



**STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION**

ROADWAY DESIGN DIVISION
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INSTRUCTIONAL BULLETIN NO. 16-09

Regarding Revised, New and Voided Standard Drawings

Effective December 2, 2016 letting (September 27, 2016 Turn-in), the following Standard Drawings have either been revised, are new, or have been voided. Also, Section V of the Roadway Design Guidelines will be revised to incorporate these changes.

Revised Standard Drawings:

DRAWING NUMBER	CURRENT REVISION DATE	DESCRIPTION
EC-STR-6 ^{1&3}	05-06-16	ROCK CHECK DAM
EC-STR-6A ¹	05-06-16	ENHANCED ROCK CHECK DAM
RD01-TS-8 ⁵	04-08-16	SHARED USE PATH TYPICAL SECTIONS
RP-D-15 ⁵	04-08-16	DETAILS OF STANDARD CONCRETE DRIVEWAYS
RP-D-16 ⁵	04-08-16	DETAILS OF LOWERED STANDARD CONCRETE DRIVEWAYS
S-GR31-1 ⁵	04-04-16	W-BEAM GUARDRAIL
S-GRS-2 ²	05-25-16	SPECIAL CASE GUARDRAIL ATTACHMENT TO CONCRETE DECKS
S-GRS-4 ⁴	04-12-16	SPECIAL CASE GUARDRAIL HEIGHT TRANSITION DETAIL
S-GRT-2 ⁵	04-04-16	TYPE 38 GUARDRAIL END TERMINAL
S-GRT-3 ⁵	04-04-16	TYPE 21 GUARDRAIL END TERMINAL
S-SSMB-4 ⁵	04-12-16	FLARED SINGLE SLOPE CONCRETE MEDIAN BARRIER WALL (VERTICAL BACK)

Revised Standard Drawings with New Titles:

DRAWING NUMBER	CURRENT REVISION DATE	DESCRIPTION
D-CB-28RA ¹	04-12-16	STANDARD PRECAST 48" CIRCULAR NO. 28 CATCH BASIN (FOR USE WITH 4" SLOPING CURB)
D-CB-28RB ¹	04-12-16	STANDARD PRECAST CIRCULAR NO. 28 CATCH BASIN (FOR USE WITH 4" SLOPING CURB)

New Standard Drawings:

DRAWING NUMBER	CURRENT REVISION DATE	DESCRIPTION
S-GR31-1A		W-BEAM BARRIER FASTENING HARDWARE

Voided Standard Drawings:

DRAWING NUMBER	CURRENT REVISION DATE	DESCRIPTION
S-GR31-2 S-GRT-3P		Median Divider Guardrail Earth Pad for Type 21 Terminal

Copies of the revised and new standard drawings are attached.

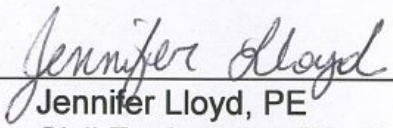
Note 1: Minor revisions, revised notes, and/or revised references to other standard drawings

Note 2: Minor revisions, revised details

Note 3: Minor revisions, revised tables

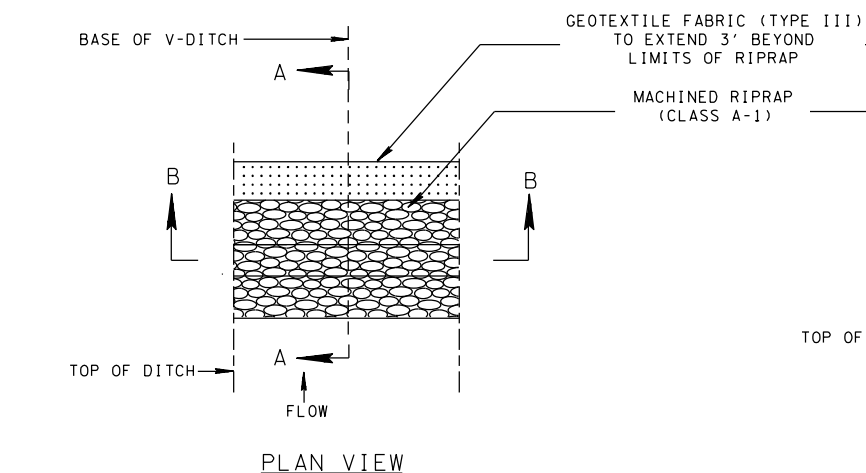
Note 4: Minor revisions, revised pay item numbers

Note 5: Major revisions, add/remove details and/or tables, revised notes

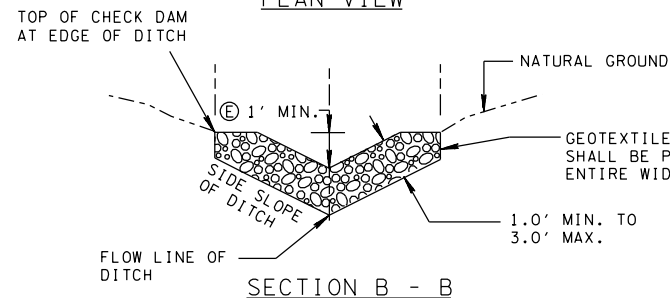


Jennifer Lloyd, PE
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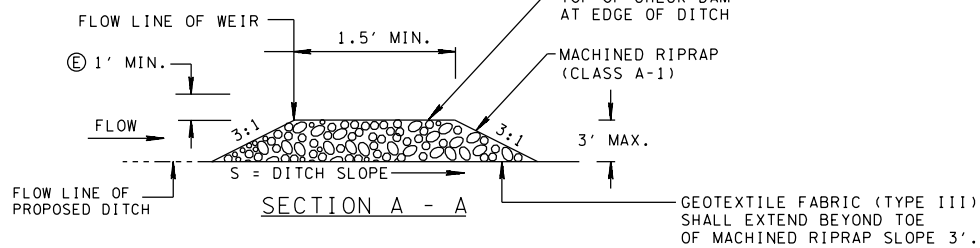
DETAIL FOR V-DITCH



PLAN VIEW

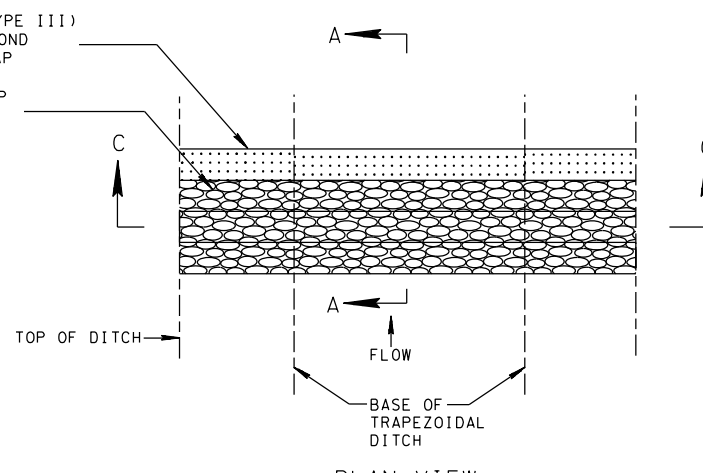


SECTION B - B

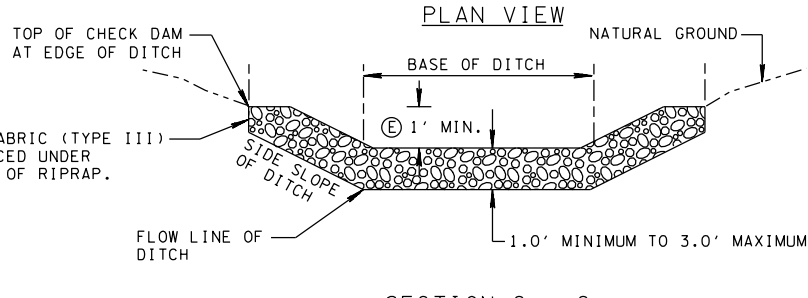


SECTION A - A

DETAIL FOR TRAPEZOIDAL DITCH

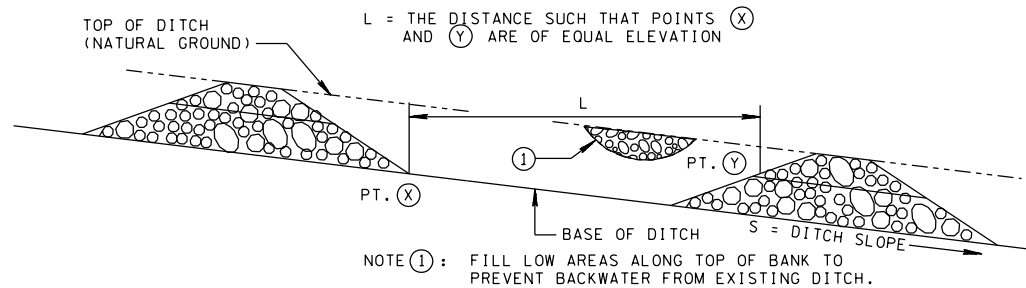


PLAN VIEW



SECTION C - C

DETAIL FOR SPACING BETWEEN CHECK DAMS



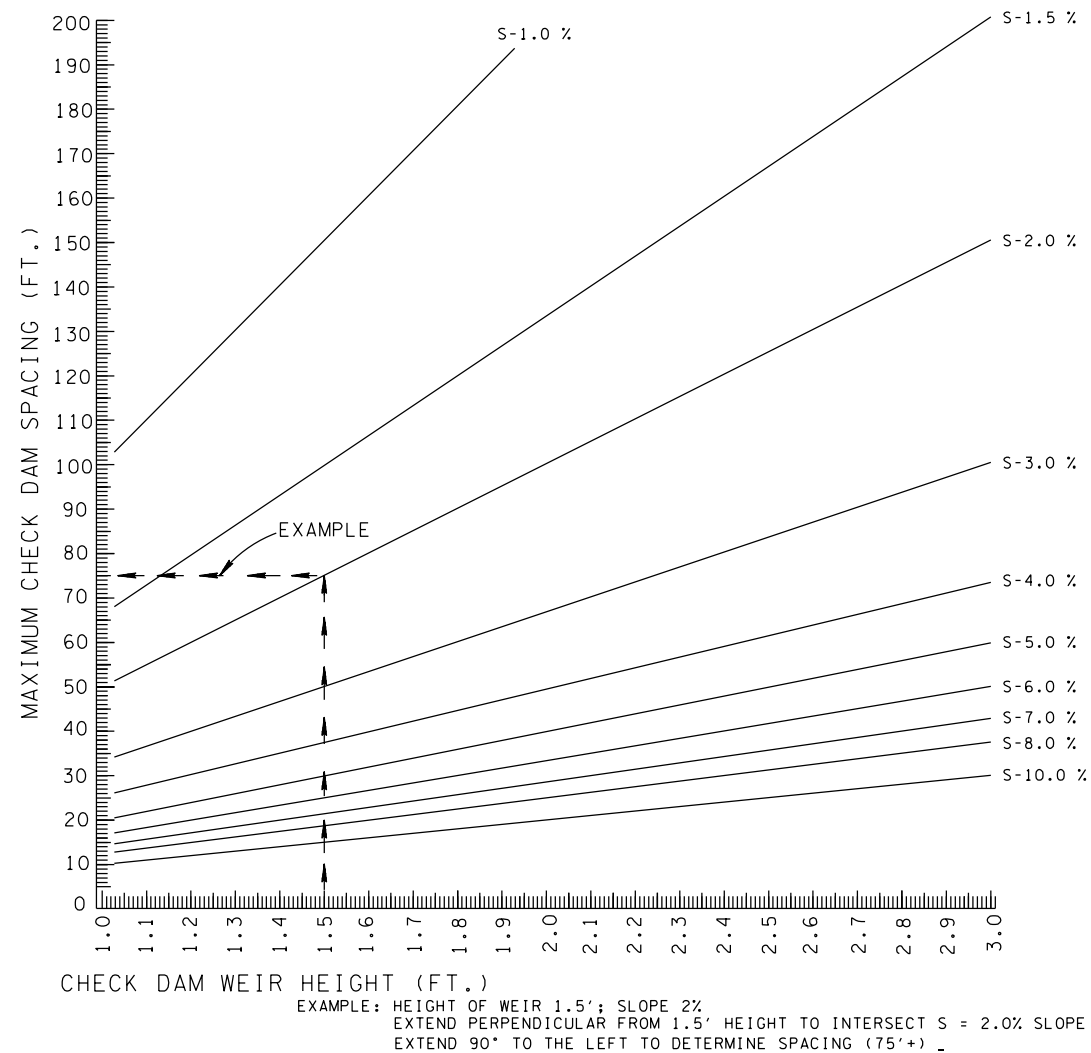
ROCK CHECK DAM ESTIMATED QUANTITIES

	2:1 DITCH SLOPE			3:1 DITCH SLOPE			4:1 DITCH SLOPE		
	HEIGHT FT	RIP RAP TON	GEOTEXTILE SF	HEIGHT FT	RIP RAP TON	GEOTEXTILE SF	HEIGHT FT	RIP RAP TON	GEOTEXTILE SF
V-DITCH ¹	1.5	6.5	16.8	1.5	9.2	23.7	1.5	12.0	30.9
	2.0	13.0	24.6	2.0	18.4	34.8	2.0	24.1	45.4
	2.5	22.8	33.9	2.5	32.3	48.0	2.5	42.1	62.5
	3.0	36.5	44.7	3.0	51.7	63.2	3.0	67.3	82.5
TRAPEZOIDAL DITCH ²	1.5	8.9	22.8	1.5	11.6	29.7	1.5	14.4	36.9
	2.0	16.9	31.9	2.0	22.3	42.1	2.0	27.9	52.7
	2.5	28.7	42.6	2.5	38.1	56.6	2.5	47.9	71.2
	3.0	44.7	54.7	3.0	59.8	73.2	3.0	75.5	92.4

- ESTIMATED QUANTITIES BASED ON 4:1 SIDE SLOPES. QUANTITIES WILL VARY BASED ON ACTUAL DITCH CONFIGURATION.
- ESTIMATED QUANTITIES BASED ON 4FT BOTTOM WIDTH, AND 4:1 SIDE SLOPES. QUANTITIES WILL VARY BASED ON ACTUAL DITCH CONFIGURATION.

EROSION CONTROL PLAN LEGEND : ROCK CHECK DAM (V-DITCH)
 EROSION CONTROL PLAN LEGEND : ROCK CHECK DAM (TRAPEZOIDAL DITCH)

ROCK CHECK DAM SPACING



- REV. 12-18-95: CHANGED DRAWING NO. FROM ESC-STR-6 TO EC-STR-6.
- REV. 7-29-96: MADE MINOR CORRECTIONS TO GENERAL NOTES.
- REV. 4-15-98: CHANGED PAY ITEMS FOR CHECK DAMS.
- REV. 5-27-01: CHANGED DESCRIPTION FOR GEOTEXTILE FABRIC (TYPE III, CLASS A) TO GEOTEXTILE FABRIC (TYPE III).
- REV. 12-18-02: CHANGED GENERAL NOTE (C).
- REV. 1-22-03: CORRECTED NOTE IN SECTION A-A.
- REV. 4-15-06: REFORMATTED SHEET, REVISED NOTES, MISC. EDITS TO DRAWING.
- REV. 4-1-08: REMOVED TEMPORARY REFERENCE, REVISED NOTES, MISC. EDITS TO DRAWING, MODIFIED SPACING CHART.
- REV. 8-1-12: MINOR EDITS TO GENERAL NOTES.
- REV. 5-6-16: REVISED QUANTITIES TABLE, REVISED GENERAL NOTE (I), REVISED DITCH DETAIL.

ROCK CHECK DAM GENERAL NOTES

- (A) ROCK CHECK DAMS ARE TO BE USED FOR VELOCITY REDUCTION AND EROSION PREVENTION IN AREAS WHERE CONCENTRATED FLOW EXISTS. ROCK CHECK DAMS SHALL NOT BE USED IN STREAMS OR OTHER NATURAL WATER RESOURCES. ROCK CHECK DAMS ARE NOT TO BE USED FOR SEDIMENT CONTROL AND SHOULD NOT BE CONSIDERED A SEDIMENT TRAPPING DEVICE.
- (B) THE DRAINAGE AREA FOR THE ROCK CHECK DAMS SHALL BE 10 ACRES OR LESS.
- (C) ROCK CHECK DAMS MAY REMAIN IN PLACE AS PERMANENT CHECK DAMS, IF SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.
- (D) THE CENTER OF THE ROCK CHECK DAM MUST BE AT LEAST ONE (1) FOOT LOWER THAN THE OUTER EDGES.
- (E) THE DEPTH OF FLOW ON THE CENTER OF THE STRUCTURE SHALL BE COMPUTED FOR THE PEAK FLOW RATE GENERATED BY THE 2-YEAR, 24-HOUR STORM IN ORDER TO ENSURE THAT THE TOP OF THE STRUCTURE WILL NOT BE OVERTOPPED. FOR SITES WHICH DRAIN TO EXCEPTIONAL TENNESSEE WATERS OR SEDIMENT-IMPARED STREAMS, THE DEPTH SHOULD BE DETERMINED FOR THE 5-YEAR, 24-HOUR PEAK FLOW RATE. THIS WILL ELIMINATE THE ROCK-SOIL FAILURE POINT WHERE THE ROCK CHECK DAM AND NATURAL GROUND MERGE.
- (F) FOR SITES WHICH DRAIN TO EXCEPTIONAL TENNESSEE WATERS OR SEDIMENT-IMPARED STREAMS, THE MINIMUM HEIGHT OF THE STRUCTURE ABOVE THE DITCH BOTTOM SHALL BE INCREASED TO 2 FEET.
- (G) THE MAXIMUM SPACING BETWEEN ROCK CHECK DAMS SHOULD BE SUCH THAT THE TOE OF THE UPSTREAM DAM IS AT THE SAME ELEVATION AS THE FLOW LINE OF THE WEIR OF THE DOWNSTREAM DAM (SEE ROCK CHECK SPACING GRAPH THIS SHEET).
- (H) ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.
- (I) PRODUCTS LISTED ON THE QUALIFIED PRODUCTS LIST FOR FILTER SOCK DITCH APPLICATION MAY BE USED AND SHALL BE PAID UNDER FOLLOWING ITEM NUMBER:
 209-08.09 FILTER SOCK CHECK DAM PER EACH
- (J) ROCK CHECK DAMS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:
 209-08.07 ROCK CHECK DAM PER EACH
 PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF ROCK CHECK DAMS.
- (K) SEDIMENT SHALL BE REMOVED FROM BEHIND THE ROCK CHECK DAMS WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE DAM AND PAID FOR UNDER ITEM NUMBER 209-05, SEDIMENT REMOVAL PER CUBIC YARD.

□ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

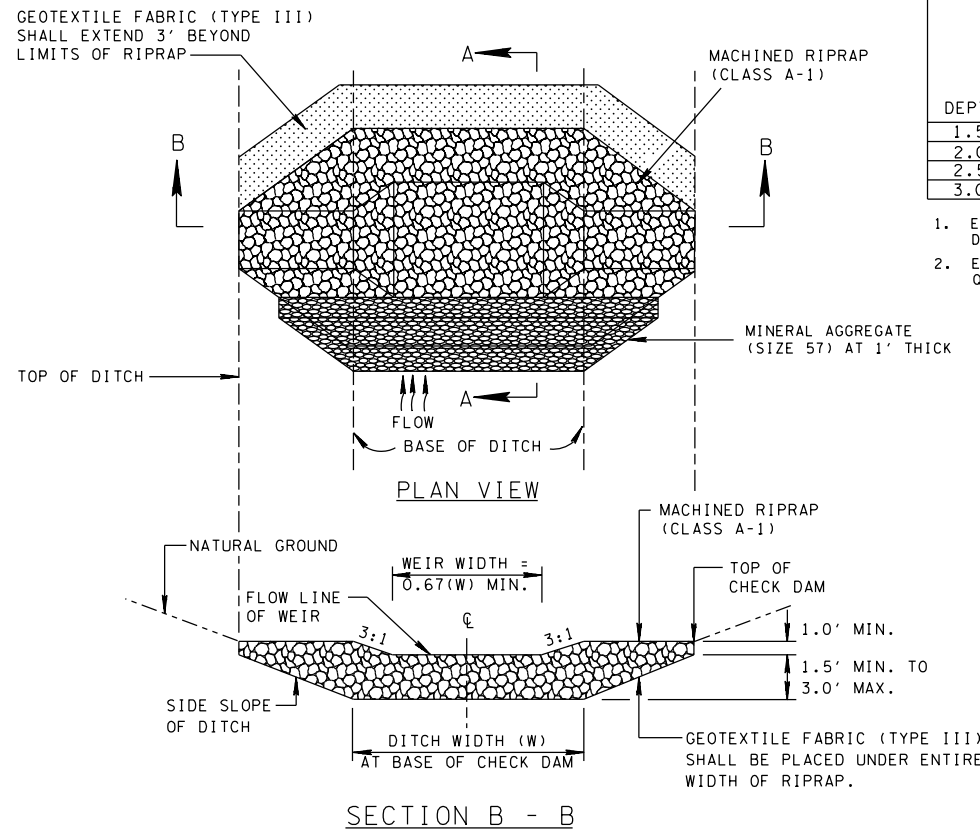
NOT TO SCALE

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ROCK
 CHECK DAM

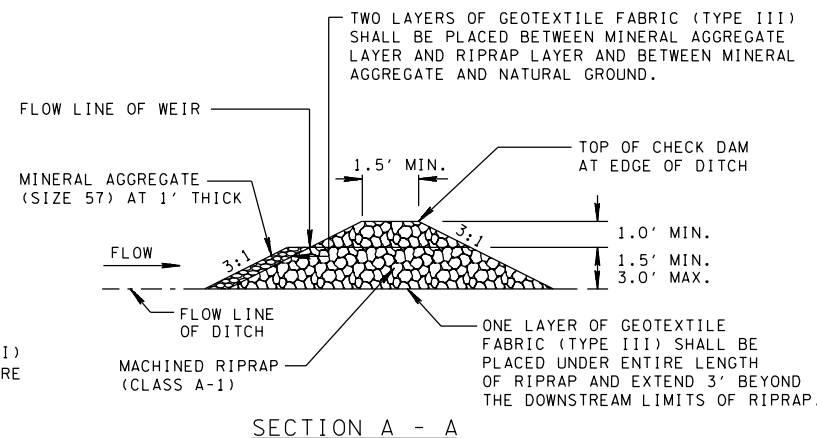
□ REV. 8-1-12: MINOR EDITS TO GENERAL NOTES.
 □ REV. 5-6-16: REVISED GENERAL NOTE ⑩

DETAIL FOR TRAPEZOIDAL DITCH

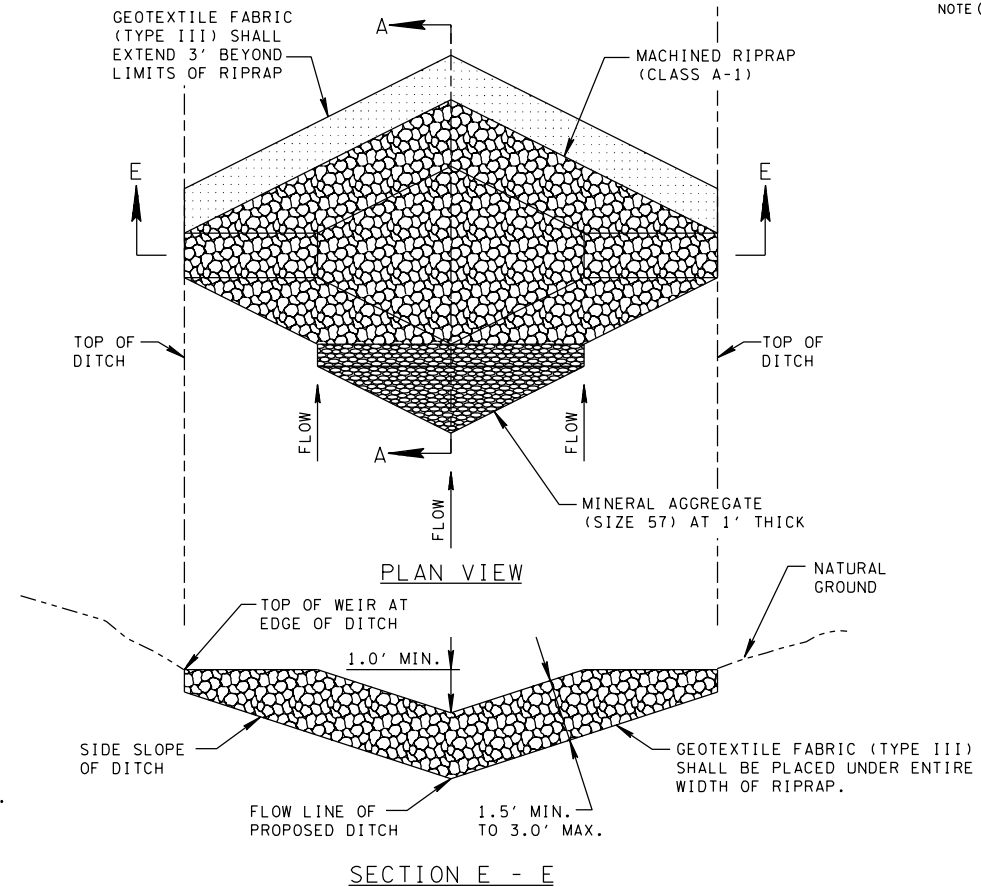


DEPTH	V-DITCH ¹			TRAPEZOIDAL DITCH ²		
	MINERAL AGGREGATE (SIZE 57) (TON)	MACHINED RIPRAP (CLASS A-1) (TON)	GEOTEXTILE FABRIC (TYPE III) (S.Y.)	MINERAL AGGREGATE (SIZE 57) (TON)	MACHINED RIPRAP (CLASS A-1) (TON)	GEOTEXTILE FABRIC (TYPE III) (S.Y.)
1.5	0.21	12.2	31.7	0.29	17.2	40.3
2.0	0.33	20.2	44.0	0.44	27.6	54.7
2.5	0.48	31.1	58.3	0.62	41.2	71.0
3.0	0.66	45.1	74.7	0.83	58.3	89.3

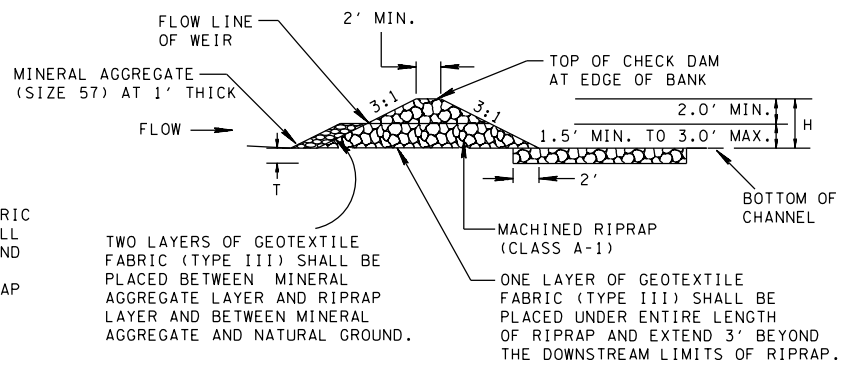
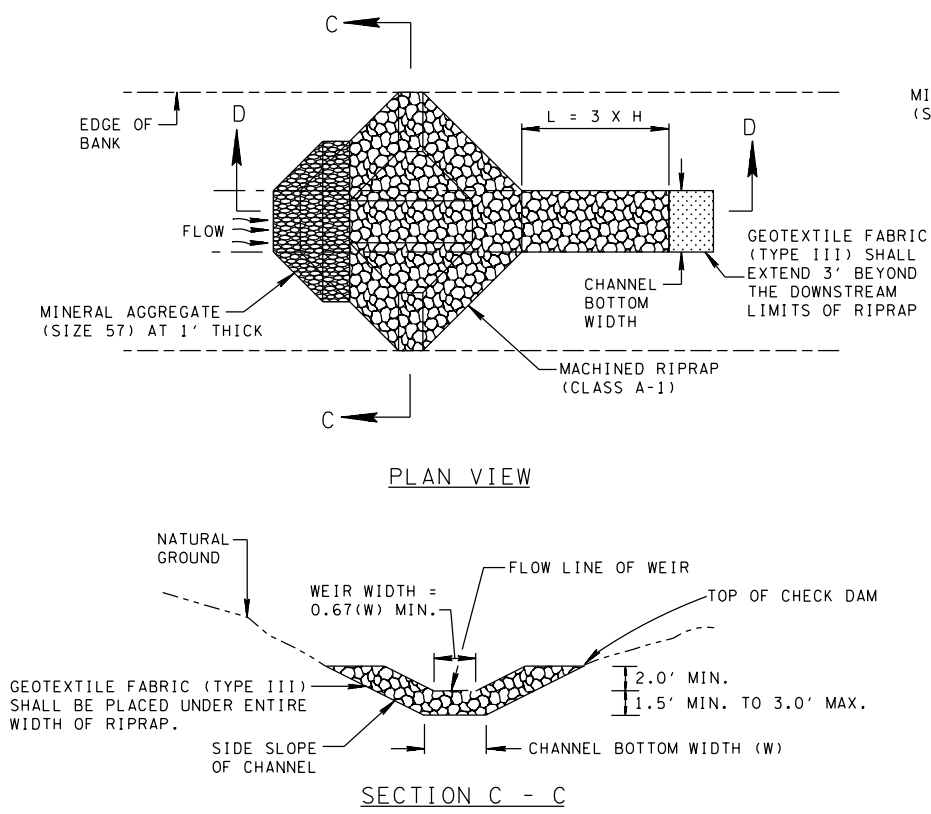
- ESTIMATED QUANTITIES BASED ON 4:1 SIDE SLOPES. QUANTITIES WILL VARY BASED ON ACTUAL DITCH CONFIGURATION.
- ESTIMATED QUANTITIES BASED ON 4FT BOTTOM WIDTH, 4 FT DEPTH, AND 4:1 SIDE SLOPES. QUANTITIES WILL VARY BASED ON ACTUAL DITCH CONFIGURATION.



DETAIL FOR V-DITCH



DETAIL FOR CHANNELS



SECTION D - D
 T = 1.0' MINIMUM TO 1.5' MAXIMUM
 H = HEIGHT OF CHECK DAM
 L = LENGTH OF RIPRAP PAD
 W = WIDTH OF DITCH (CHANNEL) BOTTOM

EROSION CONTROL PLAN LEGEND:

- ENHANCED ROCK CHECK DAM (TRAPEZOIDAL DITCH)
- ENHANCED ROCK CHECK DAM (V-DITCH)
- ENHANCED ROCK CHECK DAM (CHANNEL)

ENHANCED ROCK CHECK DAM GENERAL NOTES

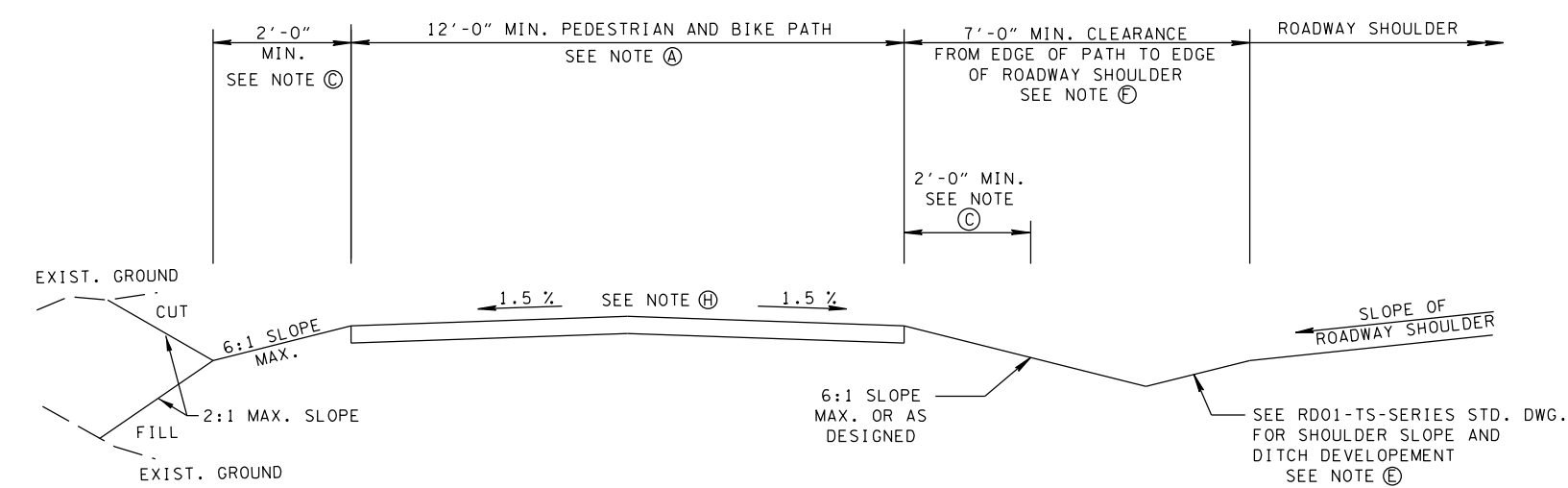
- (A) ENHANCED ROCK CHECK DAMS MAY BE USED TO REDUCE FLOW VELOCITIES TO ALLOW SEDIMENTS TO DROP OUT. THEY MAY BE EMPLOYED WHERE THE DRAINAGE AREA EXCEEDS THE MAXIMUM FOR ROCK CHECK DAMS OR WHERE A FILTRATION FUNCTION FOR VERY LOW FLOWS IS DESIRED. ENHANCED ROCK CHECK DAMS SHALL NOT BE USED IN STREAMS OR WETLANDS UNLESS PROVIDED FOR IN THE PERMITS.
- (B) AT MOST SITES, THE MAXIMUM ALLOWABLE DRAINAGE AREA SHALL BE 30 ACRES. AT SITES WHICH DRAIN TO EXCEPTIONAL TENNESSEE WATERS OR SEDIMENT-IMPAIRED STREAMS, THE MAXIMUM ALLOWABLE DRAINAGE AREA SHALL BE 20 ACRES.
- (C) ENHANCED CHECK DAM MAY REMAIN IN PLACE AS PERMANENT CHECK DAM. IF SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.
- (D) THE CENTER OF THE ENHANCED ROCK CHECK DAM USED IN DITCHES MUST BE AT LEAST ONE (1) FOOT LOWER THAN THE OUTER EDGES. THE CENTER OF ENHANCED ROCK CHECK DAMS USED IN CHANNELS MUST BE AT LEAST TWO (2) FEET LOWER THAN THE OUTER EDGES.
- (E) THE DEPTH OF FLOW ON THE CENTER OF THE STRUCTURE SHALL BE COMPUTED FOR THE PEAK FLOW RATE GENERATED BY THE 2-YEAR, 24-HOUR STORM IN ORDER TO ENSURE THAT THE TOP OF THE STRUCTURE WILL NOT BE OVERTOPPED. FOR SITES WHICH DRAIN TO EXCEPTIONAL TENNESSEE WATERS OR SEDIMENT IMPAIRED STREAMS, THE DEPTH SHOULD BE DETERMINED FOR THE 5-YEAR, 24-HOUR PEAK FLOW RATE. THIS WILL ELIMINATE THE ROCK - SOIL FAILURE POINT WHERE THE ENHANCED ROCK CHECK DAM AND NATURAL GROUND MERGE.
- (F) THE MAXIMUM SPACE BETWEEN ENHANCED ROCK CHECK DAMS SHOULD BE SUCH THAT THE TOE OF THE UPSTREAM IS AT THE SAME ELEVATION AS THE FLOW LINE OF THE WEIR OF THE DOWNSTREAM DAM. (SEE ROCK CHECK DAM SPACING GRAPH ON EC-STR-6)
- (G) ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.
- (H) PRODUCTS LISTED ON THE QUALIFIED PRODUCTS LIST FOR FILTER SOCK DITCH APPLICATION MAY BE USED AND SHALL BE PAID UNDER FOLLOWING ITEM NUMBER:
 209-08.09 FILTER SOCK CHECK DAM PER EACH
- (I) ENHANCED ROCK CHECK DAMS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:
 209-08.08 ENHANCED ROCK CHECK DAM PER EACH
 PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF ENHANCED ROCK CHECK DAMS.
- (J) SEDIMENT SHALL BE REMOVED FROM BEHIND THE ENHANCED ROCK CHECK DAM WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE STRUCTURE AND PAID FOR UNDER ITEM NUMBER 209-05, SEDIMENT REMOVAL PER CUBIC YARD.

□ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

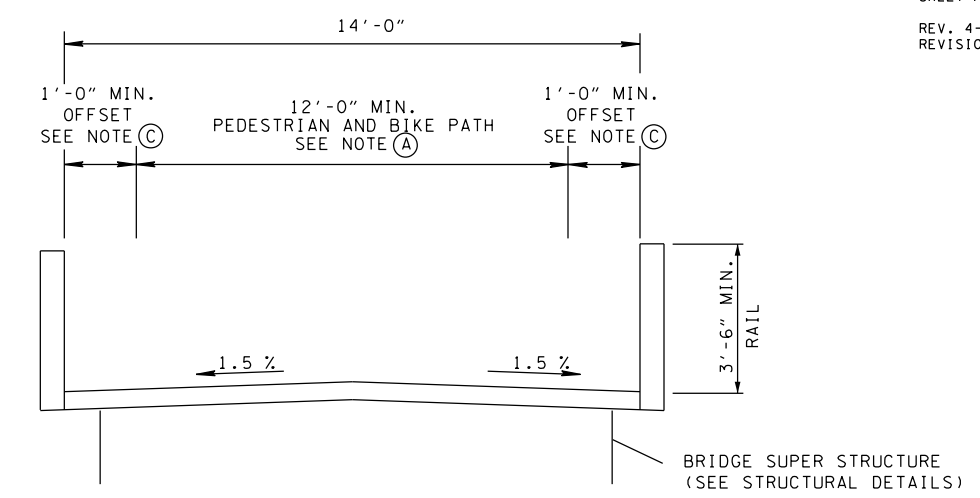
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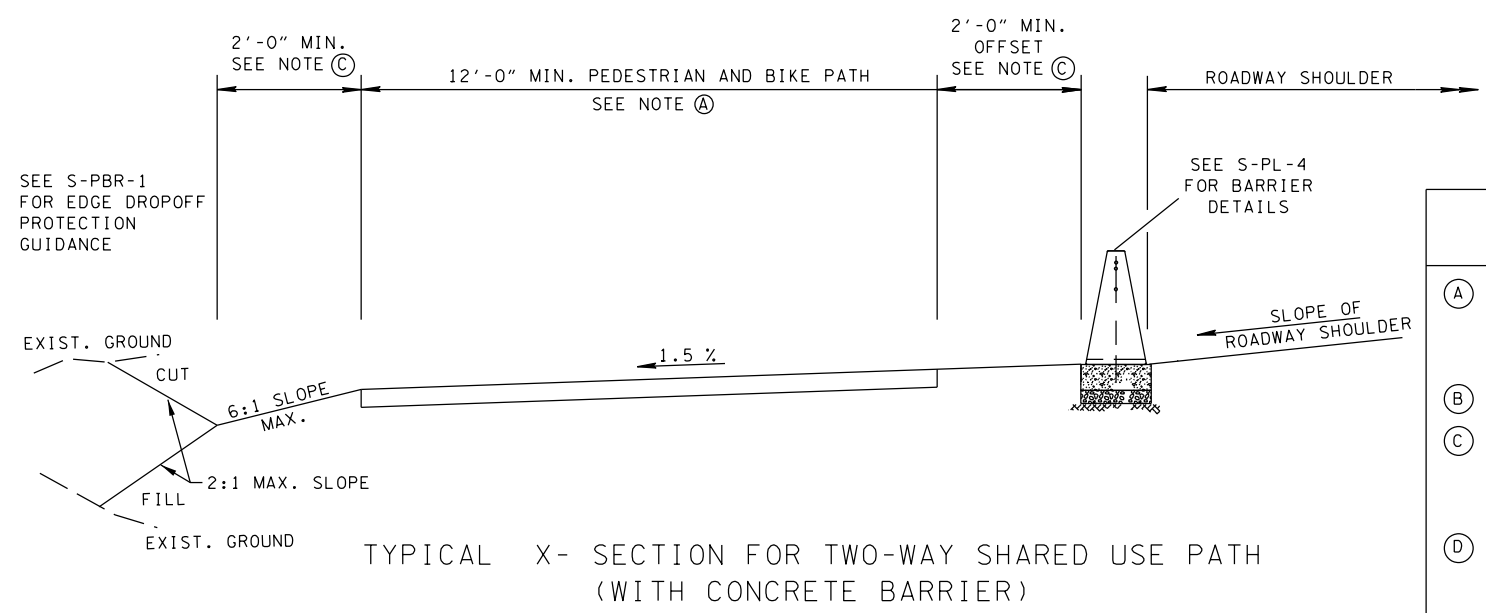
ENHANCED
 ROCK CHECK
 DAM



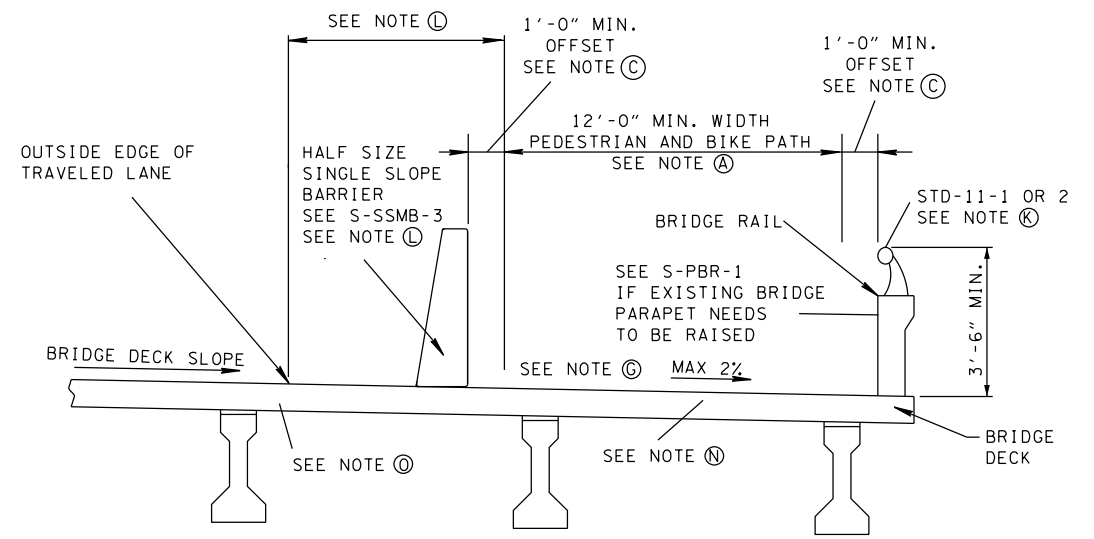
TYPICAL X- SECTION FOR TWO-WAY SHARED USE PATH (WITHOUT CONCRETE BARRIER)



TYPICAL BRIDGE X-SECTION FOR SEPARATE SHARED USE PATH



TYPICAL X- SECTION FOR TWO-WAY SHARED USE PATH (WITH CONCRETE BARRIER)



TYPICAL BRIDGE X-SECTION FOR SHARED USE PATH

DESIGN NOTES

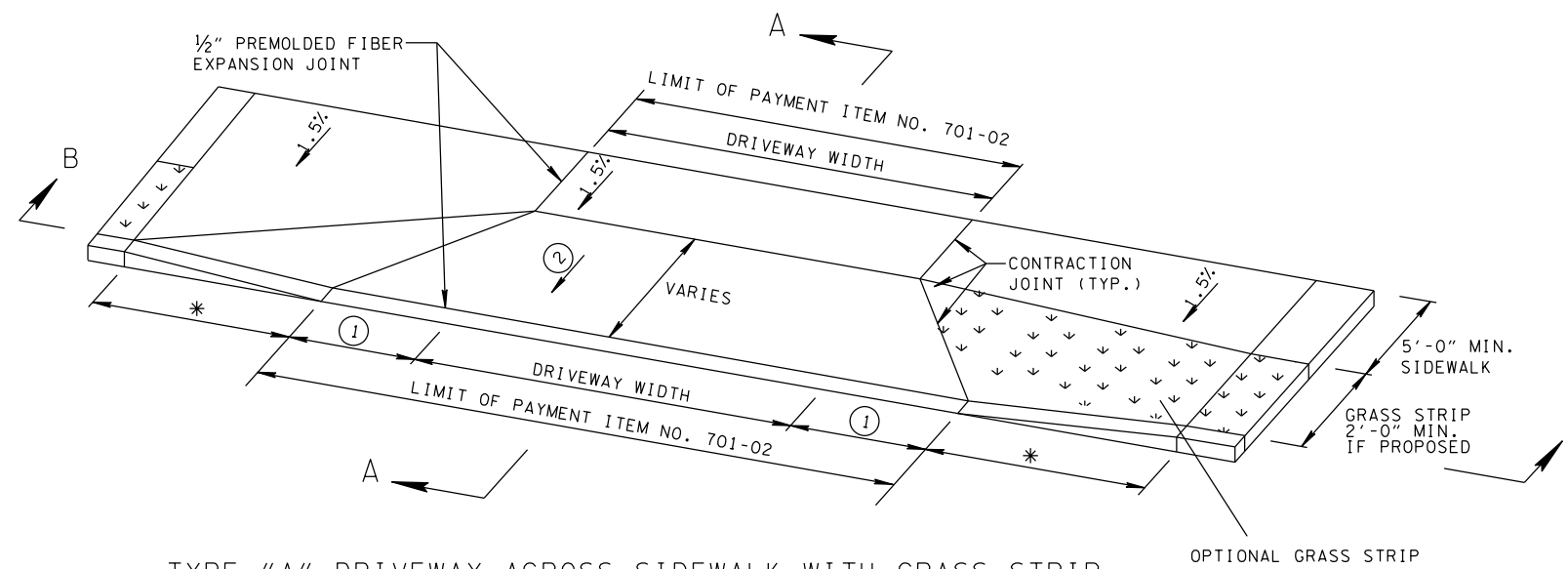
- ① THE PURPOSE OF THIS STANDARD IS TO PROVIDE MINIMUM DESIGN STANDARDS FOR NON-MOTORIZED TRANSPORTATION FACILITIES. ALL FACILITIES SHALL BE DESIGNED FOR ADA ACCESSIBILITY.
- ② BICYCLE FACILITY DESIGN NOTE: ALL SHARED USE PATHS SHOULD MEET AASHTO "GUIDE FOR THE DEVELOPMENT OF BICYCLE FACILITIES" FOR GEOMETRIC DESIGN REQUIREMENTS.

GENERAL NOTES

- (A) THE MINIMUM WIDTH OF A BI-DIRECTIONAL SHARED USE PATH IS 12' HOWEVER, UNDER CERTAIN CONDITIONS IT MAY BE NECESSARY TO REDUCE THE WIDTH OF A SHARED USE PATH TO 10 FEET. MIN. 14 FEET SHOULD BE CONSIDERED AT LOCATIONS WHERE SUBSTANTIAL USE BY BICYCLE, JOGGERS, SKATERS AND PEDESTRIANS, OR MAINTENANCE VEHICLES EXPECTED.
- (B) THE MINIMUM WIDTH OF A ONE -DIRECTIONAL SHARED USE PATH IS 6 FEET.
- (C) 2 FEET OR MORE IS DESIRABLE TO PROVIDE LATERAL OFFSET FROM TREES, POLES, WALLS, FENCES, GUARDRAILS, OR OTHER FIXED OBSTRUCTIONS. WHERE THE PATH IS ADJACENT TO CANALS, DITCHES OR SLOPES, SEE S-PBR-1 TO DETERMINE IF SAFETY RAIL IS NEEDED. THE OFFSET MAY BE REDUCED TO 1' AT EXTREME SITE CONDITIONS, SUCH AS AT BRIDGES.
- (D) THE VERTICAL CLEARANCE TO OBSTRUCTIONS SHOULD BE A MINIMUM OF 8'-6". HOWEVER, VERTICAL CLEARANCE MAY NEED TO BE GREATER TO PERMIT PASSAGE OF MAINTENANCE AND EMERGENCY VEHICLES. IN UNDER CROSSINGS AND TUNNELS, 10 FEET IS DESIRABLE FOR ADEQUATE VERTICAL SHY DISTANCE.
- (E) DITCH SHOULD BE LOCATED BETWEEN THE SHARED USE PATH AND ROADWAY TO ENSURE THAT WATER DOES NOT FLOW ONTO THE ROADWAY OR SHOULDER. ALSO, DITCH SHOULD BE SUFFICIENT ENOUGH TO REMOVE THE ADDITIONAL RUNOFF.
- (F) MINIMUM 7' HORIZONTAL OFFSET BETWEEN THE EDGE OF SHOULDER AND THE EDGE OF SHARED-USE PATH IS REQUIRED FOR FACILITIES > 45 MPH. IF 7' HORIZONTAL OFFSET CAN NOT BE ACHIEVED, A CONCRETE BARRIER IS REQUIRED.
- (G) ON ALL BRIDGE DECKS, SPECIAL CARE SHALL BE TAKEN TO ENSURE THAT BICYCLE- SAFE EXPANSION JOINTS ARE USED AND DECKING MATERIALS THAT MAY BECOME SLIPPERY WHEN WET ARE AVOIDED. ADA COMPLIANT DECKING MATERIALS SHALL BE USED.
- (H) SEE ROADWAY PLANS FOR PAVEMENT DETAILS.
- (I) SEE STD. DWG. T-M-10 FOR SIGNING AND PAVEMENT MARKINGS.
- (J) CLEAR ZONE SHOULD BE MAINTAINED BETWEEN THE ROADWAY AND THE SHARED USE PATH. IF CLEAR ZONE CANNOT BE ACHIEVED, AN APPROPRIATE BARRIER SHALL BE USED.
- (K) IF CONCRETE BARRIER IS PROPOSED, BRIDGE PARAPET RAIL MAY BE REPLACED WITH S-BPR-1. IF THE BRIDGE CROSSES OVER AN ACCESS CONTROLLED FACILITY, THE BRIDGE SHALL HAVE AN MIN. 8' TALL SAFETY FENCE.
- (L) IF MINIMUM 7'-0" OFFSET CANNOT BE MAINTAINED ON BRIDGE DECKS, A BARRIER IS REQUIRED FOR SPEEDS > 45 MPH, A BARRIER SHALL BE CONSIDERED ON A CASE BY CASE BASIS FOR SPEEDS <45 MPH.
- (M) FOR REHABILITATION PROJECTS, EXISTING BRIDGE STRUCTURE SHALL BE EVALUATED.
- (N) FOR REHABILITATION PROJECTS, IF EXISTING BRIDGE SHOULDER IS TO BE UTILIZED, THE MAX. CROSS SLOPE SHALL NOT EXCEED 2%.
- (O) FOR REHABILITATION PROJECTS, NEW BRIDGE DECK DRAINS MAY BE REQUIRED TO DIVERT ROADWAY PAVEMENT DRAINAGE AWAY FROM THE SHARD USE PATH.
- (P) ALL ELEMENTS OF SHARED USE PATH SHALL COMPLY WITH ADA.

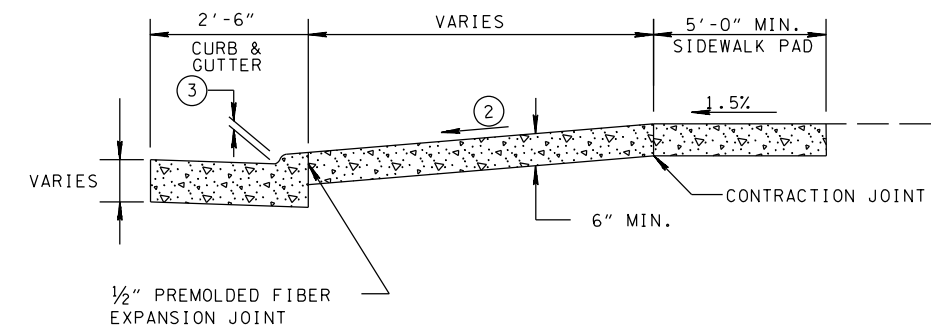
REV. 7-15-08: UPDATED SIDEWALK DIMENSIONS.

REV. 4-8-16: ADDED ITEM NUMBERS, UPDATED SLOPES AND DIMENSIONS. UPDATED NOTES.

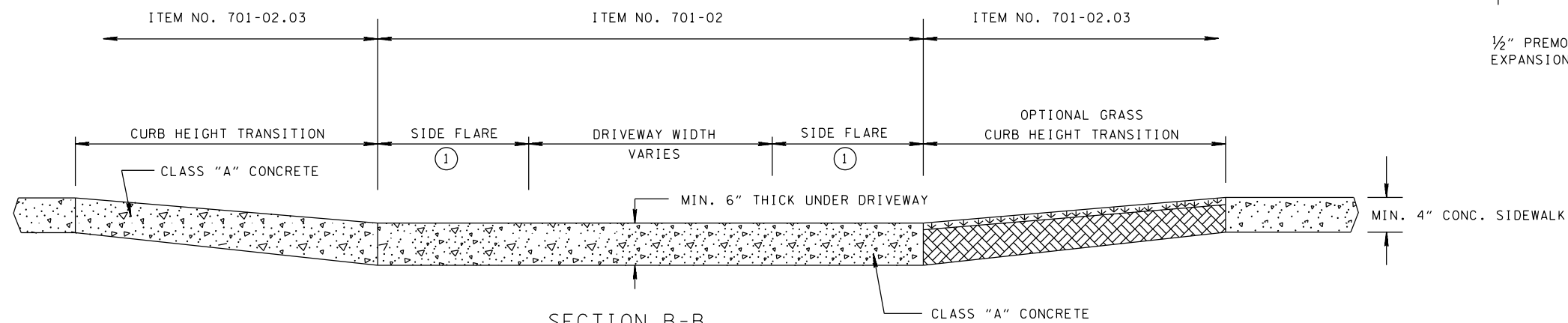


TYPE "A" DRIVEWAY ACROSS SIDEWALK WITH GRASS STRIP

* DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE



SECTION A-A



SECTION B-B

* DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE

GENERAL NOTES

- (A) 5'-0" MINIMUM SIDEWALK WITH A MAXIMUM CROSS SLOPE OF 1.5% THROUGH DRIVEWAYS.
- (B) DESIGNER TO CHECK GUTTER FLOW DEPTH AT DRIVEWAY LOCATIONS TO ASSURE THAT THE DESIGN FLOW DOES NOT OVERTOP THE SIDEWALK AREA. IF OVERTOPPING OCCURS, PLACE AN INLET AT THE UPSTREAM SIDE OF THE DRIVEWAY OR PERFORM OTHER DESIGN MITIGATION.
- (C) THE SLOPE OF THE LANDING AREA SHALL NOT EXCEED 1.5% IN THE SIDEWALK AREA.
- (D) DRIVEWAYS TO BE BUILT COMPLETE OR IN PART AS INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
- (E) ALL DRIVEWAYS TO BE 6" UNIFORM THICKNESS, UNLESS OTHERWISE SHOWN ON PLANS.
- (F) EXPANSION JOINTS TO BE PLACED AS INDICATED ON THE PLANS EXCEPT JOINT AT BACK OF DRIVEWAY WHICH WILL BE PLACED WHEN DRIVEWAY ABUTS A RIGID DRIVEWAY OR BUILDING.
- (G) THE ROADWAY DESIGNER SHALL CONSIDER THE USE OF A CATCH BASIN ON EITHER SIDE OF THE DRIVEWAY. CAREFUL CONSIDERATION TO THE PLACEMENT OF CATCH BASINS SHALL BE TAKEN IF THE DRIVEWAY IS IN A VERTICAL SAG CURVE.
- (H) ITEM NOS:

701-02	CONCRETE DRIVEWAY	PER SF
701-02.03	CONCRETE RAMP	PER SF
- (I) TYPICAL DRIVEWAY WIDTHS ARE 12' (14' TWO WAY) FOR RESIDENTIAL AND 24' (40' MAX.) FOR COMMERCIAL
- (J) REFER TO SECTION 5.1.3. IN THE MANUAL FOR CONSTRUCTING DRIVEWAY ENTRANCES ON STATE HIGHWAYS (2015) FOR RADIUS OF CURVATURE GUIDANCE.

FOOTNOTES

- (1) SIDE FLARE WIDTH SHOULD BE A MINIMUM 7'-0" FOR COMMERCIAL DRIVEWAYS. SIDE FLARE WIDTH SHOULD BE A MINIMUM 3'-6" FOR RESIDENTIAL DRIVEWAYS.
- (2) DRIVEWAY RAMP GRADE VARIES, 15% MAX. (10% RECOMMENDED) APRON GRADE FOR RESIDENTIAL DRIVEWAYS. 8% MAX. (5% RECOMMENDED) APRON GRADE FOR COMMERCIAL DRIVEWAYS.
- (3) HEIGHT OF LOWERED CURB SHALL BE 2.25 INCHES. SEE STD. DWG. RP-NMC-10.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

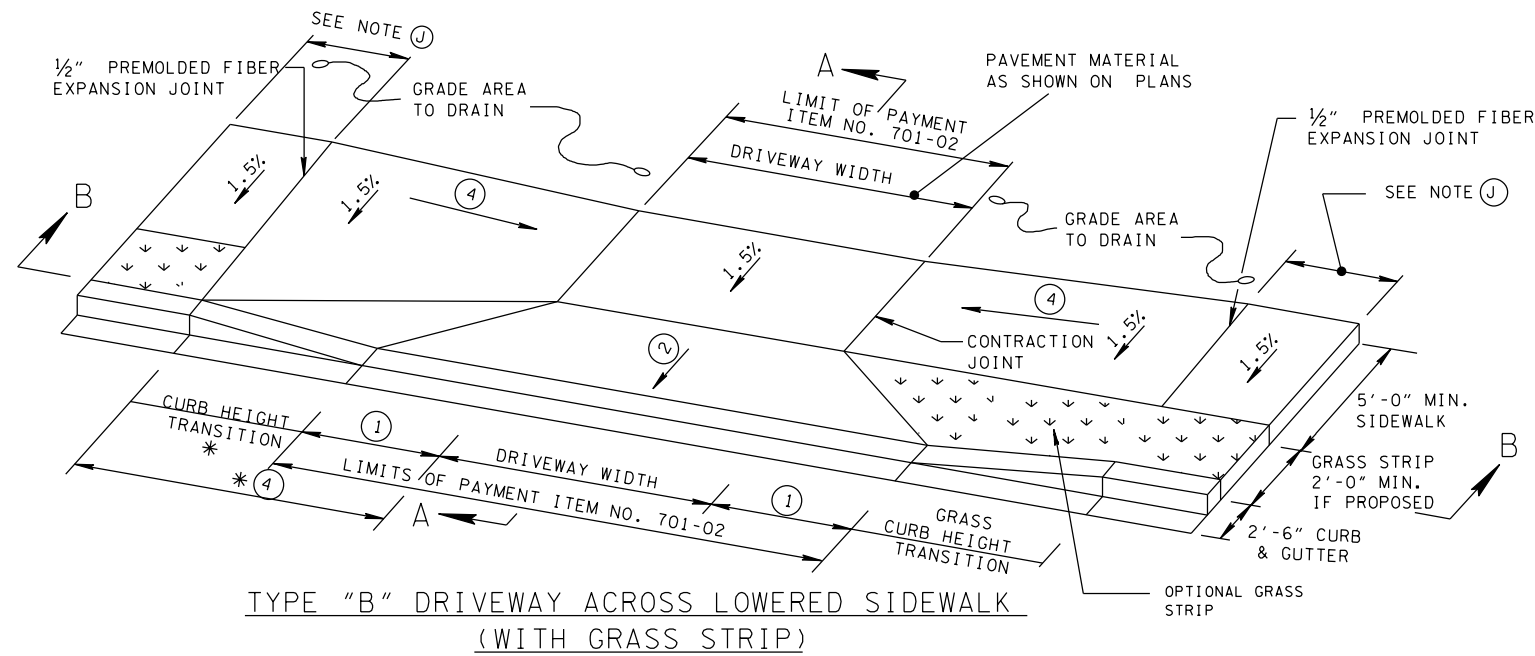
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DETAILS OF
STANDARD CONCRETE
DRIVEWAYS

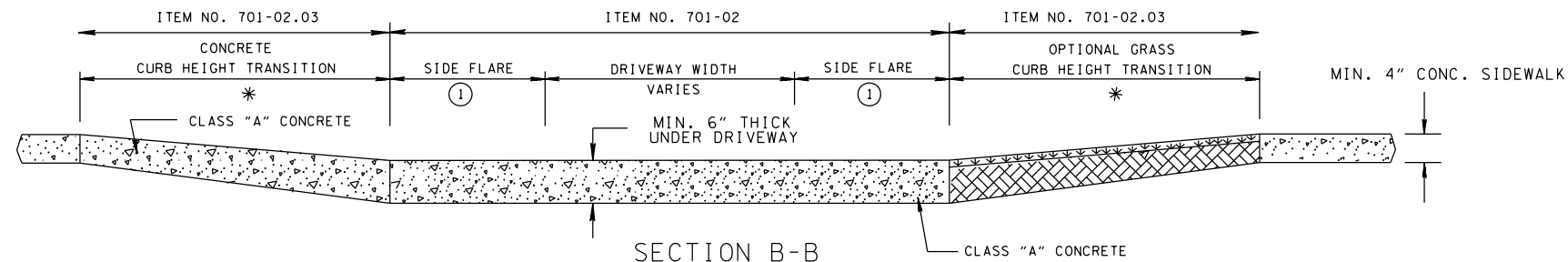
2-15-07 RP-D-15

REV. 7-15-08: UPDATED SIDEWALK DIMENSIONS.

REV. 4-8-16: ADDED ITEM NUMBERS, UPDATED SLOPES AND DIMENSIONS. UPDATED NOTES.

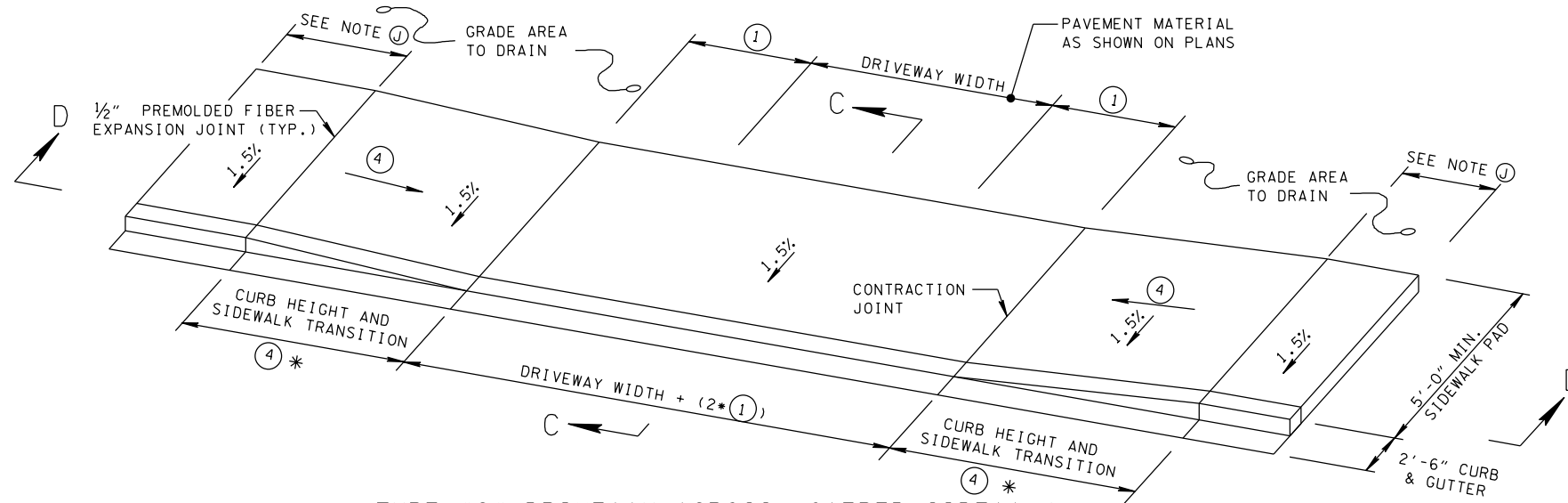


TYPE "B" DRIVEWAY ACROSS LOWERED SIDEWALK (WITH GRASS STRIP)



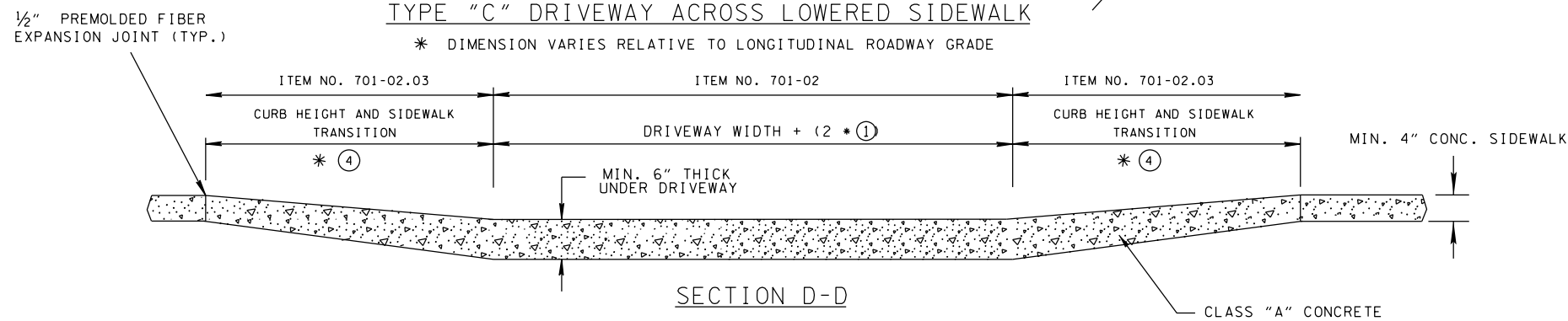
SECTION B-B

* DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE



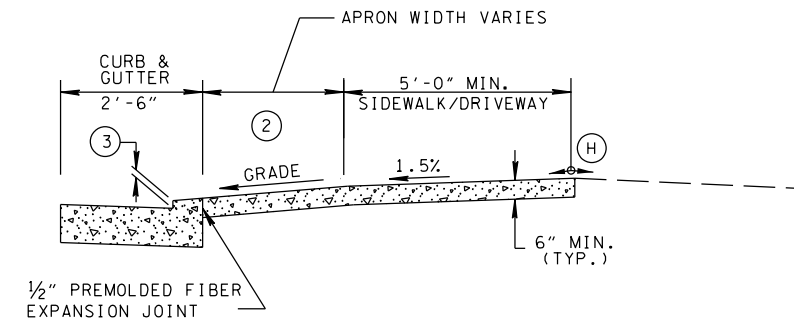
TYPE "C" DRIVEWAY ACROSS LOWERED SIDEWALK

* DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE



SECTION D-D

* DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE



SECTION A-A

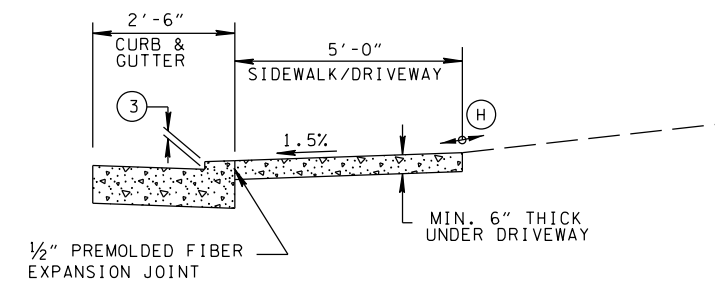
GENERAL NOTES

- (A) 5'-0" MINIMUM SIDEWALK WITH A MAXIMUM CROSS SLOPE OF 1.5% THROUGH DRIVEWAYS.
- (B) DESIGNER TO CHECK GUTTER FLOW DEPTH AT DRIVEWAY LOCATIONS TO ASSURE THAT THE DESIGN FLOW DOES NOT OVERTOP THE SIDEWALK AREA. IF OVERTOPPING OCCURS PLACE AN INLET AT THE USTREAM SIDE OF THE DRIVEWAY OR PERFORM OTHER DESIGN MITIGATION.
- (C) THE CROSS SLOPE OF THE LANDING AREA SHALL NOT EXCEED 1.5% IN THE SIDEWALK AREA.
- (D) DRIVEWAYS TO BE BUILT COMPLETE OR IN PART AS INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
- (E) ALL CONCRETE DRIVEWAYS TO BE 6" UNIFORM THICKNESS, UNLESS OTHERWISE SHOWN ON PLANS.
- (F) EXPANSION JOINTS TO BE PLACED AS INDICATED ON THE PLANS EXCEPT JOINT AT BACK OF DRIVEWAY WHICH WILL BE PLACED WHEN DRIVEWAY ABUTS A RIGID DRIVEWAY OR A BUILDING.
- (G) THE ROADWAY DESIGNER SHALL CONSIDER THE USE OF A CATCH BASIN ON EITHER SIDE OF THE DRIVEWAY. CAREFUL CONSIDERATION TO THE PLACEMENT OF CATCH BASINS SHALL BE TAKEN IF THE DRIVEWAY IS IN A VERTICAL SAG CURVE.
- (H) ALGEBRAIC DIFFERENCE NOT TO EXCEED 10.0%.
- (I) ITEM NOS:

701-02	CONCRETE DRIVEWAY	PER SF
701-02.03	CONCRETE RAMP	PER SF
- (J) WHEN MORE THAN 2 DRIVEWAYS ARE PROPOSED, USE TYPE "A" DRIVEWAY AS SHOWN ON STANDARD DRAWING RP-D-15 TO REDUCE ROLLER COASTER EFFECT FOR PEDESTRIANS.
- (K) TYPICAL DRIVEWAY WIDTHS ARE 12' (14' TWO WAY) FOR RESIDENTIAL AND 24' (40' MAX.) FOR COMMERCIAL.
- (L) REFER TO SECTION 5.1.3. IN THE MANUAL FOR CONSTRUCTING DRIVEWAY ENTRANCES ON STATE HIGHWAYS (2015) FOR RADIUS OF CURVATURE GUIDANCE.

FOOTNOTES

- (1) SIDE FLARE WIDTH SHOULD BE A MINIMUM 7'-0" FOR COMMERCIAL DRIVEWAYS. SIDE FLARE WIDTH SHOULD BE A MINIMUM 3'-6" FOR RESIDENTIAL DRIVEWAYS.
- (2) DRIVEWAY RAMP GRADE VARIES, 15% MAX. (10% RECOMMENDED) APRON GRADE FOR RESIDENTIAL DRIVEWAYS. 8% MAX. (5% RECOMMENDED) APRON GRADE FOR COMMERCIAL DRIVEWAYS.
- (3) HEIGHT OF LOWERED CURB SHALL BE 2.25 INCHES. SEE STD. DWG. RP-NMC-10.
- (4) THE SLOPE OF THE SIDEWALK AND/OR CURB HEIGHT TRANSITION VARIES TO A MAXIMUM OF 8.33% LENGTH OF TRANSITION IS RELATIVE TO THE LONGITUDINAL ROADWAY GRADE.



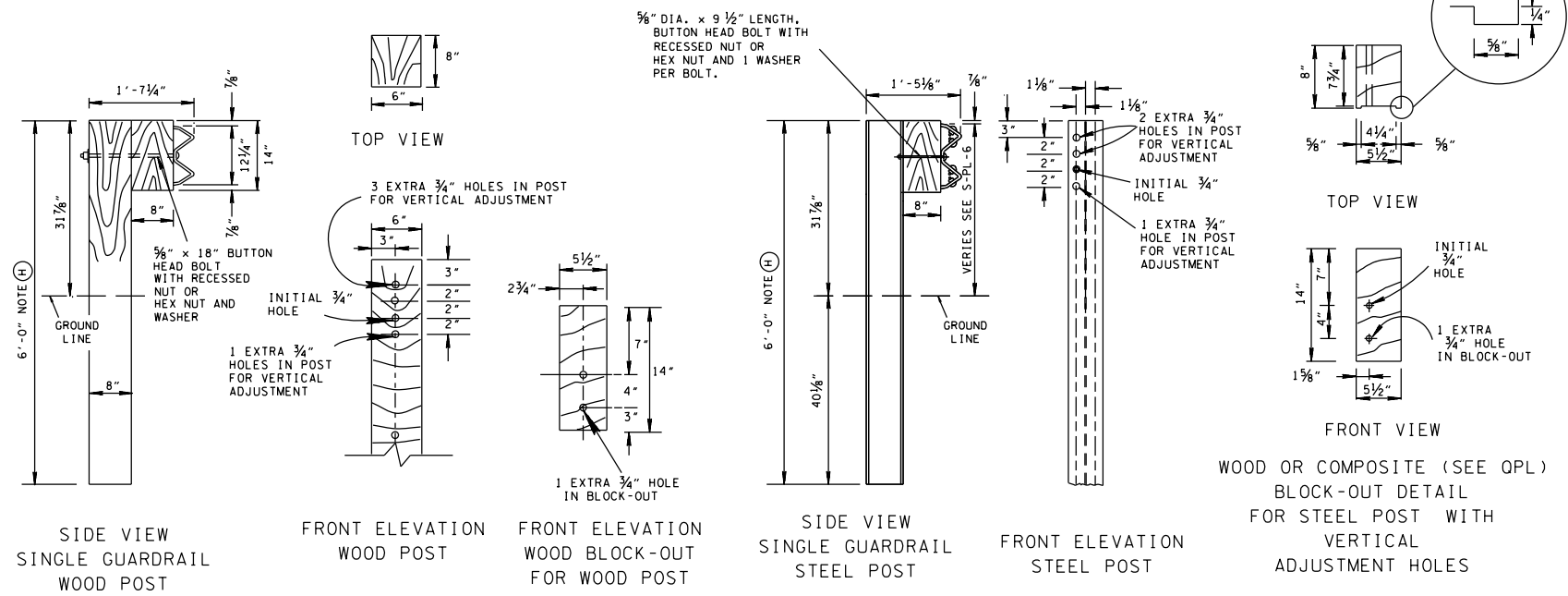
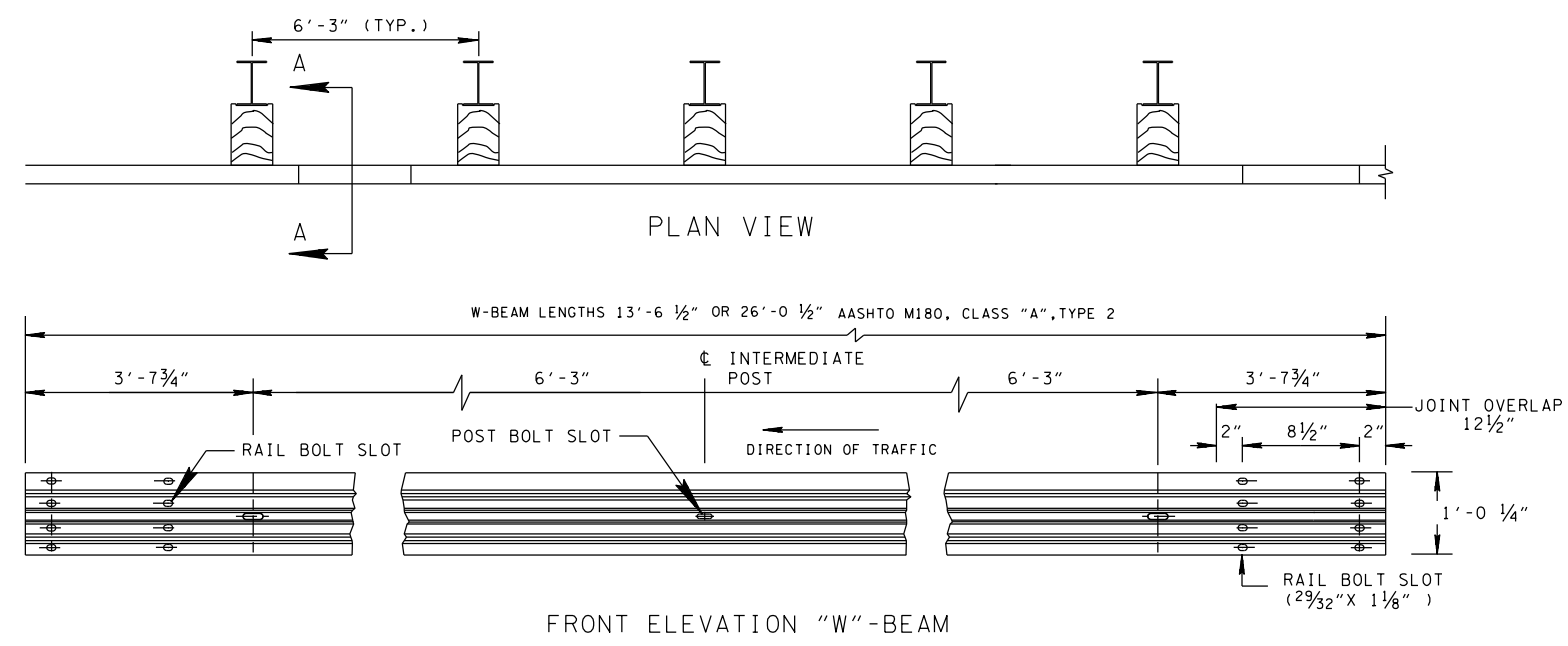
SECTION C-C

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DETAILS OF
LOWERED STANDARD
CONCRETE
DRIVEWAYS

2-15-07 RP-D-16



NOTE: SIDE VIEW FOR STEEL POST DIMENSIONS BASED ON W6 X 8.5, OTHER DETAILS APPLY TO W6 X 9.0 AND W6 X 15.0 POSTS AND BLOCK-OUTS. SEE S-GR31-1A FOR FASTENING HARDWARE DETAILS.

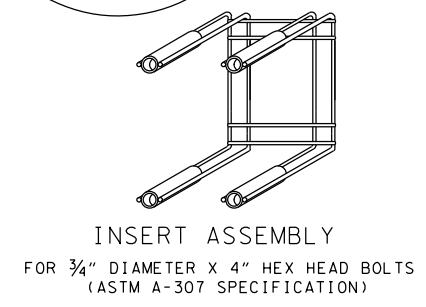
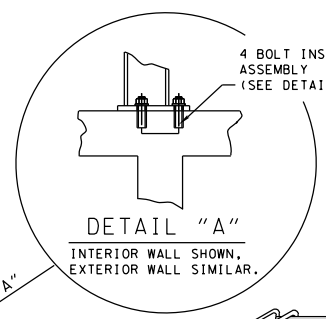
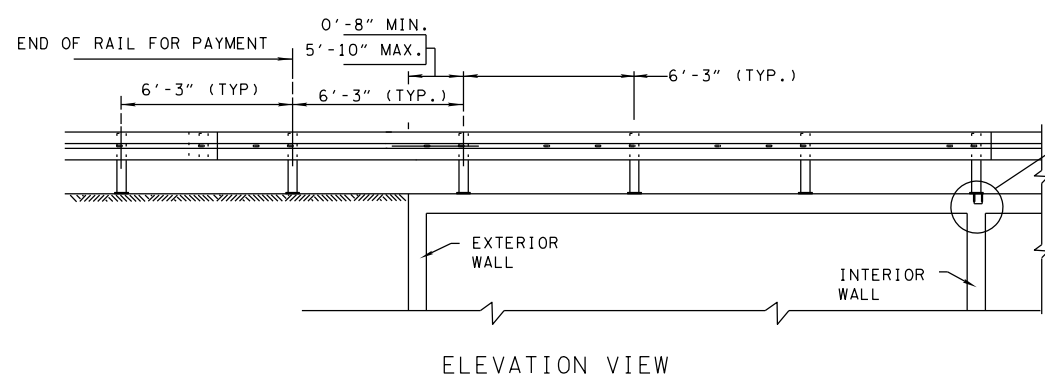
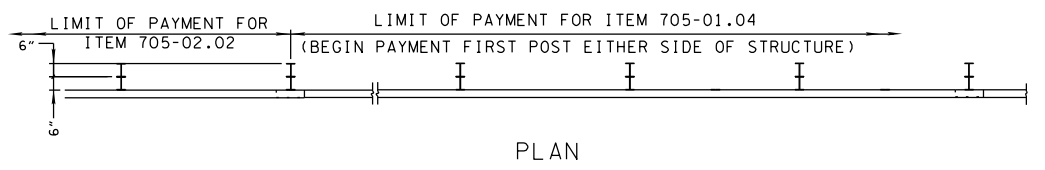
GENERAL NOTES

- METAL BEAM**
- (A) METAL BEAMS SHALL CONFORM TO AASHTO M 180: TYPE 2, CLASS "A" UNLESS OTHERWISE NOTED ON THE PLANS.
 - (B) WHERE GUARDRAIL IS PLACED ON A CURVE WITH A RADIUS LESS THAN 150 FEET, THE RAIL IS TO BE SHOP-FORMED TO THE REQUIRED RADIUS.
 - (C) AT THE OPTION OF THE CONTRACTOR THE RAIL ELEMENTS FOR THE GUARDRAIL MAY BE FURNISHED IN EITHER 12 1/2 OR 25 FOOT NOMINAL LENGTHS WITH POST BOLT SLOTS FOR CONNECTION TO POSTS.
- POSTS**
- (D) THE CONTRACTOR MAY HAVE THE CHOICE OF EITHER HOT ROLLED OR WELDED STEEL W6 X 8.5 OR W6 X 9 OR 8" X 6" WOOD POST. EXCEPT AS NOTED
 - ① THE MIXING OF ANY POST TYPES ON A GIVEN PROJECT WILL BE AVOIDED IF AT ALL POSSIBLE.
 - ② SHOULD IT BECOME NECESSARY TO MIX POST TYPES ON A GIVEN PROJECT POSTS SHALL NOT BE MIXED ON A SINGLE RUN OF GUARDRAIL EXCEPT AS NECESSARY AT END TERMINALS.
 - ③ W6 X 15 IS USED WITH GUARDRAIL CONNECTION TO STRUCTURES.
 - (E) STEEL POSTS SHALL CONFORM TO ASTM A36 AND BE GALVANIZED IN ACCORDANCE WITH ASTM A123. BOLT HOLES SHALL BE APPROXIMATELY CENTERED BETWEEN WEB AND EDGE OF FLANGE OF SPACERS AND POSTS.
 - (F) WOOD POSTS SHALL CONFORM WITH TDOT CONSTRUCTION STANDARD SPECIFICATION.
 - (G) WELDED STEEL POSTS SHALL CONFORM TO ASTM A769 AND BE GALVANIZED IN ACCORDANCE WITH ASTM A123, UNLESS OTHERWISE SPECIFIED ON THE PLANS.
 - (H) ON STEEP SLOPES, WHEN GUARDRAIL IS PLACED AT SLOPE BREAK, MINIMUM POST LENGTH SHALL BE BASED ON TABLE ON STANDARD DRAWING S-PL-6. ADDITIONAL EXPENSE TO BE INCLUDED IN THE COST OF THE RUN OF GUARDRAIL.
- BLOCKOUTS**
- (I) BLOCKOUTS SHALL BE WOOD CONFORMING TO THE REQUIREMENTS OF TDOT CONSTRUCTION STANDARD SPECIFICATIONS OR PLASTIC GUARDRAIL BLOCKOUTS LISTED ON THE TDOT QUALIFIED PRODUCT LIST.
 - (J) ONLY WOODEN BLOCKOUTS MAY BE USED WITH WOODEN POSTS, PLASTIC OR WOODEN BLOCKOUTS MAY BE USED WITH STEEL POSTS.
 - (K) ALL BLOCKOUTS SHALL MEET NCHRP-350 OR MASH GUIDELINES.
 - (L) MIXING THE BLOCKOUT MATERIAL ON A GIVEN PROJECT SHOULD BE AVOIDED. IF MIXING OF BLOCKOUT MATERIAL IS NECESSARY, BLOCKOUTS SHALL NOT BE MIXED ON A SINGLE RUN OF GUARDRAIL.
- FUTURE ADJUSTMENTS**
- (M) BLOCKOUTS SHALL HAVE ONE ADDITIONAL 3/4" HOLE, FOUR INCHES BELOW THE INITIAL HOLE FOR FUTURE ADJUSTMENT.
 - (N) INITIAL INSTALLATION REQUIRES ONE BOLT CONNECTION, EACH ADJUSTMENT THEREAFTER REQUIRES TWO BOLT CONNECTIONS.
- END TREATMENTS**
- (O) ALL RUNS OF GUARDRAIL WILL BEGIN AND END WITH AN ANCHOR SYSTEM (SEE S-GRA-SERIES).
 - (P) GUARDRAIL ENDS THAT ARE INSIDE THE CLEARZONE AND EXPOSED TO ONCOMING TRAFFIC SHALL HAVE A CRASH WORTHY END TERMINAL AS NOTED:
 - ① ANY ROAD WITH SUITABLE BACKSLOPES SHALL USE END TERMINALS BURIED IN BACK SLOPE (SEE S-GRT-1).
 - ② ALL HIGHWAY SYSTEM ROADS WITHOUT SUITABLE BACKSLOPES SHALL USE TANGENTIAL END TERMINALS (SEE S-GRT-2).
 - ③ ALL OTHER ROADS SHALL USE SLOTTED RAIL END TERMINALS UNLESS OTHERWISE NOTED (SEE S-GRT-3).
- DESIGN**
- (Q) 4' BEHIND GUARDRAIL SHALL BE CLEAR AT OBSTRUCTION FOR DEFLECTION.
 - (R) REFER TO SAFETY PLAN STANDARDS FOR HOW TO DETERMINE THE BEGINNING AND END.
- PAYMENT**
- (S) PAYMENT FOR GUARDRAIL WILL BE UNDER ITEM:
 - 705-02.02 SINGLE GUARDRAIL (TYPE 2) LF
 - (T) GUARDRAIL WILL BE PAID FOR ONLY IN LENGTHS THAT ARE MULTIPLES OF 6'-3".
 - (U) PAYMENT FOR SPECIAL CONNECTIONS AND GUARDRAIL SECTIONS REQUIRED FOR END TREATMENTS WILL BE AS NOTED ON THOSE DRAWINGS.
 - (V) FOR W-BEAM INSTALLATION, LOCATION, AND DEFLECTION NOTES SEE S-PL-6.

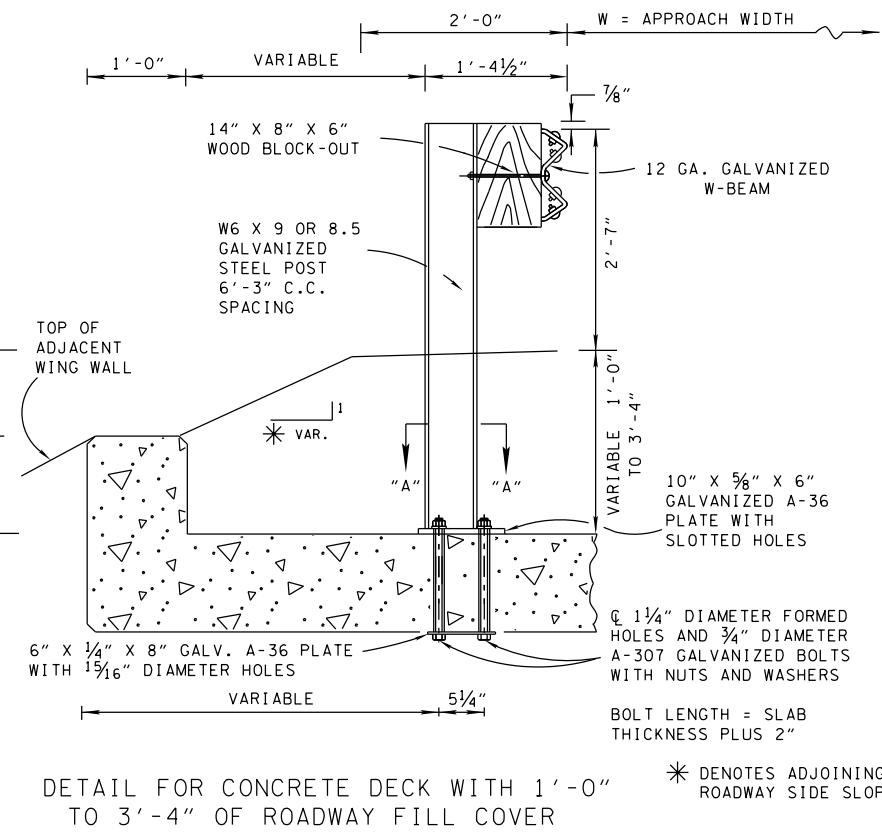
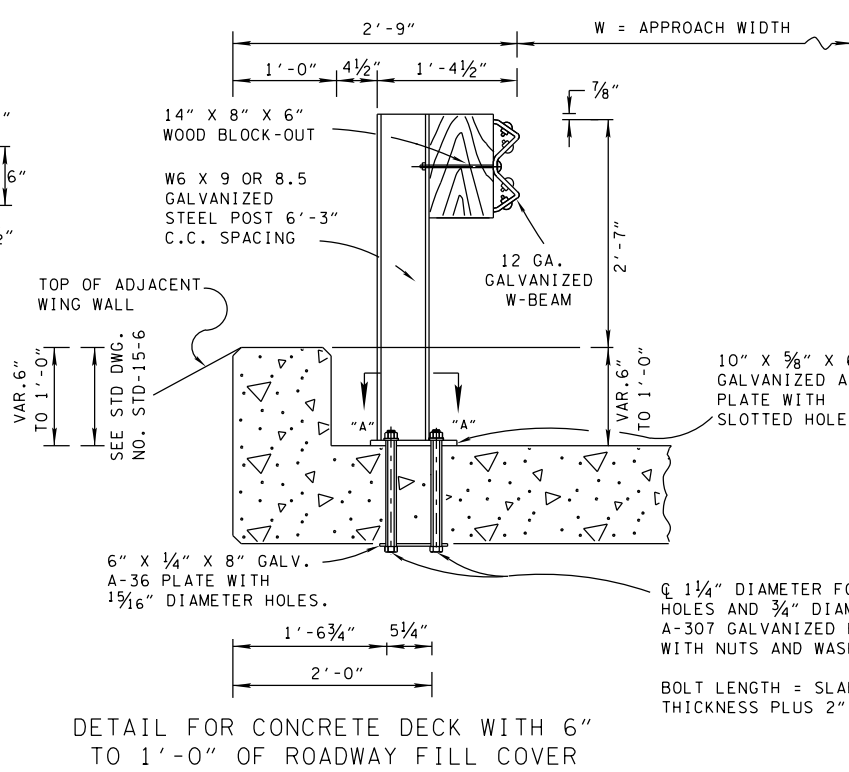
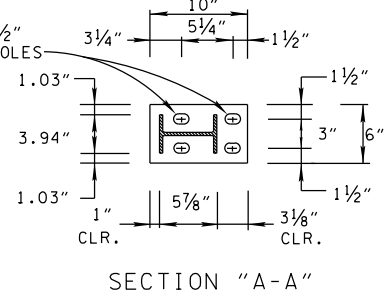
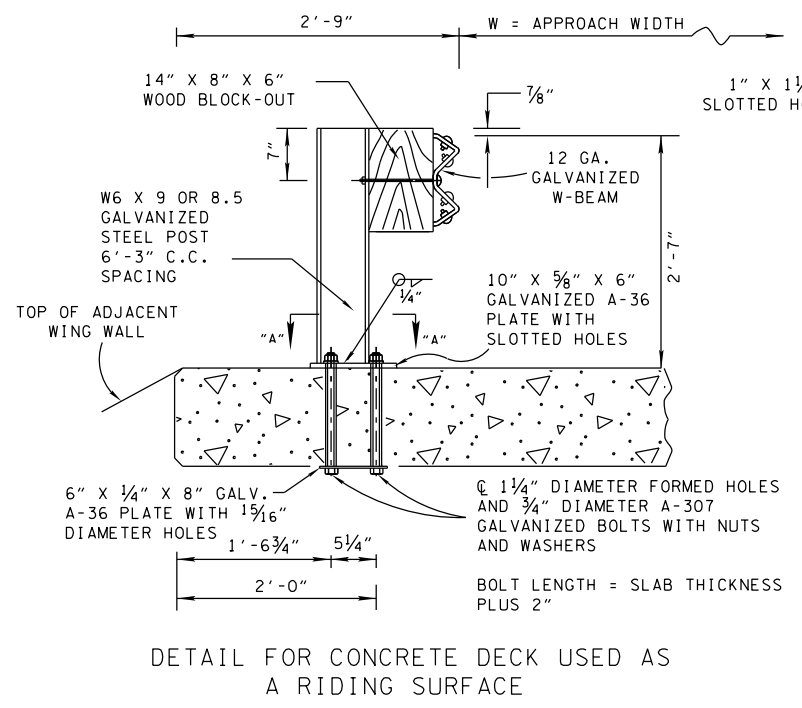
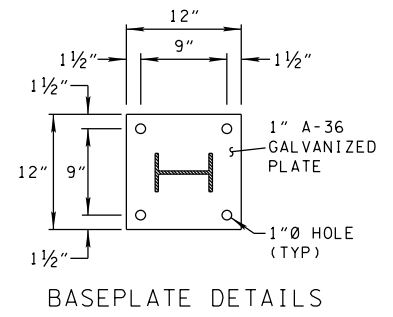
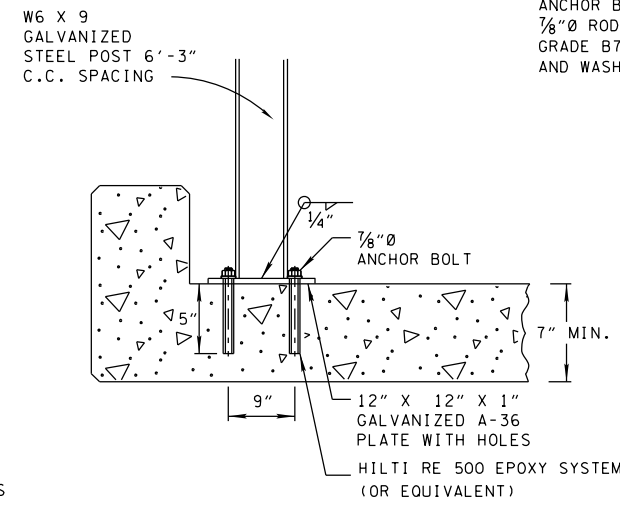
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION

W-BEAM
 GUARDRAIL



INSERT ASSEMBLY IS FOR CONNECTION OF POSTS OVER WALLS ONLY AND NOT A SUBSTITUTE FOR PLATE ASSEMBLY ELSEWHERE.



DETAIL FOR CONCRETE DECK USED AS A RIDING SURFACE

DETAIL FOR CONCRETE DECK WITH 6" TO 1'-0" OF ROADWAY FILL COVER

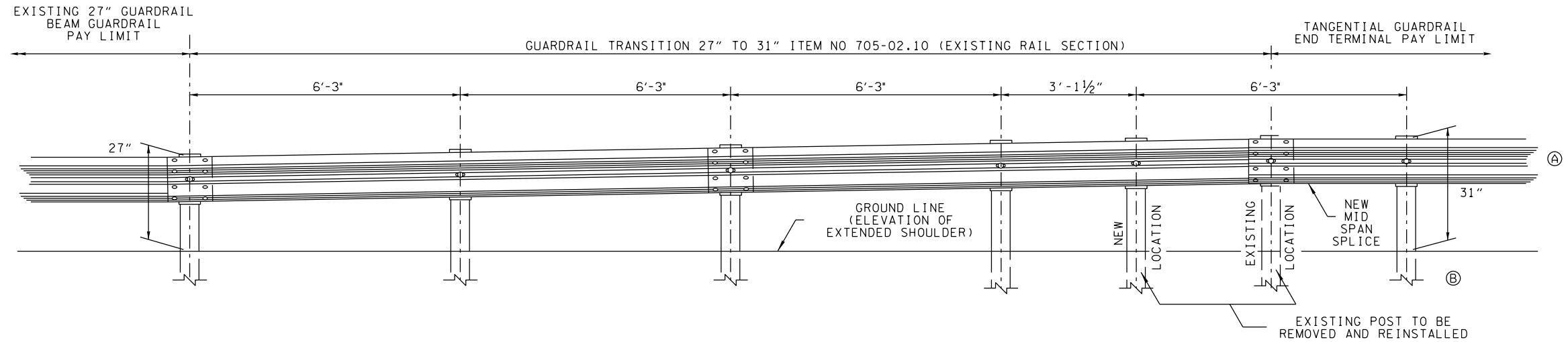
DETAIL FOR CONCRETE DECK WITH 1'-0" TO 3'-4" OF ROADWAY FILL COVER

* DENOTES ADJOINING ROADWAY SIDE SLOPE

- ### DESIGN NOTES
- WHEN DEPTH OF FILL AT FACE OF GUARDRAIL EXCEEDS 3'-4" USE ITEM 705-02.02 AS SHOWN ON S-GR31-1.
 - DO NOT USE ON PRECAST CONCRETE STRUCTURE WITHOUT PRIOR APPROVAL FROM MANUFACTURERS.
 - THIS RAIL SYSTEM HAS BEEN TESTED AND PASSED BY THE CRITERIA SET FORTH BY AASHTO MASH TEST LEVEL 3, AS DOCUMENTED IN ROADSIDE SAFETY RESEARCH PROGRAM POOLED FUND STUDY NO. TPF-5(114) DATED NOV. 11, 2011.
 - ANY REINFORCING STEEL THAT INTERFERES WITH THE 1 1/4" DIAMETER FORMED HOLES SHALL BE MOVED HORIZONTALLY TO PROVIDE A 1" MINIMUM CLEARANCE TO THE HOLE.

- ### GENERAL NOTES
- IN ORDER TO EXPEDITE INSTALLATION, GUARDRAIL POST MAY BE FIELD CUT TO ADJUST THE LENGTH REQUIRED. ALL CUT SURFACES MUST RECEIVE GALVANIZE COATING.
 - FOR DIMENSIONS AND DETAILS NOT SHOWN SEE STANDARD DRAWING NOS. STD-15-6, STD-15-7, AND S-GR31-1.
 - TO BE PAID FOR UNDER ITEM NO. 705-01.04 METAL BEAM GUARD FENCE PER LF.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.



ELEVATION VIEW - PROFILE TAPER

MAXIMUM HEIGHT ADJUSTMENT SHOULD BE LIMITED TO 1" PER 6'-3" GUARDRAIL SECTION.
 MINIMUM HEIGHT TRANSITION SECTION SHOWN.

GENERAL NOTES

- (A) THIS GUARDRAIL HEIGHT TRANSITION DETAIL MAY BE USED FOR GUARDRAIL REPAIRS, MAINTENANCE, AND BRIDGE REPAIR PROJECTS.
- (B) POST NO. 8 OR POST NO. 4 IF USED FOR TRANSITION TO GUARDRAIL END TERMINAL (SEE S-GRT-2, S-GRT-3).
- (C) WHERE FEASIBLE ADJUST THE EXISTING GUARDRAIL HEIGHT TO 28" MIN.

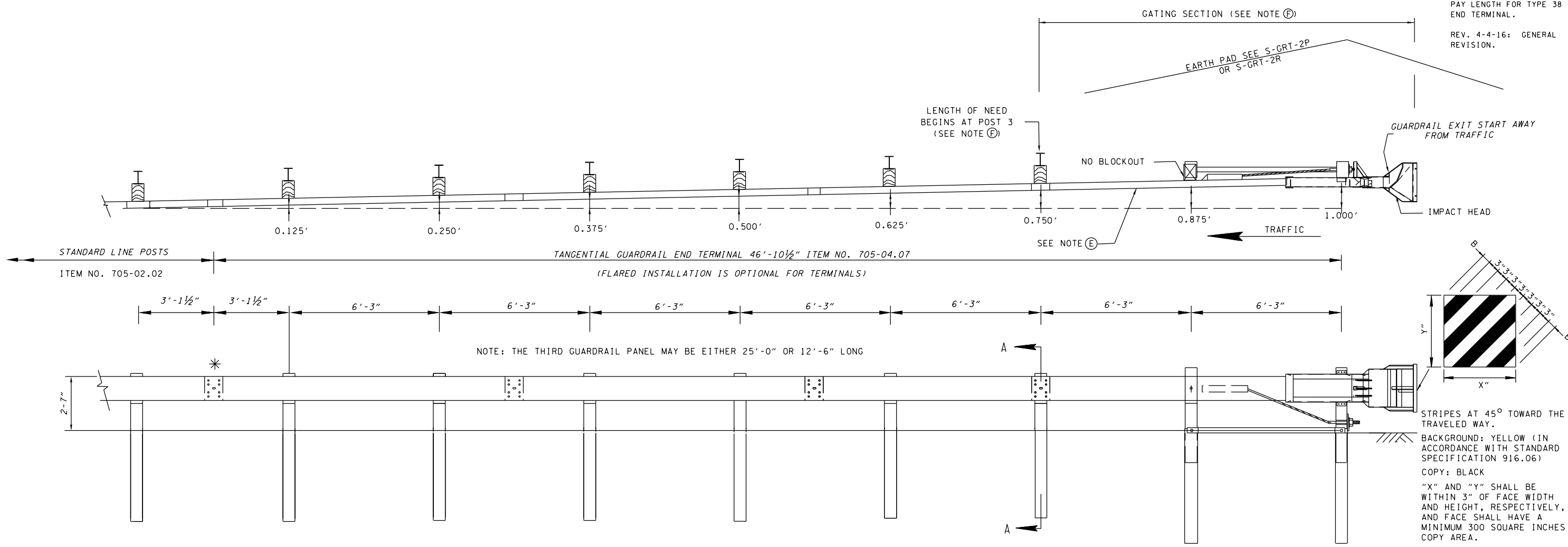
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION

SPECIAL CASE
 GUARDRAIL HEIGHT
 TRANSITION
 DETAIL

5-11-15 S-GRS-4

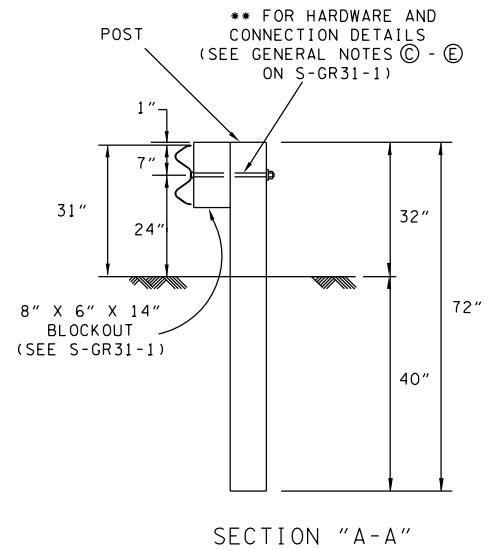
REV. 11-3-14: MODIFIED PAY LENGTH FOR TYPE 38 END TERMINAL.
 REV. 4-4-16: GENERAL REVISION.



* FOR MAINTENANCE AND REPAIR PROJECTS, USE S-GRS-4 TO TRANSITION BACK TO 27\"/>

NOTE TO INSTALLER
 SKT 350 IS SHOWN, POST MATERIAL TYPE, SIZE, GUARDRAIL SPlicing LOCATION, TAPER RATE, OFFSET, GUARDRAIL HEIGHT, IMPACT HEAD DIMENSION, AND ALL OTHER MISCELLANEOUS HARDWARE MAY BE DIFFERENT. INSTALLATION SHALL FOLLOW THE MANUFACTURER'S SHOP DRAWINGS.

NOTE TO DESIGNER
 DO NOT USE WITHOUT REFERENCING S-GRT-2P OR S-GRT-2R



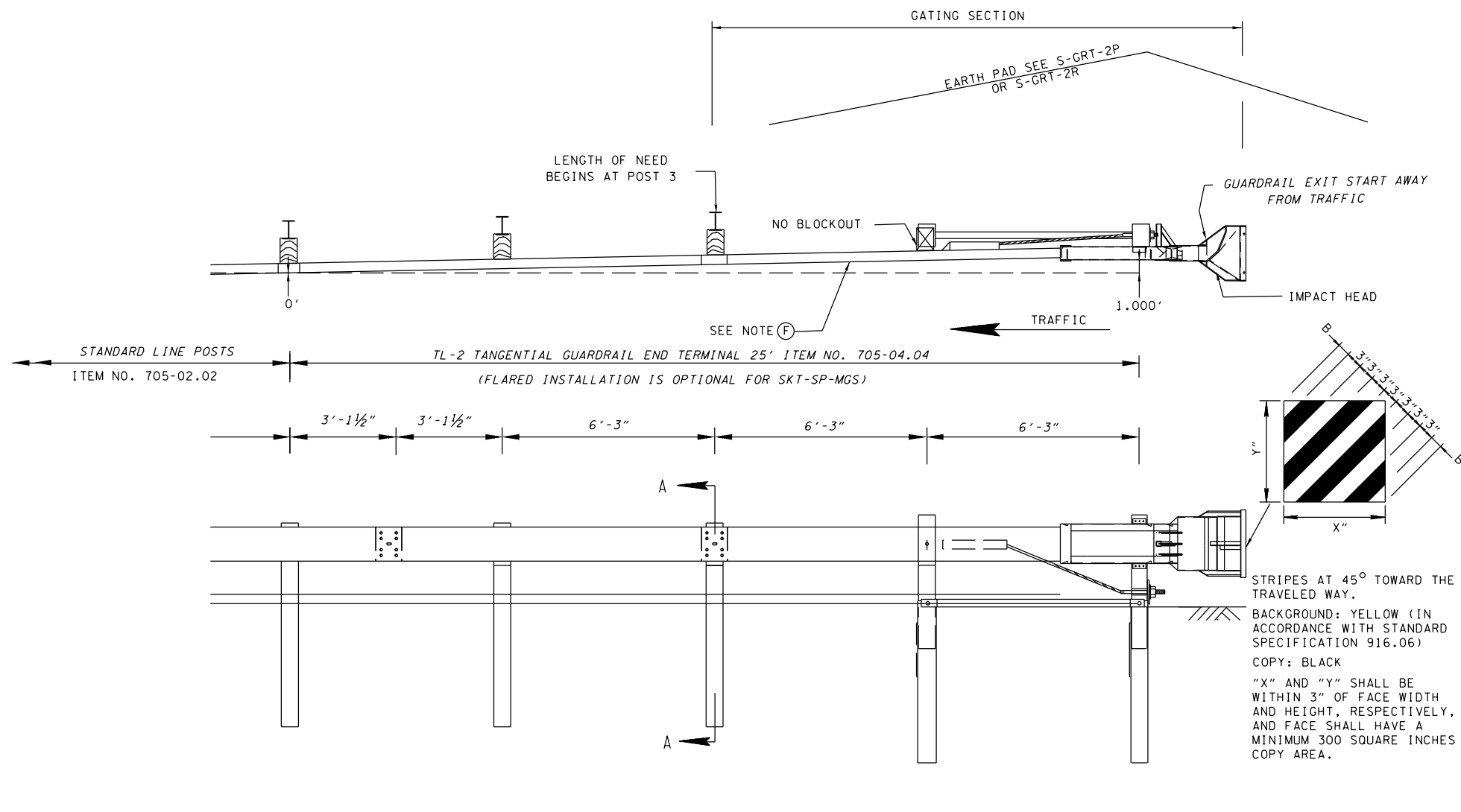
- GENERAL NOTES**
- (A) ONLY NCHRP 350 OR MASH COMPLIANT TL-3 TANGENTIAL END TERMINAL ON THE TDOT QUALIFIED PRODUCTS LIST MAY BE INSTALLED. MANUFACTURER'S SHOP DRAWINGS SHALL BE REQUIRED BEFORE ANY TANGENTIAL END TERMINAL INSTALLATIONS CAN BEGIN. THE CONTRACTOR SHALL HAVE ONE COMPLETE SET OF SHOP DRAWINGS ON SITE DURING INSTALLATION OR REPAIR OF ANY TANGENTIAL GUARDRAIL TERMINAL ANCHOR. THE CONTRACTOR SHALL ALSO PROVIDE THE CONSTRUCTION OR MAINTENANCE SUPERVISOR WITH ONE COMPLETE SET OF SHOP DRAWINGS INCLUDING TDOT QPL EVALUATION NUMBER.
 - (B) FOR THE TYPE 38 GUARDRAIL TERMINAL TO FUNCTION AS IT WAS CRASH TESTED UNDER NCHRP-350 TEST LEVEL 3 THE EARTH PAD MUST BE CONSTRUCTED PER STANDARD DRAWING NO. S-GRT-2P OR S-GRT-2R.
 - (C) THE TANGENTIAL ENERGY ABSORBING TERMINAL (INCLUDING ANCHOR) IS TO BE INSTALLED UNDER THE PRICE BID FOR ITEM NO. 705-04.07 PER EACH.
 - (D) TERMINAL SYSTEM MUST BE CONSTRUCTED SO THAT THE FULL LENGTH OF THE TERMINAL SYSTEM GUARD RAILING IS IN STRAIGHT ALIGNMENT.
 - (E) DIFFERENT TANGENTIAL TERMINAL SYSTEMS OR PARTS SHALL NOT BE COMBINED ON A RUN OF GUARDRAIL.
 - (F) FIRST 12'-6\"/>

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 TYPE 38
 GUARDRAIL END
 TERMINAL
 7-11-13 S-GRT-2

REV. 11-3-14: MODIFIED PAY LENGTH FOR TYPE 38 END TERMINAL.

REV. 4-4-16: THE PREVIOUSLY SHOWN SKT75 (SLOTTED FLARED GUARDRAIL TERMINAL) IS NO LONGER AVAILABLE FOR 31" INSTALLATION. REVISED TO SHOW TL-2 T-350 TERMINAL.



NOTE TO INSTALLER

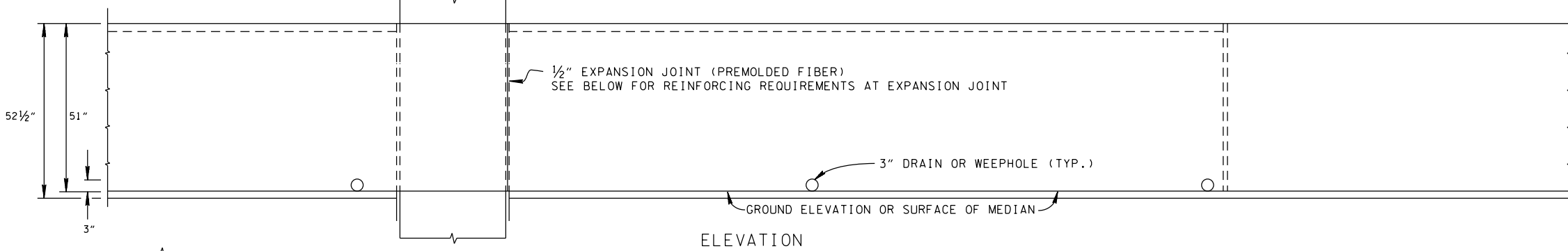
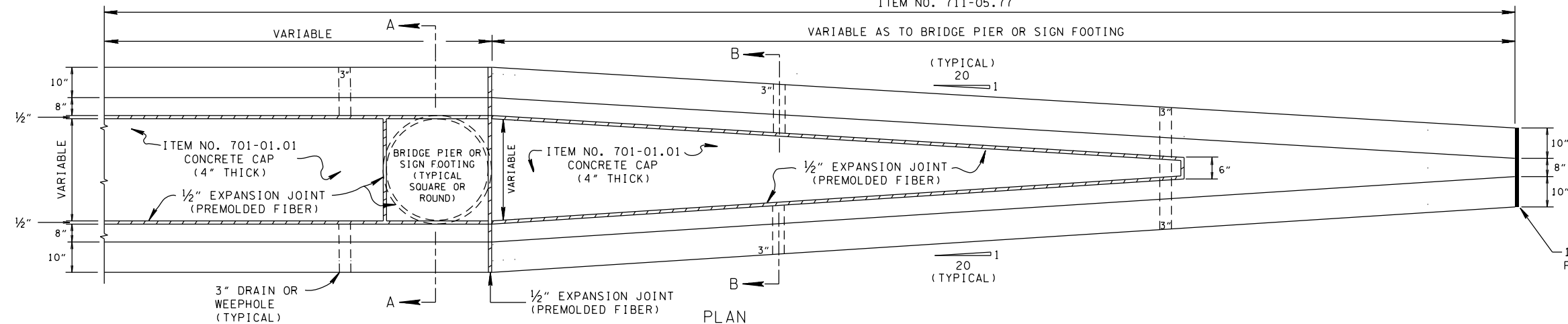
SKT 350 WITH 25' INSTALLATION IS SHOWN, POST MATERIAL TYPE, SIZE, GUARDRAIL SPLICING LOCATION, TAPER RATE, OFFSET, GUARDRAIL HEIGHT, IMPACT HEAD DIMENSION, AND ALL OTHER MISCELLANEOUS HARDWARE MAY BE DIFFERENT FOR OTHER DEVICES. INSTALLATION SHALL FOLLOW THE MANUFACTURER'S SHOP DRAWINGS.

NOTE TO DESIGNER

DO NOT USE WITHOUT REFERENCING S-GRT-2P OR S-GRT-2R

- GENERAL NOTES**
- (A) THIS TERMINAL SHALL ONLY BE USED ON ROADWAYS WITH POSTED SPEED LIMIT OF 45 MPH OR LESS.
 - (B) ONLY NCHRP 350 OR MASH COMPLIANT TL-2 END TERMINALS ON THE TDOT QUALIFIED PRODUCTS LIST MAY BE INSTALLED. MANUFACTURER'S SHOP DRAWINGS SHALL BE REQUIRED BEFORE ANY TANGENTIAL END TERMINAL INSTALLATIONS CAN BEGIN. THE CONTRACTOR SHALL HAVE ONE COMPLETE SET OF SHOP DRAWINGS ON SITE DURING INSTALLATION OR REPAIR OF ANY TANGENTIAL GUARDRAIL TERMINAL ANCHOR. THE CONTRACTOR SHALL ALSO PROVIDE THE CONSTRUCTION OR MAINTENANCE SUPERVISOR WITH ONE COMPLETE SET OF SHOP DRAWINGS INCLUDING TDOT QPL EVALUATION NUMBER.
 - (C) FOR THE TYPE 21 GUARDRAIL TERMINAL TO FUNCTION AS IT WAS CRASH TESTED UNDER NCHRP-350 TEST LEVEL 2 THE EARTH PAD MUST BE CONSTRUCTED PER STANDARD DRAWING NO. S-GRT-2P OR S-GRT-2R.
 - (D) THE TERMINAL (INCLUDING ANCHOR) IS TO BE INSTALLED UNDER THE PRICE BID FOR ITEM NO. 705-04.04 PER EACH.
 - (E) TERMINAL SYSTEM MUST BE CONSTRUCTED SO THAT THE FULL LENGTH OF THE TERMINAL SYSTEM GUARD RAILING IS IN STRAIGHT ALIGNMENT.
 - (F) DIFFERENT TERMINAL SYSTEMS OR PARTS SHALL NOT BE COMBINED ON A RUN OF GUARDRAIL.
 - (G) FIRST 12'-6" FROM IMPACT HEAD IS GATING FOR SKT-SP-MGS, DO NOT USE THIS SECTION IN LENGTH OF NEED.
 - (H) IF GUARDRAIL NEEDS TO BE EXTENDED, EXTEND GUARDRAIL IN INCREMENTS OF 12'-6".
 - (I) IF WOOD POSTS ARE USED, ALL HOLES IN WOOD POSTS ARE TO BE DRILLED BEFORE PRESERVATIVE TREATMENT.
 - (J) ALL CUTTING, DRILLING, AND WELDING OF STEEL COMPONENTS SHALL BE DONE BEFORE GALVANIZING.
 - (K) THE FINISHED CABLE ASSEMBLY WILL NOT BE ACCEPTABLE UNLESS IT IS IN TENSION WITH NO SAG.
 - (L) FLARED INSTALLATION, AS SHOWN, IS OPTIONAL FOR TERMINALS, WHERE SHOULDER IS 2'-0" OR WIDER. IF FLARED INSTALLATION IS IMPLEMENTED, USE 25:1 MAXIMUM FLARE RATE.
 - (M) FOR RETROFIT PROJECTS, SEE STANDARD DRAWING S-GRT-2R.
 - (N) FOR NEW CONSTRUCTION, INSTALL TERMINALS AT 31" HEIGHT. FOR RETROFIT PROJECTS, USE GUARDRAIL HEIGHT TRANSITION DETAIL, SEE STANDARD DRAWING S-GRS-4.

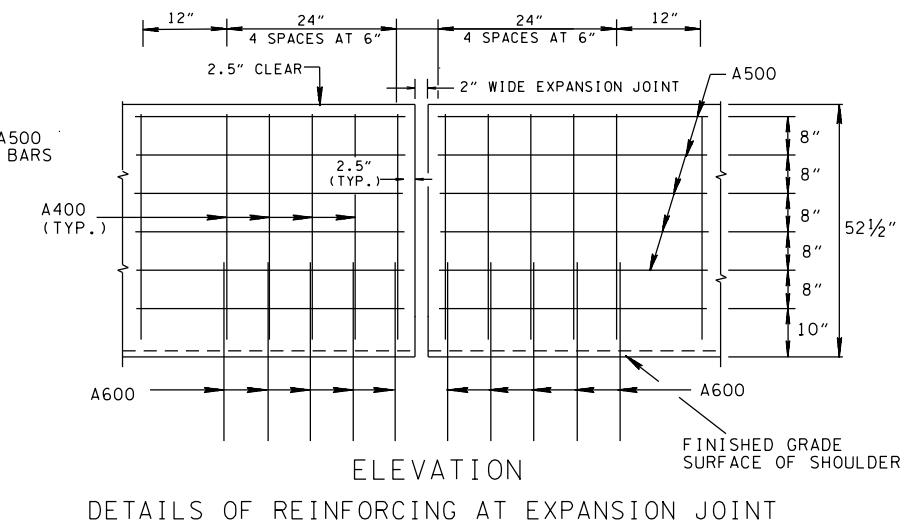
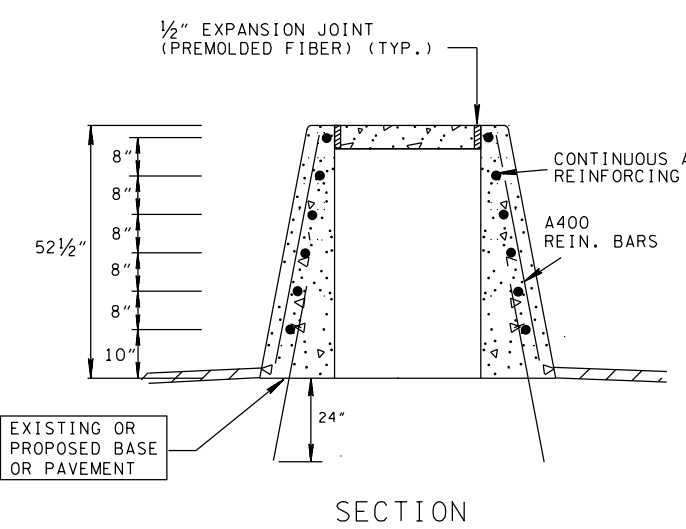
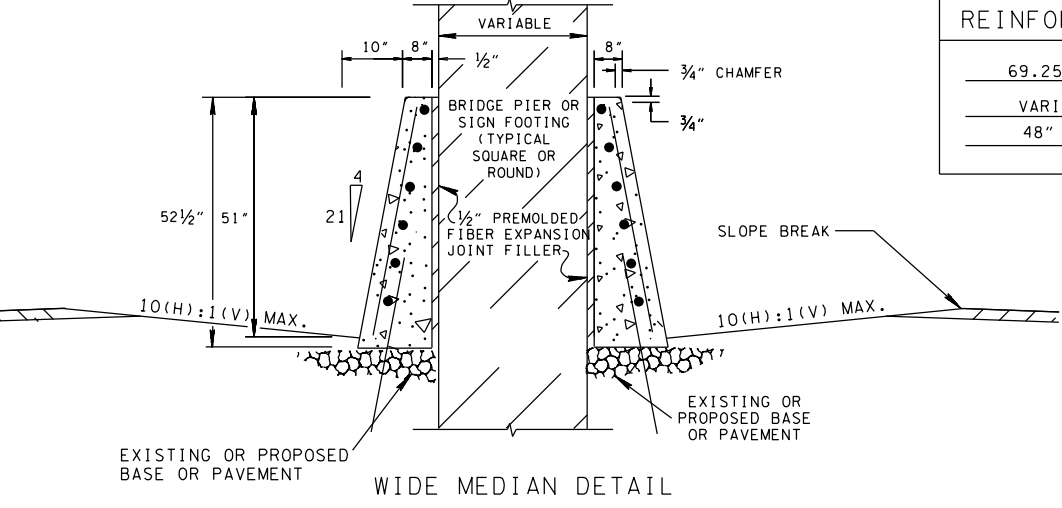
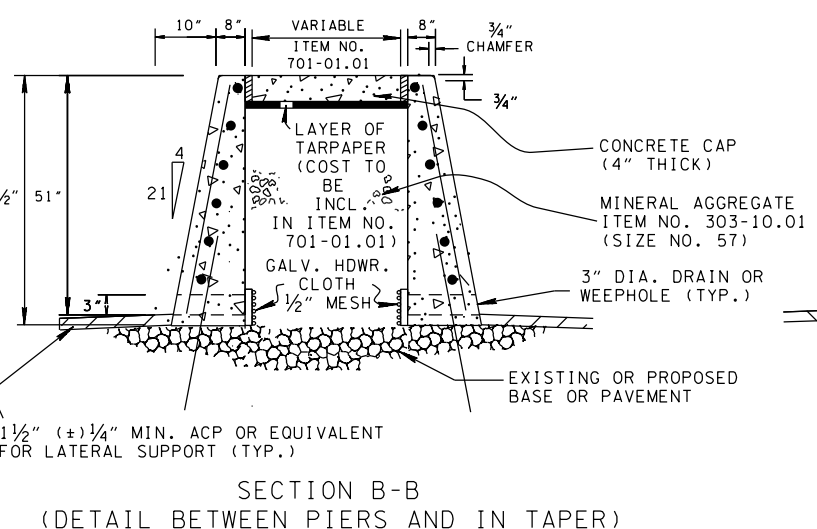
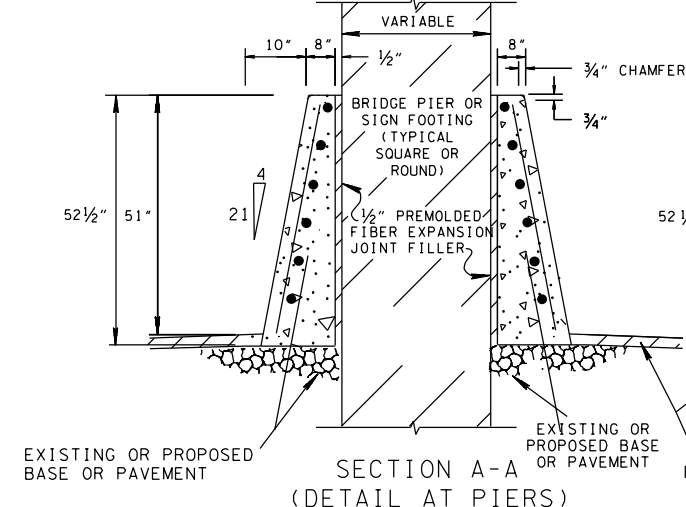
REV. 7-30-10: REVISED REINFORCING STEEL DETAILS AND GENERAL NOTES.
 REV. 4-12-16: UPDATE REFERENCES TO STANDARD DRAWINGS, ADDED REINFORCEMENT DETAILS.



SEE S-GRC-3 FOR GUARDRAIL ATTACHMENT OR S-SSMB-3 FOR MEDIAN BARRIER WALL DETAILS OR S-CC-1 AND S-CC-2 FOR CRASH CUSHIONS

1" EXPANSION JOINT PREMOLDED FIBER

REINFORCING STEEL LEGEND	
69.25"	A400
VARIABLE	A500
48"	A600



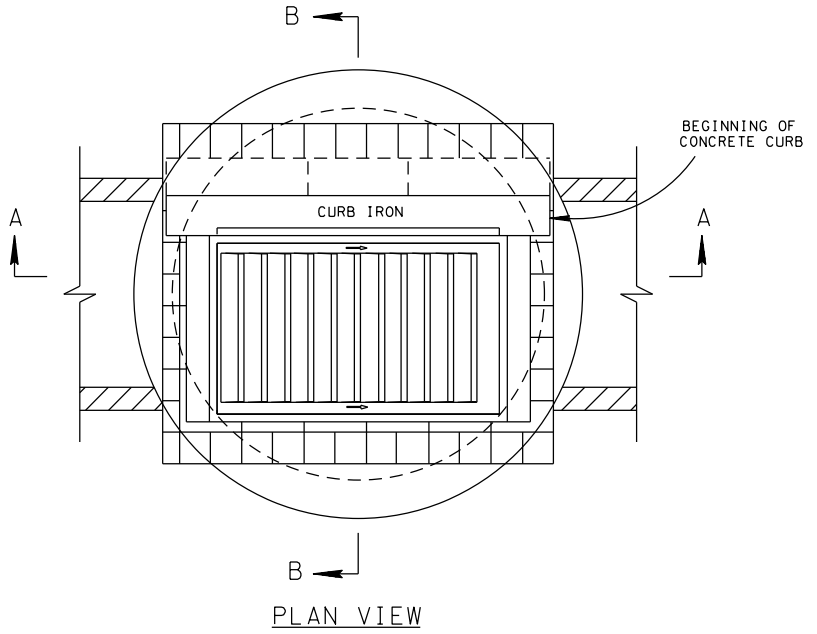
- GENERAL NOTES
- (A) CONCRETE MEDIAN BARRIER SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SECTION 711 AND/OR CURRENT SPECIAL PROVISIONS.
 - (B) SEE STANDARD DRAWING NO. S-SSMB-3 FOR ADDITIONAL DETAILS AND GENERAL NOTES REGARDING CONCRETE AND STEEL SPECIFICATIONS, CONTRACTION AND EXPANSION JOINTS, TEXTURE FINISH, DELINEATORS, AND WEEP HOLES.
 - (C) SEE STANDARD DRAWING S-SSMB-2 FOR DETAILS AND REQUIREMENTS FOR MEDIAN BARRIER DELINEATOR. MEDIAN BARRIER DELINEATORS WILL NOT BE REQUIRED IN AREAS WHERE ROADWAY IS LIGHTED.
 - (D) ALONG TOP EDGES OF CONCRETE MEDIAN BARRIER THE CONTRACTOR MAY USE 3/4" RADIUS IN LIEU OF 3/4" CHAMFER SHOWN ON THIS DRAWING.
 - (E) MAXIMUM SLOPE IN FRONT OF SINGLE SLOPE MEDIAN BARRIER WALL SHALL BE 10(H):1(V).
 - (F) PAYMENT WILL BE MADE UNDER ITEM NO. 711-05.77, FLARED SINGLE SLOPE CONCRETE MEDIAN BARRIER WALL PER LINEAR FOOT.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

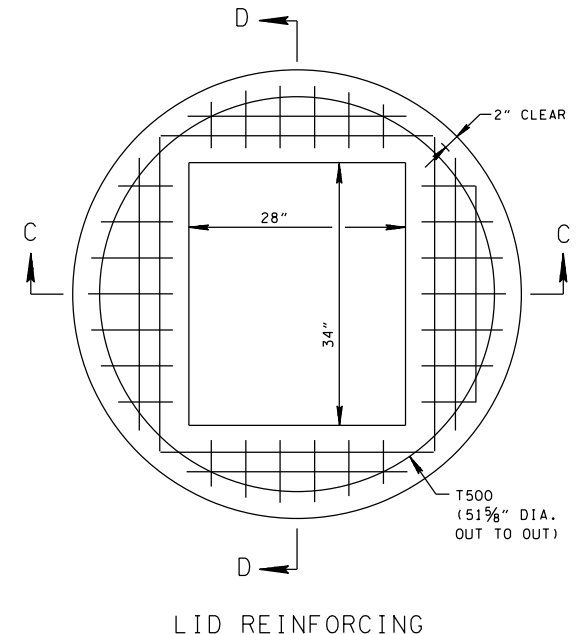
STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION

FLARED
 SINGLE SLOPE
 CONCRETE MEDIAN
 BARRIER WALL
 (VERTICAL BACK)

10-15-09 S-SSMB-4

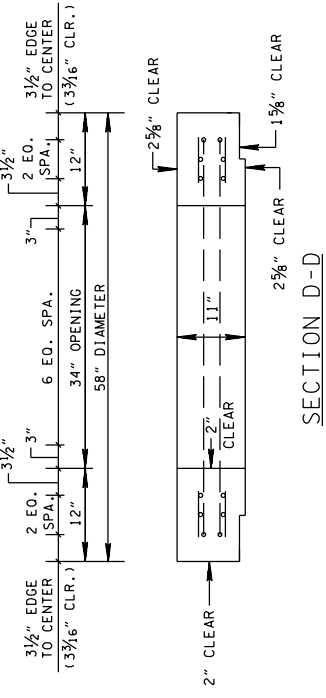


PLAN VIEW



LID REINFORCING

- T500
- A503
- A504
- A508
- A509
- A510
- A511
- A510
- A509
- A508
- A504
- A503
- T500



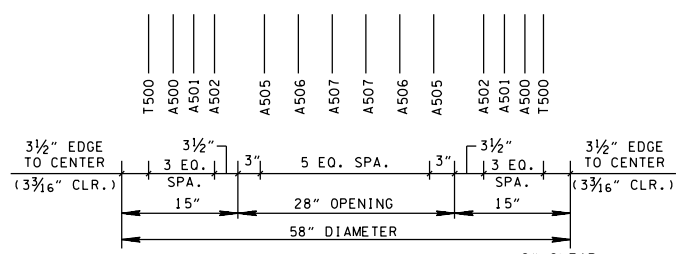
SECTION D-D

CATCH BASIN MAXIMUM DEPTH NOTE
 MAXIMUM DEPTH FOR THIS STRUCTURE IS 20.00'.

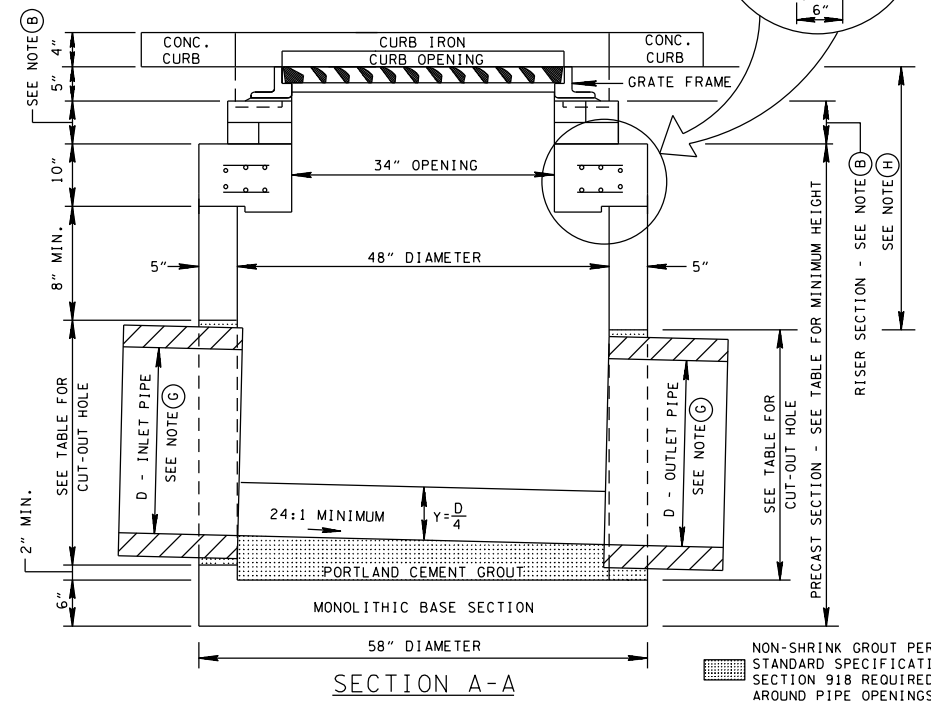
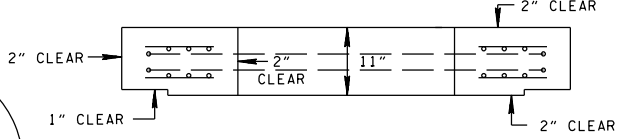
CATCH BASIN DIMENSIONS					FOR DESIGN USE ONLY
INSIDE DIAMETER (D) OF PIPE (INCHES)	PIPE WALL THICKNESS (INCHES)	DIAMETER OF CUT-OUT HOLES (INCHES)	PRECAST SECTION MIN. HEIGHTS (INCHES)	MINIMUM DESIGN DEPTH (FEET)	
18	2 1/2	25	49	3.88	
24	3	32	56	4.42	

- ① CUT-OUT HOLES BASED ON REINFORCED CONCRETE PIPE WITH WALL TYPE "B".
- ② ALL FLEXIBLE PIPE MATERIALS REQUIRE GASKET. SEE STANDARD DRAWING D-PB-2.
- ③ CUT-OUT HOLES FOR PRECAST STRUCTURES TO BE FORMED IN ORDER TO OBTAIN A SMOOTH EDGED HOLE. SCORED OR ETCHED HOLES WITH REINFORCING STEEL LEFT UN-CUT WILL NOT BE PERMITTED.

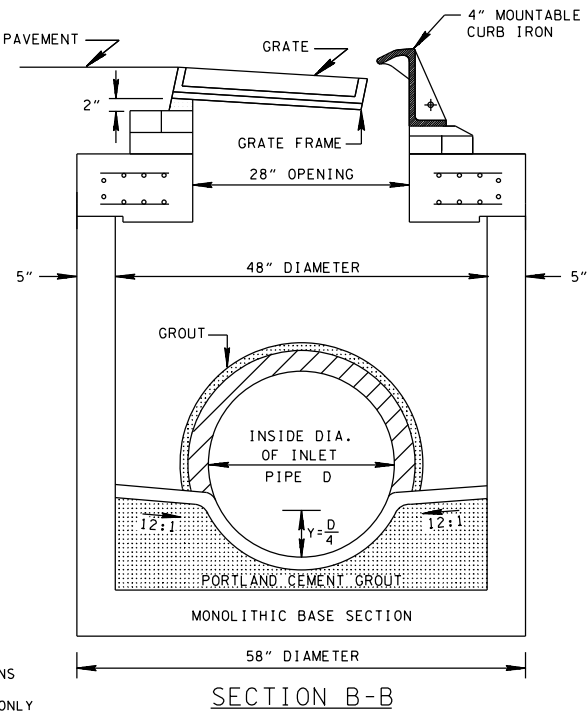
- REV. 12-18-95: MODIFIED DRAWING NO. D-CB-25RA TO ACCEPT 4" MOUNTABLE CURB BACK.
- REV. 2-14-96: CHANGED SHEET NAME.
- REV. 12-18-96: REMOVED 0.5" PREMOLDED FIBER EXPANSION JOINT FROM SECTION "B-B". REMOVED OLD GENERAL NOTE (E) CHANGED LABEL OF LAST FOUR GENERAL NOTES.
- REV. 4-15-97: CHANGED CATCH BASIN DIMENSION TABLE.
- REV. 1-19-99: CHANGED MINIMUM DEPTH TABLE AND DRAWING IN GENERAL TO REFLECT REDUCTION IN INVERT DROP ACROSS CATCH BASIN.
- REV. 12-18-99: MODIFIED CATCH BASIN DIMENSION TABLE.
- REV. 5-27-01: CHANGED PAY ITEMS IN GENERAL NOTE (I) ADDED CATCH BASIN MAXIMUM DEPTH NOTE.
- REV. 8-01-12: REVISED CATCH BASIN LID FOR COMPLIANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 4TH EDITION WITH INTERIMS. REVISED REINFORCING, GENERAL NOTES AND ADDITIONAL MISC. DRAFTING EDITS.
- REV. 9-24-12: MODIFIED TOP SLAB AND MINIMUM DEPTH.
- REV. 3-11-14: ELIMINATED STIRRUPS.
- REV. 4-12-16: CORRECTED GENERAL NOTE (D).



SECTION C-C



SECTION A-A



SECTION B-B

NON-SHRINK GROUT PER STANDARD SPECIFICATIONS SECTION 918 REQUIRED AROUND PIPE OPENINGS ONLY

GENERAL NOTES

- (A) ALL PRECAST ELEMENTS TO MEET ASTM C478 (CURRENT EDITION) AND AASHTO M199 (CURRENT EDITION) UNLESS SUPERSEDED BY THIS DRAWING.
 CONCRETE: $f'_c = 4,000$ POUNDS PER SQUARE INCH AT 28 DAYS
 REINFORCING STEEL: ASTM A615, $F_y = 60,000$ POUNDS PER SQUARE INCH
 ALL REINFORCING IS TO BE INSTALLED AS DETAILED ON THIS DRAWING.
- (B) THIS DIMENSION MAY VARY FROM A MINIMUM OF 0 INCHES TO A MAXIMUM OF 24 INCHES AS LONG AS 23 INCHES IS SATISFIED. THE CONTRACTOR HAS THE OPTION OF USING BRICK OR STANDARD PRECAST CONCRETE RISER FRAMES. THE USE OF BRICK SHALL BE LIMITED TO 6 INCHES. IF THIS DIMENSION EXCEEDS 6 INCHES, PRECAST CONCRETE RISER FRAMES SHALL BE USED AS SHOWN ON STANDARD DRAWING D-RF-1.
- (C) PRECAST CATCH BASIN UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE DAMAGED CATCH BASIN UNITS AT HIS OWN EXPENSE.
- (D) APPROPRIATE SIZING AND LOCATION OF LIFTING DEVICES SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.
- (E) THE CONTRACTOR IS TO PATCH ALL LIFTING DEVICE HOLES WITH GROUT AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.
- (F) ALTERNATIVE JOINT DETAILS MAY BE ACCEPTABLE. SEE STANDARD DRAWING D-CB-99R FOR ADDITIONAL DETAILS.
- (G) SEE ROADWAY PLANS DRAINAGE TABULATION FOR PIPE INLET AND OUTLET ELEVATIONS. IF NEEDED, INVERT ELEVATIONS MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER IN ORDER TO ACCOMMODATE INLET AND OUTLET PIPES.
- (H) FOR CASES WHERE THE OUTLET PIPE DIAMETER IS LARGER THAN THE INLET PIPE DIAMETER, A MINIMUM 23 INCH DEPTH SHALL BE MAINTAINED ABOVE THE OUTLET PIPE.
- (I) SEE STANDARD DRAWING D-CBB-12C FOR DETAILS REGARDING CAST IRON GRATES, FRAMES AND CURB INLETS.
- (J) SEE STANDARD DRAWING D-CB-28RB FOR DETAILS REGARDING 60" AND LARGER CIRCULAR NO. 28 CATCH BASIN (FOR USE WITH 4" MOUNTABLE CURB).
- (K) PAY DEPTH MEASUREMENT MADE FROM TOP OF GRATE TO OUTLET FLOW ELEVATION. PAYMENT FOR CATCH BASIN WILL BE MADE UNDER ITEM NUMBERS 611-28.01 CATCH BASINS, TYPE 28, 0'-4' DEPTH THROUGH 611-28.05 CATCH BASINS, TYPE 28, > 16'-20' DEPTH PER EACH. PAYMENT INCLUDES RISER SECTION AND GRATE.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION

STANDARD PRECAST
 48" CIRCULAR NO. 28
 CATCH BASIN
 (FOR USE WITH 4"
 SLOPING CURB)

NOT TO SCALE 12-18-95 D-CB-28RA

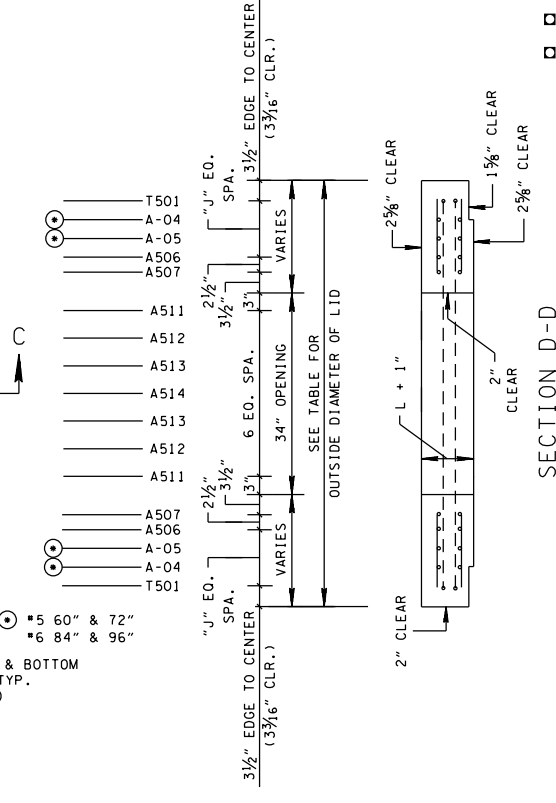
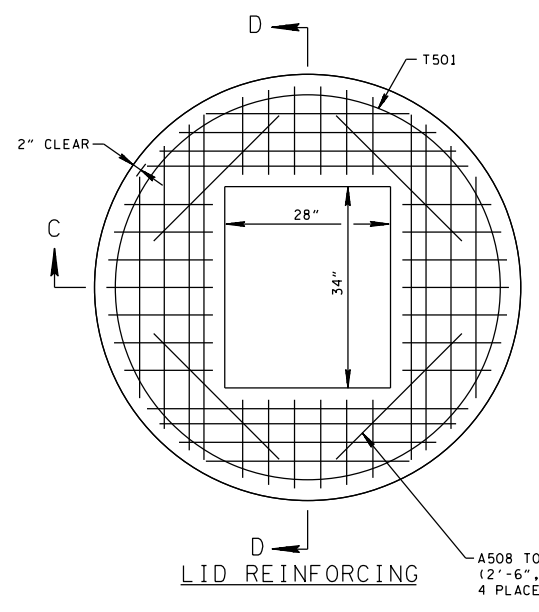
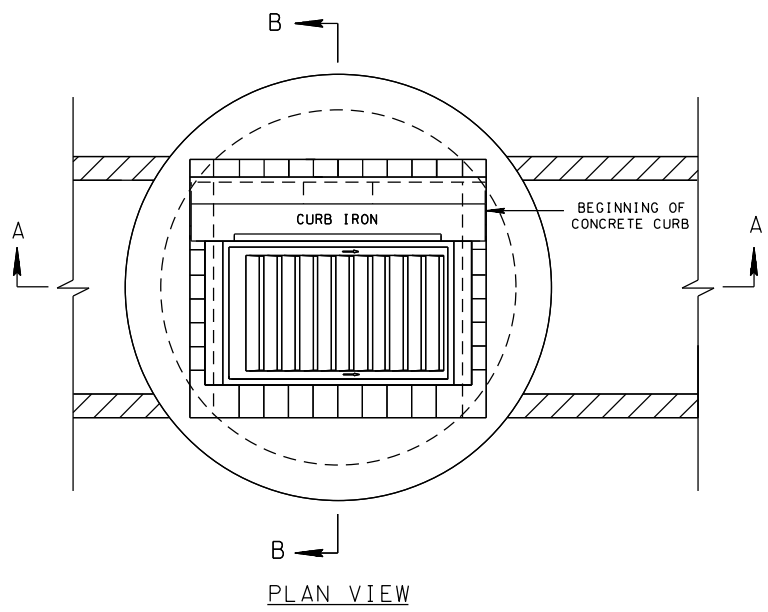
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- REV. 3-11-14: ELIMINATED STIRRUPS.
- REV. 1-19-99: CHANGED MINIMUM DEPTH TABLE AND DRAWING IN GENERAL TO REFLECT REDUCTION IN INVERT DROP ACROSS CATCH BASIN.
- REV. 5-27-01: CHANGED PAY ITEMS IN GENERAL NOTE (K) ADDED CATCH BASIN MAXIMUM DEPTH NOTE. CHANGED REINFORCING STEEL IN LID.
- REV. 8-01-12: REVISED CATCH BASIN LID FOR COMPLIANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 4TH EDITION WITH INTERIMS. REVISED REINFORCING, GENERAL NOTES AND ADDITIONAL MISC. DRAFTING EDITS.
- REV. 9-24-12: MODIFIED TOP SLAB AND MINIMUM DEPTH.

CATCH BASIN MAXIMUM DEPTH NOTE
 MAXIMUM DEPTH FOR THIS STRUCTURE IS 40.00'

INSIDE DIAMETER (D) OF PIPE (INCHES)	PIPE WALL THICKNESS (INCHES)	DIAMETER OF CUT-OUT HOLES (INCHES)	PRECAST SECTION MIN. HEIGHTS (INCHES)				FOR DESIGN USE ONLY CATCH BASIN MINIMUM DESIGN DEPTH (FEET)			
			60"	72"	84"	96"	60"	72"	84"	96"
18	2½	25	51½	53	57½	59	3.92	3.97	4.34	4.38
24	3	32	58½	60	64½	66	4.46	4.51	4.88	4.92
30	3½	39	65½	67	71½	73	5.00	5.05	5.42	5.46
36	4	46	72½	74	78½	80	5.55	5.59	5.97	6.00
42	4½	53	79½	81	85½	87	6.09	6.13	6.51	6.54
48	5	60	86½	88	92½	94	6.63	6.67	7.05	7.08
54	5½	67	93½	95	99½	101	7.17	7.22	7.59	7.63
60	6	74	100½	102	106½	108	7.71	7.76	8.13	8.17
66	6½	81	107½	109	113½	115	8.25	8.30	8.67	8.71

- (1) CUT-OUT HOLES BASED ON REINFORCED CONCRETE PIPE WITH WALL TYPE "B".
- (2) ALL FLEXIBLE PIPE MATERIALS REQUIRE GASKET. SEE STANDARD DRAWING D-PB-2.
- (3) CUT-OUT HOLES FOR PRECAST STRUCTURES TO BE FORMED IN ORDER TO OBTAIN A SMOOTH EDGED HOLE. SCORED OR ETCHED HOLES WITH REINFORCING STEEL LEFT UN CUT WILL NOT BE PERMITTED.

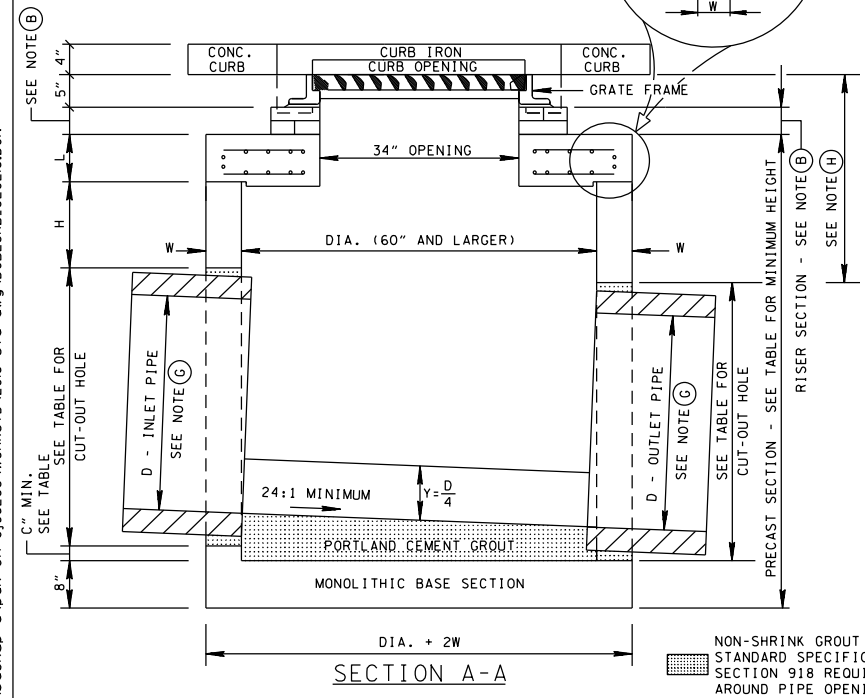
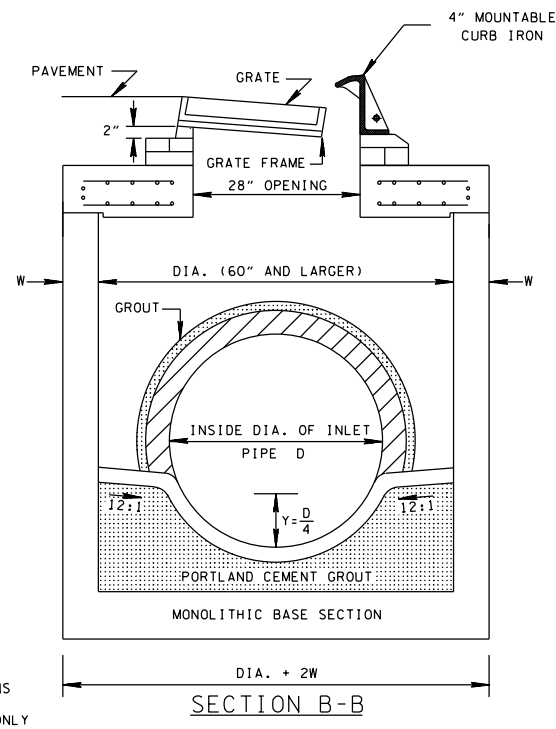
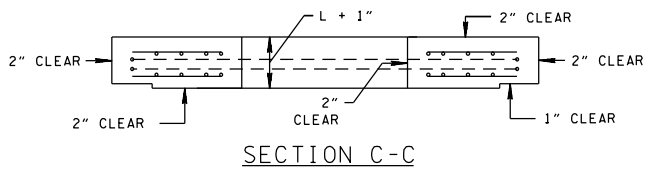
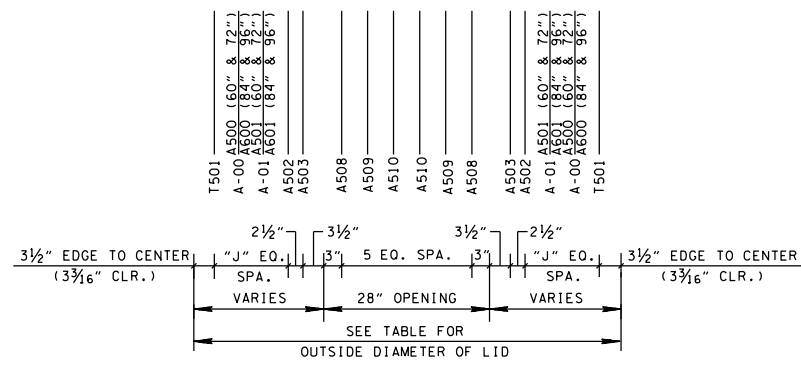


VARIABLE REINFORCING DIMENSIONS AND SPACING IN CONCRETE LID

INSIDE DIA. OF CATCH BASIN (INCHES)	OUTSIDE DIA. OF LID (INCHES)	NO. OF EQUAL SPACES "J"
60	72	3
72	86	4
84	100	5
96	114	6

OUT-TO-OUT DIAMETER FOR T501 REINFORCING BARS EQUALS OUTSIDE DIAMETER OF LID MINUS 6 3/8 INCHES.

ADDITIONAL A-BARS ARE REQUIRED FOR THE LARGER STRUCTURE. ADDITIONAL BARS SHALL BE #5 FOR 72 INCH INSIDE DIAMETER AND #6 FOR 84 INCH AND 96 INCH INSIDE DIAMETER AS INDICATED BY "NO. OF EQ. SPACES 'J'".



GENERAL NOTES

- (A) ALL PRECAST ELEMENTS TO MEET ASTM C478 (CURRENT EDITION) AND AASHTO M199 (CURRENT EDITION) UNLESS SUPERSEDED BY THIS DRAWING.
 CONCRETE: $f'_c = 4,000$ POUNDS PER SQUARE INCH AT 28 DAYS
 REINFORCING STEEL: ASTM A615, $F_y = 60,000$ POUNDS PER SQUARE INCH
 ALL REINFORCING IS TO BE INSTALLED AS DETAILED ON THIS DRAWING.
- (B) THIS DIMENSION MAY VARY FROM A MINIMUM OF 0 INCHES TO A MAXIMUM OF 24 INCHES AS LONG AS 23 INCHES (FOR 60 OR 72 INCH INSIDE DIAMETER CATCH BASIN) OR 27 INCHES (FOR 84 OR 96 INCH INSIDE DIAMETER CATCH BASIN) IS SATISFIED. THE CONTRACTOR HAS THE OPTION OF USING BRICK OR STANDARD PRECAST CONCRETE RISER FRAMES. THE USE OF BRICK SHALL BE LIMITED TO 6 INCHES. IF THIS DIMENSION EXCEEDS 6 INCHES, PRECAST CONCRETE RISER FRAMES SHALL BE USED AS SHOWN ON STANDARD DRAWING D-RF-1.
- (C) PRECAST CATCH BASIN UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE DAMAGED CATCH BASIN UNITS AT HIS OWN EXPENSE.
- (D) APPROPRIATE SIZING AND LOCATION OF LIFTING DEVICES SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.
- (E) THE CONTRACTOR IS TO PATCH ALL LIFTING DEVICE HOLES WITH GROUT AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.
- (F) ALTERNATIVE JOINT DETAILS MAY BE ACCEPTABLE. SEE STANDARD DRAWING D-CB-99R FOR ADDITIONAL DETAILS.
- (G) SEE ROADWAY PLANS DRAINAGE TABULATION FOR PIPE INLET AND OUTLET ELEVATIONS. IF NEEDED, INVERT ELEVATIONS MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER IN ORDER TO ACCOMMODATE INLET AND OUTLET PIPES.
- (H) FOR CASES WHERE THE OUTLET PIPE DIAMETER IS LARGER THAN THE INLET PIPE DIAMETER, A MINIMUM 23 INCH DEPTH (FOR 60 OR 72 INCH INSIDE DIAMETER CATCH BASIN) OR 27 INCH DEPTH (FOR 84 OR 96 INCH INSIDE DIAMETER CATCH BASIN) SHALL BE MAINTAINED ABOVE THE OUTLET PIPE.
- (I) SEE STANDARD DRAWING D-CBB-12B FOR DETAILS REGARDING CAST IRON GRATES, FRAMES AND CURB INLETS.
- (J) SEE STANDARD DRAWING D-CB-28RA FOR DETAILS REGARDING 48" CIRCULAR NO. 28 CATCH BASIN (FOR USE WITH 4" MOUNTABLE CURB).
- (K) PAY DEPTH MEASUREMENT MADE FROM TOP OF GRATE TO OUTLET FLOW ELEVATION. PAYMENT FOR CATCH BASIN WILL BE MADE UNDER ITEM NUMBERS 611-25.01 CATCH BASINS, TYPE 25, 0'-4' DEPTH THROUGH 611-25.07, CATCH BASINS, TYPE 25, > 24'-28' DEPTH PER EACH. PAYMENT FOR CATCH BASINS DEEPER THAN 28' WILL BE MADE UNDER ITEM NUMBER 611-25.08, CATCH BASINS, TYPE 25, _____' DEPTH PER EACH. PAYMENT INCLUDES RISER SECTION AND GRATE.

CATCH BASIN DIMENSIONS

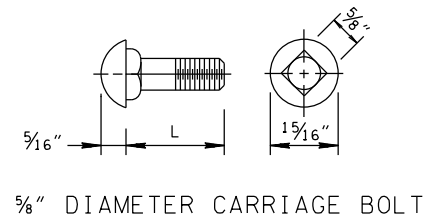
INSIDE DIA. OF CATCH BASIN DIA. (INCHES)	WALL THICKNESS W (INCHES)	LID THICKNESS L (INCHES)	OUTSIDE DIA. OF CATCH BASIN DIA. + 2W (INCHES)	MAX. INLET OR OUTLET CONC. PIPE SIZE - STR. (INCHES)	MAX. INLET OR OUTLET CONC. PIPE SIZE - 90° (INCHES)	DIMENSION	
						C (INCHES)	H (INCHES)
60	6	10	72	36	24	2.5	8
72	7	10	86	48	30	3.0	8
84	8	10	100	60	36	3.5	12
96	9	10	114	66	42	4.0	12

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

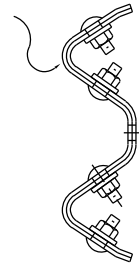
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

STANDARD PRECAST CIRCULAR NO. 28 CATCH BASIN (FOR USE WITH 4" SLOPING CURB)

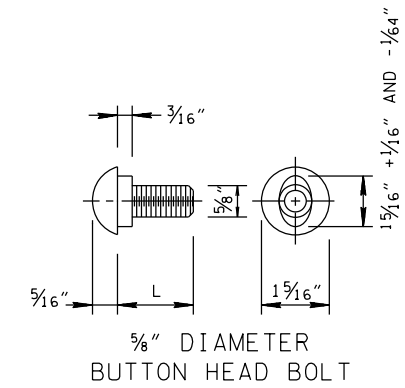
NOT TO SCALE 12-18-95 D-CB-28RB



5/8" DIA. x 1 1/4" LENGTH,
BUTTON HEAD BOLT WITH
5/8" RECESS NUT OR
HEX NUT AND 1 ROUND WASHER
PER BOLT (TYPICAL).



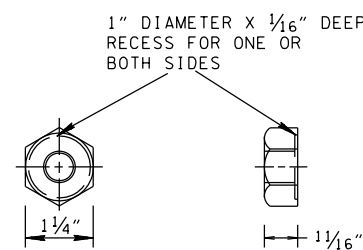
GR W-BEAM SPLICE
(CROSS-SECTION)



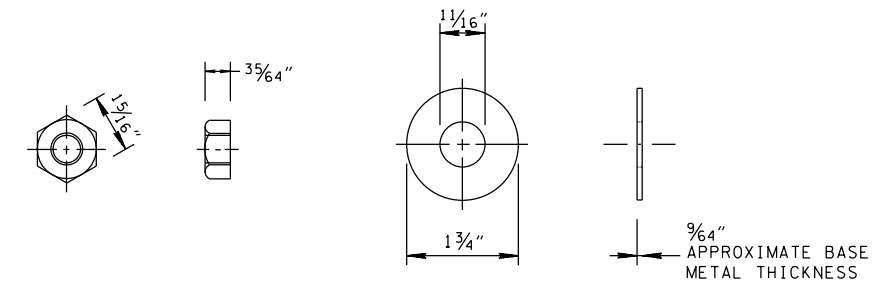
CARRIAGE BOLTS		
L	THREAD LENGTH	INTENDED USE
1 1/2"	FULL LENGTH THREAD	THIS BOLT IS A SPLICE BOLT FOR THE CHANNEL RUB RAIL ELEMENTS.
3"	1 1/2" MINIMUM THREAD LENGTH	THIS BOLT IS FOR FASTENING CHANNEL RUB RAIL ELEMENTS TO STEEL POST.
11"	1 3/4" MINIMUM THREAD LENGTH	THIS BOLT IS FOR FASTENING CHANNEL RUB RAIL ELEMENTS TO WOOD POST.
14"	1 3/4" MINIMUM THREAD LENGTH	THIS BOLT IS FOR FASTENING RUB RAIL ELEMENTS TO WOOD POST WHEN USED FOR MEDIAN DIVIDERS.
SPECIFICATIONS		
(S1) BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS TO THE REQUIREMENTS OF ASTM A563M, GRADE "A" OR BETTER, AND BE GALVANIZED IN ACCORDANCE WITH ASTM A153. (S2) DIMENSIONAL TOLERANCES NOT SHOWN OR IMPLIED ARE INTENDED TO BE THOSE CONSISTENT WITH THE PROPER FUNCTIONING OF THE PART, INCLUDING ITS APPEARANCE, AND ACCEPTED MANUFACTURING PRACTICES.		

BUTTON HEAD BOLTS		
L	THREAD LENGTH	INTENDED USE
1 1/4"	FULL LENGTH THREAD	THIS BOLT IS FOR FASTENING "W" BEAM RAIL ELEMENTS AT JOINTS.
10"	1 3/4" MINIMUM THREAD LENGTH	THIS BOLT IS FOR FASTENING "W" BEAM RAIL ELEMENTS TO METAL POST WITH WOOD BLOCK-OUTS.
18"	2 1/2" MINIMUM THREAD LENGTH	THIS BOLT IS FOR FASTENING "W" BEAM RAIL ELEMENTS TO WOOD POST WITH WOOD BLOCK-OUTS.
25"	2" MINIMUM THREAD LENGTH	THIS BOLT IS FOR FASTENING "W" BEAM RAIL ELEMENTS TO WOOD POST WITH WOOD BLOCK-OUTS WHEN USED FOR MEDIAN DIVIDERS.

GENERAL NOTES	
(A)	BOLTS FOR CONNECTING RAIL TO POST THROUGH BLOCKOUT SHALL BE 5/8" DIAMETER X 10" (STEEL POST) OR 5/8" DIAMETER BY 18" (WOOD POST) BUTTON HEAD WITH ROUND STEEL WASHER. A 5/8" DIAMETER RECESSED BOLT (WITHOUT WASHER) MAY BE SUBSTITUTED FOR THE 5/8" DIAMETER BOLT (FOR BOTH WOOD AND STEEL POSTS) PER AASHTO SPECIFICATION M-180.
(B)	BOLTS SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND NO MORE THAN 3/4" BEYOND IT.



5/8" DIAMETER RECESS NUT



5/8" DIAMETER HEX NUT AND STEEL WASHER
(ALTERNATE TO RECESS NUT)

THIS WASHER IS TO BE USED UNDER ALL BOLT HEADS AND NUTS SUBJECT TO TURNING WHEN TORQUED. ROUND WASHERS SHALL BE STEEL, GALVANIZED IN ACCORDANCE WITH AASHTO M232 SPECIFICATION.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

W-BEAM BARRIER
FASTENING
HARDWARE

5-12-16 S-GR31-1A