MISSOURI
HIGHWAYS and TRANSPORTATION
COMMISSION

JEFFERSON CITY, MISSOURI

SUPPLEMENTAL PLANS TO JULY 2018 MISSOURI STANDARD PLANS FOR HIGHWAY CONSTRUCTION

EFFECTIVE April 1, 2019

EFFECTIVE: 04/01/2019

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

MISSOURI STANDARD PLANS FOR HIGHWAY CONSTRUCTION

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* REVISED OR ADDED SINCE JULY 2018

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EFFECTIVE: 04/01/2019

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

MISSOURI STANDARD PLANS FOR HIGHWAY CONSTRUCTION

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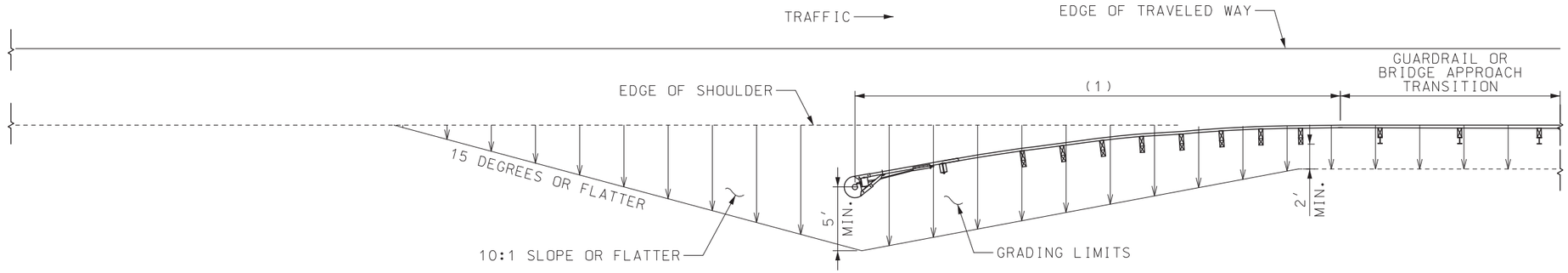
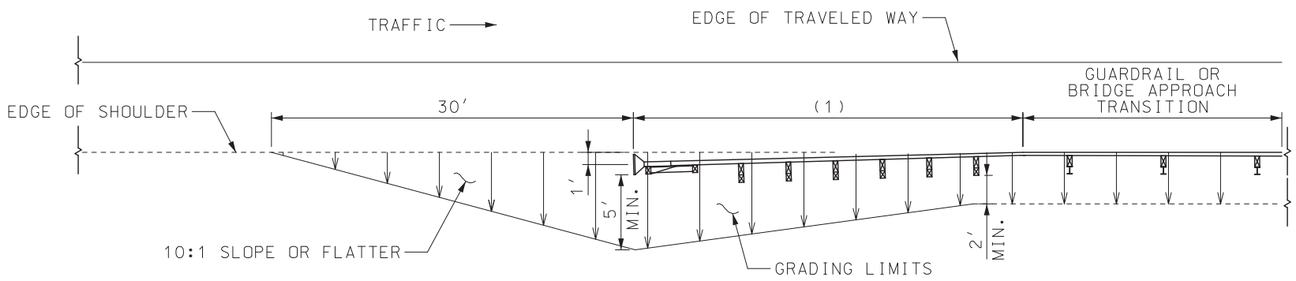
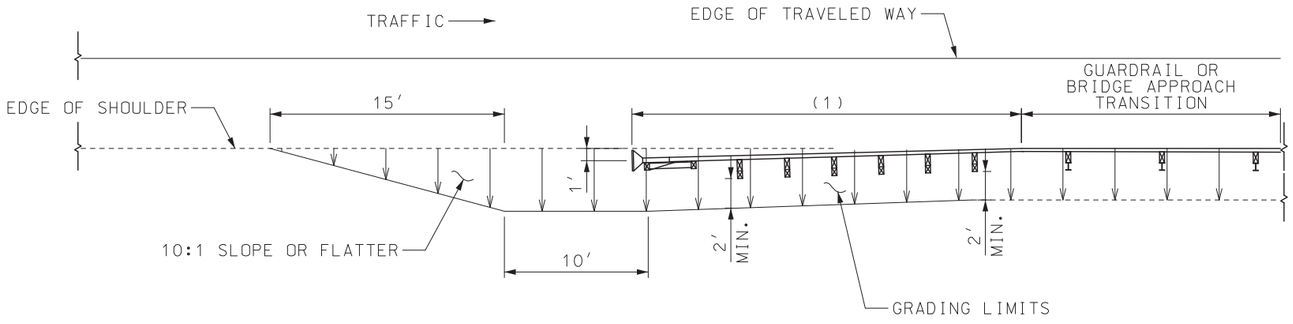


GRADING LIMITS FOR FLARED CRASHWORTHY END TERMINALS



PREFERRED GRADING LIMITS FOR CRASHWORTHY END TERMINALS



ALTERNATE GRADING LIMITS FOR CRASHWORTHY END TERMINALS

(1) APPROVED CRASHWORTHY END TERMINAL

GENERAL NOTES:

THE PREFERRED GRADING LIMITS SHALL BE USED WHEN INDICATED ON THE PLANS.

THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH APPROVED SHOP DRAWINGS OF THE APPROVED CRASH-WORTHY END TERMINAL.

END ANCHORS SHALL BE INSTALLED ON ENDS OF GUARDRAIL RUNS WHERE CRASHWORTHY END TERMINALS ARE NOT REQUIRED.

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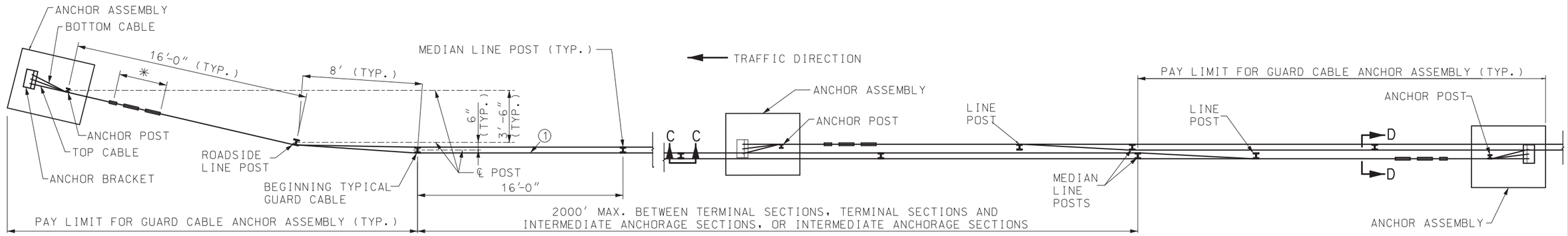
NUMBER PE-28411
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

CRASHWORTHY END TERMINALS TYPE A GRADING LIMITS

DATE EFFECTIVE: 04/01/2019
DATE PREPARED: 1/16/2019

606.31A

SHEET NO. 1 OF 1

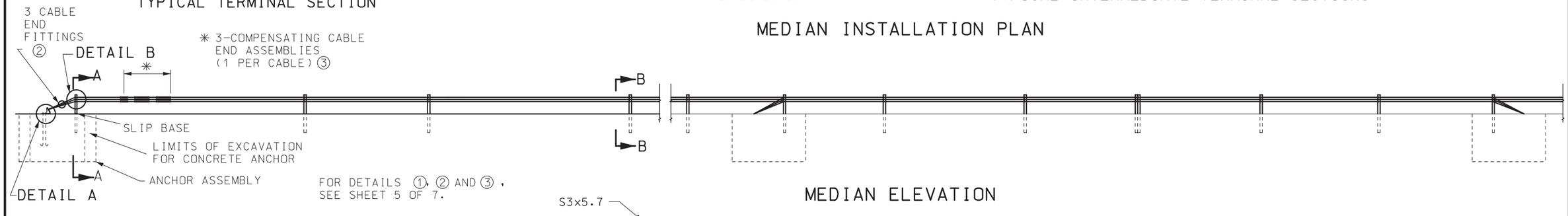


TYPICAL TERMINAL SECTION

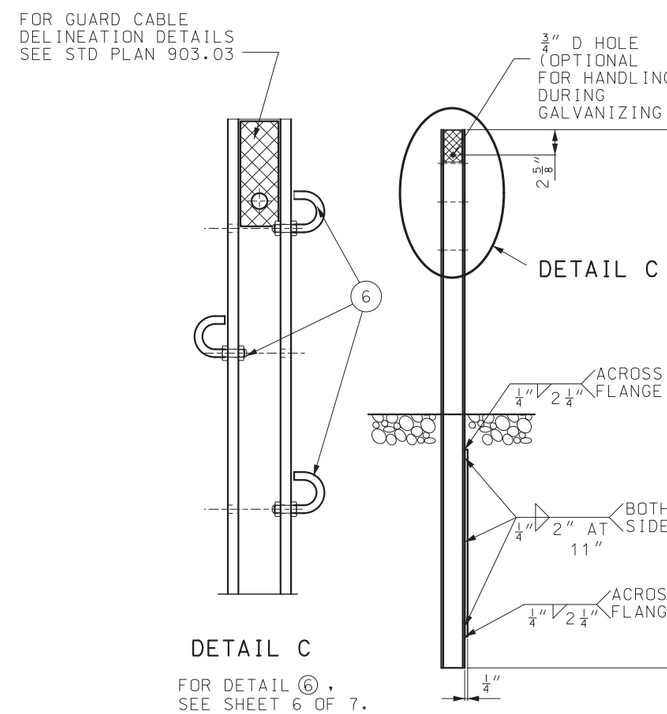
TRAFFIC DIRECTION →

TYPICAL INTERMEDIATE TERMINAL SECTIONS

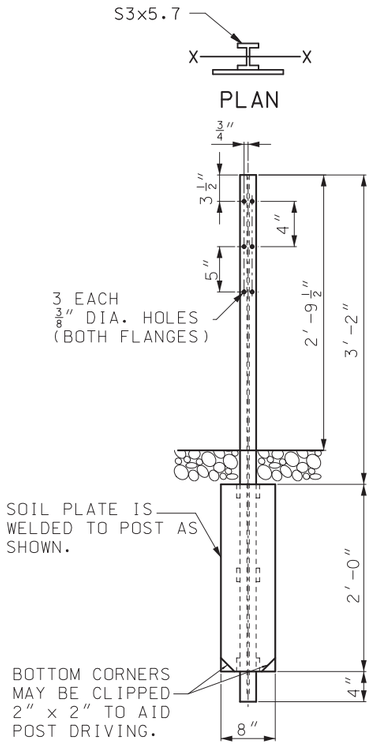
MEDIAN INSTALLATION PLAN



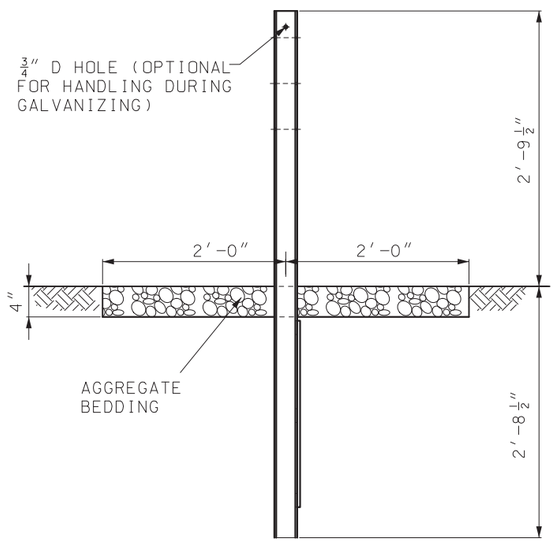
MEDIAN ELEVATION



SECTION B-B



SECTION C-C



SECTION D-D

LINE POST AND WELDED SOIL PLATE

GENERAL NOTES:

IN THE EVENT THE NORMAL 16' POST SPACING WOULD PLACE A POST ON A DROP INLET, THE SPACING OF THE TWO POSTS IMMEDIATELY PRECEDING THE INLET SHALL BE REDUCED SUCH THAT THE FOLLOWING POST CLEARS THE INLET. EACH SUBSEQUENT POST SHALL BE SPACED AT 16'. IN NO CASE SHALL THE SPACING EXCEED 16'.

IN THE EVENT A LONGITUDINAL MEDIAN PIPE IS ENCOUNTERED THE CABLE SHALL BE PLACED PARALLEL TO THE PIPE AT A MINIMUM OFFSET OF 12". THE OFFSET SHALL BE ACHIEVED BY A MINIMUM 16:1 TAPER ON THE UPSTREAM AND DOWNSTREAM END OF THE PIPE.

FOR SECTION A-A AND DETAIL B, SEE SHEET 4 OF 7.

FOR GUARD CABLE DELINEATION DETAILS SEE STD PLAN 903.03.

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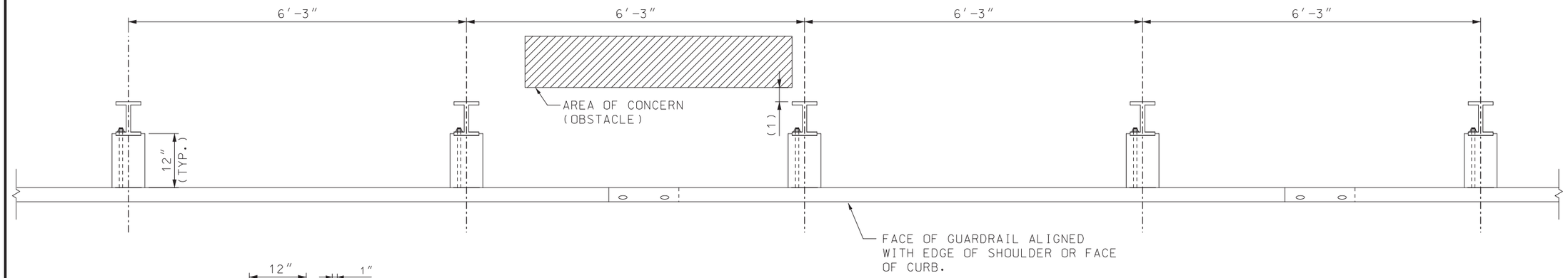
THREE-STRAND GUARD CABLE
MEDIAN APPLICATION

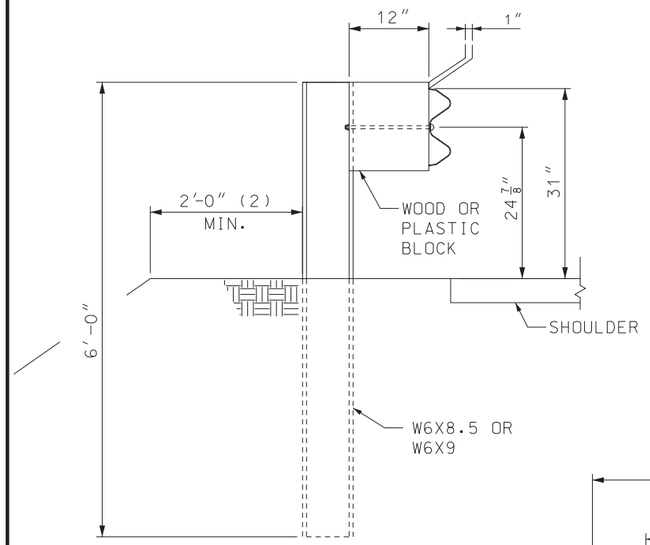
DATE EFFECTIVE: 04/01/2019
DATE PREPARED: 1/16/2019

606.41L

SHEET NO. 1 OF 7



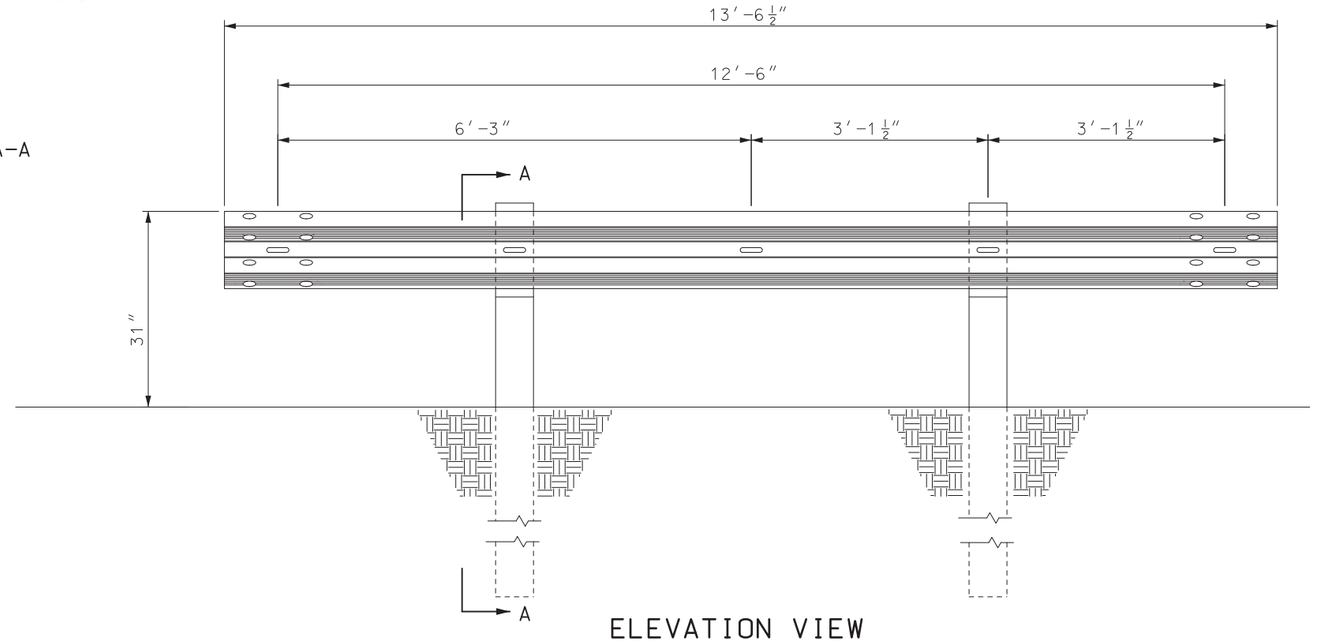
PLAN VIEW



SECTION A-A

(1) 2′-6″ MINIMUM CLEARANCE TO THE FACE OF OBSTACLE WITH 6′-3″ POST SPACINGS, 2′-0″ MINIMUM CLEARANCE TO THE FACE OF OBSTACLE WITH 3′-1 1/2″ POST SPACINGS, OR 1′-6″ MINIMUM CLEARANCE TO THE FACE OF OBSTACLE WITH 1′-6 3/4″ POST SPACINGS. SEE SHEET 4 OF 8 FOR POST SPACING DETAILS.

(2) WHEN SITE CONSTRAINTS PROHIBIT OR EMBANKMENT CANNOT BE CONSTRUCTED TO PROVIDE A MINIMUM OF 2 FEET BETWEEN THE BACK OF THE GUARDRAIL POST AND SLOPE BREAK POINT, 8 FOOT POSTS SHALL BE USED (SEE SHEET 6 OF 8).



ELEVATION VIEW

GENERAL NOTES:

FOR INITIAL INSTALLATION, CONSTRUCT THE GUARDRAIL WITHIN 1″ OF THE STANDARD 31″ HEIGHT TO THE TOP OF W-BEAM RAIL. WHEN SUBSEQUENT PROJECTS, SUCH AS RESURFACINGS, AFFECT THE HEIGHT OF EXISTING GUARDRAIL, ADJUSTMENT IS NOT REQUIRED IF THE FINISHED HEIGHT IS WITHIN 3″ OF THE STANDARD HEIGHT.

THE STANDARD POST LENGTH IS 6′-0″ (+3″,-0″ TOLERANCE).

THE SUBSTITUTION OF 8 FOOT POSTS IN LIEU OF REQUIRED GRADING, TO CONSTRUCT LESS THAN THE DESIGNED TYPICAL SECTION, SHALL NOT BE ALLOWED.

REFER TO AASHTO M 180 FOR DIMENSIONAL DETAILS OF W-BEAM, RELATED BUFFER AND END SECTIONS, BEAM SPLICES, POST AND SPLICE BOLTS, NUTS, AND TYPE 1 W-BEAM TO THRIE BEAM TRANSITION SECTIONS.

BEAM WASHERS ARE NOT TO BE USED. BOLT GRADE SHALL BE ASTM A307.

UNLESS OTHERWISE SPECIFIED, W-BEAM RAIL IS 12 GAUGE STEEL WITH AN EFFECTIVE LENGTH OF 12′-6″ OR 25′-0″, WITH 29/32″ X 1 1/8″ SPLICE BOLT SLOTS, AND 3/4″ X 1/2″ POST BOLT SLOTS ON 3′-1 1/2″ CENTERS REGARDLESS OF POST SPACING.

FOR PROTECTIVE COATING AND MATERIAL REQUIREMENTS, SEE SEC 1040 OF THE STANDARD SPECIFICATIONS.

LAP SPLICES BETWEEN TWO RAILS OR BETWEEN A RAIL AND TERMINAL CONNECTOR IN THE DIRECTION OF TRAFFIC. LAP THE FLARED END SECTIONS IN THE DIRECTION OF TRAFFIC.

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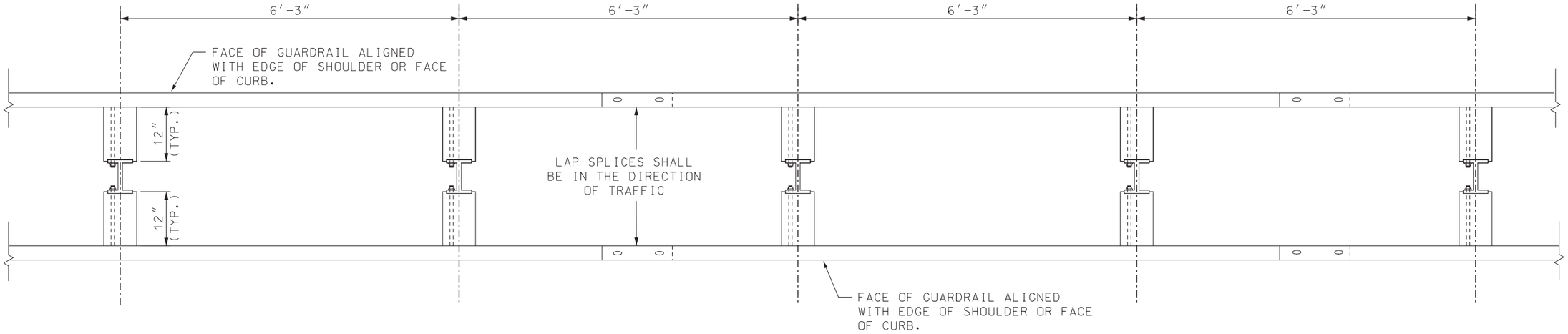
MIDWEST GUARDRAIL SYSTEM (MGS) GUARDRAIL

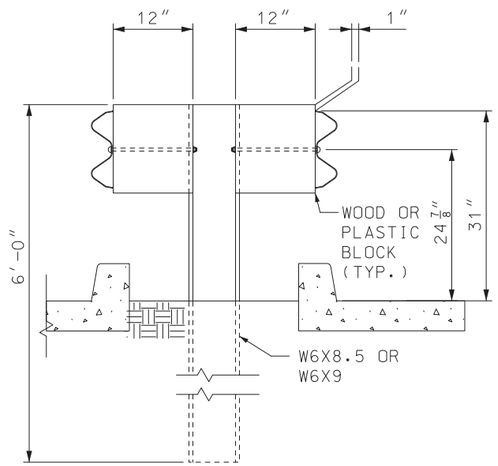
DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

606.50D

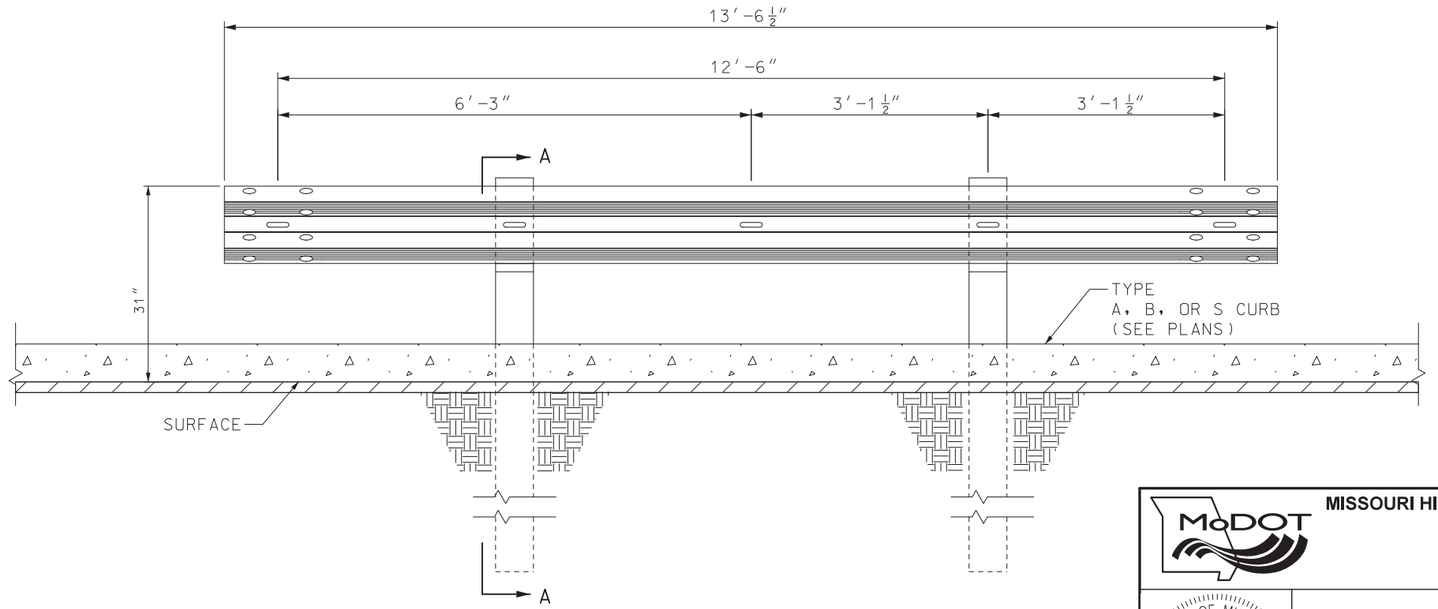
SHEET NO. 1 OF 8



PLAN VIEW



SECTION A-A



ELEVATION VIEW

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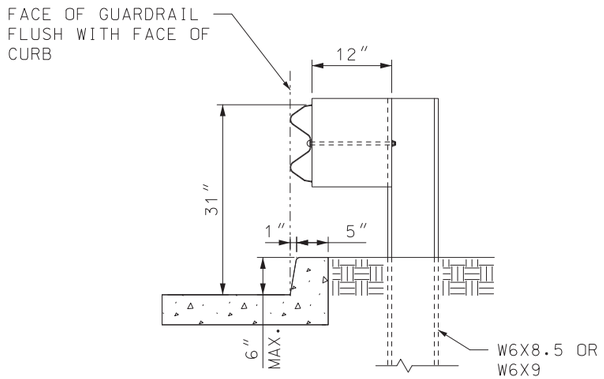
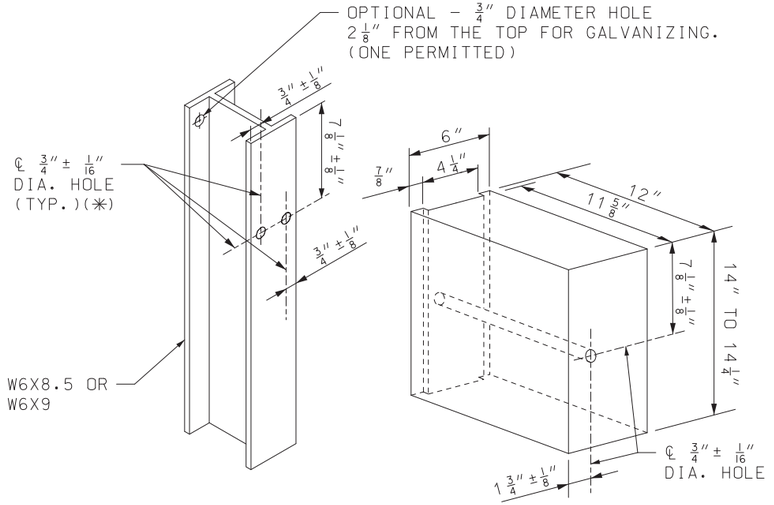
MIDWEST GUARDRAIL SYSTEM (MGS) DOUBLE FACED GUARDRAIL

DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

606.50D



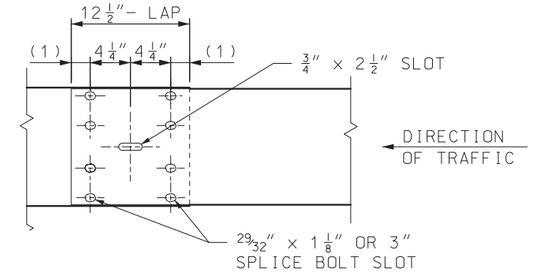
MGS GUARDRAIL AT CURB



FOR STEEL POST AND NOTCHED WOOD OR PLASTIC BLOCK

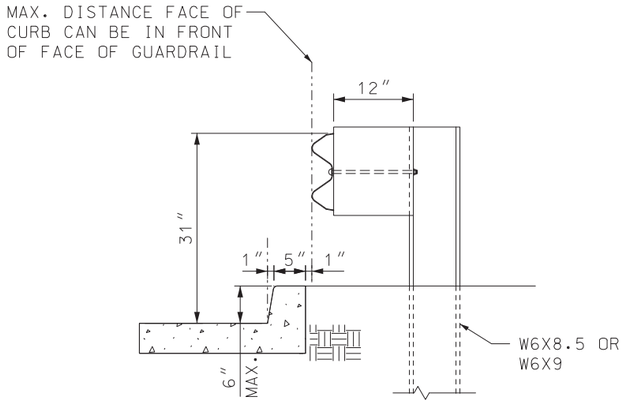
HOLE PUNCHING DETAIL

(✳) TWO HOLES CAN BE PROVIDED ON EACH FLANGE OF POST, ONLY ONE IS REQUIRED FOR FLANGE OF POST THAT HAS A BLOCK ATTACHMENT.

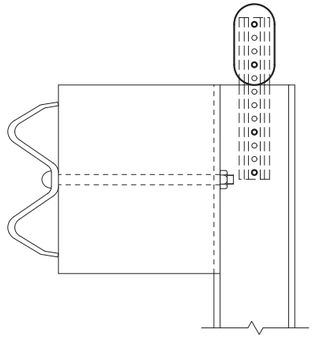


(1) 2″ (TOLERANCE +1 1/4″, – 1/4 ″)

RAIL ELEMENT SPLICE DETAIL



ALTERNATE MGS AT CURB



DELINEATORS ON GUARDRAIL

GENERAL NOTES:

FOR GUARDRAIL DELINEATION DETAILS SEE STD PLAN 903.03.

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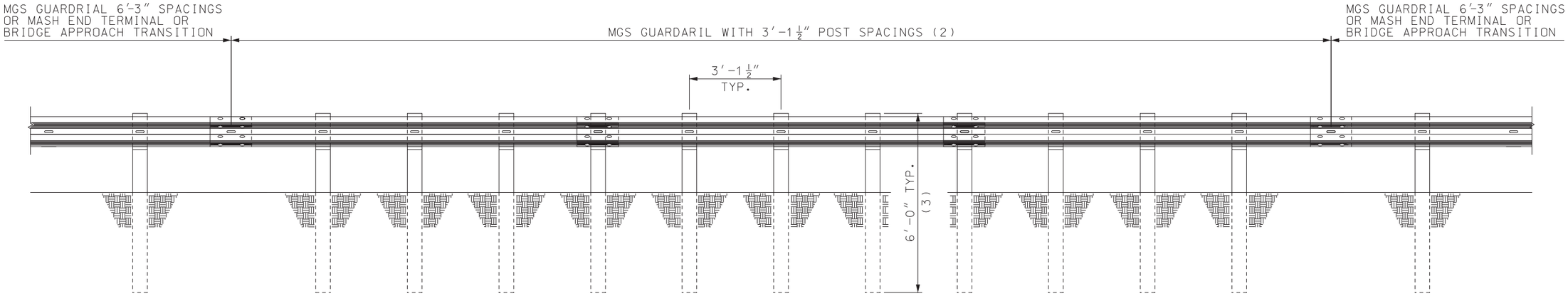
MIDWEST GUARDRAIL SYSTEM (MGS) POST AND BLOCK

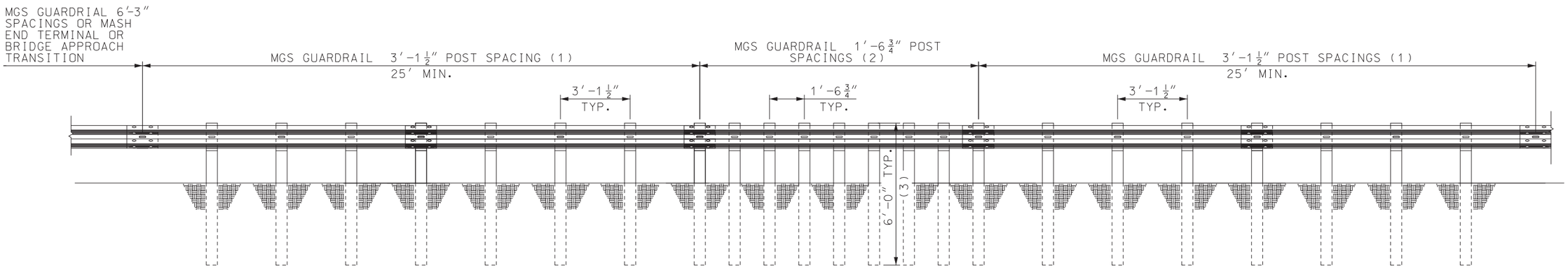
DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

606.50D

SHEET NO. 3 OF 8



MGS GUARDRAIL WITH 3'-1 1/2" POST SPACING



MGS GUARDRAIL WITH 1'-6 3/4" POST SPACING

(1) 25 FEET OF MGS 3'-1 1/2" POST SPACING GUARDRAIL IS REQIRED ON APPROACH AND DEPARTURE ENDS OF 1'-6 3/4" POST SPACING MGS GUARDRAIL.

(2) USE AS MANY SEGMENTS AS NECESSARY TO SHIELD THE AREA OF CONCERN.

(3) REDUCED POST SPACING SHALL USE 6'-0" POSTS MAX. ANY DEVIATION OF 6'-0" POSTS WILL ONLY BE ALLOWED IN ACCORDANCE WITH SPECIAL INSTALLATIONS AS SHOWN ON SHEET 5 OF 8.

GENERAL NOTES:

8' POSTS CANNOT BE USED WHEN:
- POST SPACING IS LESS THAN 6'-3"
- WITHIN CRASHWORTHY END TERMINALS (SEE MANUFACTURERS DRAWINGS)
- WITHIN VERTICAL BARRIER TRANSITIONS (606.60)
- WITHIN BRIDGE APPROACH TRANSITIONS (606.70)

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MIDWEST GUARDRAIL SYSTEM (MGS) REDUCED POST SPACINGS

DATE EFFECTIVE: 01/01/2019
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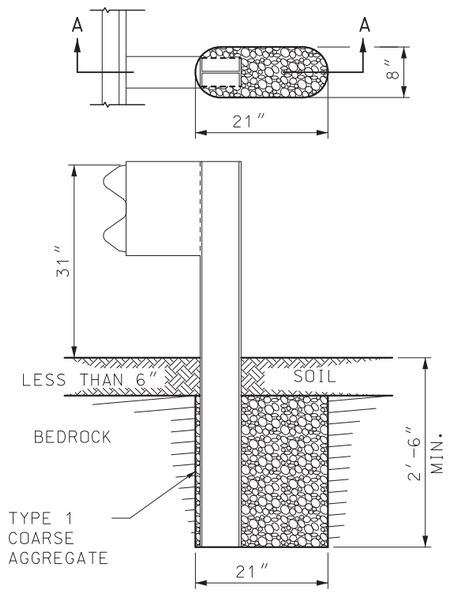
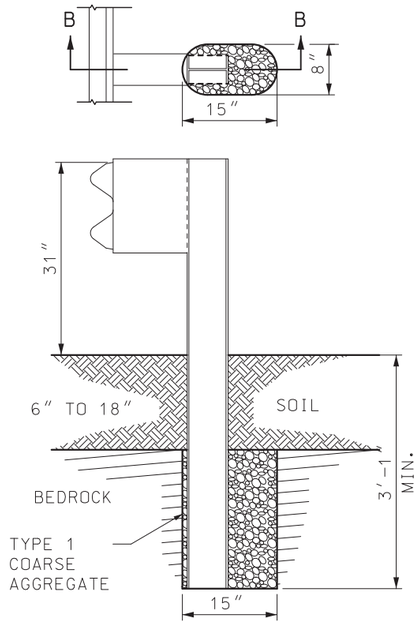
606.50D

SHEET NO. 4 OF 8



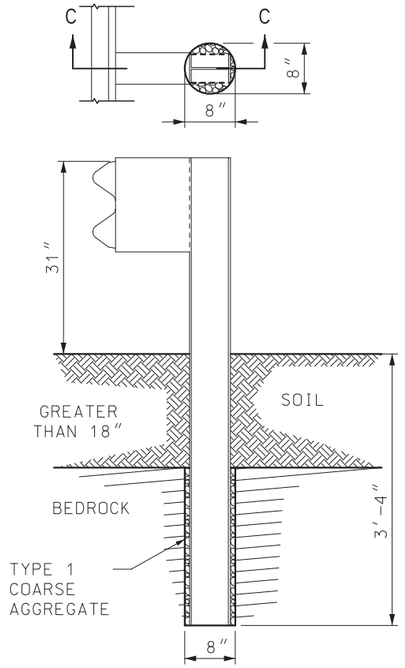
SECTION A-A

ROCK ENCOUNTERED
UP TO 6″ BENEATH SURFACE



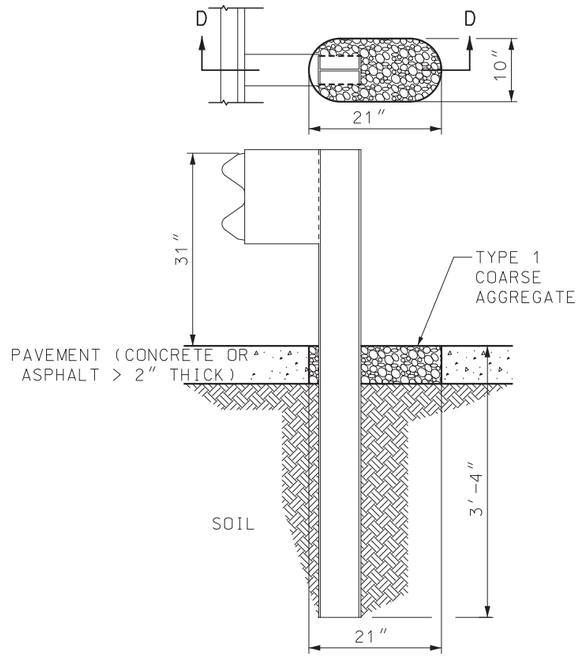
SECTION B-B

ROCK ENCOUNTERED
6″ TO 18″ BENEATH SURFACE



SECTION C-C

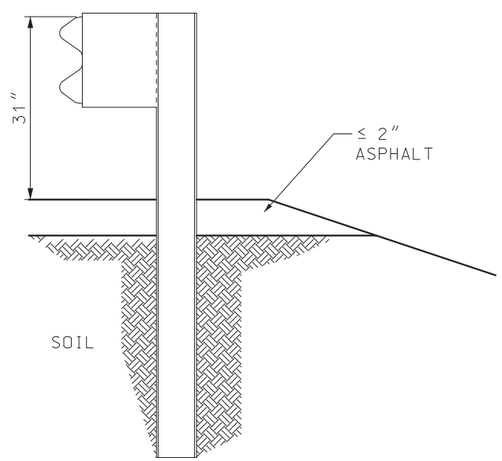
ROCK ENCOUNTERED MORE
THAN 18″ BENEATH SURFACE



SECTION D-D

SETTING POST THROUGH PAVEMENT
(CONCRETE OR ASPHALT > 2″ THICK)

SETTING POST IN SOLID ROCK



SETTING POST THROUGH ASPHALT ≤ 2″ THICK

GENERAL NOTES:

HOLES IN SOLID ROCK SHALL PROVIDE A DIAMETER OF NOT LESS THAN 4 INCHES GREATER THAN THE MAXIMUM TRANSVERSE DIMENSION OF THE POST SECTION.

POST MAY BE SHORTER WHERE PLACED IN 2 FEET OF SOLID ROCK. STEEL POSTS MAY BE FLAME OR SAW CUT. REPAIR OF CUT SHALL BE IN ACCORDANCE WITH SEC 712 OF THE STANDARD SPECIFICATIONS.

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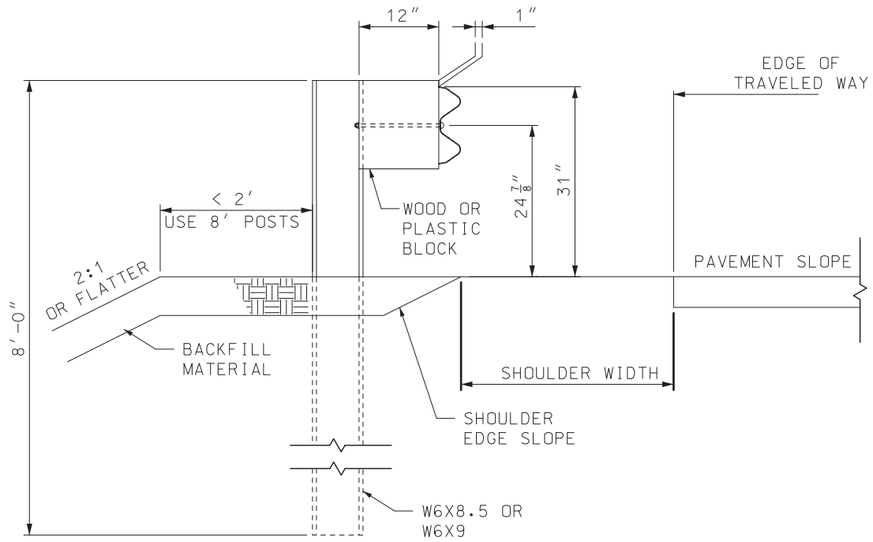
MIDWEST GUARDRAIL SYSTEM (MGS) SPECIAL INSTALLATIONS

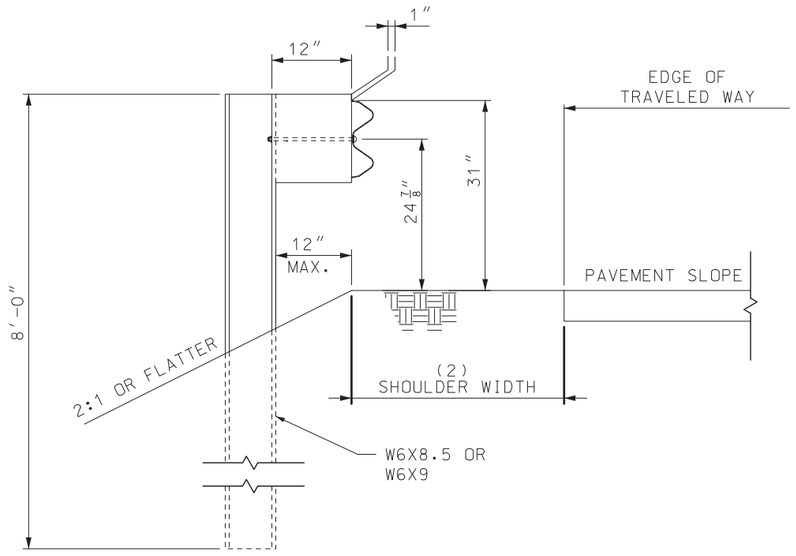
DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

606.50D

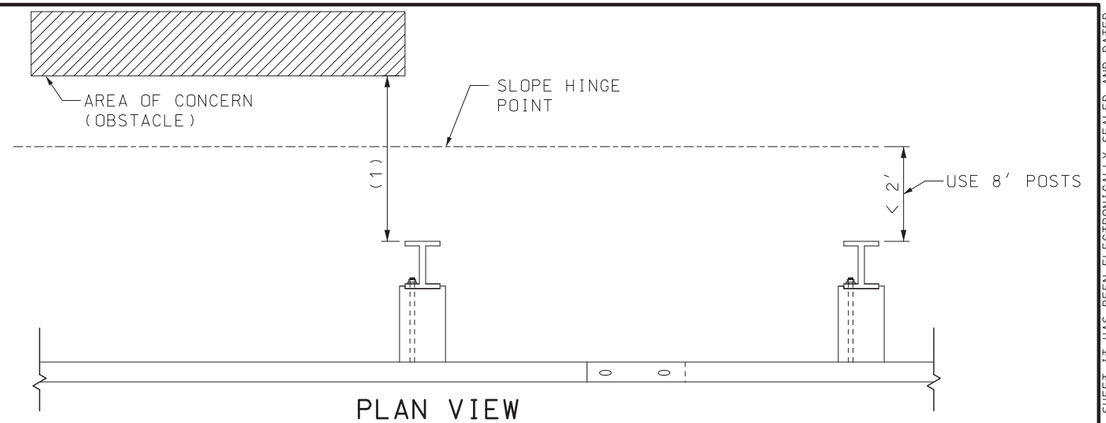
SHEET NO. 5 OF 8



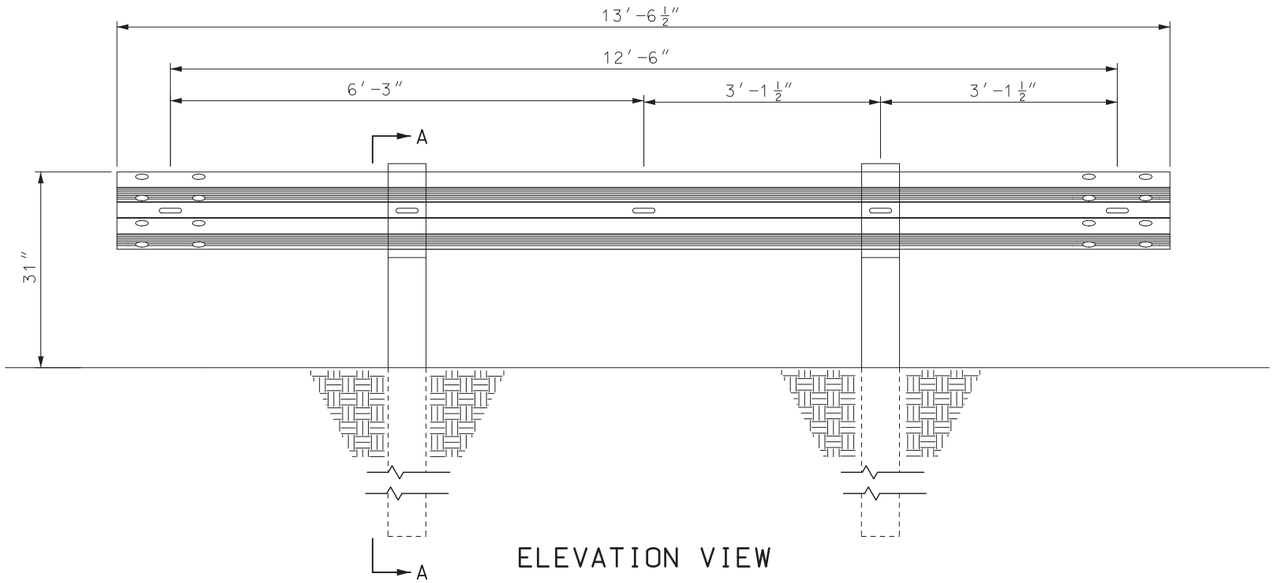
SECTION A–A
8′ STEEL POST



ALTERNATE SECTION A–A
MAXIMUM LATERAL PLACEMENT OF
8′ STEEL POSTS ADJACENT TO
SLOPES



PLAN VIEW



ELEVATION VIEW

(1) 3′-6″ MINIMUM CLEARANCE TO THE FACE OF OBSTACLE WITH 8′ POSTS ADJACENT TO A 2:1 SLOPE.

(2) WHERE THERE IS NOT SUFFICIENT EMBANKMENT BEYOND THE SHOULDER TO PLACE THE GUARDRAIL POST, THE POSTS MAY BE PLACED A MAXIMUM OF 12″ BEYOND THE SLOPE BREAK POINT OF A 2:1 OR FLATTER SLOPE.

GENERAL NOTES:

SEE STD. PLAN 606.81 FOR SITE GRADING REQUIREMENTS FOR CRASHWORTHY END TERMINALS.

8 FOOT POSTS SHALL BE USED WHEN LESS THAN 2 FEET OF EMBANKMENT IS PRESENT BETWEEN THE BACK OF THE GUARDRAIL POST AND THE SLOPE BREAK POINT. THE SUBSTITUTION OF 8 FOOT POSTS IN LIEU OF REQUIRED GRADING, TO CONSTRUCT LESS THAN THE DESIGNED TYPICAL SECTION, SHALL NOT BE ALLOWED.

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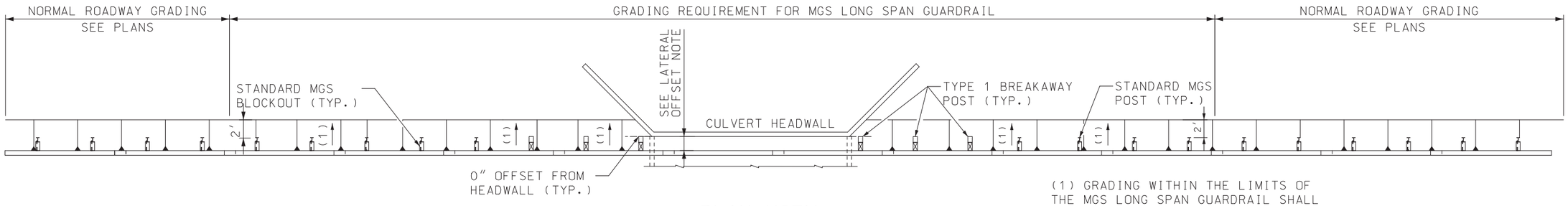
MIDWEST GUARDRAIL SYSTEM (MGS) 8 FT. POST

DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

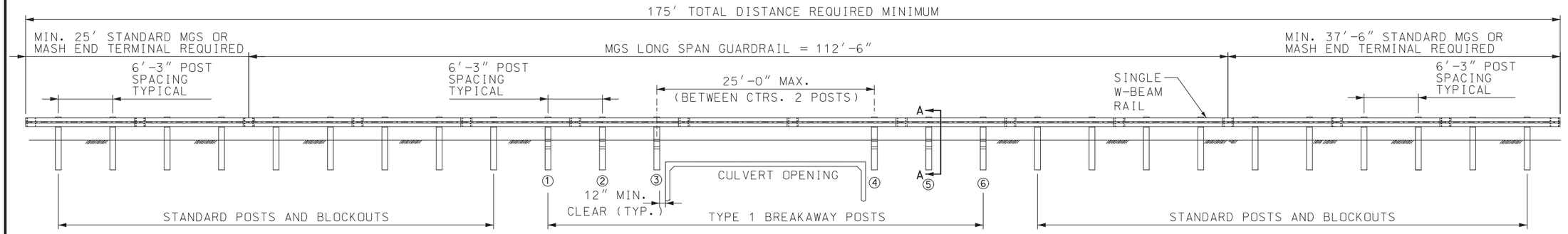
606.50D

SHEET NO. 6 OF 8

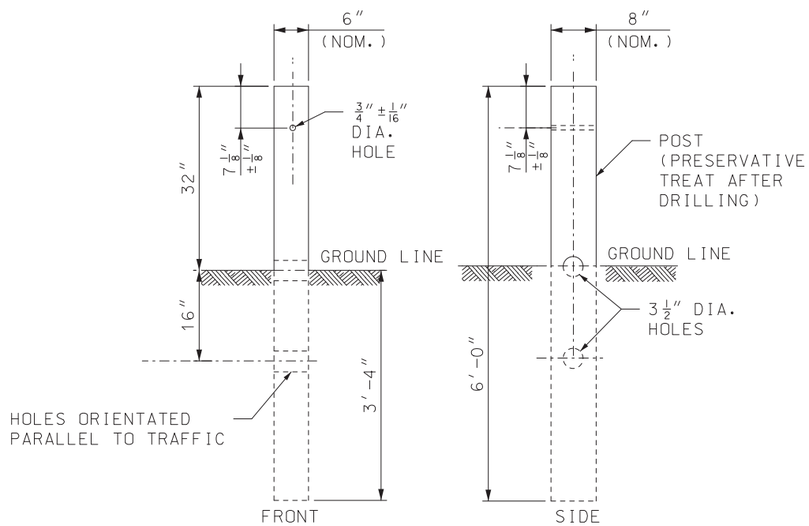


PLAN VIEW

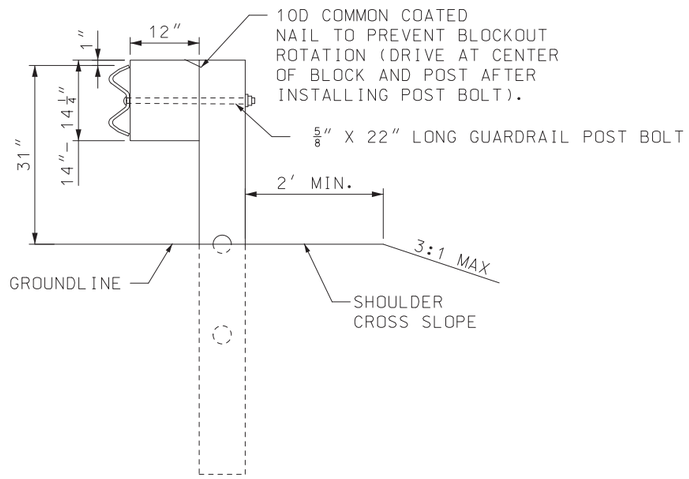
(1) GRADING WITHIN THE LIMITS OF THE MGS LONG SPAN GUARDRAIL SHALL BE THE SAME CROSS SLOPE AS SHOULDER.



ELEVATION VIEW



TYPE 1 BREAKAWAY WOOD POST



SECTION A-A

NOTES:
A MINIMUM LENGTH OF STANDARD MGS GUARDRAIL OR AN END TERMINAL IS REQUIRED BEFORE THE 112'-6" OF MGS LONG SPAN AND AFTER TO MAINTAIN STABILITY IN THE SYSTEM. 8'POSTS MAY BE USED OUTSIDE THE GRADING LIMITS SHOWN.

USE TYPE 1 BREAKAWAY WOOD POST FOR POSTS NO. 1-6. ALL OTHER POSTS SHALL BE W6X8.5 OR W6X9 STEEL POSTS.

WHEN THE HEADWALL IS FLUSH WITH THE GRADE, THE BACK OF THE POST CAN BE ALIGNED WITH THE NEAR SIDE OF THE HEADWALL. BUT IF THE HEADWALL CONTINUES ABOVE GRADE, THE SYSTEM SHOULD BE OFFSET 8' FROM THE FIXED OBJECT.

FOR LOCATIONS WHERE A GUARDRAIL FLARE IS DESIRED, THE SYSTEM SHOULD REMAIN TANGENT FOR 50'-0" BEFORE POST 1 OR AFTER POST 6, AT WHICH POINT THE GUARDRAIL MAY FLARE AT A MAXIMUM TAPER RATE OF 7:1.

ALL POSTS, BLOCK, RAILS, AND HARDWARE SHALL COMPLY WITH SEC 606, MGS GUARDRAIL AND AS DETAILED ON THIS STANDARD.

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STATE OF MISSOURI
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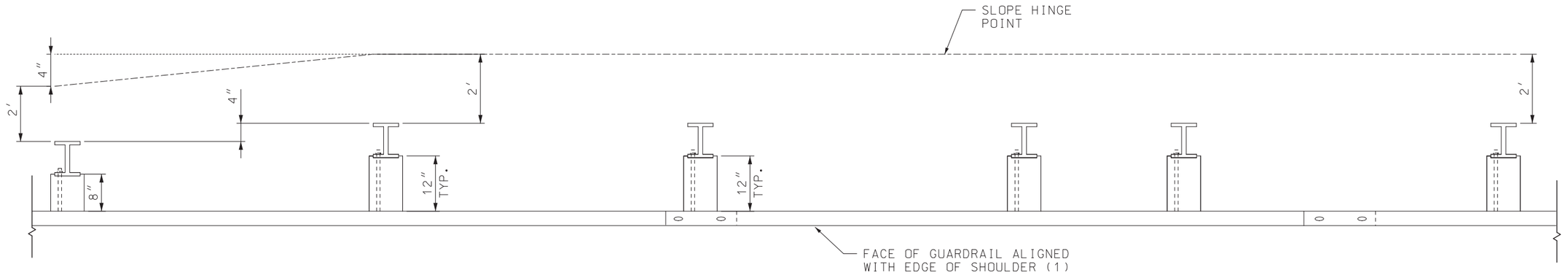
NUMBER PE-28411
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

MIDWEST GUARDRAIL SYSTEM (MGS) LONG SPAN GUARDRAIL

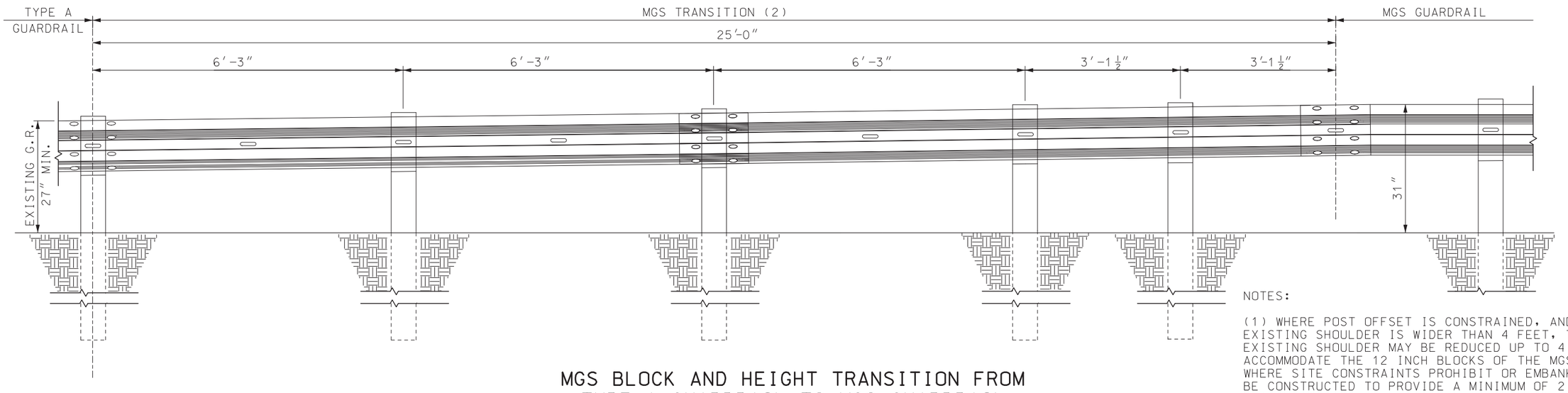
DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

606.50D

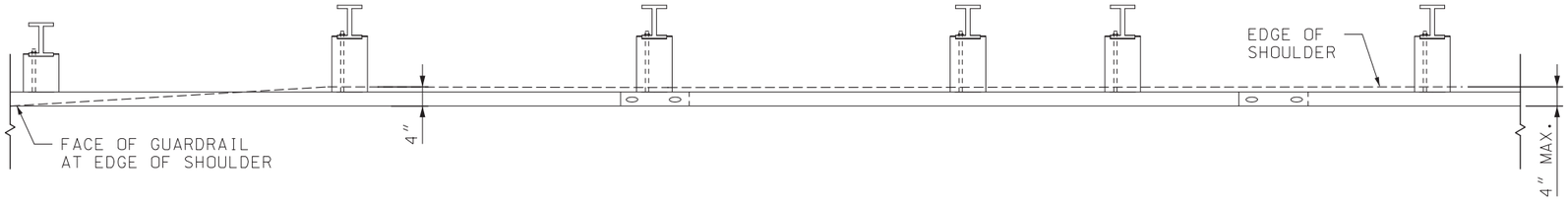
SHEET NO. 7 OF 8



PLAN VIEW



MGS BLOCK AND HEIGHT TRANSITION FROM TYPE A GUARDRAIL TO MGS GUARDRAIL



ALTERNATE PLAN VIEW – ALIGNMENT TAPER

SEE NOTE (1)

NOTES:

(1) WHERE POST OFFSET IS CONSTRAINED, AND WHEN THE EXISTING SHOULDER IS WIDER THAN 4 FEET, THE EXISTING SHOULDER MAY BE REDUCED UP TO 4 INCHES TO ACCOMMODATE THE 12 INCH BLOCKS OF THE MGS GUARDRAIL. WHERE SITE CONSTRAINTS PROHIBIT OR EMBANKMENT CANNOT BE CONSTRUCTED TO PROVIDE A MINIMUM OF 2 FEET BETWEEN THE BACK OF THE GUARDRAIL POST AND SLOPE BREAK POINT, 8 FOOT POSTS SHALL BE USED (SEE SHEET 6 OF 8). THE SUBSTITUTION OF 8 FOOT POSTS FOR REQUIRED GRADING SHALL NOT BE ALLOWED.

(2) MGS TRANSITION FROM TYPE A GUARDRAIL SHALL BE COMPLETED OUTSIDE THE 50′ MGS END TERMINAL LIMITS.

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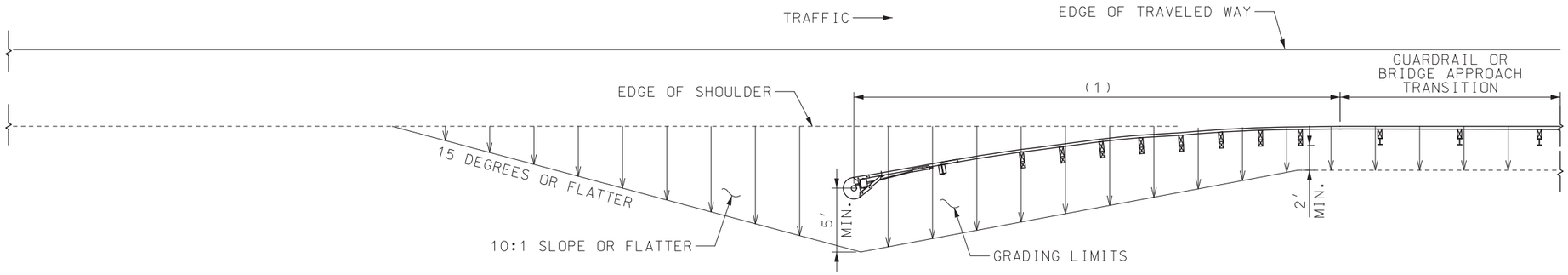
MIDWEST GUARDRAIL SYSTEM (MGS) BLOCK AND HEIGHT TRANSITION

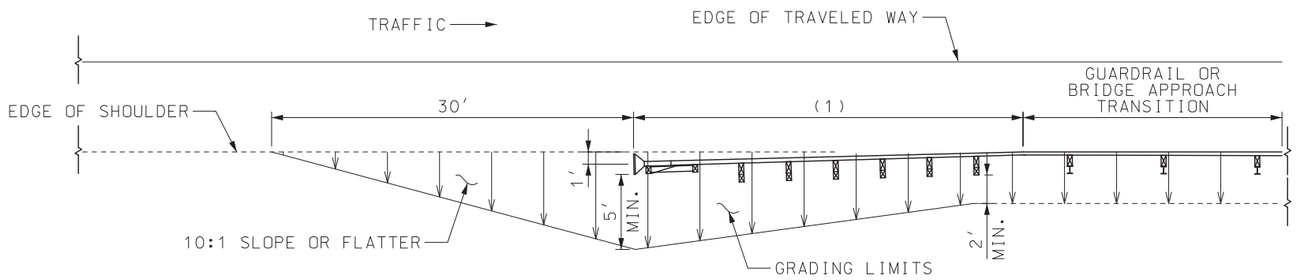
DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

606.50D

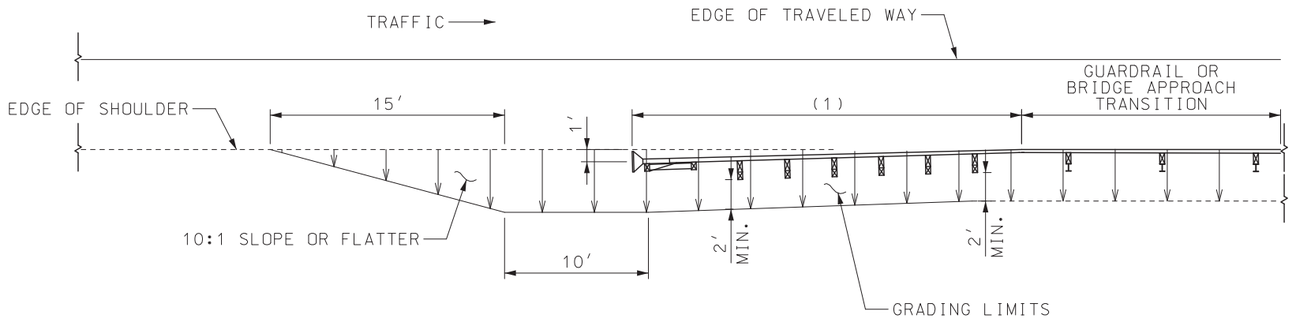
SHEET NO. 8 OF 8



GRADING LIMITS FOR FLARED CRASHWORTHY END TERMINALS



PREFERRED GRADING LIMITS FOR CRASHWORTHY END TERMINALS



ALTERNATE GRADING LIMITS FOR CRASHWORTHY END TERMINALS

(1) APPROVED CRASHWORTHY END TERMINAL

GENERAL NOTES:

THE PREFERRED GRADING LIMITS SHALL BE USED WHEN INDICATED ON THE PLANS.

THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH APPROVED SHOP DRAWINGS OF THE MASH APPROVED CRASHWORTHY END TERMINAL.

END ANCHORS SHALL BE INSTALLED ON ENDS OF GUARDRAIL RUNS WHERE CRASHWORTHY END TERMINALS ARE NOT REQUIRED.

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MASH CRASHWORTHY END TERMINALS TYPE A GRADING LIMITS

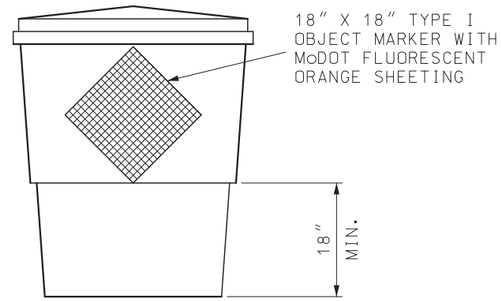
DATE EFFECTIVE: 04/01/2019
DATE PREPARED: 1/16/2019

606.81A

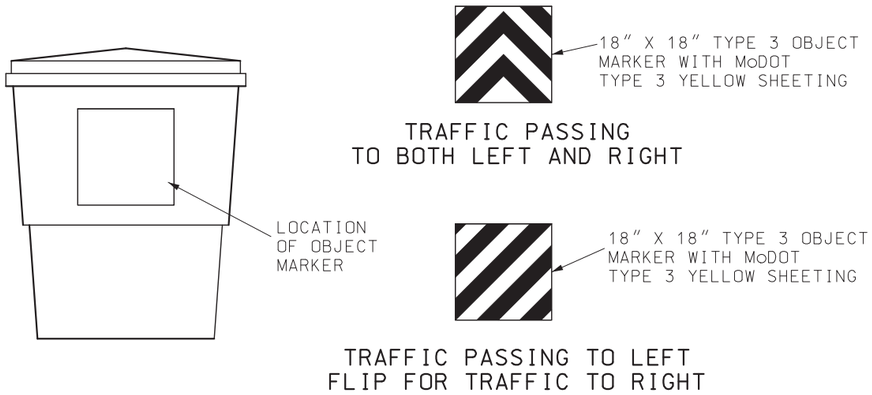
SHEET NO. 1 OF 1

ATTENUATOR LAYOUT:

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



TYPE I OBJECT MARKER PLACEMENT FOR TEMPORARY INSTALLATIONS



TYPE 3 OBJECT MARKER PLACEMENT FOR PERMANENT INSTALLATIONS

GENERAL NOTES:

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

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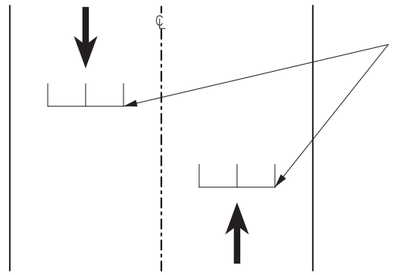
SAND FILLED IMPACT ATTENUATORS

DATE EFFECTIVE: 10/01/2018
DATE PREPARED: 7/31/2018

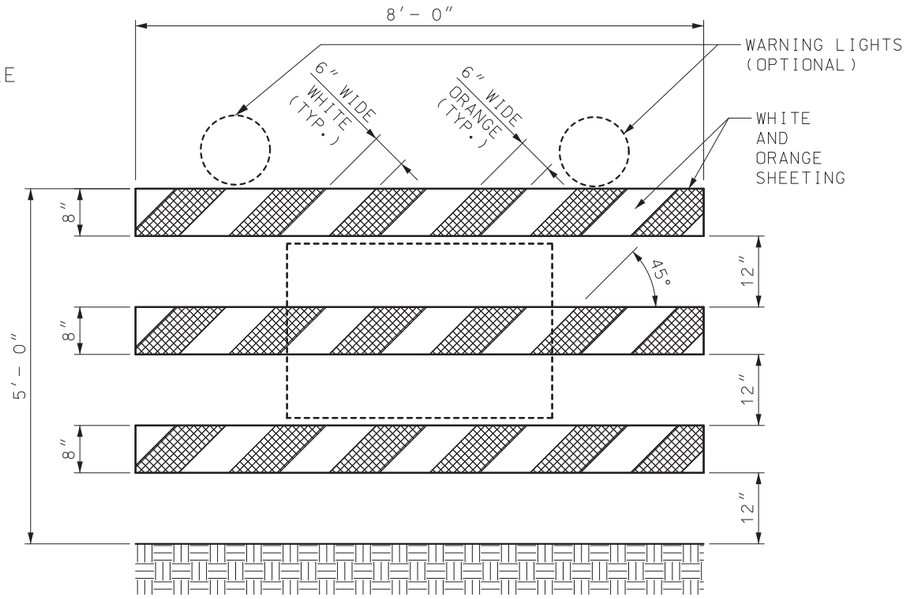
612.20E

SHEET NO. 1 OF 1

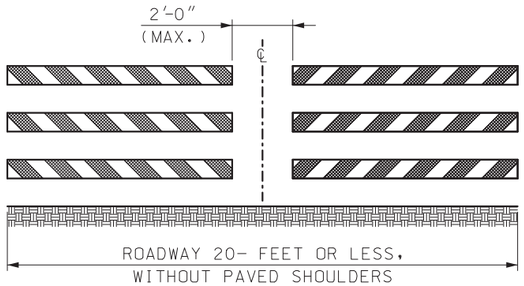


RETROREFLECTIVE MARKING ON TYPE 3 BARRICADES SHALL BE ON BOTH SIDES OF EACH RAIL AND DIRECT TRAFFIC MOVEMENT APPROPRIATELY TO ALLOW VEHICLES TO PASS THROUGH

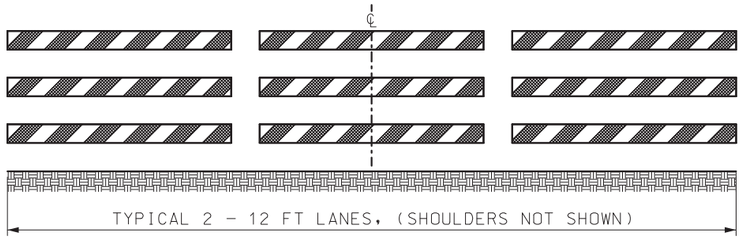
SOFT CLOSURE
PLAN VIEW



EXAMPLE 1

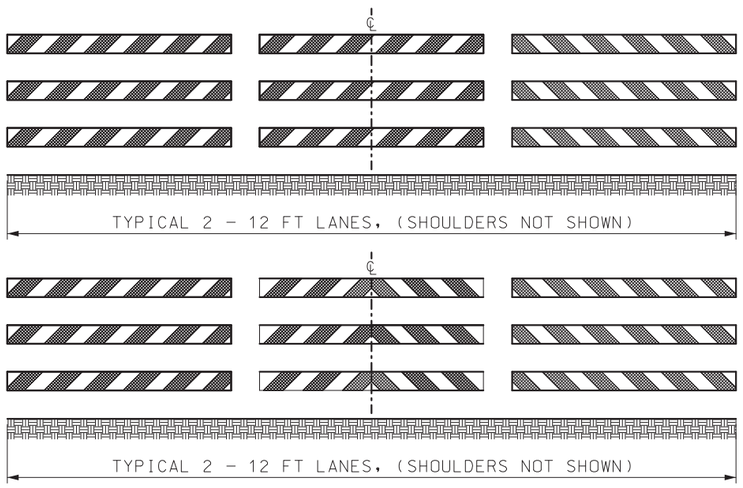


EXAMPLE 2

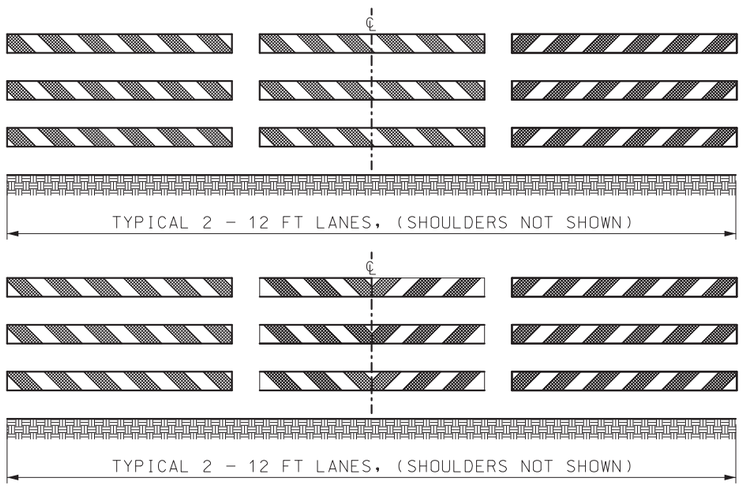


EXAMPLE SHOWS STRIPES SLOPING TO DIRECT
VEHICULAR MOVEMENT TOWARD THE LEFT

EXAMPLE 3



EXAMPLE 4



EXAMPLE 5

EXAMPLE 1 – ONE TYPE 3 MOVABLE BARRICADE WILL BE REQUIRED TO COMPLETELY CLOSE EACH 8′ OF PAVEMENT. PAVED SHOULDERS SHALL BE INCLUDED IN THE AREA TO BE CLOSED.

SIGNS SHALL BE LIGHT WEIGHT (ROLL-UP OR PLASTIC) AND SHOULD NOT OBSCURE MORE THAN 50 PERCENT OF THE TOP 2 RAILS OR 33 PERCENT OF ALL THREE RAILS.

WARNING LIGHTS SHALL BE LIGHT WEIGHT (3.3 LBS. OR LESS) OR HAVE BATTERY PACK MOUNTED NO HIGHER THAN 18-INCH AND SHALL NOT COVER ANY PORTION OF THE BARRICADE FACE.

IF WARNING LIGHTS ARE USED,THE LIGHTS SHALL BE INSTALLED ON THE BARRICADES IN THE DIRECTION OF TRAFFIC.

IF SIGNS OR LIGHTS CANNOT MEET THE ABOVE REQUIREMENTS, THEY SHALL BE MOUNTED ON SEPARATE CRASHWORTHY DEVICES AT HEIGHTS SPECIFIED FOR POST MOUNTED SIGNS, LOCATED IN TABLE A ON SHEET 1. THE BARRICADE SHALL BE LOCATED IN FRONT OF THE SIGNS OR LIGHTS WITH 7 TO 10 FEET SEPARATING THE DEVICES.

TYPE 3 MOVABLE BARRICADES SHALL BE ENTIRELY FREE STANDING AND PORTABLE. MARKING SHALL ONLY BE APPLIED TO THE FRONT OF EACH RAIL OR MAY BE APPLIED TO BOTH THE FRONT AND THE BACK OF EACH RAIL PROVIDED THE MARKING ON THE BACK DOES NOT CONFLICT WITH INTENDED OPPOSING TRAFFIC MOVEMENT.

WHITE AND ORANGE REFLECTIVE SHEETING SHALL BE IN ACCORDANCE WITH SEC 104.2.7.3.

EXAMPLE 2 – FOR PAVED ROADWAYS WITH A WIDTH OF 20-FEET OR LESS AND WITHOUT PAVED SHOULDERS, TWO BARRICADES ARE ACCEPTABLE.

EXAMPLE 3 – WHERE BARRICADES EXTEND ENTIRELY ACROSS A ROADWAY, STRIPES SLOPE DOWNWARD IN THE DIRECTION TOWARD WHICH ROAD USERS MUST TURN.

EXAMPLE 4 – WHERE BOTH RIGHT AND LEFT TURNS ARE PROVIDED, STRIPES SLOPE DOWNWARD IN BOTH DIRECTIONS FROM THE CENTER OF THE BARRICADE OR BARRICADES.

EXAMPLE 5 – WHERE NO TURNS ARE INTENDED, STRIPES POSITIONED TO SLOPE DOWNARD TOWARD THE CENTER OF THE BARRICADE OR BARRICADES.

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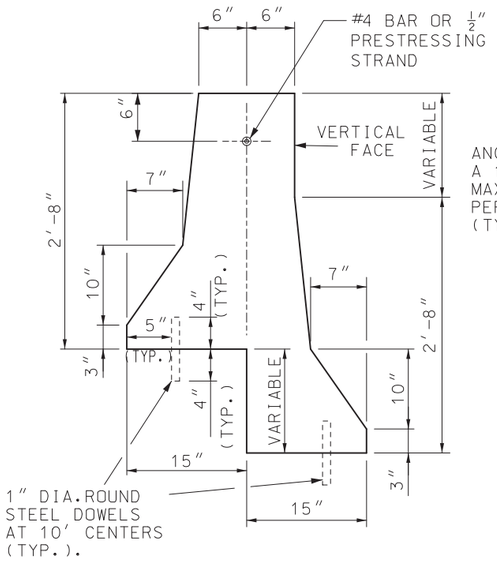
TEMPORARY TRAFFIC CONTROL DEVICES

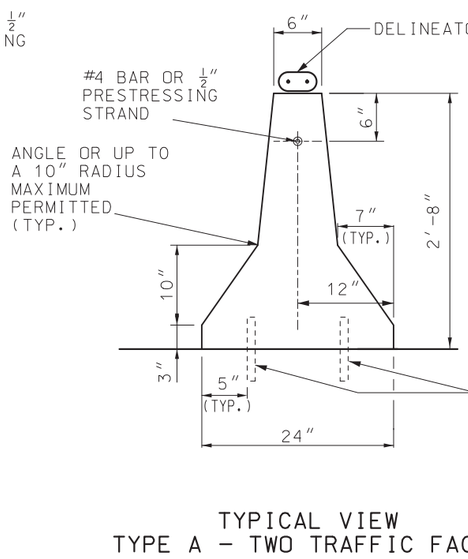
TYPE 3 MOVABLE BARRICADE

DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

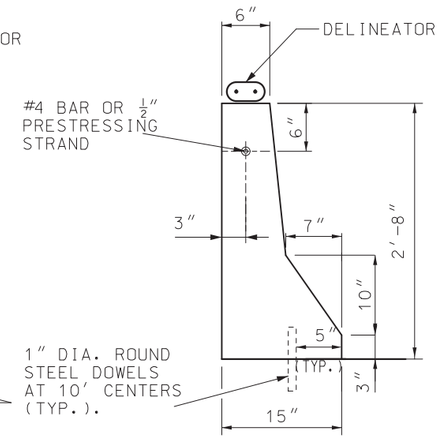
616.10AU



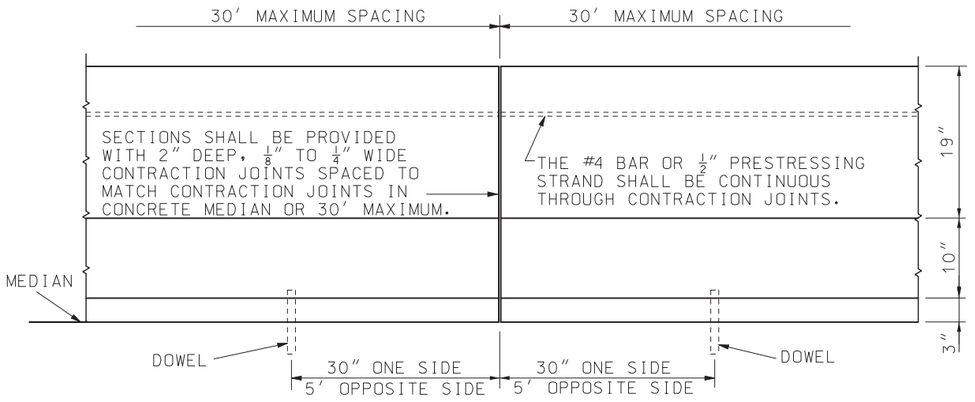
TYPICAL VIEW
BARRIER FOR
STEPPED PAVEMENT

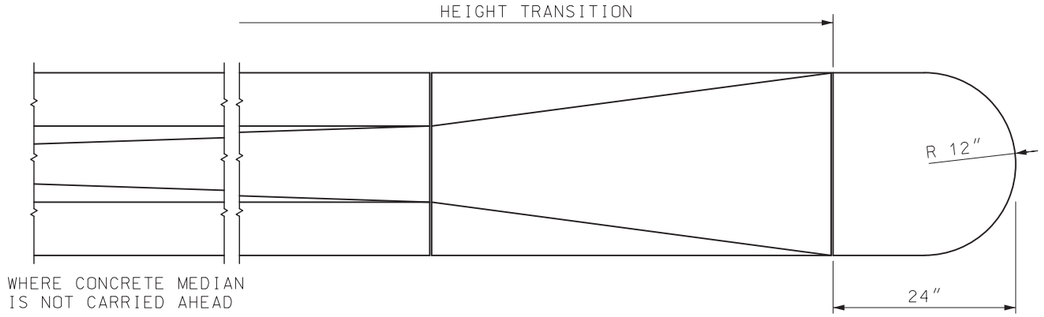


TYPICAL VIEW
TYPE A – TWO TRAFFIC FACES

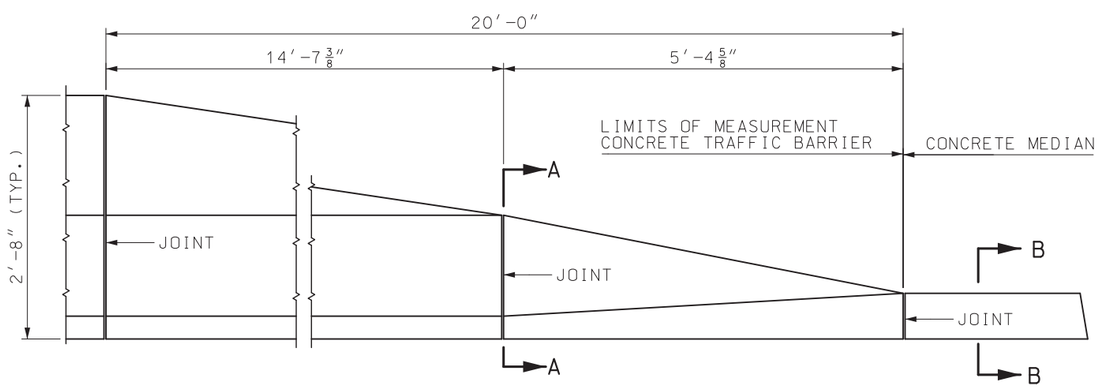


TYPICAL VIEW
TYPE B – ONE TRAFFIC FACE

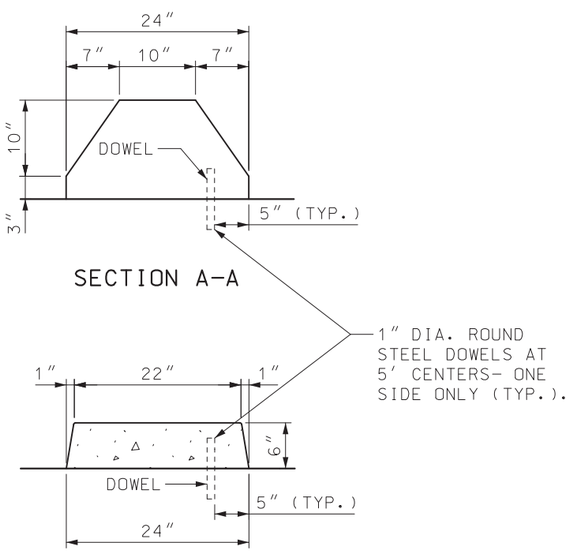




PLAN



ELEVATION
BARRIER HEIGHT TRANSITION



SECTION A–A

SECTION B–B

GENERAL NOTES:

HEIGHT TRANSITIONS SHALL NOT BE USED IN LOCATIONS WHERE THE POSTED SPEED IS GREATER THAN 35 MPH.

ALL TOP AND END EDGES SHALL BE CHAMFERED ¾ INCH.

EXPANSION JOINTS SHALL BE PROVIDED IN THE BARRIER TO MATCH EXPANSION JOINTS IN PAVEMENT.

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS SEE STD PLAN 903.03.

#8 REINFORCING BARS WITH AN EPOXY ANCHOR SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1″ DIAMETER ROUND STEEL DOWELS.

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PERMANENT CONCRETE TRAFFIC BARRIER

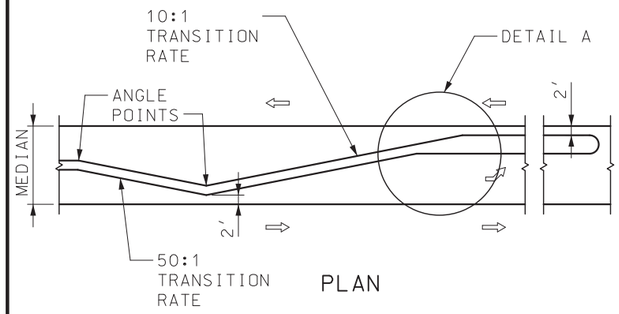
TYPE A AND B

DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

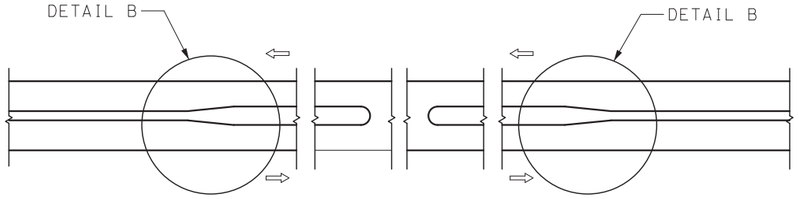
617.10L

SHEET NO.
1 OF 11

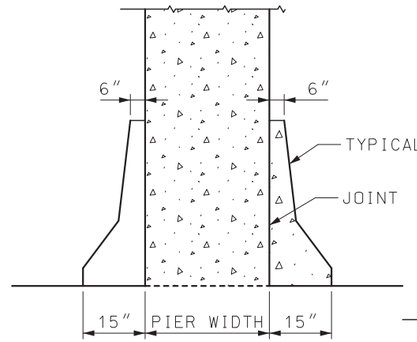
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



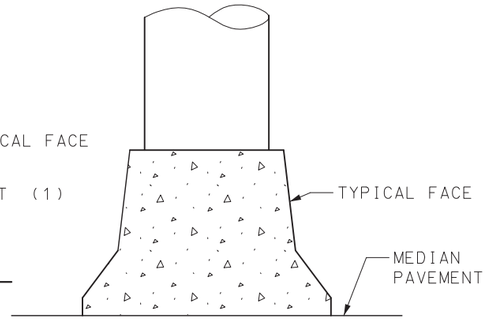
PLAN



PLAN

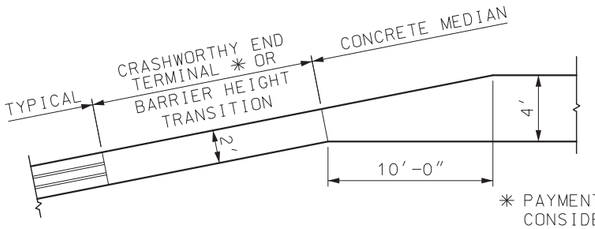


SECTION C-C



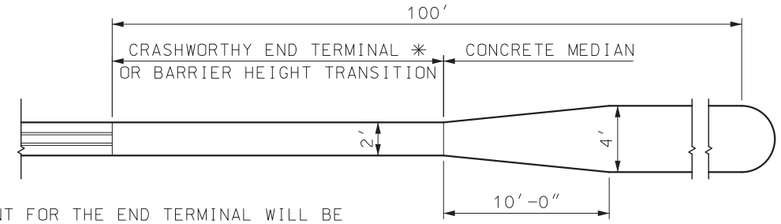
SEE SECTION C-C FOR DIMENSIONS

SECTION B-B



DETAIL A

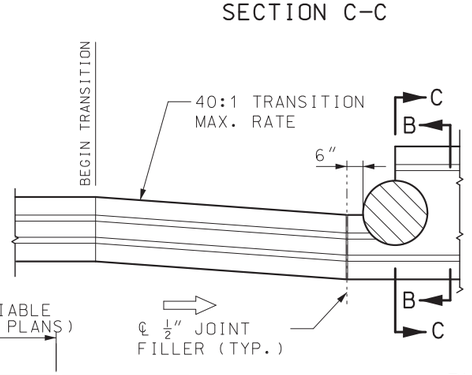
LEFT TURN LANE TRANSITION

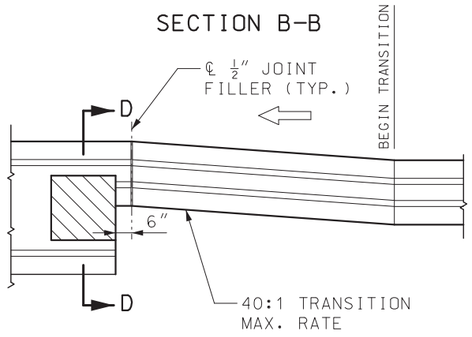


* PAYMENT FOR THE END TERMINAL WILL BE CONSIDERED FULL COMPENSATION FOR END TERMINAL, BACKUP ASSEMBLIES, AND OTHER ITEMS NECESSARY FOR PROPER INSTALLATION AS REQUIRED BY THE MANUFACTURER.

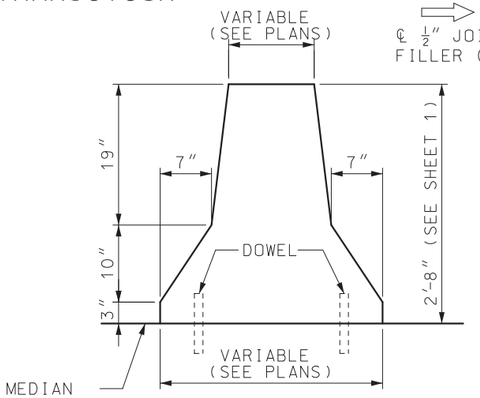
DETAIL B

MEDIAN OPENING TRANSITION

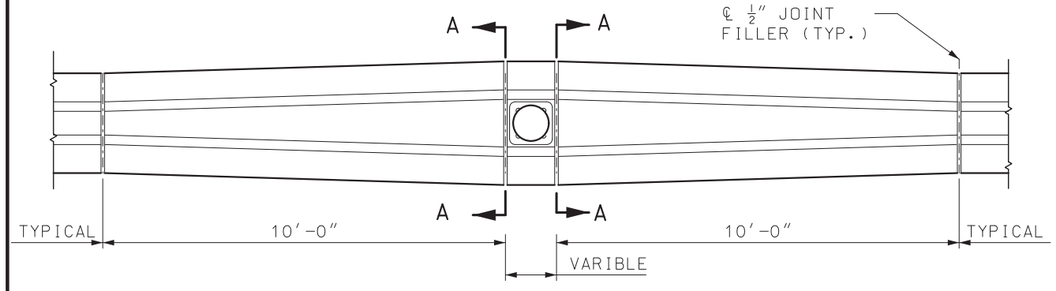




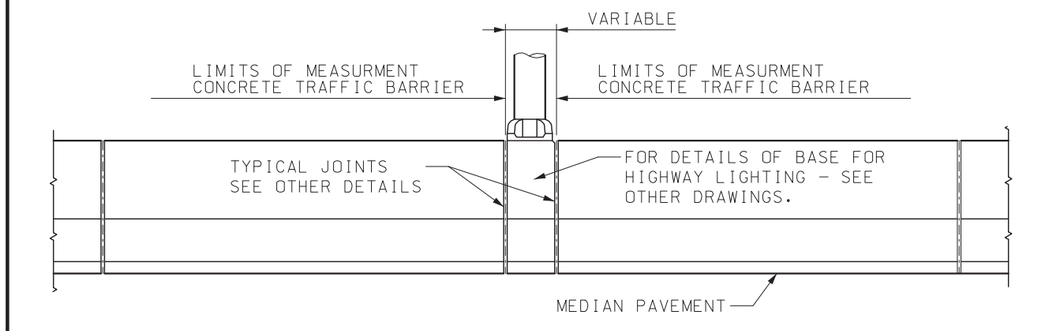
PLAN



SECTION A-A

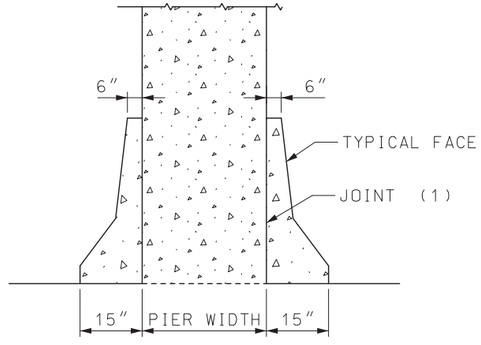


PLAN



ELEVATION

TRANSITION DETAILS FOR MEDIAN LIGHTING



SECTION D-D

PLAN

TRANSITION DETAILS FOR
PIER PROTECTION

(1) 1 IN. JOINT WITH JOINT FILLER AND SEALER

GENERAL NOTES:

FOR DETAILS AND LOCATION OF DOWELS, SEE SHEET 1.

#8 REINFORCING BARS WITH AN EPOXY ANCHOR SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1" DIAMETER ROUND STEEL DOWELS.

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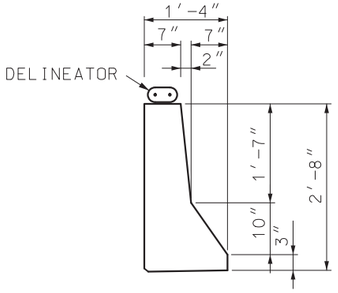
PERMANENT CONCRETE TRAFFIC BARRIER
TYPE A AND B

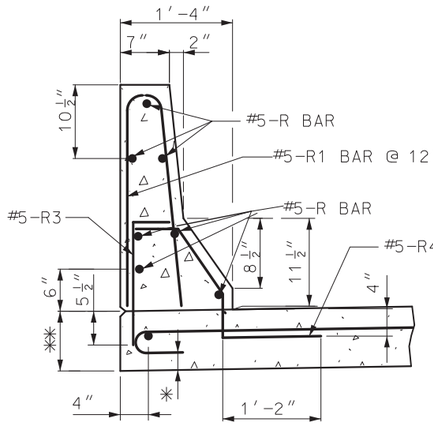
DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

617.10L

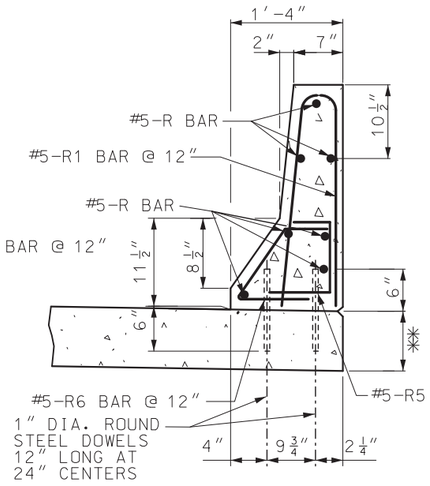
SHEET NO. 2 OF 11



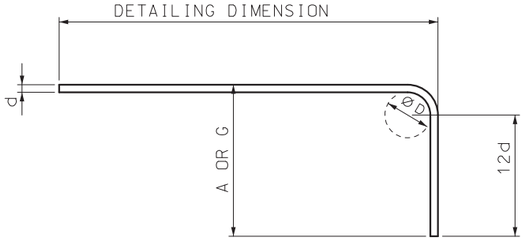
TYPE B (MODIFIED)
TYPICAL SECTION



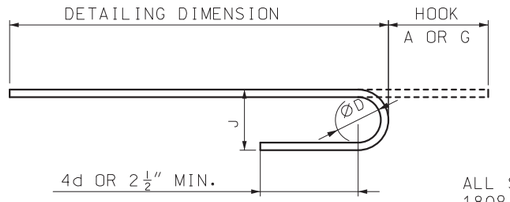
PART SECTION THROUGH
UPPER BARRIER



PART SECTION THROUGH
LOWER BARRIER



90° HOOKS

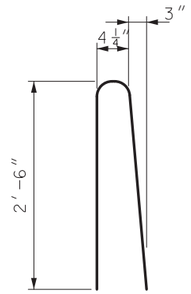


180° HOOKS

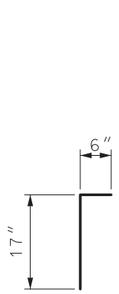
ALL STANDARD HOOKS AND BENDS OTHER THAN 180° TO BE BENT WITH THE SAME PROCEDURE AS FOR 90° STANDARD HOOKS.

END HOOK DIMENSIONS				
BAR SIZE	D (IN.)	ALL GRADES		
		180° HOOKS		90° HOOKS
		A OR G	J	A OR G
#5	3¾″	7″	5″	10″
#6	4½″	8″	6″	12″

TABLE A TRANSVERSE PAVEMENT REINFORCEMENT	
PAVEMENT THICKNESS **	BAR SIZE & SPACING
8″	#5 @ 5″ *
9″	#5 @ 6″ *
10″	#5 @ 8″
11″	#5 @ 9″
≥ 12″	#6 @ 12″



#5-R1



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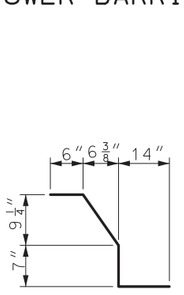
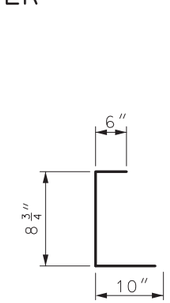
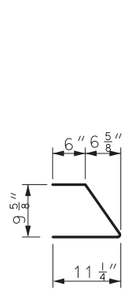


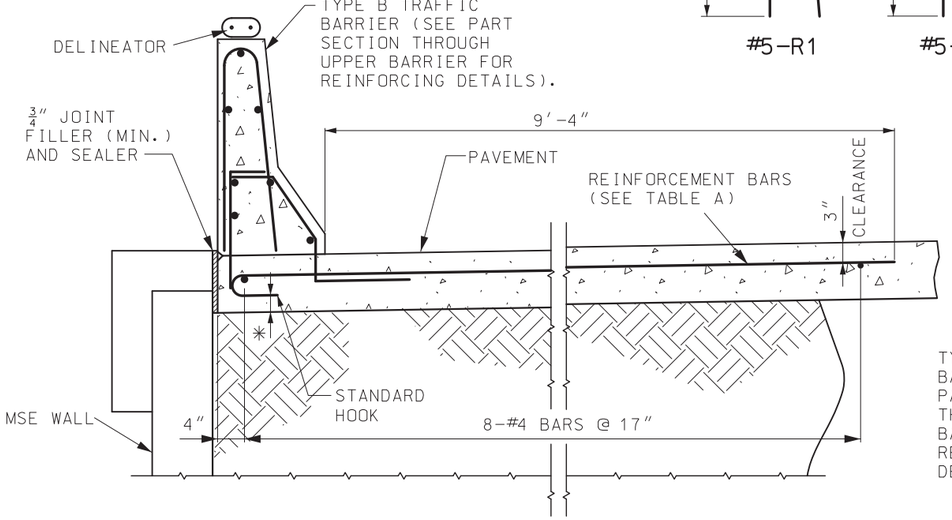
#5-R4



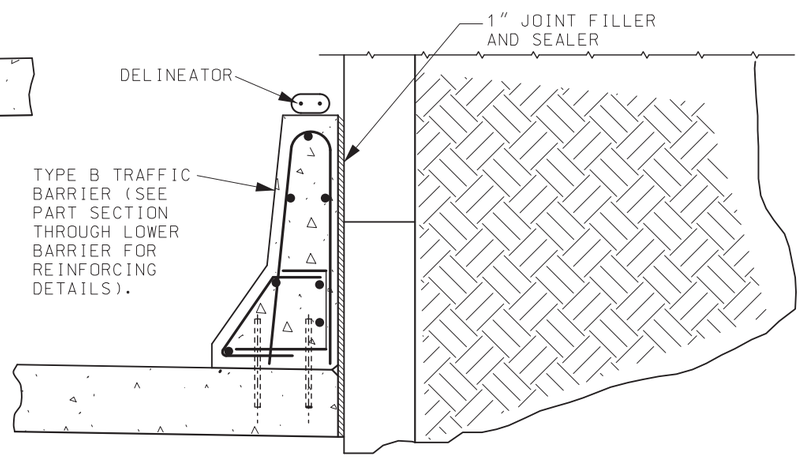
#5-R5



#5-R6



TYPE B TRAFFIC BARRIER ON TOP OF MSE WALL



TYPE B TRAFFIC BARRIER AT THE SIDE OF MSE WALL

NOTES:

ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

NO DIRECT PAYMENT WILL BE MADE FOR REINFORCING STEEL.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1½″, UNLESS OTHERWISE SHOWN.

TYPE B (MODIFIED) SHALL BE USED ONLY AT LOCATIONS SHOWN IN PLANS.

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS SEE STD PLAN 903.03.

#8 REINFORCING BARS WITH AN EPOXY ANCHOR SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1″ DIAMETER ROUND STEEL DOWELS.

* TILT TRANSVERSE PAVEMENT REINFORCEMENT HOOKS FROM VERTICAL ALIGNMENT TO MAINTAIN 1½″ MINIMUM CLEARANCE.

** SEE ROADWAY PAVEMENT DESIGN.

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

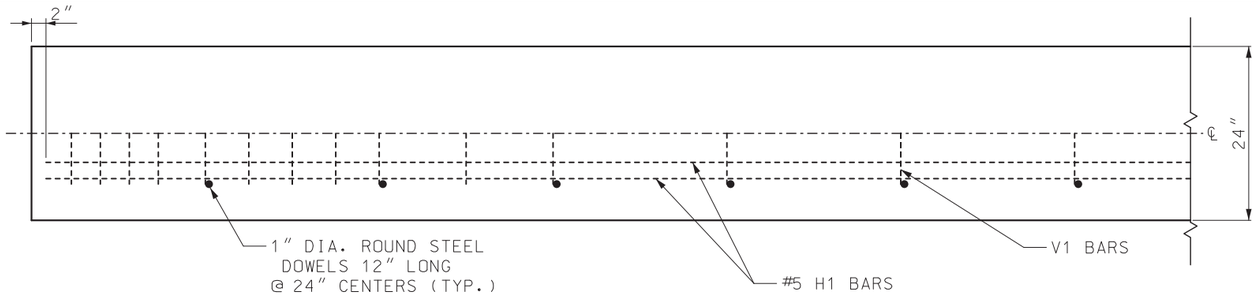
STATE OF MISSOURI
ERIC E. SCHROETER
NUMBER PE-28411
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

PERMANENT CONCRETE TRAFFIC BARRIER AT MSE WALL TYPE B MODIFIED

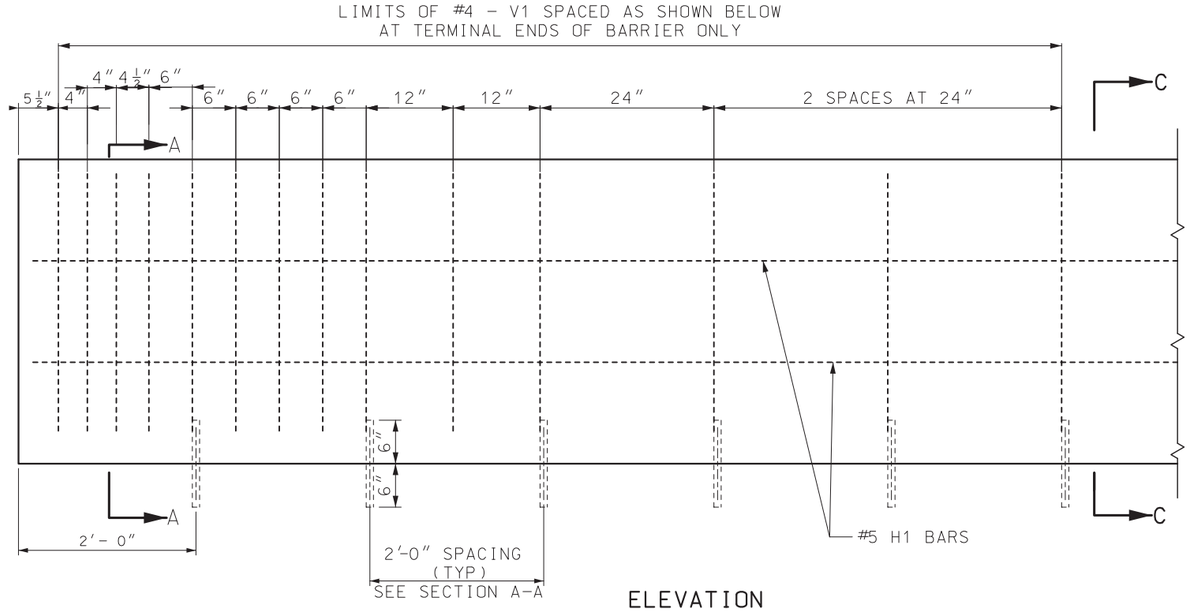
DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

617.10L

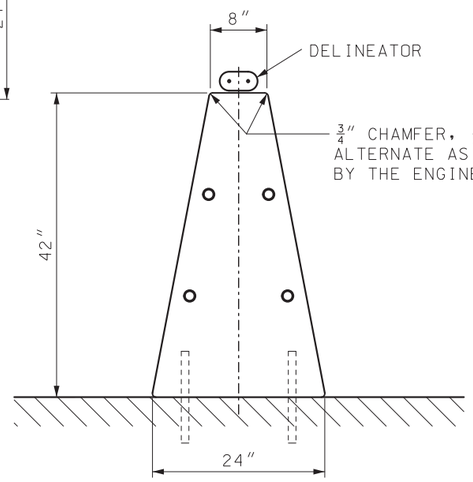
SHEET NO. 3 OF 11



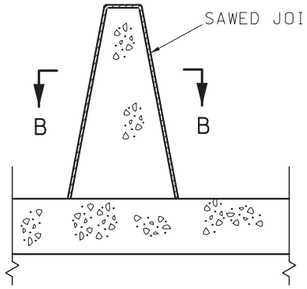
PLAN VIEW
(SYMMETRICAL ABOUT CENTERLINE)



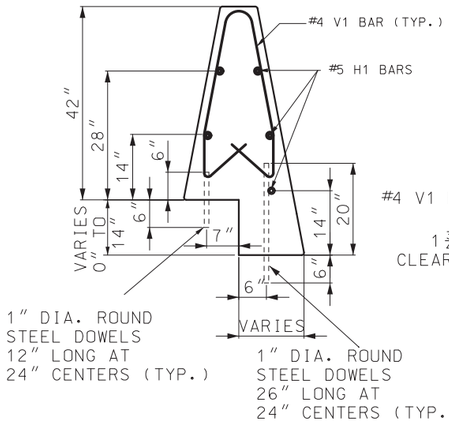
ELEVATION



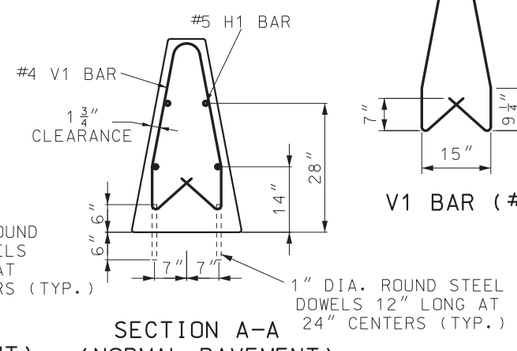
TYPE C
TYPICAL SECTION



SECTION THROUGH SAWED JOINT

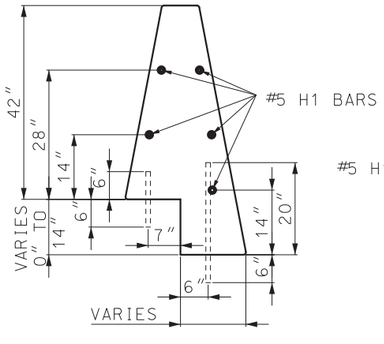


SECTION A–A
(STEPPED PAVEMENT)

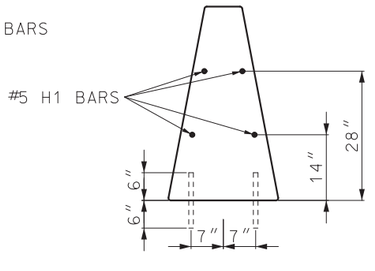


SECTION A–A
(NORMAL PAVEMENT)

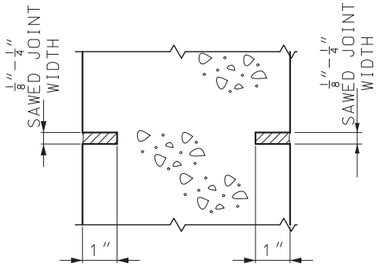
V1 BAR (#4)



SECTION C–C
(STEPPED PAVEMENT)



SECTION C–C
(NORMAL PAVEMENT)



SECTION B–B

NOTES:

ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

BAR SPLICES SHALL BE A MINIMUM OF 24 TIMES THE NOMINAL DIAMETER OF THE BAR.

ANY REINFORCING BAR INSTALLATION METHOD DEVISED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT WILL ASSURE THE LONGITUDINAL REINFORCING STEEL WILL BE POSITIONED ±½ INCH AS DIMENSIONED WILL BE SATISFACTORY.

THE CONTRACTOR HAS THE OPTION TO SLIP-FORM THE BARRIER. IN WHICH CASE, ADDITIONAL REINFORCEMENT MAY BE TIED TO THE UPPER TWO-THIRDS OF THE REINFORCING CAGE TO PROVIDE BRACING.

ANCHORING DOWELS MAY BE OMITTED WHEN THE PLANS SPECIFY A MINIMUM 1¾″ PAVEMENT SURFACE TO BE PLACED ABUTTING BOTH BARRIER FACES.

SAWED JOINTS SHALL BE LOCATED AT PAVEMENT TRANSVERSE JOINTS.

#8 REINFORCING BARS WITH AN EPOXY ANCHOR SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1″ DIAMETER ROUND STEEL DOWELS.

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS SEE STD PLAN 903.03.

REINFORCING DETAILS

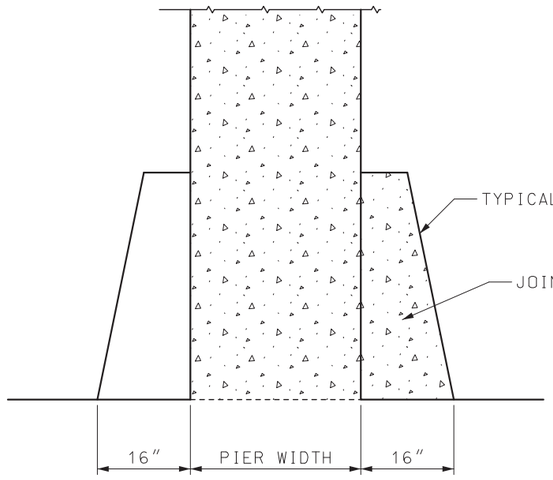
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI
ERIC E. SCHROETER
NUMBER PE-28411
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

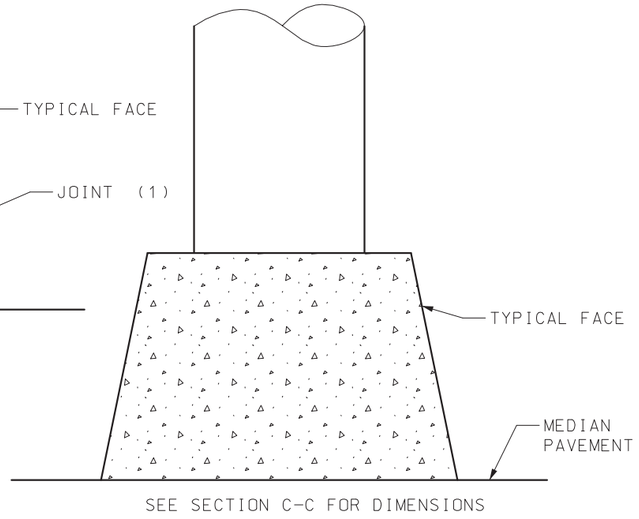
PERMANENT CONCRETE TRAFFIC BARRIER
TYPE C

DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

617.10L

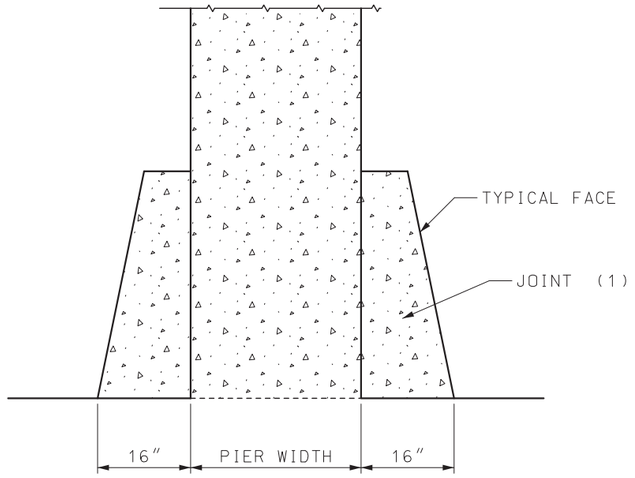


SECTION A–A

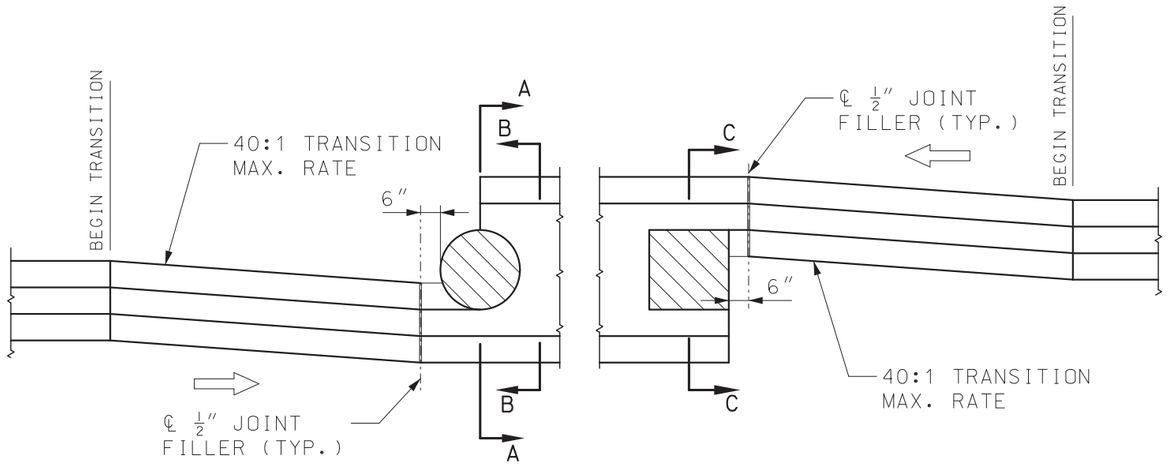


SEE SECTION C–C FOR DIMENSIONS

SECTION B–B



SECTION C–C



PLAN

TRANSITION DETAILS FOR PIER PROTECTION

(1) 1 IN. JOINT WITH JOINT FILLER AND SEALER

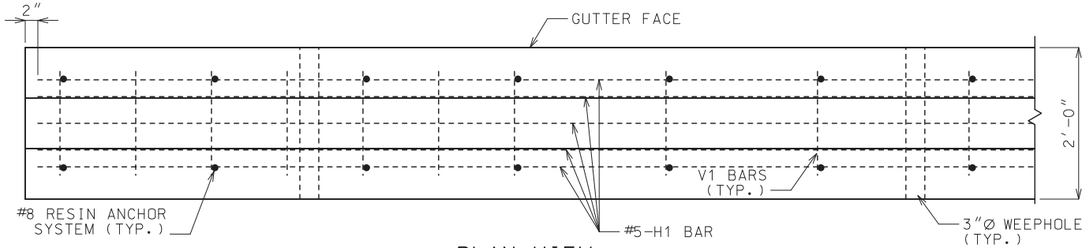
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI
ERIC E. SCHROETER
NUMBER PE-28411
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

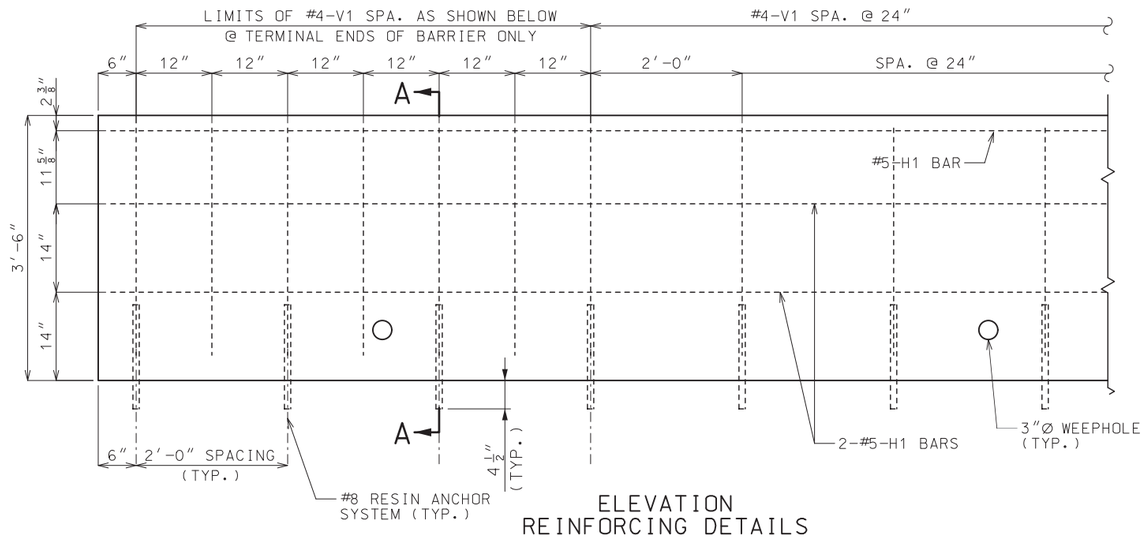
PERMANENT CONCRETE TRAFFIC BARRIER
TYPE C

DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

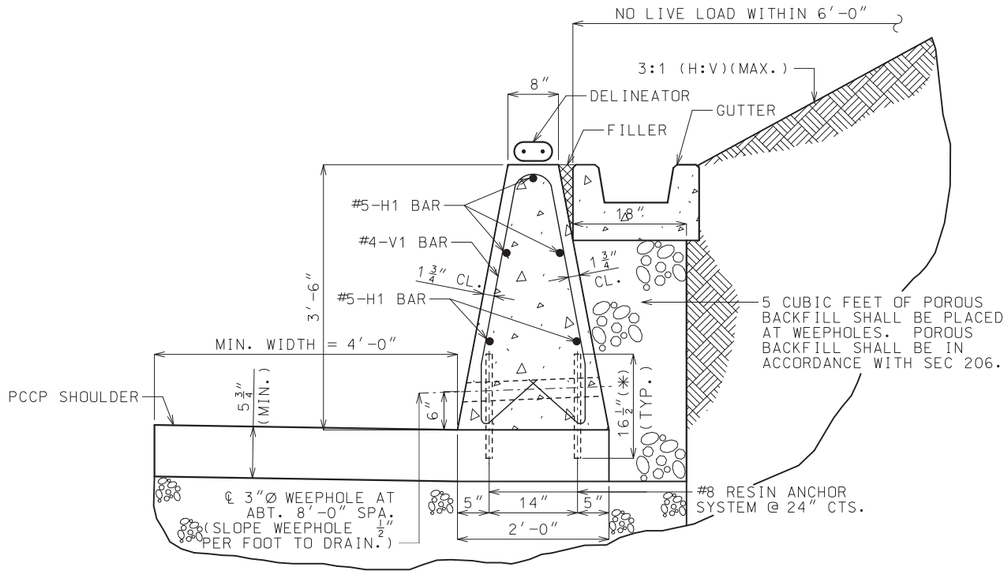
617.10L



PLAN VIEW
NOTE: GUTTER NOT SHOWN FOR CLARITY.

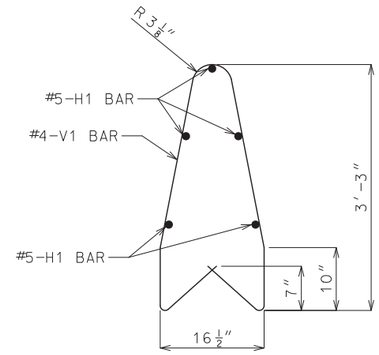


ELEVATION
REINFORCING DETAILS



(*) EMBED ANCHOR 4 1/2" INTO PCCP SHOULDER.

SECTION A-A
(FOR SLOPING AND NONSLOPING BACKSLOPE)



PART SECTION OF
#4-V1 BAR

GENERAL NOTES:

CONCRETE SHALL BE CLASS B F'C = 4,000 PSI.

ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

ANGLE OF INTERNAL FRICTION, ΦF ≥ 27° FOR BACKFILL MATERIAL.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1½", UNLESS OTHERWISE SHOWN.

BAR SPLICES SHALL BE A MINIMUM OF 24 TIMES THE NOMINAL DIAMETER OR THE BAR.

ANY METHOD DEVISED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT WILL ASSURE THE LONGITUDINAL REINFORCING STEEL WILL BE POSITIONED ±1/2 INCH AS DIMENSIONED WILL BE SATISFACTORY.

THE CONTRACTOR HAS THE OPTION TO SLIP-FORM THE BARRIER. IN WHICH CASE, ADDITIONAL REINFORCEMENT MAY BE TIED TO THE UPPER TWO-THIRDS OF THE REINFORCING CAGE TO PROVIDE BRACING.

THIS BARRIER SHALL NOT BE USED TO SUPPORT HIGHWAY LIGHTING POLES.

THIS BARRIER SHALL NOT BE USED FOR BRIDGE ROADWAY APPLICATIONS.

SAWED JOINTS SHALL BE SPACED AT 15'-0". SEE MISSOURI STANDARD PLANS FOR SAWED JOINT DETAIL.

TYPE C BARRIER MODIFIED RETAINING WALL WITH NONMOMENT SLAB SHALL BE USED ONLY AT LOCATIONS SHOWN ON PLANS.

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS SEE STD PLAN 903.03.

RESIN ANCHOR SYSTEM SHALL BE DRILLED IN THE PAVEMENT.

WHEN BARRIER HEIGHT EXCEEDS 42" OR SLOPE EXCEEDS 3:1 (H:V) OR LIVE LOAD IS WITHIN 6'-0", CONTACT BRIDGE DIVISION FOR SPECIAL DESIGN.

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

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

STATE OF MISSOURI
ERIC E. SCHROETER
NUMBER PE-28411
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

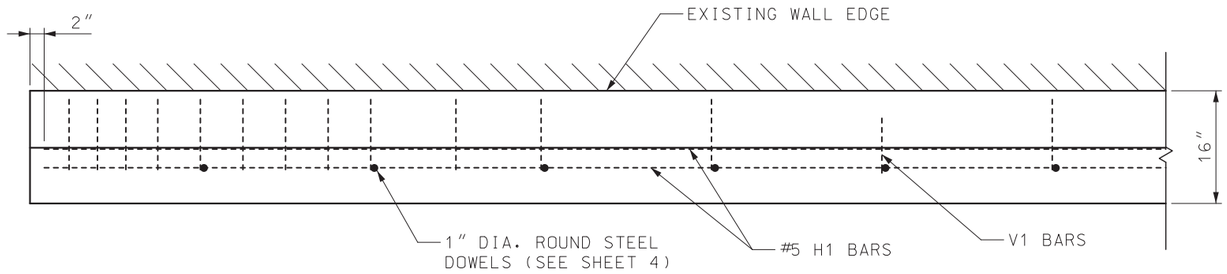
PERMANENT CONCRETE TRAFFIC BARRIER

TYPE C AS RETAINING WALL

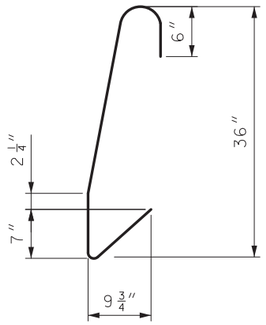
DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

617.10L

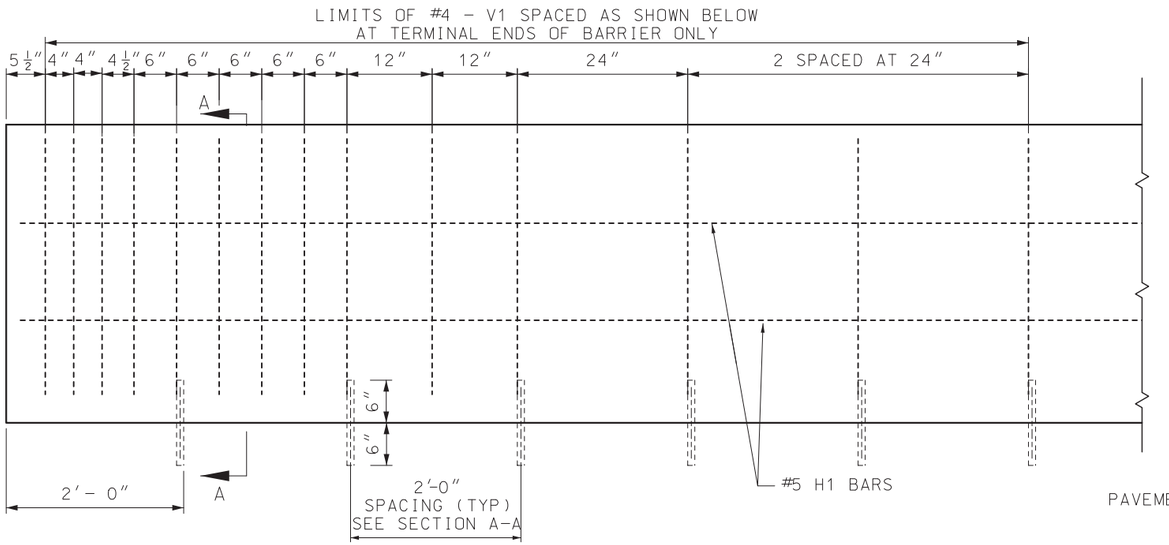
SHEET NO. 6 OF 11



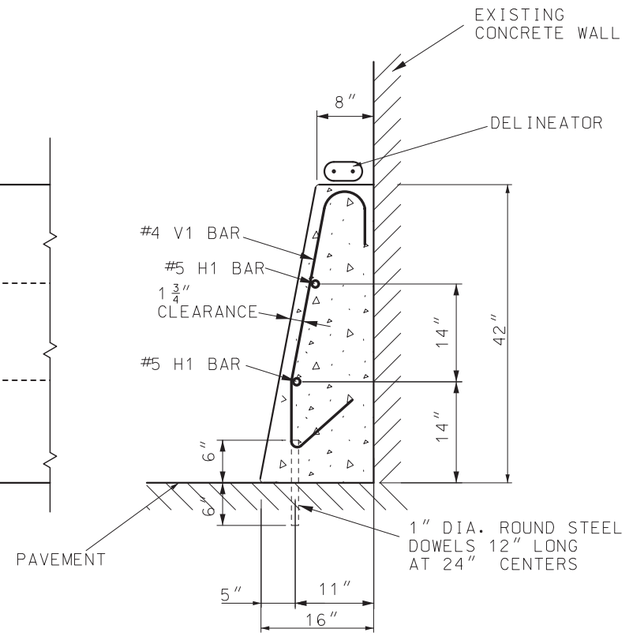
PLAN VIEW



V1 BAR (#4)



ELEVATION



SECTION A–A

REINFORCING DETAILS

NOTES:

ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

BAR SPLICES SHALL BE A MINIMUM OF 24 TIMES THE NOMINAL DIAMETER OF THE BAR.

ANY METHOD DEVISED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT WILL ASSURE THE LONGITUDINAL REINFORCING STEEL WILL BE POSITIONED ± 1/2 INCH AS DIMENSIONED WILL BE SATISFACTORY.

THE CONTRACTOR HAS THE OPTION TO SLIP-FORM THE BARRIER. IN WHICH CASE, ADDITIONAL REINFORCEMENT MAY BE TIED TO THE UPPER TWO-THIRDS OF THE REINFORCING CAGE TO PROVIDE BRACING.

THIS BARRIER SHALL NOT BE USED TO SUPPORT HIGHWAY LIGHTING POLES.

THIS BARRIER SHALL NOT BE USED FOR BRIDGE ROADWAY APPLICATIONS.

SAWED JOINTS SHALL BE LOCATED AT PAVEMENT TRANSVERSE JOINTS.

TYPE D SHALL BE USED ONLY AT LOCATIONS SHOWN ON PLANS.

#8 REINFORCING BARS WITH AN EPOXY ANCHOR SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1″ DIAMETER ROUND STEEL DOWELS.

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS SEE STD PLAN 903.03.

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

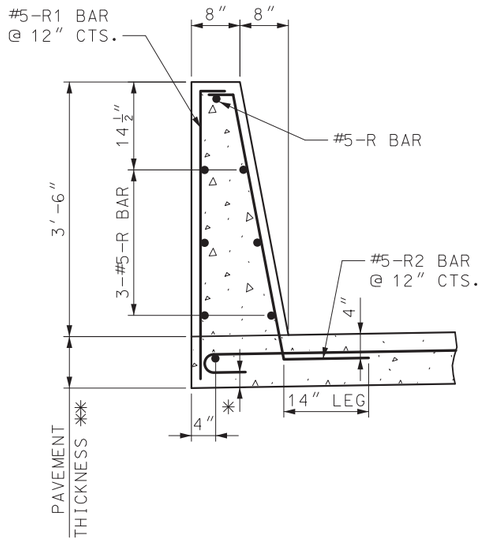
STATE OF MISSOURI
ERIC E. SCHROETER
NUMBER PE-2841
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

PERMANENT CONCRETE TRAFFIC BARRIER
TYPE D

DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

617.10L

SHEET NO. 7 OF 11



PART SECTION THROUGH BARRIER

TABLE A TRANSVERSE PAVEMENT REINFORCEMENT	
PAVEMENT THICKNESS **	BAR SIZE & SPACING
8"	#5 @ 4"*
9"	#5 @ 5"*
10"	#5 @ 6"
11"	#5 @ 7"
12"	#6 @ 12"
≥ 13"	#6 @ 12"

NOTES:

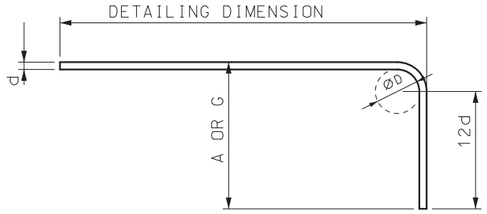
ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

NO DIRECT PAYMENT WILL BE MADE FOR REINFORCING STEEL.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1½", UNLESS OTHERWISE SHOWN.

* TILT TRANSVERSE PAVEMENT REINFORCEMENT HOOKS FROM VERTICAL ALIGNMENT TO MAINTAIN 1½" MINIMUM CLEARANCE.

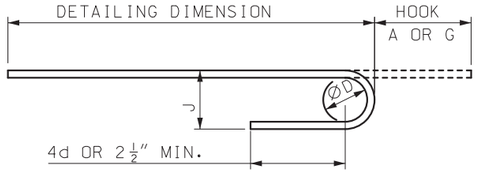
** SEE ROADWAY PAVEMENT DESIGN.



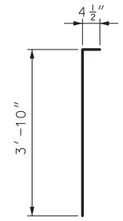
90° HOOKS

END HOOK DIMENSIONS				
BAR SIZE	D (IN.)	ALL GRADES		
		180° HOOKS		90° HOOKS
		A OR G	J	A OR G
#5	3¾"	7"	5"	10"
#6	4½"	8"	6"	12"

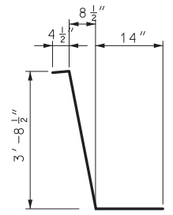
ALL STANDARD HOOKS AND BENDS OTHER THAN 180° TO BE BENT WITH THE SAME PROCEDURE AS FOR 90° STANDARD HOOKS.



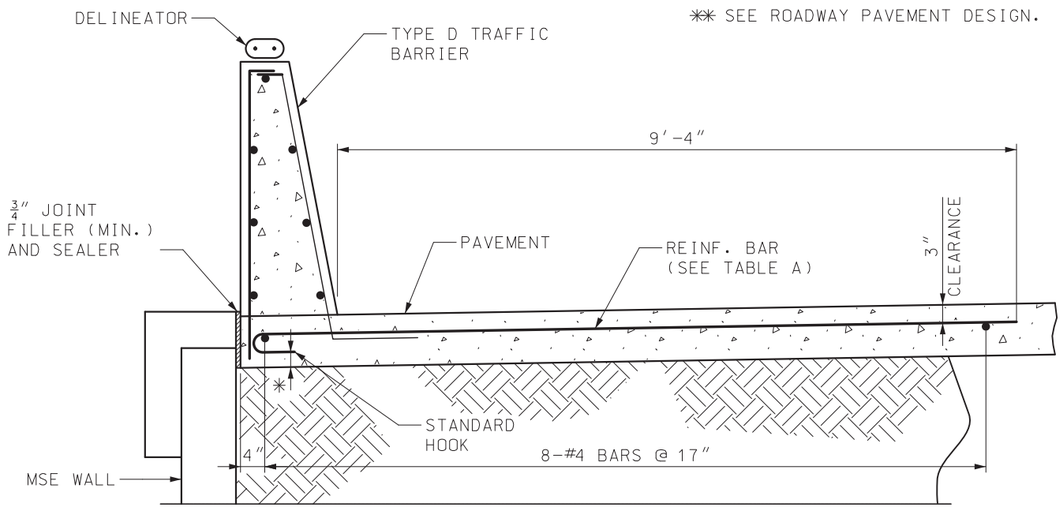
180° HOOKS



#5 R1



#5 R2



TYPE D (MSE WALL) TRAFFIC BARRIER ON TOP OF MSE WALL

NOTES:

TYPE D SHALL BE USED ONLY AT LOCATIONS SHOWN ON PLANS.

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS SEE STD PLAN 903.03.

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

STATE OF MISSOURI
ERIC E. SCHROETER
NUMBER PE-28411
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

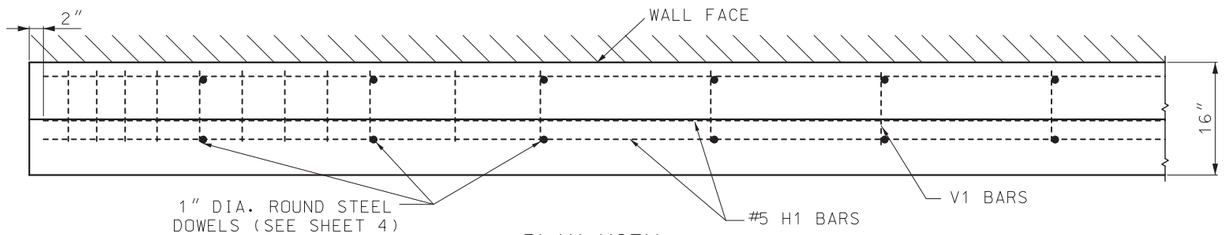
PERMANENT CONCRETE TRAFFIC BARRIER

TYPE D ATOP MSE WALL

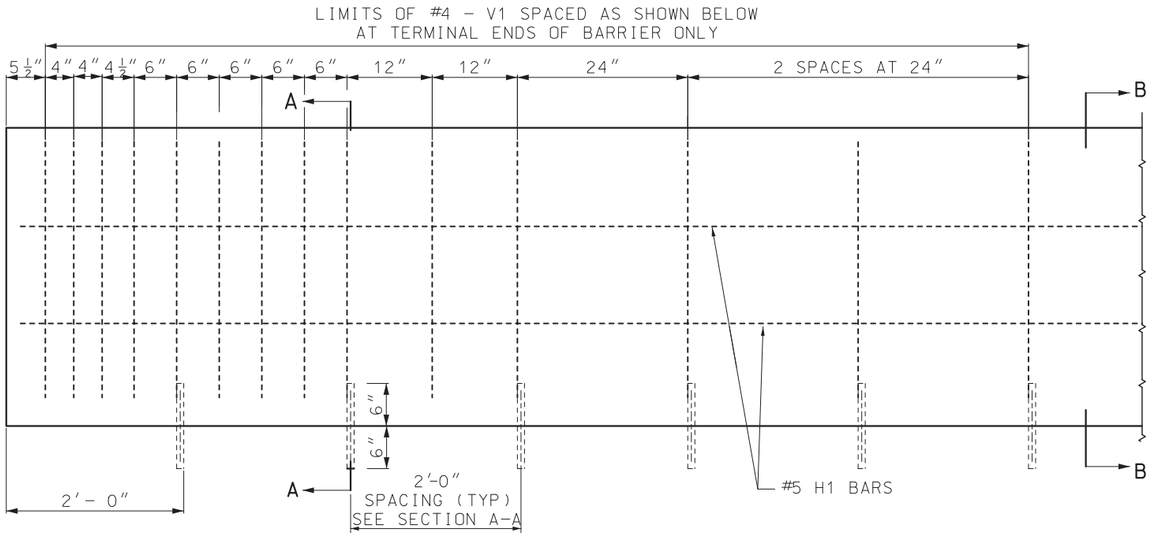
DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

617.10L

SHEET NO. 8 OF 11

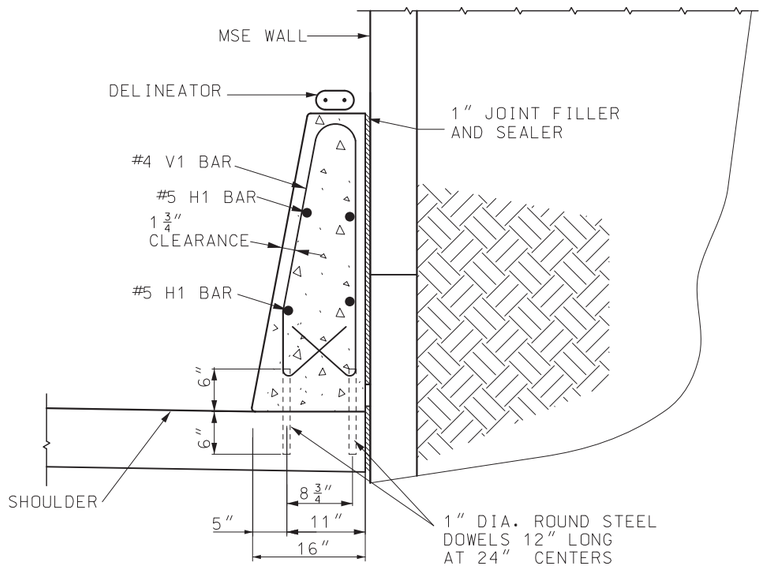


PLAN VIEW

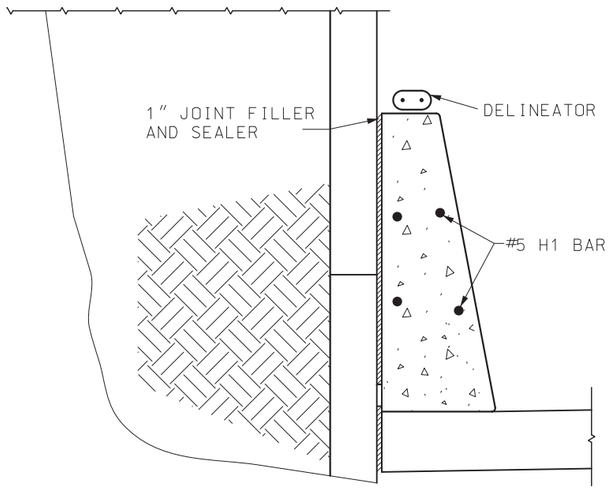


ELEVATION

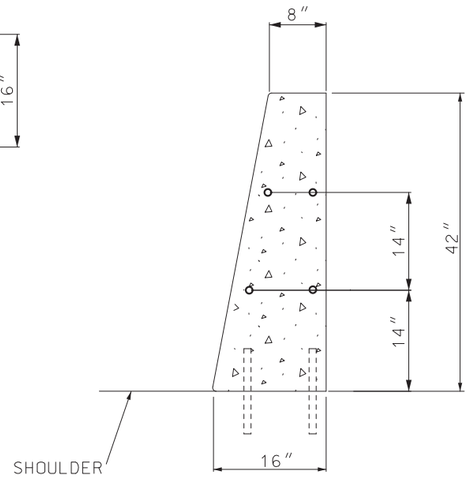
REINFORCING DETAILS



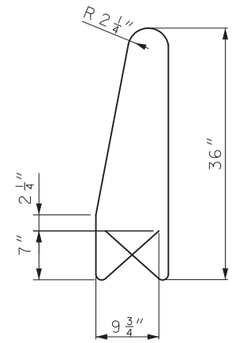
SECTION A–A



SECTION B–B



TYPE D TYPICAL SECTION



V1 BAR (#4)

NOTES:

ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

BAR SPLICES SHALL BE A MINIMUM OF 24 TIMES THE NOMINAL DIAMETER OF THE BAR.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1½″, UNLESS OTHERWISE SHOWN.

ANY METHOD DEVISED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT WILL ASSURE THE LONGITUDINAL REINFORCING STEEL WILL BE POSITIONED ± ½ INCH AS DIMENSIONED WILL BE SATISFACTORY.

THE CONTRACTOR HAS THE OPTION TO SLIP-FORM THE BARRIER. IN WHICH CASE, ADDITIONAL REINFORCEMENT MAY BE TIED TO THE UPPER TWO-THIRDS OF THE REINFORCING CAGE TO PROVIDE BRACING.

THIS BARRIER SHALL NOT BE USED TO SUPPORT HIGHWAY LIGHTING POLES.

THIS BARRIER SHALL NOT BE USED FOR BRIDGE ROADWAY APPLICATIONS.

SAWED JOINTS SHALL BE SPACED AT 15′-0″. SEE STANDARD PLANS FOR SAWED JOINT DETAIL

TYPE D BARRIER SHALL BE USED ONLY AT LOCATIONS SHOWN ON PLANS.

#8 REINFORCING BARS WITH AN EPOXY ANCHOR SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1″ DIAMETER ROUND STEEL DOWELS.

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS SEE STD PLAN 903.03.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
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STATE OF MISSOURI
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NUMBER PE-28411
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

PERMANENT CONCRETE TRAFFIC BARRIER

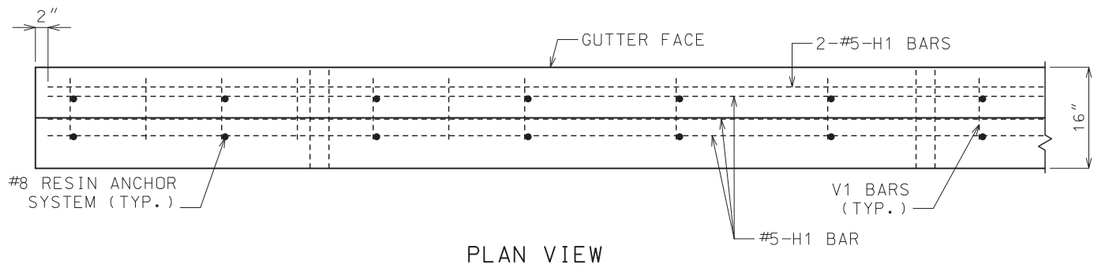
TYPE D BESIDE MSE WALL

DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

617.10L

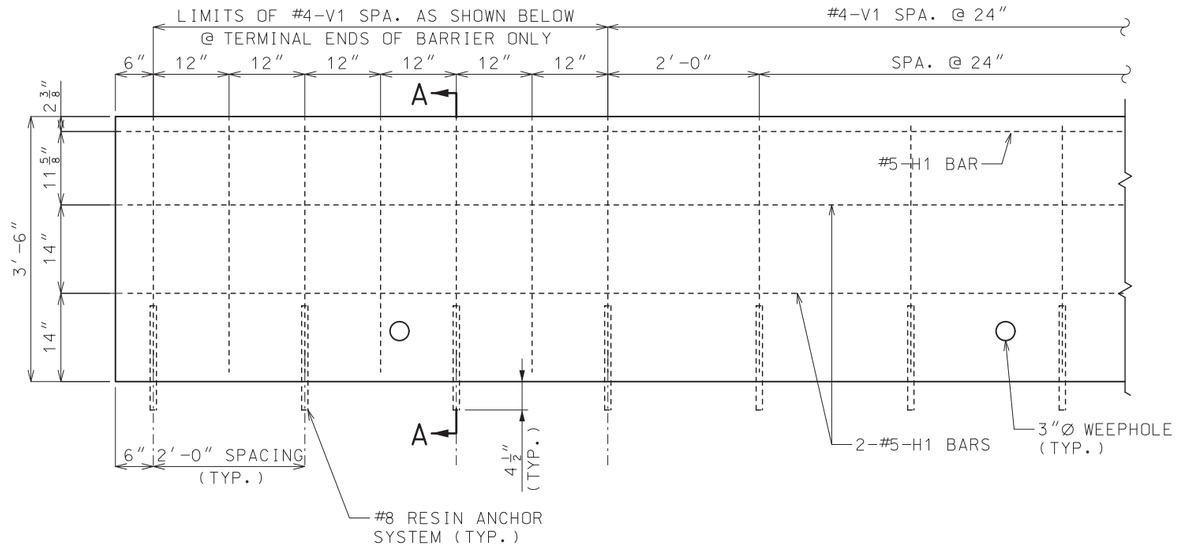
SHEET NO. 9 OF 11

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

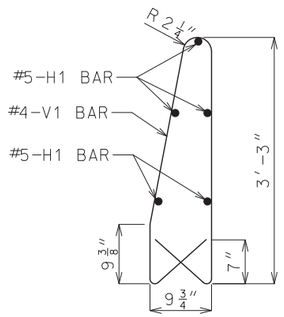


PLAN VIEW

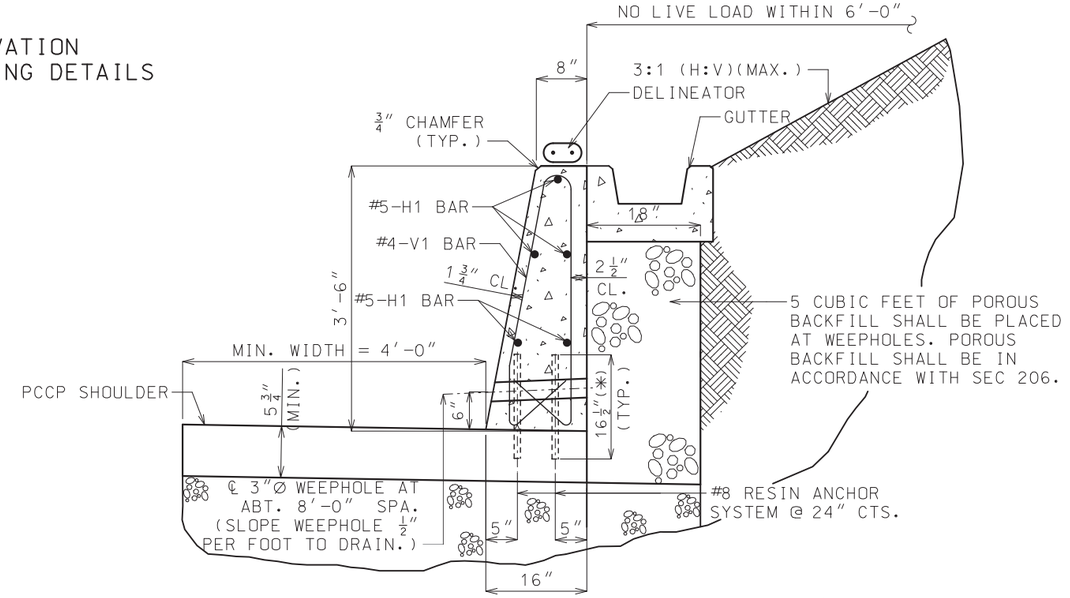
NOTE: GUTTER NOT SHOWN FOR CLARITY.



ELEVATION
REINFORCING DETAILS



PART SECTION OF
#4-V1 BAR



SECTION A-A
(FOR SLOPING AND NONSLOPING BACKSLOPE)

(*) EMBED ANCHOR 4 1/2″ INTO PCCP SHOULDER.

GENERAL NOTES:

CONCRETE SHALL BE CLASS B f′c = 4,000 PSI.

ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

ANGLE OF INTERNAL FRICTION, ϕf ≥ 30° FOR BACKFILL MATERIAL.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1-1/2″, UNLESS OTHERWISE SHOWN.

BAR SPLICES SHALL BE A MINIMUM OF 24 TIMES THE NOMINAL DIAMETER OR THE BAR.

ANY METHOD DEVISED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT WILL ASSURE THE LONGITUDINAL REFORCING STEEL WILL BE POSITIONED ±1/2 INCH AS DIMENSIONED WILL BE SATISFACTORY.

THE CONTRACTOR HAS THE OPTION TO SLIP-FORM THE BARRIER. IN WHICH CASE, ADDITIONAL REINFORCEMENT MAY BE TIED TO THE UPPER TWO-THIRDS OF THE REINFORCING CAGE TO PROVIDE BRACING.

THIS BARRIER SHALL NOT BE USED TO SUPPORT HIGHWAY LIGHTING POLES.

THIS BARRIER SHALL NOT BE USED FOR BRIDGE ROADWAY APPLICATION.

SAWED JOINTS SHALL BE SPACED AT 15′-0″. SEE MISSOURI STANDARD PLANS FOR SAWED JOINT DETAIL.

TYPE D BARRIER MODIFIED RETAINING WALL WITH NONMOMENT SLAB SHALL BE USED ONLY AT LOCATIONS SHOWN ON PLANS.

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS SEE STD PLAN 903.03.

RESIN ANCHOR SYSTEM SHALL BE DRILLED IN THE PAVEMENT.

WHEN BARRIER HEIGHT EXCEEDS 42″ OR SLOPE EXCEEDS 3:1 (H:V) OR LIVE LOAD IS WITHIN 6′-0″, CONTACT BRIDGE DIVISION FOR SPECIAL DESIGN.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
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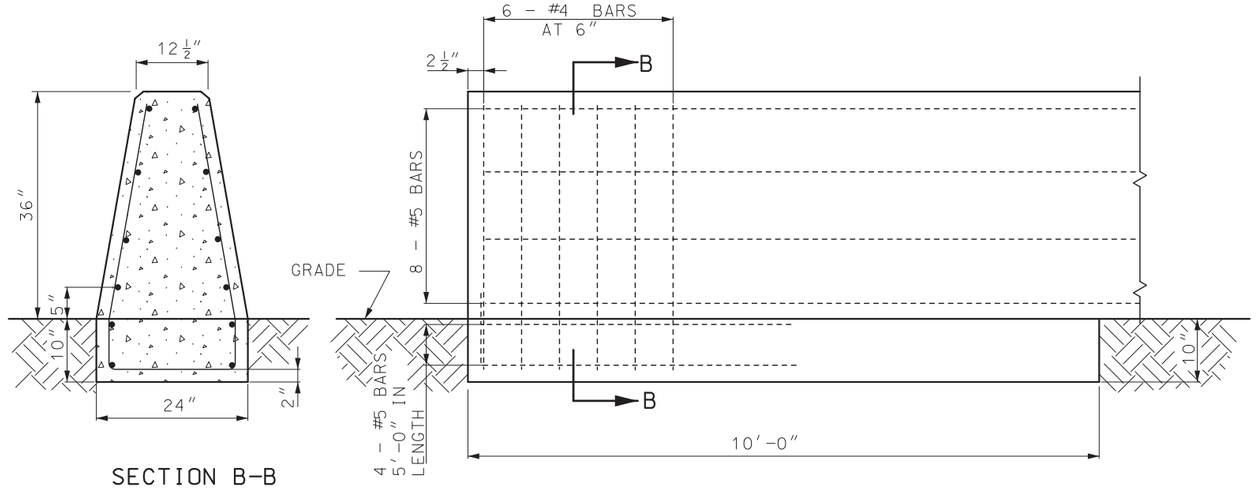
PERMANENT CONCRETE TRAFFIC BARRIER

TYPE D AS RETAINING WALL

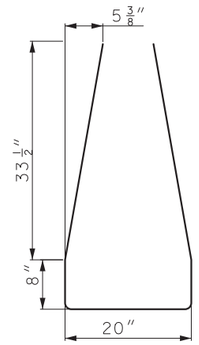
DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

617.10L

SHEET NO. 10 OF 11

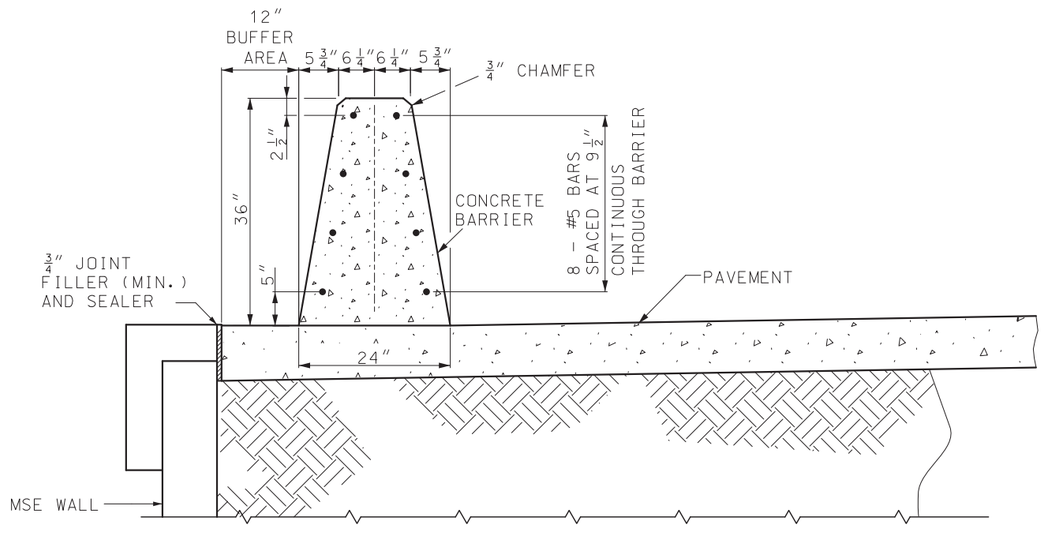


SECTION B–B



#4 BARS

CONCRETE BARRIER END ANCHORAGE ON GRADE



TRAFFIC BARRIER ON TOP OF MSE WALL

GENERAL NOTES:

ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2″, UNLESS OTHERWISE SHOWN.

A 12″ BUFFER REQUIRED WITHIN THE LIMITS OF THE TRAFFIC BARRIER EXCLUDING THE END ANCHORAGE SECTIONS.

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS SEE STD PLAN 903.03.

PAVEMENT SURFACE DIFFERENTIAL SHALL NOT EXCEED 1 1/2″.

BAR SPLICES SHALL BE A MINIMUM OF 24 TIMES THE NOMINAL DIAMETER OF THE BAR.

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STATE OF MISSOURI
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NUMBER PE-28411
PROFESSIONAL ENGINEER
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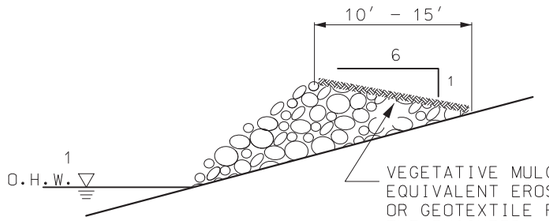
PERMANENT CONCRETE TRAFFIC BARRIER

TYPE E ATOP MSE WALL

DATE EFFECTIVE: 01/01/2019
DATE PREPARED: 10/17/2018

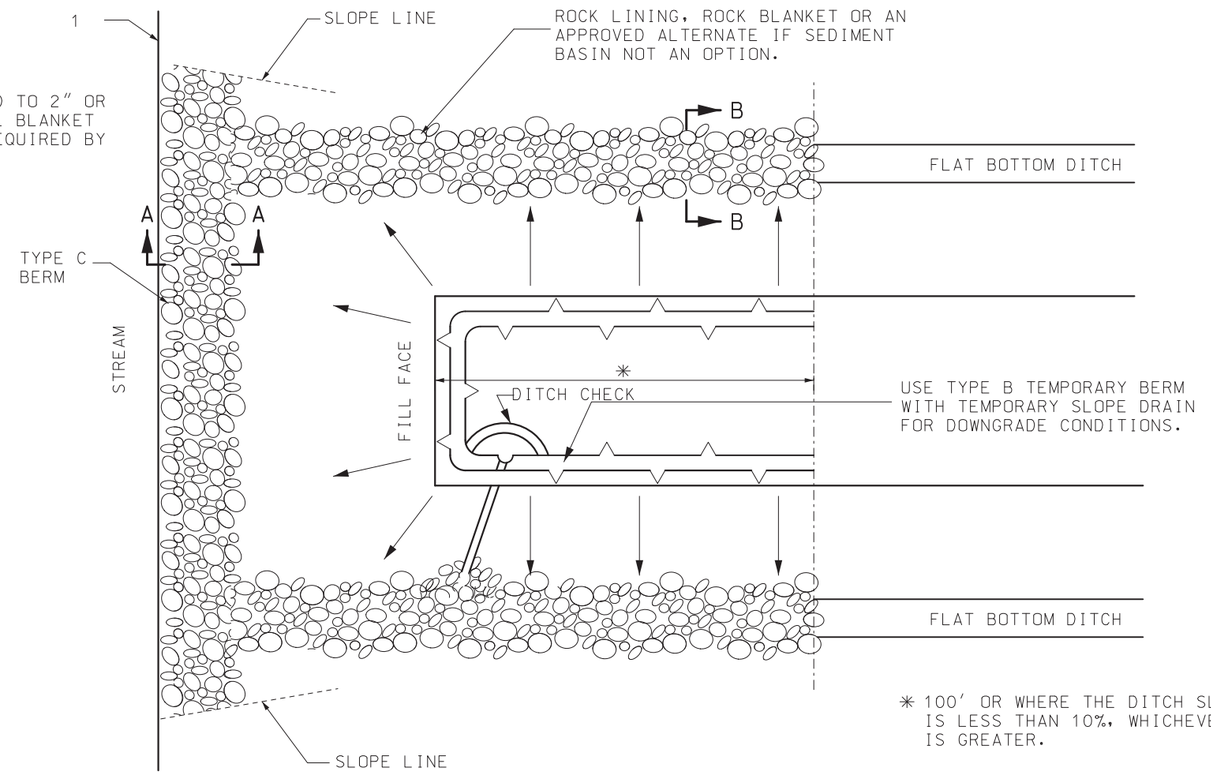
617.10L

SHEET NO. 11OF 11



SECTION A–A
TYPE C BERM

(1) TYPE C BERM SHALL BE PLACED ABOVE THE ORDINARY HIGH WATER (O.H.W.) OR AT AN ELEVATION AS DIRECTED BY THE ENGINEER.



* 100′ OR WHERE THE DITCH SLOPE IS LESS THAN 10%, WHICHEVER IS GREATER.

PLAN VIEW

SECTION B–B

GENERAL NOTES:

TYPE C BERM SHALL BE BUILT TO HANDLE SIGNIFICANT RUN-OFF EVENTS AND SHALL BE INSTALLED PRIOR TO SOIL DISTURBANCE OR PLACEMENT OF FILL IN THE DRAINAGE AREA OF THE BERM.

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STATE OF MISSOURI
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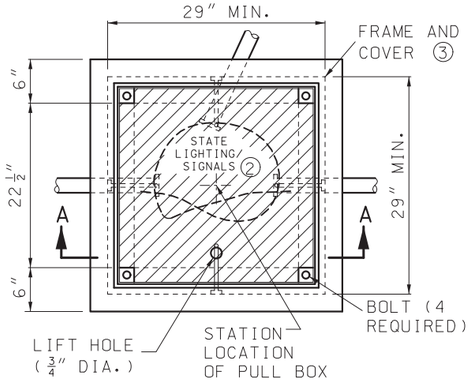
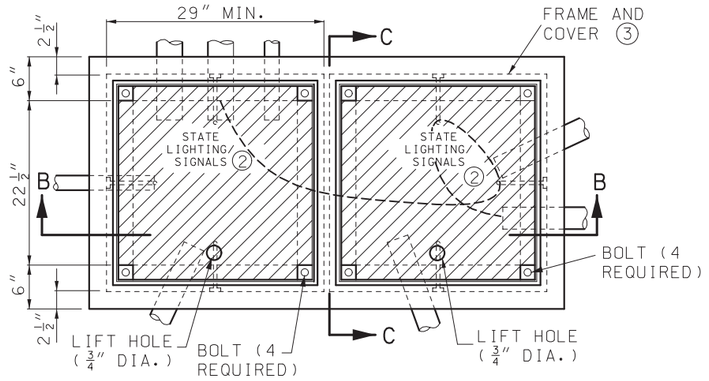
TEMPORARY EROSION CONTROL MEASURES

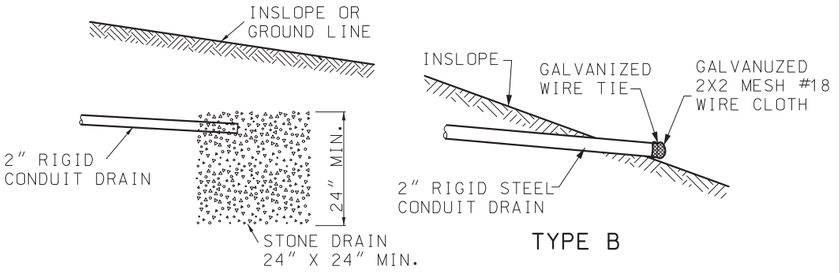
BRIDGES AND BOX CULVERTS AT STREAM CROSSINGS

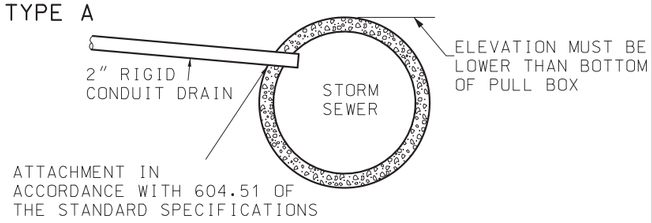
DATE EFFECTIVE: 04/01/2019
DATE PREPARED: 1/16/2019

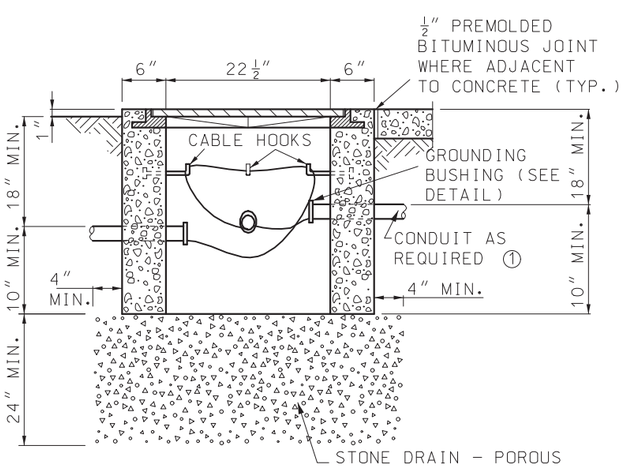
806.10J



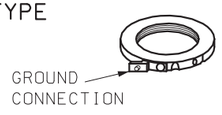




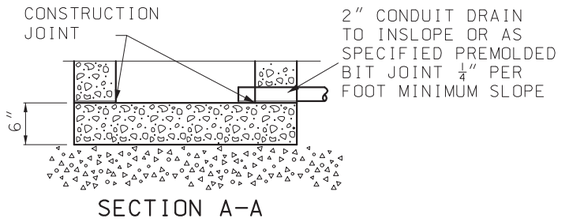




SECTION A–A
TYPE I DRAIN TYPE

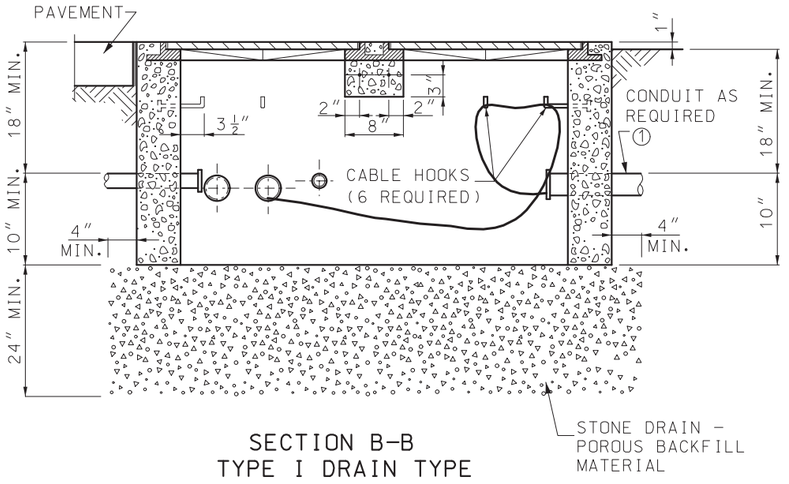


GROUNDING BUSHING (TYP) ①

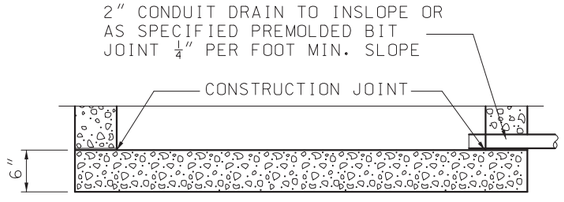


SECTION A–A
TYPE II DRAIN TYPE
(SEE DRAIN OUTLET DETAILS)
(SECTION ABOVE BREAK APPLICABLE TO TYPE I DRAIN)

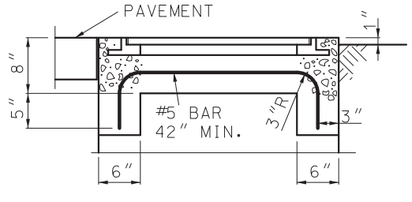
STANDARD CONCRETE PULL BOX



SECTION B–B
TYPE I DRAIN TYPE



SECTION B–B
TYPE II DRAIN TYPE
(SEE DRAIN OUTLET DETAILS)
(SECTION ABOVE BREAK APPLICABLE TO TYPE I DRAIN)



SECTION C–C

DOUBLE CONCRETE PULL BOX, TYPE A

TYPE II DRAIN OUTLET DETAILS

① ALL METAL CONDUITS SHALL BE ELECTRICALLY BONDED BY A GROUND BUSHING AND #6 AWG BARE COPPER WIRE. FOR PVC CONDUIT, ALL GROUND WIRES SHALL BE CONNECTED.

② SIGNAL PULL BOXES SHALL BE EMBOSSED "STATE SIGNALS" AND LIGHTING PULL BOXES "STATE LIGHTING."

③ PULL BOX FRAMES AND COVERS SHALL BE CAST IRON AND THE FOLLOWING MINIMUM DIMENSIONS:

FRAME SIZE:	29" x 29"
FRAME HEIGHT:	4¼"
OPENING SIZE:	22½" x 22½"
FRAME WEIGHT:	120 LBS.
COVER SIZE:	22⅝" x 22⅝"
COVER THICKNESS:	¾"
COVER WEIGHT:	140 LBS.

GENERAL NOTES:

ALL DIMENSIONS SHOWN ARE NOMINAL.

BOLT CLEANOUT DETAIL SHALL BE APPROVED BY ENGINEER.

PAVEMENT AND SUBGRADE SHALL BE AS SHOWN ON PLANS.

STONE DRAIN MATERIAL SHALL CONFORM TO SECTION 1009 OF THE STANDARD SPECIFICATIONS.

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PROFESSIONAL ENGINEER
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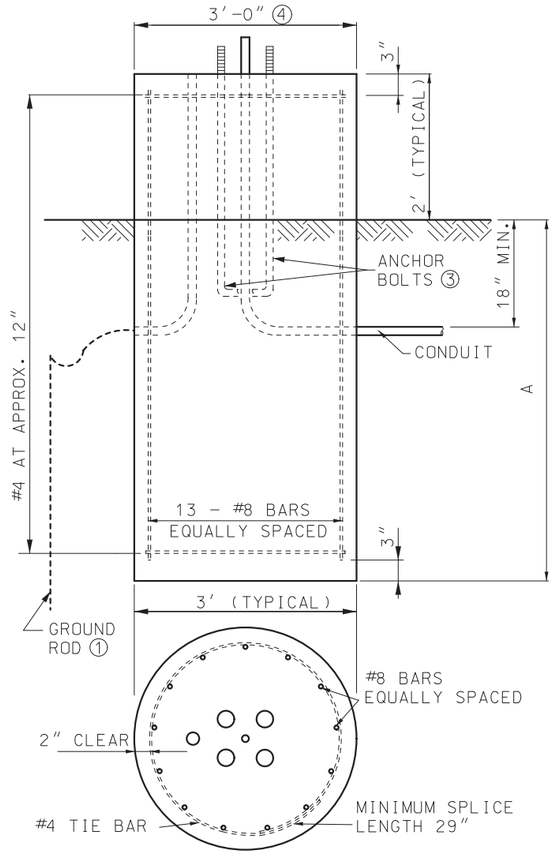
TRAFFIC SIGNALS
CONCRETE PULL BOXES

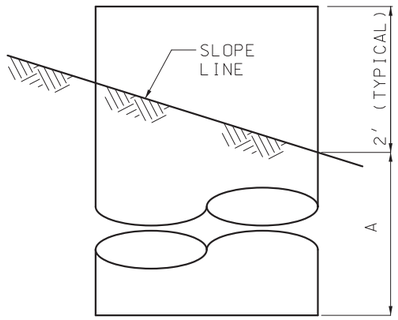
DATE EFFECTIVE: 04/01/2019
DATE PREPARED: 1/16/2019

902.20G

SHEET NO.
1 OF 3

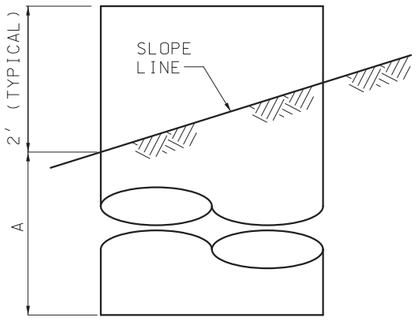


TYPE A (FLAT GROUND)



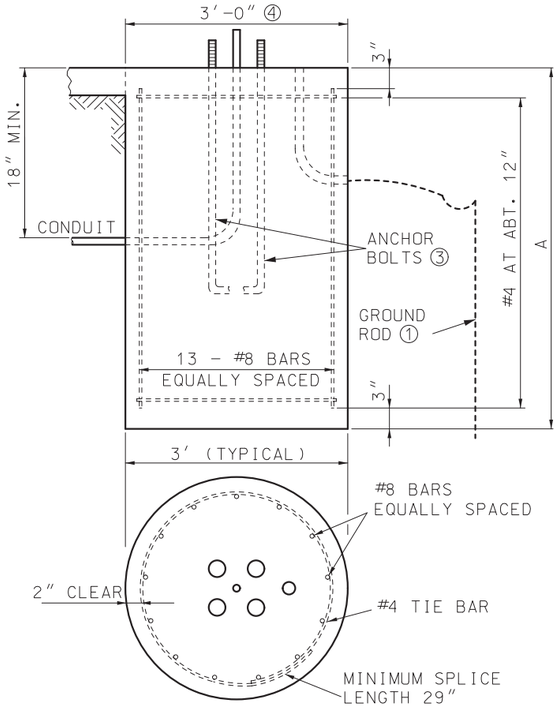
TYPE A (FILL)

(FOR ADDITIONAL DETAILS SEE TYPE A FLAT GROUND)

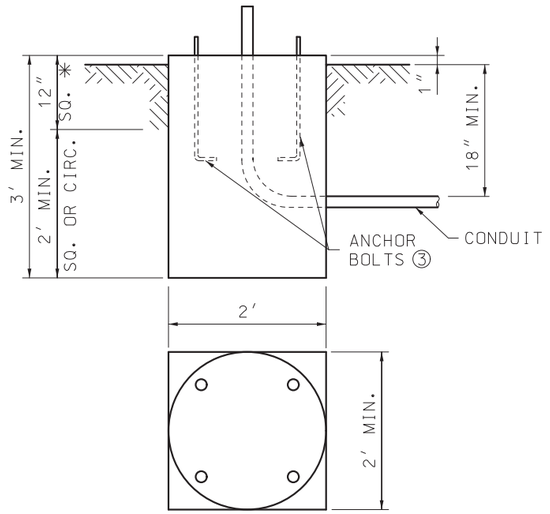


TYPE A (CUT)

(FOR ADDITIONAL DETAILS SEE TYPE A FLAT GROUND)



TYPE F



✳ SURFACE OF BASE TO BE CONSTRUCTED SQUARE FOR A DEPTH OF 12″.

TYPE C

POST BASES

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

STEEL AND CONCRETE REQUIREMENTS FOR POST BASES ⑨				
BASES		#6 STEEL BAR		CONC.
TYPE	A ⑦	LENGTH	WEIGHT LBS. ⑧	C.Y.
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″

1. REQUIRED EMBEDMENT DEPTHS CAN BE INTERPOLATED BETWEEN ENCOUNTER POINTS FOR OTHER SOLID ROCK ENCOUNTER DEPTHS.
2. NORMAL LENGTHS FOR ANCHOR BOLTS AND REINFORCING STEEL WILL BE REQUIRED.
3. 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.
4. IF SOIL, SHALE, GRAVEL, FRACTURED ROCK, OR VOIDS ARE ENCOUNTERED DURING CORE DRILLING, THE ROCK SHALL BE REMOVED TO THE POINT OF ENCOUNTER.
5. 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.
6. 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.

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 ½ DIAMETER OF THE DRILLED SHAFT.

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
DATE PREPARED: 7/31/2018

902.30P

SHEET NO. 1 OF 2