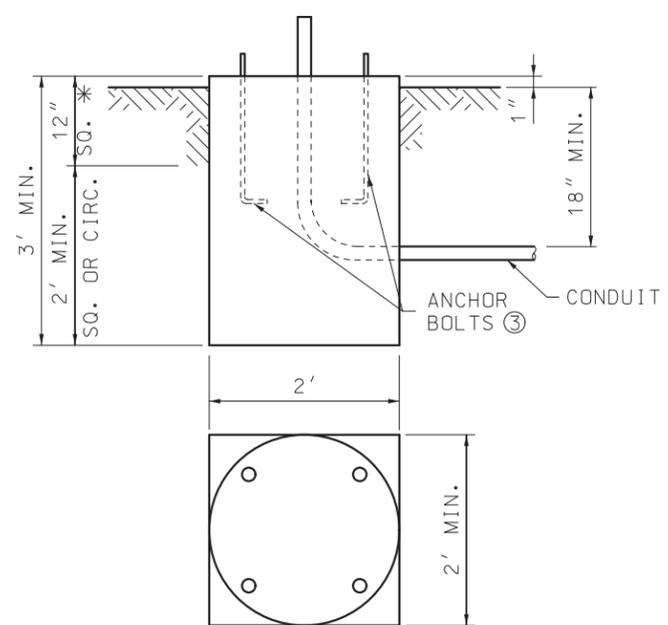
TYPE A (FILL)
(FOR ADDITIONAL DETAILS SEE TYPE A FLAT GROUND)



TYPE A (CUT)
(FOR ADDITIONAL DETAILS SEE TYPE A FLAT GROUND)



TYPE F



TYPE C

* SURFACE OF BASE TO BE CONSTRUCTED SQUARE FOR A DEPTH OF 12".

- ① APPLICABLE ONLY WHERE CONTROLLER IS MOUNTED TO A SIGNAL POLE.
- ② BASE PLATE SHALL STAY WITHIN THE TOP OF THE POST BASE DIAMETER.
- ③ ANCHOR BOLT DIMENSIONS ARE SHOWN ON THE MANUFACTURER'S APPROVED DRAWINGS.
- ④ MAXIMUM BOLT CIRCLE DIAMETER IS 26". BASE PLATE SHALL STAY WITHIN THE TOP OF THE POST BASE DIAMETER.
- ⑤ ARM LENGTH DETERMINED BY LENGTH OF LONGEST ARM FOR TYPE B & BL SIGNAL POSTS.
- ⑥ BASE TYPE A OR F DETERMINED BY LOCATION OF POST BASE.
- ⑦ SOIL DEPTH, NO ROCK.
- ⑧ WEIGHT INCLUDES #4 TIE BARS.
- ⑨ WHEN CONCRETE BASE IS LOCATED WITHIN 8" CONCRETE DIVISIONAL ISLAND, EMBEDMENT LENGTH MAY BE REDUCED BY 1/2 DIAMETER OF THE DRILLED SHAFT.

POST BASES

STEEL AND CONCRETE REQUIREMENTS FOR POST BASES ^③				
TYPE	BASES	#6 STEEL BAR		CONC. C.Y.
		LENGTH	WEIGHT LBS. ⑧	
A-9	9'-0"	10'-6"	300	2.88
A-9.5	9'-6"	11'-0"	310	3.01
A-10	10'-0"	11'-6"	320	3.14
A-10.5	10'-6"	12'-0"	330	3.27
A-11	11'-0"	12'-6"	350	3.40
A-12	12'-0"	13'-6"	380	3.67
F-9	9'-0"	8'-6"	240	2.36
F-9.5	9'-6"	9'-0"	250	2.49
F-10	10'-0"	9'-6"	270	2.62
F-10.5	10'-6"	10'-0"	280	2.75
F-11	11'-0"	10'-6"	300	2.88
F-12	12'-0"	11'-6"	320	3.14
C*				0.44

* SURFACE OF BASE TO BE CONSTRUCTED SQUARE FOR A DEPTH OF 12".

BASE EMBEDMENT IN SOLID ROCK

SOLID ROCK ENCOUNTER POINT	REQUIRED EMBEDMENT FOR BASE TYPE
	A-10 F-10
AT SURFACE	4'-9"
AT ONE-FOURTH NORMAL DEPTH	4'-0"
AT ONE-HALF NORMAL DEPTH	3'-3"
AT THREE-FOURTHS NORMAL DEPTH	1'-3"

- REQUIRED EMBEDMENT DEPTHS CAN BE INTERPOLATED BETWEEN ENCOUNTER POINTS FOR OTHER SOLID ROCK ENCOUNTER DEPTHS.
- NORMAL LENGTHS FOR ANCHOR BOLTS AND REINFORCING STEEL WILL BE REQUIRED.
- CORE DRILL HOLES FOR ANCHOR BOLTS AND REINFORCING STEEL IN SOLID ROCK SHALL BE PROVIDED. CORE DRILL HOLES SHALL BE TWICE THE DIAMETER OF THE ANCHOR BOLT AND REINFORCING STEEL DIAMETER AND TO WITHIN 3 INCHES OF THE NORMAL BASE DEPTH.
- IF SOIL, SHALE, GRAVEL, FRACTURED ROCK, OR VOIDS ARE ENCOUNTERED DURING CORE DRILLING, THE ROCK SHALL BE REMOVED TO THE POINT OF ENCOUNTER.
- ANCHOR BOLTS AND REINFORCING STEEL SHALL BE GROUTED IN THE CORE DRILL HOLES WITH NON-SHRINK GROUT HAVING A MINIMUM STRENGTH OF 9,000 POUNDS IN 24 HOURS.
- STRAIGHT ANCHOR BOLTS OF THE LENGTH SHOWN IN THE ANCHOR BOLT TABLE UNDER THE COLUMN "BOLT LENGTH" ARE ADEQUATE FOR USE IN GROUTED CORE DRILLED HOLES.

POST BASES		
POST TYPE	ARM LENGTH (FEET) ⑤	BASE TYPE ⑥
C OR CL	15 - 25	A-9 OR F-9
C OR CL	30 - 35	A-9.5 OR F-9.5
C OR CL	40 - 55	A-10.5 OR F-10.5
B OR BL	15 - 25	A-10 OR F-10
B OR BL	30 - 35	A-11 OR F-11
B OR BL	40 - 55	A-12 OR F-12

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
 105 WEST CAPITOL
 JEFFERSON CITY, MO 65102
 1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI
 NICOLE A. KOLB HOOD
 NUMBER PE-2001018754
 PROFESSIONAL ENGINEER
 THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

TRAFFIC SIGNALS
 POST BASES

DATE EFFECTIVE: 10/01/2018	902.30P	SHEET NO. 1 OF 2
DATE PREPARED: 7/31/2018		

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.