STANDARD DRAWINGS

Attached hereto is a copy of the revised drawings to existing standard drawings in the book.

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THE FOLLOWING DRAWINGS ARE VOIDED

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Attached hereto is a copy of the new drawings to be added to standard drawings in the book.

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ROADWAY DESIGN STANDARDS

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THIS PUBLICATION VOIDS INSTRUCTIONAL BULLETINS:
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ROADWAY DESIGN STANDARDS

DWG. NO	REV.	DESCRIPTION
RD-A-1	12-18-99	STANDARD ABBREVIATIONS
RD-L-1	10-26-94	STANDARD LEGEND
RD-L-2	09-05-01	STANDARD LEGEND FOR UTILITY INSTALLATIONS
RD-L-3	04-15-04	STANDARD LEGEND FOR SIGNALIZATION AND LIGHTING
RD-L-4	04-15-04	STANDARD LEGEND FOR SIGNALIZATION AND LIGHTING
RD-L-5	05-01-08	STANDARD LEGEND FOR EROSION PREVENTION AND SEDIMENT CONTROL
RD-L-6	03-30-10	STANDARD LEGEND FOR EROSION PREVENTION AND SEDIMENT CONTROL
RD-L-7		STANDARD LEGEND FOR EROSION PREVENTION AND SEDIMENT CONTROL
RD-L-8		STANDARD LEGEND FOR NATURAL STREAM DESIGN
RD-S-11	03-31-03	DESIGN AND CONSTRUCTION DETAILS FOR ROADSIDE SLOPE DEVELOPMENT
RD-S-11A	03-31-03	ROADSIDE DITCH DETAILS FOR DESIGN AND CONSTRUCTION
RD-SA-1	03-31-03	SAFETY APPROACH TO UNDERPASSES GRADING DESIGN AND SLOPE PROTECTION
RD-SE-2	10-26-95	URBAN SUPERELEVATION DETAILS
RD-SE-3	10-26-95	RURAL SUPERELEVATION DETAILS
RD-TS-1	03-31-03	DESIGN STANDARDS FOR LOCAL ROADS AND STREETS
RD-TS-2	03-31-03	DESIGN STANDARDS FOR COLLECTOR ROADS AND STREETS
RD-TS-2A	03-31-03	DESIGN STANDARDS FOR 4-6 LANE COLLECTOR HIGHWAYS WITH DEPRESSED MEDIANS
RD-TS-2B	03-31-03	DESIGN STANDARDS FOR 4-6 LANE COLLECTOR HIGHWAYS WITH FLUSH MEDIANS
RD-TS-3	03-31-03	DESIGN STANDARDS FOR 2-LANE ARTERIAL HIGHWAYS
RD-TS-3A	03-31-03	DESIGN STANDARDS 4-6 LANE ARTERIAL HIGHWAYS WITH DEPRESSED MEDIANS
RD-TS-3B	03-31-03	DESIGN STANDARDS 4-6 LANE ARTERIALS WITH INDEPENDENT ROADWAYS
RD-TS-3C	03-31-03	DESIGN STANDARDS 4-6 LANE ARTERIAL HIGHWAYS WITH FLUSH MEDIANS
RD-TS-4	03-31-03	DESIGN STANDARDS 1 & 2 LANE RAMPS
RD-TS-5	03-31-03	DESIGN STANDARDS FREEWAYS WITH DEPRESSED MEDIANS
RD-TS-5A	03-31-03	DESIGN STANDARDS FREEWAYS WITH INDEPENDENT ROADWAYS
RD-TS-5B	03-31-03	DESIGN STANDARDS FREEWAYS WITH MEDIAN BARRIER
RD-TS-6	03-31-03	TYPICAL CURB AND GUTTER SECTIONS WITH SHOULDER
RD-TS-6A	03-31-03	TYPICAL CURB AND GUTTER SECTIONS WITHOUT SHOULDER
RD-TS-7	03-31-03	DESIGN STANDARDS 2-LANE HIGHWAY WITH CONTINUOUS 2-WAY LEFT-TURN LANE
RD-TS-7A	03-31-03	DESIGN STANDARDS 2-LANE CURB & GUTTER WITH CONTINUOUS 2-WAY LEFT-TURN LANE
RD-TS-8		SHARED USE PATH TYPICAL SECTIONS
RD-TS-9	02-01-12	DESIGN STANDARD FOR SINGLE LANE URBAN AND RURAL ROUNDABOUTS
RD-TS-10	02-01-12	DESIGN STANDARD FOR MULTI-LANE URBAN AND RURAL ROUNDABOUTS
RD-UD-3	09-05-96	UNDERDRAIN DETAILS
RD-UD-4	05-27-01	UNDERDRAIN LATERAL DETAILS
RD-UD-6	12-18-94	LATERAL UNDERDRAIN ENDWALL DETAIL FOR 1:1 & 2:1 SLOPES
RD-UD-7	12-18-94	LATERAL UNDERDRAIN ENDWALL DETAIL FOR 3:1 & 4:1 SLOPES
RD-UD-8		LATERAL UNDERDRAIN ENDWALL DETAIL FOR 5:1 SLOPES
RD-UD-9	12-18-94	LATERAL UNDERDRAIN ENDWALL DETAIL FOR 6:1 SLOPES
RD01-S-11	04-04-03	DESIGN AND CONSTRUCTION DETAILS FOR ROADSIDE SLOPE DEVELOPMENT
RD01-S-11A	10-15-02	ROADSIDE DITCH DETAILS FOR DESIGN AND CONSTRUCTION
RD01-S-11B	10-15-02	DESIGN AND CONSTRUCTION DETAILS FOR ROCK CUT SLOPE AND CATCHMENT
RD01-S-12	08-01-09	CLEAR ZONE CRITERIA
RD01-SA-1	10-15-02	SAFETY APPROACH TO UNDERPASSES GRADING DESIGN AND SLOPE PROTECTION
RD01-SD-1		INTERSECTION SIGHT DISTANCE DESIGN AND GENERAL NOTES
RD01-SD-2		INTERSECTION SIGHT DISTANCE LANDSCAPE AND OBSTRUCTION
RD01-SD-3		INTERSECTION SIGHT DISTANCE 2-LANE ROADWAYS
RD01-SD-4		INTERSECTION SIGHT DISTANCE 5-LANE AND 4-LANE UNDIVIDED ROADWAYS
RD01-SD-5		INTERSECTION SIGHT DISTANCE 4-LANE DIVIDED HIGHWAYS
RD01-SD-6		INTERSECTION SIGHT DISTANCE 6-LANE DIVIDED HIGHWAYS
RD01-SD-7		INTERSECTION SIGHT DISTANCE FOR PASSIVE RAILROAD HIGHWAY GRADE CROSSING
RD01-SE-2	10-15-02	URBAN SUPERELEVATION DETAILS
RD01-SE-3	10-15-02	RURAL SUPERELEVATION DETAILS
RD01-TS-1	10-15-02	DESIGN STANDARDS FOR LOCAL ROADS AND STREETS
RD01-TS-1A		DESIGN STANDARDS FOR LOW-VOLUME LOCAL ROADS (ADT<400)
RD01-TS-2	10-15-02	DESIGN STANDARDS FOR COLLECTOR ROADS AND STREETS
RD01-TS-2A	10-15-02	DESIGN STANDARDS 4 AND 6 LANE COLLECTOR HIGHWAYS WITH DEPRESSED MEDIANS
RD01-TS-2B	10-15-02	DESIGN STANDARDS 4 AND 6 LANE COLLECTOR HIGHWAYS WITH FLUSH MEDIANS
RD01-TS-3	10-15-02	DESIGN STANDARD FOR 2-LANE ARTERIAL HIGHWAYS
RD01-TS-3A	10-15-02	DESIGN STANDARDS 4 AND 6 LANE ARTERIAL HIGHWAYS WITH DEPRESSED MEDIANS
RD01-TS-3B	10-15-02	DESIGN STANDARDS 4 AND 6 LANE ARTERIALS WITH INDEPENDENT ROADWAYS
RD01-TS-3C	10-15-02	DESIGN STANDARDS 4 AND 6 LANE ARTERIAL HIGHWAYS WITH FLUSH MEDIANS
RD01-TS-4	10-15-02	DESIGN STANDARDS 1 AND 2 LANE RAMPS
RD01-TS-5	10-15-02	DESIGN STANDARDS FREEWAYS WITH DEPRESSED MEDIANS
RD01-TS-5A	10-15-02	DESIGN STANDARDS FREEWAYS WITH INDEPENDENT ROADWAYS
RD01-TS-5B	10-15-02	DESIGN STANDARDS FREEWAYS WITH MEDIAN BARRIER
RD01-TS-6	10-15-02	TYPICAL CURB AND GUTTER SECTIONS WITH SHOULDER
RD01-TS-6A	01-24-12	TYPICAL CURB AND GUTTER SECTIONS WITHOUT SHOULDER
RD01-TS-7	10-15-02	DESIGN STANDARDS 2-LANE HIGHWAY WITH CONTINUOUS 2-WAY LEFT-TURN LANE
RD01-TS-7A	10-15-02	DESIGN STANDARDS 2-LANE CURB AND GUTTER WITH CONTINUOUS 2-WAY LEFT-TURN LANE

DRAINAGE - CULVERTS AND ENDWALL

D-FLU-1		FLUME DETAILS
D-PB-1	04-15-07	STANDARD DETAILS, CLASS "B" BEDDING AND ULVERT EXCAVATION
D-PB-2	02-01-12	STANDARD DETAILS FOR PLASTIC PIPE INSTALLATION
D-PE-1	02-12-76	TYPE “A” CONCRETE ENDWALL (2:1 SLOPE. 36” TO 78”)
D-PE-3B(1)	07-17-07	CONCRETE ENDWALL TYPE “U” WITH STEEL PIPE GRATE (FOR 18” THRU 48” PIPE) (3:1 SLOPE)
D-PE-3B(2)	05-27-01	CONCRETE ENDWALL TYPE ”U” WITH STEEL PIPE GRATE (FOR 18” THRU 48” PIPE) (3:1 SLOPE)
D-PE-4	06-01-09	STRAIGHT “L” AND “U’ TYPE CONCRETE ENDWALL
D-PE-4B(1)	03-30-00	CONCRETE ENDWALL TYPE "U" WITH STEEL PIPE GRATE (FOR 18" THRU 48" PIPES) (4:1 SLOPE)
D-PE-4B(2)	07-17-07	CONCRETE ENDWALL TYPE "U" WITH STEEL PIPE GRATE (FOR 18" THRU 48" PIPES) (4:1 SLOPE)
D-PE-5	05-27-01	WINGWALLS HORIZONTAL OVAL CONCRETE PIPES
D-PE-6	05-27-01	STRAIGHT ENDWALLS VERTICAL OVAL CONCRETE PIPES
D-PE-6A	05-27-01	WINGWALLS VERTICAL OVAL CONCRETE PIPES
D-PE-6B(1)	03-30-00	CONCRETE ENDWALL TYPE "U" WITH STEEL PIPE GRATE (FOR 18" THRU 48" PIPES) (6:1 SLOPE)
D-PE-6B(2)	07-19-10	CONCRETE ENDWALL TYPE "U" WITH STEEL PIPE GRATE (FOR 18" THRU 48" PIPES) (6:1 SLOPE)
D-PE-7	05-27-01	STRAIGHT ENDWALLS FLATBASE CONCRETE PIPES
D-PE-7A	05-27-01	WINGWALLS FLATBASE CONCRETE PIPES
D-PE-8	01-19-97	DETAIL OF STANDARD PIPE AND PIPE-ARCH CULVERT WITH BEVELED ENDS AND RIP-RAP
D-PE-9	04-25-90	CONCRETE ENDWALLS TYPE "B" (FOR ROUND & SIDE TAPERED INLETS, PIPE SIZES 15" TO 78", ALL SKEWS, 2:1 AND 4:1 SLOPES
D-PE-9A	10-25-82	GENERAL DIMENSIONS QUANTITIES, ROUND PIPE CONCRETE ENDWALLS TYPE “B” PIPE SIZES 15" TO 78", ALL SKEWS, 2:1 AND 4:1 SLOPES
D-PE-9B		GENERAL DIMENSIONS AND QUANTITIES, SIDE TAPER INLETS, CONCRETE ENDWALLS TYPE “B” PIPE SIZES 15" TO 78", ALL SKEWS, 2:1 AND 4:1 SLOPES
D-PE-9C		BILL OF STEEL (SHEET 1 OF 4) CONCRETE ENDWALLS TYPE “B” FOR CONCRETE ROUND AND SIDE TAPERED INLET, PIPE SIZES 15" TO 78", ALL SKEWS, 2:1 SLOPE

REV. 7-1-2001: REVISED RD-L-2, RD-L-3, RD-L-4, RD-UD-4, D-CE-2, D-PE-3B(1), D-PE-3B(2), D-PE-4B(1), D-PE-5, D-PE-6, D-PE-6B(1), D-PE-6B(2), D-PE-7, D-PO-1, D-SEW-6DA, AND D-SEW-12D. ADDED D-PE-6A, D-PE-7A, D-SEW-6DC AND D-SEW-6DD.

REV. 4-15-2003: REVISED RD-L-2,RD-L-4, RD-S-11,RD-S-11A,RD-SA-1,RD-TS-1, RD-TS-2,RD-TS-2A,RD-TS-2B,RD-TS-3, RD-TS-3A,RD-TS-3B,RD-TS-3C,RD-TS-4, RD-TS-5,RD-TS-5A,RD-TS-5B,RD-TS-6, RD-TS-6A,RD-TS-7 and RD-TS-7A. ADDED RD01-S-11,RD01-S-11A,RD01-S-11B RD01-S-12,RD01-SA-1,RD01-SE-2. RD01-SE-3,RD01-TS-1,RD01-TS-2, RD01-TS-2A,RD01-TS-2B,RD01-TS-3, RD01-TS-3A,RD01-TS-3B,RD01-TS-3C, RD01-TS-4,RD01-TS-5,RD01-TS-5A, RD01-TS-5B,RD01-TS-6,RD01-TS-6A, RD01-TS-7 and RD01-TS-7A. DELETED D-CE-1,D-CE-2,D-CE-3,D-PT-1, D-PT-2,D-PT-3 and RD-S-17.

REV. 7-15-2004: REVISED RD-L-3 AND RD-L-4. ADDED RD-L-5 AND RD-L-6.

REV. 7-29-2005: REVISED D-SEW-6DC AND D-SEW-6DD.

REV. 11-30-2006: CHANGED SHEET LAYOUT.

REV. 8-1-2007: REVISED D-PB-1, D-PE-3B(1), D-PE-4B(2), AND D-PE-6B(2). ADDED RD-TS-8, RD01-TS-1A, AND D-PB-2.

REV. 8-1-2008: REVISED RD-L-5, AND RD-L-6. ADDED RD-L-7.

REV. 4-09-2009: ADDED RD01-SD-1, RD01-SD-2, RD01-SD-3, RD01-SD-4, RD01-SD-5, RD01-SD-6, AND RD01-SD-7.

REV. 3-15-2010: REVISED RD-L-6, RD01-S-12, D-PB-2, D-PE-4 AND D-PE-6B(2)

REV. 12-15-2011: ADDED RD-L-8.

REV. 2-29-12: REVISED RD-TS-9, RD-TS-10, RD01-TS-6A, D-PB-2. ADDED RD-L-8.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

INDEX OF STANDARD DRAWINGS

INDEX OF STANDARD ROADWAY DRAWINGS (CONTINUED)

DRAINAGE - CULVERTS AND ENDWALL(CONT.)

DWG. NO.	REV.	DESCRIPTION
D-PE-9D		BILL OF STEEL (SHEET 2 OF 4) CONCRETE ENDWALLS TYPE “B” FOR CONCRETE ROUND AND SIDE TAPERED INLET, PIPE SIZES 15" TO 78", ALL SKEWS,4:1 SLOPE
D-PE-9E		BILL OF STEEL (SHEET 3 OF 4) CONCRETE ENDWALLS TYPE “B” FOR STEEL ROUND AND SIDE TAPERED INLET, PIPE SIZES 15" TO 78", ALL SKEWS, 2:1 SLOPE
D-PE-9F		BILL OF STEEL (SHEET 4 OF 4) CONCRETE ENDWALLS TYPE “B” FOR STEEL ROUND AND SIDE TAPERED INLET, PIPE SIZES 15" TO 78", ALL SKEWS, 4:1 SLOPE
D-PE-15A		15” CONCRETE ENDWALL CROSS DRAIN
D-PE-15B		15” CONCRETE ENDWALL CROSS DRAIN
D-PE-18A		18” CONCRETE ENDWALL CROSS DRAIN
D-PE-18B		18” CONCRETE ENDWALL CROSS DRAIN
D-PE-24A		24” CONCRETE ENDWALL CROSS DRAIN
D-PE-24B		24” CONCRETE ENDWALL CROSS DRAIN
D-PE-30A		30” CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GATE
D-PE-30B		30” CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE
D-PE-36A		36” CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE
D-PE-36B		36” CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE
D-PE-42A		42” CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE
D-PE-42B		42” CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE
D-PE-48A		48” CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE
D-PE-48B		48” CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE
D-PE-99		PIPE GRATE & SKEWED CONNECTION DETAILS FOR “U” ENDWALLS
D-PG-3	04-15-97	FERROUS AND ALUMINUM CORRUGATED METAL PIPE
D-PG-4	07-29-94	FERROUS AND ALUMINUM CORR. METAL PIPE-ARCHES
D-PO-1	05-27-01	OVAL & FLAT BASE CONCRETE CULVERT PIPE
D-PS-1	03-15-76	STRUTTING DETAILS FOR CORRUGATED METAL & STRUCTURAL PLATE ROUND PIPE
D-SEW-1A		SIDE DRAIN CONCTETE ENDWALL WITH STEEL PIPE GRATE
D-SEW-6DA	07-19-10	CONCRETE ENDWALL TYPE "SD" WITH STEEL PIPE GRATE (FOR 15" THRU 48" PIPES) (6:1 SLOPE)
D-SEW-6DB	10-26-92	CONCRETE ENDWALL TYPE "SD" WITH STEEL PIPE GRATE (FOR 15" THRU 48" PIPES) (6:1 SLOPE)
D-SEW-6DC	07-19-10	CONCRETE ENDWALL TYPE "SD" WITH STEEL PIPE GRATE (FOR 18" THRU 30" PIPES) (6:1 SLOPE)
D-SEW-6DD	04-15-05	CONCRETE ENDWALL TYPE "SD" WITH STEEL PIPE GRATE (FOR 18" THRU 30" PIPES) (6:1 SLOPE)
D-SEW-12D	03-01-12	CONCRETE ENDWALL TYPE “SD” WITH STEEL PIPE GRATE (FOR 15” AND 18” PIPES) (12:1 SLOPE)

DRAINAGE-CATCH BASINS AND MANHOLES

D-CB-10LPC	07-29-04	LOW PROFILE LOWERED CURB 32" X 26" RECTANGULAR CONCRETE NO. 10LPC CATCH BASIN
D-CB-10RA		PRECAST 48" CIRCULAR NO. 10 CATCH BASIN (FOR USE WITH 6" NONMOUNTABLE CURB)
D-CB-10S	07-29-02	RECTANGULAR CONCRETE N0. 10 CATCH BASIN
D-CB-10SB		4' X 4' SQUARE CONCRETE NO. 10 CATCH BASIN
D-CB-12B	07-29-02	RECTANGULAR BRICK NO. 12 CATCH BASIN
D-CB-12LP	07-29-04	LOW PROFILE 32" X 32" SQUARE CONCRETE NO. 12LP CATCH BASIN
D-CB-12P	07-29-02	PRECAST RECTANGULAR CONCRETE NO. 12 CATCH BASIN
D-CB-12RA	05-27-01	PRECAST 48" CIRCULAR NO. 12 CATCH BASIN (FOR USE WITH 6" NONMOUNTABLE CURB)
D-CB-12RB	05-27-01	PRECAST 60" AND 72" CIRCULAR NO. 12 CATCH BASIN (FOR USE WITH 6" NONMOUNTABLE CURB)
D-CB-12RC	05-27-01	PRECAST 84" THRU 120" CIRCULAR NO. 12 CATCH BASIN (FOR USE WITH 6" NONMOUNTABLE CURB)
D-CB-12S	07-29-02	RECTANGULAR CONCRETE NO. 12 CATCH BASIN
D-CB-12SB	07-29-02	4' X 4' SQUARE CONCRETE NO. 12 CATCH BASIN
D-CB-12SC	09-11-02	5'2" X 5'2" SQUARE CONCRETE NO. 12 CATCH BASIN
D-CB-12SD	09-11-02	7' X 7' SQUARE CONCRETE NO. 12 CATCH BASIN
D-CB-12SE	05-05-05	9' X 9' SQUARE CONCRETE NO. 12 CATCH BASIN
D-CB-13B	07-29-02	RECTANGULAR BRICK NO. 13 CATCH BASIN
D-CB-13P	07-29-02	PRECAST RECTANGULAR CONCRETE NO. 13 CATCH BASIN
D-CB-13RA	05-27-01	PRECAST 48" CIRCULAR NO. 13 CATCH BASIN (FOR USE WITH 6" NONMOUNTABLE CURB)
D-CB-13RB	05-27-01	PRECAST 60" AND 72" CIRCULAR NO. 13 CATCH BASIN (FOR USE WITH 6" NONMOUNTABLE CURB)
D-CB-13RC	05-27-01	PRECAST 84" THRU 120" CIRCULAR NO. 13 CATCH BASIN (FOR USE WITH 6" NONMOUNTABLE CURB)
D-CB-13S	07-29-02	RECTANGULAR CONCRETE NO. 13 CATCH BASIN
D-CB-14B	07-29-02	RECTANGULAR BRICK NO. 14 CATCH BASIN
D-CB-14P	07-29-02	PRECAST RECTANGULAR CONCRETE NO. 14 CATCH BASIN
D-CB-14RB	05-27-01	PRECAST CIRCULAR NO. 14RB CATCH BASIN
D-CB-14S	07-29-02	RECTANGULAR CONCRETE NO. 14 CATCH BASIN
D-CB-14SE	05-05-05	9' X 9' SQUARE CONCRETE NO. 14 CATCH BASIN
D-CB-16B	07-29-02	RECTANGULAR BRICK NO. 16 CATCH BASIN
D-CB-16S	07-29-02	RECTANGULAR CONCRETE NO. 16 CATCH BASIN
D-CB-17S	07-29-02	RECTANGULAR CONCRETE NO. 17 CATCH BASIN
D-CB-25B	07-29-02	RECTANGULAR BRICK NO. 25 CATCH BASIN (FOR USE WITH 6" MOUNTABLE CURB)
D-CB-25LP	07-29-04	LOW PROFILE 32" X 32" SQUARE CONCRETE NO. 25LP CATCH BASIN (FOR USE WITH 6" MOUNTABLE CURB)
D-CB-25P	07-29-02	PRECAST RECTANGULAR CONCRETE NO. 25 CATCH BASIN (FOR USE WITH 6" MOUNTABLE CURB)
D-CB-25RA	05-27-01	PRECAST 48" CIRCULAR NO. 25 CATCH BASIN (FOR USE WITH 6" MOUNTABLE CURB)
D-CB-25RB	05-27-01	PRECAST CIRCULAR NO. 25 CATCH BASIN (FOR USE WITH 6" MOUNTABLE CURB)
D-CB-25S	07-29-02	RECTANGULAR CONCRETE NO. 25 CATCH BASIN (FOR USE WITH 6" MOUNTABLE CURB)
D-CB-25SB	07-29-02	4' X 4' SQUARE CONCRETE NO. 25 CATCH BASIN (FOR USE WITH 6" MOUNTABLE CURB)
D-CB-25SC	09-11-02	5'2" X 5'2" SQUARE CONCRETE NO. 25 CATCH BASIN (FOR USE WITH 6" MOUNTABLE CURB)
D-CB-25SD	09-11-02	7' X 7' SQUARE CONCRETE NO. 25 CATCH BASIN (FOR USE WITH 6" MOUNTABLE CURB)
D-CB-25SE	05-05-05	9' X 9' SQUARE CONCRETE NO. 25 CATCH BASIN (FOR USE WITH 6" MOUNTABLE CURB)
D-CB-26P	07-29-02	PRECAST RECTANGULAR CONCRETE NO. 26 CATCH BASIN (FOR USE WITH 6" MOUNTABLE CURB)
D-CB-26S	07-29-02	RECTANGULAR CONCRETE NO. 26 CATCH BASIN (FOR USE WITH 6" MOUNTABLE CURB)
D-CB-27S	07-29-02	RECTANGULAR CONCRETE NO. 27 CATCH BASIN (FOR USE WITH 6" MOUNTABLE CURB)
D-CB-28B	07-29-02	RECTANGULAR BRICK NO. 28 CATCH BASIN (FOR USE WITH 4" MOUNTABLE CURB)
D-CB-28LP	07-29-04	LOW PROFILE 32" X 32" SQUARE CONCRETE NO. 28LP CATCH BASIN (FOR USE WITH 4" MOUNTABLE CURB)
D-CB-28P	07-29-02	PRECAST RECTANGULAR CONCRETE NO. 28 CATCH BASIN (FOR USE WITH 4" MOUNTABLE CURB)
D-CB-28RA	05-27-01	PRECAST 48" CIRCULAR NO. 28 CATCH BASIN (FOR USE WITH 4" MOUNTABLE CURB)
D-CB-28RB	05-27-01	PRECAST CIRCULAR NO. 28 CATCH BASIN (FOR USE WITH 4" MOUNTABLE CURB)
D-CB-28S	07-29-02	RECTANGULAR CONCRETE NO. 28 CATCH BASIN (FOR USE WITH 4" MOUNTABLE CURB)
D-CB-29P	07-29-02	PRECAST RECTANGULAR CONCRETE NO. 29 CATCH BASIN (FOR USE WITH 4" MOUNTABLE CURB)
D-CB-29S	07-29-02	RECTANGULAR CONCRETE NO. 29 CATCH BASIN (FOR USE WITH 4" MOUNTABLE CURB)
D-CB-31R	10-26-03	PRECAST CIRCULAR NO. 31 CATCH BASIN (FOR USE UNDER CONCRETE MEDIAN BARRIER WALL)
D-CB-31SD	09-11-02	7' X 7' SQUARE CONCRETE NO. 31 CATCH BASIN (FOR USE UNDER CONCRETE MEDIAN BARRIER WALL)
D-CB-31SE	02-13-04	9' X 9' SQUARE CONCRETE NO. 31 CATCH BASIN (FOR USE UNDER CONCRETE MEDIAN BARRIER WALL)
D-CB-32LP	06-30-03	80” X 32” RECTANGULAR CONCRETE NO. 32 CATCH BASIN (FOR USE UNDER CONCRETE MEDIUM BARRIER WALL)
D-CB-38RB	09-05-04	PRECAST CIRCULAR NO. 38 CATCH BASIN
D-CB-38S	07-29-02	32" X 32" SQUARE CONCRETE NO. 38 CATCH BASIN
D-CB-38SB	09-05-04	4' X 4' SQUARE CONCRETE NO. 38 CATCH BASIN
D-CB-38SC	09-05-04	5'2" X 5'2" SQUARE CONCRETE NO. 38 CATCH BASIN
D-CB-39RB	05-27-01	PRECAST CIRCULAR NO. 39 CATCH BASIN
D-CB-39S	07-29-02	4' X 4' SQUARE CONCRETE NO. 39 CATCH BASIN
D-CB-39SC		5'2" X 5'2" SQUARE CONCRETE NO. 39 CATCH BASIN
D-CB-39SD	09-11-02	7' X 7' SQUARE CONCRETE NO. 39 CATCH BASIN
D-CB-39SE	02-13-04	9' X 9' SQUARE CONCRETE NO. 39 CATCH BASIN
D-CB-40S	07-29-02	4' X 8' RECTANGULAR CONCRETE NO. 40 CATCH BASIN
D-CB-40SE	05-05-05	9' X 9' SQUARE CONCRETE NO. 40. CATCH BASIN
D-CB-41LP	07-29-04	LOW PROFILE 32" X 32" SQUARE CONCRETE NO. 41LP CATCH BASIN (FOR USE UNDER CONCRETE MEDIAN BARRIER WALL)
D-CB-41P	07-29-02	4' X 3' PRECAST RECTANGULAR CONCRETE NO. 41 CATCH BASIN (FOR USE UNDER CONCRETE MEDIAN BARRIER WALL)
D-CB-41RB	05-27-01	PRECAST CIRCULAR NO. 41 CATCH BASIN (FOR USE UNDER CONCRETE MEDIAN BARRIER WALL)

REV. 7-1-2001: REVISED D-CB-10S,D-CB-12B,D-CB-12P, D-CB-12RA,D-CB-12RB,D-CB-12S, D-CB-12SB,D-CB-12SC,D-CB-12SD, D-CB-12SE,D-CB-13B,D-CB-13P, D-CB-13S,D-CB-14B,D-CB-14P, D-CB-14S,D-CB-14SE,D-CB-16B, D-CB-16S,D-CB-17S,D-CB-25B, D-CB-25P,D-CB-25RA,D-CB-25RB, D-CB-25S,D-CB-26P,D-CB-26S, D-CB-28B,D-CB-28P,D-CB-28RA, D-CB-28RB,D-CB-28S,D-CB-29P, D-CB-29S,D-CB-31R,D-CB-31SE, D-CB-38RB,D-CB-38S,D-CB-38SB, D-CB-39RB,D-CB-39S,D-CB-39SD, D-CB-39SE,D-CB-40S,D-CB-41P, D-CB-41RB,D-CB-41S,D-CB-41SB, D-CB-42RB,D-CB-42S,D-CB-42SB, D-CB-42SD,D-CB-43SB,D-CB-45S, D-CBB-12A,D-CBB-12B,D-CBB-12C, D-CBB-13,D-CBB-31,D-CBB-42, D-JBS-1,D-JBS-2,D-JBS-3, D-MH-2,D-MH-3,D-MH-3A,D-MH-4, D-MH-5,D-MH-6,D-MH-7,D-SDS-1, D-SDS-2A,D-SDS-2B,D-SDS-3A, D-SLD-1,D-SLD-2 AND D-SLD-3. ADDED D-CB-12LP,D-CB-12RC, D-CB-13RA,D-CB-13RB,D-CB-13RC, D-CB-14RB,D-CB-25LP,D-CB-25SB, D-CB-25SC,D-CB-25SD,D-CB-25SE, D-CB-27S,D-CB-28LP,D-CB-31SD, D-CB-41LP,D-CB-41SC,D-CB-43R, D-CB-43SC,D-CB-44SE,D-CB-46SE, D-CB-51SC,D-JBS-4,AND D-JBS-5. DELETED D-CB-12SA,D-CB-25SA, D-CB-28SA,D-CB-31S,D-CB-41SA, D-CB-44SD AND D-CB-46S.

REV. 4-15-2003: REVISED D-CB-10S, D-CB-12B,D-CB-12P,D-CB-12S, D-CB-12SB,D-CB-12SC, D-CB-12SD, D-CB-12SE,D-CB-13B, D-CB-13P, D-CB-13S,D-CB-14B,D-CB-14P, D-CB-14S,D-CB-14SE,D-CB-16B, D-CB-16S,D-CB-17S,D-CB-25B, D-CB-25P,D-CB-25S,D-CB-25SB, D-CB-25SC,D-CB-25SD,D-CB-25SE, D-CB-26P,D-CB-26S,D-CB-27S, D-CB-28B,D-CB-28P,D-CB-28S, D-CB-29P,D-CB-29S,D-CB-31SD, D-CB-31SE,D-CB-38S,D-CB-38SB, D-CB-39S,D-CB-39SD,D-CB-39SE, D-CB-40S,D-CB-41P,D-CB-41S D-CB-41SB,D-CB-41SC, D-CB-42S, D-CB-42SD,D-CB-43SB,D-CB-43SC, D-CB-44SE,D-CB-46SE,D-CB-51SC, D-JBS-1,D-JBS-2,D-JBS-3,D-JBS-4, D-JBS-5,D-MH-5,D-MH-6,D-MH-7, D-SDS-1,D-SDS-2A,D-SDS-2B and D-SDS-3A. ADDED D-CB-10LPC, D-CB-10RA,D-CB-10SB,D-CB-38SC, D-CB-39SC,D-CB-41SD,D-CB-41SE, D-CB-42SC,and D-CB-51SD

REV. 7-15-2004: REVISED D-CB-12SE, D-CB-14SE,D-CB-25SE,D-CB-31R, D-CB-31SE,D-CB-39SE,D-CB-41SE, D-CB-44SE AND D-CB-46SE.

REV. 7-29-2005: REVISED D-CB-10LPC, D-CB-12LP, D-CB-12SE, D-CB-14SE, D-CB-25LP, D-CB-25SE, D-CB-28LP, D-CB-38RB, D-CB-38SB, D-CB-38SC, D-CB-41LP, D-CB-41SE, D-CB-42S, D-CB-42SB, D-CB-44SE, AND D-CB-46SE, ADDED D-CB-32LP, D-CB-40SE, D-CB-51SE, AND D-CB-52SE.

REV. 11-30-2006: CHANGED SHEET LAYOUT.

REV. 8-1-2008: ADD STANDARD DRAWING D-TD-1.

REV. 3-15-2010: REVISED D-SEW-6DA, D-SEW-6DC AND D-SEW-12D.

REV. 2-29-12: REVISED D-SEW-12D ADDED D-PE-15A, D-PE-15B, D-PE-18A, D-PE-18B, D-PE-24A, D-PE-24B, D-PE-30A, D-PE-30B, D-PE-36A, D-PE-36B, D-PE-42A, D-PE-42B, D-PE-48A, D-PE-48B, AND D-SEW-1A.

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INDEX OF STANDARD DRAWINGS

INDEX OF STANDARD ROADWAY DRAWINGS (CONTINUED)

REV. 7-1-2001: REVISED RP-CS-1, RP-CS-2,RP-J-1,RP-J-3, RP-J-5, RP-J-7,RP-J-9, RP-J-15, RP-J-17, RP-J-18,RP-J-19, RP-J-23, RP-J-24, RP-J-25,RP-PMR-1, RP-R-1, S-F-10B, S-GR-11,S-GR-15,S-GR-16, S-GR-17, S-GR-18,S-GR-19,S-GR-20,S-GR-21, S-GR-22, S-GR-23,S-GR-24,SG-GR-26, S-GR-32,S-GR-34,S-GR-35,S-GR-38, S-GR-39,S-GR-40, S-MB-1,S-MB-2 AND S-MB-4.

DRAINAGE-CATCH BASINS AND MANHOLES(CONT)

DWG. NO	REV.	DESCRIPTION
D-CB-41S	07-29-02	4' X 3' RECTANGULAR CONCRETE NO. 41 CATCH BASIN (FOR USE UNDER CONCRETE MEDIAN BARRIER WALL)
D-CB-41SB	07-29-02	4' X 4' SQUARE CONCRETE NO. 41 CATCH BASIN (FOR USE UNDER CONCRETE MEDIAN BARRIER WALL)
D-CB-41SC	09-11-02	5'2" X 5'2" SQUARE CONCRETE NO. 41 CATCH BASIN (FOR USE UNDER CONCRETE MEDIAN BARRIER WALL)
D-CB-41SD	09-11-02	7' X 7' SQUARE CONCRETE NO. 41 CATCH BASIN (FOR USE UNDER CONCRETE MEDIAN BARRIER WALL)
D-CB-41SE	05-05-05	9' X 9' SQUARE CONCRETE NO. 41 CATCH BASIN (FOR USE UNDER CONCRETE MEDIAN BARRIER WALL)
D-CB-42RB	05-27-01	PRECAST CIRCULAR NO. 42 CATCH BASIN
D-CB-42S	01-19-05	32" X 32" SQUARE CONCRETE NO. 42 CATCH BASIN
D-CB-42SB	07-29-04	4' X 4' SQUARE CONCRETE NO. 42 CATCH BASIN
D-CB-42SC		5'2" X 5'2" SQUARE CONCRETE NO. 42 CATCH BASIN
D-CB-42SD	09-11-02	7' X 7' SQUARE CONCRETE NO. 42 CATCH BASIN
D-CB-43R	05-27-01	PRECAST CIRCULAR NO. 43R CATCH BASIN
D-CB-43SB	07-29-02	8' X 4' RECTANGULAR CONCRETE NO. 43SB CATCH BASIN
D-CB-43SC	07-29-02	8' X 5'2" RECTANGULAR CONCRETE NO. 43SC CATCH BASIN
D-CB-44SE	05-05-05	9' X 9' SQUARE CONCRETE NO. 44 CATCH BASIN
D-CB-45S	05-27-01	8' X 4' RECTANGULAR CONCRETE NO. 45 CATCH BASIN (FOR USE UNDER CONCRETE MEDIAN BARRIER WALL)
D-CB-46SE	05-05-05	9' x 9' SQUARE CONCRETE NO. 46 CATCH BASIN (FOR USE CONCRETE MEDIAN BARRIER WALL)
D-CB-51SC	09-11-02	5'2" x 5'2" SQUARE CONCRETE NO. 51 CATCH BASIN (FOR USE IN FRONT CONCRETE RETAINING WALL)
D-CB-51SD		7' x 7' SQUARE CONCRETE NO. 51 CATCH BASIN (FOR USE IN FRONT CONCRETE RETAINING WALL)
D-CB-51SE		9' x 9' SQUARE CONCRETE NO. 52 CATCH BASIN
D-CB-52SE		9' x 9' SQUARE CONCRETE NO. 52 CATCH BASIN
D-CBB-12A	05-27-01	TYPE "B" CAST IRON FRAME, GRATE & NONMOUNTABLE INLET DETAILS FOR NOS. 10, 12, 14, 16, AND 17 TYPE CATCH BASINS
D-CBB-12B	05-27-01	TYPE "B" CAST IRON FRAME, GRATE & 6" MOUNTABLE INLET DETAILS FOR NOS. 25, 26 AND 27 TYPE CATCH BASINS
D-CBB-12C	05-27-01	TYPE "B" CAST IRON FRAME, GRATE & 4" MOUNTABLE INLET DETAILS FOR NOS. 28 AND 29 TYPE CATCH BASINS
D-CBB-13	05-27-01	TYPE "B" CAST IRON FRAME, GRATE & NONM0UNTABLE INLET DETAILS FOR NO. 13 TYPE CATCH BASINS
D-CBB-31	05-27-01	TYPE "B" CAST IRON FRAME, GRATE & INLET DETAILS FOR NOS. 31, 41, 45, 46, & 51 TYPE CATCH BASINS
D-CBB-42	05-27-01	CAST IRON GRATE DETAILS FOR NOS. 42, 43 & 44 TYPE CATCH BASINS
D-JBS-1	07-29-02	32" X 32" SQUARE CONCRETE NO. 1 JUNCTION BOX
D-JBS-2	07-29-02	4' X 4' SQUARE CONCRETE NO. 2 JUNCTION BOX
D-JBS-3	09-11-02	5'2" X 5'2" SQUARE CONCRETE NO. 3 JUNCTION BOX
D-JBS-4	09-11-02	7' X 7' SQUARE CONCRETE NO. 4 JUNCTION BOX
D-JBS-5	09-11-02	9' X 9' SQUARE CONCRETE NO. 5 JUNCTION BOX
D-MH-2	05-27-01	MASONRY & PRECAST NO. 3 MANHOLE
D-MH-3	04-15-00	PRECAST CIRCULAR LID DETAILS FOR NO. 3 MANHOLE
D-MH-3A	05-27-01	PRECAST CIRCULAR LID DETAILS FOR NO. 3 MANHOLE (108" AND 120" DIA.)
D-MH-4	05-27-01	NO. 3 MANHOLE CASTINGS AND STEPS
D-MH-5	09-11-02	5'2" X 5'2" SQUARE CONCRETE NO. 3 MANHOLE
D-MH-6	09-11-02	7' X 7' SQUARE CONCRETE NO. 3 MANHOLE
D-MH-7	09-11-02	9' X 9' SQUARE CONCRETE NO. 3 MANHOLE
D-SDS-1	07-29-02	32" X 32" SQUARE CONCRETE NO. 1 SPRING DRAIN BOX
D-SDS-2A	07-29-02	4' X 4' SQUARE CONCRETE NO. 2A SPRING DRAIN BOX
D-SDS-2B	07-29-02	4' X 4' SQUARE CONCRETE NO. 2B SPRING DRAIN BOX
D-SDS-3A	07-29-02	5'2" X 5'2" SQUARE CONCRETE NO. 3A SPRING DRAIN BOX
D-SLD-1	05-27-01	SLOTTED DRAINS
D-SLD-2	05-27-01	SLOTTED DRAINS
D-SLD-3	05-27-01	SLOTTED DRAINS
D-TD-1		TRANCH DRAIN

DRAINAGE-NATURAL STREAM DESIGN

D-NSD-1		BOULDER CLUSTERS
D-NSD-2		ROCK VANES
D-NSD-3		LOG DEFLECTORS
D-NSD-4		LOG DROPS AND STEP POOLS
D-NSD-5		BOULDER RIFFLES
D-NSD-6		CONSTRUCTED RIFFLES
D-NSD-7		COCONUT FIBER ROLLS AND LIVE SILTATON
D-NSD-8		LIVE FASCINES AND WILLOW CUTTINGS
D-NSD-9		BRUSH MATTRESS
D-NSD-10		LAGER WOODY DEBRIS
D-NSD-11		VEGETATED RIPRAP AND GABIONS
D-NSD-12		VEGETATED MSD WALLS
D-NSD-13		LONGITUDINAL STONE TOE AND ARTICULATED CONCRETE MAT

ROADWAY AND PAVEMENT APPURTENANCES

RP-CS-1	09-29-10	CONCRETE SHOULDER RUMBLE STRIP DETAIL (FOR 4-LANE DIVIDED HIGHWAY)
RP-CS-2	09-29-10	CONCRETE SHOULDER RUMBLE STRIP DETAIL (FOR 6-LANE OR WIDER DIVIDED HIGHWAY)
RP-D-15	07-15-08	DETAILS OF STANDARD CONCRETE DRIVEWAYS
RP-D-16	07-15-08	DETAILS OF LOWERED STANDARD CONCRETE DRIVEWAYS
RP-DHO-1	10-26-93	MEDIAN OPENINGS ON 4-LANE DIVIDED HIGHWAY
RP-H-3	04-13-11	HANDCAP RAMP AND TRUNCATED DOME SURFACE DETAIL
RP-H-4	04-13-11	PERPENDICULAR CURB RAMP
RP-H-5	04-13-11	PARALLEL CURB RAMP
RP-H-6	04-13-11	MEDIAN CROSSING
RP-H-7	04-13-11	PERPENDICULAR HANDICAP RAMP FOR 20' THRU 75' RADIUS
RP-H-8	04-13-11	PERPENDICULAR HANDICAP RAMP FOR 20' THRU 75' RADIUS
RP-H-9	04-13-11	PARALLEL HANDICAP RAMP FOR 20' THRU 75' RADIUS
RP-I-5	12-18-96	EXAMPLES OF STREET AND ALLEY INTERSECTIONS
RP-J-1	10-26-00	PORTLAND CEMENT CONCRETE PAVEMENT JOINT TYPES AND SPACING
RP-J-3	10-26-00	PORTLAND CEMENT CONCRETE PAVEMENT JOINT TYPES AND SPACING
RP-J-5	07-01-01	TYPICAL ACCELERATION AND DECELERATION LANE JOINT TYPES AND SPACING FOR CONCRETE RAMPS
RP-J-7	01-30-12	CONCRETE RAMP JOINT TYPES AND SPACING
RP-J-9	02-12-12	CONTRACTION AND CONSTRUCTION JOINTS FOR CONCRETE PAVEMENT
RP-J-11	07-29-96	3/4" AND 1-3/4" EXPANSION AND EDGE PAVEMENT JOINTS
RP-J-13	03-20-91	3/4" AND 1-3/4" ELASTOMERIC COMPRESSION JOINT SEALS
RP-J-15	01-19-02	LONGITUDINAL CONTRACTION AND CONSTRUCTION JOINTS
RP-J-17	02-12-12	DOWEL ASSEMBLY DEVICES
RP-J-18	02-12-12	DOWEL ASSEMBLY DEVICES
RP-J-19	02-12-12	DOWEL ASSEMBLY DEVICES
RP-J-23	01-24-12	CONCRETE PAVEMENT REPAIR DETAILS
RP-J-24	05-27-01	CONCRETE PAVEMENT SPALL AND RANDOM CRACK REPAIR DETAILS
RP-J-25	05-27-01	CONCRETE PAVEMENT JOINT REPAIR DETAILS
RP-MC-1	02-28-02	STANDARD 4" SLOPING (MOUNTABLE) CONCRETE CURBS AND CONCRETE CURBS AND GUTTERS
RP-MC-2	02-28-02	STANDARD 6" SLOPING (MOUNTABLE) CONCRETE CURBS AND CONCRETE CURBS AND GUTTERS
RP-NMC-10	07-29-03	STANDARD VERTICAL (NONMOUNTABLE) CONCRETE CURBS AND CONCRETE CURBS AND GUTTERS
RP-NMC-11	02-28-02	STANDARD VERTICAL (NONMOUNTABLE) CONCRETE CURBS AND CONCRETE CURBS AND GUTTERS
RP-PMR-1	05-27-01	DETAILS FOR PROPOSED PERMANENT MAINTENANCE RAMP
RP-R-1	05-27-01	RAMPS TO SIDE ROADS
RP-S-7	07-29-96	DETAILS FOR STANDARD CONCRETE SIDEWALKS
RP-S-8	01-19-93	DETAILS FOR STANDARD CONCRETE STEPS AND PIPE HANDRAILS

REV. 4-15-2003: REVISED RP-J-9, RP-J-15,RP-J-23,RP-MC-1, RP-MC-2,RP-NMC-10,RP-NMC-11, S-GR-11,S-GR-12,S-GR-17,S-GR-22, S-GR-26,S-GR-32,S-GR-35,S-GR-37 AND S-GR-40.Added S-MB-7 AND S-MB-8.

REV. 7-15-2004: REVISED RP-NMC-10 S-GR-11, S-GR-12, S-GR-13, S-GR-15, S-GR-19, S-GR-21, S-GR-27, S-GR-32, S-GR-34, S-GR-35, AND S-GR-36. ADDED S-GR-13A AND S-GR-19A.

REV. 7-29-2005: REVISED RP-J-23, S-GR-11, S-GR-15, S-GR-19A, S-GR-21, S-GR-28, S-GR-37,AND S-GR-38. ADDED S-GR-38A.

REV. 11-30-2006: REVISED RP-J-18, RP-J-19,S-GR-19 AND S-GR-19A. DELETED, S-GR-32,S-GR-33,S-GR-34, S-GR-35,S-GR-36,S-GR-37,S-GR-40, S-GR-41 AND S-GR-42. ADDED S-GR-19B,S-GR-19C,S-GR-43 AND S-GR-44

REV. 8-1-2007: ADDED RP-D-15, RP-D-16, RP-H-3, RP-H-4, RP-H-5, RP-H-6, RP-H-7, RP-H-8, RP-H-9 AND S-GR-23A. DELETED RP-D-14, AND RP-H-1

REV. 8-1-2008: REVISED RP-D-15, RP-D-16, S-FG-11, S-FG-20, S-GR-11, S-GR-18, S-GR-19A, S-GR-91B, S-GR-21, S-GR-22, S-GR-24, S-GR-26, AND S-GR-38. ADDED S-F-1, S-F-10C, AND S-F-10D STANDARD DRAWING.

REV. 3-15-2010: REVISED S-F-10, S-F-10A, S-GR-19,S-GR-19A, S-GR-21 AND S-GR-22.

REV. 2-29-12: REVISED RP-CS-1, RP-CS-2, RP-H-3, RP-H-4, RP-H-5, RP-H-6, RP-H-7, RP-H-8, RP-H-9, RP-J-7,RP-J-9, RP-J-17, RP-J-18, RP-J-19, RP-J-23, S-GR-14, ADDED D-NSD-1, THRU D-NSD-13.

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INDEX OF STANDARD ROADWAY DRAWINGS (CONTINUED)

SAFETY APPURTENANCES AND FENCE

DWG. NO	REV.	DESCRIPTION
S-F-1		HIGH VISIBILITY
S-F-10	06-01-09	RIGHT-OF-WAY STOCK FENCE
S-F-10A	06-01-09	RIGHT-OF-WAY STOCK FENCE WITH TIMBER POSTS
S-F-10B	05-14-10	RIGHT-OF-WAY CHAIN LINK FENCE
S-F-10C	05-14-10	RIGHT-OF-WAY FENCE AT BRIDGES AND BOX CULVERTS
S-F-10D		RIGHT-OF-WAY FENCE LOCATIONS AT INTERCHANGES
S-FG-11	05-14-10	STANDARD STOCK FENCE GATE
S-FG-20	01-24-08	EXAMPLES OF WATER GATES AND WATER CROSSINGS
S-GR-11	11-26-07	W-BEAM & THRIE BEAM BARRIER RAIL AND RUB RAIL ALTERNATES
S-GR-12	05-27-03	W-BEAM BARRIER POST DETAILS AND SPECIFICATIONS
S-GR-13	05-27-03	BARRIER RAIL MOUNTING, POST BLOCK-OUTS WITH VERTICAL ADJUSTMENT HOLES
S-GR-13A		BARRIER RAIL MOUNTING POST FOR PLASTIC BLOCK-OUTS WITH HORIZONTAL ADJUSTMENT HOLES
S-GR-14	06-06-11	W-BEAM BARRIER FASTENING HARDWARE AND BRIDGE APPROACH DELINEATORS
S-GR-15	06-30-05	W-BEAM BARRIER TERMINAL ELEMENT DETAILS
S-GR-16	05-27-01	GUARDRAIL BARRIER TREATMENT FOR PIERS IN MEDIAN
S-GR-17	09-11-02	BRIDGE END PROTECTION IN MEDIAN FOR DUAL BRIDGE
S-GR-18	05-15-08	GUARDRAIL TERMINAL (TYPE IN-LINE) AND SHOULDER LINE DETAIL
S-GR-19	06-01-09	GUARDRAIL TERMINAL ANCHORS, TYPE 12 AND TYPE 13
S-GR-19A	06-30-09	TYPE 12 BURIED-IN-BACKSLOPE GUARDRAIL TERMINAL
S-GR-19B	05-15-08	TYPE 12 ALTERNATE BURIED IN BACKSLOPE GUARDRAIL TERMINAL
S-GR-19C		GUARDRAIL TERMINAL ANCHOR, TYPE 13 ALTERNATE
S-GR-20	05-27-01	MEDIAN DIVIDER GUARDRAIL AND GUARDRAIL TERMINAL ANCHORS
S-GR-21	06-30-09	LENGTH OF NEED AND TERMINAL REQUIREMENTS IN FILLS
S-GR-22	03-10-10	GUARDRAIL ATTACHMENT TO CONCRETE DECKS OF BOX AND SLAB CULVERTS AND BRIDGES
S-GR-23	09-11-02	GUARDRAIL ATTACHMENT TO STRUCTURES AND PROTECTIVE GUARDRAIL AT BRIDGE ENDS DETAILS
S-GR-23A		GUARDRAIL ATTACHMENT TO BRIDGE END FOR LOW-VOLUME LOCAL ROADS (ADT<400)
S-GR-24	05-15-08	GUARDRAIL END TERMINALS AT BRIDGE ENDS
S-GR-26	03-15-08	SLOTTED GUARDRAIL TERMINAL ANCHOR (TYPE 21)
S-GR-27	05-27-03	GUARDRAIL TERMINAL ANCHOR (TYPE 21) ELEMENT ASSEMBLY DETAILS
S-GR-28	06-30-05	GUARDRAIL TERMINAL ANCHOR (TYPE 21) POST AND ASSEMBLY DETAILS
S-GR-38	06-30-09	DETAILS FOR CONSTRUCTION OF EARTH PAD FOR TYPE 38 GUARDRAIL END TERMINALS
S-GR-38A	06-30-05	DETAILS FOR CONSTRUCTION OF ALTERNATE EARTH PAD FOR TYPE 38 GUARDRAIL END TERMINALS
S-GR-39	05-27-01	DETAILS FOR CONSTRUCTION OF EARTH PAD FOR TYPE 21 GUARDRAIL END TERMINALS
S-GR-43		TANGENTIAL GUARDRAIL TERMINAL ANCHOR (TYPE 38) POST LAYOUT AND ERECTION DETAILS
S-GR-44		TANGENTIAL GUARDRAIL TERMINAL ANCHOR (TYPE 38) (2 TUBE) GUARDRAIL ELEMENT POST AND ASSEMBLY DETAILS
S-GR-45		LONG SPAN GUARDRAIL-ONE POST OMITTED
S-GR-46		CURVED GUARDRAIL
S-MB-1	06-06-11	STANDARD CONCRETE MEDIAN BARRIER
S-MB-2	05-27-01	STANDARD CONCRETE MEDIAN BARRIER (BRIDGE PIER PROCTECTION)
S-MB-3	10-26-99	CONCRETE GLARE SCREEN MEDIAN BARRIER
S-MB-3A	10-26-99	CONCRETE GLARE SCREEN MEDIAN BARRIER
S-MB-4	05-27-01	CONCRETE GLARE SCREEN MEDIAN BARRIER (BRIDGE PIER PROTECTION)
S-MB-7		STANDARD DETAILS FOR CONCRETE BARRIER WALL INCLUDING GUARDRAIL ATTACHMENT
S-MB-8		STANDARD DETAILS FOR CONCRETE BARRIER WALL AT BRIDGE BENTS INCLUDING GUARDRAIL ATTACHMENT
S-RP-2	01-19-99	CONCRETE RIGHT-OF-WAY MARKERS
S-SSMB-1		32" SINGLE SLOPE CONCRETE BARRIER WALL
S-SSMB-2		51" SINGLE SLOPE CONCRETE BARRIER WALL
S-SSMB-3	07-30-10	51" HALF SIZE SINGLE SLOPE CONCRETE BARRIER WALL
S-SSMB-4	07-30-10	FLARED SINGLE SLOPE MEDIAN BARRIER WALL (VERTICAL BACK)
S-SSMB-5		SINGLE SLOPE MEDIAN BARRIER WALL CATCH BASIN DETAIL
S-SSMB-6		GUARDRAIL ATTACHMENT TO SINGLE SLOPE CONCRETE BARRIER WALL
S-SSMB-7		FOOTING DETAILS FOR OVERHEAD SIGN STRUCTURE 32" MEDIAN BARRIER WALL
S-SSMB-8		FOOTING DETAILS FOR OVERHEAD SIGN STRUCTURE 51" MEDIAN BARRIER WALL

TRAFFIC CONTROL APPURTENANCES

DWG. NO	REV.	DESCRIPTION
T-FAB-1	05-27-97	FLASHING YELLOW ARROW BOARD
T-FO-1		FIBER OPTIC AERIAL ENTRANCE DETAILS
T-FO-2		FIBER OPTIC UNDERGROUND ENTRANCE DETAILS
T-FO-3		FIBER OPTIC AERIAL CONNECTION DETAILS
T-FO-4		FIBER OPTIC PULL BOX, CABINET & POLE DETAILS
T-L-1	02-15-07	LIGHTING DETAILS - FOUNDATIONS
T-L-1SA	07-29-04	LIGHTING DETAILS FOR SINGLE ARM SUPPORTS
T-L-1TM		LIGHTING DETAILS TENON MOUNTED OFFSET LIGHTING SUPPORTS
T-L-2	09-11-03	FOUNDATION DETAIL FOR LUMINAIRE MOUNTED ON CONCRETE MEDIAN BARRIER
T-L-3	04-15-96	LIGHTING DETAILS - PULL BOXES
T-L-4	05-25-11	LIGHTING DETAILS CONDUIT, CABLE INSTALLATION
T-M-1	11-01-11	DETAILS OF PAVEMENT MARKINGS FOR CONVENTIONAL ROADS AND MARKING ABBREVIATIONS
T-M-2	01-12-12	DETAILS OF PAVEMENT MARKINGS FOR CONVENTIONAL ROADS
T-M-3	09-19-91	MARKING STANDARDS FOR TRAFFIC ISLANDS, MEDIANS & PAVED SHOULDERS ON CONVENTIONAL ROADS
T-M-4	11-01-11	STANDARD INTERSECTION PAVEMENT MARKINGS
T-M-5	01-12-12	MARKING DETAILS FOR EXPRESSWAYS & FREEWAYS
T-M-6	01-12-12	MARKING DETAIL FOR EXPRESSWAY & FREEWAY INTERCHANGES
T-M-7	01-12-12	GORE MARKING DETAILS FOR EXPRESSWAY & FREEWAY INTERCHANGES
T-M-8	01-12-12	MARKING DETAILS FOR EXPRESSWAYS & FREEWAYS
T-M-9	11-01-11	MARKING DETAILS FOR RAMP INTERSECTIONS
T-M-10	11-01-11	SIGNING AND PAVEMENT MARKINGS FOR SHARED-USE PATHS
T-M-11	11-01-11	SIGNING AND PAVEMENT MARKINGS FOR BICYCLE 11-01-11LANES AND ROUTES ON RURAL ROADS
T-M-12	11-01-11	SIGNING AND PAVEMENT MARKINGS FOR BICYCLE LANES ON URBAN ROADWAYS
T-M-13		SIGNING AND PAVEMENT MARKINGS FOR BICYCLE LANES
T-M-14	11-01-11	SIGNING AND PAVEMENT MARKINGS FOR BICYCLE LANES AT INTERSECTIONS
T-M-15		ASPHALT SHOULDER RUMBLE STRIP INSTALLATION DETAILS FOR INTERSTATE AND ACCESS CONTROLLED ROUTES
T-M-15A	11-01-11	ASPHALT SHOULDER RUMBLE STRIP INSTALLATION DETAILS FOR NON-ACCESS CONTROLLED ROUTES
T-M-16	11-01-11	ASPHALT SHOULDER RUMBLE STRIPE INSTALLATION DETAILS FOR NON-ACCESS CONTROLLED ROUTES
T-PBR-1	06-30-09	INTERCONNECTED PORTABLE BARRIER RAIL
T-PBR-2	11-01-11	DETAIL FOR VERTICAL PANELS AND FLEXIBLE DELINEATORS
T-RR-1	11-01-11	TYPICAL PAVEMENT MARKING AT RAILROAD-HIGHWAY GRADE CROSSINGS AND RAILROAD ADVANCE WARNING SIGN
T-RR-2	11-01-11	DRAWING FOR RAILROAD AND HIGHWAY CROSSING SIGNAL WITH GATE
T-RR-3	11-01-11	DRAWING FOR RAILROAD-HIGHWAY CROSSING SIGNAL
T-RR-4	11-01-11	DRAWING FOR TYPICAL CURB & GUTTER PLAN FOR RAILROAD-HIGHWAY CROSSING WITH OR WITHOUT GATES
T-RR-5	11-01-11	DRAWING FOR RAILROAD-HIGHWAY CROSSING SIGNAL TYPICAL CANTILEVER SIGN
T-RR-6		TYPICAL SIGNING AND MARKING AT PASSIVE RAILROAD HIGHWAY GRADE CROSSINGS
T-S-6	02-12-91	MOUNTING DETAILS - BOLTED EXTRUDED PANELS

REV. 7-1-2001:T-L-2,T-M-4, T-M-9,T-PBR-1,T-S-11,T-S-12, T-S-13,T-S-14,T-S-16,T-S-18, T-S-20,T-WZ-10,T-WZ-11,T-WZ-12, T-WZ-13,T-WZ-14,T-WZ-16,T-WZ-17, T-WZ-18,T-WZ-19,T-WZ-20,T-WZ-30, T-WZ-31,T-WZ-32,T-WZ-34,T-WZ-35, T-WZ-36,T-WZ-40,T-WZ-42,T-WZ-50, T-WZ-51,T-WZ-52,T-WZ-53,T-WZ-54, EC-STR-1,EC-STR-3,EC-STR-5, EC-STR-6,EC-STR-7,EC-STR-9, EC-STR-11,EC-STR-12,EC-STR-13, EC-STR-15,EC-STR-17,EC-STR-19, EC-STR-21,EC-STR-25,EC-STR-27, EC-STR-29,EC-STR-31,EC-STR-36, AND EL-W-2. ADDED EC-STR-2.

REV. 4-15-2003: REVISED T-M-4, EC-STR-1,EC-STR-2,EC-STR-5, EC-STR-6,EC-STR-7,EC-STR-11, EC-STR-12,EC-STR-13,EC-STR-19, EC-STR-25,EC-STR-31,EC-STR-34 AND EC-STR-36. ADDED EC-STR-3D, EC-STR-3E,EC-STR-4 AND EC-STR-4A. DELETED EC-STR-3 AND EC-STR-9.

REV. 7-15-2004: REVISED T-M-1,T-M-2 T-M-5,T-PBR-1,T-S-9,T-S-10,T-S-12, T-WZ-11,T-WZ-12,T-WZ-13,T-WZ-14, T-WZ-15,T-WZ-16,T-WZ-17,T-WZ-18, T-WZ-19,T-WZ-30,T-WZ-31,T-WZ-35, T-WZ-40,T-WZ-41,T-WZ-42,T-WZ-50, T-WZ-51,T-WZ-52,T-WZ-53,T-WZ-54. ADDED NEWLY RESIGNED T-L-2. MOVED EROSION CONTROL AND LANDSCAPING SECTION TO NEW SHEET 5.

REV. 7-29-2005: REVISED T-M-2 T-M-4, T-M-5, T-M-9, T-RR-1, AND T-S-16. ADDED T-FO-1, T-FO-2, T-FO-3, T-FO-4, T-L-1, T-L-1SA, T-L-1TM, T-L-4, T-SG-1, T-SG-2, T-SG-3, T-SG-3A, T-SG-4, T-SG-5, T-SG-7, T-SG-7A, T-SG-8, T-SG-9, T-SG-9A, T-SG-10, T-SG-11, T-SG-12, T-SG-13. AND T-WZ-21. DELETED T-SG-6.

REV. 11-30-2006: REVISED T-PBR-2, T-WZ-11,T-WZ-12,T-WZ-13,T-WZ-14, T-WZ-15,T-WZ-16,T-WZ-17,T-WZ-18, T-WZ-19,T-WZ-21,T-WZ-30,T-WZ-31, T-WZ-32,T-WZ-34,T-WZ-36,T-WZ-40, T-WZ-41 AND T-WZ-42. DELETED T-WZ-17.

REV. 8-1-2007: REVISED T-L-1, T-M-4, T-RR-1, T-S-16, T-SG-10, ADDED T-M-10, T-M-11, T-M-12, T-M-13, T-M-14, T-RR-6, AND T-S-16A.

REV. 8-1-2008: ADDED S-SSMB-1 AND S-SSMB-2. REVISED STANDARD DRAWING T-M-7, T-SG-9 AND T-WZ-32.

REV. 4-09-2009: REVISED STANDARD DRAWING T-WZ-11, T-WZ-12, T-WZ-13, T-WZ-14, T-WZ-15, T-WZ-16, T-WZ-18 AND T-WZ-19.

REV. 3-15-2010:MOVED TO SHEET NO. 5 T-WZ-14, T-WZ-15, T-WZ-16, T-WZ-18 AND T-WZ-19, REVISED S-GR-38, T-M-4, T-M-6, T-M-11, T-M-12, T-PBR-1, T-SG-10 AND T-SG-13. ADDED T-M-15, T-M-15A , T-M-16, S-GR-45, S-GR-46, S-SSMB-3, S-SSMB-4 AND S-SSMB-5.

REV. 2-29-12: REVISED S-MB-1, S-SSMB-3, S-SSMB-4, T-L-4, T-M-1, T-M-2, T-M-4, T-M-5, T-M-6, T-M-7, T-M-8, T-M-9, T-M-10, T-M-11, T-M-12, T-M-14, T-M-15A, T-M-16, T-PBR-2, T-RR-1, T-RR-2, T-RR-3, T-RR-4, T-RR-5, T-S-9, T-S-10, T-S-11, T-S-16, T-S-16A, T-S-20, T-SG-1, ADDED S-SSMB-6, S-SSMB-7, S-SSMB-8, T-S-21.

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INDEX OF STANDARD DRAWINGS

INDEX OF STANDARD ROADWAY DRAWINGS (CONTINUED)

TRAFFIC CONTROL APPURTENANCES(CONT.)

DWG. NO.	REV.	DESCRIPTION
T-S-7	02-12-91	HIGHWAY SHIELDS USED ON INTERSTATE AND U.S. NUMBERED ROUTES
T-S-8	07-15-91	HIGHWAY SHIELDS USED ON STATE NUMBERED ROUTES AND ARROWS
T-S-9	11-01-11	LAYOUT - GROUND MOUNTED SIGNS
T-S-10	02-21-12	MOUNTING DETAILS - FLAT SHEET SIGNS, ALUMINUM-STEEL DESIGN
T-S-11	06-06-11	DELINEATOR AND MILEPOST DETAILS
T-S-12	05-27-03	STEEL GROUND MOUNTED SIGNS, BREAK-AWAY TYPE POST FOOTING DETAILS, SQUARE TUBES
T-S-13	05-27-01	STEEL GROUND MOUNTED SIGNS, BREAK-AWAY TYPE POST FOOTING DETAILS, I-BEAMS
T-S-14	05-27-01	STEEL GROUND MOUNTED SIGNS, BREAK-AWAY TYPE POST FOOTING DETAILS, WF-BEAMS
T-S-15	12-07-90	CONDUIT & GROUND DETAILS FOR OVERHEAD & CANTILEVER SIGN STRUCTURES
T-S-16	11-01-11	GROUND MOUNTED ROADSIDE SIGN AND DETAILS
T-S-16A	11-01-11	GROUND MOUNTED ROADSIDE SIGN PLACEMENT DETAILS
T-S-17	10-26-96	GROUND MOUNTED SIGN USING PERFORATED/KNOCKOUT SQUARE TUBE
T-S-18	05-27-01	END OF ROADWAY AND DEAD END SIGNS, METAL BARRICADES (TYPE III) & WORK ZONE SPEED SIGNS
T-S-19	07-29-91	STANDARD MEMBERS BENDAWAY SIGN SUPPORTS STEEL DESIGN
T-S-20	11-01-11	SIGN DETAILS
T-S-21		SIGNS MOUNTED ON CONCRETE MEDIAN BARRIER
T-SG-1	11-01-11	WOOD POLE, DETAILS FOR SPAN MOUNTED SIGNALS
T-SG-2	07-29-04	LOOP LEAD-INS CONDUIT AND PULL BOXES
T-SG-3	11-11-04	NOTES AND DETAILS OF INDUCTIVE LOOPS
T-SG-3A		ALTERNATE DETECTION DETAILS
T-SG-4		SPAN WIRE AND MESSENGER CABLE DETAILS
T-SG-5	07-29-04	CONTROLLER CABINET DETAILS
T-SG-7	11-01-11	SIGNAL HEAD ASSEMBLIES AND PEDESTRIAN PUSH BUTTON SIGNS
T-SG-7A	11-01-11	TYPICAL SIGNAL HEAD PLACEMENT
T-SG-8	11-01-11	STRAIN POLE DETAILS FOR SPAN MOUNTED SIGNALS
T-SG-9	11-16-07	DETAILS OF CANTILEVER SIGNAL SUPPORT
T-SG-9A		MISCELLANEOUS SIGNAL DETAILS
T-SG-10	01-05-10	MAST ARM POLE AND STRAIN POLES FOUNDATION DETAILS
T-SG-11	07-29-04	MAINTENANCE OF EXISTING SIGNALS DURING HIGHWAY CONSTRUCTION
T-SG-12	11-01-11	TYPICAL WIRING FOR SIGNAL HEADS AND DETECTION LOOPS
T-SG-13	06-01-09	FLASHING BEACON DETAIL
T-WZ-10	01-19-01	ADVANCE ROAD WORK SIGNING ON HIGHWAYS AND FREEWAYS
T-WZ-11	03-13-09	ONE LANE CLOSURE DETAIL ON DIVIDED HIGHWAYS
T-WZ-12	03-13-09	ONE LANE CLOSURE DETAIL FOR BRIDGES ON DIVIDED HIGHWAYS
T-WZ-13	03-13-09	TWO-OUTSIDE LANE CLOSURE ON FREEWAY OR EXPRESSWAY
T-WZ-14	03-13-09	TWO-OUTSIDE LANE CLOSURE ON INTERSTATES AND EXPRESSWAYS (PORTABLE BARRIER RAIL)
T-WZ-15	03-13-09	INTERIOR LANE CLOSURE ON FREEWAYS OR EXPRESSWAYS
T-WZ-16	03-13-09	LANE SHIFT ON DIVIDED HIGHWAYS AND FREEWAYS
T-WZ-18	03-13-09	SHOULDER CLOSURE DETAIL FOR FREEWAYS AND DIVIDED HIGHWAYS
T-WZ-19	03-13-09	MEDIAN CROSS-OVER DETAIL ON DIVIDED HIGHWAYS
T-WZ-20	12-18-99	GEOMETRIC MEDIAN CROSS-OVER DETAIL ON DIVIDED HIGHWAYS
T-WZ-21	03-15-11	LANE CLOSURE WITH LEFT HAND MERGE AND LANE SHIFT
T-WZ-30	09-01-05	TRAFFIC CONTROL 2-LANE, 2-WAY DIVERSION (40 MPH OR LESS)
T-WZ-31	09-01-05	TRAFFIC CONTROL 2-LANE, 2-WAY DIVERSION (GREATER THAN 40 MPH)
T-WZ-32	03-03-06	TRAFFIC CONTROL PLAN SIGNAL LAYOUT FOR TRAFFIC SIGNAL AT TWO LANE BRIDGE RECONSTRUCTION SITE
T-WZ-33	05-27-98	TRAFFIC CONTROL PLAN FOR CLOSE INTERSECTION CONDITIONS USING TRAFFIC SIGNAL AT TWO LANE BRIDGE RECONSTRUCTION SITE
T-WZ-34	09-01-05	TRAFFIC CONTROL PLAN GENERAL NOTES FOR TRAFFIC SIGNAL AT TWO LANE BRIDGE RECONSTRUCTION SITE
T-WZ-35	07-29-03	TRAFFIC CONTROL PLAN PAY ITEM AND SIGN DETAILS FOR TRAFFIC SIGNAL AT TWO LANE BRIDGE RECONSTRUCTION SITE
T-WZ-36	09-01-05	LANE CLOSURE ON LOW-VOLUME 2-LANE HIGHWAY
T-WZ-40	09-01-05	RIGHT LANE CLOSURES AT NEAR SIDE OF INTERSECTIONS
T-WZ-41	09-01-05	LEFT LANE CLOSURES AT NEAR SIDE OF INTERSECTIONS
T-WZ-42	09-01-05	CENTER LANE CLOSURES AT NEAR SIDE OF INTERSECTIONS
T-WZ-50	07-29-03	TRAFFIC CONTROL FOR SIGNALS ONLY PROJECTS ON 2 OR 3 LANE MAJOR ROUTES
T-WZ-51	07-29-03	TRAFFIC CONTROL FOR SIGNALS ONLY PROJECTS ON 4 OR 5 LANE MAJOR ROUTES
T-WZ-52	07-29-03	TRAFFIC CONTROL FOR SIGNALS ONLY PROJECTS ON 4 OR 5 LANE MAJOR AND MINOR ROUTES
T-WZ-53	07-29-03	TRAFFIC CONTROL FOR SIGNALS ONLY PROJECTS ON 4 OR MORE LANE DIVIDED MAJOR ROUTES
T-WZ-54	07-29-03	TRAFFIC CONTROL FOR SIGNALS ONLY PROJECTS ON 4 OR MORE LANE DIVIDED MAJOR ROUTES AND 4 OR MORE LANE MINOR ROUTES
T-WZ-55		SIDEWALK TRAFFIC CONTROL

EROSION PREVENTION AND SEDIMENT CONTROL

DWG. NO.	REV.	DESCRIPTION
EC-STR-1	04-01-08	DEWATERING STRUCTURE
EC-STR-2	05-14-10	SEDIMENT FILTER BAG
EC-STR-3B	04-01-08	SILT FENCE
EC-STR-3C	04-01-08	SILT FENCE WITH WIRE BACKING
EC-STR-3D	04-01-08	ENHANCED SILT FENCE
EC-STR-3E	04-01-08	SILT FENCE FABRIC JOINING DETAILS
EC-STR-4	01-01-10	ENHANCED SILT FENCE CHECK (TRAPEZOIDAL DITCH)
EC-STR-4A	01-01-10	ENHANCED SILT FENCE CHECK (V-DITCH)
EC-STR-4B		ENHANCED SILT FENCE CHECK DETAILS
EC-STR-6	04-01-08	ROCK CHECK DAM
EC-STR-6A		ENHANCED ROCK CHECK DAM
EC-STR-7	04-01-08	SEDIMENT TRAP WITH CHECK DAM
EC-STR-8		FILTER SOCK
EC-STR-11	04-01-08	CULVERT PROCTECTION TYPE 1
EC-STR-11A		CULVERT PROCTECTION TYPE 2
EC-STR-12	04-01-08	ROCK SEDIMENT DAM
EC-STR-13	04-01-08	ROCK AND EARTH SEDIMENT EMBANKMENT
EC-STR-15	04-01-08	SEDIMENT BASIN
EC-STR-16	04-01-08	SEDIMENT BASINS RISER AND COLLAR APPURTENANCES
EC-STR-17	04-01-08	SEDIMENT BASIN EMBANKMENT DETAILS
EC-STR-19	04-01-08	CATCH BASIN PROTECTION
EC-STR-21	04-01-08	PERMANENT RIPRAP BASIN ENERGY DISSIPATOR
EC-STR-25	04-01-08	TEMPORARY CULVERT CROSSING, CONSTRUCTION EXIT, CONSTRUCTION FORD
EC-STR-27	04-01-08	TEMPORARY SLOPE DRAIN AND BERM
EC-STR-29	04-01-08	PERMANENT SLOPE DRAIN PIPE
EC-STR-30		INSTREAM DIVERSION (WITHOUT TRAFFIC)
EC-STR-30A		INSTREAM DIVERSION (WITH TRAFFIC)
EC-STR-31	04-01-08	TEMPORARY DIVERSION CHANNEL
EC-STR-31A	04-01-08	TEMPORARY DIVERSION CHANNEL DESIGN
EC-STR-32	04-01-08	TEMPORARY DIVERSON CULVERTS
EC-STR-33	04-01-08	SUSPENDED PIPE DIVERSON (DOWNSTREAM)
EC-STR-33A	04-01-08	SUSPENDED PIPE DIVERSON (UPSTREAM)
EC-STR-34	04-01-08	EROSION CONTROL BLANKET FOR SLOPE INSTALLATION
EC-STR-35	04-01-08	FILTER BERMS
EC-STR-36	04-01-08	TURF REINFORCEMENT MAT FOR CHANNEL INSTALLATION
EC-STR-37	04-01-08	SEDIMENT TUBE
EC-STR-38	04-01-08	FLOATING TURBIDITY CURTAIN
EC-STR-39	06-24-10	CURB INLET PROTECTION TYPE 1 & 2
EC-STR-39A	06-24-10	CURB INLET PROTECTION TYPE 3 & 4
EC-STE-40		CATCH BASIN FILTER ASSEMBLY FOR CIRCULAR STRUCTURES
EC-STR-41		CATCH BASIN FILTER ASSEMBLY (TYPE 1)
EC-STR-41A		CATCH BASIN FILTER ASSEMBLY (TYPE 1) SLIPCOVER DETAILS
EC-STR-42		CATCH BASIN FILTER ASSEMBLY (TYPE 2)
EC-STR-42A		CATCH BASIN FILTER ASSEMBLY (TYPE 2) SLIPCOVER DETAILS

REV. 7-15-2004: MOVED EROSION CONTROL AND LANDSCAPING SECTION FROM SHEET 4.REVISED EC-STR-1,EC-STR-2,EC-STR-3D, EC-STR-4,EC-STR-4A,EC-STR-5, EC-STR-19, AND EC-STR-25. ADDED EC-STR-3A, EC-STR-3B, EC-STR-3C, EC-STR-40,EC-STR-41,EC-STR-41A, EC-STR-42,EC-STR-42A,EC-STR-43, EC-STR-43A,EC-STR-44, EC-STR-44A, EC-STR-45,EC-STR-45A,EC-STR-46, EC-STR-46A,EC-STR-47,EC-STR-47A, EC-STR-48,EC-STR-48A, EC-STR-49, EC-STR-49A.DELETE EC-STR-3.

REV. 7-29-2005: REVISED EC-STR-3A,EC-STR-3B,EC-STR-3C, EC-STR-3D,EC-STR-5,EC-STR-7, AND EC-STR-34. ADDED EC-STR-50, EC-STR-50A,EC-STR-51,EC-STR-51A, EC-STR-55,EC-STR-56,EC-STR-57, EC-STR-58,EC-STR-59 AND EC-STR-60.

REV. 11-30-2006: REVISED EC-STR-2,EC-STR-3A,EC-STR-3B, EC-STR-3C,EC-STR-3D,EC-STR-3E, EC-STR-4,EC-STR-4A,EC-STR-5, EC-STR-6,EC-STR-7,EC-STR-11, EC-STR-12,EC-STR-13,EC-STR-15, EC-STR-16,EC-STR-17,EC-STR-19, EC-STR-25,EC-STR-27,EC-STR-29, EC-STR-31,EC-STR-55,EC-STR-56, EC-STR-59, AND EC-STR-60. ADDED EC-STR-31A,EC-STR-32,EC-STR-33, EC-STR-33A,EC-STR-35,EC-STR-37, EC-STR-38,EC-STR-39 AND EC-STR-39A.

REV. 8-1-2008: REVISED EC-STR-1, EC-STR-2,EC-STR-3B, EC-STR-3C,EC-STR-3D,EC-STR-3E, EC-STR-4,EC-STR-4A, EC-STR-6,EC-STR-7,EC-STR-11, EC-STR-12,EC-STR-13,EC-STR-15, EC-STR-16,EC-STR-17,EC-STR-19, EC-STR 21,EC-STR-25,EC-STR-27, EC-STR-29,EC-STR-31,EC-STR31A, EC-STR-32,EC-STR-33, EC-STR-33A, EC-STR-34,EC-STR-35,EC-STR-36, EC-STR-37,EC-STR-38,EC-STR-39, EC-STR-39A,EC-STR-55,EC-STR-56, EC-STR-57,EC-STR-58 AND EC-STR-59 ADDED EC-STR-6A,EC-STR-8, EC-STR-11A, AND EC-STR-61. DELETED EC-STR-3A, EC-STR-5, AND EC-STR-60.

REV. 3-15-2010: REVISED EC-STR-4, EC-STR-4A. ADDED EC-STR-4B, EC-STR-30 AND EC-STR-30A

REV. 2-29-12: REVISED T-SG-7, T-SG-7A, T-SG-8, T-SG-12, T-WZ-21, EC-STR-2. ADDED T-WZ-55.

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INDEX OF STANDARD DRAWINGS

REV. 2-29-12: ADDED INDEX SHEET NO. 6, VOIDED EL-P-10 AND EL-P-11.

INDEX OF STANDARD ROADWAY DRAWINGS (CONTINUED)

EROSION PREVENTION AND SEDIMENT CONTROL(CONT.)

DWG. NO.	REV.	DESCRIPTION
EC-STR-43		CATCH BASIN FILTER ASSEMBLY (TYPE 3)
EC-STR-43A		CATCH BASIN FILTER ASSEMBLY (TYPE 3) SLIPCOVER DETAILS
EC-STR-44		CATCH BASIN FILTER ASSEMBLY (TYPE 4)
EC-STR-44A		CATCH BASIN FILTER ASSEMBLY (TYPE 4) SLIPCOVER DETAILS
EC-STR-45		CATCH BASIN FILTER ASSEMBLY (TYPE 5)
EC-STR-45A		CATCH BASIN FILTER ASSEMBLY (TYPE 5) SLIPCOVER DETAILS
EC-STR-46		CATCH BASIN FILTER ASSEMBLY (TYPE 6)
EC-STR-46A		CATCH BASIN FILTER ASSEMBLY (TYPE 6) SLIPCOVER DETAILS
EC-STR-47		CATCH BASIN FILTER ASSEMBLY (TYPE 7)
EC-STR-47A		CATCH BASIN FILTER ASSEMBLY (TYPE 7) SLIPCOVER DETAILS
EC-STR-48		CATCH BASIN FILTER ASSEMBLY (TYPE 8)
EC-STR-48A		CATCH BASIN FILTER ASSEMBLY (TYPE 8) SLIPCOVER DETAILS
EC-STR-49		CATCH BASIN FILTER ASSEMBLY (TYPE 9)
EC-STR-49A		CATCH BASIN FILTER ASSEMBLY (TYPE 9) SLIPCOVER DETAILS
EC-STR-50		CATCH BASIN FILTER ASSEMBLY (TYPE 10)
EC-STR-50A		CATCH BASIN FILTER ASSEMBLY (TYPE 10) SLIPCOVER DETAILS
EC-STR-51		CATCH BASIN FILTER ASSEMBLY (TYPE 11)
EC-STR-51A		CATCH BASIN FILTER ASSEMBLY (TYPE 11) SLIPCOVER DETAILS
EC-STR-55	04-01-08	GABION CHECK DAM
EC-STR-56	04-01-08	GABION CHECK DAM DESIGN TABLES
EC-STR-57	04-01-08	GABION ASSEMBLY DETAILS
EC-STR-58	04-01-08	GABION ASSEMBLY DETAILS
EC-STR-59	04-01-08	GABION CHECK DAM GENERAL NOTES AND COMPONENT PROPERTIES
EC-STR-61		LEVEL SPREADERS
EL-W-1	05-27-96	DETAILS OF TREE WALLS
EL-W-2	05-27-01	STANDARD GRAVITY-TYPE RETAINING WALLS

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

INDEX OF STANDARD DRAWINGS

SHEET 6 OF 6

09-MAR-2012 13:37
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STANDARD LEGEND

BOULDER CLUSTER (SHOW CONFIGURATION)

ROCK VANE

CROSS VANE

W-WEIR

J-HOOK

LOG VANE

LOG DEFLECTOR

S
STRAIGHT WEIR
LOG DROP

D
DIAGONAL WEIR
LOG DROP

"VEE" WEIR LOG DROP
(SHOW ORIENTATION)

"K" WEIR
LOG DROP

BOULDER RIFFLE

LOG RIFFLE

ROCK RIFFLE

ROLLROLL**ROLL**
COCONUT FIBER ROLLS

LS LS LS
LIVE SILTATION

LIVE FASCINE

BRUSH MATTRESS

LR
LOG REVETMENT

RACK STRUCTURE

ROOT WAD

FELLED TREE

VEGETATED GABIONS

VEGETATED RIPRAP

VMSEW VMSEW VMSEW
VEGETATED MSE WALLS

TOE TOE TOE
LONGITUDINAL STONE TOE

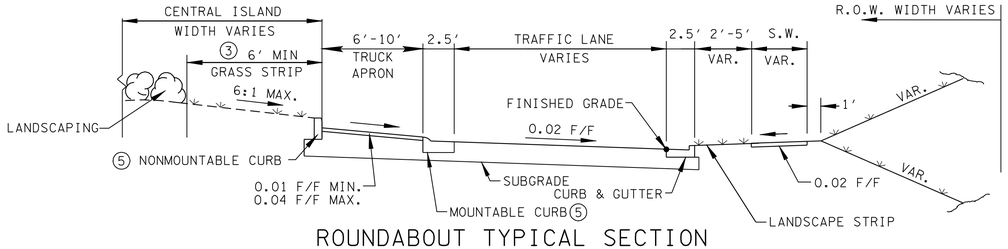
ARTICULATED CONCRETE MAT

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

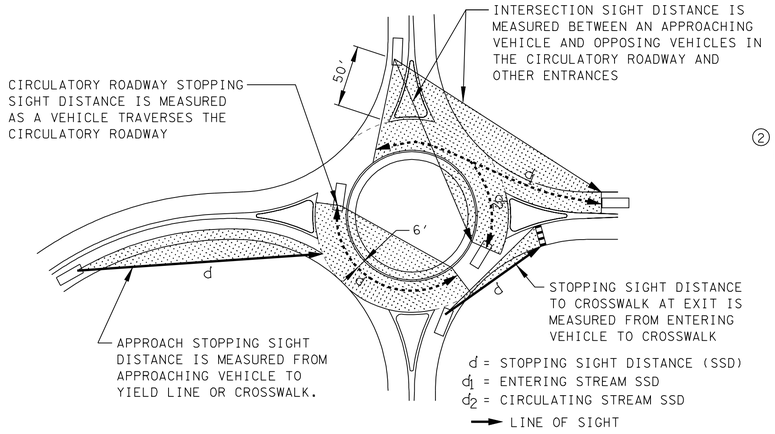
STANDARD LEGEND
FOR
NATURAL STREAM
DESIGN

9-1-11 | RD-L-8

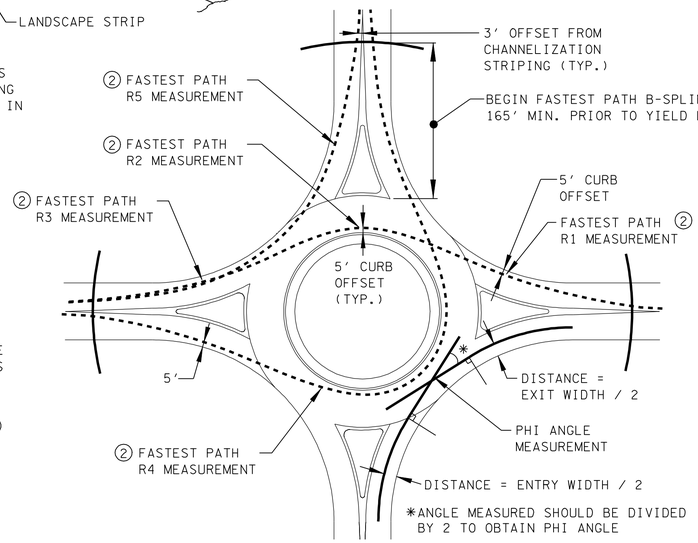
REV. 2-1-12: ADDED OPTIONAL PEDESTRIAN RAIL.



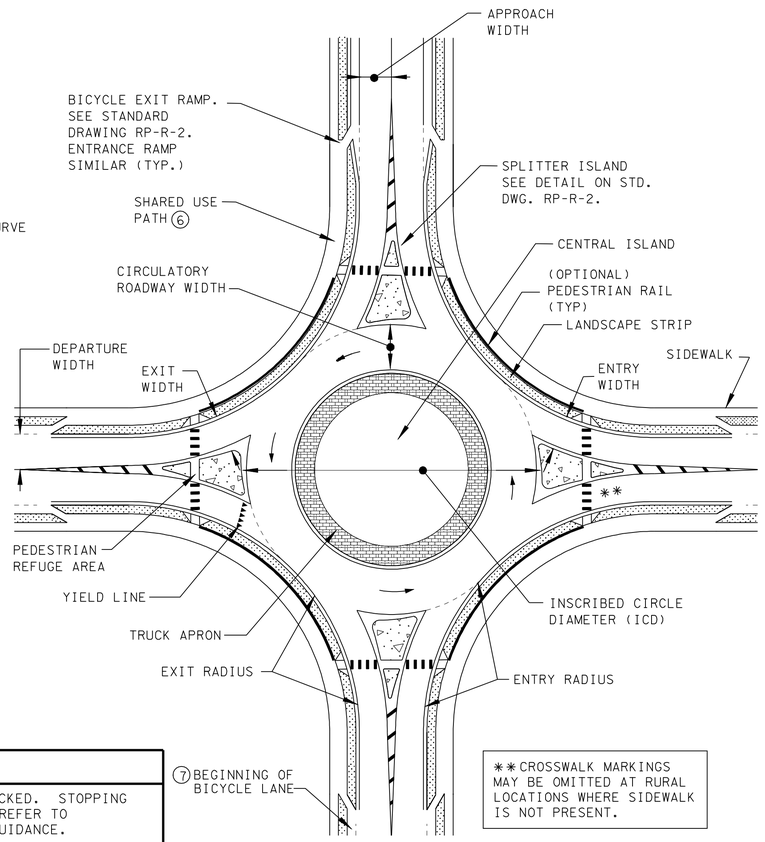
ROUNDABOUT TYPICAL SECTION



ROUNDABOUT SIGHT DISTANCE ①

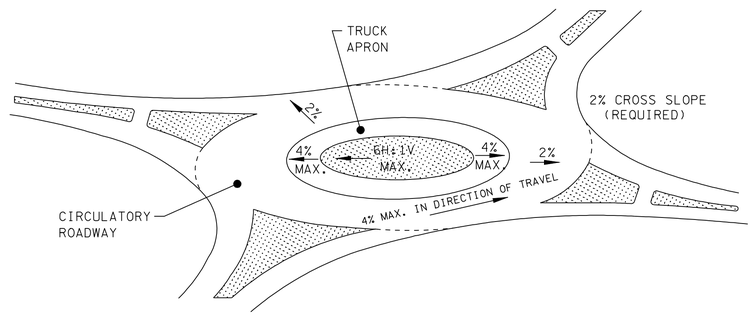


ROUNDABOUT DESIGN CHECKS



TYPICAL PLAN VIEW OF ROUNDABOUT

SEE GENERAL NOTE K



CIRCULATORY ROADWAY SLOPES

NOTE: TRUCK APRON CROSS SLOPE SHOULD MATCH CIRCULATORY ROADWAY CROSS SLOPE OR MAY BE INCREASED UP TO 4 PERCENT MAX.

DESIGN STANDARDS FOR SINGLE LANE ROUNDABOUTS

	URBAN	RURAL	NOTES
DESIGN SPEED	20 MPH	25 MPH	SEE FHWA EXHIBIT 6-4
INSCRIBED CIRCLE DIAMETER ⑧	105' - 150'	130' - 150'	MEASURED FROM CURB FACE TO CURB FACE
CIRCULATORY ROADWAY WIDTH	1.0 - 1.2 TIMES THE MAXIMUM ENTRY WIDTH	1.0 - 1.2 TIMES THE MAXIMUM ENTRY WIDTH	———
ENTRY WIDTH	18' - 22'	18' - 22'	MEASURED FROM CURB FACE TO CURB FACE
ENTRY RADIUS	65' - 90'	65' - 90'	———
EXIT WIDTH	SAME AS ENTRY WIDTH	SAME AS ENTRY WIDTH	SAME AS ENTRY WIDTH
EXIT RADIUS	200' - 1000'	200' - 1000'	———
APPROACH/DEPARTURE WIDTH	WIDTH OF APPROACHING LANE	WIDTH OF APPROACHING LANE	DOES NOT INCLUDE BIKE LANE OR GUTTER
DAILY SERVICE VOLUME (WITH CAPACITY ANALYSIS) APPROXIMATELY 25,000 VEH/DAY			

DESIGN NOTES

1. FASTEST PATH CHECKS SHOULD BE COMPLETED PRIOR TO INTERSECTION SIGHT DISTANCE BEING CHECKED. STOPPING SIGHT DISTANCE AND INTERSECTION SIGHT DISTANCE SHOULD BE CHECKED FOR ALL APPROACHES. REFER TO "ROUNDABOUTS; AN INFORMATIONAL GUIDE," FHWA, 2000 AND RD01-SD-1 THRU 7 FOR ADDITIONAL GUIDANCE.
2. CONSTRUCT A B-SPLINE (SHOWN AS DASHED LINE) FOR THE THROUGH, LEFT TURN, AND RIGHT TURN MOVEMENTS. B-SPLINE SHOULD TOUCH THE 5' CURB OFFSETS AT THE POINTS INDICATED FOR THE R1, R2, R3, R4 AND R5 MEASUREMENTS. MEASURE THE RADIUS OF THE B-SPLINE AT EACH POINT. MEASUREMENT SHOULD BE BETWEEN 65' AND 85' LONG. FOR THE R1 MEASUREMENT, THE RADIUS SHOULD NOT BE MEASURED THROUGH THE YIELD LINE.
3. PROVIDE 6' MINIMUM UNOBSTRUCTED HORIZONTAL CLEARANCE FROM THE NON-MOUTABLE CURB TO THE CENTRAL ISLAND LANDSCAPING TO ALLOW FOR CIRCULATORY ROADWAY SIGHT DISTANCE, ACTUAL DISTANCE MAY BE GREATER AND SHOULD BE DETERMINED AFTER SIGHT DISTANCE CHECKS ARE COMPLETE, BUT SHALL NOT BE LESS THAN 6 FEET.
4. SPLITTER ISLAND SHOULD BE A RAISED MEDIAN WITH CONCRETE HARDSCAPING (PREFERED). SPLITTER ISLAND SHOULD EXTEND A MINIMUM OF 50' FROM THE YIELD LINE. SEE STANDARD DRAWING RP-H-6 FOR ADDITIONAL DETAILS.
5. FOR MOUNTABLE CURB BETWEEN CIRCULATORY ROADWAY AND TRUCK APRON, SEE STANDARD DRAWING RP-R-2. FOR NONMOUNTABLE CURB BETWEEN TRUCK APRON AND CENTRAL ISLAND, SEE STANDARD DRAWING RP-NMC-10.
6. SIDEWALK SHALL BE WIDENED TO ACCOMODATE BICYCLES AND PEDESTRIANS AT ROUNDABOUT (SHARED USE PATH). SEE STANDARD DRAWING RD-TS-8 FOR ADDITIONAL DETAILS.
7. SEE STANDARD DRAWINGS T-M-10, 11 AND 12 FOR SIGNING AND PAVEMENT MARKINGS FOR SHARED USE PATHS AND BICYCLE LANES.
8. ASSUMES APPROXIMATELY 90-DEGREE ANGLES BETWEEN ENTRIES AND NO MORE THAN FOUR ENTRIES TO THE ROUNDABOUT.

GENERAL NOTES

A. FOR SPECIFIC CONDITIONS NOT COVERED ON THIS SHEET, REFERENCE SHOULD BE MADE TO "A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS", AASHTO, 2001.

B. REFERENCE SHOULD BE MADE TO "ROUNDABOUTS: AN INFORMATIONAL GUIDE", FHWA, 2000. REFERENCE SHOULD ALSO BE MADE TO THE "ROADSIDE DESIGN GUIDE", AASHTO, 2002.

C. THIS STANDARD DRAWING IS INTENDED TO BE USED AS GUIDANCE FOR THE DESIGN OF SINGLE LANE URBAN AND RURAL ROUNDABOUTS. FOR MULTI-LANE DESIGNS, SEE STANDARD DRAWING RD-TS-10.

D. TRUCK TURNING TEMPLATES SHOULD BE PERFORMED ON ALL TURNING MOVEMENTS WITHIN THE ROUNDABOUT. A WB-62 VEHICLE SHOULD BE USED WHERE APPROPRIATE.

E. STANDARD AASHTO GUIDELINES FOR ISLAND DESIGN SHOULD BE FOLLOWED FOR SPLITTER ISLAND DESIGNS, INCLUDING LARGER NOSE RADII AT APPROACH CORNERS AND OFFSETTING CURB LINES AT THE APPROACH ENDS OF THE SPLITTER ISLAND.

F. MAXIMUM LONGITUDINAL GRADE IN THE DIRECTION OF TRAVEL THROUGH THE CIRCULATORY ROADWAY SHALL BE 4 PERCENT.

G. USE OF A RIGHT-TURN BYPASS LANE MAY BE WARRANTED FROM THE ROUNDABOUT TRAFFIC MODEL.

H. ROUNDABOUT APPROACHES WITH SPEEDS OF 45 MPH OR GREATER ARE CONSIDERED HIGH SPEED APPROACHES. REFER TO SECTION 6.5 OF THE "ROUNDABOUTS: AN INFORMATIONAL GUIDE", FHWA, 2000 FOR ADDITIONAL INFORMATION ON DESIGN OF ROUNDABOUTS WITH HIGH SPEED APPROACHES.

I. MINI ROUNDABOUTS, TRAFFIC CIRCLES, AND ROTARIES ARE NOT CONSIDERED ROUNDABOUTS AND SHOULD NOT BE DESIGNED TO THE STANDARDS ON THIS DRAWING.

J. ROADWAY SHOULDERS AND BICYCLE LANE SHALL END PRIOR TO THE CIRCULATORY ROADWAY.

K. FOR ROUNDABOUT CONSTRUCTION DETAILS, SEE STANDARD DRAWING RP-R-2.

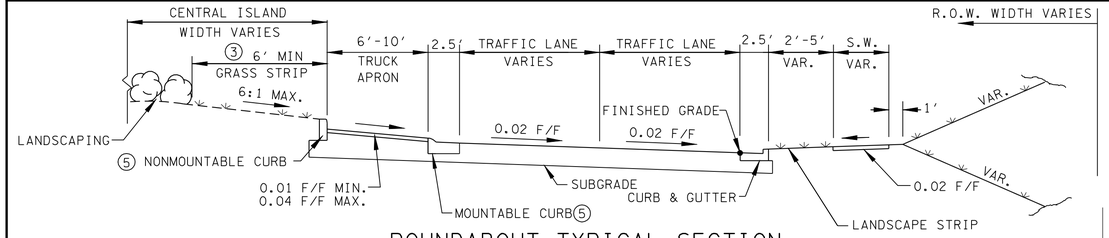
L. OPTIONAL PEDESTRIAN RAIL SHALL NOT CAUSE A CONFLICT WITH INTERSECTION SIGHT DISTANCE.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

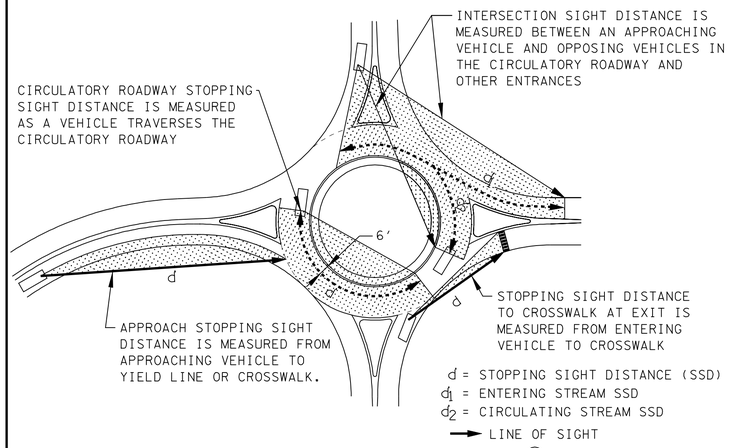
DESIGN STANDARDS FOR SINGLE LANE URBAN AND RURAL ROUNDABOUTS

4-28-10 | RD-TS-9

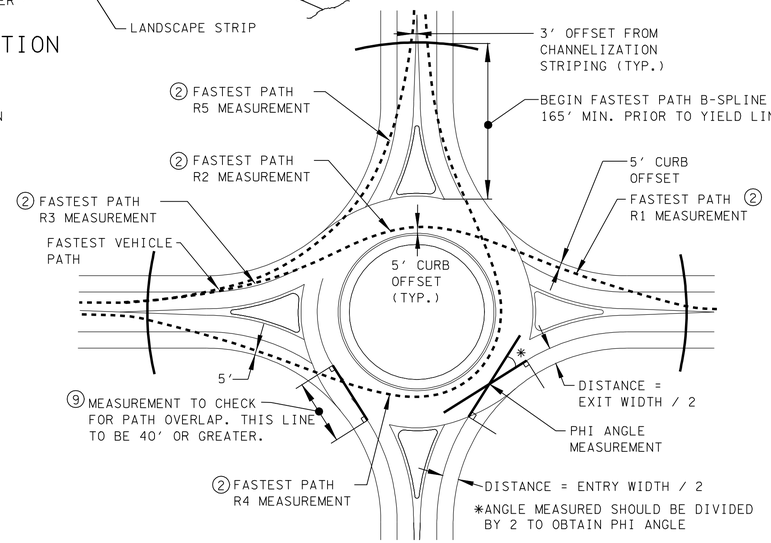
REV. 2-1-12: ADDED OPTIONAL PEDESTRIAN RAIL.



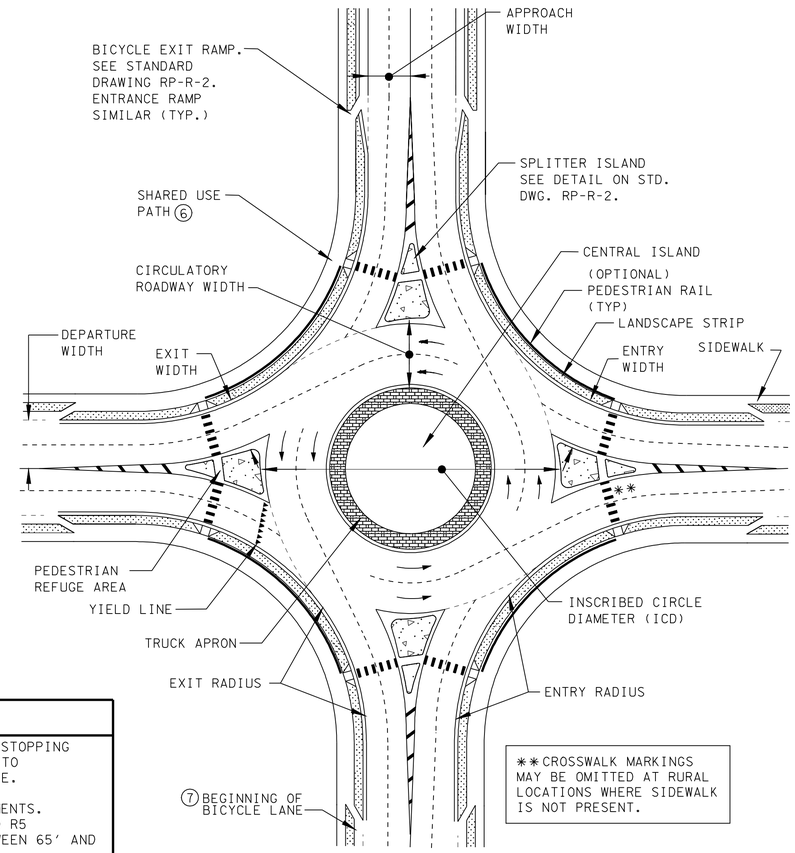
ROUNDABOUT TYPICAL SECTION



ROUNDABOUT SIGHT DISTANCE ①

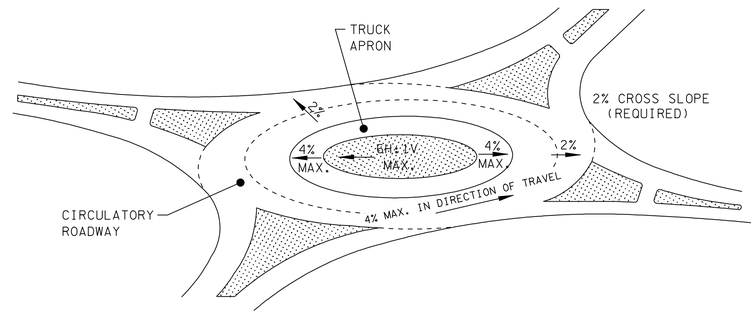


ROUNDABOUT DESIGN CHECKS



TYPICAL PLAN VIEW OF MULTI-LANE ROUNDABOUT

SEE GENERAL NOTE K



CIRCULATORY ROADWAY SLOPES

NOTE: TRUCK APRON CROSS SLOPE SHOULD MATCH CIRCULATORY ROADWAY CROSS SLOPE OR MAY BE INCREASED UP TO 4 PERCENT MAX.

DESIGN STANDARDS FOR MULTI-LANE ROUNDABOUTS

	URBAN	RURAL	NOTES
DESIGN SPEED	25 MPH	30 MPH	SEE FHWA EXHIBIT 6-4
INSCRIBED CIRCLE DIAMETER ⑧	150' - 220'	165' - 220'	MEASURED FROM CURB FACE TO CURB FACE
CIRCULATORY ROADWAY WIDTH	1.0 - 1.2 TIMES THE MAXIMUM ENTRY WIDTH	1.0 - 1.2 TIMES THE MAXIMUM ENTRY WIDTH	————
ENTRY WIDTH	24' - 28'	24' - 28'	MEASURED FROM CURB FACE TO CURB FACE
ENTRY RADIUS	65' - 100'	65' - 100'	————
EXIT WIDTH	SAME AS ENTRY WIDTH	SAME AS ENTRY WIDTH	SAME AS ENTRY WIDTH
EXIT RADIUS	200' - 1000'	200' - 1000'	————
APPROACH/DEPARTURE WIDTH	WIDTH OF APPROACHING LANE	WIDTH OF APPROACHING LANE	DOES NOT INCLUDE BIKE LANE OR GUTTER
DAILY SERVICE VOLUME (WITHOUT CAPACITY ANALYSIS) APPROXIMATELY 45,000 VEH/DAY			

DESIGN NOTES

① FASTEST PATH CHECKS SHOULD BE COMPLETED PRIOR TO INTERSECTION SIGHT DISTANCE BEING CHECKED. STOPPING SIGHT DISTANCE AND INTERSECTION SIGHT DISTANCE SHOULD BE CHECKED FOR ALL APPROACHES. REFER TO "ROUNDABOUTS; AN INFORMATIONAL GUIDE," FHWA, 2000 AND RD01-SD-1 THRU 7 FOR ADDITIONAL GUIDANCE.

② CONSTRUCT A B-SPLINE (SHOWN AS DASHED LINE) FOR THE THROUGH, LEFT TURN, AND RIGHT TURN MOVEMENTS. B-SPLINE SHOULD TOUCH THE 5' CURB OFFSETS AT THE POINTS INDICATED FOR THE R1, R2, R3, R4 AND R5 MEASUREMENTS. MEASURE THE RADIUS OF THE B-SPLINE AT EACH POINT. MEASUREMENT SHOULD BE BETWEEN 65' AND 85' LONG. FOR THE R1 MEASUREMENT, THE RADIUS SHOULD NOT BE MEASURED THROUGH THE YIELD LINE.

③ PROVIDE 6' MINIMUM UNOBSTRUCTED HORIZONTAL CLEARANCE FROM THE NON-MOUTABLE CURB TO THE CENTRAL ISLAND LANDSCAPING TO ALLOW FOR CIRCULATORY ROADWAY SIGHT DISTANCE, ACTUAL DISTANCE MAY BE GREATER AND SHOULD BE DETERMINED AFTER SIGHT DISTANCE CHECKS ARE COMPLETE, BUT SHALL NOT BE LESS THAN 6 FEET.

④ SPLITTER ISLAND SHOULD BE A RAISED MEDIAN WITH CONCRETE HARDSCAPING (PREFERED). SPLITTER ISLAND SHOULD EXTEND A MINIMUM OF 50' FROM THE YIELD LINE. SEE STANDARD DRAWING RP-H-6 FOR ADDITIONAL DETAILS.

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⑦ SEE STANDARD DRAWINGS T-M-10, 11 AND 12 FOR SIGNING AND MARKINGS FOR SHARED USE PATHS AND BICYCLE LANES.

⑧ ASSUMES APPROXIMATELY 90-DEGREE ANGLES BETWEEN ENTRIES AND NO MORE THAN FOUR ENTRIES TO THE ROUNDABOUT.

⑨ PATH OVERLAP SHOULD BE MEASURED AT THE ENTRANCE AND EXITS OF MULTI-LANE ROUNDABOUTS. LINE SHOULD BE DRAWN TANGENT TO THE CENTER OF THE ENTRANCE/EXIT AND CIRULATORY ROADWAY.

GENERAL NOTES

Ⓐ FOR SPECIFIC CONDITIONS NOT COVERED ON THIS SHEET, REFERENCE SHOULD BE MADE TO "A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS", AASHTO, 2001.

Ⓑ REFERENCE SHOULD BE MADE TO "ROUNDABOUTS: AN INFORMATIONAL GUIDE", FHWA, 2000. REFERENCE SHOULD ALSO BE MADE TO THE "ROADSIDE DESIGN GUIDE", ASSHTO, 2002.

Ⓒ THIS STANDARD DRAWING IS INTENDED TO BE USED AS GUIDANCE FOR THE DESIGN OF MULTI-LANE URBAN AND RURAL ROUNDABOUTS. FOR SINGLE LANE DESIGNS, SEE STANDARD DRAWING RD-TS-9.

Ⓓ TRUCK TURNING TEMPLATES SHOULD BE PERFORMED ON ALL TURNING MOVEMENTS WITHIN THE ROUNDABOUT. A WB-62 VEHICLE SHOULD BE USED WHERE APPROPRIATE.

Ⓔ STANDARD AASHTO GUIDELINES FOR ISLAND DESIGN SHOULD BE FOLLOWED FOR SPLITTER ISLAND DESIGNS, INCLUDING LARGER NOSE RADII AT APPROACH CORNERS AND OFFSETTING CURB LINES AT THE APPROACH ENDS OF THE SPLITTER ISLAND.

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Ⓖ USE OF A RIGHT-TURN BYPASS LANE MAY BE WARRANTED FROM THE ROUNDABOUT TRAFFIC MODEL.

Ⓗ ROUNDABOUT APPROACHES WITH SPEEDS OF 45 MPH OR GREATER ARE CONSIDERED HIGH SPEED APPROACHES. REFER TO SECTION 6.5 OF THE "ROUNDABOUTS: AN INFORMATIONAL GUIDE", FHWA, 2000 FOR ADDITIONAL INFORMATION ON DESIGN OF ROUNDABOUTS WITH HIGH SPEED APPROACHES.

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Ⓙ ROADWAY SHOULDERS AND BICYCLE LANE SHOULD END PRIOR TO CIRCULATORY ROADWAY.

Ⓚ FOR ROUNDABOUT CONSTRUCTION DETAILS, SEE STANDARD DRAWING RP-R-2.

Ⓛ OPTIONAL PEDESTRIAN RAIL SHALL NOT CAUSE A CONFLICT WITH INTERSECTION SIGHT DISTANCE.

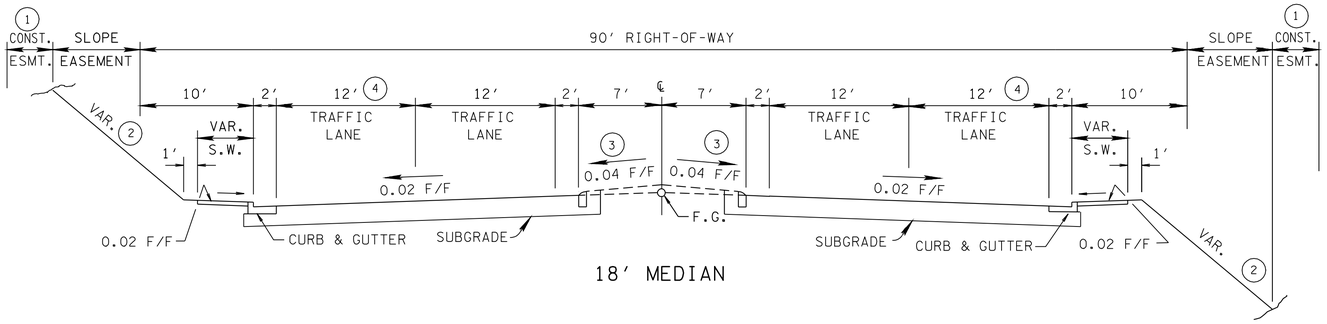
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DESIGN STANDARDS FOR MULTI-LANE URBAN AND RURAL ROUNDABOUTS

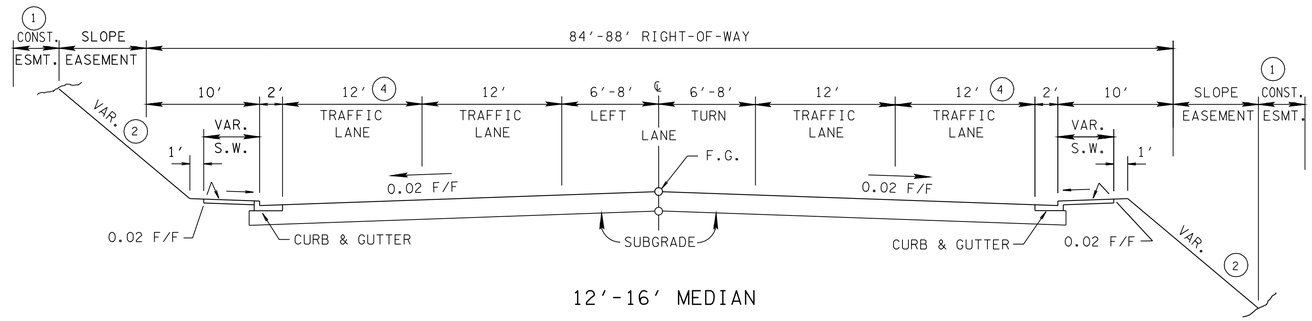
4-28-10 | RD-TS-10

REV. 10-15-02: NEW SHEET. REPLACES RD-TS-6A.

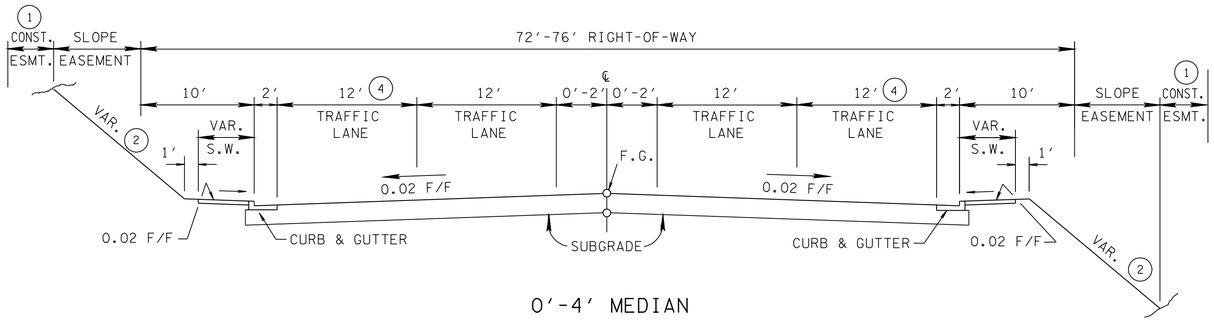
REV. 1-24-12: ADDED REFERENCE TO NOTE (4).



18' MEDIAN



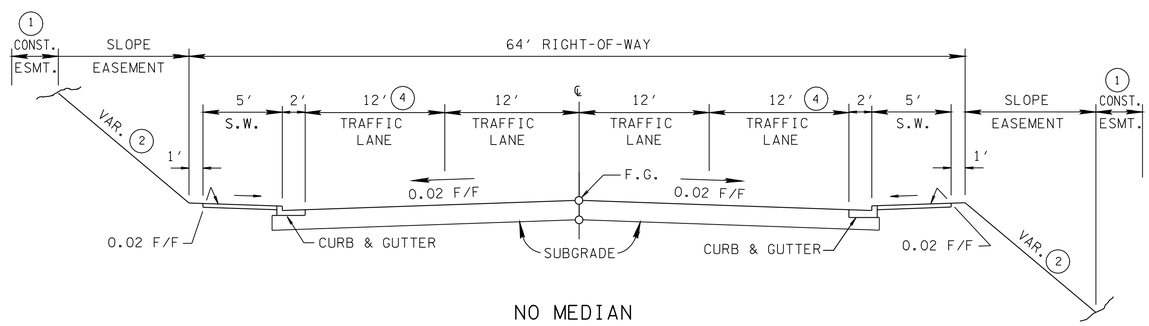
12'-16' MEDIAN



0'-4' MEDIAN

NOTE

THE "NO MEDIAN" TYPICAL, SHOWN BELOW, IS NOT TO BE USED UNLESS THE OTHER TYPICALS SHOWN ABOVE ARE NOT APPLICABLE, BECAUSE THE COST OF RIGHT-OF-WAY REQUIREMENTS FOR WIDER SECTIONS WOULD BE PROHIBITIVE.



NO MEDIAN

GENERAL NOTES

DESIGN SPEED

THESE SECTIONS ARE FOR 45 MILES PER HOUR OR LESS.

ALIGNMENT

SEE APPROPRIATE STANDARD DRAWING IN THE RD01-TS-SERIES FOR HORIZONTAL AND VERTICAL ALIGNMENT.

SUPERELEVATION AND MEDIAN BARRIERS

SEE APPROPRIATE STANDARD DRAWING IN THE RD01-SE-SERIES AND THE "ROADSIDE DESIGN GUIDE," AASHTO, 2002, FOR MEDIAN BARRIERS.

CONSTRUCTION EASEMENT

(1) 10 FEET MINIMUM DESIRABLE.

SLOPES

(2) ON URBAN PROJECTS THE BACKSLOPE AND FORESLOPE DESIGN WILL VARY FROM PROJECT TO PROJECT, AS A GENERAL RULE USE THE FOLLOWING:

3:1 SLOPES OR FLATTER ARE DESIRABLE AND 2:1 SLOPES ARE APPLICABLE IN AREAS WHERE RIGHT-OF-WAY RESTRICTIONS OR COST WARRANTS A STEEPER THAN 3:1 SLOPE. THE MAXIMUM SLOPE IN REGION IV IS 3:1.

MEDIAN CURBS

(3) MEDIAN CURBS WILL BE SLOPING CURBS. VERTICAL CURBS WILL NOT BE PERMITTED.

SIDEWALKS

SIDEWALK WIDTH IS TO INCLUDE THE SIX INCH WIDTH OF PROPOSED CURB AND SHOULD BE A MINIMUM OF FIVE FEET WIDE.

BICYCLE PROVISIONS

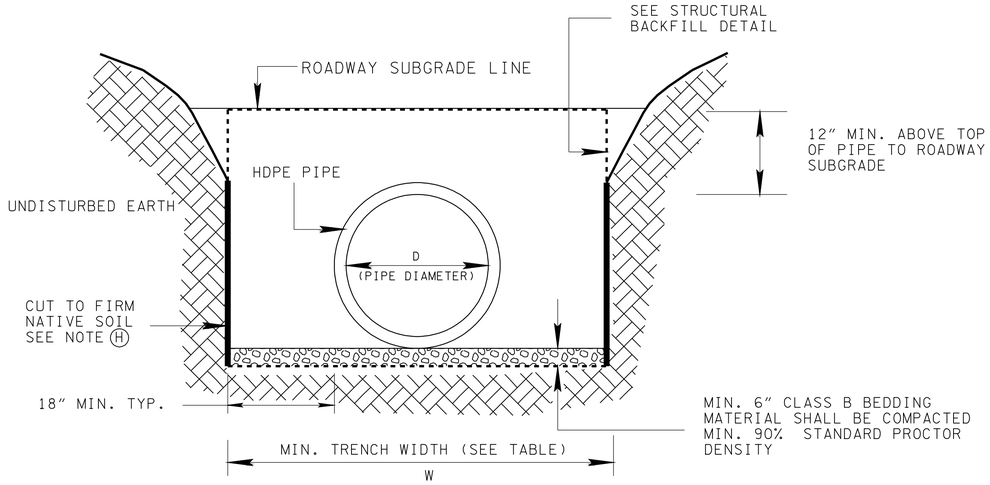
(4) 14 FEET TO 16 FEET OUTSIDE LANE WIDTH TO BE UTILIZED WHEN BICYCLE LANE PROVISIONS ARE REQUIRED. REFER T-M-15, 15A, AND 16 FOR MORE INFORMATION.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

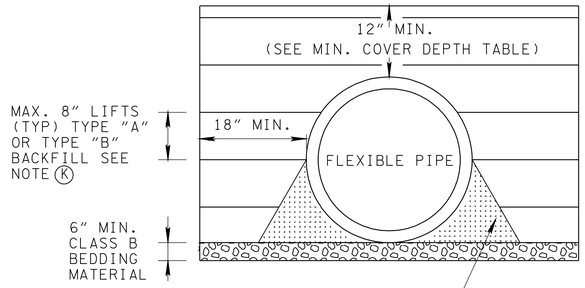
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TYPICAL CURB AND GUTTER SECTIONS WITHOUT SHOULDER

10-15-02 RD01-TS-6A



OPEN DITCH INSTALLATION (TYPICAL CROSS-SECTION)

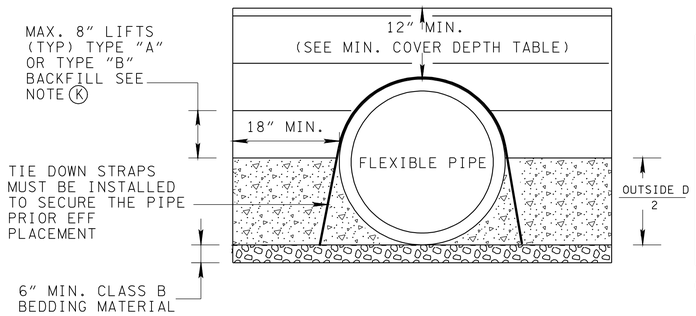


STRUCTURAL BACKFILL DETAIL (TYPE "A" OR TYPE "B" AGGREGATE, GRADING D OR E)

BEDDING AND BACKFILL FOR FLEXIBLE PIPE CULVERTS

PIPE MATERIAL	D PIPE DIAMETER (INCHES)	W TRENCH WIDTH (MIN.) (INCHES)	CY. OF BACKFILL MATL. PER LIN. FT	CY. OF BEDDING MATL.(CLASS B) PER LIN. FT
CMP, HDPE, PVC/SRTRP	12	53	0.337	0.082
	15	57	0.395	0.088
	18	60	0.439	0.093
	24	66	0.531	0.102
	30	77	0.711	0.218
	36	84	0.831	0.259
	42	91	0.957	0.304
	48	97	1.070	0.324
	54	104	1.206	0.374
	60	110	1.328	0.396
	66	116	1.453	0.418
	72	112	1.582	0.439

SRTRP: STEEL REINFORCED THERMOPLASTIC RIBBED PIPE



ALTERNATE STRUCTURAL BACKFILL DETAIL USING EXCAVATABLE FLOWABLE FILL (EFF)

SEE GENERAL NOTE (H)

MINIMUM COVER DEPTHS, DURING CONSTRUCTION FOR INDICATED AXLE LOADS, (IN.)

NOMINAL PIPE DIA. FT	18.0-50.0 KIP	50.0-75.0 KIP	75.0-110.0 KIP	110.0-150.0 KIP
2.0-3.0	24.0	30.0	36.0	36.0
3.5-4.0	36.0	36.0	42.0	48.0
4.5-5.0	36.0	36.0	42.0	48.0

(AASHTO, SECTION 30)

GENERAL NOTES

PIPE MATERIALS:

(A) FLEXIBLE PIPE MATERIALS ARE HDPE, PVC, CMP, AND THERMOPLASTIC STEEL REINFORCED RIBBED PIPE INCLUDING CORRUGATED ALUMINUM PIPE. ONLY PRODUCTS LISTED ON QPL MAY BE USED.

(B) ALL HIGH-DENSITY POLYETHYLENE (HDPE) PIPE USED FOR CULVERT AND STORMDRAIN APPLICATIONS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M294, TYPE S, CURRENT EDITION AND VERIFIED THROUGH THE PLASTIC PIPE INSTITUTE (PPI) THIRD PARTY CERTIFICATION PROGRAM. ALL HDPE PIPE DELIVERED AND USED SHALL BE PARTICIPATED IN NTPEP. MAX. PIPE DIA. FOR HDPE PIPE IS 48 INCHES.

(C) PVC (POLY VINYL CHLORIDE) PROFILE WALL DRAINAGE PIPE SHALL MEET AASHTO DESIGNATION M-304(2007). THE MAXIMUM PIPE DIAMETER FOR PVC PIPE IS 36 INCHES.

(D) STEEL REINFORCED THERMOPLASTIC RIBBED PIPE SHALL MEET AASHTO DESIGNATION MP-20. THE MAXIMUM PIPE DIAMETER FOR THE PIPE IS 36".

INSTALLATIONS REQUIREMENTS:

(E) ALL PIPES SHALL BE ASSEMBLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. PIPE SHALL BE PLACED IN THE BED STARTING AT THE DOWNSTREAM END. (FOR MIN. INSTALLATION REQUIREMENTS REFER TO AASHTO SECTION 30 OR ASTM D2321)

(F) ONLY AS MUCH TRENCH AS CAN BE SAFELY MAINTAINED SHALL BE OPENED. ALL TRENCHES SHALL BE BACKFILLED AND COMPACTED AS SOON AS PRACTICABLE, BUT NOT LATER THAN THE END OF EACH WORKING DAY.

(G) JOINTS FOR FLEXIBLE PIPE SHALL MEET THE PERFORMANCE REQUIREMENT FOR SOIL TIGHTNESS UNLESS WATER TIGHTNESS IS SPECIFIED. JOINTS SHALL BE INSTALLED SO THAT THE CONNECTION OF PIPE SECTIONS, FOR A CONTINUOUS LINE, WILL BE FREE FROM IRREGULARITIES IN THE FLOW LINE.

(H) FOR HDPE PIPE INSTALLATIONS, THE STIFFNESS OF IN SITU SOIL FOR THE VERTICAL SIDE WALLS OF THE TRENCH SHALL BE VERIFIED BY ENGINEER. EFF SHOULD BE USED WHEN IN SITU SOIL IS NOT STABLE AND FIRM IN ACCORDANCE WITH SECTION 204-06(B) OF THE STANDARD SPECIFICATIONS.

(I) ALL PIPE INSTALLATIONS REQUIRE CONCRETE ENDWALLS.

(J) PIPE SHALL NOT BE INSTALLED IF WATER IS PRESENT IN THE TRENCH OR LOCATION WHERE THE WATER TABLE IS FOUND HIGH. ALSO, AT THE SITES WHERE THE INLET OR THE OUTLET OF THE DRAINAGE PIPE WILL BE SUBMERGED DUE TO PONDING PIPE SHALL NOT BE INSTALLED.

GRANULAR COMPACTABLE BACKFILL REQUIREMENTS:

(K) THE BACKFILL SHALL BE TYPE "A" OR TYPE "B" AGGREGATE, GRADING D OR E MATERIAL MEETING THE REQUIREMENTS OF SUBSECTION 903.05. A MINIMUM OF 6 INCHES OF BEDDING COMPACTED TO A MIN. 90% STANDARD PROCTOR DENSITY SHALL BE PROVIDED PRIOR TO PLACEMENT OF THE PIPE UNLESS OTHERWISE SPECIFIED.

STRUCTURAL BACKFILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING AN 8 INCH LOOSE LIFT THICKNESS AND BROUGHT UP EVENLY AND SIMULTANEOUSLY ON BOTH SIDES OF THE PIPE TO AN ELEVATION NOT LESS THAN ONE FOOT ABOVE THE TOP OF THE PIPE.

A MINIMUM COMPACTION LEVEL OF 90% STANDARD PROCTOR DENSITY PER AASHTO T99 SHALL BE ACHIEVED BY USE OF VIBRATORY PLATE. HYDROHAMMER TYPE COMPACTORS SHALL NOT BE USED OVER THE PIPE. ALL COMPACTION EQUIPMENT USED SHALL BE APPROVED BY THE ENGINEER.

INSPECTION REQUIREMENTS:

(1) ALL PIPES SHALL UNDERGO INSPECTION DURING INSTALLATION.

(2) FINAL INSPECTIONS SHALL BE CONDUCTED NO SOONER THAN 30 DAYS AFTER COMPLETIONS OF INSTALLATION AND FINAL FILL.

(3) THE PIPE SHALL BE EVALUATED TO DETERMINE WHETHER THE INTERNAL DIAMETER OF THE BARREL HAS BEEN REDUCED MORE THAN 5% WHEN MEASURED NOT LESS THAN 30 DAYS FOLLOWING COMPLETION OF THE INSTALLATION.

(4) FOR LOCATIONS WHERE PIPE DEFLECTION EXCEEDS 5% OF THE INSIDE DIAMETER, AN EVALUATION SHALL BE CONDUCTED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL CONSIDERING THE SEVERITY OF THE DEFLECTION, STRUCTURAL INTEGRITY, ENVIRONMENTAL CONDITIONS,AND THE DESIGN SERVICE LIFE OF THE PIPE. PIPE REMEDIATION OR REPLACEMENT SHALL BE REQUIRED FOR LOCATIONS WHERE THE EVALUATION FINDS THAT THE DEFLECTION COULD BE PROBLEMATIC.

(5) INSTALLED PIPE DEFLECTIONS THAT EXCEED 5% OF THE INITIAL INSIDE DIAMETER MAY INDICATE THAT THE INSTALLATION WAS SUBSTANDARD. APPROPRIATE REMEDIATION, IF ANY, WILL DEPEND UPON THE SEVERITY OF THE DEFLECTION.

(6) IN ALL PIPE INSTALLATIONS, AT LEAST 10% OF THE TOTAL NUMBER OF PIPE RUNS REPRESENTING AT LEAST 10% OF THE TOTAL PROJECT FOOTAGE ON THE PROJECT SHALL BE RANDOMLY SELECTED BY THE ENGINEER AND INSPECTED FOR DEFLECTION. ALSO AS DETERMINED BY THE 100% VISUAL INSPECTION IN AASHTO SECTION 30. 5.6.1, ALL AREAS IN WHICH DEFLECTION CAN BE VISUALLY DETECTED SHALL BE INSPECTED FOR DEFLECTION. (REFER TO AASHTO, SECTION 30,5.6 AS ADOPED BY THE AASHTO SUBCOMMITTEE ON BRIDGES AND STRUCTURES, JUNE 29, 2005)

PAYMENT:

EXCAVATION FOR PIPE WILL NOT BE MEASURED AND PAID FOR DIRECTLY, BUT THE COST WILL BE INCLUDED IN THE COST OF THE PROPOSED PIPE CULVERT.

PAYMENT FOR GRANULAR COMPACTABLE TYPE "A" OR TYPE "B" BACKFILL AND/OR EXCAVATABLE FLOWABLE FILL INCLUDING BEDDING MATERIAL WILL BE INCLUDED IN THE UNIT PRICE OF THE PIPE.

(L) ALL PIPE INSTALLATION REQUIRE A RUBBER GASKET PROVIDED BY THE PIPE MANUFACTURER AND CONFORMING TO ASTM D3212 AT ALL CONNECTIONS WITH CONCRETE STRUCTURE.

REV. 7-12-07: REVISED GENERAL NOTE (J).

REV. 6-1-09: REVISED GENERAL NOTE (I) AND TITLE NAME. ADDED GENERAL NOTE (J).

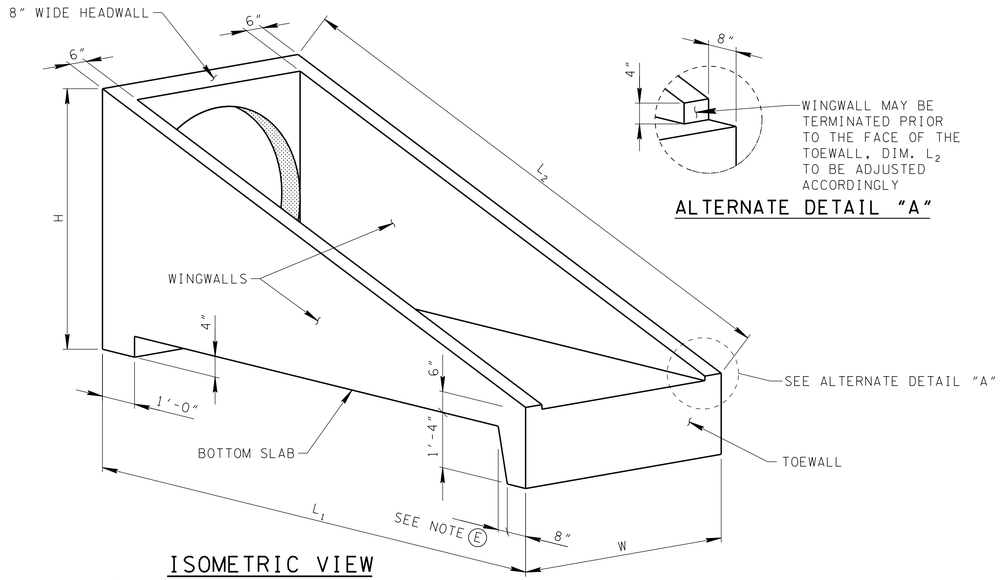
REV.2-1-12: REVISED DRAWING NAME ADDED EFF DETAIL. REVISED GENERAL NOTES AND TABLE. ADDED MINIMUM COVER TABLE.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STANDARD DETAILS FOR FLEXIBLE PIPE INSTALLATION

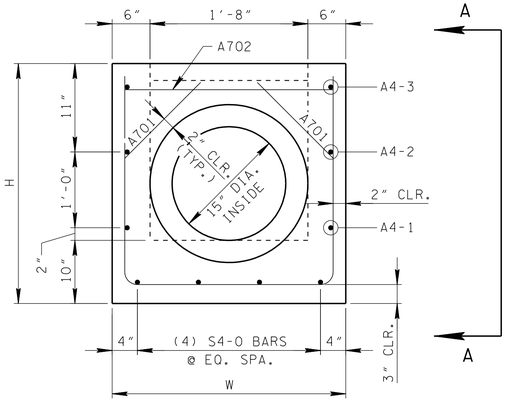
3-15-07 | D-PB-2



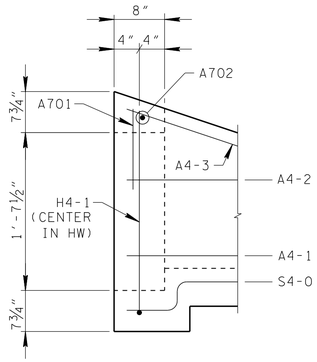
ALTERNATE DETAIL "A"

ISOMETRIC VIEW

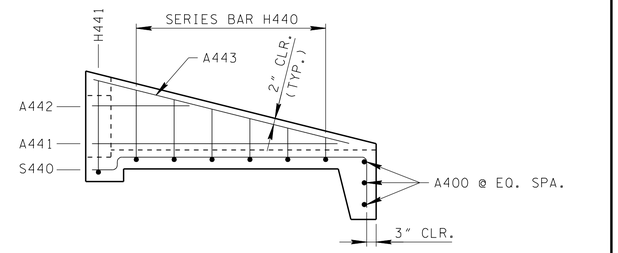
NOTE: ¾" CHAMFER REQUIRED ON ALL EXPOSED EDGES



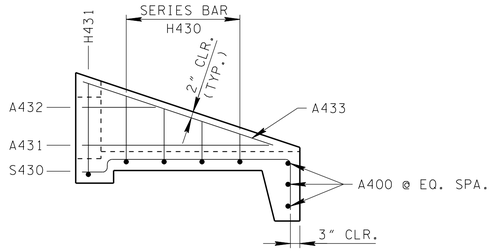
ELEVATION



PARTIAL VIEW A-A



BOTTOM SLAB PLAN

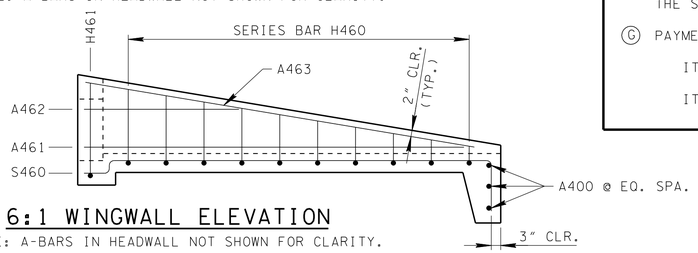


3:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

4:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

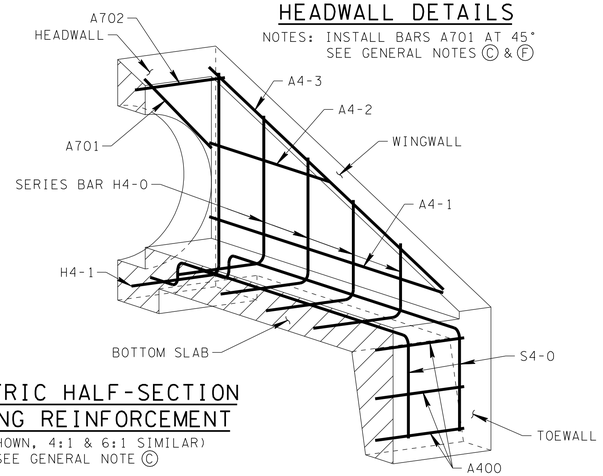


6:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

HEADWALL DETAILS

NOTES: INSTALL BARS A701 AT 45°
SEE GENERAL NOTES Ⓒ & Ⓕ



ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT

(3:1 SHOWN, 4:1 & 6:1 SIMILAR)
SEE GENERAL NOTE Ⓒ

GENERAL NOTES

Ⓐ DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST 15" CONCRETE ENDWALLS (TYPE "U") FOR CROSS DRAINS ONLY. "U" ENDWALL TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT PERPENDICULAR TO CENTERLINE. CAST-IN-PLACE CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.

Ⓑ SEE STD. DWG. D-PE-15B FOR BILL OF STEEL & PRECAST NOTES.

Ⓒ "-" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.

Ⓓ SPLICING OF REINFORCEMENT IS ACCEPTABLE PROVIDED THAT A MINIMUM 21" SPLICE LENGTH IS USED.

Ⓔ TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.

Ⓕ OPTIONAL STEPPED HOLE IS ALLOWED PROVIDED THE AMOUNT OF COVER BETWEEN THE PIPE OPENING AND BARS A701 AND A702 IS THE SAME OR GREATER THAN SHOWN ON THIS DRAWING.

Ⓖ PAYMENT WILL BE MADE UNDER:

ITEM NO. 611-07.01, CLASS "A" CONCRETE (PIPE ENDWALLS)----CU. YD.
ITEM NO. 611-07.02, STEEL BAR REINFORCING (PIPE ENDWALLS)----LB.

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 15" PIPE						
SLOPE	CONCRETE ENDWALL DIMENSIONS				ESTIMATED QUANTITIES	
	H	L_1	L_2	W	CLASS "A" CONC. CU. YD.	STEEL BAR REINF. LB.
3:1	2' - 11"	6' - 0"	6' - 3⅞"	2' - 8"	0.72	68
4:1		8' - 0"	8' - 3"		0.89	85
6:1		11' - 2"	11' - 3⅞"		1.21	117

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

15"
CONCRETE ENDWALL
CROSS DRAIN
(FOR 3:1, 4:1 & 6:1 SLOPES)

NOT TO SCALE | 3-01-12 | D-PE-15A

BILL OF STEEL

CODE NO.	LOCATION	BAR SIZE	3:1 WINGWALL SLOPE						4:1 WINGWALL SLOPE						6:1 WINGWALL SLOPE					
			BENDING DIMENSIONS				NO. REQ'D	LENGTH	BENDING DIMENSIONS				NO. REQ'D	LENGTH	BENDING DIMENSIONS				NO. REQ'D	LENGTH
			a	b	c	d			a	b	c	d			a	b	c	d		
A400	TOEWALL	4	2' - 4"	-	-	-	3	2' - 4"	2' - 4"	-	-	-	3	2' - 4"	2' - 4"	-	-	-	3	2' - 4"
A431	WINGWALLS	4	4' - 10"	-	-	-	2	4' - 10"	-	-	-	-	-	-	-	-	-	-	-	-
A432	WINGWALLS	4	1' - 10"	-	-	-	2	1' - 10"	-	-	-	-	-	-	-	-	-	-	-	-
A433	WINGWALLS	4	5' - 3"	-	-	-	2	5' - 3"	-	-	-	-	-	-	-	-	-	-	-	-
A441	WINGWALLS	4	-	-	-	-	-	-	6' - 6 ¾"	-	-	-	2	6' - 6 ¾"	-	-	-	-	-	-
A442	WINGWALLS	4	-	-	-	-	-	-	2' - 6 ¾"	-	-	-	2	2' - 6 ¾"	-	-	-	-	-	-
A443	WINGWALLS	4	-	-	-	-	-	-	6' - 11"	-	-	-	2	6' - 11"	-	-	-	-	-	-
A461	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	9' - 11"	-	-	-	2	9' - 11"
A462	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	3' - 11"	-	-	-	2	3' - 11"
A463	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	10' - 4"	-	-	-	2	10' - 4"
A701	HEADWALL	7	1' - 3"	-	-	-	2	1' - 3"	1' - 3"	-	-	-	2	1' - 3"	1' - 3"	-	-	-	2	1' - 3"
A702	HEADWALL	7	2' - 4"	-	-	-	1	2' - 4"	2' - 4"	-	-	-	1	2' - 4"	2' - 4"	-	-	-	1	2' - 4"
SERIES H430	BOTTOM SLAB & WINGWALL	4	2' - 4"	*	-	-	1	19' - 0"	-	-	-	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 1'-8 ½" TO 0'-8 ½" IN INCREMENTS OF 0'-4" (4 BARS)																	
H431	BOTTOM SLAB & HEADWALL	4	2' - 4"	2' - 4 ½"	-	-	1	7' - 1"	-	-	-	-	-	-	-	-	-	-	-	-
SERIES H440	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	2' - 4"	*	-	-	1	28' - 4 ½"	-	-	-	-	-	-
									* DIMENSION "b" VARIES FROM 1'-9 ⅞" TO 0'-6 ⅞" IN INCREMENTS OF 0'-3" (6 BARS)											
H441	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	2' - 4"	2' - 4 ⅞"	-	-	1	7' - 1 ¾"	-	-	-	-	-	-
SERIES H460	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	2' - 4"	*	-	-	1	47' - 1"
															* DIMENSION "b" VARIES FROM 1'-11 ¼" TO 0'-5 ¼" IN INCREMENTS OF 0'-2" (10 BARS)					
H461	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	2' - 4"	2' - 5 ¼"	-	-	1	7' - 2 ½"
S430	BOTTOM SLAB & TOEWALL	4	4' - 11 ½"	0' - 4 ½"	0' - 8"	1' - 5"	4	7' - 5"	-	-	-	-	-	-	-	-	-	-	-	-
S440	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	6' - 11 ½"	0' - 4 ½"	0' - 8"	1' - 5"	4	9' - 5"	-	-	-	-	-	-
S460	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	10' - 1 ½"	0' - 4 ½"	0' - 8"	1' - 5"	4	12' - 7"

PRECAST NOTES

PRECAST UNITS:

THE CONTRACTOR MAY, WITH PERMISSION FROM THE ENGINEER, SUBSTITUTE PRECAST ENDWALLS FOR CAST-IN-PLACE ENDWALLS PROVIDED THAT:

① APPROPRIATE SIZING AND LOCATION OF THE LIFTING INSERTS SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION OF THE PRECAST ENDWALL.

② THE CONTRACTOR TO PATCH ALL LIFTING INSERT HOLES AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.

③ PAYMENT FOR PRECAST ENDWALLS BASED ON THE QUANTITIES FOR CAST-IN-PLACE ENDWALLS IS ACCEPTABLE.

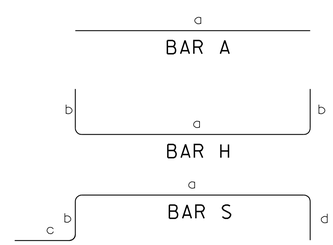
④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.

⑤ PIPE OPENINGS FOR HEADWALLS ARE BASED ON REINFORCED CONCRETE PIPE WITH TYPE "B" WALL THICKNESS (AASHTO M170).

⑥ ADDITIONAL REINFORCING STEEL NECESSARY TO MAINTAIN THE INTEGRITY OF THE STRUCTURE DURING HANDLING AND PLACEMENT SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.

CONCRETE: F'c=4,500 POUNDS PER SQUARE INCH MINIMUM AT 28 DAYS.
REINFORCING STEEL: ASTM A615, Fy=60,000 POUNDS PER SQUARE INCH.

REINFORCING STEEL LEGEND



REINFORCING STEEL CODE

TYPE	SIZE	SERIES
A	5	06

DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF BAR.

STANDARD C.R.S.I. HOOK DETAILS SHALL APPLY, EXCEPT AS NOTED.

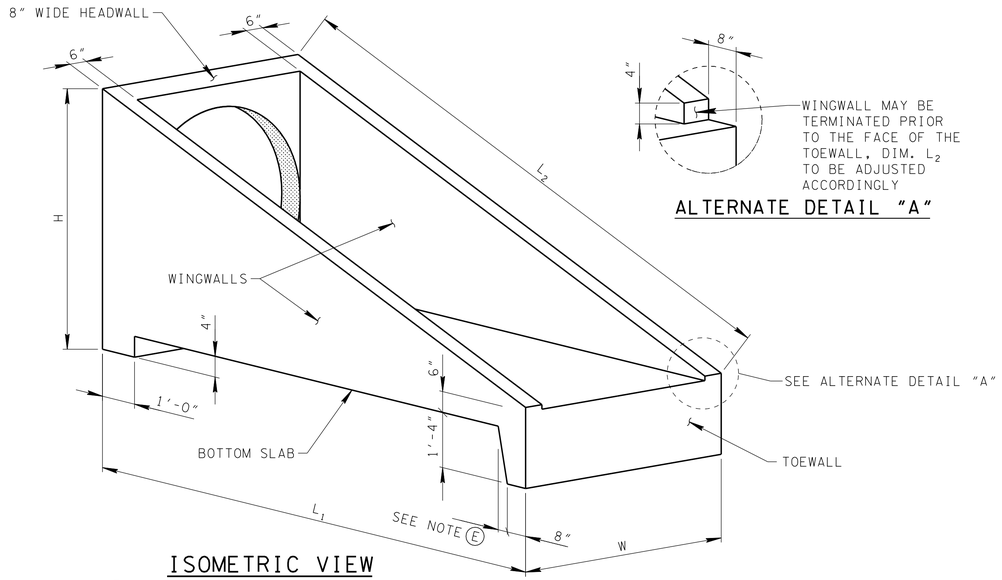
NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

15"
CONCRETE ENDWALL
CROSS DRAIN
(FOR 3:1, 4:1 & 6:1 SLOPES)

3-01-12

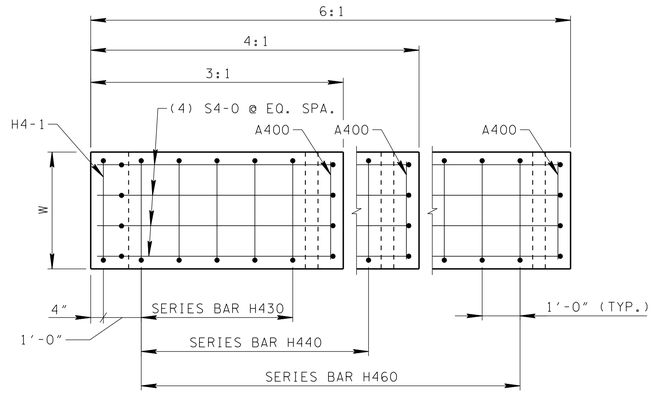
D-PE-15B



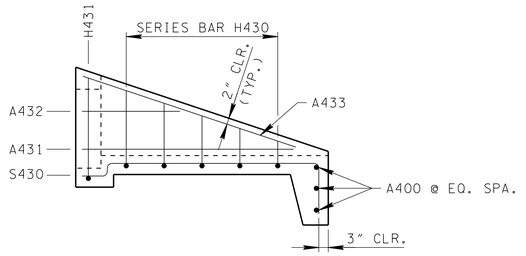
ISOMETRIC VIEW

NOTE: ¾" CHAMFER REQUIRED ON ALL EXPOSED EDGES

ALTERNATE DETAIL "A"

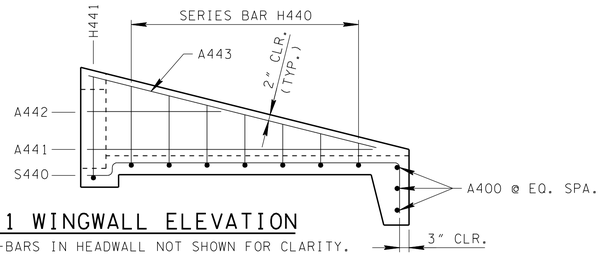


BOTTOM SLAB PLAN



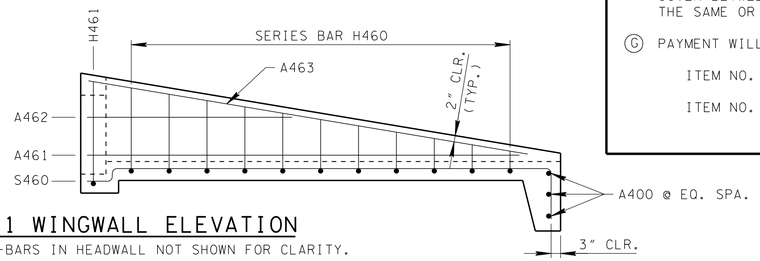
3:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



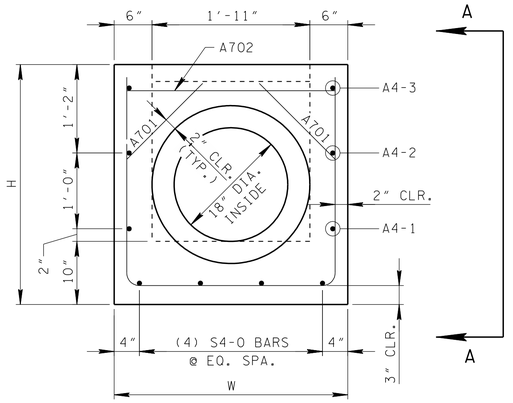
4:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

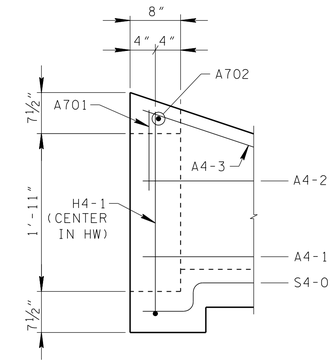


6:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



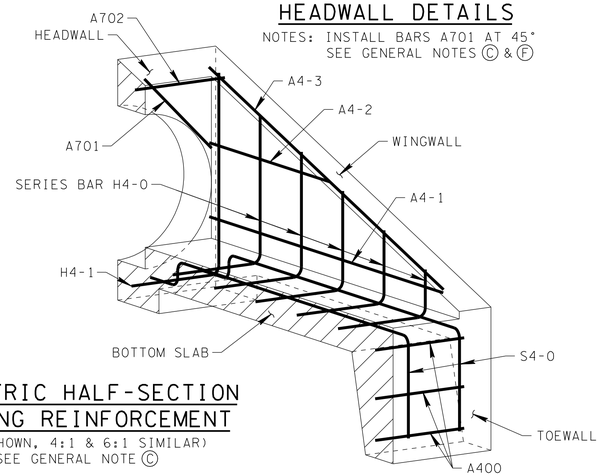
ELEVATION



PARTIAL VIEW A-A

HEADWALL DETAILS

NOTES: INSTALL BARS A701 AT 45°
SEE GENERAL NOTES Ⓒ & Ⓕ



ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT

(3:1 SHOWN, 4:1 & 6:1 SIMILAR)
SEE GENERAL NOTE Ⓒ

GENERAL NOTES

Ⓐ DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST 18" CONCRETE ENDWALLS (TYPE "U") FOR CROSS DRAINS ONLY. "U" ENDWALL TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT PERPENDICULAR TO CENTERLINE. CAST-IN-PLACE CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.

Ⓑ SEE STD. DWG. D-PE-18B FOR BILL OF STEEL & PRECAST NOTES.

Ⓒ "-" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.

Ⓓ SPLICING OF REINFORCEMENT IS ACCEPTABLE PROVIDED THAT A MINIMUM 21" SPLICE LENGTH IS USED.

Ⓔ TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.

Ⓕ OPTIONAL STEPPED HOLE IS ALLOWED PROVIDED THE AMOUNT OF COVER BETWEEN THE PIPE OPENING AND BARS A701 AND A702 IS THE SAME OR GREATER THAN SHOWN ON THIS DRAWING.

Ⓖ PAYMENT WILL BE MADE UNDER:

ITEM NO. 611-07.01, CLASS "A" CONCRETE (PIPE ENDWALLS)----CU. YD.
ITEM NO. 611-07.02, STEEL BAR REINFORCING (PIPE ENDWALLS)----LB.

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 18" PIPE						
SLOPE	CONCRETE ENDWALL DIMENSIONS				ESTIMATED QUANTITIES	
	H	L_1	L_2	W	CLASS "A" CONC. CU. YD.	STEEL BAR REINF. LB.
3:1	3' - 2"	6' - 8"	7' - 0⅜"	2' - 11"	0.87	79
4:1		8' - 8"	8' - 11¼"		1.08	98
6:1		12' - 8"	12' - 10⅛"		1.49	137

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

18"
CONCRETE ENDWALL
CROSS DRAIN
(FOR 3:1, 4:1 & 6:1 SLOPES)

NOT TO SCALE | 3-01-12 | D-PE-18A

BILL OF STEEL

CODE NO.	LOCATION	BAR SIZE	3:1 WINGWALL SLOPE						4:1 WINGWALL SLOPE						6:1 WINGWALL SLOPE					
			BENDING DIMENSIONS				NO. REQ'D	LENGTH	BENDING DIMENSIONS				NO. REQ'D	LENGTH	BENDING DIMENSIONS				NO. REQ'D	LENGTH
			a	b	c	d			a	b	c	d			a	b	c	d		
A400	TOEWALL	4	2' - 7"	-	-	-	3	2' - 7"	2' - 7"	-	-	-	3	2' - 7"	2' - 7"	-	-	-	3	2' - 7"
A431	WINGWALLS	4	5' - 7"	-	-	-	2	5' - 7"	-	-	-	-	-	-	-	-	-	-	-	-
A432	WINGWALLS	4	2' - 7"	-	-	-	2	2' - 7"	-	-	-	-	-	-	-	-	-	-	-	-
A433	WINGWALLS	4	6' - 0"	-	-	-	2	6' - 0"	-	-	-	-	-	-	-	-	-	-	-	-
A441	WINGWALLS	4	-	-	-	-	-	-	7' - 6"	-	-	-	2	7' - 6"	-	-	-	-	-	-
A442	WINGWALLS	4	-	-	-	-	-	-	3' - 6"	-	-	-	2	3' - 6"	-	-	-	-	-	-
A443	WINGWALLS	4	-	-	-	-	-	-	7' - 11"	-	-	-	2	7' - 11"	-	-	-	-	-	-
A461	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	11' - 5"	-	-	-	2	11' - 5"
A462	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	5' - 5"	-	-	-	2	5' - 5"
A463	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	11' - 10"	-	-	-	2	11' - 10"
A701	HEADWALL	7	1' - 4"	-	-	-	2	1' - 4"	1' - 4"	-	-	-	2	1' - 4"	1' - 4"	-	-	-	2	1' - 4"
A702	HEADWALL	7	2' - 7"	-	-	-	1	2' - 7"	2' - 7"	-	-	-	1	2' - 7"	2' - 7"	-	-	-	1	2' - 7"
SERIES H430	BOTTOM SLAB & WINGWALL	4	2' - 7"	*	-	-	1	25' - 10"	-	-	-	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 1'-11 ½" TO 0'-7 ½" IN INCREMENTS OF 0'-4" (5 BARS)																	
H431	BOTTOM SLAB & HEADWALL	4	2' - 7"	2' - 7 ½"	-	-	1	7' - 10"	-	-	-	-	-	-	-	-	-	-	-	-
SERIES H440	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	2' - 7"	*	-	-	1	36' - 7 ¼"	-	-	-	-	-	-
									* DIMENSION "b" VARIES FROM 2'-0 ⅞" TO 0'-6 ⅞" IN INCREMENTS OF 0'-3" (7 BARS)											
H441	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	2' - 7"	2' - 7 ⅞"	-	-	1	7' - 10 ¾"	-	-	-	-	-	-
SERIES H460	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	2' - 7"	*	-	-	1	58' - 2 ½"
															* DIMENSION "b" VARIES FROM 2'-2 ¼" TO 0'-6 ¼" IN INCREMENTS OF 0'-2" (11 BARS)					
H461	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	2' - 7"	2' - 8 ¼"	-	-	1	7' - 11 ½"
S430	BOTTOM SLAB & TOEWALL	4	5' - 7 ½"	0' - 4 ½"	0' - 8"	1' - 5"	4	8' - 1"	-	-	-	-	-	-	-	-	-	-	-	-
S440	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	7' - 7 ½"	0' - 4 ½"	0' - 8"	1' - 5"	4	10' - 1"	-	-	-	-	-	-
S460	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	11' - 7 ½"	0' - 4 ½"	0' - 8"	1' - 5"	4	14' - 1"

PRECAST NOTES

PRECAST UNITS:

THE CONTRACTOR MAY, WITH PERMISSION FROM THE ENGINEER, SUBSTITUTE PRECAST ENDWALLS FOR CAST-IN-PLACE ENDWALLS PROVIDED THAT:

① APPROPRIATE SIZING AND LOCATION OF THE LIFTING INSERTS SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION OF THE PRECAST ENDWALL.

② THE CONTRACTOR TO PATCH ALL LIFTING INSERT HOLES AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.

③ PAYMENT FOR PRECAST ENDWALLS BASED ON THE QUANTITIES FOR CAST-IN-PLACE ENDWALLS IS ACCEPTABLE.

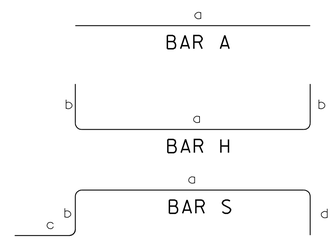
④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.

⑤ PIPE OPENINGS FOR HEADWALLS ARE BASED ON REINFORCED CONCRETE PIPE WITH TYPE "B" WALL THICKNESS (AASHTO M170).

⑥ ADDITIONAL REINFORCING STEEL NECESSARY TO MAINTAIN THE INTEGRITY OF THE STRUCTURE DURING HANDLING AND PLACEMENT SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.

CONCRETE: F'c=4,500 POUNDS PER SQUARE INCH MINIMUM AT 28 DAYS.
REINFORCING STEEL: ASTM A615, Fy=60,000 POUNDS PER SQUARE INCH.

REINFORCING STEEL LEGEND



REINFORCING STEEL CODE

TYPE	SIZE	SERIES
A	5	06

DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF BAR.

STANDARD C.R.S.I. HOOK DETAILS SHALL APPLY, EXCEPT AS NOTED.

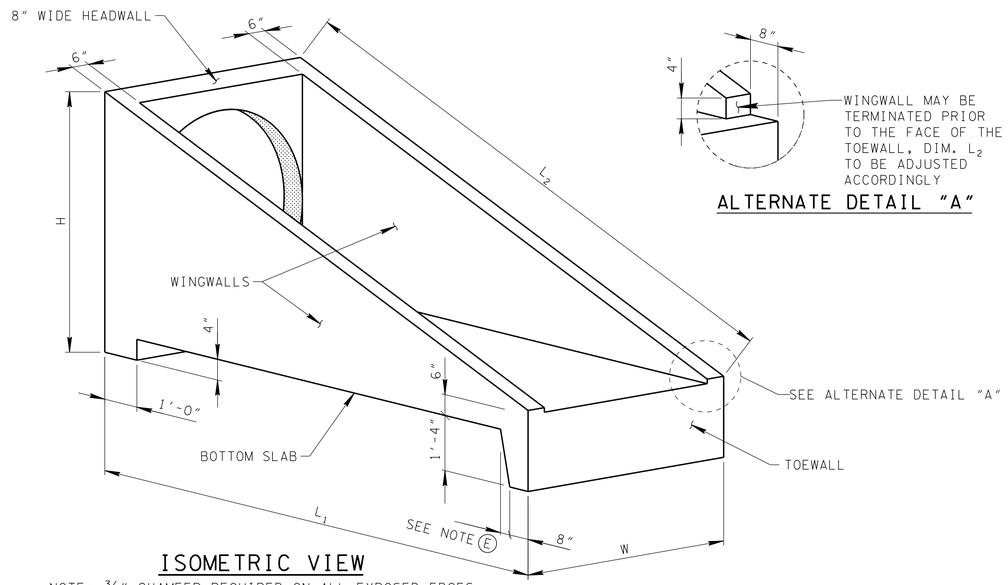
NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

18"
CONCRETE ENDWALL
CROSS DRAIN
(FOR 3:1, 4:1 & 6:1 SLOPES)

3-01-12

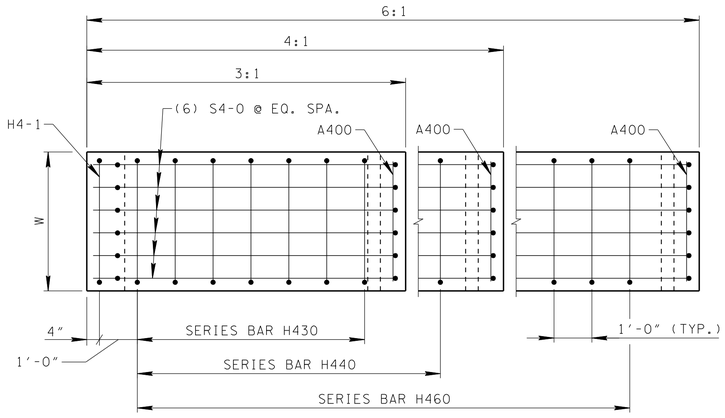
D-PE-18B



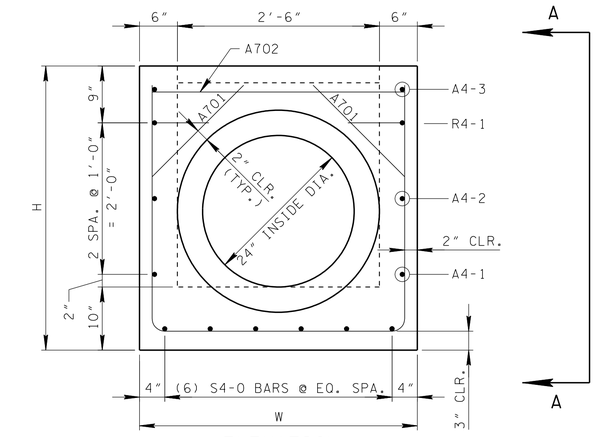
ISOMETRIC VIEW

NOTE: ¾" CHAMFER REQUIRED ON ALL EXPOSED EDGES

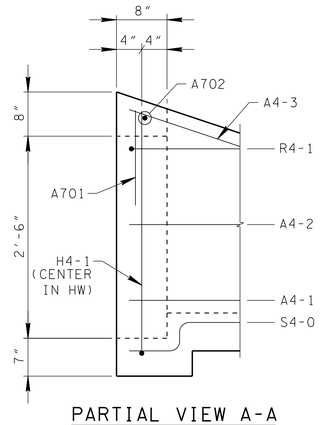
ALTERNATE DETAIL "A"



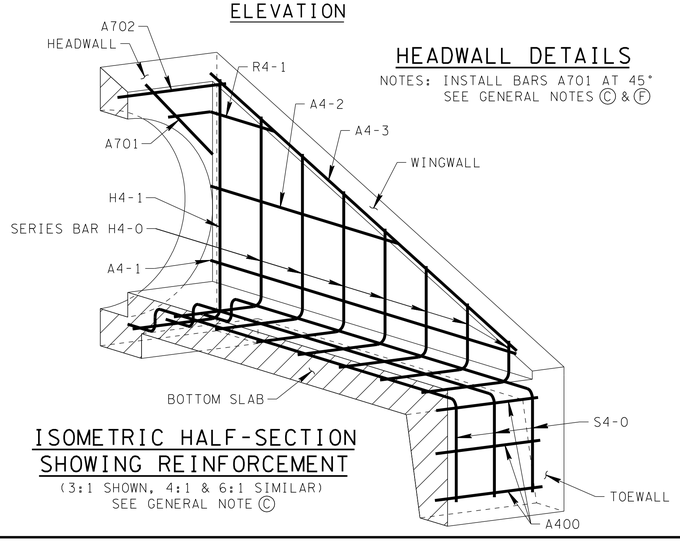
BOTTOM SLAB PLAN



ELEVATION



PARTIAL VIEW A-A

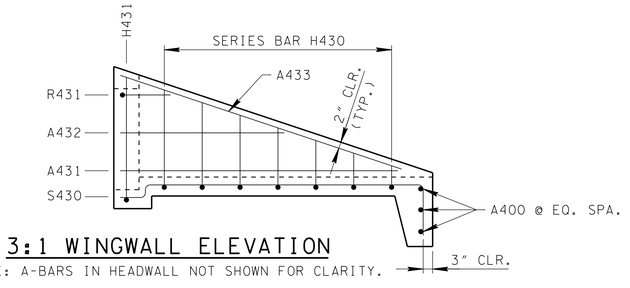


ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT

(3:1 SHOWN, 4:1 & 6:1 SIMILAR)
SEE GENERAL NOTE (C)

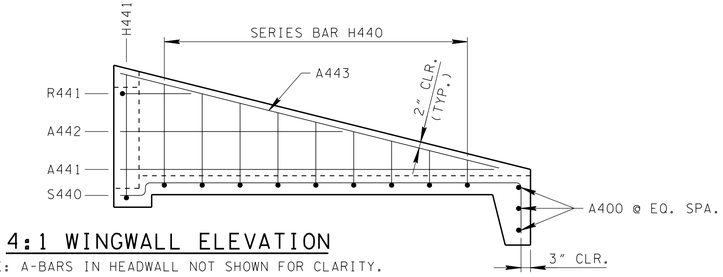
HEADWALL DETAILS

NOTES: INSTALL BARS A701 AT 45°
SEE GENERAL NOTES (C) & (F)



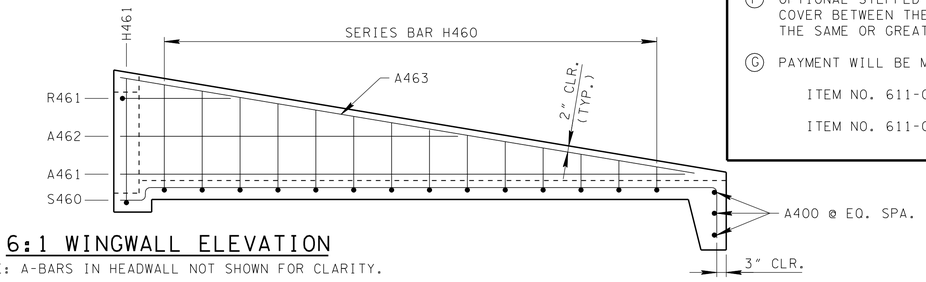
3:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



4:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



6:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

GENERAL NOTES

(A) DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST 24" CONCRETE ENDWALLS (TYPE "U") FOR CROSS DRAINS ONLY. "U" ENDWALL TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT PERPENDICULAR TO CENTERLINE. CAST-IN-PLACE CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.

(B) SEE STD. DWG. D-PE-24B FOR BILL OF STEEL & PRECAST NOTES.

(C) "-" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.

(D) SPLICING OF REINFORCEMENT IS ACCEPTABLE PROVIDED THAT A MINIMUM 21" SPLICE LENGTH IS USED.

(E) TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.

(F) OPTIONAL STEPPED HOLE IS ALLOWED PROVIDED THE AMOUNT OF COVER BETWEEN THE PIPE OPENING AND BARS A701 AND A702 IS THE SAME OR GREATER THAN SHOWN ON THIS DRAWING.

(G) PAYMENT WILL BE MADE UNDER:

ITEM NO. 611-07.01, CLASS "A" CONCRETE (PIPE ENDWALLS)----CU. YD.
ITEM NO. 611-07.02, STEEL BAR REINFORCING (PIPE ENDWALLS)----LB.

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 24" PIPE						
SLOPE	CONCRETE ENDWALL DIMENSIONS				ESTIMATED QUANTITIES	
	H	L_1	L_2	W	CLASS "A" CONC. CU. YD.	STEEL BAR REINF. LB.
3:1	3' - 9"	8' - 5"	8' - 10 ½"	3' - 6"	1.28	124
4:1		11' - 0"	11' - 4"		1.61	153
6:1		16' - 2"	16' - 4 ⅝"		2.26	215

NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

24"
CONCRETE ENDWALL
CROSS DRAIN
(FOR 3:1, 4:1 & 6:1 SLOPES)

3-01-12 | D-PE-24A

BILL OF STEEL

CODE NO.	LOCATION	BAR SIZE	3:1 WINGWALL SLOPE						4:1 WINGWALL SLOPE						6:1 WINGWALL SLOPE					
			BENDING DIMENSIONS				NO. REQ'D	LENGTH	BENDING DIMENSIONS				NO. REQ'D	LENGTH	BENDING DIMENSIONS				NO. REQ'D	LENGTH
			a	b	c	d			a	b	c	d			a	b	c	d		
A400	TOEWALL	4	3' - 2"	-	-	-	3	3' - 2"	3' - 2"	-	-	-	3	3' - 2"	3' - 2"	-	-	-	3	3' - 2"
A431	WINGWALLS	4	7' - 4"	-	-	-	2	7' - 4"	-	-	-	-	-	-	-	-	-	-	-	-
A432	WINGWALLS	4	4' - 4"	-	-	-	2	4' - 4"	-	-	-	-	-	-	-	-	-	-	-	-
A433	WINGWALLS	4	7' - 10"	-	-	-	2	7' - 10"	-	-	-	-	-	-	-	-	-	-	-	-
A441	WINGWALLS	4	-	-	-	-	-	-	9' - 10"	-	-	-	2	9' - 10"	-	-	-	-	-	-	-
A442	WINGWALLS	4	-	-	-	-	-	-	5' - 10"	-	-	-	2	5' - 10"	-	-	-	-	-	-	-
A443	WINGWALLS	4	-	-	-	-	-	-	10' - 4"	-	-	-	2	10' - 4"	-	-	-	-	-	-	-
A461	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	14' - 11"	-	-	-	2	14' - 11"
A462	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	8' - 11"	-	-	-	2	8' - 11"
A463	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	15' - 4"	-	-	-	2	15' - 4"
A701	HEADWALL	7	1' - 8"	-	-	-	2	1' - 8"	1' - 8"	-	-	-	2	1' - 8"	1' - 8"	-	-	-	2	1' - 8"
A702	HEADWALL	7	3' - 2"	-	-	-	1	3' - 2"	3' - 2"	-	-	-	1	3' - 2"	3' - 2"	-	-	-	1	3' - 2"
SERIES H430	BOTTOM SLAB & WINGWALL	4	3' - 2"	*	-	-	1	43' - 9"	-	-	-	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 2'-6 ½" TO 0'-6 ½" IN INCREMENTS OF 0'-4" (7 BARS)																	
H431	BOTTOM SLAB & HEADWALL	4	3' - 2"	3' - 2 ½"	-	-	1	9' - 7"	-	-	-	-	-	-	-	-	-	-	-	-
SERIES H440	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	3' - 2"	*	-	-	1	58' - 3 ¾"	-	-	-	-	-	-
									* DIMENSION "b" VARIES FROM 2'-7 ⅞" TO 0'-7 ⅞" IN INCREMENTS OF 0'-3" (9 BARS)											
H441	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	3' - 2"	3' - 2 ⅞"	-	-	1	9' - 7 ¾"	-	-	-	-	-	-
SERIES H460	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	3' - 2"	*	-	-	1	91' - 7"
															* DIMENSION "b" VARIES FROM 2'-9 ¼" TO 0'-7 ¼" IN INCREMENTS OF 0'-2" (14 BARS)					
H461	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	3' - 2"	3' - 3 ¼"	-	-	1	9' - 8 ½"
R431	WINGWALL & HEADWALL	4	1' - 4"	0' - 8"	-	-	2	2' - 0"	-	-	-	-	-	-	-	-	-	-	-	-
R441	WINGWALL & HEADWALL	4	-	-	-	-	-	-	1' - 10"	0' - 8"	-	-	2	2' - 6"	-	-	-	-	-	-
R461	WINGWALL & HEADWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	2' - 11"	0' - 8"	-	-	2	3' - 7"
S430	BOTTOM SLAB & TOEWALL	4	7' - 4 ½"	0' - 4 ½"	0' - 8"	1' - 5"	6	9' - 10"	-	-	-	-	-	-	-	-	-	-	-	-
S440	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	9' - 11 ½"	0' - 4 ½"	0' - 8"	1' - 5"	6	12' - 5"	-	-	-	-	-	-
S460	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	15' - 1 ½"	0' - 4 ½"	0' - 8"	1' - 5"	6	17' - 7"

PRECAST NOTES

PRECAST UNITS:

THE CONTRACTOR MAY, WITH PERMISSION FROM THE ENGINEER, SUBSTITUTE PRECAST ENDWALLS FOR CAST-IN-PLACE ENDWALLS PROVIDED THAT:

① APPROPRIATE SIZING AND LOCATION OF THE LIFTING INSERTS SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION OF THE PRECAST ENDWALL.

② THE CONTRACTOR TO PATCH ALL LIFTING INSERT HOLES AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.

③ PAYMENT FOR PRECAST ENDWALLS BASED ON THE QUANTITIES FOR CAST-IN-PLACE ENDWALLS IS ACCEPTABLE.

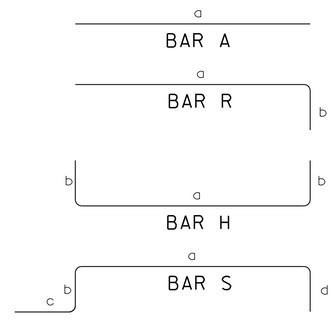
④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.

⑤ PIPE OPENINGS FOR HEADWALLS ARE BASED ON REINFORCED CONCRETE PIPE WITH TYPE "B" WALL THICKNESS (AASHTO M170).

⑥ ADDITIONAL REINFORCING STEEL NECESSARY TO MAINTAIN THE INTEGRITY OF THE STRUCTURE DURING HANDLING AND PLACEMENT SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.

CONCRETE: f'_c=4,500 POUNDS PER SQUARE INCH MINIMUM AT 28 DAYS.
REINFORCING STEEL: ASTM A615, Fy=60,000 POUNDS PER SQUARE INCH.

REINFORCING STEEL LEGEND



REINFORCING STEEL CODE

TYPE	SIZE	SERIES
A	5	06

DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF BAR.

STANDARD C.R.S.I. HOOK DETAILS SHALL APPLY, EXCEPT AS NOTED.

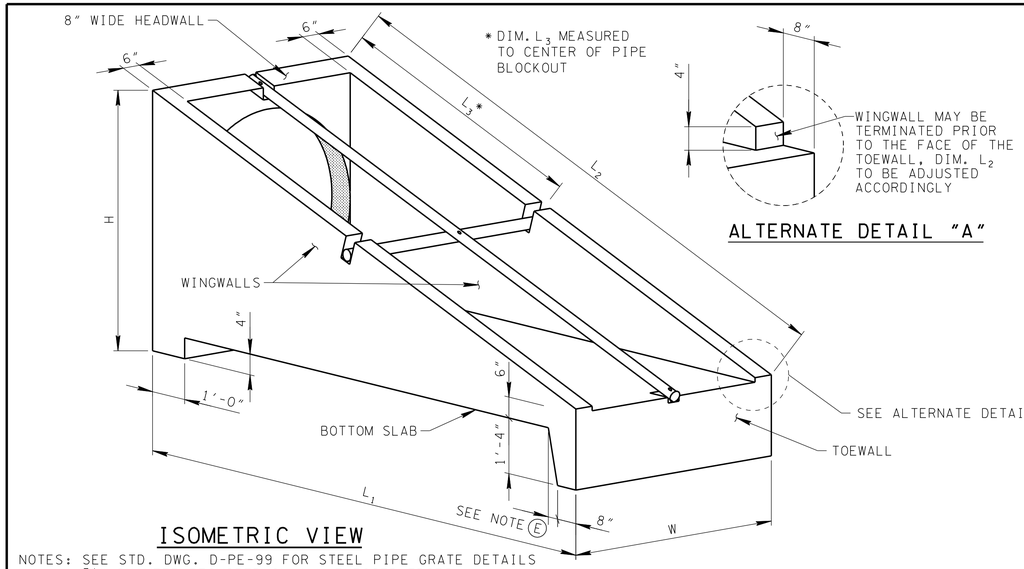
NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

24"
CONCRETE ENDWALL
CROSS DRAIN
(FOR 3:1, 4:1 & 6:1 SLOPES)

3-01-12

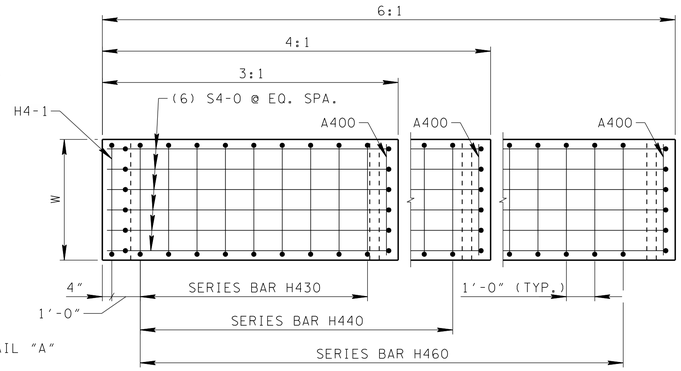
D-PE-24B



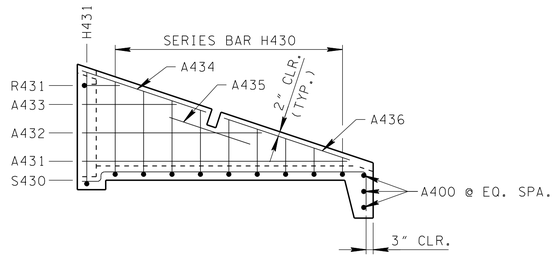
ISOMETRIC VIEW

NOTES: SEE STD. DWG. D-PE-99 FOR STEEL PIPE GRATE DETAILS
¾" CHAMFER REQUIRED ON ALL EXPOSED EDGES

ALTERNATE DETAIL "A"

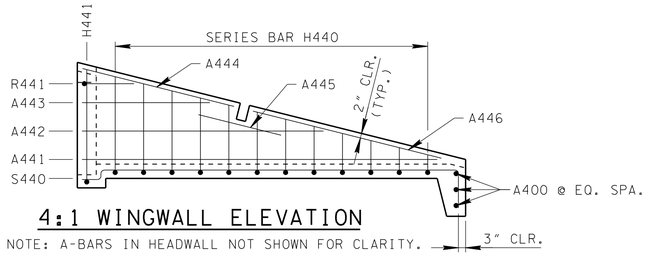


BOTTOM SLAB PLAN



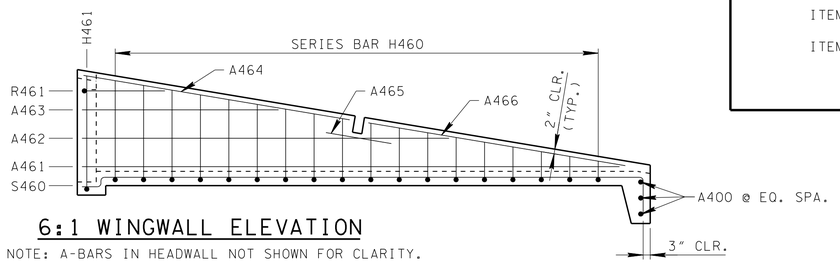
3:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



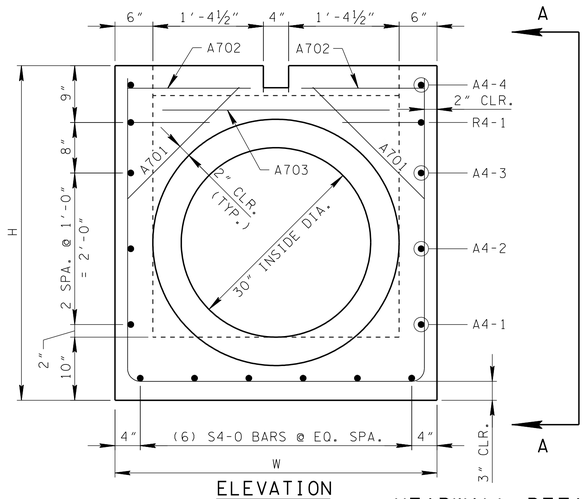
4:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

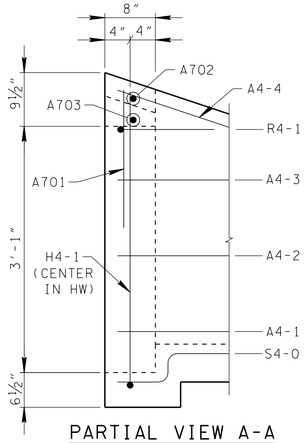


6:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



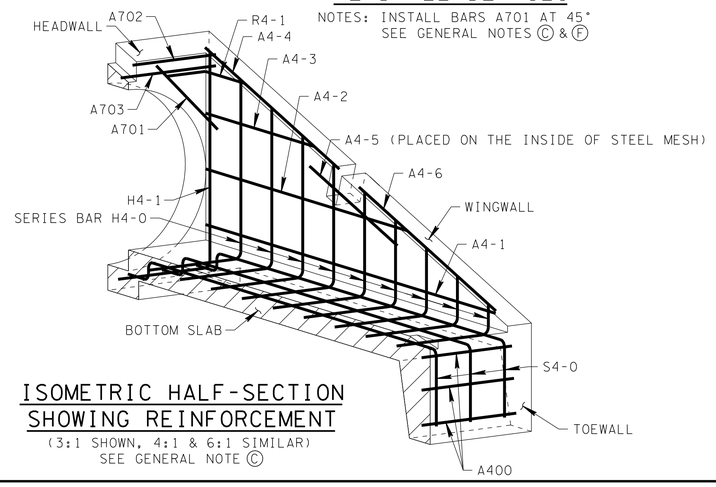
ELEVATION



PARTIAL VIEW A-A

HEADWALL DETAILS

NOTES: INSTALL BARS A701 AT 45°
SEE GENERAL NOTES Ⓒ & Ⓕ



ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT

(3:1 SHOWN, 4:1 & 6:1 SIMILAR)
SEE GENERAL NOTE Ⓒ

GENERAL NOTES

Ⓐ DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST 30" CONCRETE ENDWALLS (TYPE "U") FOR CROSS DRAINS ONLY. "U" ENDWALL TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT PERPENDICULAR TO CENTERLINE. CAST-IN-PLACE CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.

Ⓑ SEE STD. DWG. D-PE-30B FOR BILL OF STEEL & PRECAST NOTES.

Ⓒ "-" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.

Ⓓ SPLICING OF REINFORCEMENT IS ACCEPTABLE PROVIDED THAT A MINIMUM 21" SPLICE LENGTH IS USED.

Ⓔ TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.

Ⓕ OPTIONAL STEPPED HOLE IS ALLOWED PROVIDED THE AMOUNT OF COVER BETWEEN THE PIPE OPENING AND BARS A701 AND A703 IS THE SAME OR GREATER THAN SHOWN ON THIS DRAWING.

Ⓖ PAYMENT WILL BE MADE UNDER:

ITEM NO. 611-07.01, CLASS "A" CONCRETE (PIPE ENDWALLS)----CU. YD.
ITEM NO. 611-07.02, STEEL BAR REINFORCING (PIPE ENDWALLS)----LB.

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 30" PIPE

SLOPE	CONCRETE ENDWALL DIMENSIONS					STRUCTURAL STEEL PIPE DIMENSIONS		ESTIMATED QUANTITIES		
	H	L_1	L_2	L_3	W	LG	WG	CLASS "A" CONC. CU. YD.	STEEL BAR REINF. LB.	STRUCTURAL STEEL LB.
3:1	4' - 5"	10' - 5"	10' - 11 ¾"	5' - 2"	4' - 1"	10' - 10 ⅝"	4' - 1"	1.84	174	114
4:1		13' - 8"	14' - 1"	6' - 1"		14' - 0 ⅛"		2.32	216	137
6:1		20' - 2"	20' - 5 ⅜"	10' - 1"		20' - 4 ¾"		3.29	303	186

NOTE: SEE STD. DWG. D-PE-99 FOR STRUCTURAL STEEL PIPE DIMENSIONS LG & WG.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

30" CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE

(FOR 3:1, 4:1 & 6:1 SLOPES)

NOT TO SCALE | 3-01-12 | D-PE-30A

BILL OF STEEL

CODE NO.	LOCATION	BAR SIZE	3:1 WINGWALL SLOPE						4:1 WINGWALL SLOPE						6:1 WINGWALL SLOPE					
			BENDING DIMENSIONS				NO. REQ'D	LENGTH	BENDING DIMENSIONS				NO. REQ'D	LENGTH	BENDING DIMENSIONS				NO. REQ'D	LENGTH
			a	b	c	d			a	b	c	d			a	b	c	d		
A400	TOEWALL	4	3' - 9"	-	-	-	3	3' - 9"	3' - 9"	-	-	-	3	3' - 9"	3' - 9"	-	-	-	3	3' - 9"
A431	WINGWALLS	4	9' - 4"	-	-	-	2	9' - 4"	-	-	-	-	-	-	-	-	-	-	-	-
A432	WINGWALLS	4	6' - 4"	-	-	-	2	6' - 4"	-	-	-	-	-	-	-	-	-	-	-	-
A433	WINGWALLS	4	3' - 4"	-	-	-	2	3' - 4"	-	-	-	-	-	-	-	-	-	-	-	-
A434	WINGWALLS	4	4' - 7"	-	-	-	2	4' - 7"	-	-	-	-	-	-	-	-	-	-	-	-
A435	WINGWALLS	4	3' - 0"	-	-	-	2	3' - 0"	-	-	-	-	-	-	-	-	-	-	-	-
A436	WINGWALLS	4	4' - 9"	-	-	-	2	4' - 9"	-	-	-	-	-	-	-	-	-	-	-	-
A441	WINGWALLS	4	-	-	-	-	-	-	12' - 6"	-	-	-	2	12' - 6"	-	-	-	-	-	-	-
A442	WINGWALLS	4	-	-	-	-	-	-	8' - 6"	-	-	-	2	8' - 6"	-	-	-	-	-	-	-
A443	WINGWALLS	4	-	-	-	-	-	-	4' - 6"	-	-	-	2	4' - 6"	-	-	-	-	-	-	-
A444	WINGWALLS	4	-	-	-	-	-	-	5' - 6"	-	-	-	2	5' - 6"	-	-	-	-	-	-	-
A445	WINGWALLS	4	-	-	-	-	-	-	3' - 0"	-	-	-	2	3' - 0"	-	-	-	-	-	-	-
A446	WINGWALLS	4	-	-	-	-	-	-	6' - 11"	-	-	-	2	6' - 11"	-	-	-	-	-	-	-
A461	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	18' - 11"	-	-	-	2	18' - 11"
A462	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	12' - 11"	-	-	-	2	12' - 11"
A463	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	6' - 11"	-	-	-	2	6' - 11"
A464	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	9' - 6"	-	-	-	2	9' - 6"
A465	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	3' - 0"	-	-	-	2	3' - 0"
A466	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	9' - 2"	-	-	-	2	9' - 2"
A701	HEADWALL	7	2' - 0"	-	-	-	2	2' - 0"	2' - 0"	-	-	-	2	2' - 0"	2' - 0"	-	-	-	2	2' - 0"
A702	HEADWALL	7	1' - 6 ½"	-	-	-	2	1' - 6 ½"	1' - 6 ½"	-	-	-	2	1' - 6 ½"	1' - 6 ½"	-	-	-	2	1' - 6 ½"
A703	HEADWALL	7	3' - 0"	-	-	-	1	3' - 0"	3' - 0"	-	-	-	1	3' - 0"	3' - 0"	-	-	-	1	3' - 0"
SERIES H430	BOTTOM SLAB & WINGWALL	4	3' - 9"	*	-	-	1	67' - 6"	-	-	-	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 3'-2 ½" TO 0'-6 ½" IN INCREMENTS OF 0'-4" (9 BARS)																	
H431	BOTTOM SLAB & HEADWALL	4	3' - 9"	3' - 10 ½"	-	-	1	11' - 6"	-	-	-	-	-	-	-	-	-	-	-	-
SERIES H440	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	3' - 9"	*	-	-	1	91' - 9"	-	-	-	-	-	-
									* DIMENSION "b" VARIES FROM 3'-3 ⅜" TO 0'-6 ⅞" IN INCREMENTS OF 0'-3" (12 BARS)											
H441	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	3' - 9"	3' - 10 ⅞"	-	-	1	11' - 6 ¾"	-	-	-	-	-	-
SERIES H460	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	3' - 9"	*	-	-	1	140' - 3"
															* DIMENSION "b" VARIES FROM 3'-5 ¼" TO 0'-7 ¼" IN INCREMENTS OF 0'-2" (18 BARS)					
H461	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	3' - 9"	3' - 11 ¼"	-	-	1	11' - 7 ½"
R431	HEADWALL & WINGWALL	4	1' - 4"	1' - 0"	-	-	2	2' - 4"												
R441	HEADWALL & WINGWALL	4							1' - 10"	1' - 0"	-	-	2	2' - 10"						
R461	HEADWALL & WINGWALL	4													2' - 11"	1' - 0"	-	-	2	3' - 11"
S430	BOTTOM SLAB & TOEWALL	4	9' - 4 ½"	0' - 4 ½"	0' - 8"	1' - 5"	6	11' - 10"	-	-	-	-	-	-	-	-	-	-	-	-
S440	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	12' - 7 ½"	0' - 4 ½"	0' - 8"	1' - 5"	6	15' - 1"	-	-	-	-	-	-
S460	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	19' - 1 ½"	0' - 4 ½"	0' - 8"	1' - 5"	6	21' - 7"

PRECAST NOTES

PRECAST UNITS:

THE CONTRACTOR MAY, WITH PERMISSION FROM THE ENGINEER, SUBSTITUTE PRECAST ENDWALLS FOR CAST-IN-PLACE ENDWALLS PROVIDED THAT:

① APPROPRIATE SIZING AND LOCATION OF THE LIFTING INSERTS SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION OF THE PRECAST ENDWALL.

② THE CONTRACTOR TO PATCH ALL LIFTING INSERT HOLES AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.

③ PAYMENT FOR PRECAST ENDWALLS BASED ON THE QUANTITIES FOR CAST-IN-PLACE ENDWALLS IS ACCEPTABLE.

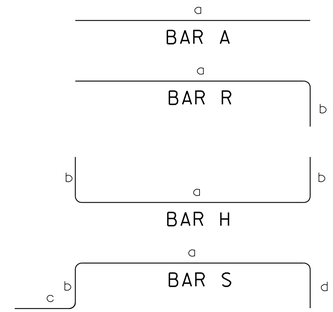
④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.

⑤ PIPE OPENINGS FOR HEADWALLS ARE BASED ON REINFORCED CONCRETE PIPE WITH TYPE "B" WALL THICKNESS (AASHTO M170).

⑥ ADDITIONAL REINFORCING STEEL NECESSARY TO MAINTAIN THE INTEGRITY OF THE STRUCTURE DURING HANDLING AND PLACEMENT SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.

CONCRETE: F'c=4,500 POUNDS PER SQUARE INCH MINIMUM AT 28 DAYS.
REINFORCING STEEL: ASTM A615, Fy=60,000 POUNDS PER SQUARE INCH.

REINFORCING STEEL LEGEND



REINFORCING STEEL CODE

TYPE	SIZE	SERIES
A	5	06

DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF BAR.

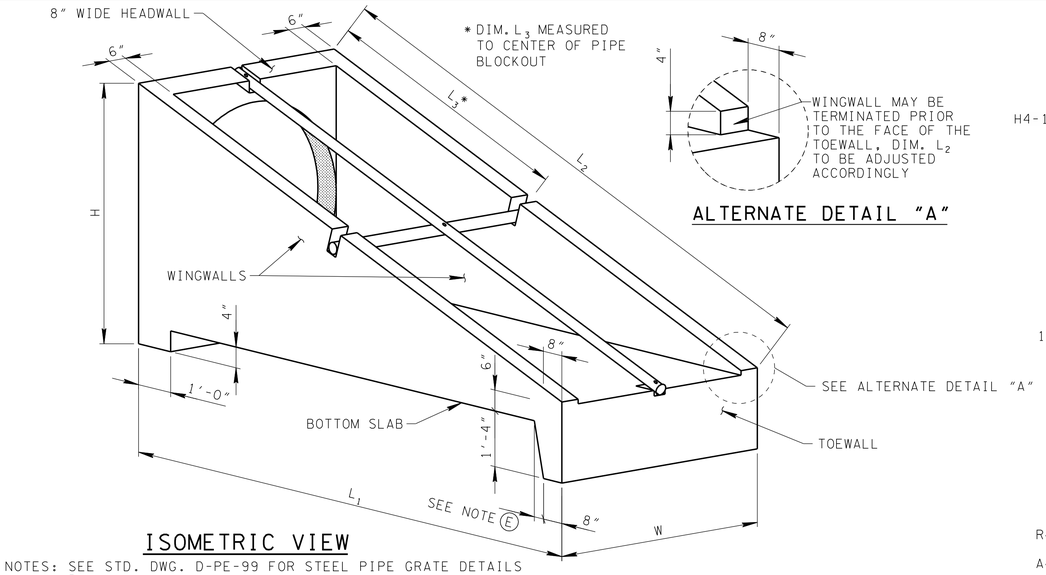
STANDARD C.R.S.I. HOOK DETAILS SHALL APPLY, EXCEPT AS NOTED.

NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

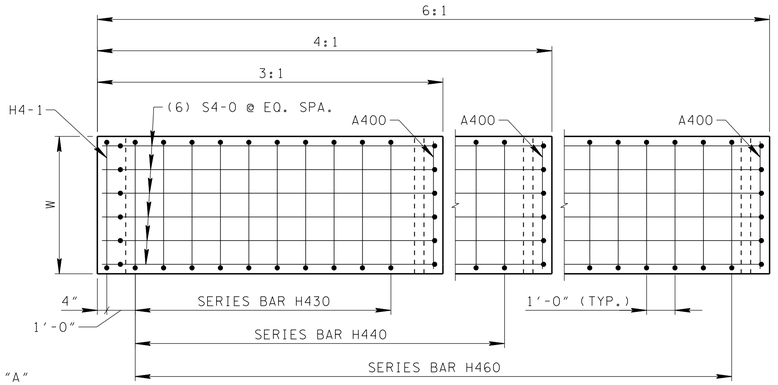
30" CONCRETE ENDWALL
CROSS DRAIN WITH
STEEL PIPE GRATE
(FOR 3:1, 4:1 & 6:1 SLOPES)

3-01-12 D-PE-30B



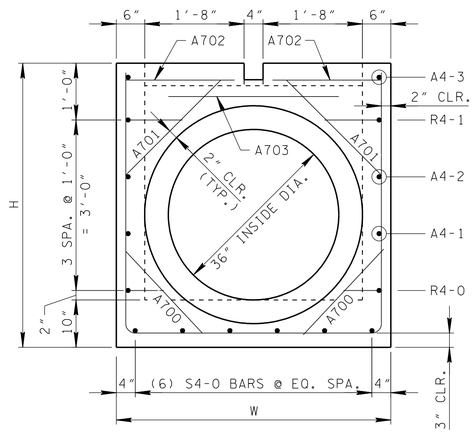
ISOMETRIC VIEW

ALTERNATE DETAIL "A"

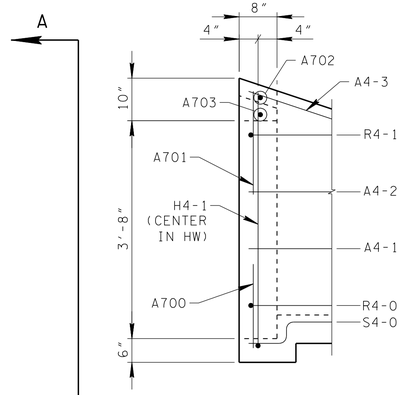


BOTTOM SLAB PLAN

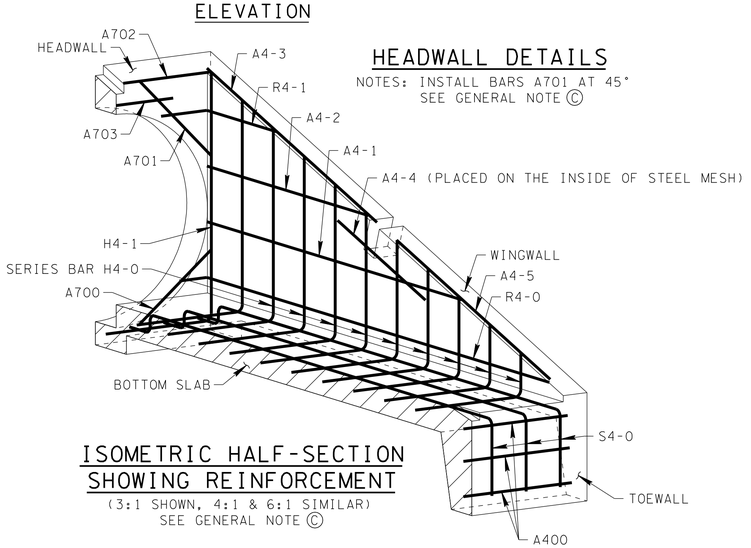
NOTES: SEE STD. DWG. D-PE-99 FOR STEEL PIPE GRATE DETAILS
¾" CHAMFER REQUIRED ON ALL EXPOSED EDGES



ELEVATION



PARTIAL VIEW A-A

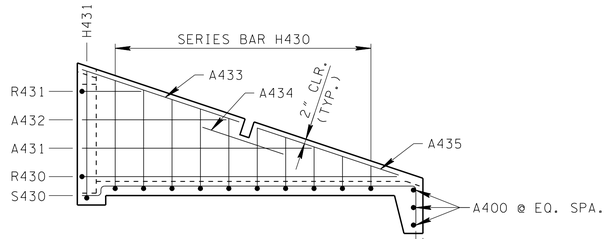


ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT

(3:1 SHOWN, 4:1 & 6:1 SIMILAR)
SEE GENERAL NOTE (C)

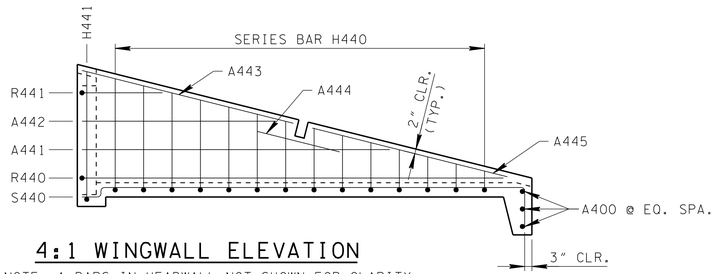
HEADWALL DETAILS

NOTES: INSTALL BARS A701 AT 45°
SEE GENERAL NOTE (C)



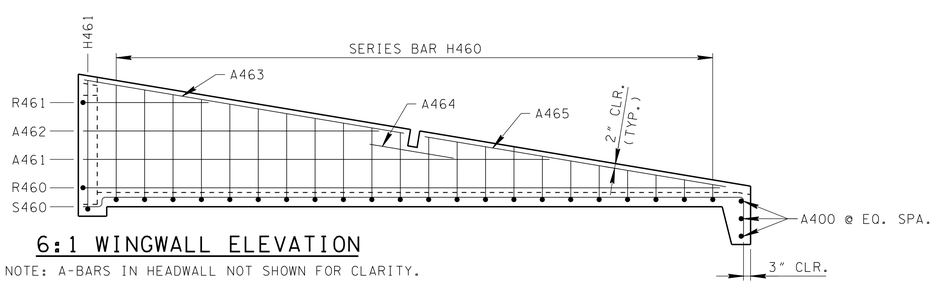
3:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



4:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



6:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

GENERAL NOTES

(A) DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST 36" CONCRETE ENDWALLS (TYPE "U") FOR CROSS DRAINS ONLY. "U" ENDWALL TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT PERPENDICULAR TO CENTERLINE. CAST-IN-PLACE CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.

(B) SEE STD. DWG. D-PE-36B FOR BILL OF STEEL & PRECAST NOTES.

(C) "-" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.

(D) SPLICING OF REINFORCEMENT IS ACCEPTABLE PROVIDED THAT A MINIMUM 21" SPLICE LENGTH IS USED.

(E) TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.

(F) PAYMENT WILL BE MADE UNDER:

ITEM NO. 611-07.01, CLASS "A" CONCRETE (PIPE ENDWALLS)----CU. YD.
ITEM NO. 611-07.02, STEEL BAR REINFORCING (PIPE ENDWALLS)----LB.

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 36" PIPE

SLOPE	CONCRETE ENDWALL DIMENSIONS					STRUCTURAL STEEL PIPE DIMENSIONS		ESTIMATED QUANTITIES		
	H	L_1	L_2	L_3	W	LG	WG	CLASS "A" CONC. CU. YD.	STEEL BAR REINF. LB.	STRUCTURAL STEEL LB.
3:1	5' - 0"	12' - 2"	12' - 9⅞"	6' - 4¾"	4' - 8"	12' - 8¾"	4' - 8"	2.43	219	132
4:1		16' - 0"	16' - 5⅞"	8' - 2½"		16' - 5"		3.08	276	160
6:1		23' - 8"	23' - 11⅞"	12' - 0¼"		23' - 11⅜"		4.39	388	217

NOTE: SEE STD. DWG. D-PE-99 FOR STRUCTURAL STEEL PIPE DIMENSIONS LG & WG.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

36" CONCRETE ENDWALL
CROSS DRAIN WITH
STEEL PIPE GRATE
(FOR 3:1, 4:1 & 6:1 SLOPES)

NOT TO SCALE | 3-01-12 | D-PE-36A

BILL OF STEEL

CODE NO.	LOCATION	BAR SIZE	3:1 WINGWALL SLOPE						4:1 WINGWALL SLOPE						6:1 WINGWALL SLOPE					
			BENDING DIMENSIONS				NO. REQ'D	LENGTH	BENDING DIMENSIONS				NO. REQ'D	LENGTH	BENDING DIMENSIONS				NO. REQ'D	LENGTH
			a	b	c	d			a	b	c	d			a	b	c	d		
A400	TOEWALL	4	4' - 4"	-	-	-	3	4' - 4"	4' - 4"	-	-	-	3	4' - 4"	4' - 4"	-	-	-	3	4' - 4"
A431	WINGWALLS	4	8' - 1"	-	-	-	2	8' - 1"	-	-	-	-	-	-	-	-	-	-	-	-
A432	WINGWALLS	4	5' - 1"	-	-	-	2	5' - 1"	-	-	-	-	-	-	-	-	-	-	-	-
A433	WINGWALLS	4	5' - 9 ½"	-	-	-	2	5' - 9 ½"	-	-	-	-	-	-	-	-	-	-	-	-
A434	WINGWALLS	4	3' - 0"	-	-	-	2	3' - 0"	-	-	-	-	-	-	-	-	-	-	-	-
A435	WINGWALLS	4	5' - 4"	-	-	-	2	5' - 4"	-	-	-	-	-	-	-	-	-	-	-	-
A441	WINGWALLS	4	-	-	-	-	-	-	10' - 10"	-	-	-	2	10' - 10"	-	-	-	-	-	-
A442	WINGWALLS	4	-	-	-	-	-	-	6' - 10"	-	-	-	2	6' - 10"	-	-	-	-	-	-
A443	WINGWALLS	4	-	-	-	-	-	-	7' - 7 ½"	-	-	-	2	7' - 7 ½"	-	-	-	-	-	-
A444	WINGWALLS	4	-	-	-	-	-	-	3' - 0"	-	-	-	2	3' - 0"	-	-	-	-	-	-
A445	WINGWALLS	4	-	-	-	-	-	-	7' - 2 ½"	-	-	-	2	7' - 2 ½"	-	-	-	-	-	-
A461	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	16' - 5"	-	-	-	2	16' - 5"
A462	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	10' - 5"	-	-	-	2	10' - 5"
A463	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	11' - 5 ½"	-	-	-	2	11' - 5 ½"
A464	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	3' - 0"	-	-	-	2	3' - 0"
A465	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	10' - 10"	-	-	-	2	10' - 10"
A700	HEADWALL	7	1' - 11"	-	-	-	2	1' - 11"	1' - 11"	-	-	-	2	1' - 11"	1' - 11"	-	-	-	2	1' - 11"
A701	HEADWALL	7	2' - 4"	-	-	-	2	2' - 4"	2' - 4"	-	-	-	2	2' - 4"	2' - 4"	-	-	-	2	2' - 4"
A702	HEADWALL	7	1' - 10"	-	-	-	2	1' - 10"	1' - 10"	-	-	-	2	1' - 10"	1' - 10"	-	-	-	2	1' - 10"
A703	HEADWALL	7	3' - 0"	-	-	-	1	3' - 0"	3' - 0"	-	-	-	1	3' - 0"	3' - 0"	-	-	-	1	3' - 0"
SERIES H430	BOTTOM SLAB & WINGWALL	4	4' - 4"	*	-	-	1	89' - 2"	-	-	-	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 3'-9 ½" TO 0'-9 ½" IN INCREMENTS OF 0'-4" (10 BARS)																	
H431	BOTTOM SLAB & HEADWALL	4	4' - 4"	4' - 5 ½"	-	-	1	13' - 3"	-	-	-	-	-	-	-	-	-	-	-	-
SERIES H440	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	4' - 4"	*	-	-	1	124' - 10"	-	-	-	-	-	-
									* DIMENSION "b" VARIES FROM 3'-11" TO 0'-8" IN INCREMENTS OF 0'-3" (14 BARS)											
H441	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	4' - 4"	4' - 6"	-	-	1	13' - 4"	-	-	-	-	-	-
SERIES H460	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	4' - 4"	*	-	-	1	195' - 3"
															* DIMENSION "b" VARIES FROM 4'-0 ¼" TO 0'-6 ¼" IN INCREMENTS OF 0'-2" (22 BARS)					
H461	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	4' - 4"	4' - 6 ¼"	-	-	1	13' - 4 ½"
R430	HEADWALL & WINGWALL	4	11' - 1"	0' - 7 ½"	-	-	2	11' - 8 ½"	-	-	-	-	-	-	-	-	-	-	-	-
R431	HEADWALL & WINGWALL	4	2' - 1"	1' - 0"	-	-	2	3' - 1"	-	-	-	-	-	-	-	-	-	-	-	-
R440	HEADWALL & WINGWALL	4	-	-	-	-	-	-	14' - 10"	0' - 7 ½"	-	-	2	15' - 5 ½"	-	-	-	-	-	-
R441	HEADWALL & WINGWALL	4	-	-	-	-	-	-	2' - 10"	1' - 0"	-	-	2	3' - 10"	-	-	-	-	-	-
R460	HEADWALL & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	22' - 5"	0' - 7 ½"	-	-	2	23' - 0 ½"
R461	HEADWALL & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	4' - 5"	1' - 0"	-	-	2	5' - 5"
S430	BOTTOM SLAB & TOEWALL	4	11' - 1 ½"	0' - 4 ½"	0' - 8"	1' - 5"	6	13' - 7"	-	-	-	-	-	-	-	-	-	-	-	-
S440	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	14' - 11 ½"	0' - 4 ½"	0' - 8"	1' - 5"	6	17' - 5"	-	-	-	-	-	-
S460	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	22' - 7 ½"	0' - 4 ½"	0' - 8"	1' - 5"	6	25' - 1"

PRECAST NOTES

PRECAST UNITS:

THE CONTRACTOR MAY, WITH PERMISSION FROM THE ENGINEER, SUBSTITUTE PRECAST ENDWALLS FOR CAST-IN-PLACE ENDWALLS PROVIDED THAT:

① APPROPRIATE SIZING AND LOCATION OF THE LIFTING INSERTS SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION OF THE PRECAST ENDWALL.

② THE CONTRACTOR TO PATCH ALL LIFTING INSERT HOLES AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.

③ PAYMENT FOR PRECAST ENDWALLS BASED ON THE QUANTITIES FOR CAST-IN-PLACE ENDWALLS IS ACCEPTABLE.

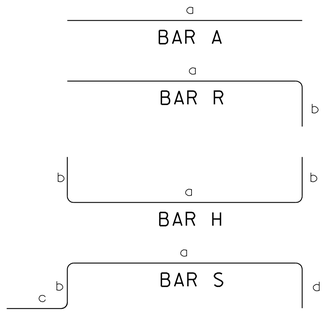
④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.

⑤ PIPE OPENINGS FOR HEADWALLS ARE BASED ON REINFORCED CONCRETE PIPE WITH TYPE "B" WALL THICKNESS (AASHTO M170).

⑥ ADDITIONAL REINFORCING STEEL NECESSARY TO MAINTAIN THE INTEGRITY OF THE STRUCTURE DURING HANDLING AND PLACEMENT SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.

CONCRETE: f'_c=4,500 POUNDS PER SQUARE INCH MINIMUM AT 28 DAYS.
REINFORCING STEEL: ASTM A615, Fy=60,000 POUNDS PER SQUARE INCH.

REINFORCING STEEL LEGEND



REINFORCING STEEL CODE

TYPE	SIZE	SERIES
A	5	06

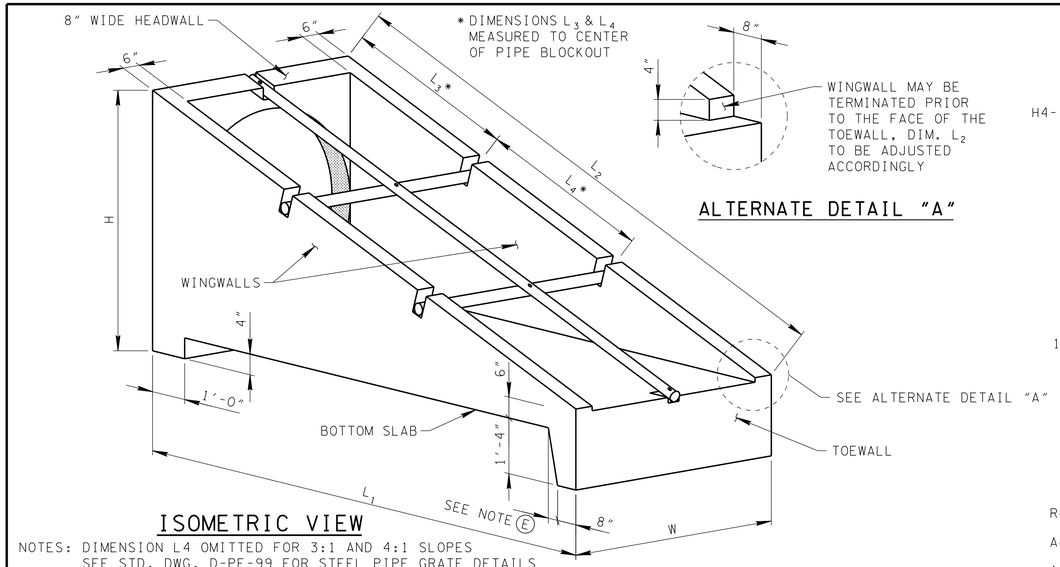
DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF BAR.

STANDARD C.R.S.I. HOOK DETAILS SHALL APPLY, EXCEPT AS NOTED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

36" CONCRETE ENDWALL
CROSS DRAIN WITH
STEEL PIPE GRATE
(FOR 3:1, 4:1 & 6:1 SLOPES)

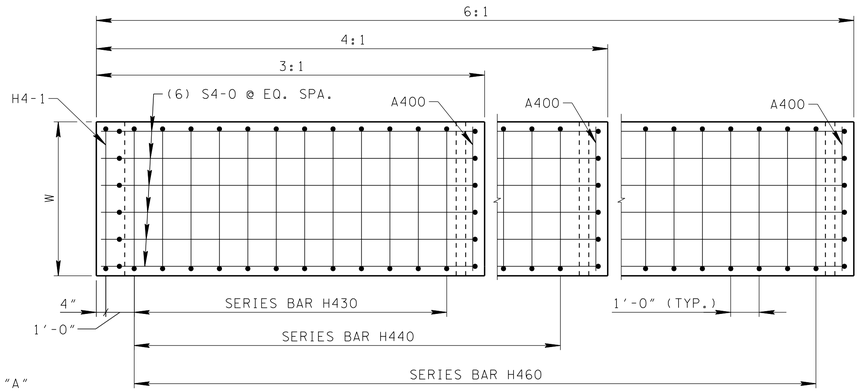
NOT TO SCALE | 3-01-12 | D-PE-36B



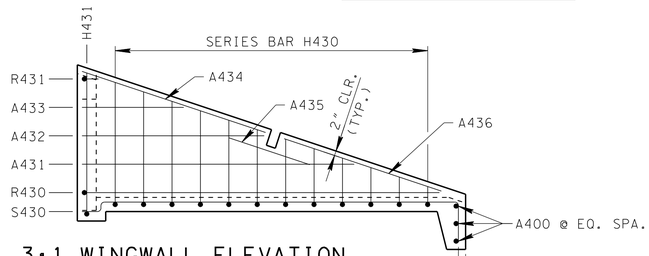
ISOMETRIC VIEW

NOTES: DIMENSION L4 OMITTED FOR 3:1 AND 4:1 SLOPES
SEE STD. DWG. D-PE-99 FOR STEEL PIPE GRATE DETAILS
¾" CHAMFER REQUIRED ON ALL EXPOSED EDGES

ALTERNATE DETAIL "A"

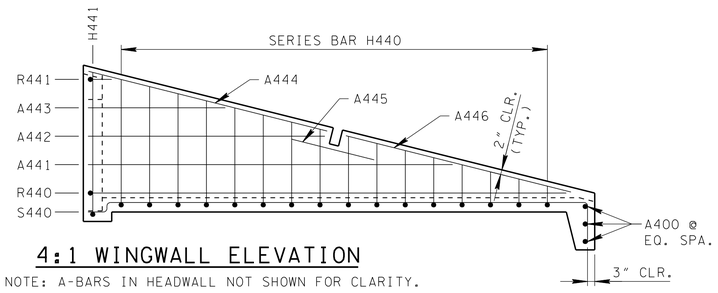


BOTTOM SLAB PLAN



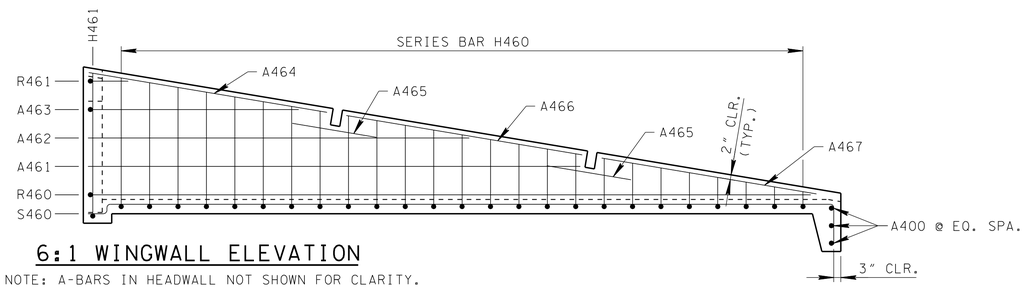
3:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



4:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



6:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

GENERAL NOTES

(A) DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST 42" CONCRETE ENDWALLS (TYPE "U") FOR CROSS DRAINS ONLY. "U" ENDWALL TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT PERPENDICULAR TO CENTERLINE. CAST-IN-PLACE CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.

(B) SEE STD. DWG. D-PE-42B FOR BILL OF STEEL & PRECAST NOTES.

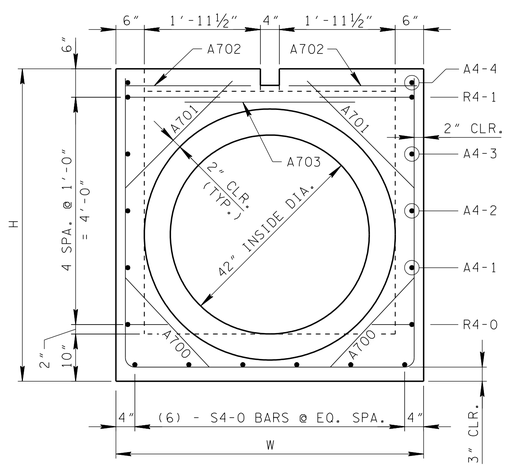
(C) "-" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.

(D) SPLICING OF REINFORCEMENT IS ACCEPTABLE PROVIDED THAT A MINIMUM 21" SPLICE LENGTH IS USED.

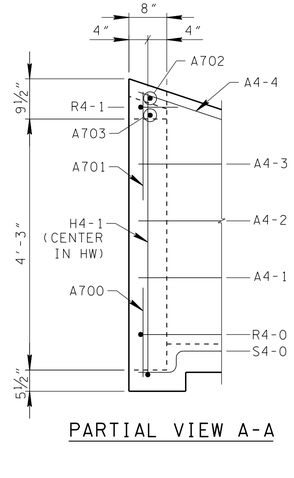
(E) TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.

(F) PAYMENT WILL BE MADE UNDER:

ITEM NO. 611-07.01, CLASS "A" CONCRETE (PIPE ENDWALLS)----CU. YD.
ITEM NO. 611-07.02, STEEL BAR REINFORCING (PIPE ENDWALLS)----LB.

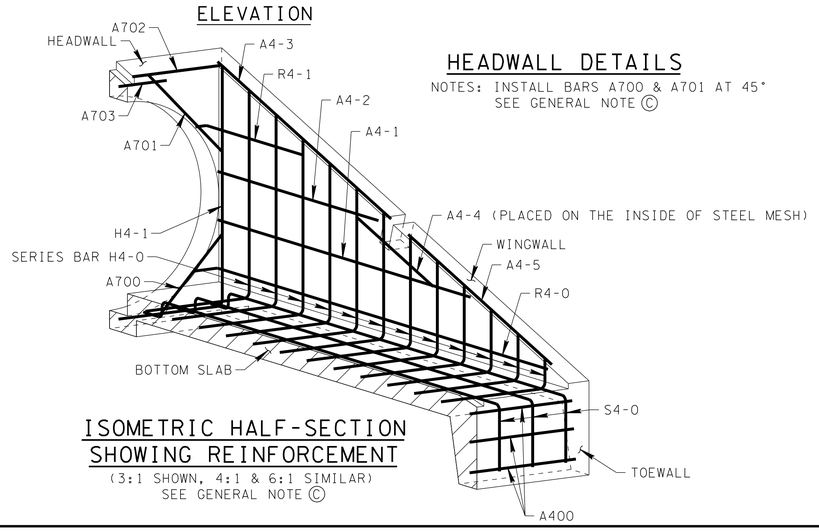


ELEVATION



HEADWALL DETAILS

NOTES: INSTALL BARS A700 & A701 AT 45°
SEE GENERAL NOTE (C)



ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT

(3:1 SHOWN, 4:1 & 6:1 SIMILAR)
SEE GENERAL NOTE (C)

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 42" PIPE											
SLOPE	CONCRETE ENDWALL DIMENSIONS						STRUCTURAL STEEL PIPE DIMENSIONS		ESTIMATED QUANTITIES		
	H	L_1	L_2	L_3	L_4	W	LG	WG	CLASS "A" CONC. CU. YD.	STEEL BAR REINF. LB.	STRUCTURAL STEEL LB.
3:1	5' - 6"	13' - 8"	14' - 4⅞"	7' - 4½"	-	5' - 3"	14' - 3¾"	1 @ 5' - 3"	3.03	261	148
4:1		18' - 0"	18' - 6⅝"	9' - 2⅞"	-		18' - 5¾"	1 @ 5' - 3"	3.85	327	180
6:1		26' - 8"	27' - 0⅜"	9' - 1"	9' - 1"		26' - 11⅞"	2 @ 5' - 3"	5.50	464	284

NOTE: SEE STD. DWG. D-PE-99 FOR STRUCTURAL STEEL PIPE DIMENSIONS LG & WG.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

42" CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE

(FOR 3:1, 4:1 & 6:1 SLOPES)

NOT TO SCALE | 3-01-12 | D-PE-42A

BILL OF STEEL

CODE NO.	LOCATION	BAR SIZE	3:1 WINGWALL SLOPE						4:1 WINGWALL SLOPE						6:1 WINGWALL SLOPE					
			BENDING DIMENSIONS				NO. REQ'D	LENGTH	BENDING DIMENSIONS				NO. REQ'D	LENGTH	BENDING DIMENSIONS				NO. REQ'D	LENGTH
			a	b	c	d			a	b	c	d			a	b	c	d		
A400	TOEWALL	4	4' - 11"	-	-	-	3	4' - 11"	4' - 11"	-	-	-	3	4' - 11"	4' - 11"	-	-	-	3	4' - 11"
A431	WINGWALLS	4	9' - 7"	-	-	-	2	9' - 7"	-	-	-	-	-	-	-	-	-	-	-	-
A432	WINGWALLS	4	6' - 5"	-	-	-	2	6' - 5"	-	-	-	-	-	-	-	-	-	-	-	-
A433	WINGWALLS	4	3' - 7"	-	-	-	2	3' - 7"	-	-	-	-	-	-	-	-	-	-	-	-
A434	WINGWALLS	4	6' - 9 ½"	-	-	-	2	6' - 9 ½"	-	-	-	-	-	-	-	-	-	-	-	-
A435	WINGWALLS	4	3' - 0"	-	-	-	2	3' - 0"	-	-	-	-	-	-	-	-	-	-	-	-
A436	WINGWALLS	4	5' - 11 ½"	-	-	-	2	5' - 11 ½"	-	-	-	-	-	-	-	-	-	-	-	-
A441	WINGWALLS	4	-	-	-	-	-	-	12' - 10"	-	-	-	2	12' - 10"	-	-	-	-	-	-
A442	WINGWALLS	4	-	-	-	-	-	-	8' - 4 ½"	-	-	-	2	8' - 4 ½"	-	-	-	-	-	-
A443	WINGWALLS	4	-	-	-	-	-	-	4' - 10"	-	-	-	2	4' - 10"	-	-	-	-	-	-
A444	WINGWALLS	4	-	-	-	-	-	-	8' - 8"	-	-	-	2	8' - 8"	-	-	-	-	-	-
A445	WINGWALLS	4	-	-	-	-	-	-	3' - 0"	-	-	-	2	3' - 0"	-	-	-	-	-	-
A446	WINGWALLS	4	-	-	-	-	-	-	8' - 2 ½"	-	-	-	2	8' - 2 ½"	-	-	-	-	-	-
A461	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	17' - 3"	-	-	-	2	17' - 3"
A462	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	13' - 5"	-	-	-	2	13' - 5"
A463	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	7' - 5"	-	-	-	2	7' - 5"
A464	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	8' - 6 ½"	-	-	-	2	8' - 6 ½"
A465	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	3' - 0"	-	-	-	4	3' - 0"
A466	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	8' - 5"	-	-	-	2	8' - 5"
A467	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	7' - 9"	-	-	-	2	7' - 9"
A700	HEADWALL	7	2' - 1"	-	-	-	2	2' - 1"	2' - 1"	-	-	-	2	2' - 1"	2' - 1"	-	-	-	2	2' - 1"
A701	HEADWALL	7	2' - 5 ½"	-	-	-	2	2' - 5 ½"	2' - 5 ½"	-	-	-	2	2' - 5 ½"	2' - 5 ½"	-	-	-	2	2' - 5 ½"
A702	HEADWALL	7	2' - 1 ½"	-	-	-	2	2' - 1 ½"	2' - 1 ½"	-	-	-	2	2' - 1 ½"	2' - 1 ½"	-	-	-	2	2' - 1 ½"
A703	HEADWALL	7	3' - 0"	-	-	-	1	3' - 0"	3' - 0"	-	-	-	1	3' - 0"	3' - 0"	-	-	-	1	3' - 0"
SERIES H430	BOTTOM SLAB & WINGWALL	4	4' - 11"	*	-	-	1	118' - 0"	-	-	-	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 4'-3 ½" TO 0'-7 ½" IN INCREMENTS OF 0'-4" (12 BARS)																	
H431	BOTTOM SLAB & HEADWALL	4	4' - 11"	4' - 11 ½"	-	-	1	14' - 10"	-	-	-	-	-	-	-	-	-	-	-	-
SERIES H440	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	4' - 11"	*	-	-	1	160' - 0"	-	-	-	-	-	-
									* DIMENSION "b" VARIES FROM 4'-5" TO 0'-8" IN INCREMENTS OF 0'-3" (16 BARS)											
H441	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	4' - 11"	5' - 0"	-	-	1	14' - 11"	-	-	-	-	-	-
SERIES H460	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	4' - 11"	*	-	-	1	248' - 11 ½"
															* DIMENSION "b" VARIES FROM 4'-6 ¼" TO 0'-6 ¼" IN INCREMENTS OF 0'-2" (25 BARS)					
H461	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	4' - 11"	5' - 0 ¼"	-	-	1	14' - 11 ½"
R430	HEADWALL & WINGWALL	4	12' - 7"	0' - 9"	-	-	2	13' - 4"	-	-	-	-	-	-	-	-	-	-	-	-
R431	HEADWALL & WINGWALL	4	0' - 7"	1' - 8"	-	-	2	2' - 3"	-	-	-	-	-	-	-	-	-	-	-	-
R440	HEADWALL & WINGWALL	4	-	-	-	-	-	-	16' - 10"	0' - 9"	-	-	2	17' - 7"	-	-	-	-	-	-
R441	HEADWALL & WINGWALL	4	-	-	-	-	-	-	0' - 10"	1' - 8"	-	-	2	2' - 6"	-	-	-	-	-	-
R460	HEADWALL & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	25' - 5"	0' - 9"	-	-	2	26' - 2"
R461	HEADWALL & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	1' - 5"	1' - 8"	-	-	2	3' - 1"
S430	BOTTOM SLAB & TOEWALL	4	12' - 7 ½"	0' - 4 ½"	0' - 8"	1' - 5"	6	15' - 1"	-	-	-	-	-	-	-	-	-	-	-	-
S440	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	16' - 11 ½"	0' - 4 ½"	0' - 8"	1' - 5"	6	19' - 5"	-	-	-	-	-	-
S460	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	25' - 7 ½"	0' - 4 ½"	0' - 8"	1' - 5"	6	28' - 1"

PRECAST NOTES

PRECAST UNITS:

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① APPROPRIATE SIZING AND LOCATION OF THE LIFTING INSERTS SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION OF THE PRECAST ENDWALL.

② THE CONTRACTOR TO PATCH ALL LIFTING INSERT HOLES AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.

③ PAYMENT FOR PRECAST ENDWALLS BASED ON THE QUANTITIES FOR CAST-IN-PLACE ENDWALLS IS ACCEPTABLE.

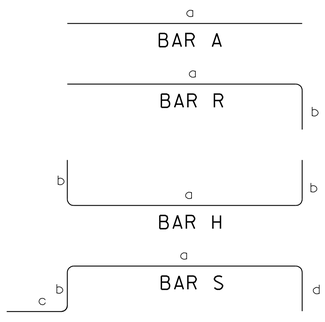
④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.

⑤ PIPE OPENINGS FOR HEADWALLS ARE BASED ON REINFORCED CONCRETE PIPE WITH TYPE "B" WALL THICKNESS (AASHTO M170).

⑥ ADDITIONAL REINFORCING STEEL NECESSARY TO MAINTAIN THE INTEGRITY OF THE STRUCTURE DURING HANDLING AND PLACEMENT SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.

CONCRETE: F'c=4,500 POUNDS PER SQUARE INCH MINIMUM AT 28 DAYS.
REINFORCING STEEL: ASTM A615, Fy=60,000 POUNDS PER SQUARE INCH.

REINFORCING STEEL LEGEND



REINFORCING STEEL CODE

TYPE	SIZE	SERIES
A	5	06

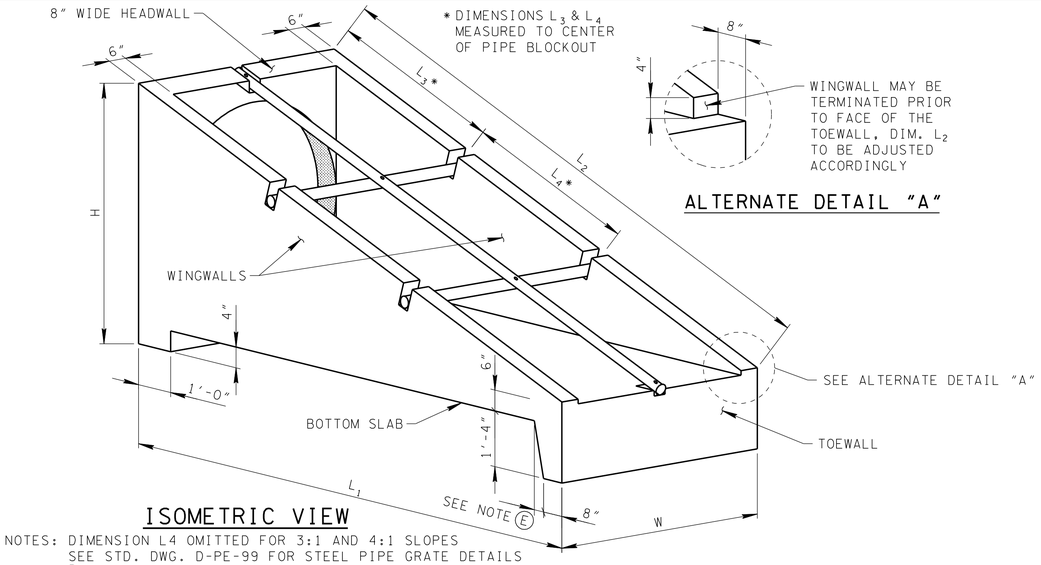
DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF BAR.

STANDARD C.R.S.I. HOOK DETAILS SHALL APPLY, EXCEPT AS NOTED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

42" CONCRETE ENDWALL
CROSS DRAIN WITH
STEEL PIPE GRATE
(FOR 3:1, 4:1 & 6:1 SLOPES)

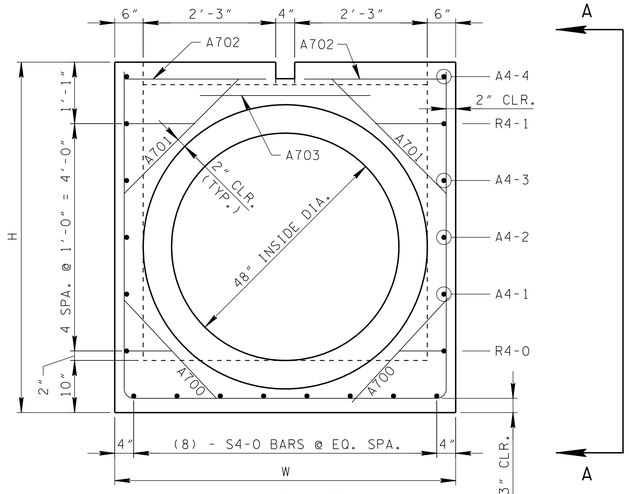
NOT TO SCALE | 3-01-12 | D-PE-42B



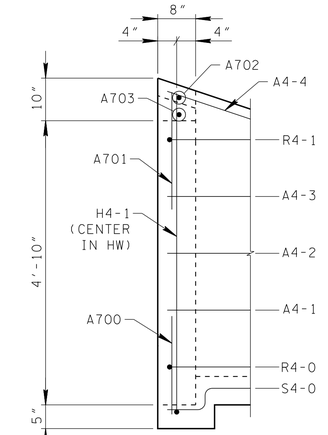
ISOMETRIC VIEW

ALTERNATE DETAIL "A"

NOTES: DIMENSION L4 OMITTED FOR 3:1 AND 4:1 SLOPES
SEE STD. DWG. D-PE-99 FOR STEEL PIPE GRATE DETAILS
¾" CHAMFER REQUIRED ON ALL EXPOSED EDGES



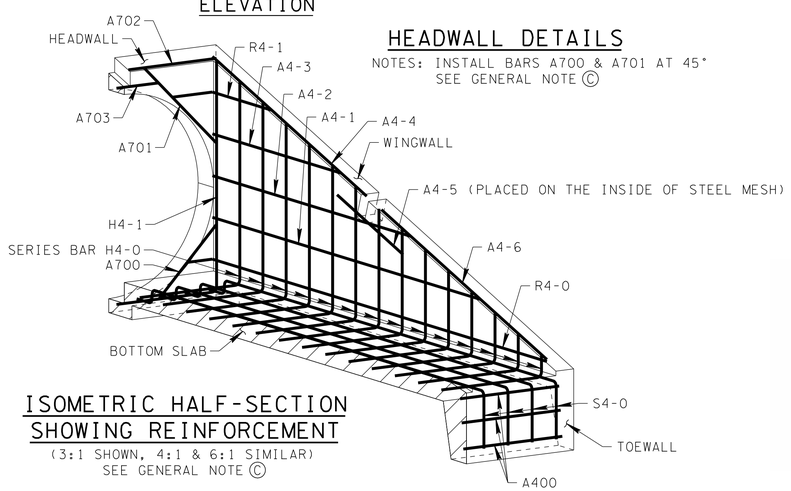
ELEVATION



PARTIAL VIEW A-A

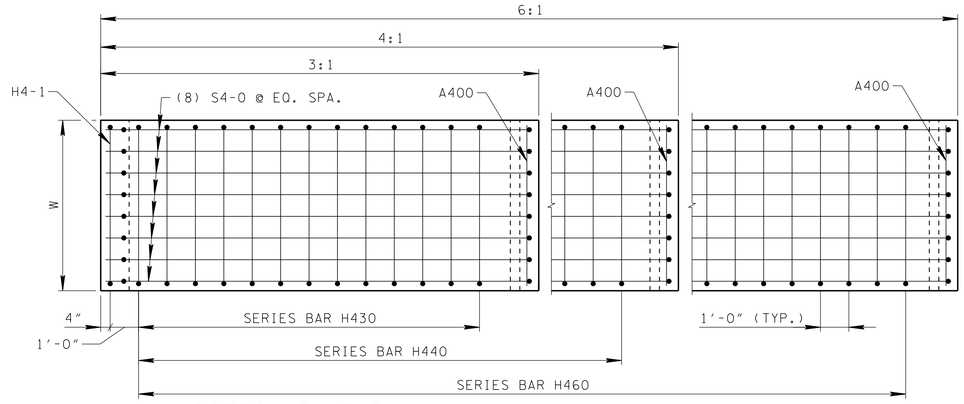
HEADWALL DETAILS

NOTES: INSTALL BARS A700 & A701 AT 45°
SEE GENERAL NOTE (C)

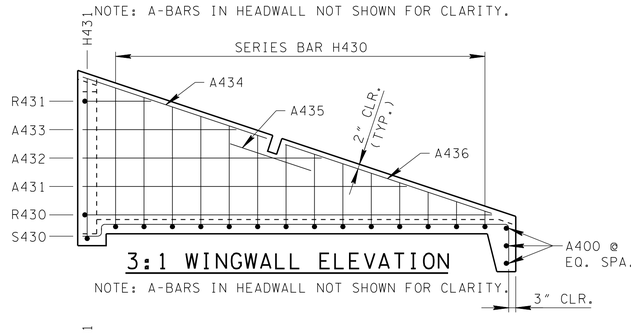


ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT

(3:1 SHOWN, 4:1 & 6:1 SIMILAR)
SEE GENERAL NOTE (C)

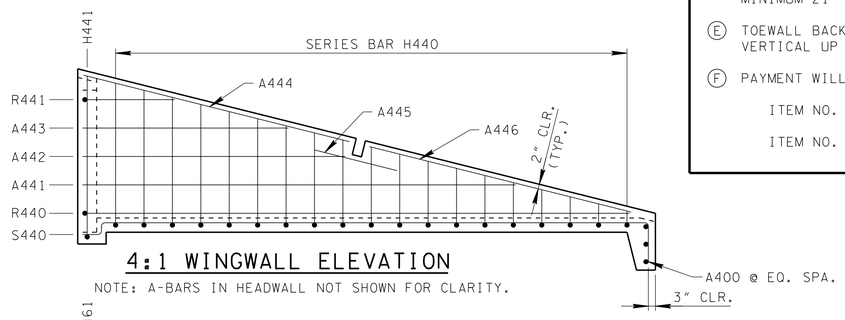


BOTTOM SLAB PLAN



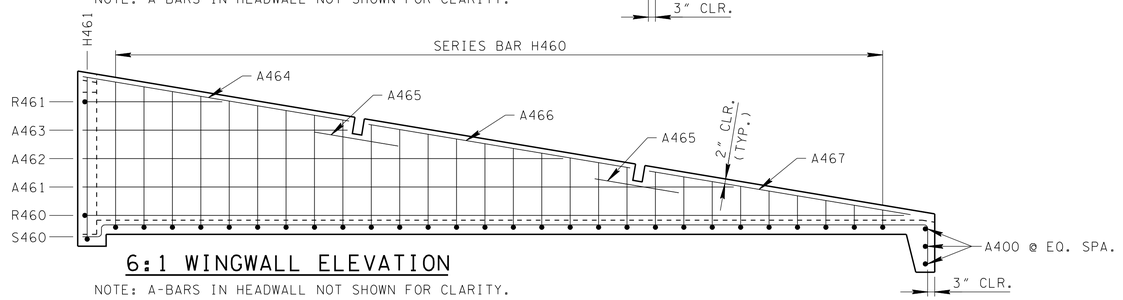
3:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



4:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



6:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

GENERAL NOTES

(A) DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST 48" CONCRETE ENDWALLS (TYPE "U") FOR CROSS DRAINS ONLY. "U" ENDWALL TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT PERPENDICULAR TO CENTERLINE. CAST-IN-PLACE CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.

(B) SEE STD. DWG. D-PE-48B FOR BILL OF STEEL & PRECAST NOTES.

(C) "-" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.

(D) SPLICING OF REINFORCEMENT IS ACCEPTABLE PROVIDED THAT A MINIMUM 21" SPLICE LENGTH IS USED.

(E) TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.

(F) PAYMENT WILL BE MADE UNDER:

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ITEM NO. 611-07.02, STEEL BAR REINFORCING (PIPE ENDWALLS)----LB.

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 48" PIPE

SLOPE	CONCRETE ENDWALL DIMENSIONS						STRUCTURAL STEEL PIPE DIMENSIONS		ESTIMATED QUANTITIES		
	H	L_1	L_2	L_3	L_4	W	LG	WG	CLASS "A" CONC. CU. YD.	STEEL BAR REINF. LB.	STRUCTURAL STEEL LB.
3:1	6' - 1"	15' - 5"	16' - 3"	7' - 4⅞"	-	5' - 10"	16' - 1⅞"	1 @ 5' - 10"	3.79	333	167
4:1		20' - 4"	20' - 11½"	10' - 3¾"	-		20' - 10⅝"	1 @ 5' - 10"	4.83	420	203
6:1		30' - 2"	30' - 7"	10' - 0¾"	10' - 0⅛"		30' - 6⅜"	2 @ 5' - 10"	6.92	597	320

NOTE: SEE STD. DWG. D-PE-99 FOR STRUCTURAL STEEL PIPE DIMENSIONS LG & WG.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

48" CONCRETE ENDWALL
CROSS DRAIN WITH
STEEL PIPE GRATE

(FOR 3:1, 4:1 & 6:1 SLOPES)

NOT TO SCALE | 3-01-12 | D-PE-48A

BILL OF STEEL

CODE NO.	LOCATION	BAR SIZE	3:1 WINGWALL SLOPE						4:1 WINGWALL SLOPE						6:1 WINGWALL SLOPE					
			BENDING DIMENSIONS				NO. REQ'D	LENGTH	BENDING DIMENSIONS				NO. REQ'D	LENGTH	BENDING DIMENSIONS				NO. REQ'D	LENGTH
			a	b	c	d			a	b	c	d			a	b	c	d		
A400	TOEWALL	4	5' - 6"	-	-	-	3	5' - 6"	5' - 6"	-	-	-	3	5' - 6"	5' - 6"	-	-	-	3	5' - 6"
A431	WINGWALLS	4	11' - 4"	-	-	-	2	11' - 4"	-	-	-	-	-	-	-	-	-	-	-	-
A432	WINGWALLS	4	8' - 4"	-	-	-	2	8' - 4"	-	-	-	-	-	-	-	-	-	-	-	-
A433	WINGWALLS	4	5' - 4"	-	-	-	2	5' - 4"	-	-	-	-	-	-	-	-	-	-	-	-
A434	WINGWALLS	4	6' - 10"	-	-	-	2	6' - 10"	-	-	-	-	-	-	-	-	-	-	-	-
A435	WINGWALLS	4	3' - 0"	-	-	-	2	3' - 0"	-	-	-	-	-	-	-	-	-	-	-	-
A436	WINGWALLS	4	7' - 9"	-	-	-	2	7' - 9"	-	-	-	-	-	-	-	-	-	-	-	-
A441	WINGWALLS	4	-	-	-	-	-	-	15' - 2"	-	-	-	2	15' - 2"	-	-	-	-	-	-
A442	WINGWALLS	4	-	-	-	-	-	-	9' - 4"	-	-	-	2	9' - 4"	-	-	-	-	-	-
A443	WINGWALLS	4	-	-	-	-	-	-	7' - 2"	-	-	-	2	7' - 2"	-	-	-	-	-	-
A444	WINGWALLS	4	-	-	-	-	-	-	9' - 8"	-	-	-	2	9' - 8"	-	-	-	-	-	-
A445	WINGWALLS	4	-	-	-	-	-	-	3' - 0"	-	-	-	2	3' - 0"	-	-	-	-	-	-
A446	WINGWALLS	4	-	-	-	-	-	-	9' - 7"	-	-	-	2	9' - 7"	-	-	-	-	-	-
A461	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	22' - 11"	-	-	-	2	22' - 11"
A462	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	16' - 11"	-	-	-	2	16' - 11"
A463	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	9' - 4"	-	-	-	2	9' - 4"
A464	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	9' - 6"	-	-	-	2	9' - 6"
A465	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	3' - 0"	-	-	-	4	3' - 0"
A466	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	9' - 4"	-	-	-	2	9' - 4"
A467	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	9' - 4"	-	-	-	2	9' - 4"
A700	HEADWALL	7	2' - 4"	-	-	-	2	2' - 4"	2' - 4"	-	-	-	2	2' - 4"	2' - 4"	-	-	-	2	2' - 4"
A701	HEADWALL	7	2' - 9"	-	-	-	2	2' - 9"	2' - 9"	-	-	-	2	2' - 9"	2' - 9"	-	-	-	2	2' - 9"
A702	HEADWALL	7	2' - 5"	-	-	-	2	2' - 5"	2' - 5"	-	-	-	2	2' - 5"	2' - 5"	-	-	-	2	2' - 5"
A703	HEADWALL	7	3' - 0"	-	-	-	1	3' - 0"	3' - 0"	-	-	-	1	3' - 0"	3' - 0"	-	-	-	1	3' - 0"
SERIES H430	BOTTOM SLAB & WINGWALL	4	5' - 6"	*	-	-	1	152' - 10"	-	-	-	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 4'-10 ½" TO 0'-6 ½" IN INCREMENTS OF 0'-4" (14 BARS)																	
H431	BOTTOM SLAB & HEADWALL	4	5' - 6"	5' - 6 ½"	-	-	1	16' - 7"	-	-	-	-	-	-	-	-	-	-	-	-
SERIES H440	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	5' - 6"	*	-	-	1	209' - 0"	-	-	-	-	-	-
									* DIMENSION "b" VARIES FROM 5'-0" TO 0'-6" IN INCREMENTS OF 0'-3" (19 BARS)											
H441	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	5' - 6"	5' - 7"	-	-	1	16' - 8"	-	-	-	-	-	-
SERIES H460	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	5' - 6"	*	-	-	1	313' - 10"
															* DIMENSION "b" VARIES FROM 5'-1 ¼" TO 0'-7 ¼" IN INCREMENTS OF 0'-2" (28 BARS)					
H461	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	5' - 6"	5' - 7 ¼"	-	-	1	16' - 8 ½"
R430	HEADWALL & WINGWALL	4	14' - 4"	0' - 10"	-	-	2	15' - 2"	-	-	-	-	-	-	-	-	-	-	-	-
R431	HEADWALL & WINGWALL	4	2' - 4"	1' - 3"	-	-	2	3' - 7"	-	-	-	-	-	-	-	-	-	-	-	-
R440	HEADWALL & WINGWALL	4	-	-	-	-	-	-	19' - 2"	0' - 10"	-	-	2	20' - 0"	-	-	-	-	-	-
R441	HEADWALL & WINGWALL	4	-	-	-	-	-	-	3' - 2"	1' - 3"	-	-	2	4' - 5"	-	-	-	-	-	-
R460	HEADWALL & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	28' - 11"	0' - 10"	-	-	2	29' - 9"
R461	HEADWALL & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	4' - 11"	1' - 3"	-	-	2	6' - 2"
S430	BOTTOM SLAB & TOEWALL	4	14' - 4 ½"	0' - 4 ½"	0' - 8"	1' - 5"	8	16' - 10"	-	-	-	-	-	-	-	-	-	-	-	-
S440	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	19' - 3 ½"	0' - 4 ½"	0' - 8"	1' - 5"	8	21' - 9"	-	-	-	-	-	-
S460	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	29' - 1 ½"	0' - 4 ½"	0' - 8"	1' - 5"	8	31' - 7"

PRECAST NOTES

PRECAST UNITS:

THE CONTRACTOR MAY, WITH PERMISSION FROM THE ENGINEER, SUBSTITUTE PRECAST ENDWALLS FOR CAST-IN-PLACE ENDWALLS PROVIDED THAT:

① APPROPRIATE SIZING AND LOCATION OF THE LIFTING INSERTS SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION OF THE PRECAST ENDWALL.

② THE CONTRACTOR TO PATCH ALL LIFTING INSERT HOLES AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.

③ PAYMENT FOR PRECAST ENDWALLS BASED ON THE QUANTITIES FOR CAST-IN-PLACE ENDWALLS IS ACCEPTABLE.

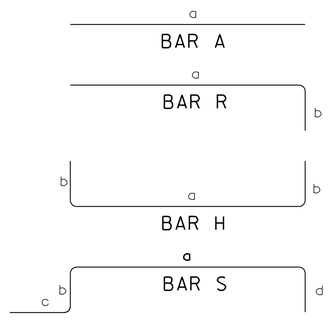
④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.

⑤ PIPE OPENINGS FOR HEADWALLS ARE BASED ON REINFORCED CONCRETE PIPE WITH TYPE "B" WALL THICKNESS (AASHTO M170).

⑥ ADDITIONAL REINFORCING STEEL NECESSARY TO MAINTAIN THE INTEGRITY OF THE STRUCTURE DURING HANDLING AND PLACEMENT SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.

CONCRETE: F'c=4,500 POUNDS PER SQUARE INCH MINIMUM AT 28 DAYS.
REINFORCING STEEL: ASTM A615, Fy=60,000 POUNDS PER SQUARE INCH.

REINFORCING STEEL LEGEND



REINFORCING STEEL CODE

TYPE	SIZE	SERIES
A	5	06

DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF BAR.

STANDARD C.R.S.I. HOOK DETAILS SHALL APPLY, EXCEPT AS NOTED.

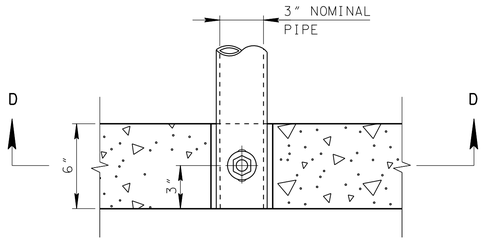
NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

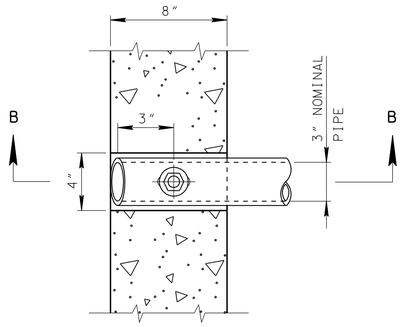
48" CONCRETE ENDWALL
CROSS DRAIN WITH
STEEL PIPE GRATE
(FOR 3:1, 4:1 & 6:1 SLOPES)

3-01-12

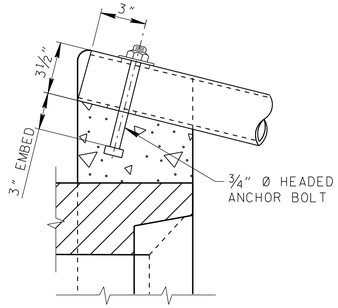
D-PE-48B



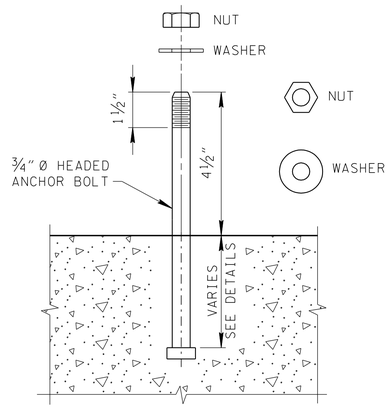
DETAIL PLAN AT WINGWALL



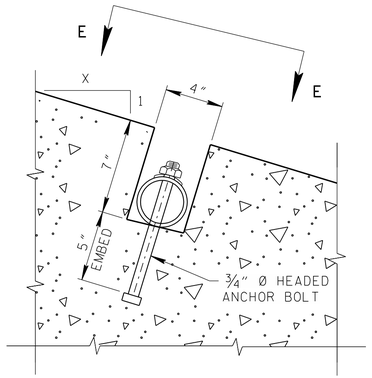
DETAIL PLAN AT HEADWALL

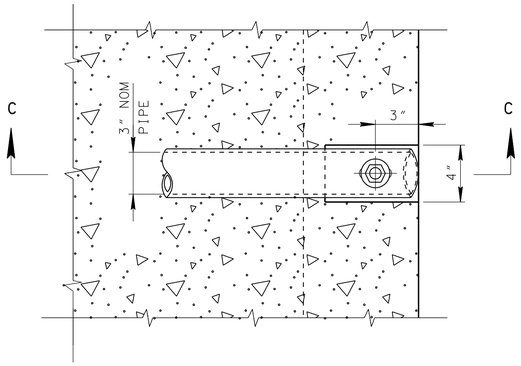


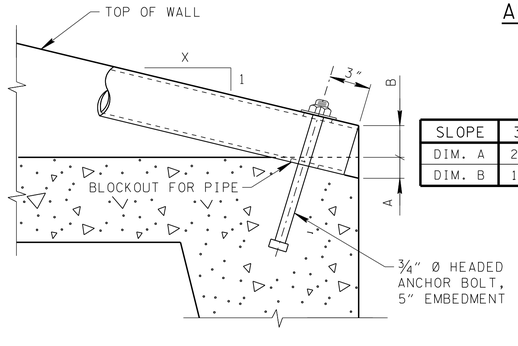
SECTION B-B THRU HEADWALL



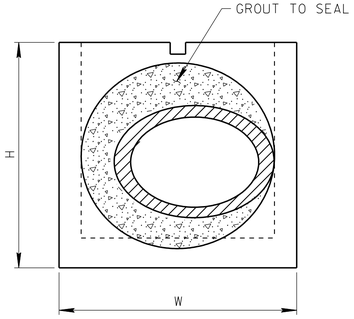
ANCHOR BOLT ASSEMBLY







SLOPE	3:1	4:1	6:1
DIM. A	2⅜"	1⅝"	⅞"
DIM. B	1⅜"	2"	2⅝"

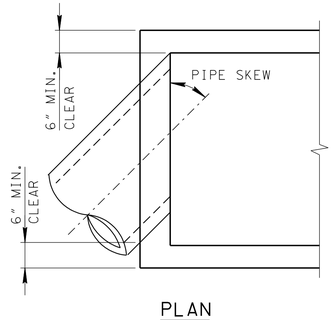


HEADWALL ELEVATION

OVERSIZED TYPE "U" CONCRETE END WALL TO BE USED TO ACCOMMODATE THE SKEWED PIPE (ASSUMES CONCRETE PIPE)

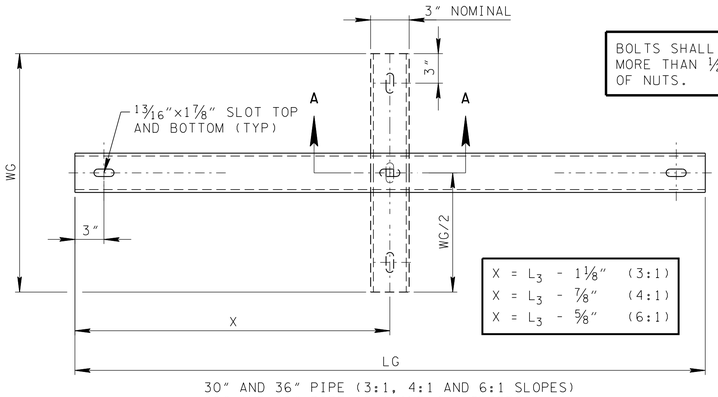
PIPE CULV. DIA.	PIPE SKEW		
	75°	60°	45°
18"	24"	24"	30"
24"	30"	36"	42"
30"	36"	42"	48"
36"	42"	48"	*
42"	48"	*	*
48"	*	*	*

* EXCEEDS 48" TYPE "U" ENDWALL OPENING



PLAN

SECTION D-D THRU WINGWALL



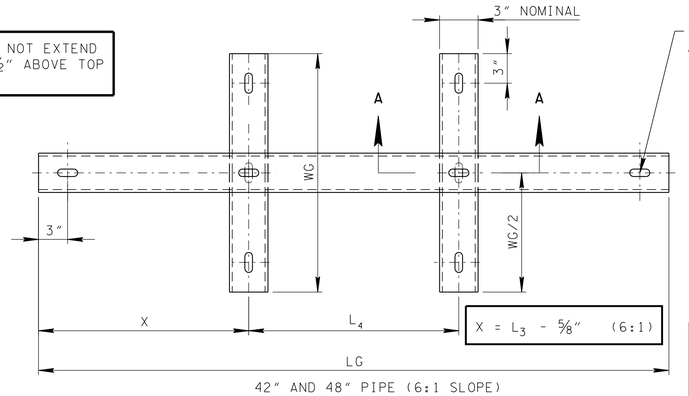
$X = L_3 - 1\frac{1}{8}"$ (3:1)
$X = L_3 - \frac{7}{8}"$ (4:1)
$X = L_3 - \frac{5}{8}"$ (6:1)

30" AND 36" PIPE (3:1, 4:1 AND 6:1 SLOPES)
42" AND 48" PIPE (3:1 AND 4:1 SLOPES)

DETAIL PLAN AT TOEWALL

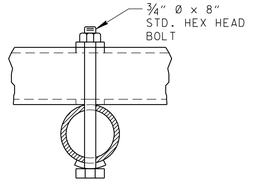
BOLTS SHALL NOT EXTEND MORE THAN ½" ABOVE TOP OF NUTS.

SECTION C-C THRU TOEWALL



$X = L_3 - \frac{5}{8}"$ (6:1)

42" AND 48" PIPE (6:1 SLOPE)



SECTION A-A

SKEWED CONNECTION DETAIL

NOTE: TABLE VALUES PROVIDED ARE APPROXIMATE
ENGINEER SHALL VERIFY MINIMUM CLEARANCES

STEEL PIPE GRATE PLANS

FOR L_3 AND L_4 DIMENSIONS SEE STD. DWGS.
D-PE-30A THROUGH D-PE-48A

PIPE CULV. DIA.	ALL SLOPES	3:1	4:1	6:1
	WG	LG	LG	LG
30"	4'-1"	10'-10⅝"	14'-0 ⅛"	20'-4 ¾"
36"	4'-8"	12'-8¾"	16'-5"	23'-11 ⅜"
42"	5'-3"	14'-3¾"	18'-5 ¾"	26'-11 ⅞"
48"	5'-10"	16'-1⅞"	20'-10 ⅝"	30'-6 ⅜"

ALTERNATE ANCHORS FOR STRUCTURAL STEEL GRATES

CERTIFICATION:
DRILLED-IN EPOXY ANCHORS OR CAST-IN THREADED INSERTS MAY BE UTILIZED IN LIEU OF CAST-IN HEADED ANCHOR BOLTS PROVIDED THAT THE CONTRACTOR FURNISHES CERTIFIED ANCHOR PULL OUT DATA FROM AN INDEPENDENT TESTING LABORATORY USING CLASS "A" CONCRETE AS PRESCRIBED BY TENNESSEE HIGHWAY SPECIFICATIONS. THE REQUIRED ULTIMATE LOAD FOR ¾" DIAMETER ANCHORS IS 10,000 POUNDS.

GENERAL NOTES

1. THE MATERIAL AND PAINTING FOR STRUCTURAL STEEL GRATE SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:
   - (A) STEEL PIPE ASTM A53, TYPE E, GRADE B, SCHEDULE 40.
   - (B) THE GRATE SHALL BE PAINTED BLACK, FEDERAL SPECIFICATION TT-E-489J, AFTER FABRICATION.
2. THE MATERIAL AND GALVANIZING FOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:
   - (A) BOLTS, NUTS AND WASHERS ASTM F1554 GRADE 36
   - (B) GALVANIZING ASTM A153
3. THE COST OF FURNISHING BOLTS, NUTS AND WASHERS, INCLUDING ALL MATERIALS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE INSTALLATION, SHALL BE INCLUDED IN THE PRICE BID FOR THE PIPE ENDWALL.
4. PAYMENT WILL BE MADE UNDER:
   ITEM NO. 611-07.03, STRUCTURAL STEEL (PIPE ENDWALLS)----LB.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

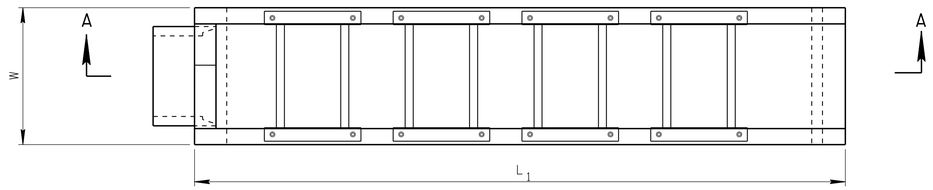
PIPE GRATE & SKEWED CONNECTION DETAILS FOR "U" ENDWALLS

(FOR 3:1, 4:1 & 6:1 SLOPES)

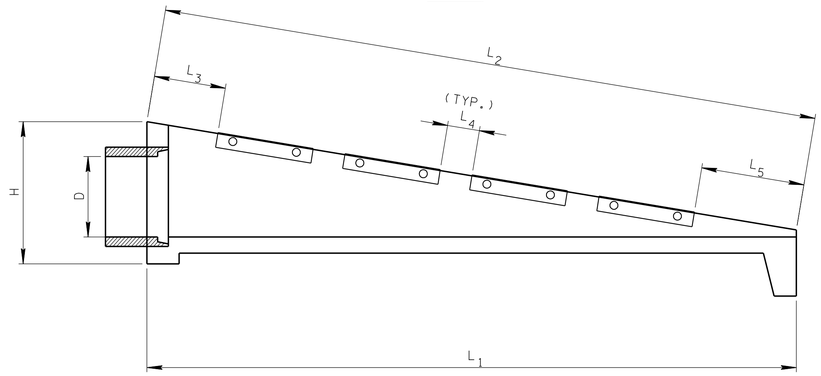
NOT TO SCALE

3-01-12

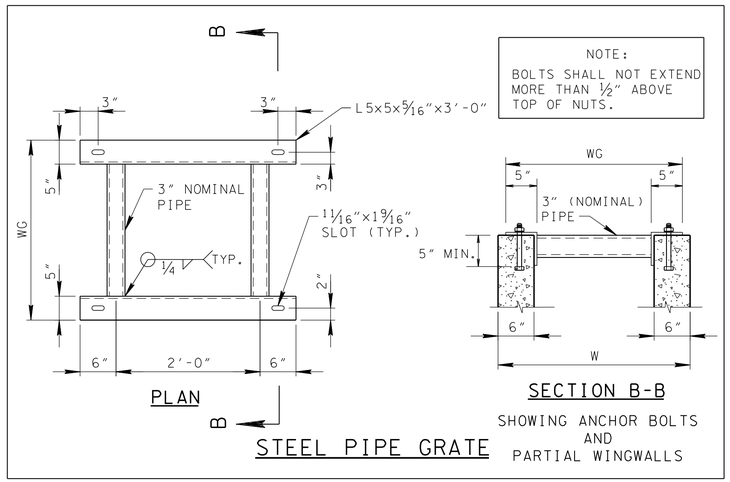
D-PE-99



PLAN



SECTION A-A

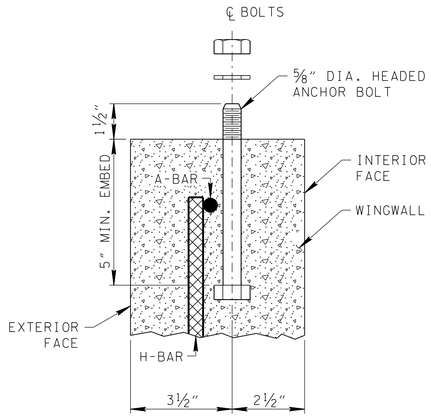


PLAN

SECTION B-B

STEEL PIPE GRATE

SHOWING ANCHOR BOLTS AND PARTIAL WINGWALLS



ANCHOR BOLT ASSEMBLY

GENERAL NOTES

Ⓐ DRAWING TO BE USED FOR ALL 15" THRU 48" SIDE DRAIN CONCRETE ENDWALLS. FOR ENDWALL CONSTRUCTION DIMENSIONS AND QUANTITIES, EXCEPT STEEL PIPE GRATES, SEE THE FOLLOWING STANDARD DRAWINGS:

15" ENDWALL - SEE D-PE-15A & D-PE-15B WITH 6:1 WINGWALL SLOPE
18" ENDWALL - SEE D-PE-18A & D-PE-18B WITH 6:1 WINGWALL SLOPE
24" ENDWALL - SEE D-PE-24A & D-PE-24B WITH 6:1 WINGWALL SLOPE
30" ENDWALL - SEE D-PE-30A & D-PE-30B WITH 6:1 WINGWALL SLOPE
36" ENDWALL - SEE D-PE-36A & D-PE-36B WITH 6:1 WINGWALL SLOPE
42" ENDWALL - SEE D-PE-42A & D-PE-42B WITH 6:1 WINGWALL SLOPE
48" ENDWALL - SEE D-PE-48A & D-PE-48B WITH 6:1 WINGWALL SLOPE

NOTE: 30" THRU 48" SIDE DRAIN CONCRETE ENDWALL REQUIRES STEEL PIPE GRATES SHOWN ON THIS DRAWING. THE CONTRACTOR SHALL OMIT THE CONCRETE BLOCKOUTS AS SHOWN ON THE ABOVE DRAWINGS AND SUBSTITUTE THE FOLLOWING REINFORCING BARS:

30" ENDWALL - SUBSTITUTE A465 & A466 BY EXTENDING A464 TO 19'-5"
36" ENDWALL - SUBSTITUTE A464 & A465 BY EXTENDING A463 TO 23'-0"
42" ENDWALL - SUBSTITUTE A465 (2 BARS), A466 & A467 BY EXTENDING A464 TO 26'-0"
48" ENDWALL - SUBSTITUTE A465 (2 BARS), A466 & A467 BY EXTENDING A464 TO 29'-7"

Ⓑ THE MATERIALS, WELDING AND PAINTING FOR STRUCTURAL STEEL GRATE SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:

① ANGLES: ASTM A36
② STEEL PIPE: ASTM A53, TYPE E, GRADE B, STANDARD WEIGHT (SW) FOR 15" THRU 24" DIAMETER PIPE CULVERT. ASTM A53, TYPE E, GRADE B, DOUBLE EXTRA STRONG WEIGHT (XXS) - FOR 30" THRU 48" DIAMETER PIPE CULVERT.
③ WELDING: AASHTO/AWS D1.5M/D1.5 BRIDGE WELDING CODE (LATEST EDITION)
④ THE GRATE SHALL BE PAINTED BLACK, FEDERAL SPECIFICATION TT-E-489J, AFTER FABRICATION.

Ⓒ THE MATERIAL AND GALVANIZING FOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:

① BOLTS, NUTS AND WASHERS: ASTM F1554 GRADE 36
② GALVANIZING: ASTM A153

Ⓓ THE COST OF FURNISHING BOLTS, NUTS AND WASHERS, INCLUDING ALL MATERIALS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE INSTALLATION, SHALL BE INCLUDED IN THE PRICE BID FOR STRUCTURAL STEEL.

Ⓔ PAYMENT WILL BE MADE UNDER:
ITEM NUMBER 611-07.03, STRUCTURAL STEEL (PIPE ENDWALLS)----POUND.

ALTERNATE ANCHORS FOR STRUCTURAL STEEL GRATES

CERTIFICATION:
DRILLED-IN EPOXY ANCHORS OR CAST-IN THREADED INSERTS MAY BE UTILIZED IN LIEU OF CAST-IN HEADED ANCHOR BOLTS PROVIDED THAT THE CONTRACTOR FURNISHES CERTIFIED ANCHOR PULL OUT DATA FROM AN INDEPENDENT TESTING LABORATORY USING CLASS "A" CONCRETE AS PRESCRIBED BY TENNESSEE HIGHWAY SPECIFICATIONS. THE REQUIRED ULTIMATE LOAD FOR 3/4" DIAMETER ANCHORS IS 10,000 POUNDS.

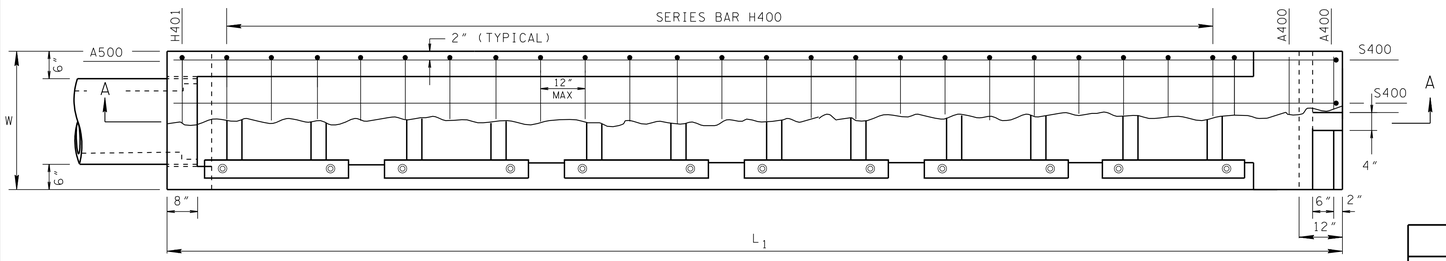
SIDE DRAIN DIA. (D)	DIMENSIONS AND QUANTITIES FOR ONE ENDWALL									
	CONCRETE ENDWALL DIMENSIONS				GRATE PLACEMENT DIMENSIONS			STRUCTURAL STEEL GRATE DIMENSIONS AND QUANTITY		STRUCT. STEEL
	H	W	L_1	L_2	L_3	L_4	L_5	WG	NO. REQ'D.	LB.
15"	SEE STD. DWG. D-PE-15A				1'-9 7/16"	1'-0"	2'-6"	2'-5"	2	172 ①
18"	SEE STD. DWG. D-PE-18A				1'-2 1/16"	0'-9"	1'-2"	2'-8"	3	269 ①
24"	SEE STD. DWG. D-PE-24A				2'-2"	1'-0"	3'-2 5/8"	3'-3"	3	296 ①
30"	SEE STD. DWG. D-PE-30A				2'-2"	1'-0"	3'-3 3/8"	3'-10"	4	694
36"	SEE STD. DWG. D-PE-36A				2'-2"	1'-0"	2'-9 1/8"	4'-5"	5	975
42"	SEE STD. DWG. D-PE-42A				2'-2"	1'-0"	1'-10 3/8"	5'-0"	6	1,294
48"	SEE STD. DWG. D-PE-48A				2'-2"	1'-0"	1'-5"	5'-7"	7	1,669

① STRUCTURAL STEEL GRATE IS OPTIONAL FOR 15" - 24" SIDE DRAIN CONCRETE ENDWALLS.

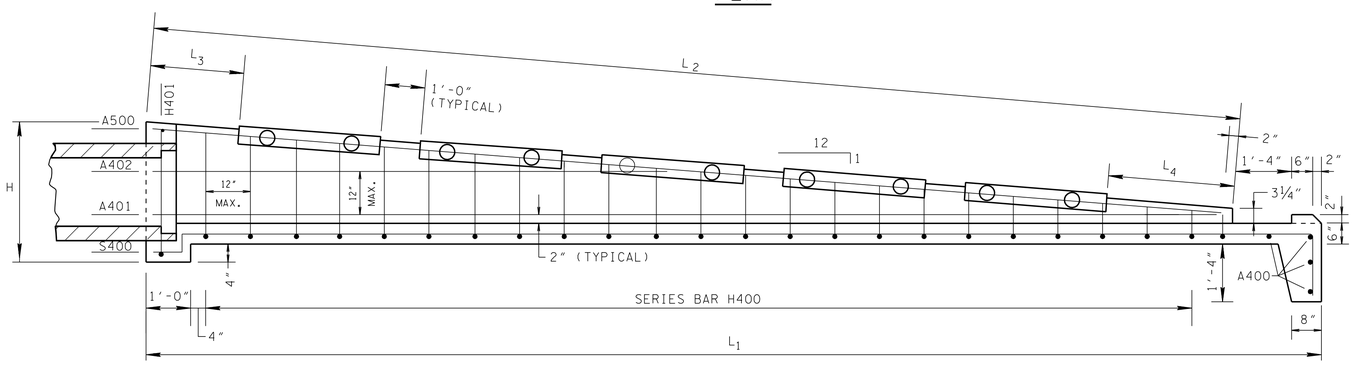
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SIDE DRAIN CONCRETE ENDWALL WITH STEEL PIPE GRATE
FOR 15" THRU 48" PIPES - 6:1 SLOPE

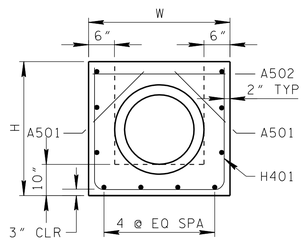
NOT TO SCALE | 3-01-12 | D-SEW-1A



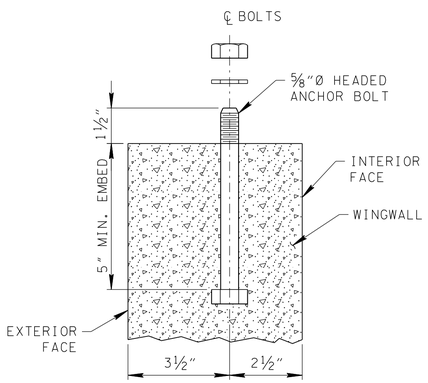
PLAN



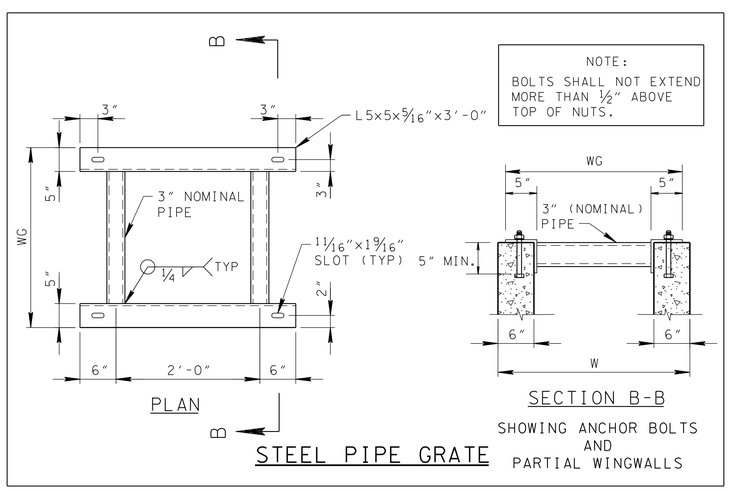
SECTION A-A



HEADWALL ELEVATION



ANCHOR BOLT ASSEMBLY

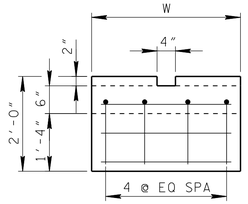


PLAN

SECTION B-B

SHOWING ANCHOR BOLTS AND PARTIAL WINGWALLS

STEEL PIPE GRATE



TOEWALL ELEVATION

GENERAL NOTES

1. CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.
2. THE MATERIALS, WELDING AND PAINTING FOR STRUCTURAL STEEL GRATE SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:
   - (A) ANGLES ASTM A36
   - (B) STEEL PIPE ASTM A53, TYPE E, GRADE B, STANDARD WEIGHT (SW)
   - (C) WELDING AASHTO/AWS D1.5M/D1.5 BRIDGE WELDING CODE (LATEST EDITION)
   - (D) THE GRATE SHALL BE PAINTED BLACK, FEDERAL SPECIFICATION TT-E-489J, AFTER FABRICATION.
3. THE MATERIAL AND GALVANIZING FOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:
   - (A) BOLTS, NUTS AND WASHERS ASTM F1554 GRADE 36
   - (B) GALVANIZING ASTM A153
4. THE COST OF FURNISHING BOLTS, NUTS AND WASHERS, INCLUDING ALL MATERIALS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE INSTALLATION, SHALL BE INCLUDED IN THE PRICE BID FOR PIPE ENDWALL.
5. PIPE OPENINGS FOR HEADWALLS ARE BASED ON REINFORCED CONCRETE PIPE WITH TYPE "B" WALL THICKNESS (AASHTO M170).
5. PAYMENT WILL BE MADE UNDER:

   ITEM NUMBER 611-07.01, CLASS "A" CONCRETE (PIPE ENDWALLS)----CUBIC YARD.
   ITEM NUMBER 611-07.02, STEEL BAR REINFORCING (PIPE ENDWALLS)----POUND.
   ITEM NUMBER 611-07.03, STRUCTURAL STEEL (PIPE ENDWALLS)----POUND.

REV. 7-28-84: CHANGED MATERIAL SPECIFICATIONS FOR STRUCTURAL STEEL PIPES AND PAINT SPECIFICATIONS.

REV. 3-20-86: CHANGED FEDERAL PAINT SPECIFICATION.

- REV. 7-29-92: REDREW, RENAMED AND REORGANIZED SHEET. CHANGED SHEET NUMBER FROM D-PE-12 TO D-SEW-12D. CHANGED ENDWALL FROM TYPE "U" TO TYPE "SD". UPDATED SPECIFICATIONS IN THE GENERAL NOTES. CORRECTED DIMENSIONS AND ESTIMATED QUANTITIES IN THE DIMENSION AND QUANTITY BLOCK. CORRECTED DIMENSIONS IN BILL OF STEEL.
- REV. 10-26-95: IN GENERAL NOTE (2) CHANGED MINIMUM WALL THICKNESS FROM 0.25" TO 0.216".
- REV. 1-19-97: CHANGED WEIGHT OF STRUCTURAL STEEL GRATES.
- REV. 5-27-99: CHANGED PAINT SPECIFICATION TO TT-E-489J.
- REV. 4-15-00: MODIFIED TOE WALL AND CLASS "A" CONCRETE QUANTITIES.
- REV. 5-27-01: CHANGED DESCRIPTION FOR ITEM NO. 611-07.03.
- REV. 6-1-09: ADDED GENERAL NOTE (6).
- REV. 7-19-10: DELETED GENERAL NOTE (6).
- REV. 3-1-12: REVISED REINFORCING STEEL, BILL OF STEEL, REINFORCING STEEL LEGEND, STEEL GRATE, ANCHOR BOLT DETAIL, ESTIMATED QUANTITIES FOR CLASS "A" CONCRETE, STEEL BAR REINF. & STRUCTURAL STEEL. REVISED GENERAL NOTES AND NOTE FOR ALTERNATE DRILLED IN ANCHORS.

BILL OF STEEL

			15" PIPE						18" PIPE					
			BENDING DIMENSIONS				NO. REQD.	LENGTH	BENDING DIMENSIONS				NO. REQD.	LENGTH
			a	b	c	d			a	b	c	d		
A400	TOEWALL	4	2'-6"	——	——	——	4	2'-6"	2'-9"	——	——	——	4	2'-9"
A401	WINGWALLS	4	19'-1"	——	——	——	2	19'-1"	10'-0½"	——	——	——	2	10'-0½"
A402	WINGWALLS	4	7'-1"	——	——	——	2	7'-1"	22'-0"	——	——	——	2	22'-0"
A500	WINGWALLS	5	20'-9"	——	——	——	2	20'-9"	23'-8"	——	——	——	2	23'-8"
A501	HEADWALL	5	1'-7¼"	——	——	——	2	1'-7¼"	1'-8⅝"	——	——	——	2	1'-8⅝"
A502	HEADWALL	5	2'-6"	——	——	——	1	2'-6"	2'-9"	——	——	——	1	2'-9"
H400	BOTTOM SLAB AND WINGWALL	4	2'-6"	*	——	——	1	97'-11"	2'-9"	*	——	——	1	102'-11"
			*DIMENSION "b" VARIES FROM 1'-11⅞" TO 0'-4⅞" IN INCREMENTS OF 0'-1" (20 BARS)						*DIMENSION "b" VARIES FROM 2'-2 ⅞" TO 0'-4 ⅞" IN INCREMENTS OF 0'-1" (23 BARS)					
H401	BOTTOM SLAB AND HEADWALL	4	2'-6"	2'-4⅞"	——	——	1	7'-3¾"	2'-9"	2'-7⅞"	——	——	1	8'-0¾"
S400	BOTTOM SLAB AND TOEWALL	4	21'-11"	0'-4½"	0'-8"	1'-4"	4	24'-3½"	24'-10"	0'-4½"	0'-8"	1'-4"	4	27'-2½"

REINFORCING STEEL LEGEND

ALTERNATE ANCHORS FOR STRUCTURAL STEEL GRATES

CERTIFICATION:
DRILLED-IN EPOXY ANCHORS OR CAST-IN THREADED INSERTS MAY BE UTILIZED IN LIEU OF CAST-IN HEADED ANCHOR BOLTS PROVIDED THAT THE CONTRACTOR FURNISHES CERTIFIED ANCHOR PULL OUT DATA FROM AN INDEPENDENT TESTING LABORATORY USING CLASS "A" CONCRETE AS PRESCRIBED BY TENNESSEE HIGHWAY SPECIFICATIONS. THE REQUIRED ULTIMATE LOAD FOR ¾" DIAMETER ANCHORS IS 10,000 POUNDS.

REINFORCING STEEL CODE

TYPE	SIZE	SERIES
A	5	06

DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF BAR.

STANDARD C.R.S.I. HOOK DETAILS SHALL APPLY, EXCEPT AS NOTED.

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL

PIPE CULV. DIA.	CONCRETE ENDWALL DIMENSIONS						STRUCTURAL STEEL GRATE DIMENSION AND QUANTITY		ESTIMATED QUANTITIES		
	H	L_1	L_2	L_3	L_4	W	WG	NO. REQ'D	CLASS "A" CONCRETE CU. YD.	STEEL BAR REINF. LB.	STRUCT. STEEL LB.
15"	2'-10¼"	23'-0"	21'-0⅞"	1'-10"	1'-10"	2'-10"	2'-7"	4	2.32	224	354
18"	3'-1¼"	25'-11"	24'-0"	0'-10"	0'-10"	3'-1"	2'-10"	5	2.84	253	461

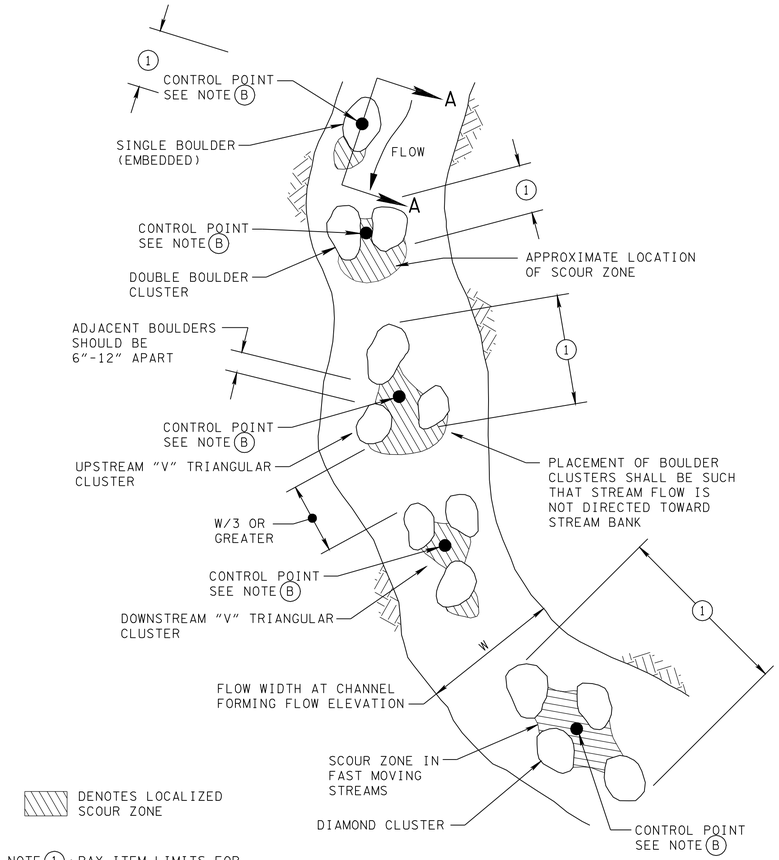
NOT TO SCALE

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

CONCRETE ENDWALL
TYPE "SD" WITH
STEEL PIPE GRATE
FOR 15" & 18" PIPES
12:1 SLOPE

D-SEW-12D



PLAN VIEW
BOULDER CLUSTER CONFIGURATIONS

BOULDER CLUSTERS GENERAL NOTES

(A) BOULDER CLUSTERS ARE HYDRAULIC CONTROL MEASURES CONSISTING OF A GROUP OF ONE OR MORE LARGE IMMOBILE ROCKS STRATEGICALLY ARRANGED IN A STREAM. THEY SHOULD BE USED TO DUPLICATE BOULDERS WHICH MAY BE PRESENT IN A STREAM TO BE RELOCATED.

(B) PLACE CLUSTERS AT THE STATIONS AND OFFSETS INDICATED ON THE STREAM MITIGATION DATA TABLE IN THE PROJECT PLANS. PLACE BOULDERS IN THE CONFIGURATIONS SHOWN ON THE STREAM MITIGATION PLAN SHEET TO CREATE A MEANDERING FLOW PATH FOR LOW FLOWS OR AS DIRECTED BY THE ENGINEER. BOULDERS SHOULD NOT BE PLACED IN AREAS SUBJECT TO DEPOSITION OF SEDIMENT.

(C) BOULDERS SHOULD BE PLACED SUCH THAT THE SCOUR CREATED BY ONE BOULDER WILL NOT OVERLAP THE LOCATION OF ANOTHER BOULDER CLUSTER. IN FAST MOVING STREAMS, THE SCOUR ZONE WILL TEND TO OCCUR ALONG THE SIDES AND DOWNSTREAM OF THE BOULDER CLUSTER. IN SLOWER MOVING STREAMS, THE SCOUR ZONE WILL TEND TO FORM UPSTREAM OF THE BOULDER CLUSTER. TO DISCOURAGE UPSTREAM SCOUR, THE LONGEST DIMENSION OF THE BOULDER SHOULD BE ALIGNED WITH THE STREAM FLOW.

(D) BOULDER CLUSTERS SHOULD BE PLACED IN STREAMS WHERE THE CHANNEL MATERIALS CONSIST OF A COMBINATION OF GRAVEL AND COBBLES AND THE AVERAGE FLOW VELOCITY IS AT LEAST 2 FEET PER SECOND. THEY SHOULD NOT BE APPLIED IN SANDY STREAMS, WHERE SCOUR COULD LEAD TO THE FAILURE OF THE MEASURE.

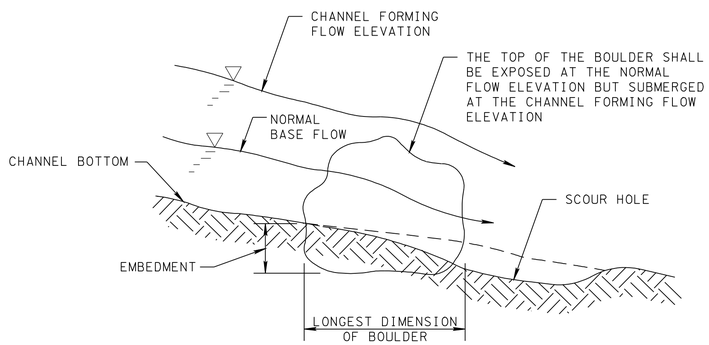
(E) BOULDER CLUSTERS SHOULD NOT BE UTILIZED IN LOCATIONS THAT EXPERIENCE HEAVY LOADS OF DEBRIS OR SEDIMENT TRANSPORT.

(F) BOULDERS SHALL BE OF THE SIZE INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER. IN SMALL CHANNELS, THE MINIMUM HORIZONTAL DIMENSION PERPENDICULAR TO THE FLOW MAY RANGE FROM 9 INCHES TO 20% OF THE CHANNEL WIDTH (UP TO 30% IS ALLOWABLE IN SMALL STREAMS WITH STEEP SLOPES). IN LARGER CHANNELS, THE BOULDER SIZE MAY VARY FROM 12 INCHES TO 20% OF THE CHANNEL WIDTH. WHERE POSSIBLE, BOULDERS PRESENT IN THE EXISTING STREAM SHOULD BE USED IN THE RELOCATED CHANNEL SEGMENT.

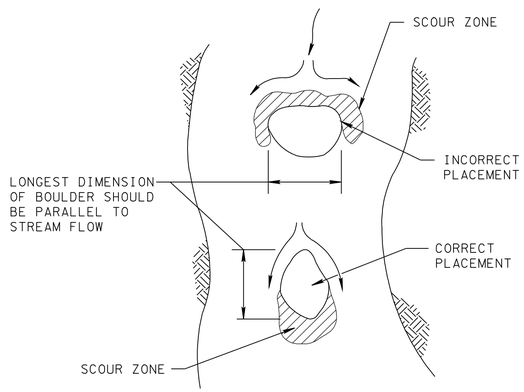
(G) BOULDER CLUSTERS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-03.32 STREAM MITIGATION - BOULDER CLUSTERS PER EACH

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION OF EACH BOULDER CLUSTER.



SECTION A-A



CORRECT BOULDER PLACEMENT

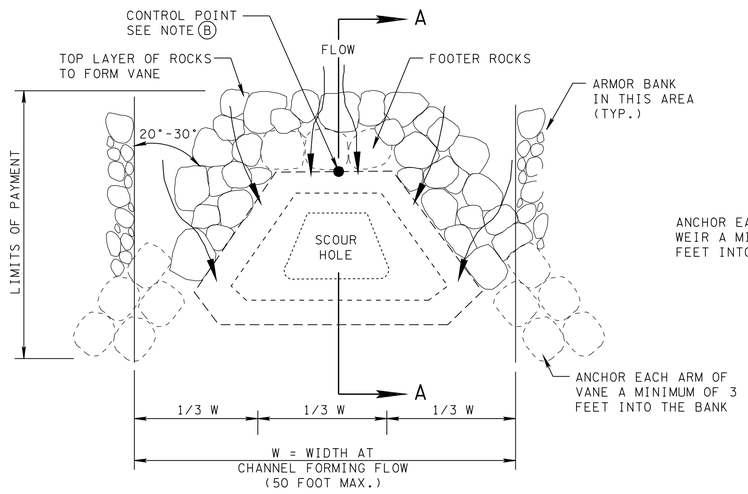
STREAM MITIGATION PLAN LEGEND: BOULDER CLUSTER (SHOW CONFIGURATION)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

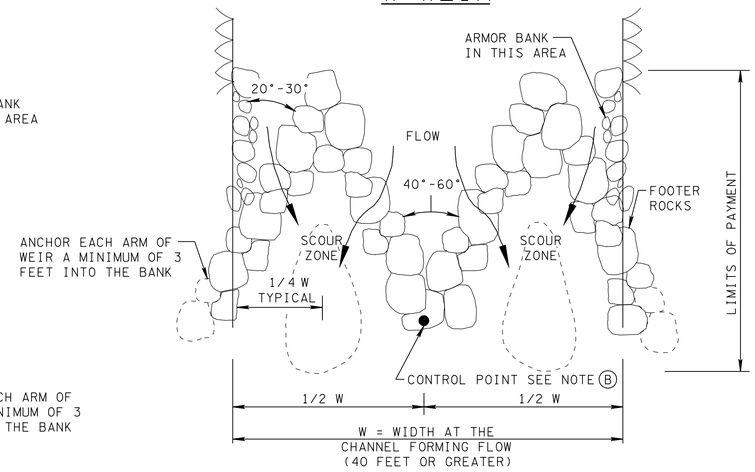
BOULDER CLUSTERS

NOT TO SCALE | 8-01-11 | D-NSD-1

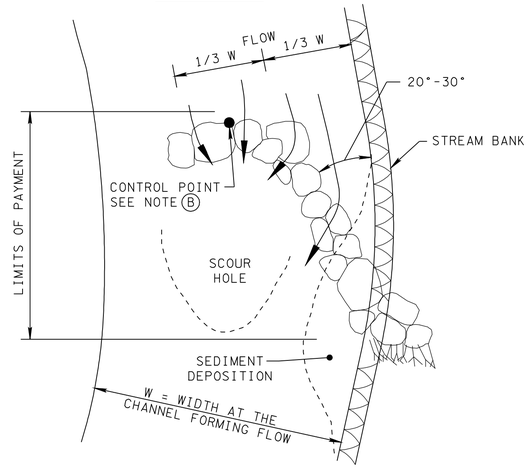
CROSS VANE



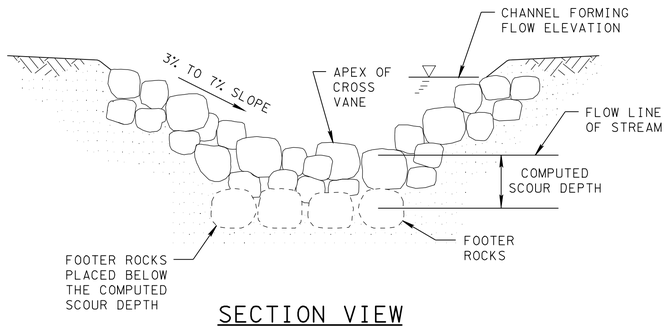
W-WEIR



J-HOOK

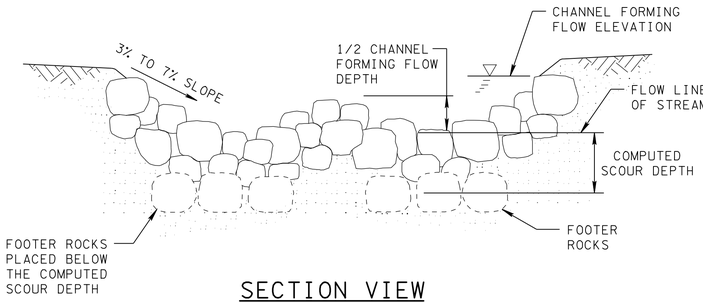


PLAN VIEW
CROSS VANE



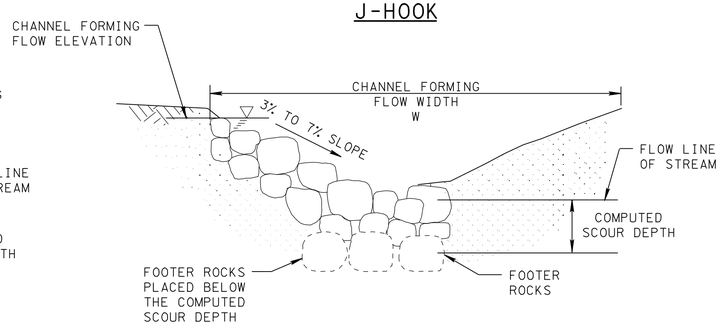
SECTION VIEW
CROSS VANE

PLAN VIEW
W-WEIR

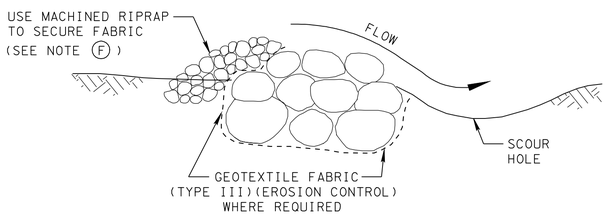


SECTION VIEW
W-WEIR

PLAN VIEW
J-HOOK



SECTION VIEW
J-HOOK



SECTION A-A

STREAM MITIGATION PLAN LEGEND: CROSS VANE

STREAM MITIGATION PLAN LEGEND: W-WEIR

STREAM MITIGATION PLAN LEGEND: J-HOOK

ROCK VANE GENERAL NOTES

(A) ROCK VANES ARE HYDRAULIC CONTROL MEASURES THAT MAY BE USED TO DIRECT FLOW AWAY FROM THE CHANNEL BANK, CONCENTRATE FLOWS INTO THE CENTER OF THE CHANNEL AND ENHANCE HABITAT. THEY MAY CONSIST OF STRAIGHT VANES, CROSS VANES, "W" WEIRS OR "J" HOOKS. STRAIGHT VANES ARE EQUIVALENT TO A SINGLE ARM OF A CROSS VANE.

(B) CONSTRUCT AT THE ELEVATIONS AND STATIONS INDICATED IN THE STREAM MITIGATION DATA TABLE IN THE PROJECT PLANS OR AS DIRECTED BY THE ENGINEER.

(C) ROCK VANES SHOULD BE APPLIED WITH CAUTION IN STREAMS WITH BEDS COMPOSED OF CLAY, SILT OR OTHER SOFT MATERIAL. THE SIZE AND DEPTH OF THE FOOTER ROCKS MUST BE SUFFICIENT TO ENSURE THAT THE STRUCTURE WILL NOT SUBSIDE. ROCK VANES ALSO ARE NOT SUITABLE FOR STREAMS WITH BEDROCK CHANNELS.

(D) THE STONES USED TO CONSTRUCT THE VANE SHOULD BE SUFFICIENTLY FLAT AND BLOCKY TO ALLOW STACKING WITH LITTLE TO NO GAP WHEN THE STONES ARE BUTTED AGAINST EACH OTHER. THE STONES SHOULD ALSO BE SIZED TO REMAIN STABLE IN THE 50-YEAR STORM EVENT. THE MINIMUM SIZE OF THE STONES WILL BE PROVIDED IN THE STREAM MITIGATION DATA TABLE. LARGER STONES MAY BE REQUIRED FOR THE FOOTER STONES IN ORDER TO PROVIDE A STABLE BASE FOR THE STRUCTURE.

(E) THE LOWEST COURSE OF FOOTER ROCKS SHOULD BE PLACED AT A DEPTH BELOW THE SCOUR HOLE DEPTH INDICATED IN THE STREAM MITIGATION DATA TABLE IN THE PROJECT PLANS.

(F) WHERE THE STREAM BED IS COMPOSED OF SAND OR FINER MATERIALS, THE BOTTOM AND UPSTREAM FACE OF THE STRUCTURE SHOULD BE LINED WITH GEOTEXTILE FABRIC (TYPE III) (EROSION CONTROL) TO PREVENT THE PIPING OF FINE MATERIALS THROUGH THE STONES. RIPRAP SHOULD THEN BE PLACED ON THE UPSTREAM FACE OF THE STRUCTURE IN ORDER TO SECURE THE GEOTEXTILE FABRIC. THE REQUIRED CLASS OF MACHINED RIPRAP WILL BE INDICATED IN THE PROJECT PLANS. ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(G) THE BANK SLOPES UPSTREAM OF THE VANE ARMS SHOULD BE PROTECTED AGAINST EROSION BY THE PLACEMENT OF APPROPRIATE EROSION PREVENTION MEASURES SUCH AS MACHINED RIPRAP, VEGETATED RIPRAP, OR TURF REINFORCEMENT MATS.

(H) THE ENDS OF THE VANE ARMS SHOULD BE KEYED INTO THE BANK A MINIMUM DISTANCE OF 3 FEET OR AS DIRECTED BY THE ENGINEER.

(I) CROSS VANES AND J-HOOKS MAY BE USED IN COMBINATION WITH STEP POOLS. SEE STANDARD DRAWING D-NSD-4.

(J) ROCK VANES AND J-HOOKS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

209-03.37 STREAM MITIGATION - CROSS VANE STRUCTURE PER EACH
209-03.38 STREAM MITIGATION - J-HOOK PER EACH
209-03.39 STREAM MITIGATION - W-WEIR PER EACH
209-03.52 STREAM MITIGATION - J-HOOK WITH STEP PER EACH
209-03.54 STREAM MITIGATION - CROSS VANE STRUCTURE WITH STEP PER EACH
209-03.60 STREAM MITIGATION - ROCK VANE PER EACH

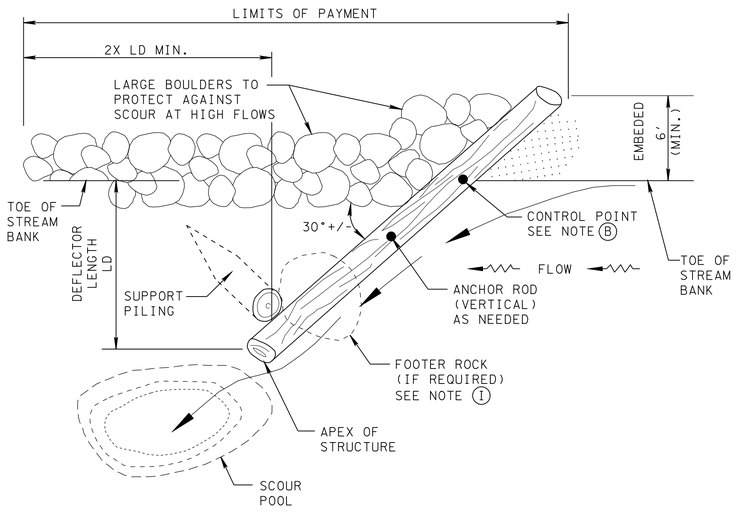
PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION OF THE VANE STRUCTURE.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

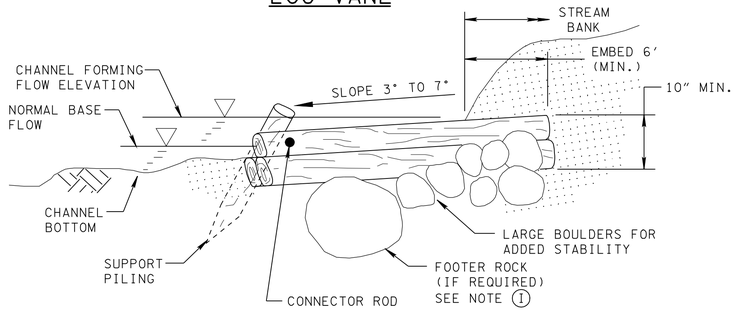
ROCK VANES

NOT TO SCALE | 8-01-11 | D-NSD-2

LOG VANE

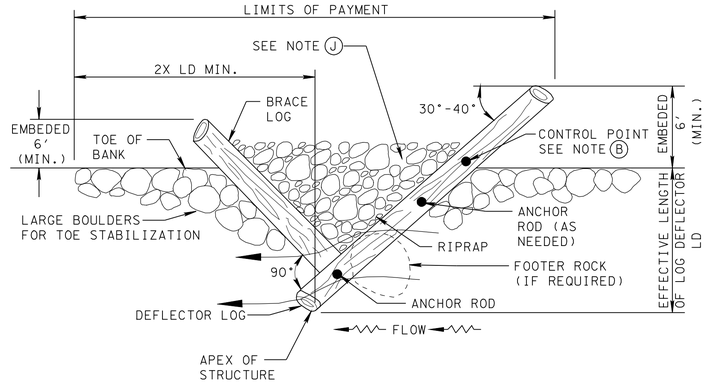


PLAN VIEW
LOG VANE

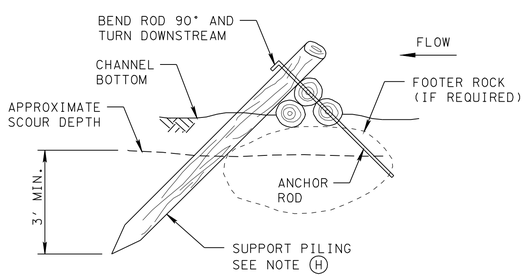


SECTION VIEW
LOG VANE
SHOWING MULTIPLE LOGS

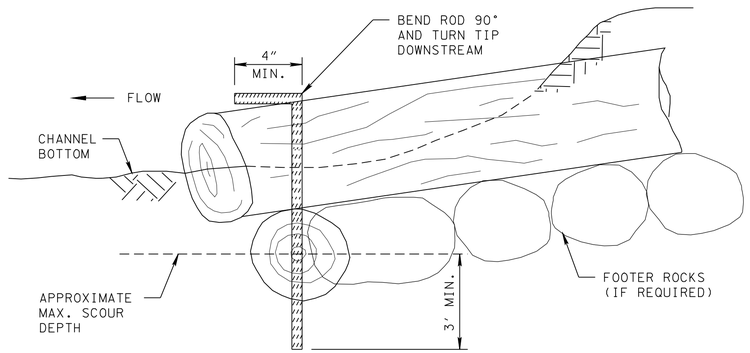
LOG DEFLECTOR



PLAN VIEW
LOG DEFLECTOR



ELEVATION VIEW
SUPPORT PILING INSTALLATION
(SINGLE OR MULTIPLE LOGS)



ANCHOR ROD
INSTALLATION DETAIL
FOR LOG DEFLECTOR

LOG DEFLECTORS AND VANES GENERAL NOTES

(A) LOG DEFLECTORS AND VANES ARE HYDRAULIC CONTROL MEASURES THAT EXTEND FROM THE BANK INTO THE STREAM TO REDUCE THE WIDTH TO DEPTH RATIO OF THE BANKFULL CHANNEL. THEY MAY BE USED IN WIDE, SHALLOW, AND SLUGGISH CHANNELS UP TO 30 FEET WIDE TO CREATE SCOUR POOLS, DEEPEN THE CHANNEL, CREATE A MEANDERING ALIGNMENT OR DEFLECT CURRENT FROM AN ERODING CHANNEL BANK ON THE OUTSIDE OF A BEND.

(B) DEFLECTORS AND VANES SHALL BE INSTALLED AT THE CONTROL POINT STATIONS AND OFFSETS INDICATED IN THE STREAM MITIGATION DATA TABLE IN THE PROJECT PLANS. THE TABLE WILL ALSO PROVIDE THE REQUIRED DEFLECTION LENGTH, LD.

(C) LOGS SHOULD BE TAKEN FROM LOCALLY AVAILABLE, DECAY-RESISTANT SPECIES SUCH AS CEDAR, WHITE OAK, ETC. THE MINIMUM LOG DIAMETER SHALL BE 10 INCHES. WHERE SUFFICIENTLY LARGE LOGS ARE NOT AVAILABLE, THREE SMALLER LOGS MAY BE STACKED AS SHOWN ON THIS DRAWING. USE ANCHOR RODS DRIVEN AT A MAXIMUM SPACING OF 6 FEET ON CENTERS TO ATTACH AND SECURE THE LOGS.

(D) THE TIP OF THE LOG AT THE APEX SHALL BE EMBEDDED INTO THE CHANNEL BED A DISTANCE EQUAL TO HALF OF ITS DIAMETER AND SHOULD BE NO MORE THAN 6 INCHES ABOVE THE NORMAL BASE FLOW ELEVATION.

(E) THE DISTANCE LD SHALL BE NO MORE THAN 50% OF THE CHANNEL WIDTH FOR AN ALTERNATING LAYOUT OR 25% FOR AN OPPOSITE LAYOUT AS SHOWN IN THE DRAINAGE MANUAL.

(F) LARGE NATURAL STONES SHOULD BE USED FOR EROSION PREVENTION ON THE STREAM BANK DOWNSTREAM OF THE STRUCTURE. OPTIONAL MEANS OF PROVIDING EROSION PROTECTION INCLUDE ROOT WADS OR VEGETATED RIPRAP. EROSION PROTECTION SHOULD EXTEND A MINIMUM DISTANCE OF 2X LD FROM THE APEX OF THE STRUCTURE.

(G) ANCHOR RODS SHOULD CONSIST OF #6 REBAR PINS AND SHOULD BE DRIVEN INTO FIRM MATERIAL A MINIMUM OF 3 FEET BELOW THE APPROXIMATE SCOUR DEPTH. ANCHOR RODS SHOULD BE DRIVEN VERTICALLY EXCEPT WHERE USED TO CONNECT A SUPPORT PILING.

(H) SUPPORT PILINGS FOR LOG VANES SHOULD BE DRIVEN AT AN ANGLE TO PREVENT DISPLACEMENT AND UPLIFT OF THE LOGS. THEY SHOULD BE DRIVEN TO A DEPTH OF 3 FEET BELOW THE APPROXIMATE SCOUR DEPTH.

(I) FOOTER ROCKS SHOULD BE USED WHERE THE CHANNEL BOTTOM CONSISTS OF ERODIBLE MATERIALS SUCH AS SAND THAT COULD ALLOW THE STRUCTURE TO BECOME UNDERMINED. THE ROCKS SHOULD BE NATURAL BOULDERS SUFFICIENTLY LARGE TO EXTEND A MINIMUM OF 2 FEET BELOW THE APPROXIMATE SCOUR DEPTH.

(J) FILL MATERIAL FOR A LOG DEFLECTOR SHALL CONSIST OF MACHINED OR VEGETATED RIPRAP ON GEOTEXTILE FABRIC (TYPE III) (EROSION CONTROL). THE REQUIRED CLASS OF MACHINED RIPRAP WILL BE INDICATED IN THE STREAM MITIGATION DATA TABLE. ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(K) LOG DEFLECTORS AND VANES SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

209-03.33 STREAM MITIGATION - LOG STRUCTURES AND DEFLECTORS PER LINEAR FOOT
209-03.34 STREAM MITIGATION - LOG VANES PER LINEAR FOOT

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION AND MAINTENANCE OF THE LOG DEFLECTOR OR VANE INCLUDING EROSION PREVENTION MEASURES DOWNSTREAM OF THE STRUCTURE.

STREAM MITIGATION PLAN LEGEND: LOG VANE

STREAM MITIGATION PLAN LEGEND: LOG DEFLECTOR

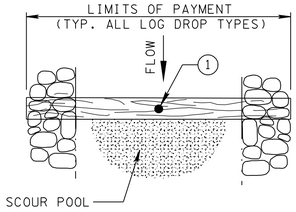
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

LOG DEFLECTORS AND LOG VANES

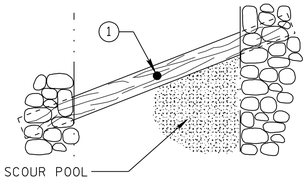
NOT TO SCALE | 8-01-11 | D-NSD-3

LOG DROP STRUCTURES

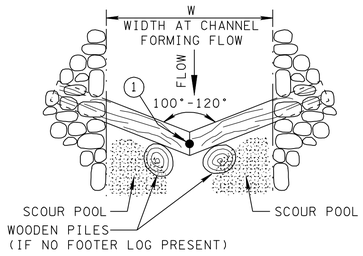
NOTE (1) : CONTROL POINT
SEE LOG DROP NOTE (B)



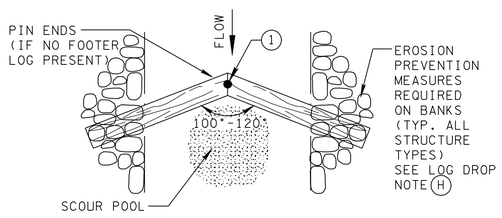
PLAN VIEW - STRAIGHT WEIR



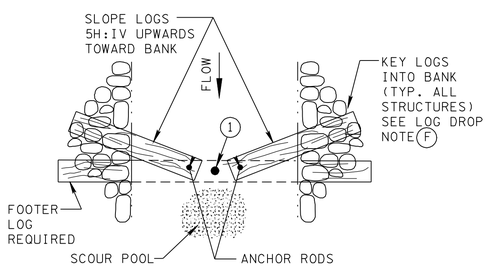
PLAN VIEW - DIAGONAL WEIR



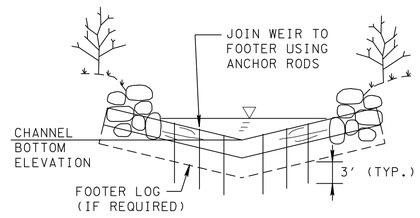
PLAN VIEW
"VEE" WEIR DOWNSTREAM



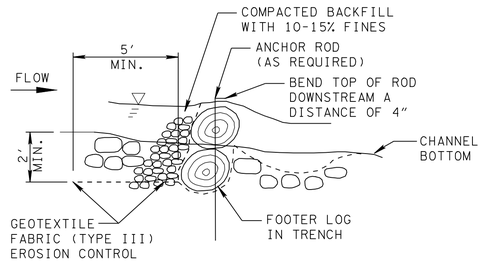
PLAN VIEW
"VEE" WEIR UPSTREAM



PLAN VIEW - "K" WEIR



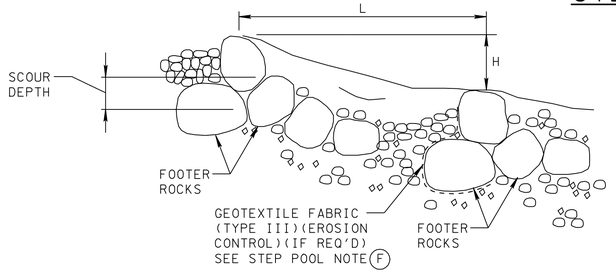
SECTION VIEW
OF "VEE" WEIR



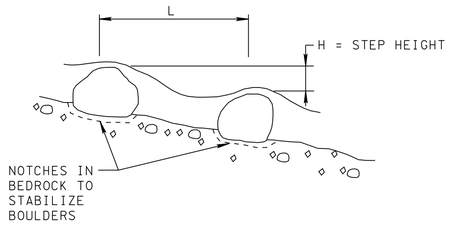
ELEVATION VIEW
DETAIL WITH FOOTER LOG
AND STRUCTURE SEALING

IF REQUIRED - SEE LOG DROP NOTE (G)

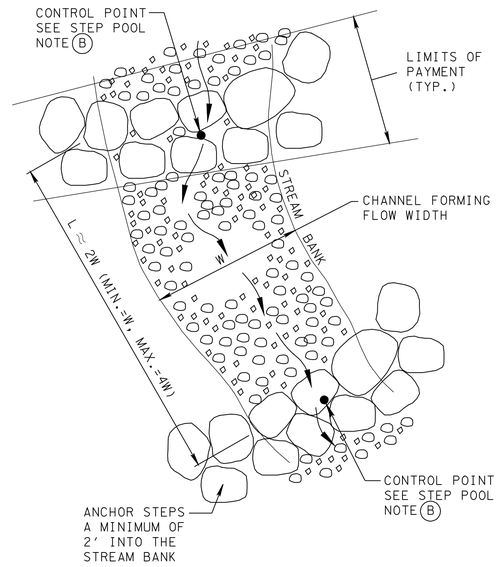
STEP POOLS



INSTALLATION IN
ALLUVIAL CHANNEL



INSTALLATION ON
BEDROCK CHANNEL



PLAN VIEW
STEP POOLS IN SERIES

LOG DROP GENERAL NOTES

(A) LOG DROPS ARE HYDRAULIC CONTROL MEASURES THAT MAY BE USED TO MAINTAIN THE ELEVATION OF THE STREAM BED, DIRECT FLOWS AWAY FROM ERODIBLE CHANNEL BANKS, OR ENCOURAGE THE FORMATION OF SCOUR HOLES IN THE CHANNEL TO ENHANCE HABITAT. LOG DROPS MAY BE USED IN STREAMS WITH SLOPES RANGING FROM 1% TO 3%.

(B) CONSTRUCT AT THE ELEVATIONS, STATIONS AND OFFSETS INDICATED ON THE STREAM MITIGATION DATA TABLE IN THE PROJECT PLANS OR AS DIRECTED BY THE ENGINEER. "VEE" WEIRS MAY BE EITHER SYMMETRICAL (WITH THE APEX AT THE CENTER OF THE CHANNEL) OR ASYMMETRICAL. THE LOCATION OF THE APEX SHOULD ALSO BE INDICATED ON THE TABLE.

(C) LOGS SHOULD BE TAKEN FROM LOCALLY AVAILABLE ROT-RESISTANT SPECIES SUCH AS CEDAR. THE MINIMUM LOG DIAMETER IS 16 INCHES.

(D) FOOTER LOGS ARE OPTIONAL FOR ALL CONFIGURATIONS EXCEPT THE "K" WEIR. FOOTER LOGS SHOULD BE PROVIDED AS A CUTOFF WHERE THE DOWNSTREAM SCOUR HOLE WILL BE BELOW THE BOTTOM OF THE WEIR LOG. FOOTER LOGS MAY ALSO BE USED TO PROVIDE ADDITIONAL STABILITY FOR THE WEIR LOG AND SHOULD BE ATTACHED BY MEANS OF STEEL ANCHOR RODS CONSISTING OF NO. 6 REBAR.

(E) STRAIGHT OR DIAGONAL WEIRS SHOULD BE EMBEDDED INTO THE CHANNEL BOTTOM TO A DEPTH EQUAL TO HALF OF THE LOG DIAMETER. THE FOOTER LOG OF A "K" WEIR AND THE VERTEX OF A "VEE" WEIR SHOULD BOTH BE AT THE CHANNEL BOTTOM ELEVATION. THE WEIR LOGS OF "VEE" AND "K" WEIRS SHOULD SLOPE UPWARD FROM THE CENTER OF THE CHANNEL INTO THE STREAM BANKS.

(F) AT A MINIMUM, LOGS SHOULD BE KEYED INTO THE CHANNEL BANKS A DISTANCE EQUAL TO 0.4 X THE WIDTH (W) OF THE CHANNEL FORMING FLOW, BUT NO LESS THAN 5 FEET.

(G) WHERE THE CHANNEL SUBSTRATE IS COMPOSED OF COARSE SEDIMENTS, THE STRUCTURE SHOULD BE SEALED TO ENCOURAGE LOW FLOWS TO PASS OVER THE LOG RATHER THAN THROUGH THE MATERIALS BENEATH IT. PLACE GEOTEXTILE FABRIC (TYPE III) (EROSION CONTROL) ON THE UPSTREAM FACE OF THE STRUCTURE AND BACKFILL WITH A SUITABLE COMPACTED MIXTURE OF GRAVEL AND FINE SEDIMENTS. ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(H) THE BANK SLOPES ADJACENT TO THE WEIR SHOULD BE PROTECTED AGAINST EROSION BY THE PLACEMENT OF APPROPRIATE EROSION PREVENTION MEASURES SUCH AS VEGETATED RIPRAP, NATURAL BOULDERS, OR BRUSH MATTRESSES.

(I) LOG DROPS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-03.35, STREAM MITIGATION - LOG DROP STRUCTURE, PER LINEAR FOOT

PAYMENT SHALL INCLUDE ALL MATERIAL AND LABOR NECESSARY FOR THE CONSTRUCTION OF THE LOG DROP STRUCTURE.

STEP POOL GENERAL NOTES

(A) STEP POOLS ARE HYDRAULIC CONTROL MEASURES THAT MAY BE USED TO MAINTAIN GRADE, CONTROL FLOW VELOCITY, AND DISSIPATE ENERGY IN STREAMS WITH SLOPES GREATER THAN 3%.

(B) STEP POOLS SHOULD BE CONSTRUCTED AT THE ELEVATIONS AND STATIONS INDICATED ON THE STREAM MITIGATION DATA TABLE IN THE PROJECT PLANS OR AS DIRECTED BY THE ENGINEER. MINIMUM REQUIRED BOULDER DIAMETER SHOULD ALSO BE INDICATED ON THE TABLE.

(C) THE ROCKS USED TO CONSTRUCT A STEP POOL SHOULD BE SUFFICIENTLY FLAT AND BLOCKY TO ALLOW STACKING WITH LITTLE TO NO GAP WHEN THE ROCKS ARE BUTTED AGAINST EACH OTHER. LARGER ROCKS MAY BE REQUIRED FOR THE FOOTER ROCKS IN ORDER TO PROVIDE A STABLE BASE FOR THE STRUCTURE.

(D) IN AN ALLUVIAL STREAM, THE LOWEST COURSE OF FOOTER ROCKS SHOULD BE PLACED BELOW THE SCOUR DEPTH PROVIDED IN THE STREAM MITIGATION DATA TABLE.

(E) THE STEP HEIGHT (H) SHOULD BE NO MORE THAN 12 INCHES. IF THIS IS NOT POSSIBLE, SMALL GAPS SHOULD BE LEFT BETWEEN THE ROCKS.

(F) WHERE THE CHANNEL SUBSTRATE IS SUFFICIENTLY FINE TO PASS BETWEEN THE ROCKS IN THE STEP POOL, THE STRUCTURE SHOULD BE PLACED ON A LAYER OF GEOTEXTILE FABRIC (TYPE III) (EROSION CONTROL) LOCATED UNDERNEATH AND ON THE UPSTREAM SIDE OF THE STRUCTURE. ABOVE THE FLOW LINE, A LAYER OF RIPRAP MAY BE USED TO HOLD THE FABRIC IN PLACE. THE REQUIRED CLASS OF MACHINED RIPRAP WILL BE INDICATED IN THE STREAM MITIGATION DATA TABLE. ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(G) STEP POOLS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-03.36 STREAM MITIGATION - STEP POOL PER EACH

PAYMENT SHALL INCLUDE ALL MATERIAL AND LABOR NECESSARY FOR THE CONSTRUCTION OF THE STEP POOL.

STREAM MITIGATION PLAN LEGEND: S STRAIGHT WEIR LOG DROP

STREAM MITIGATION PLAN LEGEND: D DIAGONAL WEIR LOG DROP

STREAM MITIGATION PLAN LEGEND: "VEE" WEIR LOG DROP (SHOW ORIENTATION)

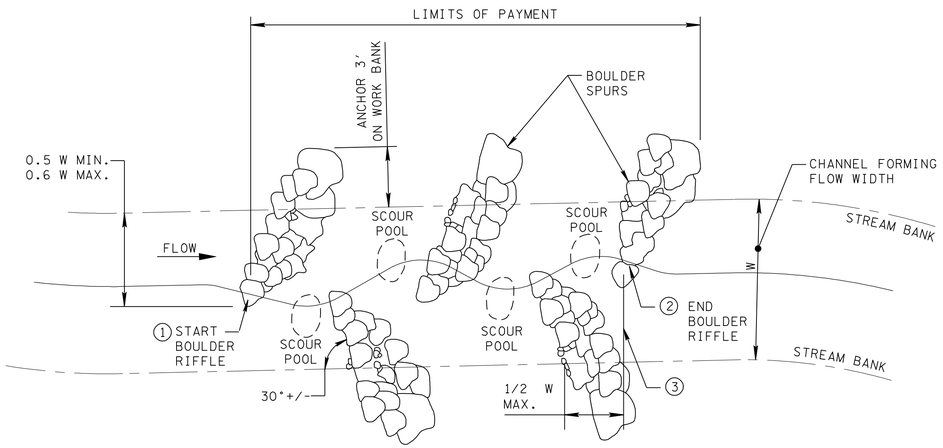
STREAM MITIGATION PLAN LEGEND: "K" WEIR LOG DROP

STREAM MITIGATION PLAN LEGEND: STEP POOL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

LOG DROPS
AND
STEP POOLS

NOT TO SCALE | 8-01-11 | D-NSD-4



NOTE (1) : CONTROL POINT BEGINNING OF RIFFLE
SEE NOTE (B)

NOTE (2) : CONTROL POINT END OF RIFFLE
SEE NOTE (B)

NOTE (3) : SEE NOTE (H)

PLAN VIEW

BOULDER RIFFLE GENERAL NOTES

(A) BOULDER RIFFLES ARE HYDRAULIC CONTROL MEASURES THAT MAY BE USED TO RECREATE HABITAT IN A RELOCATED STREAM BY CREATING POOLS AND A MEANDERING PATH FOR LOW FLOWS. THEY ALSO CREATE FLOW TURBULENCE WHICH HELPS TO INCREASE DISSOLVED OXYGEN. THEY CONSIST OF BOULDER SPURS KEYED INTO THE CHANNEL BANK AND EXTENDING TO AT LEAST THE CENTER OF THE CHANNEL.

(B) ELEVATIONS, STATIONS AND OFFSETS FOR THE BEGINNING AND ENDING POINTS OF THE BOULDER RIFFLE WILL BE INDICATED IN THE STREAM MITIGATION DATA TABLE IN THE PROJECT PLANS. BOULDER SPURS SHOULD BE PLACED AT AN EVEN SPACING BETWEEN THESE POINTS OR AS DIRECTED BY THE ENGINEER.

(C) BOULDER RIFFLES SHOULD BE APPLIED WITH CAUTION IN STREAMS WITH BEDS COMPOSED OF CLAY, SILT OR OTHER SOFT MATERIAL. THE SIZE AND DEPTH OF THE FOOTER ROCKS MUST BE SUFFICIENT TO ENSURE THAT THE STRUCTURE WILL NOT SUBSIDE.

(D) THE ROCKS USED TO CONSTRUCT BOULDER RIFFLES SHOULD BE SIZED TO REMAIN STABLE IN THE 50-YEAR STORM EVENT. THE MINIMUM SIZE OF THE ROCKS WILL BE PROVIDED IN THE PROJECT PLANS. LARGER STONES MAY BE REQUIRED FOR THE FOOTER ROCKS IN ORDER TO PROVIDE A STABLE BASE FOR THE STRUCTURE.

(E) THE LOWEST COURSE OF FOOTER ROCKS SHALL BE PLACED AT A DEPTH BELOW THE SCOUR HOLE DEPTH INDICATED IN THE STREAM MITIGATION DATA TABLE IN THE PROJECT PLANS.

(F) WHERE THE STREAM BED IS COMPOSED OF SAND OR FINER MATERIALS, THE BOTTOM AND UPSTREAM FACE OF EACH SPUR SHALL BE LINED WITH GEOTEXTILE FABRIC (TYPE III)(EROSION CONTROL) TO PREVENT THE PIPING OF FINE MATERIALS THROUGH THE ROCKS. ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED. REFER TO SECTION A-A ON STANDARD DRAWING D-NSD-2.

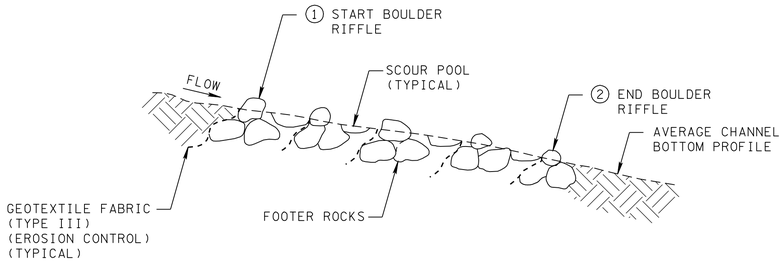
(G) THE ENDS OF THE SPURS SHALL BE KEYED INTO THE BANK A MINIMUM DISTANCE OF 3 FEET OR AS DIRECTED BY THE ENGINEER.

(H) THE TIP OF AN INDIVIDUAL BOULDER SPUR SHALL BE ALIGNED WITH THE POINT AT WHICH THE EDGE OF THE NEXT UPSTREAM SPUR INTERSECTS THE STREAM BANK.

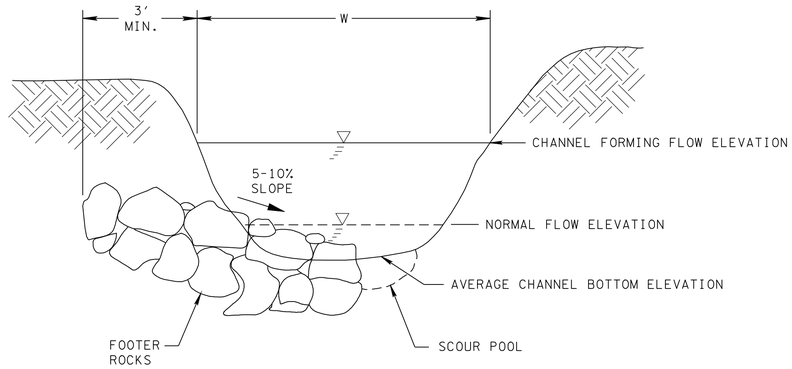
(I) BOULDER RIFFLES SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-03.41 STREAM MITIGATION - BOULDER RIFFLE PER LINEAR FOOT

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION OF THE BOULDER RIFFLE.



PROFILE VIEW



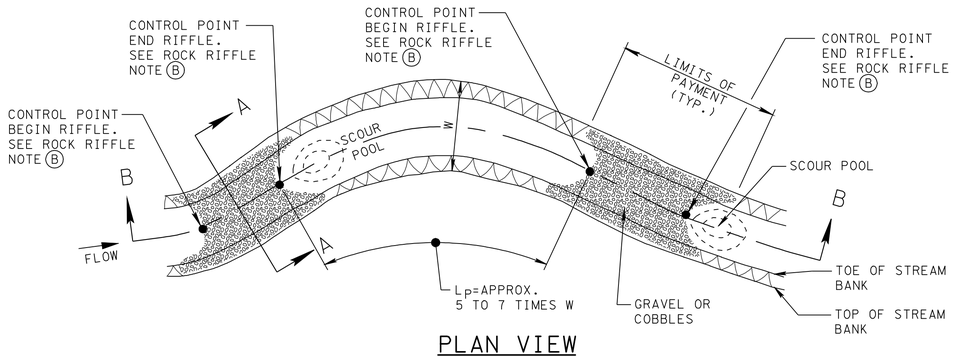
SECTION VIEW

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

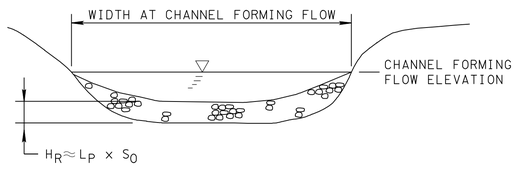
BOULDER RIFFLES

NOT TO SCALE | 8-01-11 | D-NSD-5

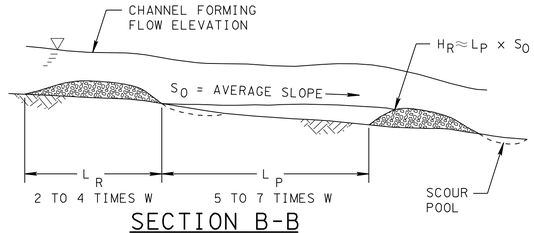
ROCK RIFFLE



PLAN VIEW
ROCK RIFFLES



SECTION A-A



SECTION B-B

ROCK RIFFLE GENERAL NOTES

(A) ROCK RIFFLES ARE HYDRAULIC CONTROL MEASURES THAT MAY BE USED TO RECREATE THE POOL AND RIFFLE PROFILE PRESENT IN THE EXISTING STREAM THAT IS TO BE RELOCATED.

(B) CONSTRUCT RIFFLES AT THE BEGINNING AND ENDING CONTROL POINT LOCATIONS INDICATED IN THE STREAM MITIGATION DATA TABLE IN THE PROJECT PLANS OR AS DIRECTED BY THE ENGINEER.

(C) RIFFLES SHOULD BE CONSTRUCTED IN STRAIGHT REACHES OF THE STREAM RATHER THAN IN THE BENDS. CONSTRUCT FROM THE SIDES OF THE CHANNEL, PLACING THE ROCKS IN THE CENTER LAST. THE CENTER OF THE RIFFLE SHOULD BE LOWER THAN THE SIDES IN ORDER TO HELP CONCENTRATE LOW FLOWS TO THE MIDDLE OF THE CHANNEL. THE RIFFLE HEIGHT (H_R) SHOULD NOT BE GREATER THAN THE WATER DEPTH AT NORMAL FLOW.

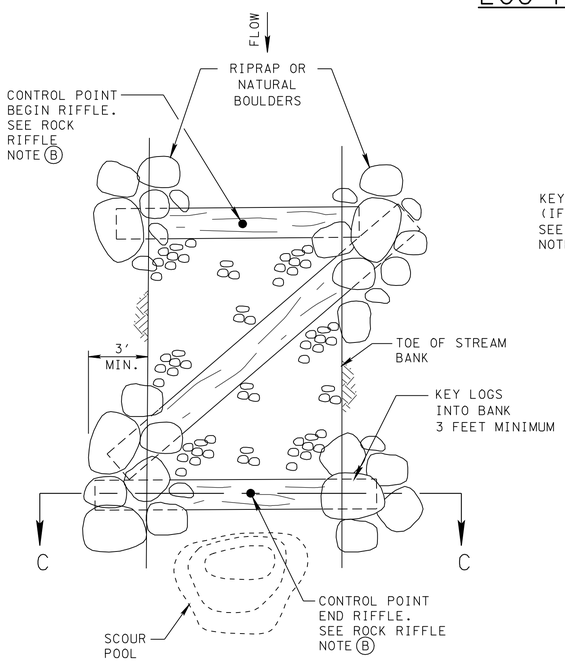
(D) THE MATERIALS USED TO CONSTRUCT A RIFFLE IN THE RELOCATED CHANNEL SHOULD HAVE A PARTICLE SIZE DISTRIBUTION SIMILAR TO THE MATERIALS FOUND IN NATURALLY OCCURRING RIFFLES ON THE STREAM. WHERE POSSIBLE, USE RIFFLE MATERIALS FROM THE STREAM BEING RELOCATED TO CONSTRUCT RIFFLES IN THE RELOCATED CHANNEL REACH. OTHERWISE THE D_{50} OF THE MATERIAL TO BE USED WILL BE PROVIDED IN THE STREAM MITIGATION DATA TABLE IN THE PROJECT PLANS.

(E) ROCK RIFFLES SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

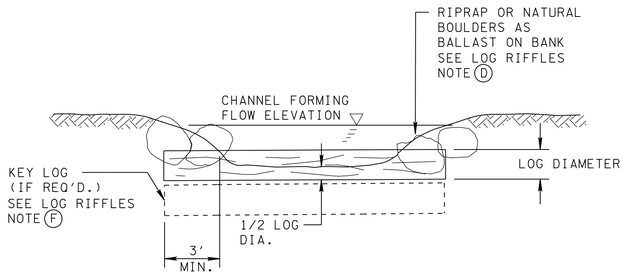
709-05.81 ROCK RIFFLES PER LUMP SUM

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION OF THE ROCK RIFFLE.

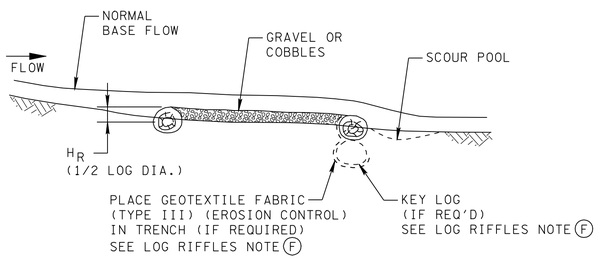
LOG RIFFLE



PLAN VIEW
LOG RIFFLE



SECTION C-C



SECTION VIEW
LOG RIFFLE

LOG RIFFLES GENERAL NOTES

(A) LOG RIFFLES ARE HYDRAULIC CONTROL MEASURES THAT MAY BE USED TO RECREATE THE POOL AND RIFFLE PROFILE PRESENT IN THE EXISTING STREAM THAT IS TO BE RELOCATED AS WELL AS TO ADD OXYGEN TO THE WATER AND PROVIDE SUBSTRATE FOR AQUATIC ORGANISMS.

(B) CONSTRUCT LOG RIFFLES AT THE BEGINNING AND ENDING CONTROL POINT LOCATIONS INDICATED IN THE STREAM MITIGATION DATA TABLE IN THE PROJECT PLANS OR AS DIRECTED BY THE ENGINEER. THE TABLE WILL ALSO INDICATE THE MINIMUM REQUIRED LOG DIAMETER AND THE D_{50} OF THE GRAVEL AND COBBLES PLACED BETWEEN THE LOGS. THE RIFFLE HEIGHT, H_R, SHALL GENERALLY BE EQUAL TO HALF OF THE LOG DIAMETER.

(C) GRAVEL OR COBBLES PLACED BETWEEN THE LOGS SHOULD CORRESPOND TO THE MATERIAL PRESENT IN RIFFLES IN THE EXISTING STREAM. IF POSSIBLE USE THE EXISTING MATERIAL TO CONSTRUCT THE RIFFLES IN THE RELOCATED STREAM.

(D) THE LOGS SHOULD BE KEYED INTO THE BANKS A MINIMUM OF 3 FEET AND NATURAL BOULDERS OR RIPRAP USED TO PROVIDE EXTRA BALLAST. ADDITIONAL STONE SHOULD BE PLACED ABOVE THE ENDS OF THE LOGS IN ORDER TO PROVIDE MATERIAL THAT WILL FILL IN THE VOIDS LEFT AS THE LOGS DECAY.

(E) SELECT LOGS FROM LOCALLY AVAILABLE WOOD SPECIES THAT DECAY RELATIVELY SLOWLY, SUCH AS CEDAR OR WHITE OAK.

(F) WHERE THE CHANNEL IS CHARACTERIZED BY NON-COHESIVE MATERIALS SUCH AS SAND OR SILT, PLACE A KEY LOG BENEATH THE DOWNSTREAM RIFFLE LOG TO PREVENT UNDERMINING. THE TRENCH WITH THIS LOG SHOULD BE LINED WITH GEOTEXTILE FABRIC (TYPE III)(EROSION CONTROL) TO SEAL THE STRUCTURE. ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(G) LOG RIFFLES SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

709-05.80 LOG RIFFLES PER EACH

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION OF THE LOG RIFFLES.

STREAM MITIGATION PLAN LEGEND: LOG RIFFLE

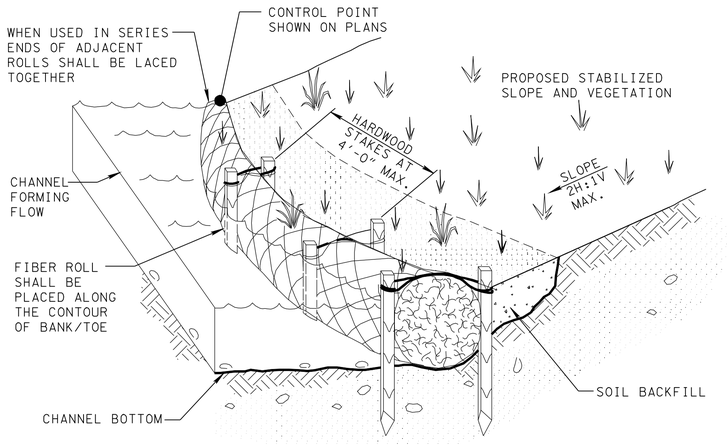
STREAM MITIGATION PLAN LEGEND: ROCK RIFFLE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

CONSTRUCTED RIFFLES

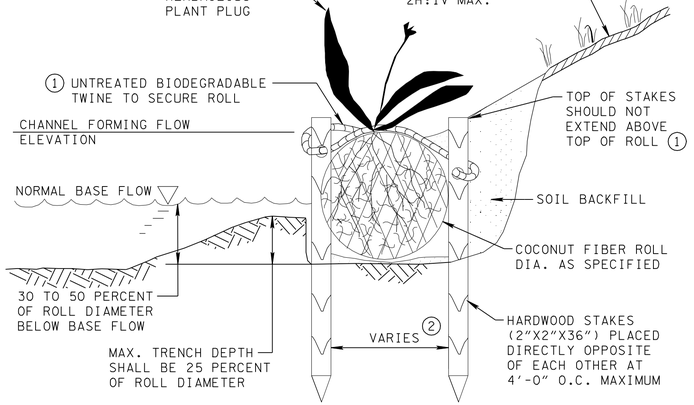
NOT TO SCALE | 8-01-11 | D-NSD-6

COCONUT FIBER ROLL



ISOMETRIC VIEW COCONUT FIBER ROLL

FULL OR PARTIAL SUN REQUIRED FOR USE



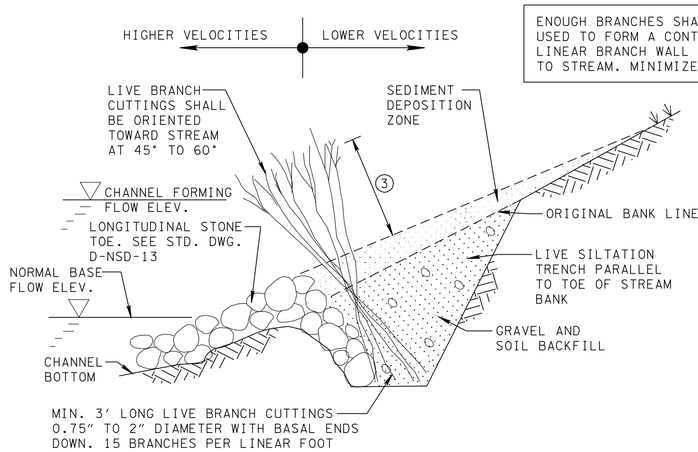
SECTION VIEW COCONUT FIBER ROLL

NOTE 1 : DRIVE STAKES AS NEEDED SO TWINE IS SECURED AGAINST TOP OF ROLL.

NOTE 2 : SPACING VARIES BASED ON ROLL DIAMETER 8, 12, 16, 18, 20-INCH (TYPICAL)

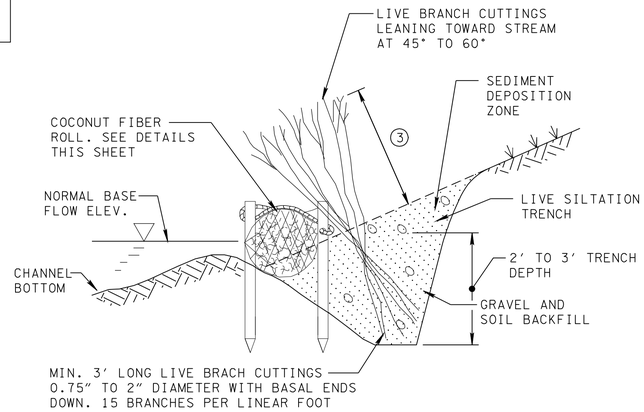
STREAM MITIGATION PLAN LEGEND: **ROLL**ROLL**ROLL** COCONUT FIBER ROLLS

LIVE SILTATION



SECTION VIEW - LIVE SILTATION WITH STONE TOE

NOTE 3 : 1/3 OF THE BRANCH LENGTH SHALL BE ABOVE TRENCH



SECTION VIEW - LIVE SILTATION WITH COCONUT FIBER ROLL

NOTE 3 : 1/3 OF THE BRANCH LENGTH SHALL BE ABOVE TRENCH

COCONUT FIBER ROLL GENERAL NOTES

A. COCONUT FIBER ROLLS ARE A FLEXIBLE BANK STABILIZATION MEASURE CONSISTING OF INTERWOVEN COCONUT HUSK FIBERS THAT CAN BE FITTED TO THE CURVATURE OF A STREAM BANK PROVIDING IMMEDIATE TOE PROTECTION AND BANK STABILIZATION. COCONUT FIBER ROLLS ARE USED TO ENHANCE THE ESTABLISHMENT AND GROWTH OF NATIVE VEGETATION ALONG THE STREAM BANK BY TRAPPING SEDIMENT BEHIND THE ROLL PROVIDING A SUBSTRATE FOR PLANT GROWTH. EFFECTIVE LIFE 2 TO 3 YEARS.

B. COCONUT FIBER ROLLS ARE AN ACCEPTABLE MITIGATION PRACTICE FOR USE IN STREAMS AND ALONG THE SHORELINE OF PONDS AND WETLANDS.

C. COCONUT FIBER ROLLS MAY BE USED IN COMBINATION WITH LONGITUDINAL STONE TOES, ROOT WADS, LIVE SILTATION, OR OTHER BANK STABILIZATION MEASURES.

D. COCONUT FIBER ROLLS SHOULD NOT BE USED WHEN CHANNEL FLOW VELOCITY EXCEEDS 10 FEET PER SECOND, WHERE CHANNEL SHEAR STRESSES ARE MODERATE TO HIGH ALONG THE BANK, IN BEDROCK CHANNELS, IN CHANNELS WHERE SCOUR IS PRESENT OR EXPECTED, OR IN STREAMS WHERE SIGNIFICANT DEBRIS LOAD IS EXPECTED.

E. COCONUT FIBER ROLLS SHOULD BE CONSTRUCTED AT THE TOE OF A STREAM BANK TO A HEIGHT EQUAL TO THE CHANNEL FORMING FLOW ELEVATION.

F. COCONUT FIBER ROLLS SHALL BE SEATED IN A SHALLOW HAND-CUT TRENCH SLIGHTLY BELOW THE CHANNEL BOTTOM ELEVATION. COCONUT FIBER ROLL SHALL BE IN CONTACT WITH THE WATER, SUBMERGED FROM ONE-HALF TO TWO-THIRDS OF THE ROLL DIAMETER.

G. ENDS OF COCONUT FIBER ROLLS SHALL BE TURNED IN AND BURIED WITHIN THE BANK TO PREVENT WATER FROM INTRUDING BEHIND THE ROLL.

H. VEGETATION (SPECIES) USED FOR HERBACIOUS PLUGS TO BE INSTALLED IN THE TOP OF COCONUT FIBER ROLLS SHALL BE APPROVED BY THE ENVIRONMENTAL DIVISION. LIVE DORMANT STAKES MAY BE USED FOR PLUGS.

I. COCONUT FIBER ROLLS SHALL BE KEPT DRY PRIOR TO INSTALLATION.

J. COCONUT FIBER ROLLS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-03.31 STREAM MITIGATION - COCONUT FIBER ROLLS (SIZE) PER LINEAR FOOT

EROSION CONTROL BLANKETS SHALL BE PAID FOR ACCORDING TO THEIR RESPECTIVE ITEM NUMBERS.

PAYMENT FOR COCONUT FIBER ROLLS SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE INSTALLATION OF THE COCONUT FIBER ROLL.

LIVE SILTATION GENERAL NOTES

A. LIVE SILTATION IS A BANK STABILIZATION MEASURE THAT NATURALLY REBUILDS A STREAM BANK THAT HAS ERODED BY SLOWING THE FLOW VELOCITY RESULTING IN THE DEPOSITION OF SEDIMENT DURING HIGH FLOWS. LIVE SILTATION ALSO ENHANCES THE ESTABLISHMENT AND GROWTH OF NATIVE VEGETATION ALONG THE STREAM BANK BY TRAPPING SEED AND ORGANIC MATERIAL ALONG THE SHORE LINE.

B. LIVE SILTATION SHOULD BE CONSTRUCTED AT THE TOE OF A STREAM BANK BEHIND ANY OTHER TOE OF SLOPE PROTECTION AND AT THE NORMAL BASE FLOW ELEVATION.

C. LIVE SILTATION SHOULD BE USED IN COMBINATION WITH LONGITUDINAL STONE TOE, ROOT WADS, OR COCONUT FIBER ROLLS.

D. ALLOWABLE VELOCITY OF FLOW FOR USING LIVE SILTATION SHALL BE 0.8 FT/SEC TO A MAXIMUM OF 6.6 FT/SEC WHEN USED WITH OTHER TOE STABILIZATION MEASURES, LIVE SILTATION MAY BE USED FOR FLOWS UP TO 12 FT/SEC MAXIMUM.

E. LIVE SILTATION MAY BE USED AT THE INSIDE OF A MEANDER BEND, WITHIN A SIDE CHANNEL, IN AREAS WHERE BANK SCOUR HAS OCCURRED, OR AT LOCATIONS WHERE THE FORMATION OF A NEW BANK IS DESIRED.

F. MULTIPLE ROWS OF LIVE SILTATION MAY BE USED PARALLEL TO THE STREAM BANK AND TO EACH OTHER. SPACING OF ROWS SHALL BE 5 TO 10 FEET.

G. CONSTRUCTION OF LIVE SILTATION SHOULD BE PERFORMED DURING THE DORMANT SEASON AND DURING LOW FLOW CONDITIONS.

H. LIVE SILTATION SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-03.46 STREAM MITIGATION - LIVE SILTATION (SPECIES) PER CUBIC YARD

LONGITUDINAL STONE TOE SHALL BE PAID FOR ACCORDING TO ITS RESPECTIVE STANDARD DRAWING.

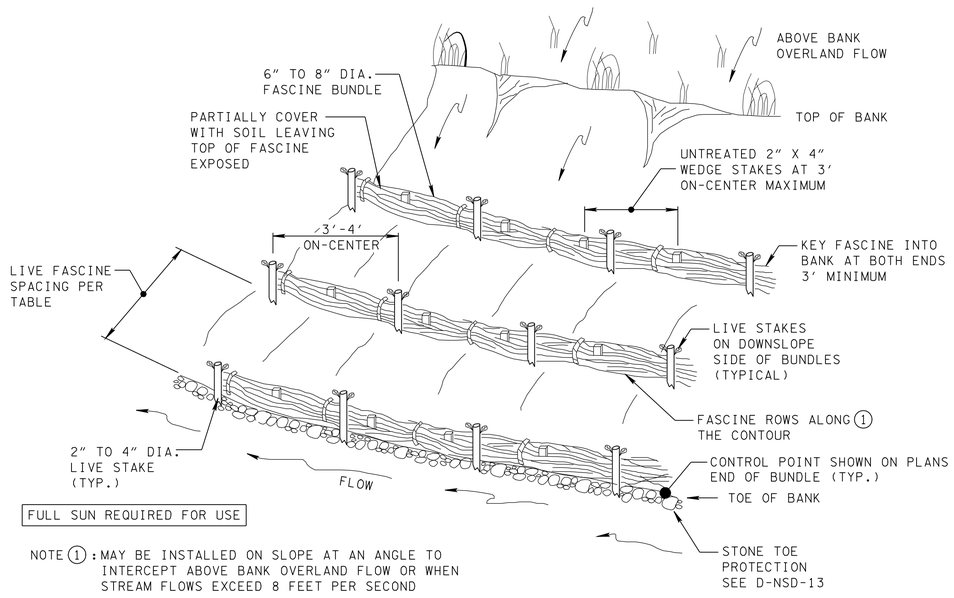
PAYMENT FOR LIVE SILTATION SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION OF THE LIVE SILTATION SYSTEM.

STREAM MITIGATION PLAN LEGEND: ⇓⇓ LS ⇓⇓ LS ⇓⇓ LS ⇓⇓ LS ⇓⇓ LIVE SILTATION

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

COCONUT FIBER ROLLS AND LIVE SILTATION

NOT TO SCALE | 8-01-11 | D-NSD-7

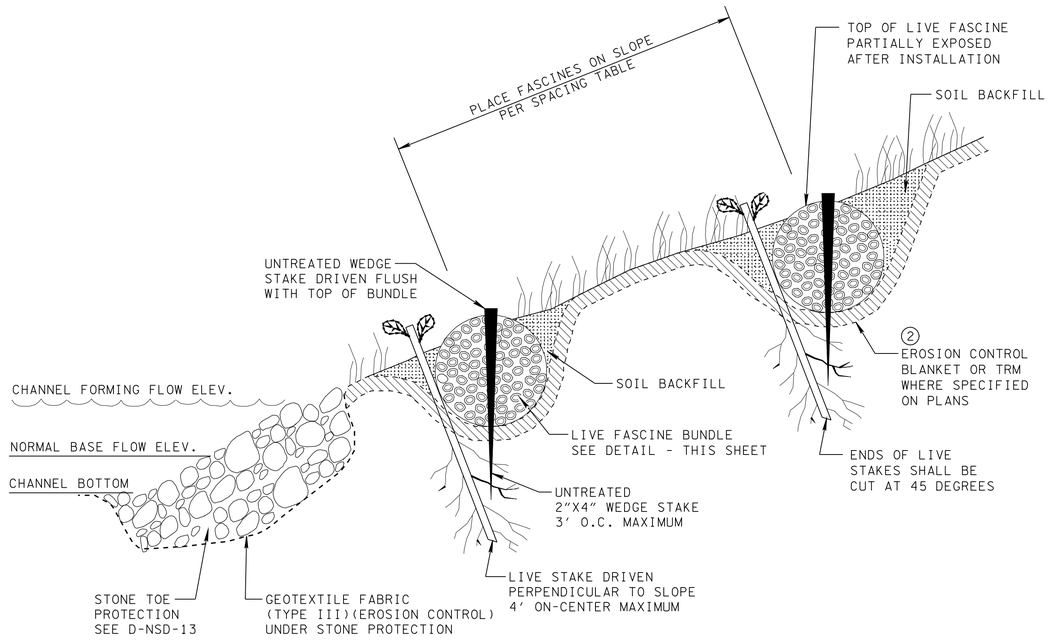


FULL SUN REQUIRED FOR USE

NOTE (1) : MAY BE INSTALLED ON SLOPE AT AN ANGLE TO INTERCEPT ABOVE BANK OVERLAND FLOW OR WHEN STREAM FLOWS EXCEED 8 FEET PER SECOND

ISOMETRIC VIEW

SHOWN ON SURFACE FOR CLARITY
FASCINES SHALL BE TRENCHED IN AS SHOWN IN SECTION VIEW

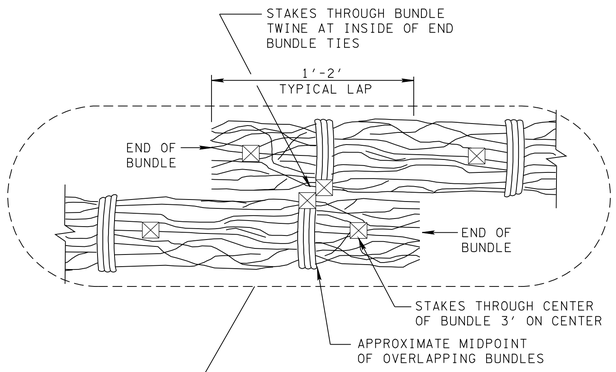


SECTION VIEW

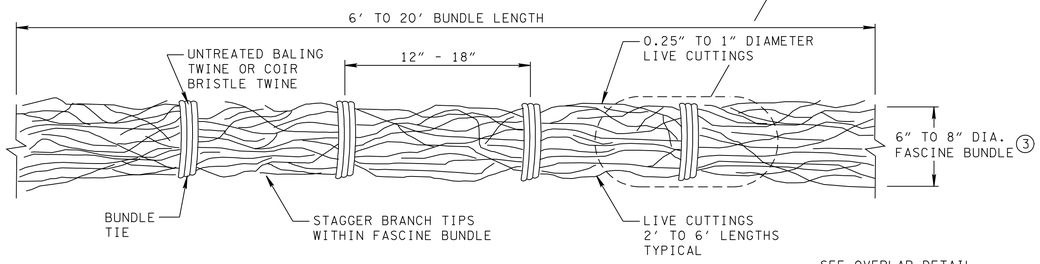
NOTE (2) : WHEN EROSION CONTROL BLANKETS OR TURF REINFORCED MATS ARE SPECIFIED ON SLOPES THEY SHALL BE CONTINUED THROUGH THE TRENCH FOR EACH ROW OF FASCINES

LIVE FASCINE SPACING (FEET)		
SLOPE	SOIL TYPE	
	COHESIVE	NON-COHESIVE
1H:1V	3 *	NA
1H:1V-2H:1V	3-4 *	NA
2H:1V-3H:1V	4-5 *	3-4 *
3H:1V-4H:1V	5-6	4-5 *
4:1 OR FLATTER	6-8	5-7

*USE OF AN EROSION CONTROL BLANKET BETWEEN THE LIVE FASCINE AND BANK RECOMMENDED



OVERLAP DETAIL



LIVE FASCINES DETAIL

SEE OVERLAP DETAIL

NOTE (3) : FINAL DIAMETER WHEN FIRMLY COMPRESSED AND TIED

STREAM MITIGATION PLAN LEGEND: LF LF LF LIVE FASCINE

LIVE FASCINES GENERAL NOTES

(A) LIVE FASCINES ARE CYLINDRICAL BUNDLES OF LIVE BRANCH CUTTINGS USED AS A BANK STABILIZATION MEASURE TO PROTECT A BANK AND TOE FROM SURFACE EROSION, TRAP SEDIMENTS, AND INCREASE SLOPE STABILITY WITH A DEVELOPED ROOT SYSTEM. FASCINES ARE USED ABOVE THE BASE FLOW ELEVATION OF A SLOPE TO TRAP SEED AND SEDIMENT AND TO ENHANCE CONDITIONS FOR COLONIZATION OF NATIVE VEGETATION USED IN THE BUNDLES.

(B) CONSTRUCTION OF FASCINES ON SLOPES SHALL CONFORM TO ASTM D6599.

(C) THIS MEASURE MAY BE COMBINED WITH OTHER SLOPE STABILIZATION MEASURES INCLUDING LIVE STAKES, EROSION CONTROL BLANKET, TURF REINFORCED MAT, BRUSH MATTRESSES, AND LONGITUDINAL STONE TOE.

(D) NOT SUITABLE FOR USE ON SLOPES COMPRISED OF SAND, GRAVEL, OR ROCK, OR ON SLOPES THAT ARE NOT IN FULL SUNLIGHT. FASCINES SHALL NOT BE USED WHERE THEY WILL BE SUBJECTED TO CONCENTRATED FLOW FROM ABOVE THE STREAMBANK OR WHERE CHANNEL FLOW VELOCITIES EXCEED 12 FEET PER SECOND.

(E) FASCINES SHALL BE PLACED ON A SLOPE ALONG THE CONTOUR AND SHALL BE KEYED INTO BANK AT BOTH ENDS OF THE FASCINE ROW.

(F) FASCINE BUNDLES SHALL BE CONSTRUCTED OF LIVE DORMANT BRANCH CUTTINGS RANDOMLY BOUND TOGETHER WITH UNTREATED TWINE EVERY 12 TO 18 INCHES. BASAL (CUT) ENDS OF BRANCHES SHALL BE ALTERNATING WITHIN THE FASCINE BUNDLE.

(G) FASCINES SHALL BE OVERLAPPED AT THE ENDS A MINIMUM OF ONE FOOT.

(H) UNTREATED WEDGE STAKES SHALL BE INSTALLED FLUSH WITH THE TOP OF THE FASCINE BUNDLES AND SHALL BE SPACED AT 3 FEET ON-CENTER MAXIMUM.

(I) FASCINE BRANCHES SHALL BE OBTAINED FROM LOCAL SOURCES APPROVED BY THE ENGINEER.

(J) LIVE FASCINES SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-03.45 STREAM MITIGATION - LIVE FASCINES (SPECIES) PER LINEAR FOOT

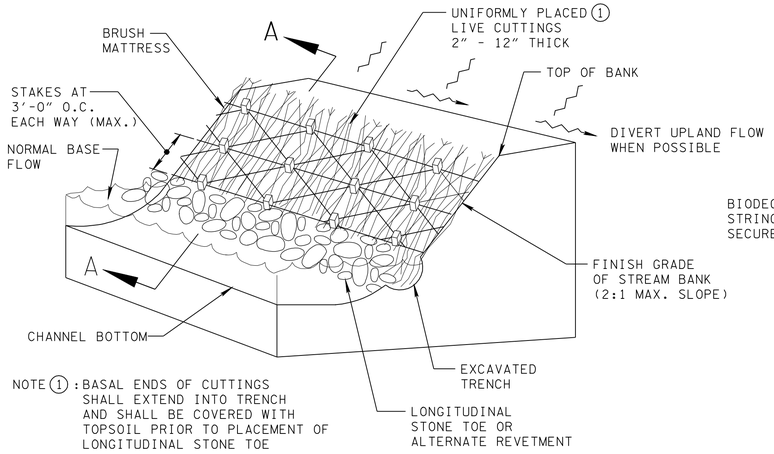
EROSION CONTROL BLANKETS AND TURF REINFORCED MATS SHALL BE PAID FOR ACCORDING TO THEIR RESPECTIVE ITEM NUMBERS.

PAYMENT FOR LIVE FASCINES SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION OF THE LIVE FASCINE.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

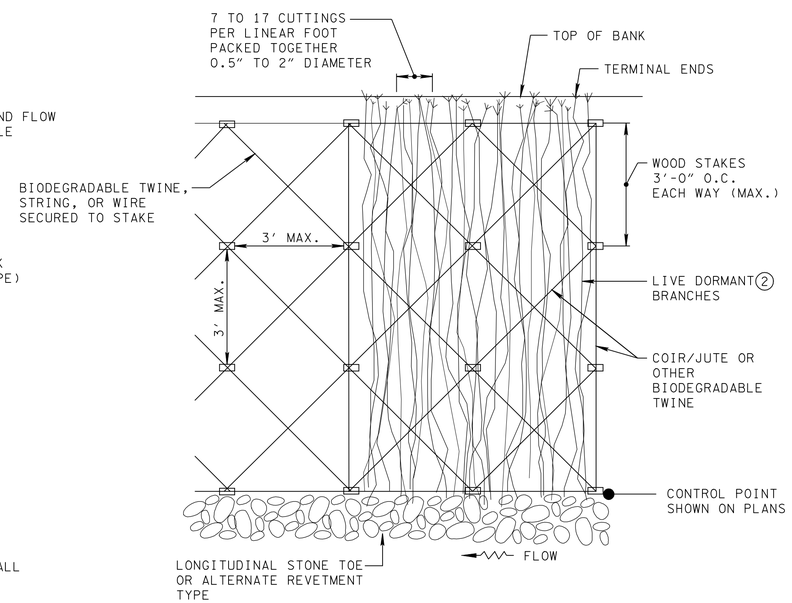
LIVE FASCINES AND WILLOW CUTTINGS

NOT TO SCALE | 8-01-11 | D-NSD-8



NOTE (1): BASAL ENDS OF CUTTINGS SHALL EXTEND INTO TRENCH AND SHALL BE COVERED WITH TOPSOIL PRIOR TO PLACEMENT OF LONGITUDINAL STONE TOE

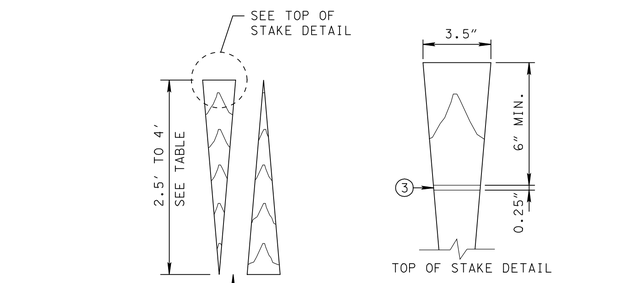
ISOMETRIC VIEW



FULL OR PARTIAL SUN REQUIRED FOR USE

NOTE (2): BRANCHES SHOULD BE PLACED PERPENDICULAR TO FLOW

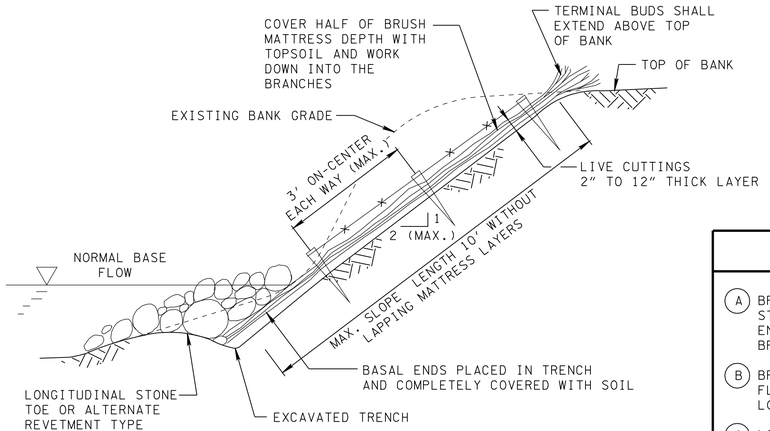
PLAN VIEW



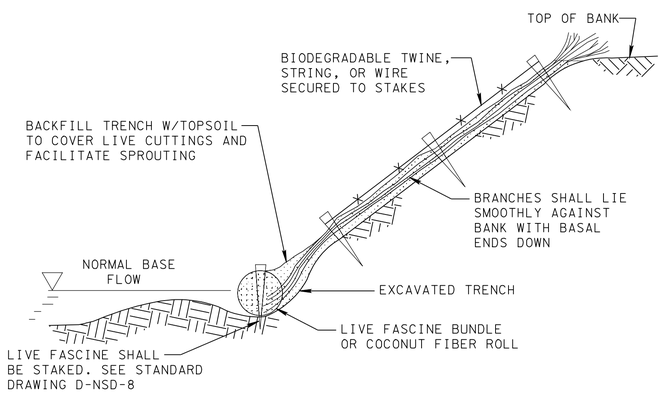
NOTE (3): NOTCH STAKES TO 3/8" DEPTH (BOTH SIDES). TWINE, STRING, OR WIRE SHALL BE WRAPPED 1 TURN MIN. AROUND EACH STAKE AND PLACED WITHIN NOTCH

BRUSH MATTRESS STAKE DETAIL

STAKE LENGTH	
SOIL TYPE	LENGTH (FEET)
CLAY	2.5
SILT	3.0
SAND	4.0
LOAM	2.5



SECTION A-A



ALTERNATE REVETMENT AT TOE OF SLOPE

STREAM MITIGATION PLAN LEGEND: BRUSH MATTRESS

BRUSH MATTRESS GENERAL NOTES

(A) BRUSH MATTRESS IS A BANK STABILIZATION PRACTICE THAT PROTECTS A STREAMBANK FROM EROSION, CAPTURES SEDIMENT DURING HIGH FLOWS, AND ENHANCES THE ESTABLISHMENT AND GROWTH OF NATIVE VEGETATION USING LIVE BRANCHES AND CUTTINGS ANCHORED TO THE STREAM BANK.

(B) BRUSH MATTRESSES SHOULD NOT BE USED WHERE PERENNIAL (YEAR ROUND) STREAM FLOW IS NOT PRESENT OR ALONG STREAMS WITH ANTICIPATED HIGH SEDIMENT LOADS.

(C) LIVE DORMANT CUTTINGS SHALL BE PLACED ON THE SLOPE PERPENDICULAR TO THE STREAM AND THE MATTRESS SHALL BE BETWEEN 2 INCHES AND 12 INCHES THICK. CUTTINGS SHALL BE STRAIGHT, FLEXIBLE BRANCHES OF WILLOW, SHRUB DOGWOOD, OR OTHER APPROVED SPECIES.

(D) LIVE DORMANT CUTTINGS OR BRANCHES SHALL BE A MINIMUM OF 0.5-INCHES IN DIAMETER AT THE BASAL END AND NO GREATER THAN 2 INCHES. BASAL ENDS OF THE BRANCHES SHOULD BE CUT AT A 30 TO 45 DEGREE ANGLE AND SHALL BE INSTALLED BELOW THE NORMAL BASE FLOW ELEVATION IN THE TRENCH.

(E) MAXIMUM GRADE OF SLOPE FOR BRUSH MATTRESS SHALL BE 2H:1V OR FLATTER AND SHALL BE UNIFORMLY GRADED AND SHAPED TO PROVIDE ADEQUATE SOIL TO STEM CONTACT. MAXIMUM FACE LENGTH OF SLOPE SHALL BE 10 FEET. WHERE LONGER SLOPES ARE PRESENT, USE MULTIPLE ROWS OF BRUSH MATTRESS WITH MINIMUM 1 FOOT OVERLAP. TERMINAL ENDS OF LOWER ROW SHALL LAP OVER THE BASAL ENDS OF UPPER ROW.

(F) CARE SHOULD BE TAKEN WHEN INSTALLING LONGITUDINAL STONE TOE, COCONUT FIBER ROLLS OR LIVE FASCINES IN TRENCH TO AVOID PUTTING THE BRANCHES IN TENSION AND LIFTING THEM FROM THE STREAMBANK.

(G) ROCK FOR LONGITUDINAL STONE TOE SHALL BE SIZED ACCORDING TO COMPUTED FLOW VELOCITY AND SHEAR STRESS ALONG THE BANK. FOR ADDITIONAL DETAILS OF LONGITUDINAL STONE TOE SEE STANDARD DRAWING D-NSD-13. FOR DETAILS OF LIVE FASCINES SEE STANDARD DRAWING D-NSD-8.

(H) WOOD STAKES MAY BE STANDARD COMMERCIAL GRADE UNTREATED LUMBER CUT TO LENGTH, RIPPED LENGTHWISE TO PRODUCE TWO WEDGE SHAPED STAKES, AND NOTCHED AT THE TOP TO ACCEPT 1 TURN OF THE TWINE, STRING, OR WIRE WITHIN THE NOTCH. WHERE DORMANT LIVE STAKES ARE USED INSTEAD OF DEAD STAKES, NOTCH FOR TWINE SHALL BE OMITTED. NON-BIODEGRADABLE STAKES ARE NOT PERMITTED FOR USE WITH BRUSH MATTRESS.

(I) TYPICAL INSTALLATION SEQUENCE:

1. COLLECT AND SOAK LIVE BRANCHES A MINIMUM OF 24 HOURS. 5-7 DAYS PREFERRED. LEAVE SIDE BRANCHES INTACT.
2. EXCAVATE BANK TO DESIRED GRADE CLEARING AWAY LARGE DEBRIS.
3. EXCAVATE AN 8 TO 12-INCH DEEP HORIZONTAL TRENCH AT THE TOE OF SLOPE.
4. LAY CUTTINGS FLAT AGAINST THE SLOPE WITH BASAL ENDS PLACED DEEPLY IN THE TRENCH EXPOSED TO MOIST SOIL.
5. INSTALL WEDGE STAKES OR LIVE STAKES LEAVING APPROXIMATELY 12 INCHES OF THE TOP OF STAKE EXPOSED. DISCARD AND REPLACE SHATTERED STAKES.
6. TIE TWINE, STRING, OR OTHER BIODEGRADABLE WIRE AROUND STAKES IN A DIAGONAL PATTERN BETWEEN EACH ROW OF STAKES.
7. DRIVE THE STAKES IN FURTHER TO COMPRESS THE MATTRESS AGAINST THE SLOPE LEAVING A MINIMUM OF 6 INCHES OF THE STAKE ABOVE THE MATTRESS.
8. INSTALL LONGITUDINAL STONE TOE OR OTHER APPROVED ALTERNATE IN TRENCH.
9. BACKFILL IN AND BETWEEN THE BRANCHES WITH LOOSE MATERIAL UNTIL APPROXIMATELY HALF THE MATTRESS REMAINS EXPOSED. WET THE SURFACE TO WASH SOIL DOWN BETWEEN THE BRANCHES.

(J) ALL TWINE, STRING, WIRE OR OTHER MEASURES USED FOR SECURING MATTRESS TO STAKES SHALL BE BIODEGRADABLE. WHERE COIR TWINE IS USED, IT SHALL BE MACHINE SPUN BRISTLE COIR OF 0.2 TO 0.25-INCH THICKNESS WITH BREAK STRENGTH OF 70 TO 100 POUNDS. JUTE OR OTHER BIODEGRADABLE MATERIAL IS ACCEPTABLE.

(K) BRANCHES SHALL BE FLEXIBLE ENOUGH TO CONFORM TO ANY SLOPE SURFACE IRREGULARITIES AND SHOULD BE INSTALLED DURING DORMANT SEASON.

(L) BRUSH MATTRESS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-03.59 STREAM MITIGATION - BRUSH MATTRESS PER SQUARE YARD

LONGITUDINAL STONE TOE, COCONUT FIBER ROLL, AND LIVE FASCINE BUNDLES SHALL BE PAID FOR ACCORDING TO THEIR RESPECTIVE STANDARD DRAWINGS.

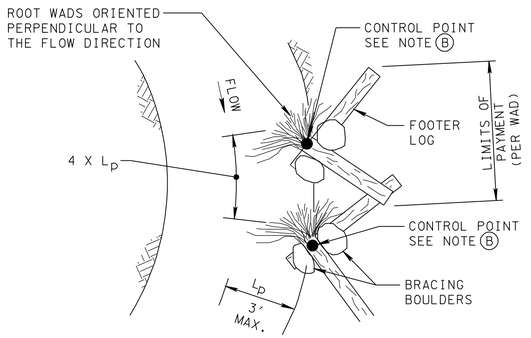
PAYMENT FOR BRUSH MATTRESS SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION OF THE MATTRESS.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

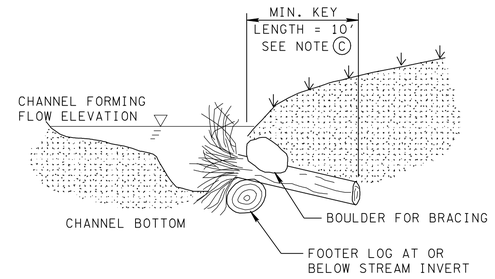
BRUSH MATTRESS

NOT TO SCALE | 8-01-11 | D-NSD-9

ROOT WAD

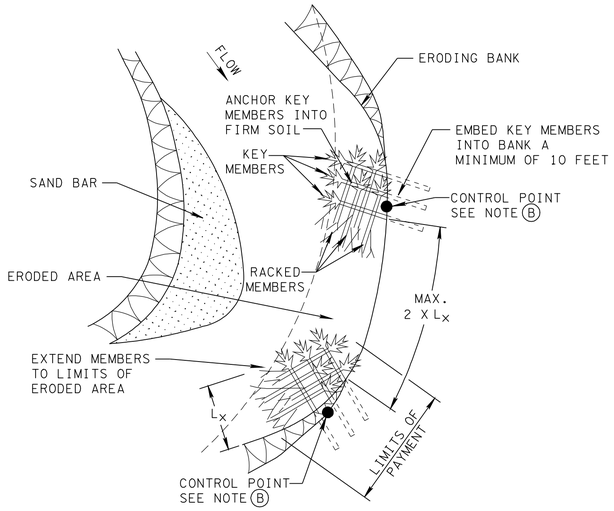


PLAN VIEW
ROOT WAD REVETMENT



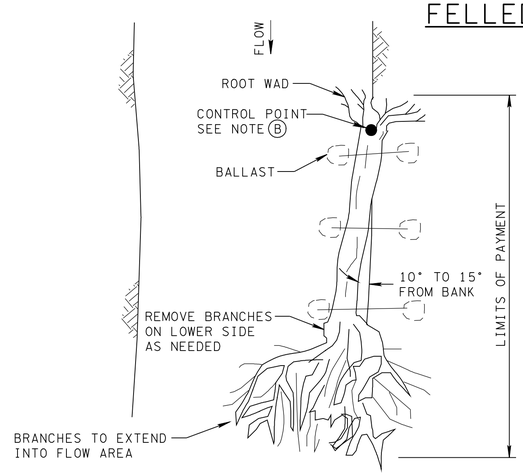
SECTION VIEW
ROOT WAD

RACK STRUCTURE

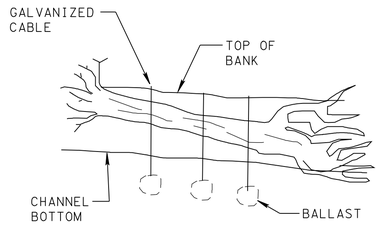


PLAN VIEW
RACK STRUCTURES

FELLED TREE

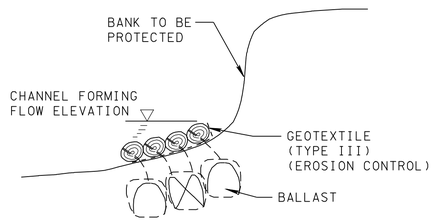


PLAN VIEW
FELLED TREE

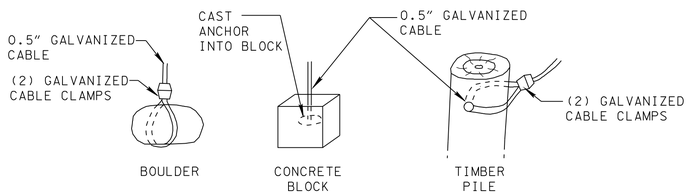


TREE PLACEMENT
ON BANK

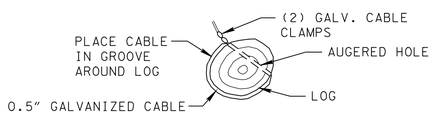
LOG REVETMENT



SECTION VIEW
LOG REVETMENT



BALLAST TYPES FOR ANCHORS



ANCHOR CONNECTION
LOG REVETMENT

LARGE WOODY DEBRIS GENERAL NOTES

(A) LARGE WOODY DEBRIS MAY HAVE A VARIETY OF CONFIGURATIONS BASED ON THE PURPOSE OF THE INSTALLATION. ROOT WADS, LOG REVETMENTS AND FELLED TREES MAY BE USED TO PREVENT EROSION ON AN OUTSIDE CHANNEL BEND WHILE ALSO PROVIDING HABITAT OPPORTUNITIES. RACK STRUCTURES CAN PREVENT EROSION AND ALSO HELP ENCOURAGE THE DEPOSITION OF SEDIMENT TO REBUILD AN ERODED BANK. LARGE WOODY DEBRIS SHOULD NOT BE PLACED ON STREAMS THAT DO NOT ALREADY HAVE SIGNIFICANT RIPARIAN TREE COVER.

(B) STATIONS, OFFSETS AND REQUIRED ANCHOR STRENGTH FOR LARGE WOODY DEBRIS INSTALLATIONS WILL BE PROVIDED IN THE STREAM MITIGATION DATA TABLE IN THE PROJECT PLANS. CONSTRUCT AS INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER. CONSTRUCT LARGE WOODY DEBRIS STRUCTURES WITH LOCALLY AVAILABLE ROT RESISTANT TREE SPECIES SUCH AS CEDAR OR WHITE OAK.

(C) ROOT WADS SHALL BE PLACED SO THAT THE ROOT FAN IS NO MORE THAN 3 FEET FROM THE BANK. WHERE THE CHANNEL WIDTH IS LESS THAN 15 FEET, THE TRUNK SHOULD BE KEYED INTO THE BANK A MINIMUM DISTANCE OF 10 FEET. IN LARGER STREAMS, THE KEY LENGTH SHOULD BE INCREASED TO 20 FEET. CONSTRUCT KEYS BY EXCAVATING A TRENCH IN THE STREAM BANK AND BURYING THE TRUNK. ROOT WADS SHOULD BE SUPPORTED ON FOOTER LOGS PLACED IN A TRENCH AT THE BANK LINE. LARGE BOULDERS MAY BE PLACED ON TOP OF THE LOG TO PROVIDE INCREASED STABILITY.

(D) RACK STRUCTURES SHALL BE USED ONLY WHERE THE UNDERLYING SOILS OFFER SUFFICIENT STRENGTH TO FIRMLY HOLD THE ANCHORS. THE KEY MEMBERS SHOULD BE KEYED INTO THE BANK AS DESCRIBED IN NOTE (C) WITH THE ROOT FANS FACING THE CHANNEL. RACKED MEMBERS SHOULD INTERLOCK WITH THE KEY MEMBERS WITH ROOT FANS FACING UPSTREAM. THE ENTIRE STRUCTURE SHOULD BE ANGLED SO THAT THE FLOW INTERSECTS THE RACKED MEMBERS AT AN ANGLE OF 15 DEGREES. THE STRUCTURE SHALL ALSO BE ANCHORED AS DESCRIBED IN NOTE (G). THE TOP OF THE STRUCTURE SHOULD BE AT THE CHANNEL FORMING FLOW ELEVATION WHILE THE LOWEST MEMBERS SHOULD BE BELOW THE ANTICIPATED SCOUR DEPTH.

(E) EACH LOG IN A LOG REVETMENT SHALL BE SECURED AT BOTH ENDS BY APPROPRIATE ANCHORS AS DESCRIBED IN NOTE (G). ANCHORS SHOULD BE PLACED THROUGH HOLES BORED IN THE LOGS AND TIED WITH TWO GALVANIZED CABLE CLAMPS. LOGS SHALL BE PLACED ON GEOTEXTILE FABRIC (TYPE III) (EROSION CONTROL). ONLY GEOTEXTILE (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(F) FELLED TREES SHALL BE PLACED SO THAT THE ROOT FAN IS NEAR THE TOP OF BANK. THE TRUNK SHOULD BE PLACED AT AN ANGLE OF 10 TO 15 DEGREES WITH THE BANK LINE SO THAT THE BRANCHES EXTEND INTO THE ACTIVE FLOW OF THE STREAM. BRANCHES MAY BE REMOVED AS NEEDED FROM THE UNDERSIDE OF THE TREE TO FACILITATE PLACEMENT IN THE CHANNEL. BRANCH REMOVAL SHALL BE KEPT TO A MINIMUM.

(G) ANCHORS SHALL CONSIST OF GALVANIZED CABLE. THE GAUGE OF CABLE, TYPE OF BALLAST AND CLAMPS SHALL BE SELECTED BY THE CONTRACTOR BASED ON THE REQUIRED ANCHOR TENSILE STRENGTH SHOWN IN THE STREAM MITIGATION TABLE IN THE PROJECT PLANS. ANCHORS SHALL BE BALLASTED BY MEANS OF BOULDERS, CONCRETE BLOCKS OR TIMBER PILES BURIED IN WELL COMPACTED SOILS AT A LEVEL BELOW THE EXPECTED SCOUR DEPTH.

(H) LARGE WOODY DEBRIS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

209-03.62	STREAM MITIGATION - ROOT WAD (SIZE) PER EACH
209-03.63	STREAM MITIGATION - RACK STRUCTURE (SIZE) PER EACH
209-03.64	STREAM MITIGATION - FELLED TREE (SIZE) PER EACH
209-03.65	STREAM MITIGATION - LOG REVETMENTS (DESCRIPTION) PER LINEAR FOOT

NOTE: SIZE IS DEFINED BY THE AVERAGE DIAMETER OF THE TREE TRUNK.

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION OF THE SPECIFIED WOODY DEBRIS STRUCTURE.

(I) ALL HARDWARE SHALL BE LISTED ON THE QUALIFIED PRODUCT LIST OR APPROVED BY TDOT IN ADVANCE OF IT'S USE AND INTENDED PURPOSE.

STREAM MITIGATION PLAN LEGEND: LR — LOG REVETMENT

STREAM MITIGATION PLAN LEGEND: # — RACK STRUCTURE

STREAM MITIGATION PLAN LEGEND: — ROOT WAD

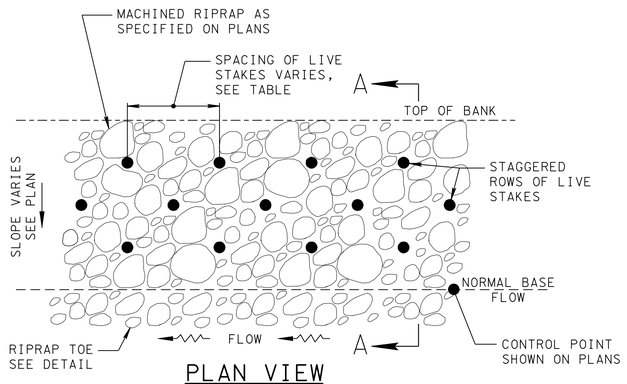
STREAM MITIGATION PLAN LEGEND: — FELLED TREE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

LARGE WOODY DEBRIS

NOT TO SCALE | 8-01-11 | D-NSD-10

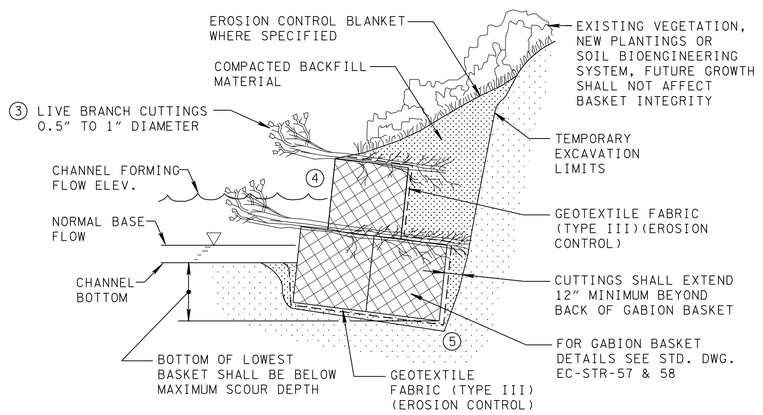
VEGETATED RIPRAP



PLAN VIEW
VEGETATED RIPRAP

● DENOTES LIVE STAKE

VEGETATED GABIONS



NOTE ③ : BRANCHES MAY BE INSTALLED WITHIN BASKETS DURING THE FILLING OF THE GABION. ROOT SYSTEM SHALL EXTEND TO SOIL BEHIND GABION BASKET.

NOTE ④ : STACKED GABIONS SHALL BE TILTED TOWARD THE SLOPE A MINIMUM OF 6 DEGREES

NOTE ⑤ : GABIONS SHALL BE CONSTRUCTED ON STABLE, NON-ERODING FOUNDATION

SECTION VIEW
VEGETATED GABION

CONTROL POINT (BEGIN AND END) FOR GABIONS SHALL BE PROVIDED ON THE STREAM MITIGATION PLANS

VEGETATED RIPRAP GENERAL NOTES

(A) VEGETATED RIPRAP IS A BANK STABILIZATION PRACTICE THAT PROTECTS A STREAMBANK FROM EROSION, REDUCES LOCAL FLOW VELOCITIES, TRAPS SEDIMENT DURING HIGH FLOWS, AND ENHANCES THE ESTABLISHMENT AND GROWTH OF NATIVE VEGETATION USING LIVE BRANCHES AND CUTTINGS ANCHORED TO THE SLOPES.

(B) VEGETATED RIPRAP FOR STREAM MITIGATION SHOULD BE LIMITED TO LOCATIONS WHERE HARD ARMORING IS REQUIRED SUCH AS THE OUTSIDE OF A STREAM BEND.

(C) RIPRAP SHALL BE KEYED INTO THE STREAM BED TO AN ELEVATION BELOW THE COMPUTED SCOUR DEPTH TO AVOID UNDERMINING AT THE TOE OF SLOPE.

(D) LIVE STAKES SHALL BE IN CONTACT WITH THE SOIL BELOW THE RIPRAP AND ANY GEOTEXTILE PRESENT BELOW THE RIPRAP A MINIMUM OF 12 INCHES. PLANTING OF CUTTINGS DURING THE DORMANT SEASON OF THE PLANT SPECIES IS PREFERRED.

(E) LIVE STAKES SHALL BE 0.75 INCHES TO 2.5 INCHES IN DIAMETER AND GENERALLY 2.5 TO 4 FEET LONG WITH SIDE BRANCHES CLEANLY REMOVED.

(F) THE BOTTOM (BASAL) END OF LIVE STAKES SHALL BE CLEANLY CUT AT A 45 DEGREE ANGLE. THE TOP OF ALL LIVE STAKES SHALL BE CUT SQUARE (FLAT). ALL PLANTINGS SHALL BE INSTALLED PERPENDICULAR TO THE SLOPE.

(G) LIVE STAKES FOR VEGETATED RIPRAP MAY BE INSTALLED THE DAY THEY ARE HARVESTED IF WATERED. SOAKING FOR A MINIMUM 24 HOURS IS REQUIRED WHEN PLANTING IS DELAYED.

(H) LIVE STAKES FOR VEGETATED RIPRAP MAY BE INSTALLED LEAVING A FEW INCHES ABOVE THE TOP OF THE RIPRAP OR CUT FLUSH WITH THE TOP OF THE RIPRAP. AT LEAST TWO BUDS OR BUD SCARS SHALL BE PRESENT ON THE STAKE WHEN INSTALLED.

(I) VOIDS IN RIPRAP WHERE LIVE STAKES ARE INSTALLED SHALL BE BACKFILLED WITH A WATER AND SOIL SLURRY MIXTURE TO A MINIMUM DEPTH OF HALF THE RIPRAP LAYER THICKNESS.

(J) ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(K) VEGETATED RIPRAP SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-03.43 STREAM MITIGATION - VEGETATED RIPRAP (DESCRIPTION) PER CUBIC YARD
740-10.03 GEOTEXTILE (TYPE III) (EROSION CONTROL) PER SQUARE YARD

PAYMENT FOR VEGETATED RIPRAP SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION OF THE RIPRAP AND VEGETATION (LIVE STAKES).

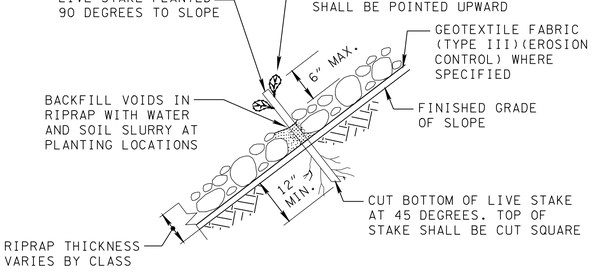
(L) OTHER VARIATIONS MAY BE USED SUCH AS RIPRAP WITH BRUSH LAYERING AND POLE PLANTING, BENT POLE (HORIZONTAL) METHOD, OR WILLOW BUNDLE METHOD.

LIVE STAKE SPACING TABLE

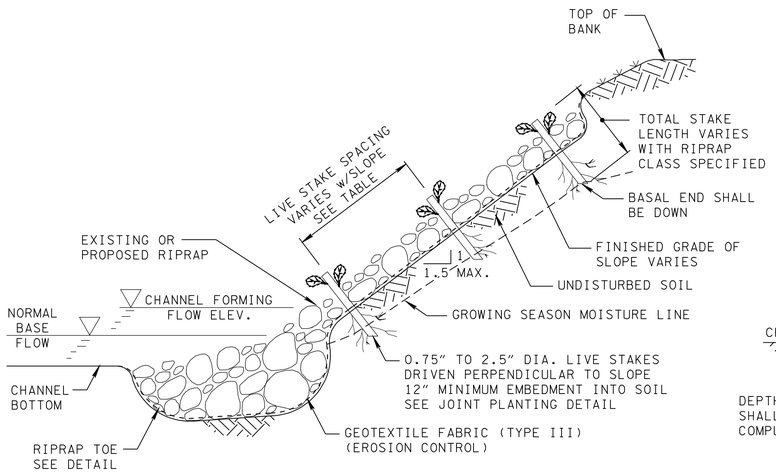
SLOPE STEEPNESS ① H:V	SPACING IN FEET ②	
	SOILS	
	COHESIVE	NON-COHESIVE
1.5:1	1.5 TO 2.5	1 TO 2
2:1	1.5 TO 3	1.5 TO 2
3:1	3 TO 5	2 TO 4
FLATTER	AS DIRECTED BY ENGINEER	

NOTE ① : ASSUMES SLOPE IS STABLE

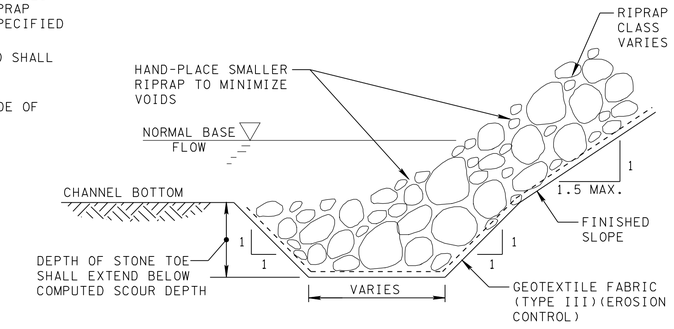
NOTE ② : ON-CENTER, EACH WAY



LIVE STAKE RIPRAP JOINT PLANTING DETAIL



SECTION A-A



RIPRAP TOE DETAIL

VEGETATED GABIONS GENERAL NOTES

(A) VEGETATED GABIONS ARE RECTANGULAR WIRE BASKETS OR MATTRESSES FILLED WITH ROCK AND USED AS A BANK STABILIZATION PRACTICE TO PROTECT A STEEP STREAMBANK FROM EROSION IN LOCATIONS WHERE THE BANK IS TOO STEEP FOR RIPRAP OR OTHER MEASURES AND STRUCTURAL SUPPORT IS REQUIRED. VEGETATED GABIONS ENHANCE THE ESTABLISHMENT AND GROWTH OF NATIVE VEGETATION USING LIVE BRANCHES AND CUTTINGS COMBINED WITH THE WIRE BASKETS.

(B) VEGETATED GABIONS FOR STREAM MITIGATIONS SHOULD BE LIMITED TO LOCATIONS WHERE HARD ARMORING IS REQUIRED SUCH AS THE OUTSIDE OF A STREAM BEND AND WHERE LIMITED SPACE IS AVAILABLE AND STRUCTURAL SUPPORT IS REQUIRED.

(C) GABIONS SHALL BE KEYED INTO THE STREAM BED SO THAT THE BOTTOM ELEVATION OF THE LOWEST BASKET IS BELOW THE EXPECTED MAXIMUM COMPUTED SCOUR DEPTH OF THE STREAM.

(D) LIVE BRANCH CUTTINGS SHALL BE 0.5 INCHES TO 1.5 INCHES MAX. DIAMETER AND A MINIMUM OF 4 FEET LONG WITH SIDE BRANCHES CLEANLY REMOVED. LENGTH OF CUTTING WILL VARY BASED ON GABION WALL LAYOUT.

(E) LIVE BRANCH CUTTINGS MAY BE INSTALLED BETWEEN HORIZONTAL LAYERS OF GABIONS OR ANYWHERE WITHIN THE BASKET DURING THE FILLING OF THE BASKET WITH ROCK. WHERE INSTALLED WITHIN A BASKET, THE STONES SHALL BE HAND-PLACED TO AVOID DAMAGE TO THE LIVE BRANCH CUTTINGS.

(F) LIVE BRANCH CUTTINGS SHALL BE PLACED PERPENDICULAR TO THE SLOPE WITH GROWING TIPS SLIGHTLY PROTRUDING FROM THE FRONT OF THE GABION WALL.

(G) LIVE BRANCH CUTTINGS SHALL BE IN CONTACT WITH THE SOIL BEHIND THE GABION BASKETS OR MATTRESSES AND THROUGH THE GEOTEXTILE PRESENT BEHIND THE GABION A MINIMUM OF 12 INCHES (PREFERABLY TO THE UNDISTURBED BANK SOIL).

(H) GABION CONSTRUCTION AND ASSEMBLY SHALL BE AS PROVIDED ON STANDARD DRAWINGS EC-STR-57 AND EC-STR-58.

(I) WHERE GABION MATTRESSES ARE SPECIFIED, PLANTING OF LIVE BRANCHES OR STAKES SHALL BE SIMILAR TO VEGETATED RIPRAP.

(J) ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(K) VEGETATED GABIONS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-03.48 STREAM MITIGATION - VEGETATED GABIONS (DESCRIPTION) PER CUBIC YARD
740-10.03 GEOTEXTILE (TYPE III) (EROSION CONTROL) PER SQUARE YARD

PAYMENT FOR VEGETATED GABIONS SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION OF THE GABIONS AND VEGETATION.

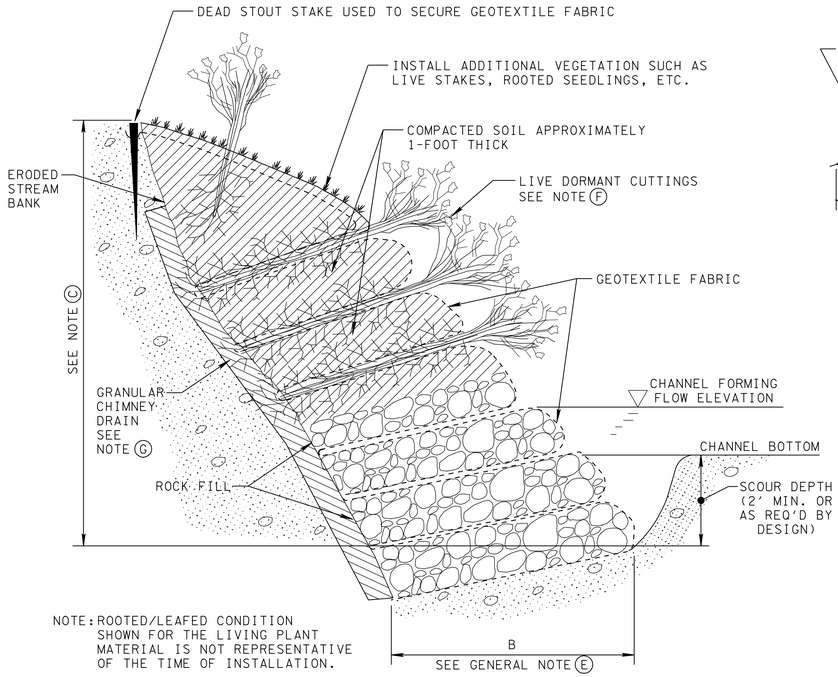
STREAM MITIGATION PLAN LEGEND: VEGETATED GABIONS

STREAM MITIGATION PLAN LEGEND: VEGETATED RIPRAP

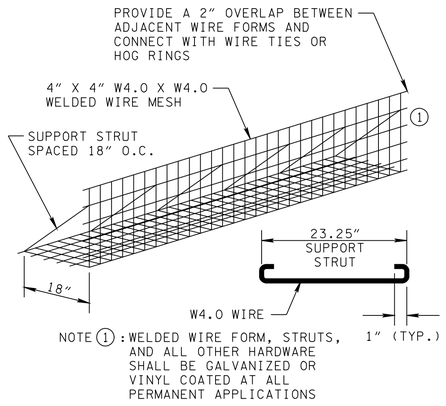
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

VEGETATED RIPRAP AND GABIONS

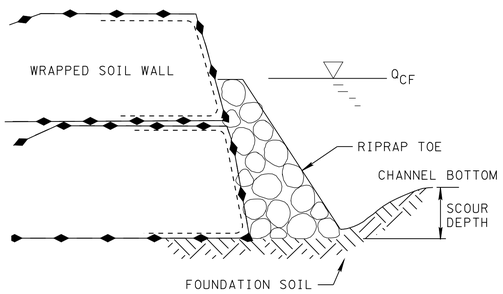
NOT TO SCALE | 8-01-11 | D-NSD-11



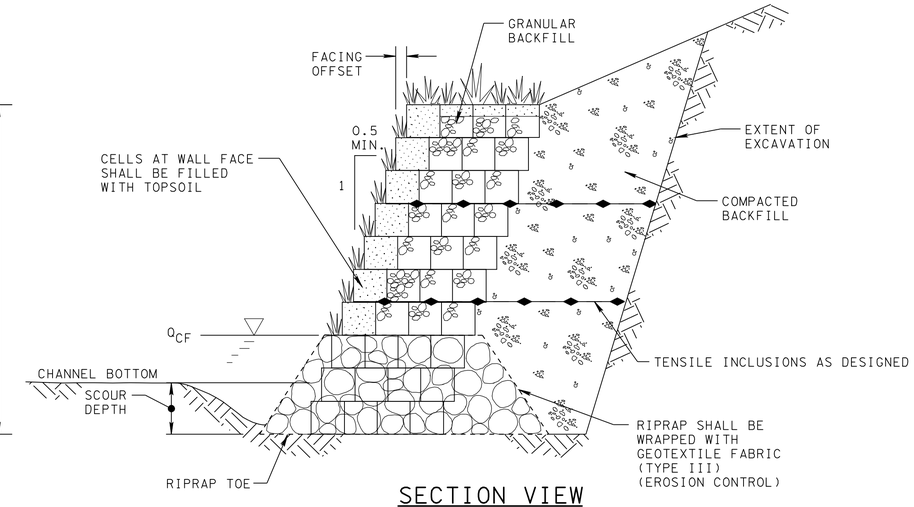
SECTION VIEW
WRAPPED SOIL GEOTEXTILE WALL



WELDED WIRE FORM DETAIL

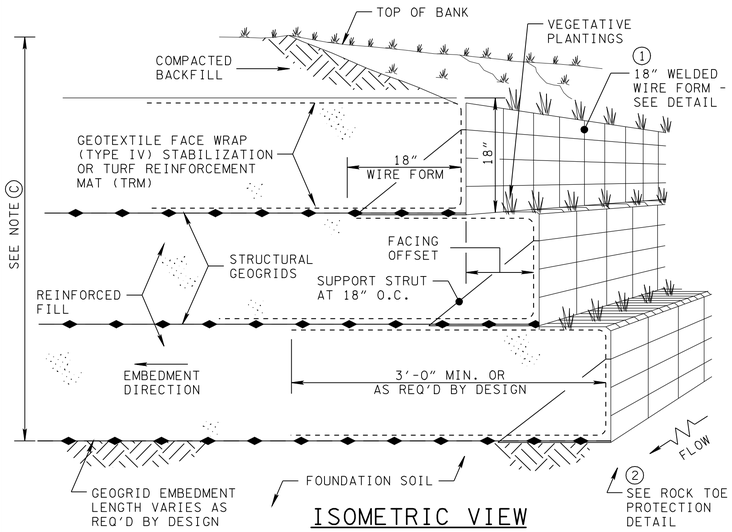


(2) ROCK TOE PROTECTION DETAIL



SECTION VIEW
SOIL REINFORCED GEOCELLULAR WALL

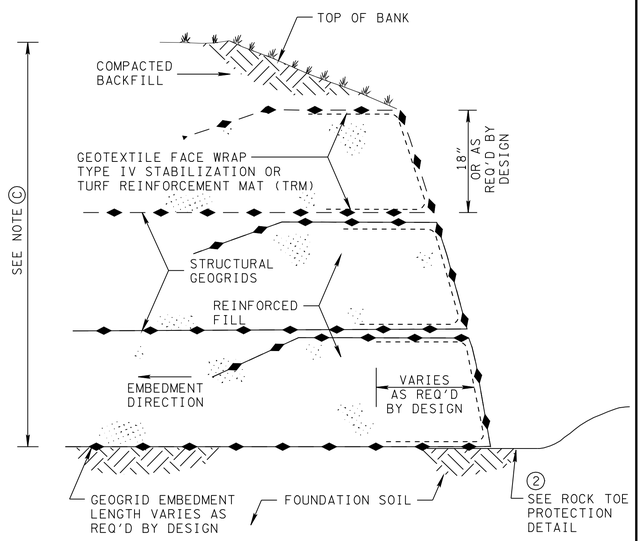
NOTE: MATERIALS AND DIMENSIONS TYPICAL AND MAY VARY PER INDIVIDUAL DESIGNS.



ISOMETRIC VIEW
WRAPPED SOIL WELDED WIRE WALL
STEP FACE EXAMPLE

NOTE: STEPPED WALL SHOWN - MAY BE STEPPED, VERTICAL OR SLOPING FACE. MATERIALS AND DIMENSIONS TYPICAL AND MAY VARY PER INDIVIDUAL DESIGNS.

STREAM MITIGATION PLAN LEGEND: —— VMSE —— VMSE —— VMSE ——



SECTION VIEW
WRAPPED SOIL GEOGRID WALL
SLOPING FACE EXAMPLE

NOTE: SLOPING WALL SHOWN - MAY BE STEPPED, OR SLOPING FACE. MATERIALS AND DIMENSIONS TYPICAL AND MAY VARY PER INDIVIDUAL DESIGNS.

VEGETATED MSE WALLS GENERAL NOTES

(A) VEGETATED MECHANICAL STABILIZED EARTH (MSE) WALLS MAY BE USED FOR STREAM SLOPE STABILIZATION WHERE HORIZONTAL CONSTRAINTS SUCH AS THE ROADWAY ITSELF OR RIGHT-OF-WAY LIMITS LEAVE LITTLE ROOM FOR A SLOPING CHANNEL BANK. VEGETATED MSE WALLS INCORPORATE VEGETATION TO PROVIDE HABITAT VALUES SUCH AS SHADING AND TO PROVIDE A MORE NATURAL AESTHETIC. THE VEGETATION CAN ALSO ASSIST IN PREVENTING EROSION AT THE FACE OF THE WALL.

(B) A VEGETATED MSE WALL IS A COMPLEX STRUCTURE WHICH WILL REQUIRE SPECIALIZED DESIGN. VEGETATED MSE WALLS SHALL BE DESIGNED IN ACCORDANCE WITH TDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AND THE CURRENT AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES WITH INTERIMS. EXAMPLES DEPICTED ON THIS SHEET ARE REPRESENTATIVE OF TYPICAL APPLICATIONS. VEGETATED MSE WALLS SHALL BE INDIVIDUALLY DESIGNED ON A CASE-BY-CASE BASIS.

(C) MSE WALL DESIGN INCLUDING WALL HEIGHT AND LENGTH AND SPACING OF TENSILE INCLUSIONS SHALL BE COORDINATED WITH THE GEOTECHNICAL ENGINEERING SECTION. TYPICAL WALL HEIGHTS ARE UP TO 10 FT. WALL HEIGHTS OF UP TO 20 FEET ARE ALLOWABLE IF ECONOMICALLY JUSTIFIED. THE SLOPE OF THE WALL FACE MAY VARY FROM 0.5H:1V TO 1H:1V. PROPRIETARY DESIGN SYSTEMS SHALL BE CONSTRUCTED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND SPECIFICATIONS.

(D) ROCK FILL SHALL BE KEYED INTO THE STREAM BED TO AN ELEVATION BELOW THE COMPUTED SCOUR DEPTH TO AVOID UNDERMINING AT THE TOE OF SLOPE.

(E) THE WIDTH AT THE BASE OF A WRAPPED SOIL WALL (B) SHALL BE BASED ON SITE CONDITIONS AND AS RECOMMENDED BY THE GEOTECHNICAL ENGINEERING SECTION, BUT NOT LESS THAN 3 FEET.

(F) LIVE DORMANT CUTTINGS MAY BE INSTALLED BETWEEN HORIZONTAL LAYERS OF A WRAPPED SOIL MSE WALL. PLANTING OF CUTTINGS DURING THE DORMANT SEASON IS PREFERRED. THE LIVE BRANCHES SHALL BE BETWEEN 0.5 INCHES TO 1.5 INCHES. IN DIAMETER AND A MINIMUM OF 4 FEET LONG WITH SIDE BRANCHES CLEANLY REMOVED AND SHALL BE IN CONTACT WITH THE SOIL A MINIMUM OF 12 INCHES. THE BOTTOM (BASAL) ENDS OF LIVE CUTTINGS SHALL BE CLEANLY CUT AT A 45 DEGREE ANGLE AND THE TOPS SHALL BE CUT SQUARE (FLAT). ALL PLANTINGS SHALL BE INSTALLED PERPENDICULAR TO THE SLOPE. LIVE CUTTINGS MAY NOT BE REQUIRED FOR FLATTER SLOPES AND SHORT WALL HEIGHTS.

(G) WRAPPED SOIL MSE WALLS SHALL BE PROVIDED WITH CHIMNEY DRAINS SUFFICIENT TO RELIEVE PORE PRESSURE AT THE BOUNDARY BETWEEN NATIVE SOIL AND THE MSE WALL MATERIALS. THESE DRAINS WILL TYPCIALLY BE COMPOSED OF COARSE AGGREGATE, BUT OTHER MATERIALS ARE ALLOWABLE WHERE LIVE DORMANT CUTTINGS ARE NOT INCORPORATED INTO THE WALL.

(H) THE GEOCELLS USED FOR A STACKED GEOCELL MSE WALLS SHALL BE PERFORATED EXCEPT AT THE FRONT FACE WHICH SHALL BE SOLID. THE GEOCELLS SHALL BE BACK FILLED WITH SOIL SUITABLE TO SUPPORT THE ESTABLISHMENT OF VEGETATION AND BE SEEDED WITH SMALL PLANTS, VINES, AND GRASSES. THE EXPOSED FACE OF THE WALL SHALL BE PROTECTED FROM EROSION BY MEANS OF AN HYDRAULICALLY APPLIED MULCH COMPOSED OF NATURAL FIBERS AND ORGANIC TACKIFIERS.

(I) ONLY GEOTEXTILE FABRIC (TYPE III) AND (TYPE IV) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED. ONLY TRM'S LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(J) VEGETATED MSE WALLS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-03.49 STREAM MITIGATION - VEGETATED MSE WALLS (DESCRIPTION) PER SQUARE FOOT

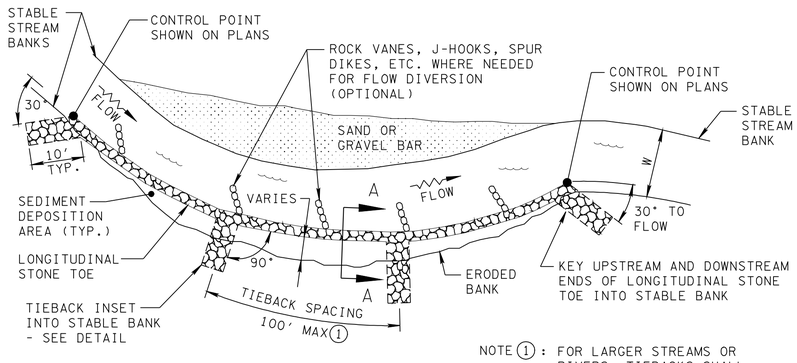
PAYMENT FOR VEGETATED MSE WALLS SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION OF THE WALL AND VEGETATION.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

VEGETATED MSE WALLS

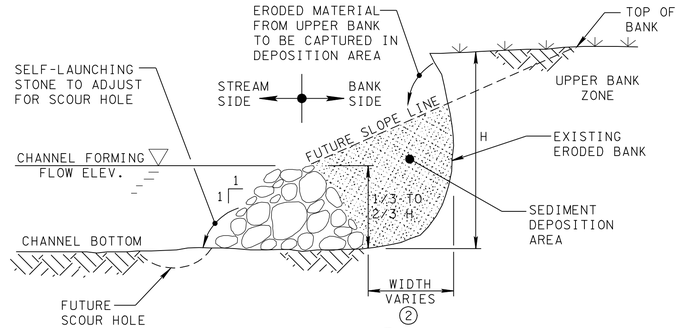
NOT TO SCALE | 8-01-11 | D-NSD-12

LONGITUDINAL STONE TOE



NOTE (1): FOR LARGER STREAMS OR RIVERS, TIEBACKS SHALL BE SPACED AT 2X THE CHANNEL FORMING FLOW WIDTH (W)

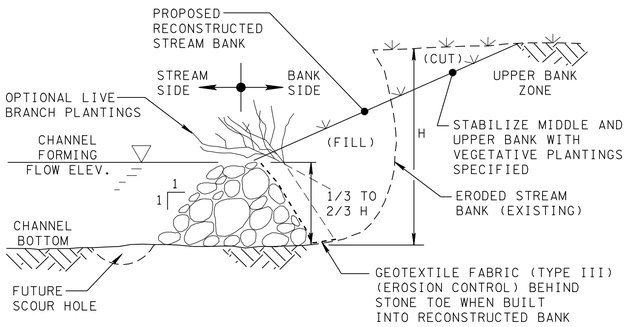
PLAN VIEW



NOTE (2): BANKSIDE WIDTH VARIES TO PROVIDE SMOOTH ALIGNMENT THROUGH THE CHANNEL BEND

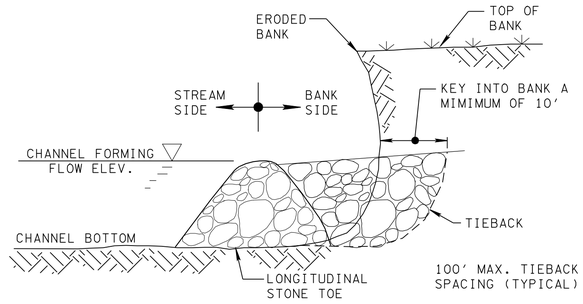
SECTION A-A
STONE TOE IN FRONT OF BANK

(SEDIMENT DEPOSITION AREA FILLS NATURALLY OVER TIME)



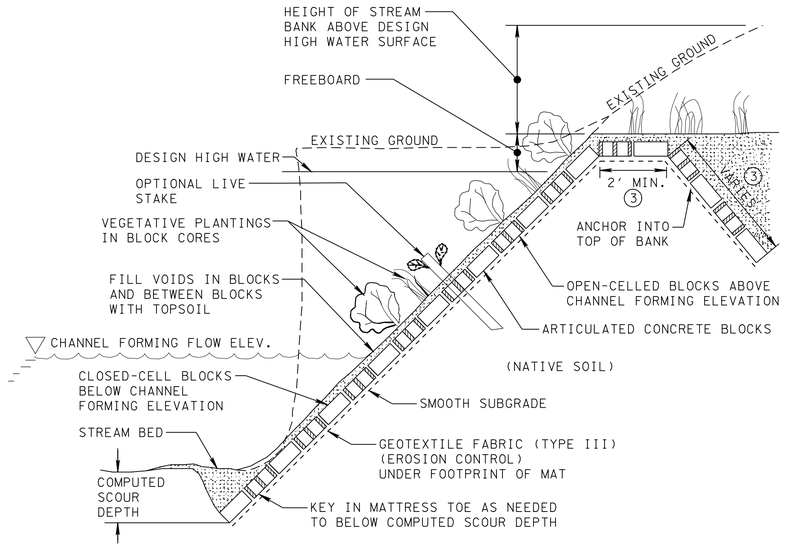
SECTION A-A
STONE TOE BUILT INTO RECONSTRUCTED BANK

(SEDIMENT DEPOSITION AREA FILLED DURING CONSTRUCTION)



TIEBACK DETAIL

ARTICULATED CONCRETE MAT



SECTION VIEW

CONTROL POINTS FOR ARTICULATED CONCRETE MAT SHALL BE PROVIDED ON THE STREAM MITIGATION PLANS

NOTE (3): ANCHOR LENGTHS VARY AND SHALL BE PER MANUFACTURE'S SPECIFICATIONS

LONGITUDINAL STONE TOE GENERAL NOTES

(A) LONGITUDINAL STONE TOE IS A LOWER BANK STABILIZATION MEASURE THAT IS PLACED AT THE TOE OF AN ERODING BANK, OR STREAM SIDE OF THE TOE, TO PROVIDE HARD ARMORING AGAINST FURTHER EROSION, PROVIDE AN AREA FOR SEDIMENT DEPOSITION AND NATURAL RECONSTRUCTION OF THE TOE, AND ENCOURAGE THE GROWTH OF ADDITIONAL VEGETATION AS THE BANK SLOPE STABILIZES.

(B) LONGITUDINAL STONE TOE IS ACCEPTABLE FOR USE IN STABLE ALLUVIAL CHANNELS WHERE THE LOWER BANK IS FAILING BUT THE MID AND UPPER SLOPES ARE FAIRLY STABLE.

(C) USE OF THIS IN-STREAM MEASURE SHALL NOT ADVERSELY AFFECT THE HYDRAULIC CAPACITY OF THE CHANNEL.

(D) LONGITUDINAL STONE TOE SHOULD NOT BE USED IN BEDROCK CHANNELS.

(E) LONGITUDINAL STONE TOE MAY BE USED IN COMBINATION WITH OTHER HYDRAULIC CONTROL STRUCTURES (J-HOOKS, VANES, ETC.), AND MOST OTHER BANK STABILIZATION MEASURES.

(F) MACHINED RIPRAP CLASS SELECTED FOR CONSTRUCTING LONGITUDINAL STONE TOE SHALL BE SELECTED BASED ON CRITERIA IN SECTION 11.04.6 OF THE DRAINAGE MANUAL.

(G) WHEN THE STONE TOE IS BUILT INTO A RECONSTRUCTED BANK, GEOTEXTILE (TYPE III) (EROSION CONTROL) SHALL BE PLACED BEHIND THE ROCK TO PREVENT SOIL MIGRATION THROUGH THE STRUCTURE.

(H) THE TOP ELEVATION OF THE STRUCTURE SHALL BE NO LOWER THAN THE CHANNEL FORMING FLOW ELEVATION OF THE STREAM.

(I) ACCESS TO THE STREAMBANK AREA SHALL BE PROVIDED FOR HEAVY EQUIPMENT, MONITORING, AND MAINTENANCE.

(J) ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(K) LONGITUDINAL STONE TOE SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

209-03.47	STREAM MITIGATION - LONGITUDINAL STONE TOE (DESCRIPTION) PER CUBIC YARD
740-10.03	GEOTEXTILE (TYPE III) (EROSION CONTROL) PER SQUARE YARD

PAYMENT FOR LONGITUDINAL STONE TOE SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION OF THE TOE PROTECTION SYSTEM.

ARTICULATED CONCRETE MAT GENERAL NOTES

(A) ARTICULATED CONCRETE MATS ARE A BANK STABILIZATION REVETMENT MADE UP OF MULTIPLE CONCRETE BLOCKS BOUND TOGETHER BY STEEL CABLE OR INTERLOCKING BLOCK THAT IS USED TO RESIST EROSIVE FORCES EXERTED BY HIGH ENERGY FLOWS. ARTICULATED BLOCKS ARE NORMALLY HOLLOW-CORED ABOVE THE CHANNEL FORMING FLOW ELEVATION SO THAT TOPSOIL AND VEGETATION CAN BE INSTALLED WITHIN THE CORES ALLOWING FOR A PARTIALLY VEGETATED STREAM BANK.

(B) ARTICULATED CONCRETE BLOCK MATS ARE BEST SUITED FOR THRESHOLD STREAMS WHERE VELOCITIES EXCEED 12 FEET PER SECOND, AND ON THE OUTSIDE BEND OF HIGH GRADIENT STREAMS. MAY BE USED IN ALLUVIAL STREAMS WHERE APPROPRIATE.

(C) SEE HEC-23 FOR DETAILED DESIGN GUIDANCE FOR ARTICULATED CONCRETE BLOCK MAT SYSTEMS.

(D) AT A MINIMUM, INDIVIDUAL CONCRETE BLOCKS USED FOR THE REVETMENT SYSTEM SHALL BE CONSTRUCTED OF CLASS D CONCRETE (f'c 4000 PSI).

(E) ALL ARTICULATED BLOCK REVETMENT SYSTEMS SHALL BE KEYED INTO THE BANK AT BOTH THE CONTROL POINTS (UPSTREAM AND DOWNSTREAM ENDS) OF THE INSTALLATION.

(F) BOTTOM OF BLOCK MAT SHALL EXTEND BELOW THE COMPUTED SCOUR DEPTH OF THE CHANNEL BOTTOM. TOP OF MAT SHALL BE ANCHORED IN STABLE SOIL.

(G) TOP OF MAT AT THE TOP OF THE STREAM BANK SHALL BE KEYED INTO THE SOIL A MINIMUM OF 3 BLOCKS ALONG THE ENTIRE LENGTH OF THE INSTALLATION.

(H) ONLY BLOCK SYSTEMS LISTED ON THE QUALIFIED PRODUCTS LIST MAY BE USED.

(I) BLOCKS SHALL MEET THE PHYSICAL REQUIREMENTS OF ASTM D6684.

(J) ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(K) ARTICULATED CONCRETE MAT SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

209-03.53	STREAM MITIGATION - ARTICULATED CONCRETE MAT PER SQUARE YARD
740-10.03	GEOTEXTILE (TYPE III) (EROSION CONTROL) PER SQUARE YARD

PAYMENT FOR ARTICULATED CONCRETE MAT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION OF THE REVETMENT SYSTEM.

(L) ARTICULATED CONCRETE MATS SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S SPECIFICATIONS.

STREAM MITIGATION PLAN LEGEND: TOE TOE TOE TOE LONGITUDINAL STONE TOE

STREAM MITIGATION PLAN LEGEND: ARTICULATED CONCRETE MAT

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

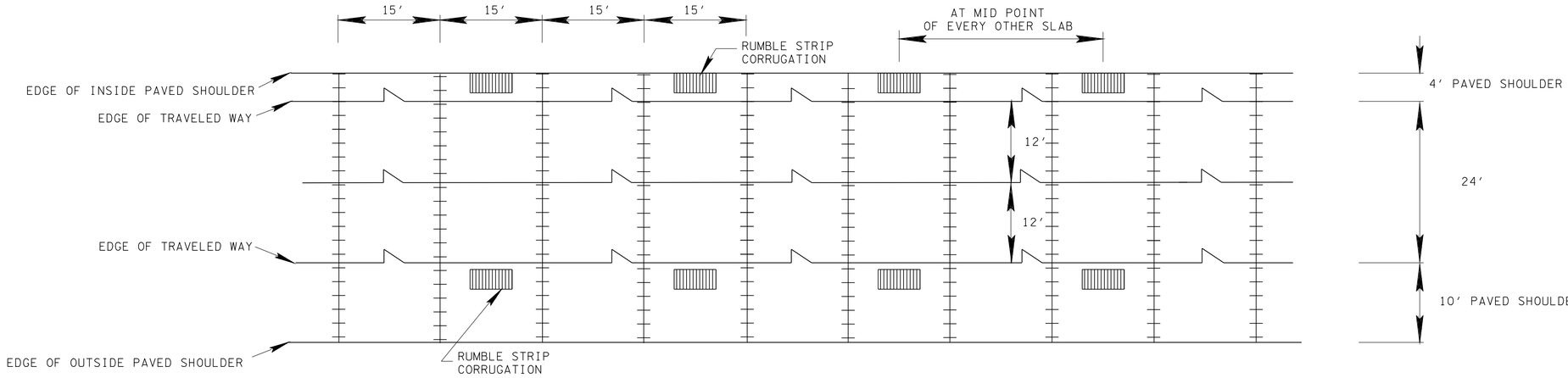
LONGITUDINAL STONE TOE AND ARTICULATED CONCRETE MAT

NOT TO SCALE

8-01-11

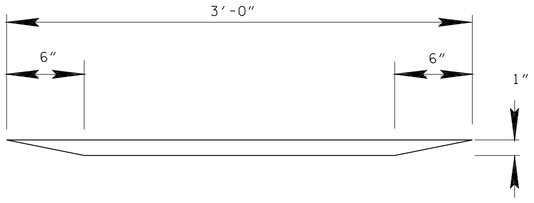
D-NSD-13

- REV. 5-27-01: CHANGED VARIABLE JOINT SPACING TO 15′ CONSTANT IN ALL VIEWS TO MATCH STD. DWG. NO. RP-J-1.
- REV. 9-29-10: CHANGED ITEM NUMBER.

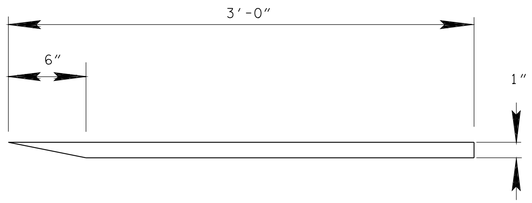


PLAN VIEW SHOWING RUMBLE STRIP CORRUGATIONS IN CONCRETE SHOULDERS

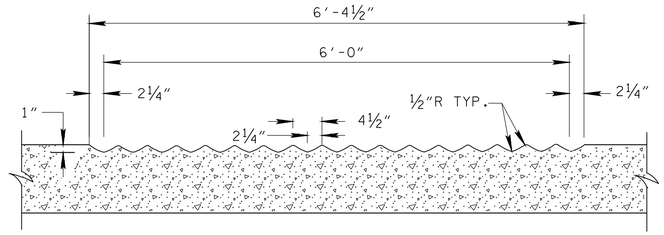
NOTE: RUMBLE STRIPS TO BE FORMED AND PAID FOR UNDER ITEM NO. 501-03.10, CONCRETE SHOULDER RUMBLE STRIP LINEAR FEET.



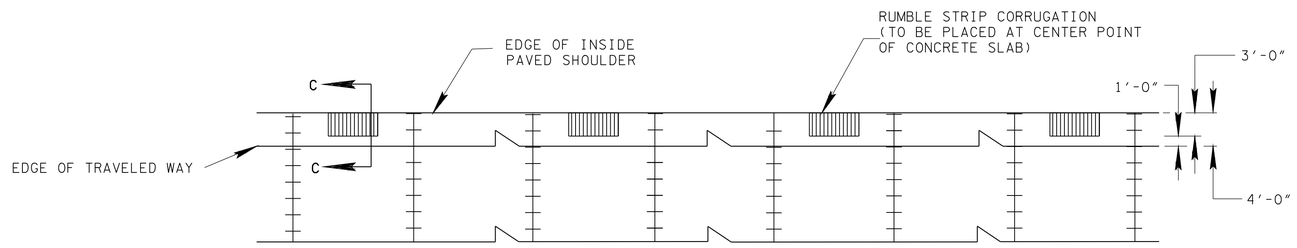
SECTION B-B



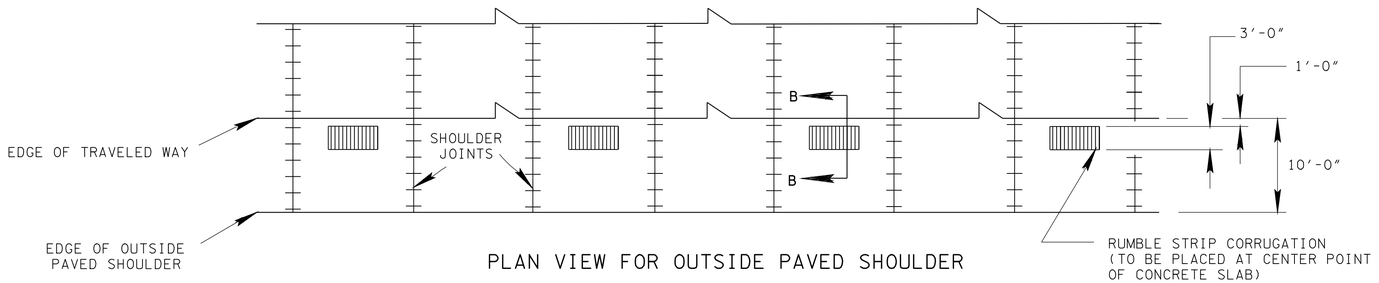
SECTION C-C



DETAIL OF CORRUGATIONS IN CONCRETE SHOULDER RUMBLE STRIP



PLAN VIEW FOR INSIDE PAVED SHOULDER



PLAN VIEW FOR OUTSIDE PAVED SHOULDER

JOINT SYMBOLS

TRANSVERSE CONTRACTION

LONGITUDINAL CONTRACTION

OR

LONGITUDINAL CONSTRUCTION

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

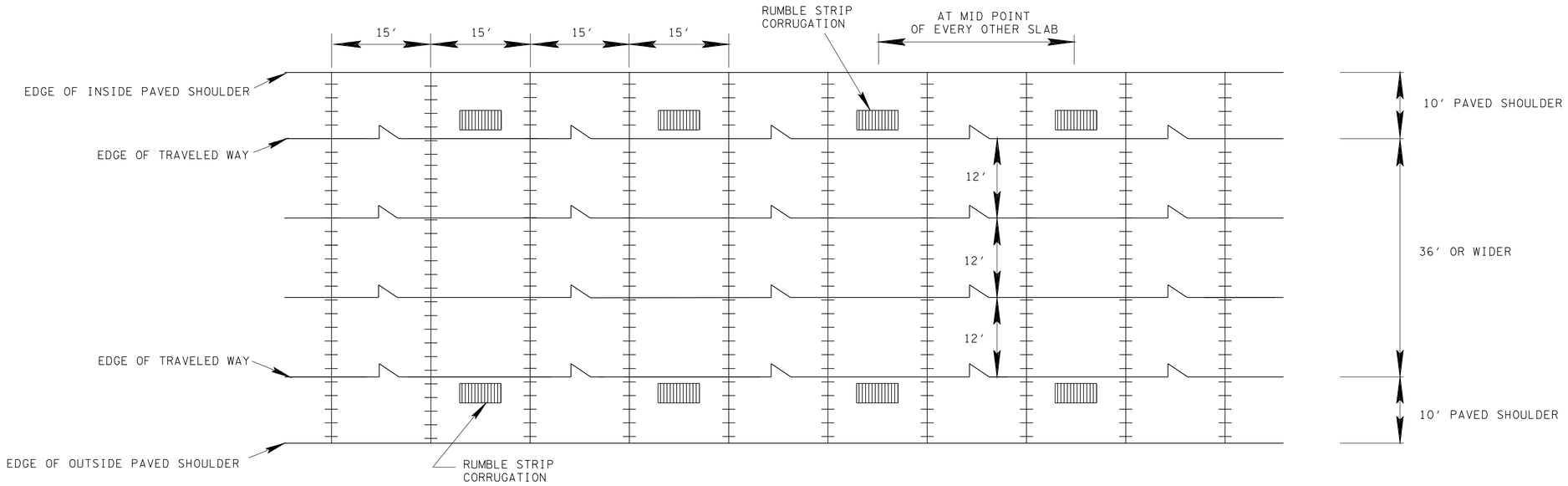
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

CONCRETE SHOULDER RUMBLE STRIP DETAIL

(FOR 4-LANE DIVIDED HIGHWAY)

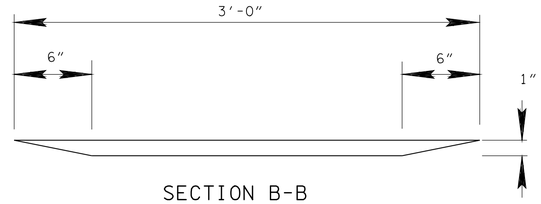
10-26-96 | RP-CS-1

- REV. 5-27-01: CHANGED VARIABLE JOINT SPACING TO 15′ CONSTANT IN ALL VIEWS TO MATCH STD. DWG. NO. RP-J-1.
- REV. 9-29-10: CHANGED ITEM NUMBER.

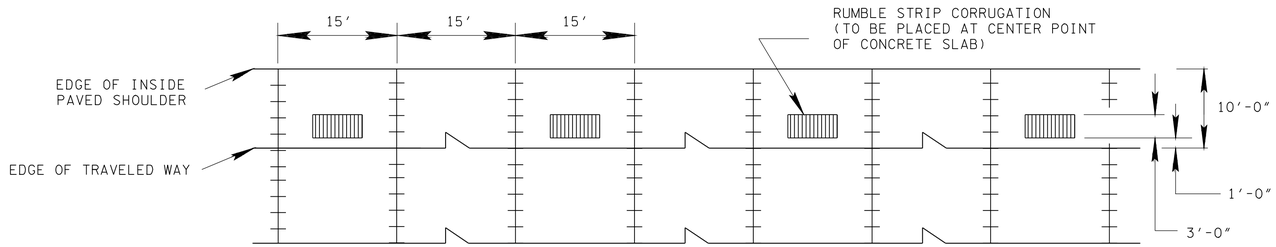


PLAN VIEW SHOWING RUMBLE STRIP CORRUGATIONS IN CONCRETE SHOULDERS

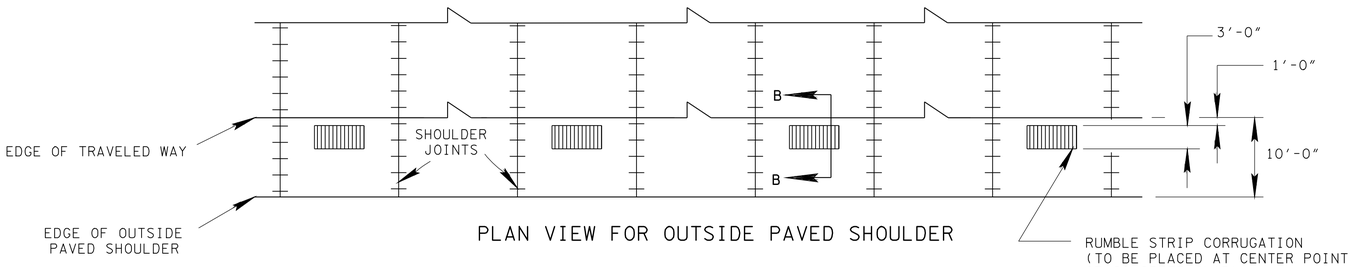
NOTE: RUMBLE STRIPS TO BE FORMED AND PAID FOR UNDER ITEM NO. 501-03.10, CONCRETE SHOULDER RUMBLE STRIP LINEAR FEET.



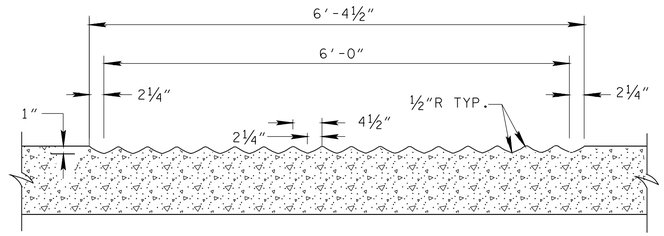
SECTION B-B



PLAN VIEW FOR INSIDE PAVED SHOULDER



PLAN VIEW FOR OUTSIDE PAVED SHOULDER



DETAIL OF CORRUGATIONS IN CONCRETE SHOULDER RUMBLE STRIP

JOINT SYMBOLS

TRANSVERSE CONTRACTION

LONGITUDINAL CONTRACTION

OR

LONGITUDINAL CONSTRUCTION

- MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

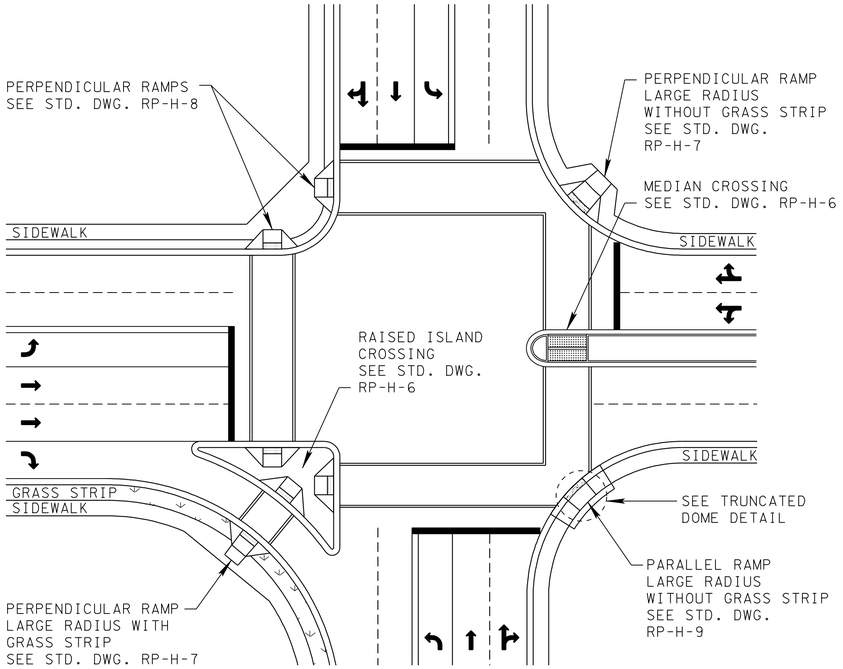
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

CONCRETE SHOULDER RUMBLE STRIP DETAIL

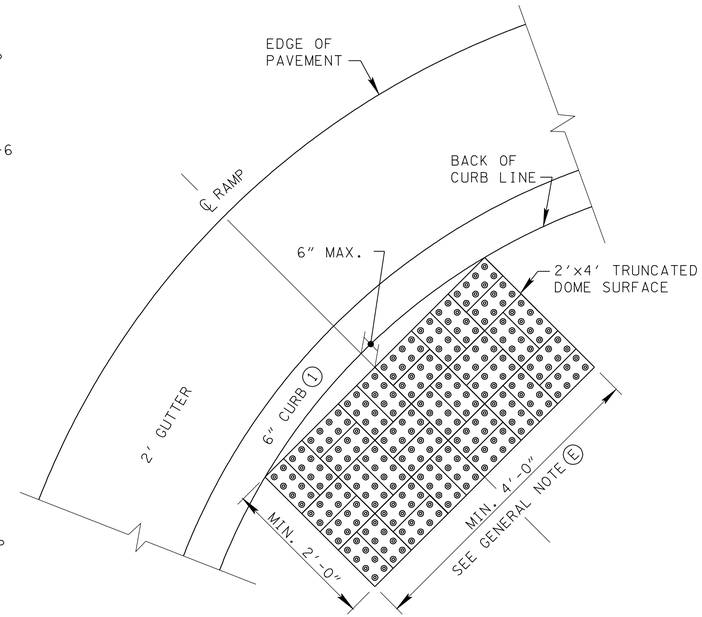
(FOR 6-LANE OR WIDER DIVIDED HIGHWAY)

10-26-96 | RP-CS-2

- REV. 7-17-07: REVISED SIZE AND SPACING OF TRUNCATED DOMES, ADDED NOTE (E). MODIFIED SPECIAL PAVER NOTES.
- REV. 4-13-11: ADDED LOWERED CURB FOOTNOTE (1) TO TRUNCATED DOME DETAIL. MISC. EDITS TO DRAWING.

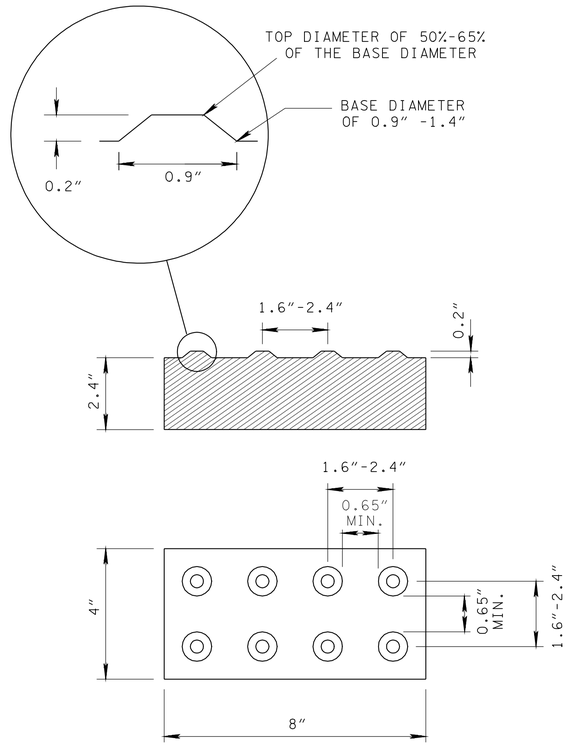


PLAN VIEW
(4-WAY INTERSECTION)



NOTE (1) : CURB SHALL BE LOWERED ACROSS ENTIRE WIDTH OF RAMP

DETAIL OF
TRUNCATED DOME
SURFACE IN RADIUS



CONCRETE PAVER WITH
TRUNCATED DOME SURFACE
(SEE SPECIAL PAVER NOTES)

SPECIAL PAVER NOTES

(1) CONCRETE PAVER UNITS SHALL MEET ALL REQUIREMENTS OF ASTM C-936. 4"X8" CONCRETE PAVERS SHALL BE PLACED IN A BASKET WEAVE PATTERN, AS SHOWN. CONCRETE PAVERS OF OTHER DIMENSIONS ARE ALSO ACCEPTABLE PROVIDED THE PAVERS CAN BE PLACED IN A 2'X4' DIMENSION WITHOUT CUTTING THE PAVERS AND PAVER DEPTH IS 2.4".

(2) COMPOSITE TILES WITH NOMINAL DEPTH OF 0.4" MAY BE USED INSTEAD OF CONCRETE PAVERS. COMPOSITE TILES SHALL BE INSTALLED SO THAT DOMES ARE ALIGNED IN A SQUARE GRID PATTERN.

(3) CONCRETE PAVER UNITS SHALL HAVE A TRUNCATED DOME TOP SURFACE FOR DETECTABLE WARNING TO PEDESTRIANS.

(4) CONCRETE PAVER UNITS OR COMPOSITE TILES SHALL BE A TRADITIONAL BRICK RED COLOR UNLESS SHOWN OTHERWISE IN THE PLANS.

(5) CONCRETE PAVER UNITS SHALL BE SAW CUT ONLY AND CUT UNITS SHALL NOT BE LESS THAN 25 PERCENT OF A FULL UNIT.

(6) ALL PRODUCTS LISTED ON THE QUALIFIED PRODUCTS LIST ARE ACCEPTABLE.

(7) PLACE A MINIMUM TOTAL PAVER WIDTH OF 2'-0" ADJACENT TO CURB LINE.

GENERAL NOTES

(A) DETAILS SHOWN ON THIS PLAN APPLY TO THE CONSTRUCTION OR RECONSTRUCTION OF STREETS, CURBS, OR SIDEWALKS.

(B) CURB RAMPS ARE TO BE LOCATED AS SHOWN ON THE PLANS.

(C) RAMPS SHALL BE PROVIDED AT ALL CORNERS OF STREET INTER-SECTIONS WHERE THERE IS EXISTING OR PROPOSED SIDEWALK AND CURB. RAMPS SHALL ALSO BE PROVIDED AT WALK LOCATIONS IN MID-BLOCK AND ACROSS FROM CORNER RAMPS AT T-INTERSECTIONS.

(D) THE FIRST TWO FEET OF RAMP MUST CONSIST OF A TRUNCATED DOMED SURFACE. RAMPS SHALL INCLUDE THE TRUNCATED DOME SURFACE TO PROVIDE A DETECTABLE WARNING FOR VISUALLY IMPAIRED PEDESTRIANS.

(E) THE DETECTABLE WARNING SHOULD EXTEND THE FULL WIDTH OF THE CURB RAMP (EXCLUSIVE OF FLARED SIDES).

(F) THE DETECTABLE WARNING SURFACES SHALL PROVIDE A 70 PERCENT CONTRAST IN LIGHT REFLECTANCE WITH THE ADJOINING SURFACE.

(G) CARE SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE RAMP. THE GRADE SHALL BE FREE OF SAGS AND SHORT GRADE CHANGES.

(H) DRAINAGE STRUCTURES SHALL NOT BE PLACED IN LINE WITH RAMPS.

(I) THE NORMAL GUTTER LINE PROFILE SHALL BE MAINTAINED THROUGH THE AREA OF THE RAMP.

(J) CROSSWALK MARKINGS, IF USED, SHALL BE LOCATED AS SHOWN ON THE APPLICABLE HANDICAP RAMP STD. DWG. SEE STD. DWG. T-M-4 FOR TYPICAL STOP LINE PLACEMENT AND STANDARD CROSS WALK MARKING.

(K) COST OF THE LOWERED CURB AND GUTTER TO BE INCLUDED IN THE PRICE OF ITEM NO. 702-01, CONCRETE CURB OR ITEM NO. 702-03, CONCRETE COMBINED CURB & GUTTER.

(L) ENGINEER SHOULD BE NOTIFIED FOR ASSESMENT IF THE HANDICAP RAMP SIDE FLARES EXCEED 10' IN LENGTH DUE TO THE LONGITUDINAL ROADWAY GRADE.

(M) ALL COST OF INSTALLING HANDICAP RAMPS INCLUDING TRUNCATED DOME IN EXISTING SIDEWALK AREAS INCLUDING REMOVAL OF THE EXISTING SIDEWALK SHALL BE BID FOR UNDER THE FOLLOWING PAY ITEM:

701-02.01, CONCRETE HANDICAP RAMP (RETROFIT) PER SQUARE FOOT.

PAYMENT SHALL INCLUDE ALL MATERIALS, EQUIPMENT, AND LABOR NECESSARY FOR CONSTRUCTION OF THE HANDICAP RAMP(S).

(N) ALL COST OF INSTALLING HANDICAP RAMPS INCLUDING TRUNCATED DOME IN NEWLY CONSTRUCTED SIDEWALK AREAS SHALL BE BID FOR UNDER THE FOLLOWING PAY ITEM:

701-02.03, CONCRETE HANDICAP RAMP PER SQUARE FOOT.

PAYMENT SHALL INCLUDE ALL MATERIALS, EQUIPMENT, AND LABOR NECESSARY FOR CONSTRUCTION OF THE HANDICAP RAMP(S).

(O) SURFACE TEXTURE TO BE OBTAINED BY A COURSE BROOMING TRANSVERSE TO THE SLOPE OF RAMP.

(P) FOR SIGNALIZED INTERSECTIONS THAT REQUIRE PEDESTRIAN SIGNAL PUSH BUTTONS, SEE TDOT TRAFFIC DESIGN MANUAL FOR PLACEMENT AND DETAILS.

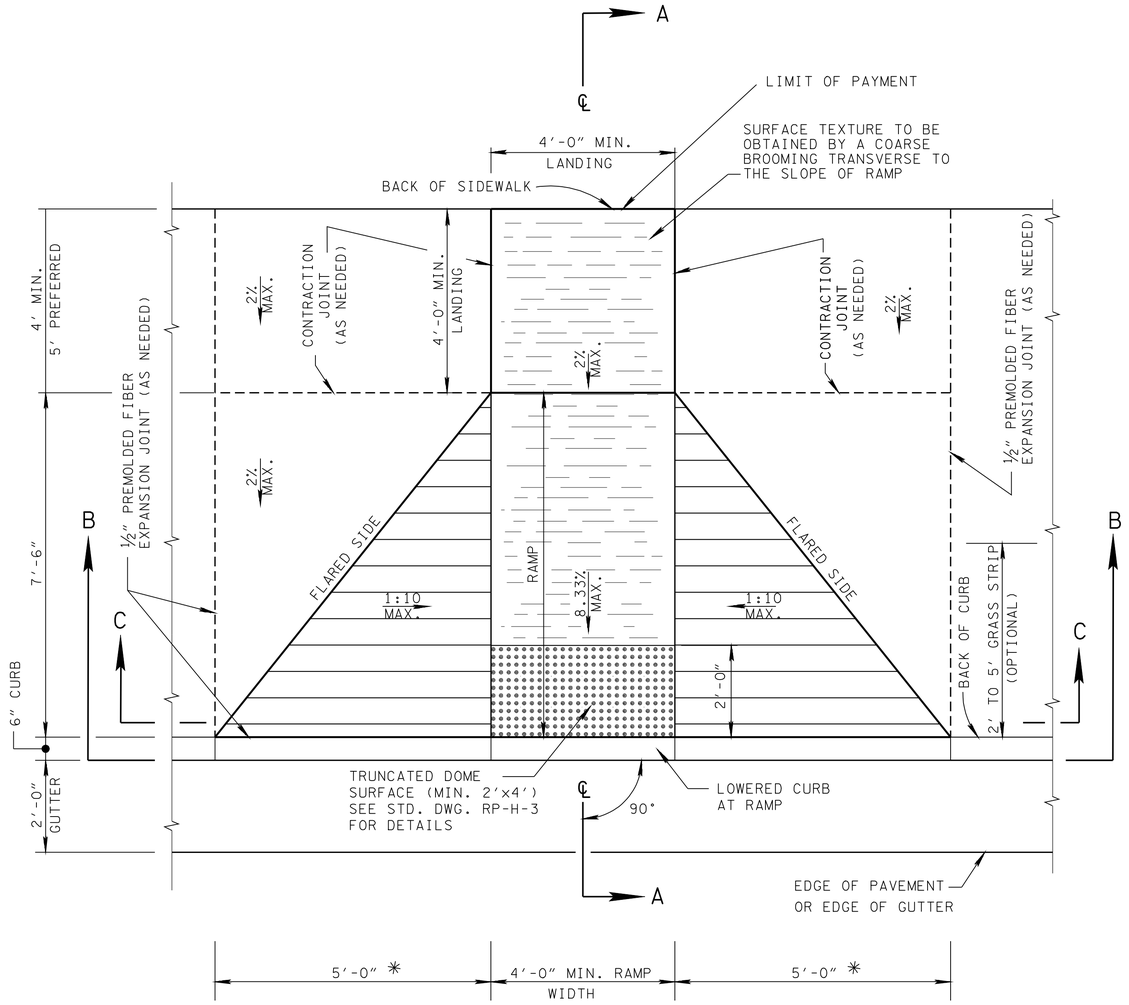
☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

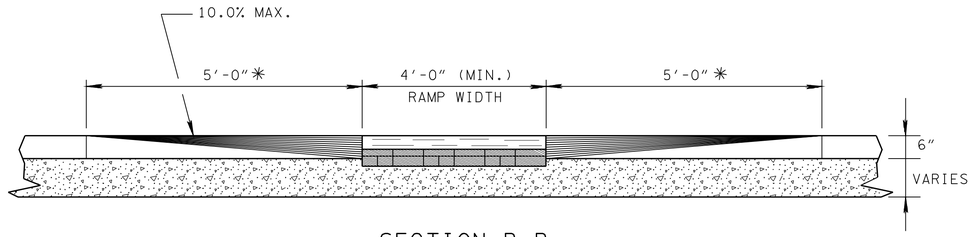
HANDICAP RAMP AND TRUNCATED DOME SURFACE DETAIL

1-15-07 | RP-H-3

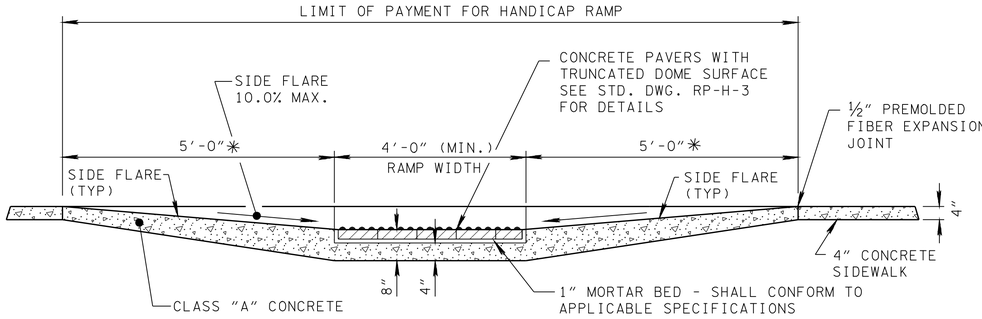
REV. 4-13-11: ADDED CURB NOTE AND REVISED RAMP DIMENSION IN SECTION A-A, ADDED FOOTNOTE (1), MISC. EDITS TO DRAWING.



PLAN VIEW

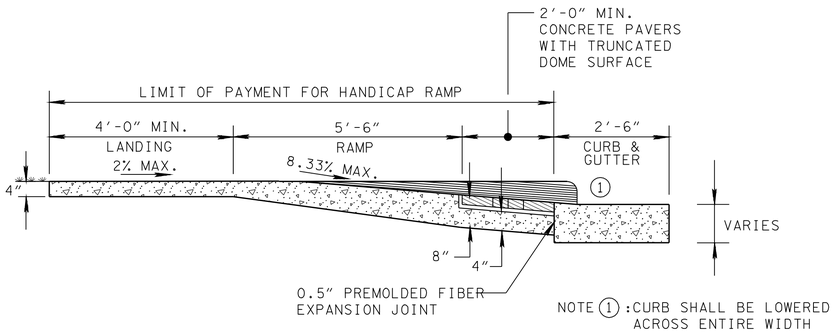


SECTION B-B

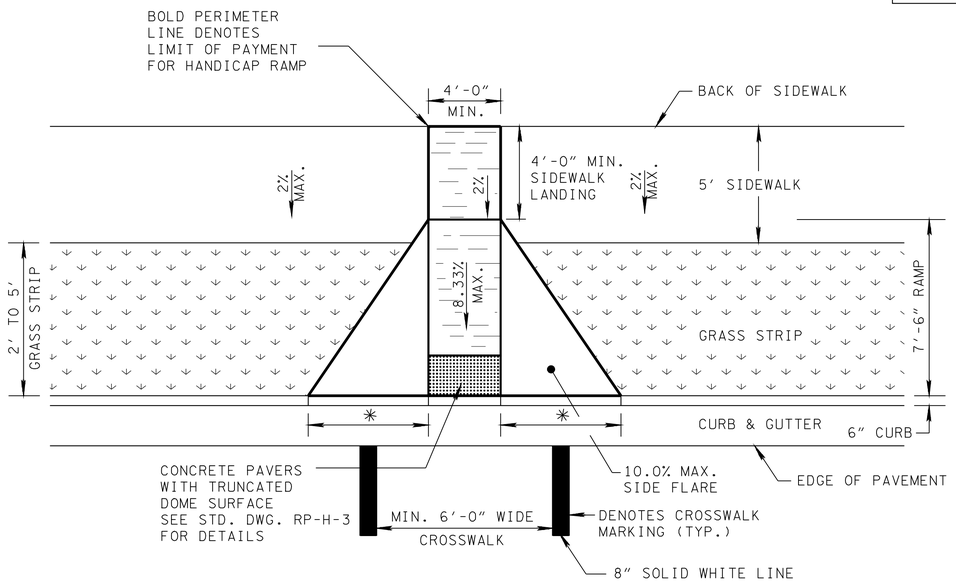


SECTION C-C

* DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE SEE GENERAL NOTE (L) ON RP-H-3



SECTION A-A



TANGENT SECTION WITH GRASS STRIP

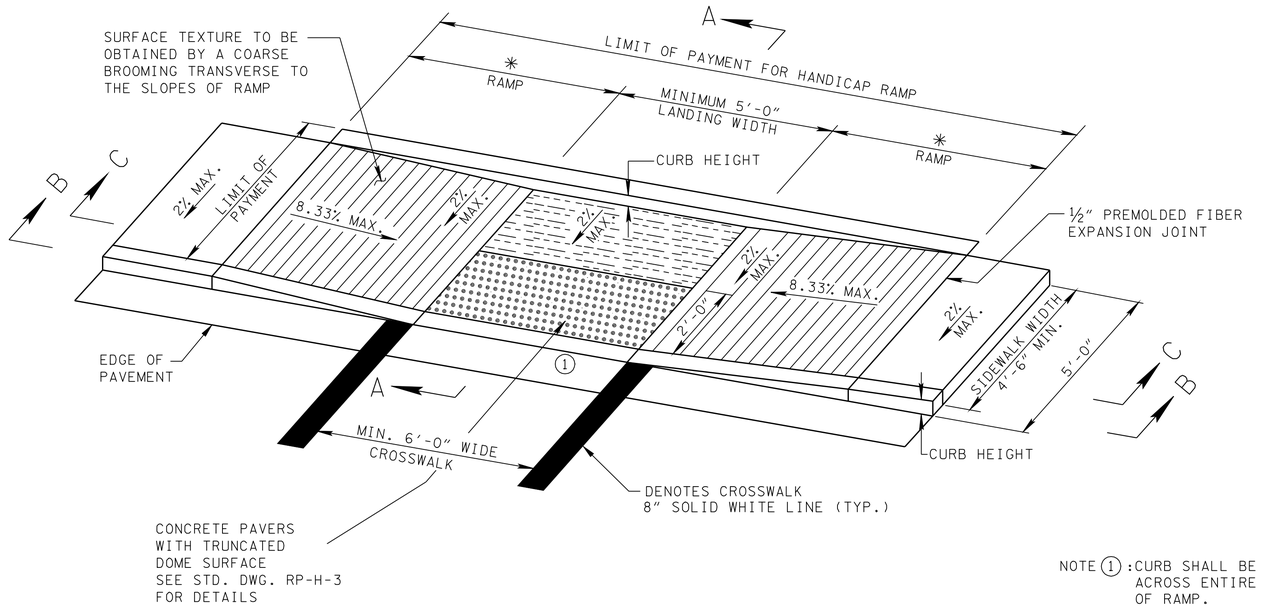
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PERPENDICULAR CURB RAMP

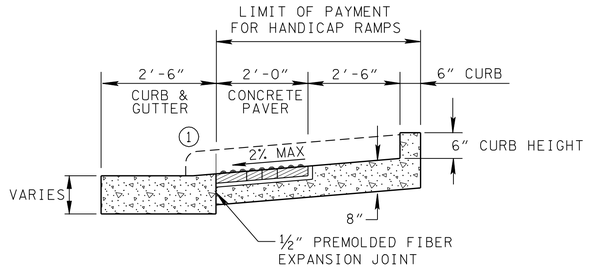
1-15-07 | RP-H-4

REV. 4-13-11: ADDED FOOTNOTE (1), ADJUSTED DIMENSIONS IN RAMP DETAIL, MISC. EDITS TO DRAWING.



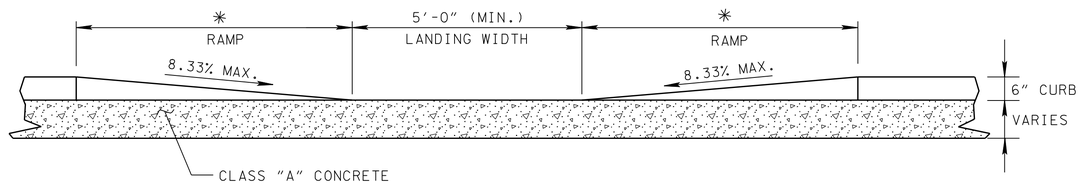
PARALLEL CURB RAMP DETAIL

NOTE (1) : CURB SHALL BE LOWERED ACROSS ENTIRE WIDTH OF RAMP.

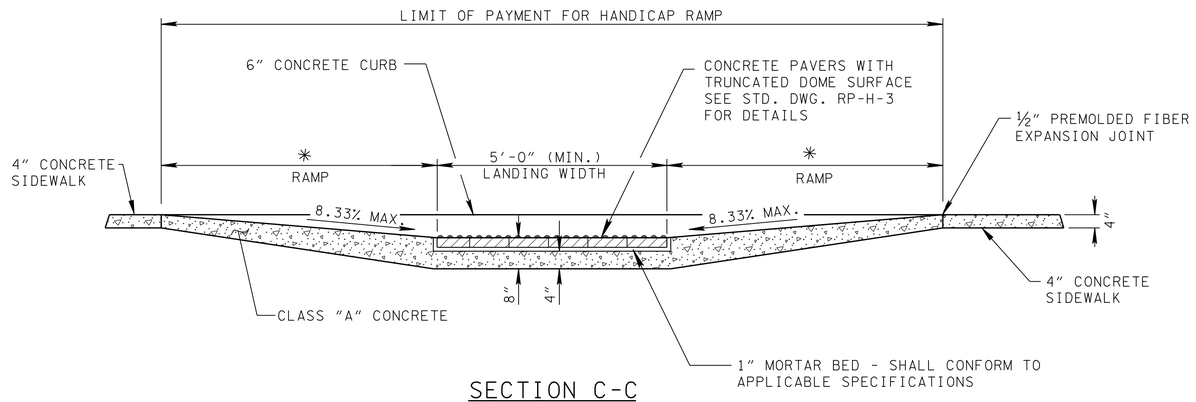


SECTION A-A

* DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE SEE GENERAL NOTE (K) ON RP-H-3



SECTION B-B



SECTION C-C

GENERAL NOTES

(A) THE FIRST TWO FEET OF RAMP MUST CONSIST OF A TRUNCATED DOMED SURFACE. RAMPS SHALL INCLUDE THE TRUNCATED DOME SURFACE TO PROVIDE A DETECTABLE WARNING FOR VISUALLY IMPAIRED PEDESTRIANS.

(B) THE COST OF THE LOWERED CURB AND GUTTER TO BE INCLUDED IN THE PRICE OF ITEM NO. 702-01, CONCRETE CURB OR ITEM NO. 702-03, CONCRETE COMBINED CURB & GUTTER.

(C) ALL COST OF INSTALLING HANDICAP RAMPS IN NEWLY CONSTRUCTED SIDEWALK AREAS SHALL BE BID FOR UNDER THE FOLLOWING PAY ITEM:

701-02.03 CONCRETE HANDICAP RAMP PER SQUARE FOOT.

PAYMENT SHALL INCLUDE ALL MATERIALS (INCLUDING TRUNCATED DOME SURFACE), INTREGAL BACK CURB, EQUIPMENT, AND LABOR NECESSARY FOR CONSTRUCTION OF THE HANDICAP RAMP(S).

(D) CONCRETE PAVER SHALL MEET THE REQUIREMENTS OF ASTM C-936 AND SHALL BE LAID IN TWO BY TWO UNITS BASKET WEAVE PATTERN, UNLESS OTHERWISE SHOWN ON THE PLANS.

(E) SEE SPECIAL PAVER NOTES ON STD. DWG. RP-H-3.

(F) DESIGN/CONSTRUCTION MODIFICATIONS MAY BE REQUIRED FOR HANDICAP RAMPS TO BE INSTALLED ALONG A ROADWAY WITH LONGITUDINAL GRADES EXCEEDING FIVE PERCENT.

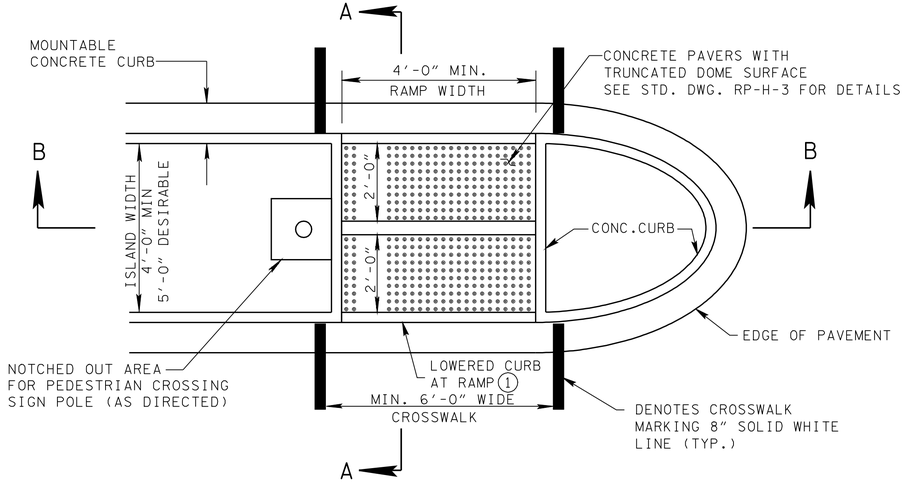
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

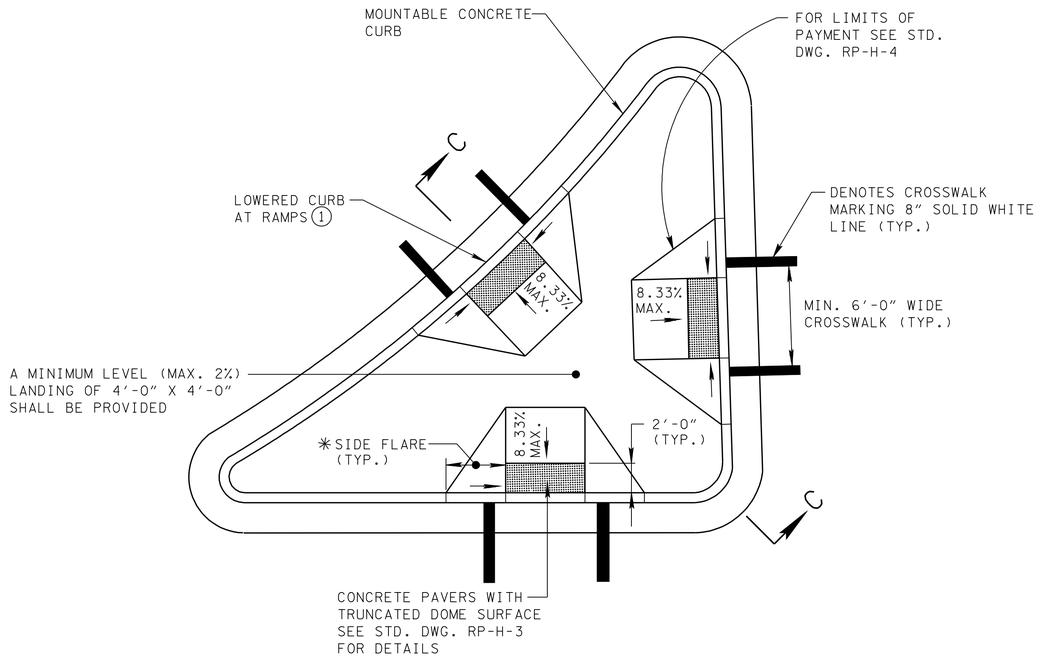
PARALLEL CURB RAMP

1-15-07 | RP-H-5

REV. 4-13-11: CHANGED CURB TYPE, ADJUSTED CROSSWALK MARKINGS, ADDED FOOTNOTE (1), MISC. EDITS TO DRAWING.

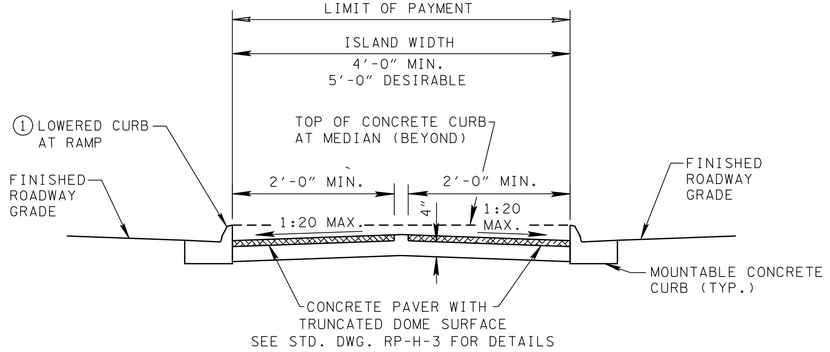


MEDIAN CROSSING PLAN VIEW

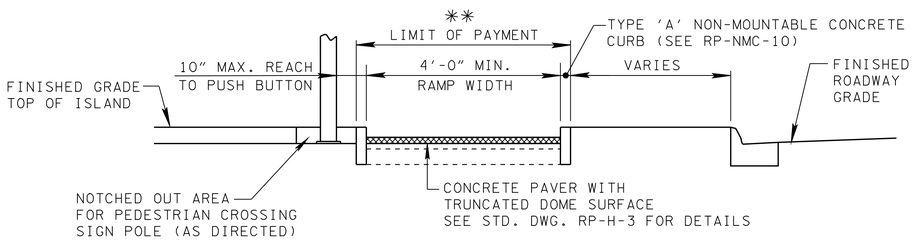


RAISED RIGHT TURN CHANNELIZATION ISLAND PLAN VIEW

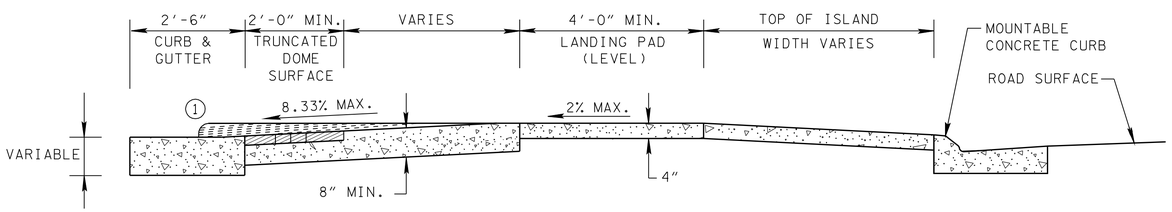
✳ DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE 10.0% MAX.(8.33% DESIRABLE)



MEDIAN CROSSING SECTION A-A



MEDIAN CROSSING SECTION B-B



SECTION C-C

✳✳ SEE NOTE (C) ON RP-H-5

NOTE (1): CURB SHALL BE LOWERED ACROSS ENTIRE WIDTH OF RAMP.

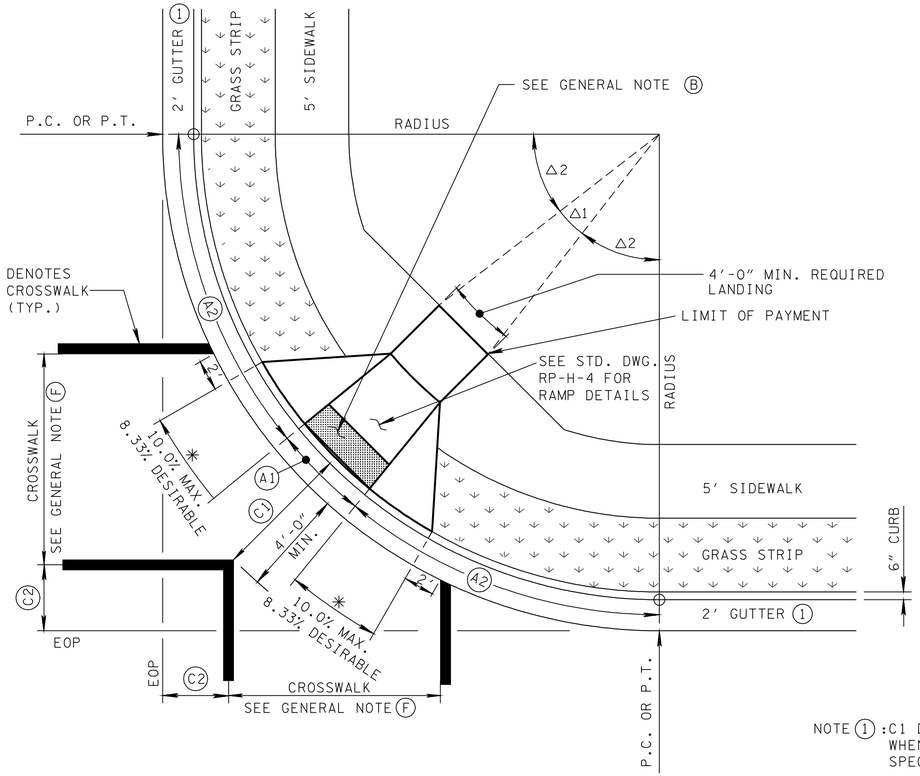
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

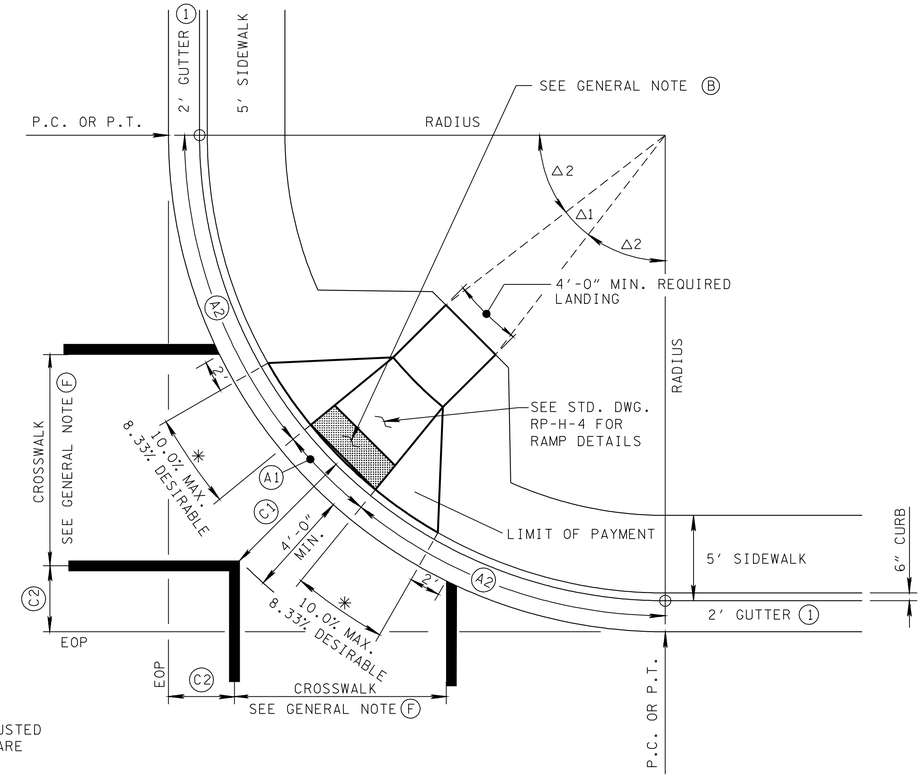
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

MEDIAN CROSSING

1-15-07 | RP-H-6

REV. 4-13-11: REVISED TABLE DIMENSIONS, ADDED NOTE (1), AND ADDED GUTTER TO CROSSWALK INTERSECTION DIMENSION.





NOTE (1): C1 DIMENSION SHALL BE ADJUSTED WHEN OTHER GUTTER WIDTHS ARE SPECIFIED ON PLANS.

TYPE 1
RAMP IN RADIUS (WITH GRASS STRIP)

✳ DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE

TYPE 1 ALTERNATE
RAMP IN RADIUS (SIDEWALK ADJACENT CURB & GUTTER)

✳ DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE

TABLE OF DIMENSIONS (1)
PERPENDICULAR RAMPS - RADIUS OF 20' TO 75'

R RADIUS (FEET)	(A1) (FEET)	(A2) (FEET)	(C1) (FEET)	(C2) (FEET)	△1	△2	ESTIMATED QUANTITY (SQUARE FEET)
20	9.55	10.54	6.00	3.62	28°04'21"	30°57'50"	113
25	7.48	15.50	6.00	5.08	17°29'32"	36°15'14"	103
30	6.53	19.90	6.00	6.54	12°40'49"	38°39'35"	98
35	5.98	24.11	6.00	8.01	9°56'22"	40°01'49"	95
40	5.63	28.21	6.00	9.47	8°10'16"	40°54'52"	93
45	5.39	32.26	6.00	10.94	6°56'11"	41°31'54"	91
50	5.21	36.27	6.00	12.40	6°01'32"	41°59'14"	90
55	5.07	40.27	6.00	13.87	5°19'34"	42°20'13"	90
60	4.96	44.25	6.00	15.33	4°46'19"	42°36'51"	89
65	4.87	48.22	6.00	16.80	4°19'20"	42°50'20"	89
70	4.79	52.19	6.00	18.26	3°57'00"	43°01'30"	88
75	4.73	56.15	6.00	19.72	3°38'12"	43°10'54"	88

(1) VALUES SHOWN IN TABLE ARE BASED ON A 90° INTERSECTION ON 0.0% ROADWAY GRADE AND ARE APPROXIMATE ONLY.

GENERAL NOTES

(A) FOR SIGNALIZED INTERSECTIONS THAT REQUIRE PEDESTRIAN SIGNAL PUSH BUTTONS, SEE TDOT TRAFFIC DESIGN MANUAL FOR PLACEMENT DETAILS.

(B) SEE STANDARD DRAWING RP-H-3 FOR TRUNCATED DOMED SURFACE DETAILS.

(C) 5'-0" SIDEWALK WIDTH INCLUDES 6" CONCRETE CURB.

(D) GRATES FOR STORM DRAINS SHALL NOT BE PLACED IN THE ACCESSIBLE ROUTE.

(E) C1 DIMENSIONS SHALL NOT BE LESS THAN 4'.

(F) CROSS WALK MARKINGS SHALL BE CALCULATED BY USING THE DIMENSIONS FROM THE TABLES ON A CASE BY CASE BASIS, UNLESS SPECIFIED.

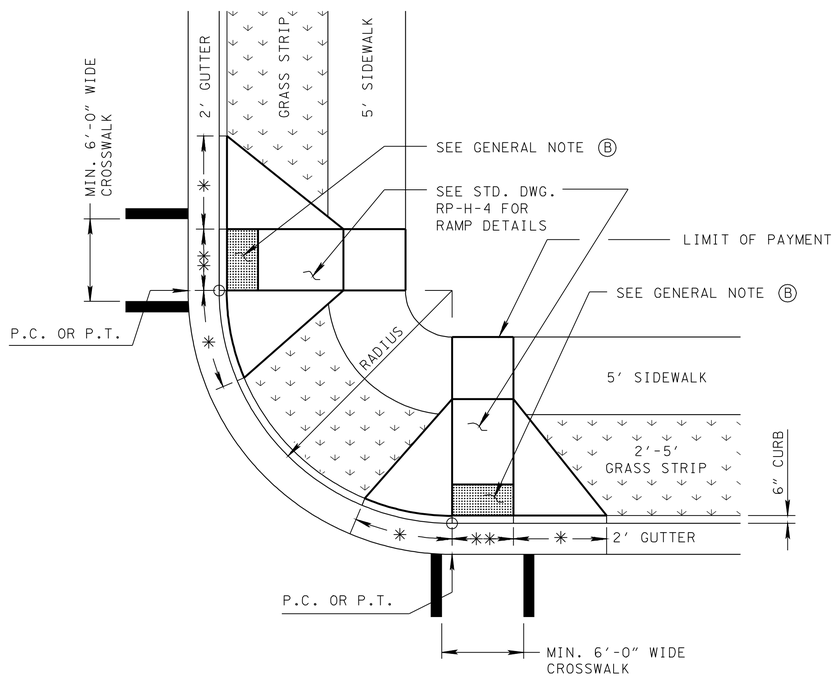
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PERPENDICULAR HANDICAP RAMP FOR 20' THRU 75' RADIUS

1-15-07 | RP-H-7

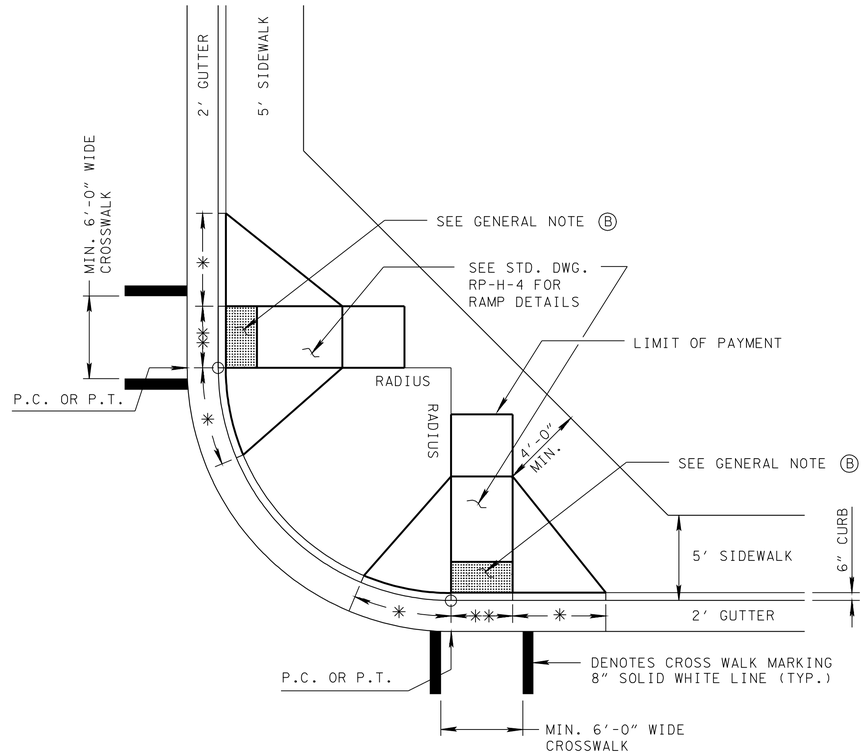
REV. 4-13-11: ADJUSTED CROSSWALK MARKINGS, ADDED TYPE 2 SIDEWALK DIMEMSION, MISC. EDITS TO DRAWING.



TYPE 2
RAMP OUTSIDE RADIUS (WITH GRASS STRIP)

✳ DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE 10.0% MAX.(8.33% DESIRABLE)

✳✳ 4'-0" MINIMUM REQUIRED



TYPE 2 ALTERNATE
RAMP OUTSIDE RADIUS (SIDEWALK ADJACENT TO CURB & GUTTER)

✳ DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE 10.0% MAX.(8.33% DESIRABLE)

✳✳ 4'-0" MINIMUM REQUIRED

GENERAL NOTES

(A) FOR SIGNALIZED INTERSECTIONS THAT REQUIRE PEDESTRIAN SIGNAL PUSH BUTTONS, SEE TDOT TRAFFIC DESIGN MANUAL FOR PLACEMENT DETAILS.

(B) SEE STANDARD DRAWING RP-H-3 FOR TRUNCATED DOMED SURFACE DETAILS.

(C) 5'-0" SIDEWALK WIDTH INCLUDES 6" CONCRETE CURB.

(D) GRATES FOR STORM DRAINS SHALL NOT BE PLACED IN THE CROSSWALK OR IN FRONT OF THE HANDICAP RAMP.

(E) DESIRABLE DIMENSIONS SHALL BE USED UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

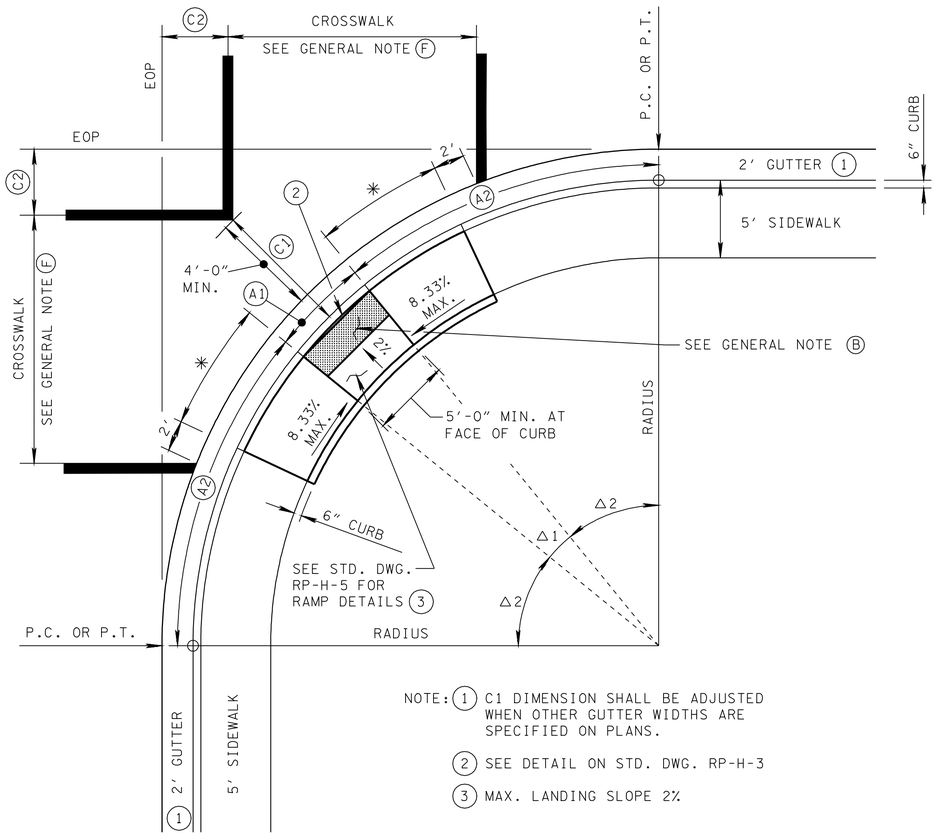
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PERPENDICULAR HANDICAP RAMP FOR 20' THRU 60' RADIUS

1-15-07 | RP-H-8

REV. 4-13-11: ADJUSTED CROSSWALK MARKINGS, ADDED NOTE (1), REVISED TABLE DIMENSIONS, ADDED GUTTER TO CROSSWALK INTERSECT DIMENSION, OTHER MISC. EDITS TO DRAWINGS.



NOTE: (1) C1 DIMENSION SHALL BE ADJUSTED WHEN OTHER GUTTER WIDTHS ARE SPECIFIED ON PLANS.

(2) SEE DETAIL ON STD. DWG. RP-H-3

(3) MAX. LANDING SLOPE 2%

TYPE 3
(RAMP IN RADIUS)

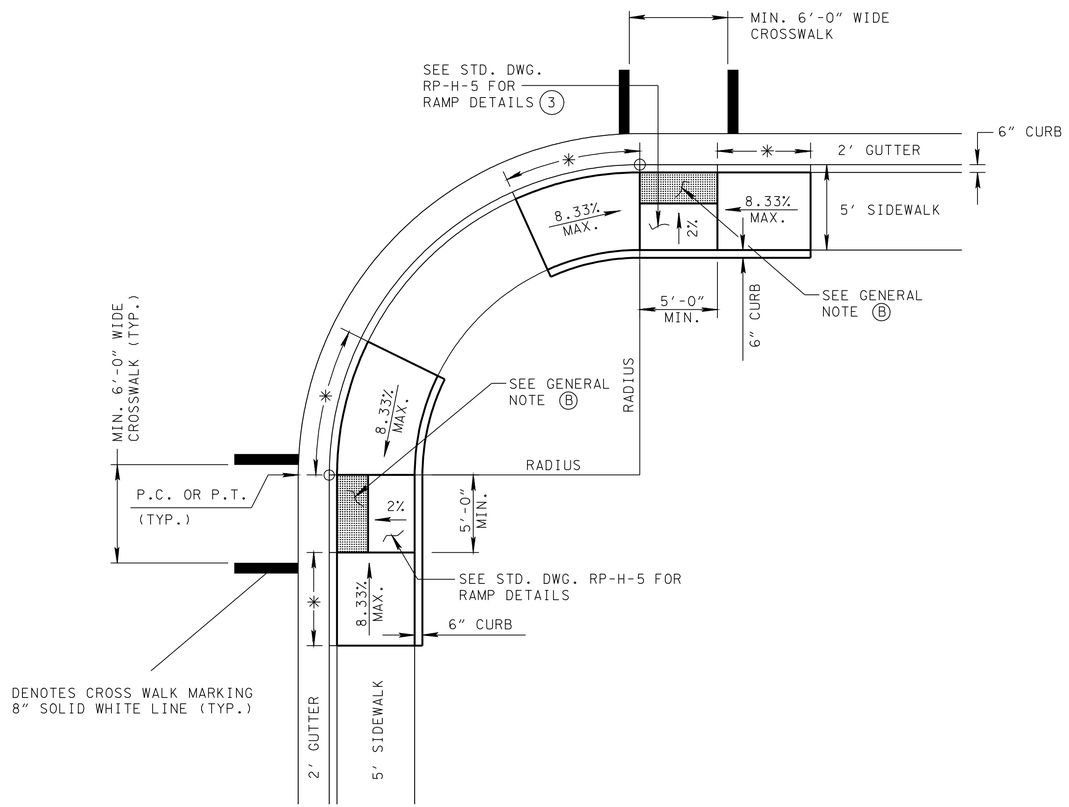
(CONSTRUCTION IN RADIUS)

✳ DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE

TABLE OF DIMENSIONS (1)
PARALLEL HANDICAP RAMPS - RADIUS OF 20' TO 75'

R RADIUS (FEET)	(A1) (FEET)	(A2) (FEET)	(C1) (FEET)	(C2) (FEET)	Δ1	Δ2	ESTIMATED QUANTITY (SQUARE FEET)
20	6.50	12.07	6.00	3.62	19°05'55"	35°27'03"	96
25	6.13	16.18	6.00	5.08	14°19'26"	37°50'17"	94
30	5.90	20.22	6.00	6.54	11°27'33"	39°16'14"	92
35	5.75	24.22	6.00	8.01	9°32'57"	40°13'31"	91
40	5.64	28.20	6.00	9.47	8°11'06"	40°54'27"	90
45	5.56	32.17	6.00	10.94	7°09'43"	41°25'08"	89
50	5.50	36.13	6.00	12.40	6°21'58"	41°49'01"	89
55	5.45	40.08	6.00	13.87	5°43'46"	42°08'07"	88
60	5.41	44.03	6.00	15.33	5°12'31"	42°23'44"	88
65	5.38	47.97	6.00	16.80	4°46'29"	42°36'46"	88
70	5.35	51.91	6.00	18.26	4°24'27"	42°47'47"	88
75	5.32	55.85	6.00	19.72	4°05'33"	42°57'13"	87

(1) VALUES SHOWN IN TABLE ARE BASED ON A 90° INTERSECTION ON 0.0% ROADWAY GRADE AND ARE APPROXIMATE ONLY.



DENOTES CROSS WALK MARKING 8" SOLID WHITE LINE (TYP.)

TYPE 4
(RAMP OUTSIDE RADIUS)

✳ DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE

GENERAL NOTES

(A) FOR SIGNALIZED INTERSECTIONS THAT REQUIRE PEDESTRIAN SIGNAL PUSH BUTTONS, SEE TDOT TRAFFIC DESIGN MANUAL FOR PLACEMENT DETAILS.

(B) SEE STANDARD DRAWING RP-H-3 FOR TRUNCATED DOMED SURFACE DETAILS.

(C) 5'-0" SIDEWALK WIDTH INCLUDES 6" CONCRETE CURB.

(D) GRATES FOR STORM DRAINS SHALL NOT BE PLACED IN THE CROSSWALK OR IN FRONT OF THE HANDICAP RAMP.

(E) DESIRABLE DIMENSIONS SHALL BE USED UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

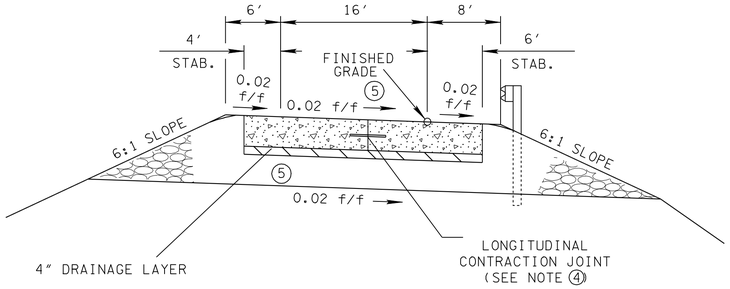
(F) CROSS WALK MARKINGS SHALL BE CALCULATED BY USING THE DIMENSIONS FROM THE TABLE ON A CASE BY CASE BASIS, UNLESS SPECIFIED.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

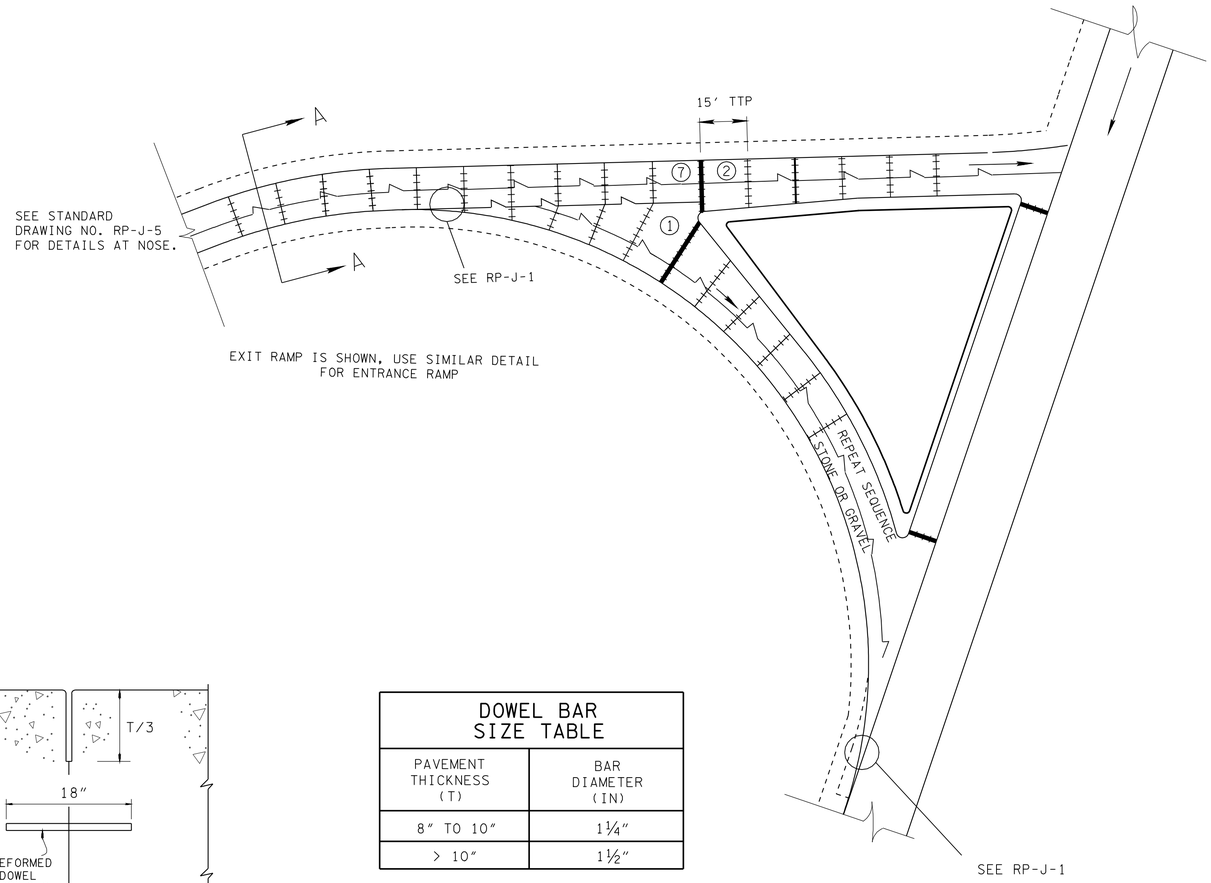
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PARALLEL HANDICAP RAMP
FOR 20' THRU 75' RADIUS

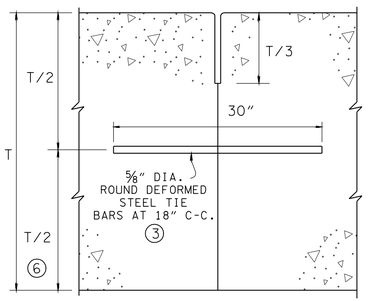
1-15-07 | RP-H-9



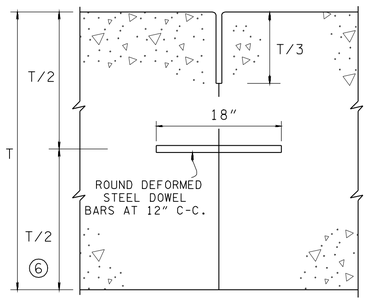
SECTION A-A



EXIT RAMP IS SHOWN, USE SIMILAR DETAIL FOR ENTRANCE RAMP



TIE BAR DETAIL FOR
LONGITUDINAL CONTRACTION JOINTS
FOR JOINT SEAL DETAILS SEE DRAWING RP-J-15



DOWEL BAR DETAIL FOR
TRANSVERSE CONTRACTION JOINTS
FOR JOINT SEAL DETAILS SEE DRAWING RP-J-9

DOWEL BAR SIZE TABLE	
PAVEMENT THICKNESS (T)	BAR DIAMETER (IN)
8″ TO 10″	1¼″
> 10″	1½″

JOINT SYMBOLS

1¾″ EXPANSION

TRANSVERSE CONTRACTION

LONGITUDINAL CONTRACTION OR CONSTRACTION

CROSS-REFERENCE DRAWINGS FOR THIS SHEET: RP-J-1, RP-J-5, RP-J-9, RP-J-11, RP-J-13, RP-J-15, RP-J-17, RP-J-18 AND RP-J-19.

FOOTNOTES

1. SKEW JOINTS WITH TURNING RADII WHEN LENGTH OF JOINT IS GREATER THAN 8′.
2. UNLESS OTHERWISE NOTED IN THE PLANS, THE TRANSVERSE CONTRACTION AND EXPANSION JOINTS SHALL BE SKEWED AT 90° TO THE ROADWAY CENTERLINE OR BASELINE.
3. NO TIE BARS SHALL BE PLACED WITHIN 18″ OF TRANSVERSE JOINT.
4. LONGITUDINAL CONSTRUCTION JOINT MAY BE USED INSTEAD OF THE LONGITUDINAL CONTRACTION JOINT (RP-J-15).
5. CONSTANT ROADWAY SLOPE SHOULD BE USED, INCLUDING ON SHOULDERS, REFER TO RDO1-TS-4 FOR INFORMATION PERTAINING TO RAMP DESIGN
6. MAX. HORIZONTAL AND VERTICAL TOLERANCE FOR DOWEL AND TIE BARS IS 1″.
7. UNLESS OTHERWISE NOTED IN THE PLANS, THE LONGITUDINAL CONTRACTION JOINTS, IS TO END WHEN IT REACHES THE EXPANSION JOINT.

REV. 1-31-83: ADDED JOINT SKEW NOTE.

REV. 6-23-88: DELETED JOINT SKEW.

REV. 3-20-91: REDREW SHEET AND CHANGED JOINT SPACING FOR CONCRETE PAVEMENT USING STONE. ADDED FOOTNOTE NO. ③.

□ REV. 12-18-94: CHANGED DRAWING REFERENCE NUMBER IN CROSS-REFERENCE BLOCK.

□ REV. 10-26-00: CHANGED VARIABLE JOINT SPACING TO 15′ CONSTANT.

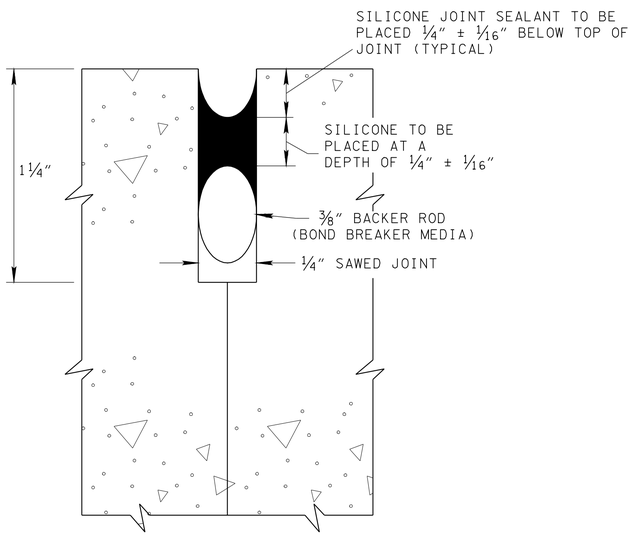
REV. 1-30-12: ADDED LONGITUDINAL CONTRACTION JOINT DETAILS.

□ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

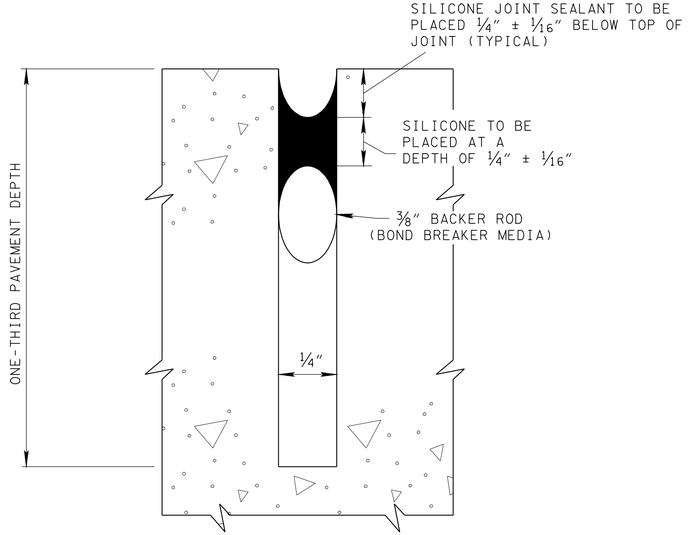
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

CONCRETE RAMP JOINT TYPES AND SPACING

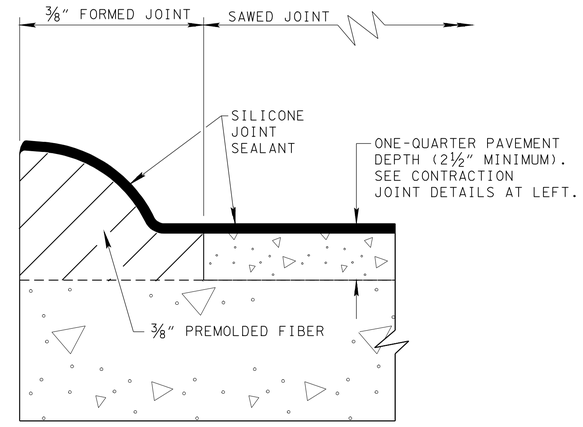
RP-J-7



CONSTRUCTION JOINT

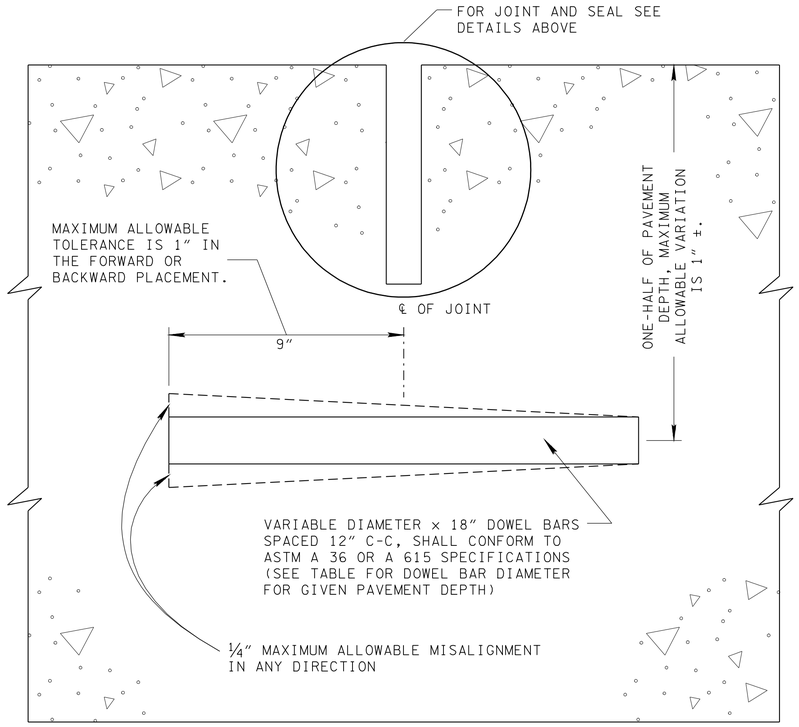


PLAIN SAWED GROOVE CONTRACTION JOINT



CONTRACTION DETAILS THROUGH INTEGRAL CONCRETE CURB

SEE STANDARD DRAWING RP-MC-1 FOR ADDITIONAL DETAILS AND NOTES NOT SHOWN ON THIS SHEET.



DETAIL OF DOWEL BAR FOR ALL TRANSVERSE CONTRACTION JOINTS

GENERAL NOTES

(A) SEE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS FOR PAVEMENT JOINTS AND SEALANTS.

(B) TRANSVERSE CONTRACTION AND CONSTRUCTION JOINTS WITH DOWELS SHALL BE REQUIRED. CONTRACTION JOINTS SHALL HAVE 15 FEET CONSTANT SPACING (SEE STANDARD DRAWING RP-J-1).

(C) TRANSVERSE CONTRACTION AND/OR CONSTRUCTION JOINTS IN THE PORTLAND CEMENT CONCRETE SHOULDERS SHALL BE OF THE SAME TYPE, MATERIAL AND SPACING AS THE CORRESPONDING JOINTS IN THE PORTLAND CEMENT CONCRETE TRAFFIC LANES. (SEE SUBSECTION 501.23 (b) OF THE STANDARD SPECIFICATIONS.) SEE STANDARD DRAWINGS RP-CS-1 AND RP-CS-2 FOR FURTHER DETAILS.

(D) SEE STANDARD DRAWINGS RP-I-5 AND RP-J-11 FOR ¾" EXPANSION JOINTS AT STREET AND ALLEY INTERSECTIONS.

(E) SEE STANDARD DRAWINGS RP-J-1 FOR 1¾" EXPANSION JOINTS AT BRIDGE ENDS.

(F) SEE STANDARD DRAWINGS RP-J-5 AND RP-J-7 FOR 1¾" EXPANSION JOINTS ON RAMPS.

(G) SEE STANDARD DRAWING RP-J-15 FOR LONGITUDINAL CONSTRUCTION JOINTS WITH TIE BARS.

(H) SEE STANDARD DRAWINGS RP-J-17, RP-J-18, AND RP-J-19 FOR DOWEL BAR AND DOWEL BAR ASSEMBLY DEVICE PLACEMENT DETAILS.

(I) DOWELS MAY BE PRESET IN BASKETS OR VIBRATED INTO PLACE WITH A DOWEL IMPLANTER, SO LONG AS THE TOLERANCES SHOWN IN DETAIL ON THIS SHEET ARE MET.

(J) LONGITUDINAL CONTRACTION AND/OR CONSTRUCTION JOINTS WITH TIE BARS SHALL BE REQUIRED. TIE BARS SHALL BE 2'-6" LONG AND SPACED 1'-6" CENTER-TO-CENTER. TIE BARS SHALL BE ⅝" DIAMETER ROUND DEFORMED STEEL BARS AND CONFORM TO ASTM A 615 - GRADE 40 SPECIFICATIONS.

DOWEL BAR SIZE TABLE

PAVEMENT THICKNESS (INCHES)	BAR DIAMETER (INCHES)
8-10	1¼"
>10	1½"

CROSS-REFERENCE DRAWINGS FOR THIS SHEET: RP-I-5, RP-J-1, RP-J-3, RP-J-5, RP-J-7, RP-J-11, RP-J-13, RP-J-15, RP-J-17, RP-J-18, RP-J-19 AND RP-MC-1.

REV. 3-32-82: UPDATED DETAIL OF DOWEL BAR FOR TRANSVERSE JOINTS.

REV. 1-4-83: CHANGED DEPTH REQUIREMENT ON ALTERNATE TO SAWING LONGITUDINAL CONTRACTION JOINT.

REV. 1-9-85: CHANGED DOWEL BAR TO ASTM A 36.

REV. 11-19-85: DELETED TOLERANCE IN NOTE 6.

REV. 5-25-88: ELIMINATED POLYETHYLENE SHEETING ALTERNATE AND REPLACED ELASTOMERIC WITH SILICONE.

REV. 2-14-90: REDREW SHEET; UPDATED "PLAIN SAWED GROOVE CONTRACTION JOINT" AND "CONSTRUCTION JOINT" DETAILS. ELIMINATED "INSERT AND SAWED GROOVE CONTRACTION JOINT" DETAIL, CHANGED DOWEL BAR LENGTH TO 18", AND MODIFIED GENERAL NOTES.

REV. 2-14-91: ADDED DOWEL BAR SIZE TABLE. CHANGED REFERENCE FOR DOWEL BAR SIZE FROM 1¼" TO VARIABLE DIAMETER.

REV. 10-26-91: MODIFIED INTEGRAL CONCRETE CURB DETAIL.

☐ REV. 12-18-94: CHANGED DRAWING REFERENCE NUMBER IN GENERAL NOTE (C) AND IN CROSS-REFERENCE BLOCK.

☐ REV. 5-27-96: CHANGED MAXIMUM ALLOWABLE MISALIGNMENT TOLERANCE FOR DOWEL BARS FROM ½" TO ¼".

REV. 10-26-00: CHANGED WIDTH AND DEPTH OF SAWED GROVE CONTRACTION JOINT. CHANGED WIDTH OF CONSTRUCTION JOINT. CHANGED GENERAL NOTE (I).

☐ REV. 1-19-02: ADDED NEW GENERAL NOTE (C). REDESIGNATED ALL SUBSEQUENT GENERAL NOTES.

☐ REV. 9-24-10: ADDED 8" PAVEMENT THICKNESS.

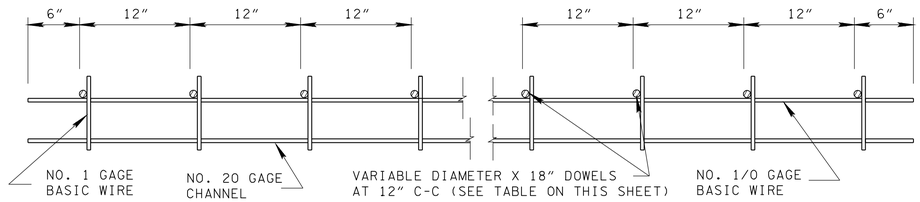
☐ REV. 2-2-12: CHANGED DOWEL BAR TABLE

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

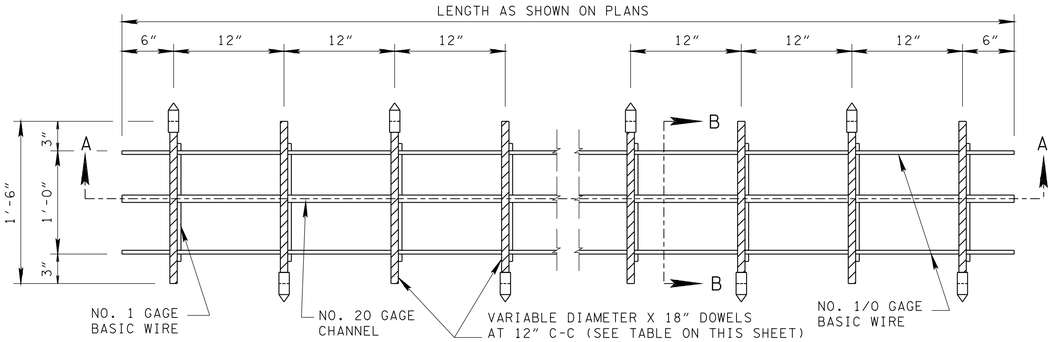
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

CONTRACTION AND CONSTRUCTION JOINTS FOR CONCRETE PAVEMENT

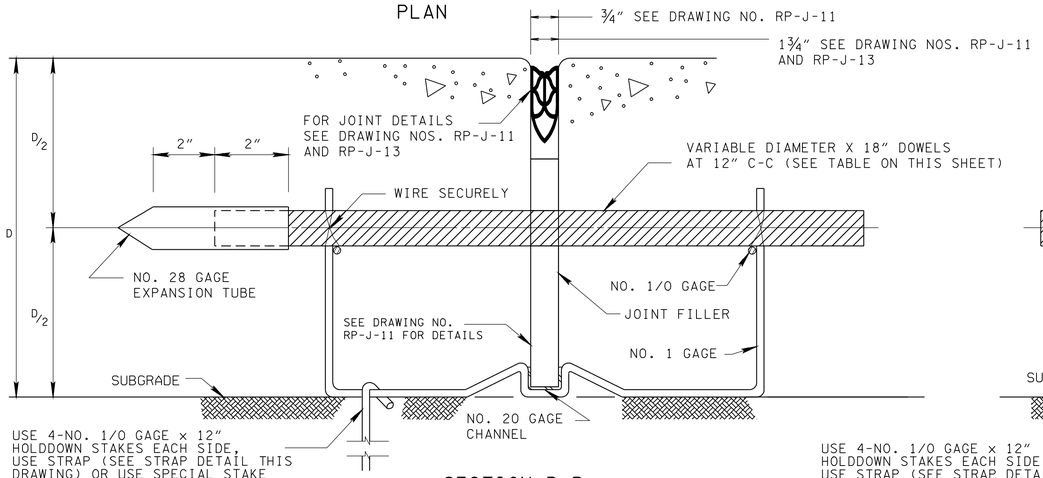
RP-J-9



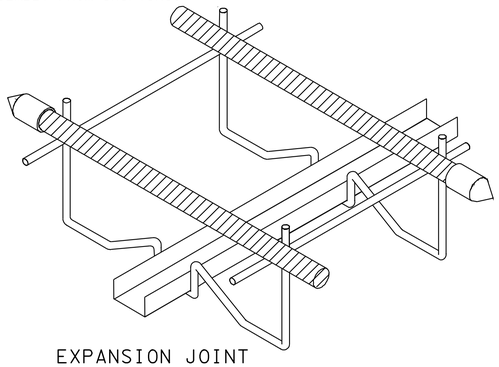
SECTION A-A
(EXPANSION TYPE)



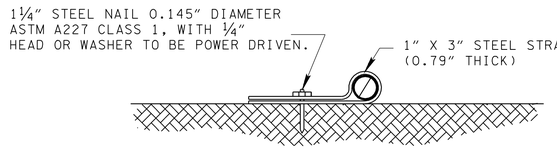
PLAN



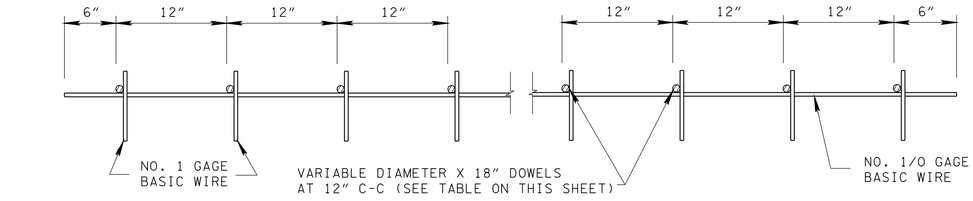
SECTION B-B
(EXPANSION TYPE)



EXPANSION JOINT



STRAP DETAIL



SECTION D-D
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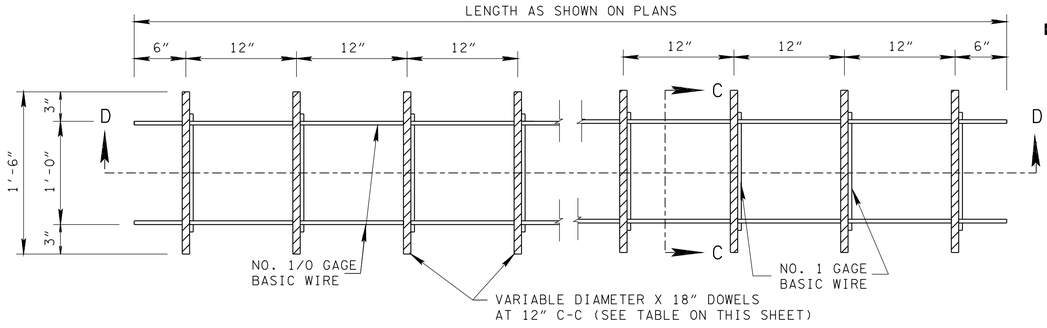
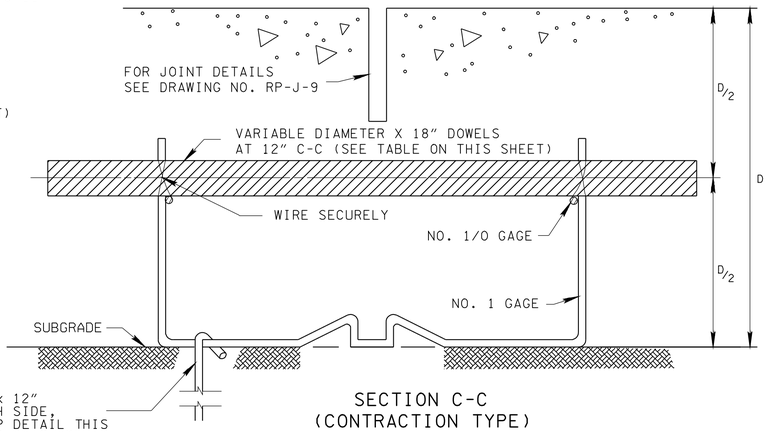


PLAN



SECTION C-C
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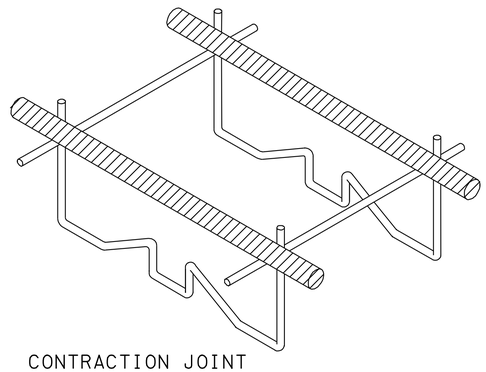


CONTRACTION JOINT

REV. 4-18-90: CHANGE DOWEL BAR LENGTH FROM 15" TO 18". ELIMINATED DOWEL BAR ASSEMBLY DETAILS FOR SKEWED INSTALLATIONS. MODIFIED GENERAL NOTES TO REFLECT THESE CHANGES.

REV. 3-20-91: REDREW AND REORGANIZED SHEET. ADDED DOWEL BAR SIZE TABLE. CHANGED REFERENCE FOR DOWEL BAR SIZE FROM 1¼" TO VARIABLE DIAMETER.

☐ REV. 7-29-93: REMOVED REFERENCE TO THE ORIGINAL MANUFACTURE'S NAME AND CROSS-REFERENCE TO DRAWING NO. RP-J-19. CHANGED GAGE OF BOTTOM WIRE AND VERTICAL SUPPORT WIRE FROM NO. 3 TO NO. 1.

☐ REV. 12-18-94: CHANGED CROSS-REFERENCE BLOCK AND GENERAL NOTE (A).

☐ REV. 10-26-00: CHANGED WIDTH AND DEPTH OF SAWED GROOVED CONTRACTION JOINT.

☐ REV. 2-2-12: CHANGED DOWEL BAR TABLE.

GENERAL NOTES

(A) DOWEL ASSEMBLY DEVICES OTHER THAN SHOWN ON DRAWING NOS. RP-J-17, RP-J-18, AND RP-J-19 MAY BE USED FOR SUPPORTING DOWELS AT EXPANSION AND CONTRACTION JOINTS.

(B) DOWEL ASSEMBLY DEVICES SHALL BE SO CONSTRUCTED AS TO HOLD THE DOWEL BARS FIRMLY IN POSITION PARALLEL TO THE SURFACE AND CENTERLINE OF THE PAVEMENT SLAB DURING THE PLACING OF CONCRETE.

(C) DOWEL ASSEMBLY DEVICES SHALL BE OF SUCH DESIGN AS TO PERMIT UNRESTRICTED MOVEMENT OF THE PAVEMENT SLAB.

(D) DOWEL ASSEMBLY DEVICES TO BE USED MUST BE APPROVED BY THE ENGINEER PRIOR TO THEIR USE.

(E) SEE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SECTION 501-PORTLAND CEMENT CONCRETE PAVEMENT FOR DOWEL ASSEMBLY DEVICES. ALSO SEE APPLICABLE SPECIAL PROVISIONS.

(F) DOWEL ASSEMBLY DEVICES ARE TO BE FURNISHED IN SECTIONS WITH SUITABLE LENGTHS FOR VARIOUS WIDTHS OF PAVEMENT.

(G) ONE OF THE ALTERNATE DOWEL ASSEMBLY DEVICES WILL BE REQUIRED AT EACH EXPANSION JOINT WITH LOAD TRANSFERS UNLESS A BULKHEAD IS USED. SEE DRAWING NOS. RP-J-17, RP-J-18, AND RP-J-19 FOR ALTERNATE DOWEL BAR AND DOWEL ASSEMBLY DETAILS AND SPECIFICATIONS.

(H) SEE DRAWING NOS. RP-J-9 AND RP-J-11 FOR ADDITIONAL INFORMATION NOT SHOWN ON THIS SHEET.

DOWEL BAR SIZE TABLE	
PAVEMENT THICKNESS (INCHES)	BAR DIAMETER (INCHES)
8-10	1¼"
>10	1½"

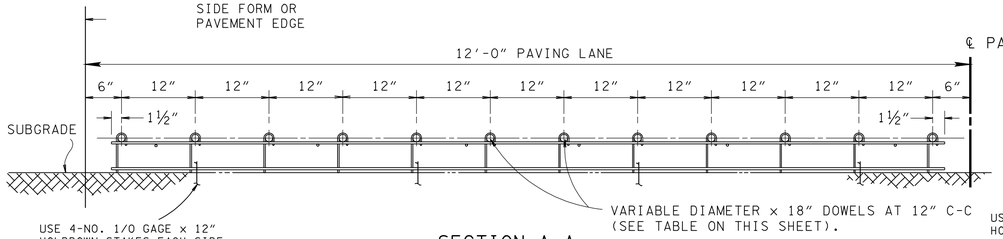
CROSS-REFERENCE DRAWING FOR THIS SHEET: RP-J-9, RP-J-11, RP-J-13, RP-J-18 AND RP-J-19.

☒ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

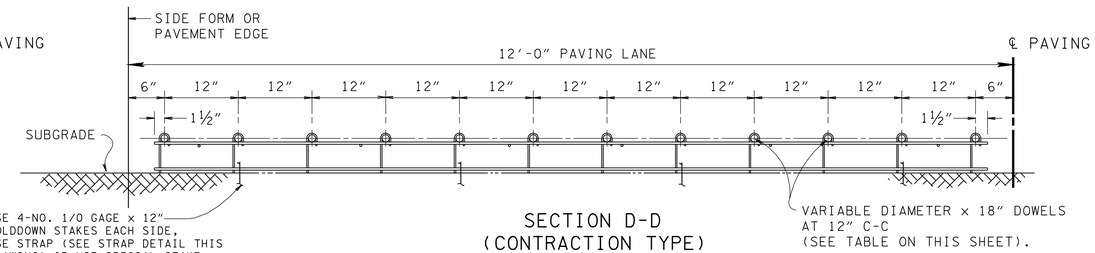
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DOWEL ASSEMBLY DEVICES

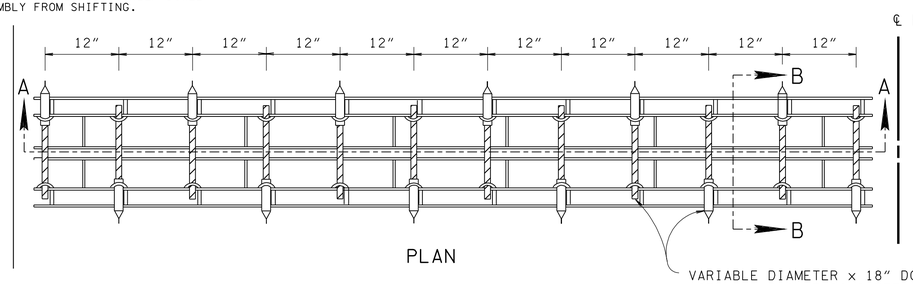
RP-J-17



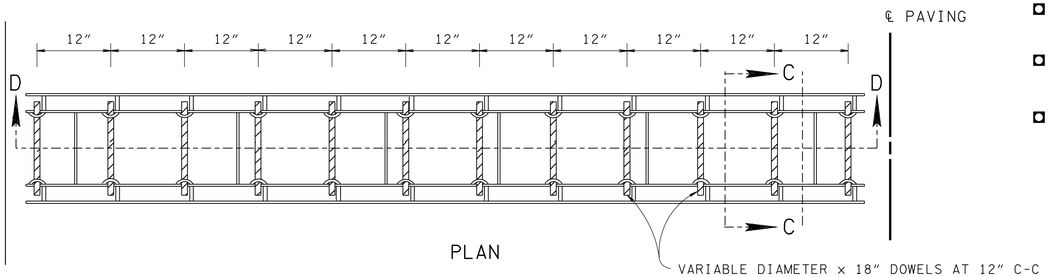
SECTION A-A
(EXPANSION TYPE)



SECTION D-D
(CONTRACTION TYPE)



PLAN



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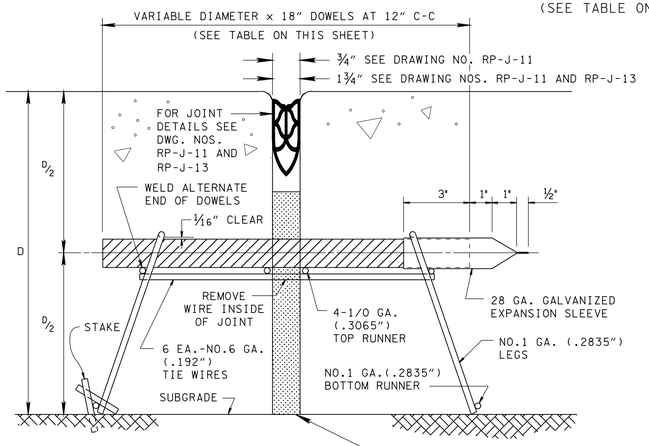
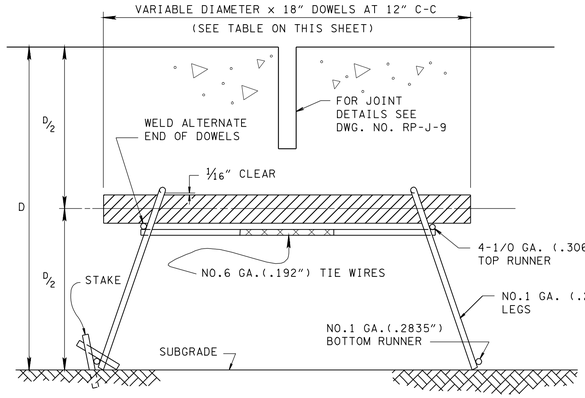
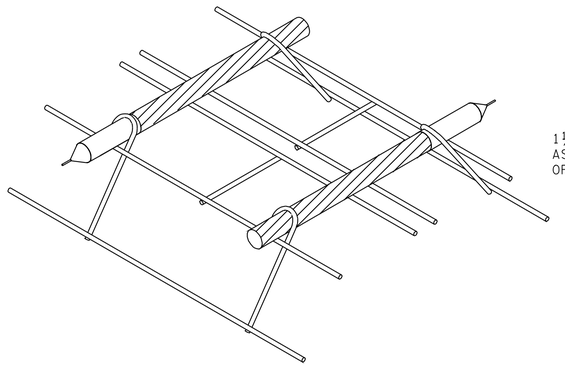


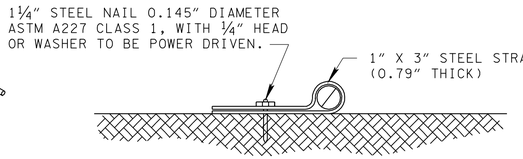
SECTION B-B
(EXPANSION TYPE)



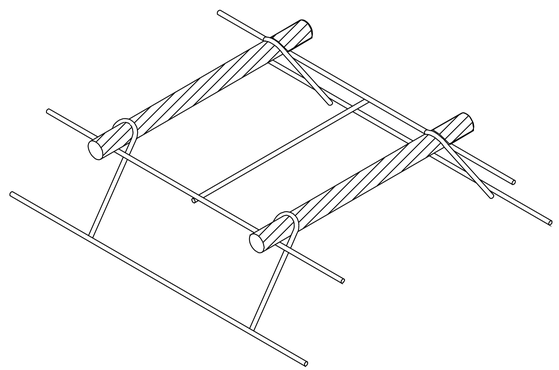
SECTION C-C
(CONTRACTION TYPE)



EXPANSION JOINT



STRAP DETAIL



CONTRACTION JOINT

GENERAL NOTES

(A) DOWEL ASSEMBLY DEVICES OTHER THAN SHOWN ON DRAWING NOS. RP-J-17, RP-J-18 AND RP-J-19 MAY BE USED FOR SUPPORTING DOWELS AT EXPANSION AND CONTRACTION JOINTS.

(B) DOWEL ASSEMBLY DEVICES SHALL BE SO CONSTRUCTED AS TO HOLD THE DOWEL BARS FIRMLY IN POSITION PARALLEL TO THE SURFACE AND CENTERLINE OF THE PAVEMENT SLAB DURING THE PLACING OF CONCRETE.

(C) DOWEL ASSEMBLY DEVICES SHALL BE OF SUCH DESIGN AS TO PERMIT UNRESTRICTED MOVEMENT OF THE PAVEMENT SLAB.

(D) DOWEL ASSEMBLY DEVICES TO BE USED MUST BE APPROVED BY THE ENGINEER PRIOR TO THEIR USE.

(E) SEE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SECTION 501-PORTLAND CEMENT CONCRETE PAVEMENT FOR DOWEL ASSEMBLY DEVICES. ALSO SEE APPLICABLE SPECIAL PROVISIONS.

(F) DOWEL ASSEMBLY DEVICES ARE TO BE FURNISHED IN SECTIONS WITH SUITABLE LENGTHS FOR VARIOUS WIDTHS OF PAVEMENT.

(G) ONE OF THE ALTERNATE DOWEL ASSEMBLY DEVICES WILL BE REQUIRED AT EACH EXPANSION JOINT WITH LOAD TRANSFERS, UNLESS A BULKHEAD IS USED. SEE DRAWING NOS. RP-J-17, RP-J-18

(H) SEE DRAWING NOS. RP-J-9 AND RP-J-11 FOR ADDITIONAL INFORMATION NOT SHOWN ON THIS SHEET.

DOWEL BAR SIZE TABLE	
PAVEMENT THICKNESS (INCHES)	BAR DIAMETER (INCHES)
8-10	1¼"
>10	1½"

CROSS-REFERENCE DRAWING FOR THIS SHEET: RP-J-9, RP-J-11, RP-J-13, RP-J-17 AND RP-J-19.

REV. 4-18-90: CHANGED DOWEL BAR LENGTH FROM 15" TO 18". ELIMINATED DOWEL BAR ASSEMBLY DETAILS FOR SKEWED INSTALLATIONS.

REV. 3-20-91: REDREW AND REORGANIZED SHEET. ADDED DOWEL BAR SIZE TABLE. CHANGED REFERENCE FOR DOWEL BAR SIZE FROM 1¼" TO VARIABLE SIZE.

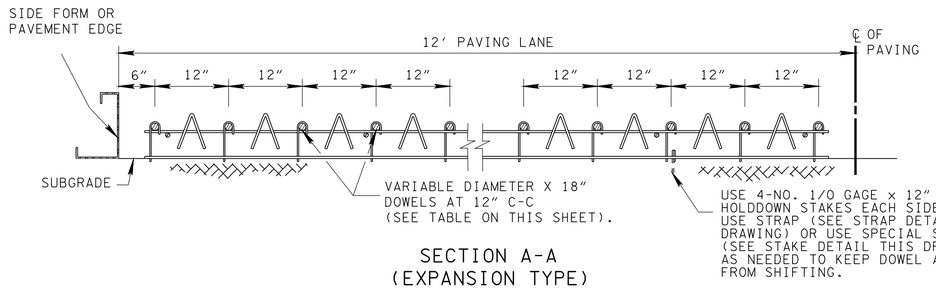
- REV. 7-29-93: REMOVED REFERENCE TO THE ORIGINAL MANUFACTURE'S NAME AND CROSS-REFERENCE TO DRAWING NO. RP-J-19. CHANGED GAGE OF BOTTOM WIRE AND VERTICAL SUPPORT WIRE FROM NO. 2 TO NO. 1. CHANGED CUTTING OF TIE WIRE NOTE ON CONTRACTION PLAN VIEW AND SECTION C-C VIEW.
- REV. 12-18-94: CHANGED CROSS-REFERENCE BLOCK AND GENERAL NOTE (A).
- REV. 10-26-00: CHANGED WIDTH AND DEPTH OF SAWED GROOVED CONTRACTION JOINT.
- REV. 10-21-05: DELETED NOTES ABOUT CUTTING OF TIE WIRE AFTER STAKING.
- REV. 2-2-12: CHANGED DOWEL BAR TABLE.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

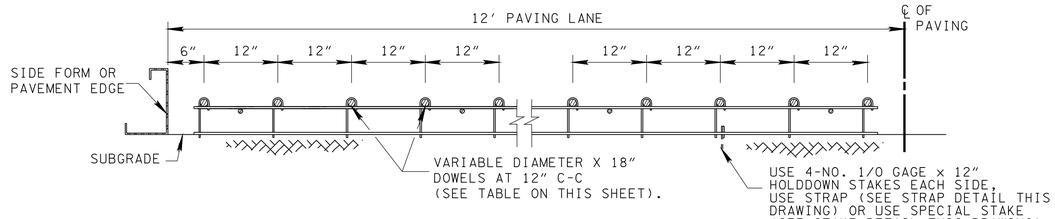
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DOWEL ASSEMBLY DEVICES

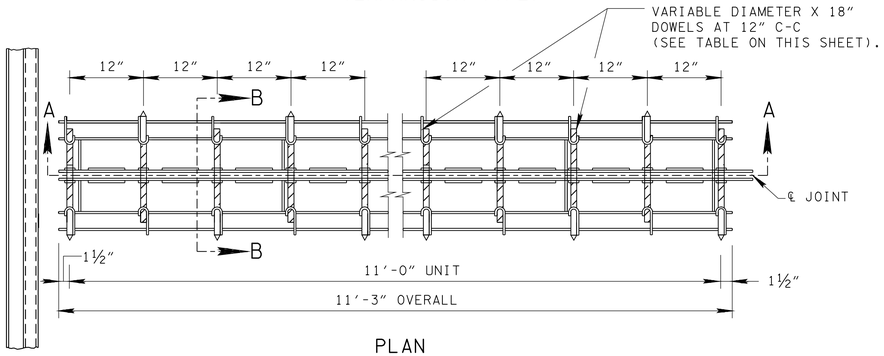
10-22-79 | RP-J-18



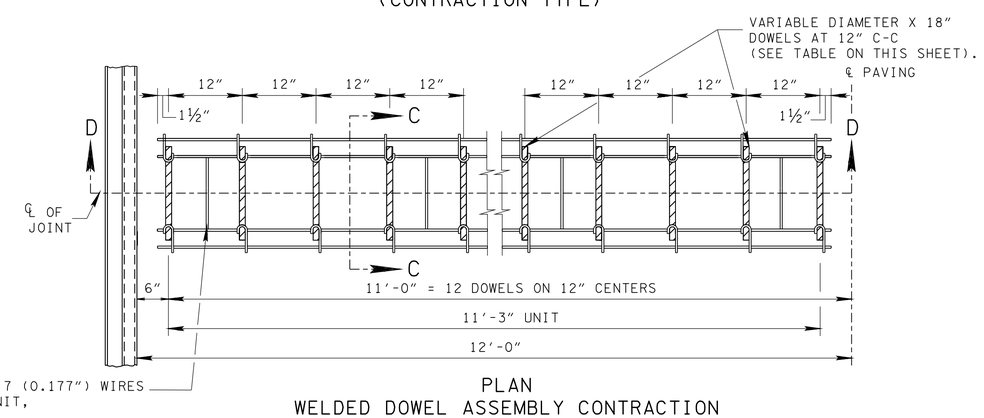
SECTION A-A
(EXPANSION TYPE)



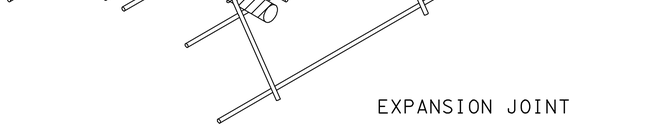
SECTION D-D
(CONTRACTION TYPE)



PLAN
WELDED DOWEL ASSEMBLY EXPANSION
TYPE U

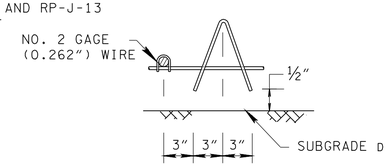


PLAN
WELDED DOWEL ASSEMBLY CONTRACTION
TYPE U

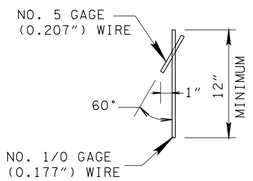


NOTE: THE FIXED END ALTERNATES FROM SIDE TO SIDE ON THIS ASSEMBLY.

SECTION B-B
(EXPANSION TYPE)



JOINT HOLDER

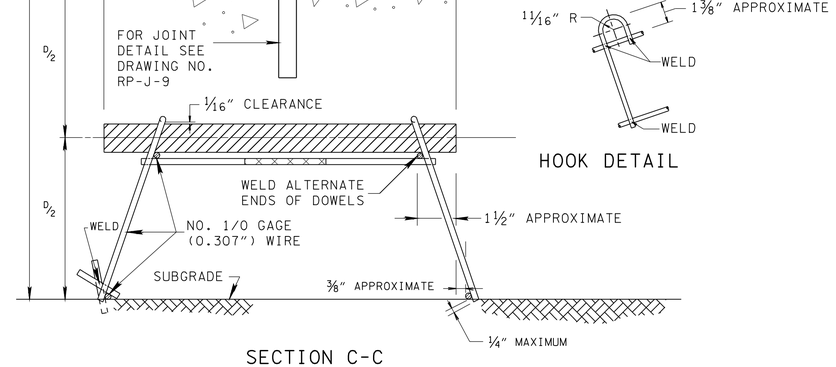


STAKE DETAIL

EXPANSION JOINT

STRAP DETAIL

CONTRACTION JOINT



SECTION C-C
(CONTRACTION TYPE)

HOOK DETAIL

REV. 4-18-90: CHANGED DOWEL BAR LENGTH FROM 15″ TO 18″. ELIMINATED DOWEL BAR ASSEMBLY DETAILS FOR SKEWED INSTALLATIONS.

REV. 3-20-91: REDREW AND REORGANIZED SHEET. ADDED DOWEL BAR SIZE TABLE. CHANGED REFERENCE FOR DOWEL BAR SIZE FROM 1¼″ TO VARIABLE DIAMETER.

- REV. 7-29-93: REMOVED REFERENCE TO THE ORIGINAL MANUFACTURE'S NAME AND CROSS-REFERENCE TO DRAWING NO. RP-J-19. ADD CUTTING OF TIE WIRE NOTE TO CONTRACTION JOINT PLAN VIEW AND SECTION C-C VIEW.
- REV. 12-18-94: CHANGED DRAWING NO. FROM RP-J-21 TO RP-J-19. CHANGED GENERAL NOTE (A).
- REV. 10-26-00: CHANGED WIDTH AND DEPTH OF SAWED GROOVED CONTRACTION JOINT.
- REV. 10-21-05: DELETED NOTES ABOUT CUTTING OF TIE WIRE AFTER STAKING.
- REV. 2-2-12: CHANGED DOWEL BAR TABLE.

GENERAL NOTES

(A) DOWEL ASSEMBLY DEVICES OTHER THAN SHOWN ON DRAWING NOS. RP-J-17, RP-J-18 AND RP-J-19 MAY BE USED FOR SUPPORTING DOWELS AT EXPANSION AND CONTRACTION JOINTS.

(B) DOWEL ASSEMBLY DEVICES SHALL BE SO CONSTRUCTED AS TO HOLD THE DOWEL BARS FIRMLY IN POSITION PARALLEL TO THE SURFACE AND CENTERLINE OF THE PAVEMENT SLAB DURING THE PLACING OF CONCRETE.

(C) DOWEL ASSEMBLY DEVICES SHALL BE OF SUCH DESIGN AS TO PERMIT UNRESTRICTED MOVEMENT OF THE PAVEMENT SLAB.

(D) DOWEL ASSEMBLY DEVICES TO BE USED MUST BE APPROVED BY THE ENGINEER PRIOR TO THEIR USE.

(E) SEE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SECTION 501-PORTLAND CEMENT CONCRETE PAVEMENT FOR DOWEL ASSEMBLY DEVICES. ALSO SEE APPLICABLE SPECIAL PROVISIONS.

(F) DOWEL ASSEMBLY DEVICES ARE TO BE FURNISHED IN SECTIONS WITH SUITABLE LENGTHS FOR VARIOUS WIDTHS OF PAVEMENT.

(G) ONE OF THE ALTERNATE DOWEL ASSEMBLY DEVICES WILL BE REQUIRED AT EACH EXPANSION JOINT WITH LOAD TRANSFERS UNLESS A BULKHEAD IS USED. SEE DRAWING NOS. RP-J-17, RP-J-18 AND RP-J-19 FOR ALTERNATE DOWEL BAR AND DOWEL ASSEMBLY DETAILS AND SPECIFICATIONS.

(H) SEE DRAWING NOS. RP-J-9 AND RP-J-11 FOR ADDITIONAL INFORMATION NOT SHOWN ON THIS SHEET.

DOWEL BAR SIZE TABLE	
PAVEMENT THICKNESS (INCHES)	BAR DIAMETER (INCHES)
8-10	1¼″
>10	1½″

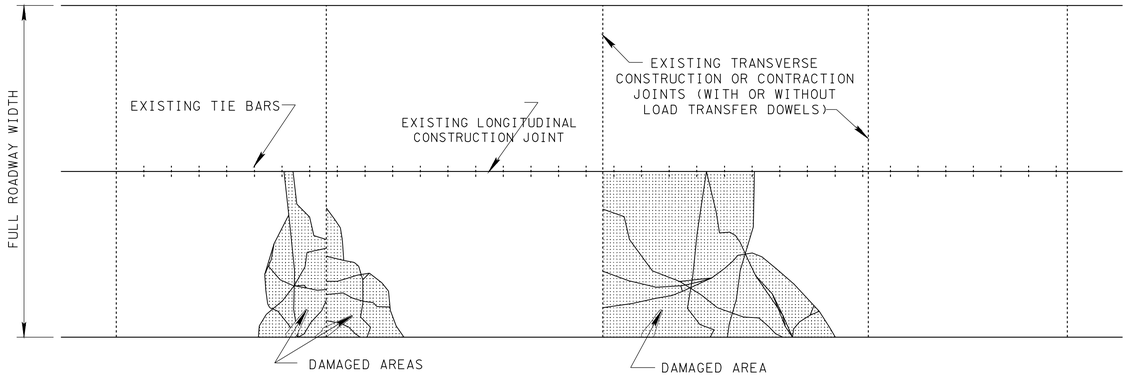
CROSS-REFERENCE DRAWING FOR THIS SHEET: RP-J-9, RP-J-11, RP-J-13, RP-J-17 AND RP-J-18.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

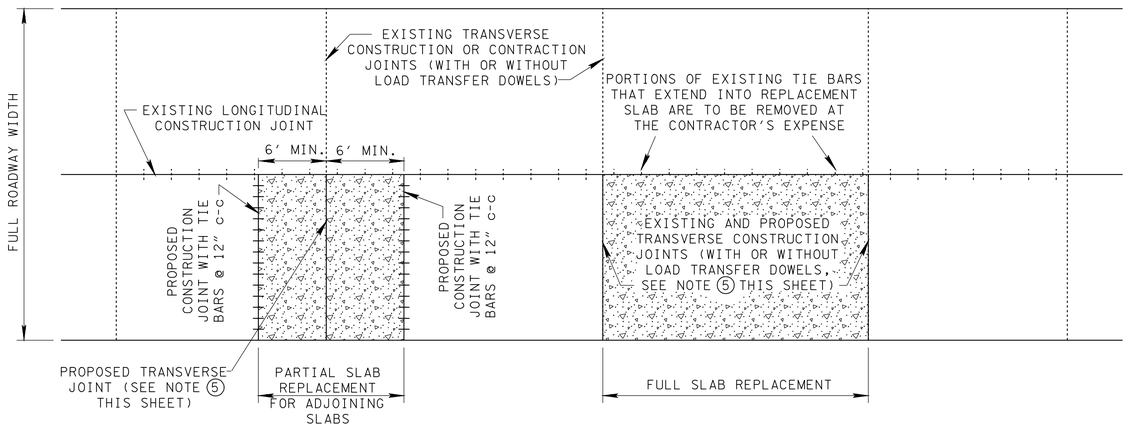
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DOWEL ASSEMBLY DEVICES

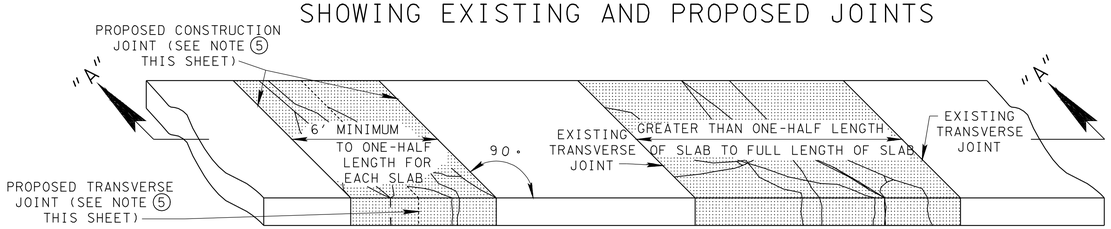
RP-J-19



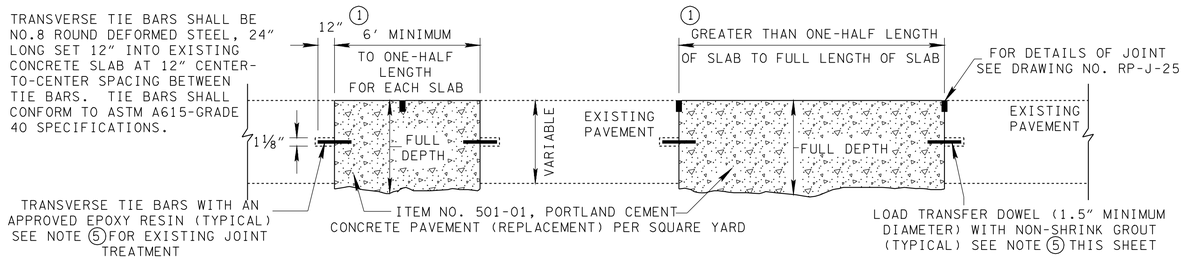
PLAN VIEW OF EXISTING LAYOUT OF CONCRETE PAVEMENT REPLACEMENT SHOWING EXISTING JOINTS



PLAN VIEW OF PROPOSED LAYOUT OF CONCRETE PAVEMENT REPLACEMENT SHOWING EXISTING AND PROPOSED JOINTS



PLAN VIEW OF CONCRETE PAVEMENT REPLACEMENT



PROFILE VIEW ALONG SECTION "A-A" OF CONCRETE PAVEMENT REPLACEMENT

GENERAL NOTES

(1) SEE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS FOR CONCRETE PAVEMENT REPAIR.

(2) IF THE LENGTH OF CONCRETE SLAB TO BE REPLACED IS GREATER THAN HALF THE ENTIRE LENGTH OF THE SLAB, THE ENTIRE SLAB SHALL BE REPLACED. IF THE LENGTH OF CONCRETE SLAB TO BE REPLACED IS LESS THAN HALF THE ENTIRE LENGTH OF THE SLAB (6' MINIMUM), THEN ONLY A PORTION OF THE SLAB WILL BE REPLACED.

(3) THE EXISTING CONCRETE PAVEMENT SHALL BE SAWED FULL DEPTH AROUND THE AREA TO BE REMOVED. WITHIN THE LANE SAWING SHALL BE PERPENDICULAR TO THE CENTERLINE AND A MINMUM OF 6" OUTSIDE THE DAMAGED AREAS.

(4) NO ADDITIONAL BASE MATERIAL SHALL BE ADDED AND ALL LOOSE BASE MATERIAL NOT RECOMPACTABLE SHALL BE REMOVED PRIOR TO PLACEMENT OF THE NEW CONCRETE SLAB. THE CONCRETE SLAB SHALL BE PLACED TO THE FULL DEPTH OF THE MATERIAL REMOVED. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR ADDITIONAL CONCRETE REQUIRED TO BRING PROPOSED CONCRETE SLAB UP TO PROPOSED GRADE.

(5) WHEN EXISTING TRANSVERSE JOINTS ARE REMOVED AND NOT TO FULL ROADWAY WIDTH, THEY SHALL BE RECONSTRUCTED IN KIND (WITH OR WITHOUT LOAD TRANSFER DOWELS) AND IN THE SAME LOCATION. WHEN A JOINT IS REPLACED FOR THE FULL ROADWAY WIDTH, LOAD TRANSFER DOWELS SHALL BE USED IN THE JOINT. SEE DRAWING NO. RP-J-9 FOR DOWEL PLACEMENT DETAILS. SPACING IS AT 12" CENTER-TO-CENTER BETWEEN DOWELS.

(6) FOR DETAILS REGARDING INSTALLATION OF CONTRACTION AND CONSTRUCTION JOINTS, SEE DRAWING NO. RP-J-9.

(7) LONGITUDINAL CONSTRUCTION JOINT TIE BARS AS SHOWN ON DRAWING NO. RP-J-15 SHALL BE OMITTED BETWEEN THE NEW REPLACEMENT SLAB AND THE EXISTING SLAB. THE CONTRACTOR IS TO REMOVE WHATEVER PORTION OF THE EXISTING TIE BARS THAT EXTENDS FROM EXISTING SLAB ALONG LONGITUDINAL JOINT INTO NEW SLAB. ALL COST WILL BE INCLUDED IN THE PRICE BID FOR ITEM NO. 501-01, PORTLAND CEMENT CONCRETE PAVEMENT (REPLACEMENT) PER SQUARE YARD.

(8) REMOVAL OF THE DAMAGED CONCRETE PAVEMENT SHALL BE BY LIFTING. ANY GOOD CONCRETE PAVEMENT WHICH IS DAMAGED DURING REMOVAL OF DAMAGED AREAS SHALL BE REMOVED AND REPLACED BY THE CONTRACTOR, AT HIS EXPENSE.

(9) IF THE ROADWAY CONTRACT INCLUDES EITHER GRINDING OR UNDERSEALING, THEN THE SLAB REPAIR SHALL BE PERFORMED FIRST.

(10) THE COSTS OF REMOVAL AND DISPOSAL OF EXISTING CONCRETE PAVEMENT, PLACEMENT OF NEW CONCRETE PAVEMENT, AND SAWING NEW JOINTS SHALL BE INCLUDED IN THE PRICE BID FOR ITEM NO. 501-01, PORTLAND CEMENT CONCRETE PAVEMENT (REPLACEMENT) PER SQUARE YARD.

(11) ONCE THE CONTRACTOR BEGINS REMOVING AN EXISTING FULL OR PARTIAL DEPTH CONCRETE SLAB, HE SHALL CONTINUE THE WORK UNTIL IT IS COMPLETE INCLUDING JOINT SEALING. JOINTS SHALL NOT BE LEFT UNSEALED DURING WINTER MONTHS.

(12) THE COST OF ALL RELATED WORK (DRILLING HOLES, GROUTING, ETC.) SHALL BE INCLUDED IN THE PRICE BID FOR THE FOLLOWING ITEMS AS APPROPRIATE:

- (A) ITEM NO. 502-04.01 ..... SAWING CONCRETE PAVEMENT (FULL DEPTH) PER LINEAR FOOT
- (B) ITEM NO. 502-04.02 ..... LOAD TRANSFER DOWELS PER EACH
- (C) ITEM NO. 502-04.03 ..... TRANSVERSE TIE - BARS PER EACH

(13) WHEN SPECIFIED BY AN ENGINEER, FAST TRACK CONCRETE OR EQUIVALENT MAY BE USED TO REPAIR CONCRETE PAVEMENT

ITEM NO. 501-01.31..... CONCRETE REPLACEMENT (FAST TRACK) S. Y.

NOTE

IF REPLACEMENT IS MID-SLAB, NO TRANSVERSE JOINT IS REQUIRED. IN THIS SITUATION A CONSTRUCTION JOINT WITH TIE BARS WILL BE USED.

CROSS-REFERENCE DRAWINGS NOTED ON THIS SHEET: RP-J-9, RP-J-24 AND RP-J-25.

REV. 7-17-84: ADDED EXISTING AND PROPOSED LAYOUTS OF CONCRETE PAVEMENT REPLACEMENT. ADDED TIE BARS AND CHANGED NOTES.

REV. 4-2-90: REDREW AND RENAMED SHEET. PLACED SPALL REPAIR, RANDOM CRACK REPAIR, AND JOINT REPAIR, AND JOINT REPAIRS DETAILS ON NEW SHEET NO. RP-J-24.

- REV. 12-18-94: ELIMINATED USE OF TIE BARS BETWEEN REPLACEMENT AND EXISTING SLAB.
- REV. 5-27-96: CHANGED MINIMUM SIZE OF LOAD TRANSFER DOWEL TO 1.5".
- REV. 7-29-96: CHANGED GENERAL NOTES (3) AND (8).
- REV. 5-27-01: CHANGED ITEM NO. 501-04.03.
- REV. 1-19-02: IN GENERAL NOTE (9) REMOVED REFERENCE TO UNDERSEALING OF SLAB.
- REV. 10-26-04: CHANGED PAY ITEMS IN GENERAL NOTE (12).
- REV. 1-24-12: ADDED GENERAL NOTE (13).

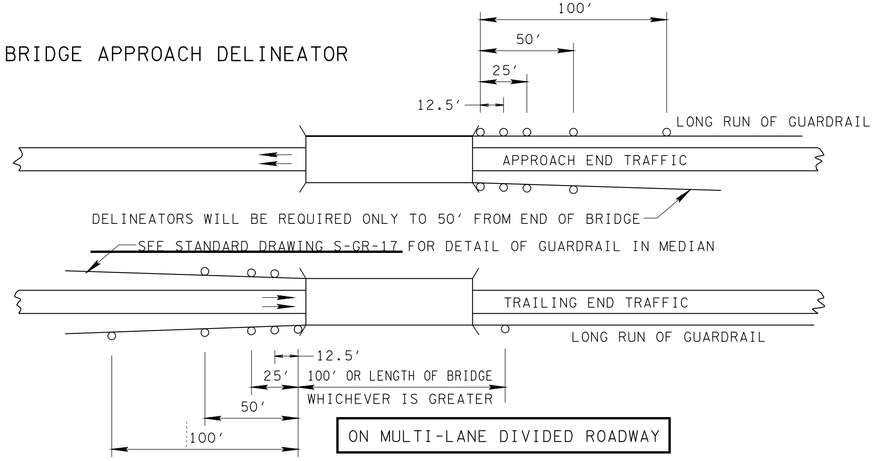
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

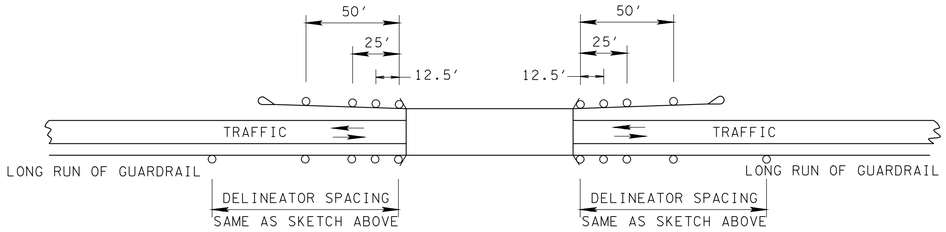
CONCRETE PAVEMENT REPAIR DETAILS

RP-J-23

BRIDGE APPROACH DELINEATOR



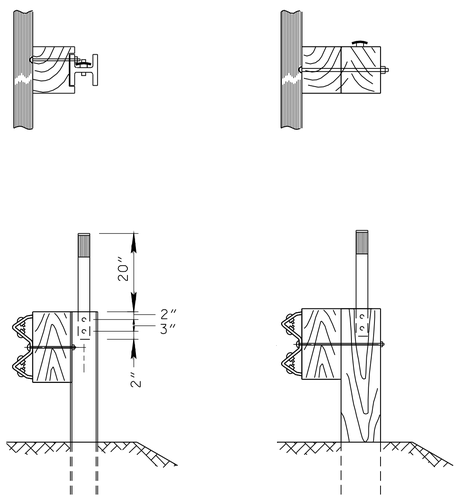
ON MULTI-LANE DIVIDED ROADWAY



ON TWO-LANE, TWO-WAY ROADWAY

LOCATION OF BRIDGE APPROACH GUARDRAIL DELINEATORS

NOTE: "o" DENOTES GUARDRAIL DELINEATORS. (SHOULDER LINES AND GUARDRAIL POSTS NOT INDICATED.)



STEEL POST WOOD POST

TYPICAL GUARDRAIL FLEXIBLE DELINEATOR INSTALLATION

NOTE: SEE STANDARD DRAWING T-S-11 FOR OTHER DETAILS. DELINEATOR MAY BE FULL LENGTH BEHIND POST AS AN ALTERNATE.

FLEXIBLE DELINEATOR GENERAL NOTES

(A) DELINEATORS SHALL CONFORM TO NOTES AND DETAILS SPECIFIED ON STANDARD DRAWING T-S-11,

(B) DELINEATORS SHALL BE INSTALLED ACROSS BRIDGES ONLY WHEN GUARDRAIL IS CONTINUOUS ACROSS BRIDGES. SPACING ON BRIDGES SHALL BE AT 12′-6″ INTERVALS.

(C) THE COLOR OF DELINEATORS SHALL CONFORM TO THE COLOR OF EDGELINES STIPULATED IN SECTION 3B-6 OF THE MUTCD (CURRENT EDITION).

(D) DELINEATORS SHALL BE FACED TOWARD THE APPROACHING TRAFFIC IN LANE ADJACENT TO THE GUARDRAIL AT ALL LOCATIONS.

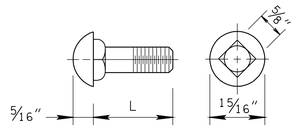
(E) THE GUARDRAIL DELINEATORS WILL BE SECURED TO THE WOOD POST BY TWO (2) 16 PENNY NAILS AND TO THE STEEL POST BY TWO (2) 2-PIECE CHERRY MATE RIVETS (MODEL: BALM-8-BP12) OR EQUIVALENT. A ⅜″ GALVANIZED FLANGED NUT WILL BE PLACED BETWEEN THE DELINEATOR AND THE POST ON EACH OR RIVET.

(F) THE TWO HOLES IN THE STEEL GUARDRAIL POSTS USED TO ATTACH THE DRILLED IN THE FIELD. IF THE HOLES ARE SHOP DRILLED IT SHALL BE DELINEATOR SHALL BE ¼″ IN DIAMETER AND SHALL BE SHOP DRILLED OR BE DONE PRIOR TO GALVANIZING THE POST. IF THE HOLES ARE FIELD DRILLED THEY SHALL BE THOROUGHLY PAINTED WITH A TOUCH-UP GALVANIZING SPRAY PAINT PRIOR TO ATTACHING THE DELINEATOR POST.

(G) THE COST OF FURNISHING AND INSTALLING THESE BRIDGE APPROACH GUARDRAIL DELINEATORS SHALL BE INCLUDED IN THE PRICE BID FOR THE ITEMS OF GUARDRAIL TO WHICH THE DELINEATORS ARE ATTACHED.

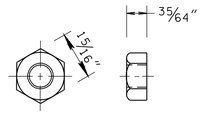
(H) ONLY DELINEATORS LISTED ON THE QPL, LIST 1. SECTION G.2 GUARDRAIL POST DELINEATION, MAY BE USED.

W-BEAM BARRIER FASTENING HARDWARE

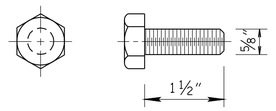


⅝″ DIAMETER CARRIAGE BOLT

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.

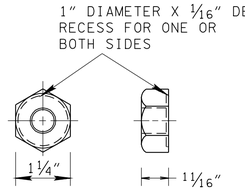


⅝″ DIAMETER HEX NUT



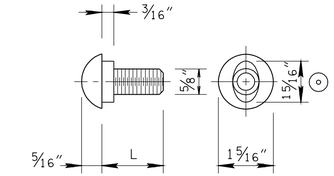
⅝″ DIAMETER HEX BOLT

(FOR FASTENING STEEL POST BLOCK-OUTS TO POSTS AND TO SPLICE TUBULAR W-BEAM RAIL ELEMENTS)



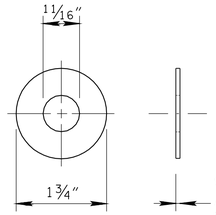
⅝″ DIAMETER RECESS NUT

THIS NUT IS TO BE USED AS AN ALTERNATE TO SPLICE TUBULAR W-BEAM RAIL ELEMENTS (NO WASHER REQUIRED)



⅝″ DIAMETER BUTTON HEAD BOLT

⊙ TOLERANCES +1⁄16″ AND -1⁄64″



STEEL WASHER

REV. 5-1-85: REDREW SHEET AND CHANGED GUARDRAIL MOUNTED DELINEATOR TO FLEXIBLE DELINEATOR.

REV. 11-14-85: CHANGED ⅝″ BOLT AND NUT DETAILS.

REV. 9-1-86: ADDED TO DELINEATOR NOTE.

REV. 11-4-87: ADDED ⅝″ RECESS NUT TO DRAWING.

REV. 10-26-91: REDREW AND REORGANIZED SHEET. UPDATED DRAWING TO 1991 STANDARDS.

□ REV. 1-19-92: MODIFIED CODING SYSTEM ON GENERAL NOTES AND SPECIFICATIONS.

REV. 7-29-98: CHANGED FLEXIBLE DELINEATOR INSTALLATION DETAIL.

REV. 9-5-98: CHANGED CARRIAGE AND BUTTON HEAD BOLT NOTES. DELETED DETAIL FOR SQUARE WASHER FOR BUTTON HEAD BOLTS.

REV. 6-6-11: REORGANIZED SHEET AND ADDED GENERAL NOTE (H).

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.

CARRIAGE BOLTS

L	THREAD LENGTH	INTENDED USE
1½″	FULL LENGTH THREAD	THIS BOLT IS A SPLICE BOLT FOR THE CHANNEL RUB RAIL ELEMENTS.
3″	1½″ MINIMUM THREAD LENGTH	THIS BOLT IS FOR FASTENING CHANNEL RUB RAIL ELEMENTS TO STEEL POST.
11″	1¾″ MINIMUM THREAD LENGTH	THIS BOLT IS FOR FASTENING CHANNEL RUB RAIL ELEMENTS TO WOOD POST.
14″	1¾″ MINIMUM THREAD LENGTH	THIS BOLT IS FOR FASTENING RUB RAIL ELEMENTS TO WOOD POST WHEN USED FOR MEDIAN DIVIDERS.

BUTTON HEAD BOLTS

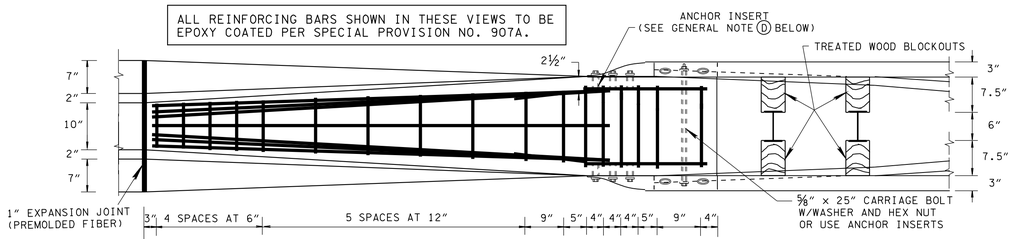
L	THREAD LENGTH	INTENDED USE
1¼″	FULL LENGTH THREAD	THIS BOLT IS FOR FASTENING "W" BEAM RAIL ELEMENTS AT JOINTS.
9½″	1¾″ MINIMUM THREAD LENGTH	THIS BOLT IS FOR FASTENING "W" BEAM RAIL ELEMENTS TO METAL POST WITH WOOD BLOCK-OUTS.
18″	2½″ MINIMUM THREAD LENGTH	THIS BOLT IS FOR FASTENING "W" BEAM RAIL ELEMENTS 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.

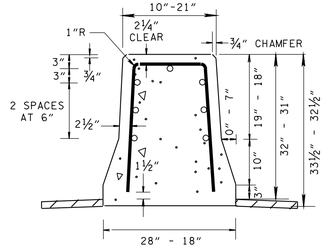
□ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

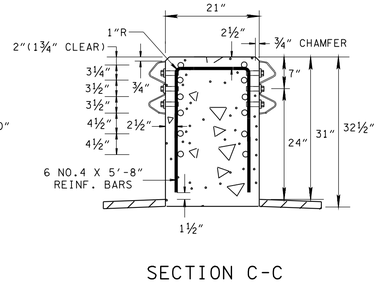
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

W-BEAM BARRIER FASTENING HARDWARE AND BRIDGE APPROACH DELINEATORS

S-GR-14







DETAIL OF TRANSITION FROM CONCRETE MEDIAN BARRIER TO METAL MEDIAN DIVIDER GUARDRAIL

GENERAL NOTES

(A) CONCRETE MEDIAN BARRIER SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SECTION 711 AND/OR THE SPECIAL PROVISIONS.

(B) SEE STANDARD DRAWING S-GR-20 FOR DETAILS OF MEDIAN DIVIDER GUARDRAIL AND FOR TERMINATING CONCRETE MEDIAN BARRIER.

(C) SEE STANDARD DRAWING S-GR-15 FOR DETAILS OF TERMINAL ELEMENT FOR ANCHOR BLOCK AND BRIDGE CONNECTIONS.

(D) SEE GENERAL NOTES ON STANDARD DRAWING S-GR-19 FOR REQUIREMENTS OF ANCHOR INSERTS.

(E) IF SAWED CONTRACTION JOINTS ARE USED, THE JOINTS MUST BE SAWED WITHIN FOUR (4) HOURS AFTER THE CONCRETE IS PLACED UNLESS DUE TO COOL WEATHER THE ENGINEER EXTENDS THIS TIME PERIOD. IN NO CASE WILL THE TIME PERIOD BE LONGER THAN EIGHT (8) HOURS.

(F) THE CONTRACTION JOINTS ARE TO BE SPACED AT 20 TO 25 FOOT INTERVALS WHEN CONSTRUCTED ON ASPHALT PAVEMENT. WHEN THE CONCRETE MEDIAN BARRIER IS ATTACHED TO CONCRETE PAVEMENT, THE CONTRACTION JOINTS WILL CORRESPOND TO THE JOINTS IN THE CONCRETE PAVEMENT. THE COST OF MATERIAL AND LABOR FOR THE JOINT INSTALLATION SHALL BE INCLUDED IN THE BID PRICE FOR CONCRETE MEDIAN BARRIER.

(G) THE TWO (2) INCH OPEN EXPANSION JOINTS SHALL BE PLACED AT A MAXIMUM SPACING NOT TO EXCEED 400 FEET. IF FIXED OBJECTS SUCH AS BRIDGE PIERS, BRIDGE ENDS, OVERHEAD SIGN SUPPORTS, OR OTHER FEATURES PROJECTING THROUGH, INTO OR AGAINST THE BARRIER EXIST THAT REQUIRE TWO INCH OPEN EXPANSION JOINTS, THEN THE DISTANCE BETWEEN THE EXPANSION JOINTS IS TO BE REDUCED IN ORDER TO ALLOW AN EQUAL DISTANCE BETWEEN JOINTS THAT IS LESS THAN 400 FEET. ALL ADDITIONAL STEEL REQUIRED AT EXPANSION JOINTS TO BE EPOXY COATED REINFORCING STEEL. THE COST OF MATERIAL AND LABOR FOR THE JOINT INSTALLATION SHALL BE INCLUDED IN THE BID PRICE FOR CONCRETE MEDIAN BARRIER.

(H) THE CONCRETE MEDIAN BARRIER SHALL BE GIVEN AN APPLIED TEXTURE FINISH. THE COLOR OF THE FINISH SHALL BE WHITE, FEDERAL SPECIFICATION NO. 37886. THE COST OF MATERIAL AND LABOR FOR THE TEXTURE FINISH SHALL BE INCLUDED IN THE BID PRICE FOR CONCRETE MEDIAN BARRIER.

(I) MEDIAN BARRIER DELINEATOR REFLECTIVE SHEETING SHALL MEET ASTM D4956, TYPE V SPECIFICATIONS. DELINEATORS WITH DIMENSIONS OTHER THAN 4" X 3" MAY BE USED IF THE PRODUCT IS ON THE APPROVED PRODUCTS LIST. THE VARIATIONS IN DELINEATOR DIMENSION SHOULD NOT EXCEED ± 10%. DIFFERENT SIZE OR MANUFACTUREED MEDIAN BARRIER DELINEATORS SHOULD NOT BE MIXED IN THE SAME LINE.

(J) MEDIAN BARRIER DELINEATORS SHALL BE HIGH IMPACT, UV-STABILIZED, ENGINEERED THERMOPLASTIC OR POLYCARBONATE SUBSTRATE. SEE TDOT APPROVED QUALIFIED PRODUCT LISTS FOR ACCEPTABLE PRODUCTS.

(K) MEDIAN BARRIER DELINEATORS WILL NOT BE REQUIRED IN AREAS WHERE ROADWAY IS LIGHTED.

(L) SINGLE WHITE REFLECTIVE SHEETING WILL BE SUBSTITUTED FOR THE DOUBLE YELLOW REFLECTIVE SHEETING WHEN TRAFFIC ON EACH SIDE OF THE BARRIER IS GOING IN THE SAME DIRECTION.

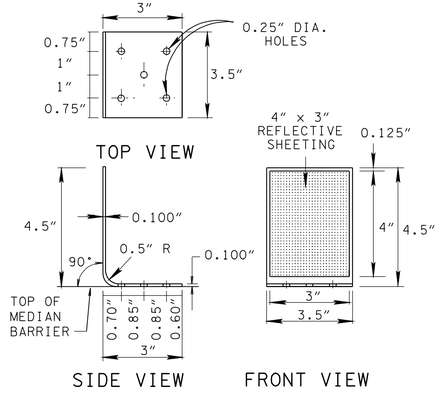
(M) THE COST OF FURNISHING AND INSTALLING MEDIAN BARRIER DELINEATORS, INCLUDING ALL MATERIALS, LABOR, AND INCIDENTALS NECESSARY TO COMPLETE THE INSTALLATION, SHALL BE INCLUDED IN BID PRICE FOR CONCRETE MEDIAN BARRIER.

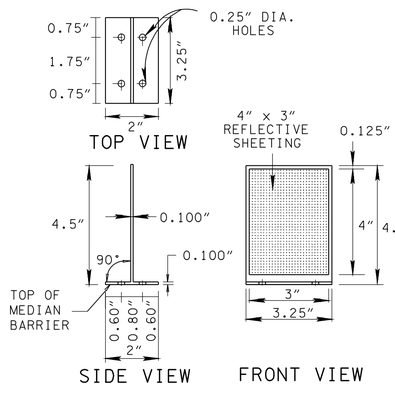
(N) MEDIAN BARRIER DELINEATORS SHALL BE MOUNTED TO THE CONCRETE MEDIAN BARRIER WITH A ONE COMPONENT ADHESIVE AS RECOMMENDED BY THE MANUFACTURER. THEY SHALL BE INSTALLED NO EARLIER THAN THREE WEEKS AFTER THE TEXTURE COATING HAS BEEN APPLIED.

(O) ALONG TOP EDGES OF CONCRETE MEDIAN BARRIER THE CONTRACTOR MAY USE ¾" RADIUS IN LIEU OF ¾" CHAMFER SHOWN ON THIS DRAWING.

(P) PAYMENT WILL BE MADE UNDER ITEM NO. 711-01, CONCRETE MEDIAN BARRIER, PER LINEAR FOOT AND ITEM NO. 711-01.06, CONCRETE MEDIAN BARRIER (TYING TO GUARDRAIL), PER LINEAR FOOT.

(Q) ONLY DELINEATORS LISTED ON THE OPL, LIST 1. SECTION G.1 BARRIER WALL DELINEATION, MAY BE USED.

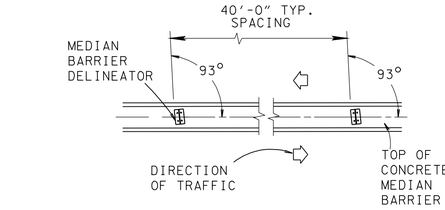


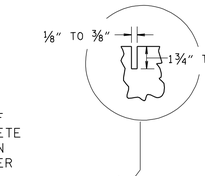


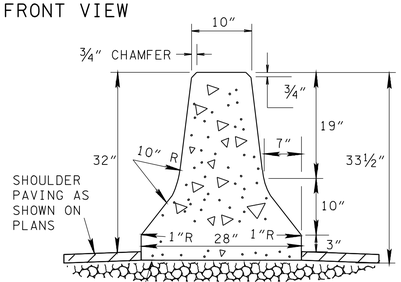
REV. 7-29-98: MODIFIED PLAN VIEW, SECTION B-B AND SECTION C-C.

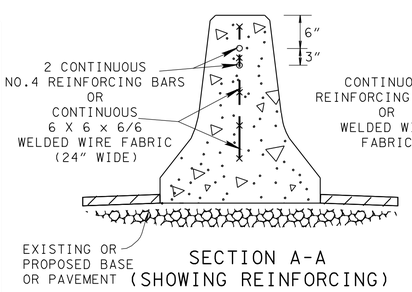
REV. 9-5-98: MODIFIED GENERAL NOTES (B) AND (D).

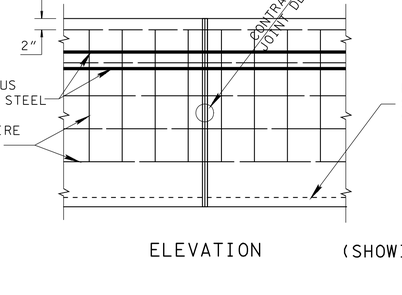
- REV. 1-19-99: CHANGED TYPE OF MEADIAN BARRIER DELINEATORS AND MODIFIED GENERAL NOTES ACCORDINGLY.
- REV. 5-27-99: MODIFIED DIMENSION ON SIDE VIEW OF LEFT GROUP OF MEDIAN BARRIER DELINEATORS.
- REV. 10-26-99: MODIFIED GENERAL NOTE (G).
- REV. 5-27-01: CHANGED ITEM NO. 705-01.06 TO 705-03.04 IN ELEVATION VIEW. CHANGED GENERAL NOTE (P).
- REV. 01-31-06: MODIFIED GENERAL NOTE (I).
- REV. 6-6-11: ADDED GENERAL NOTES (Q).

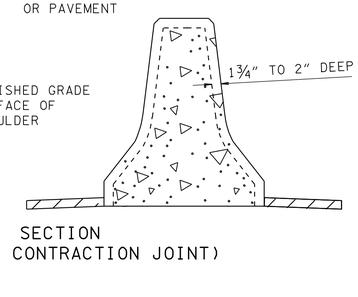




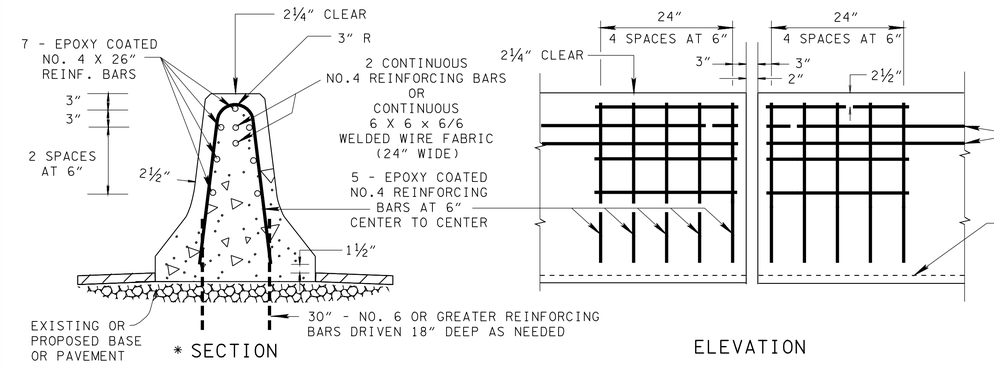








DETAILS OF REINFORCING AND CONTRACTION JOINT FOR CONCRETE MEDIAN BARRIER



DETAILS OF REINFORCING AT EXPANSION JOINT FOR CONCRETE MEDIAN BARRIER

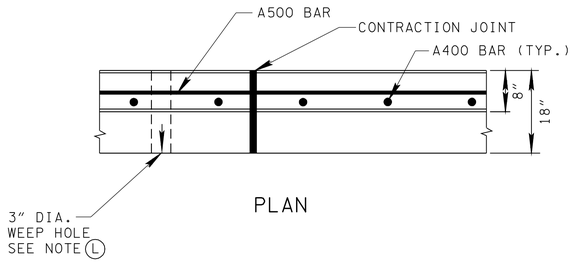
- MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

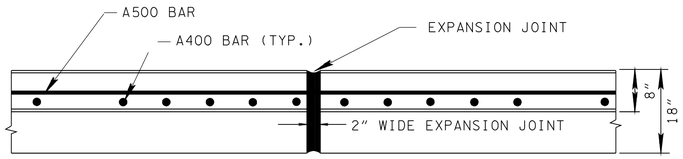
STANDARD CONCRETE MEDIAN BARRIER

11-18-82 | S-MB-1

REV. 7-30-10: REVISED REINFORCING STEEL DETAILS AND GENERAL NOTES.

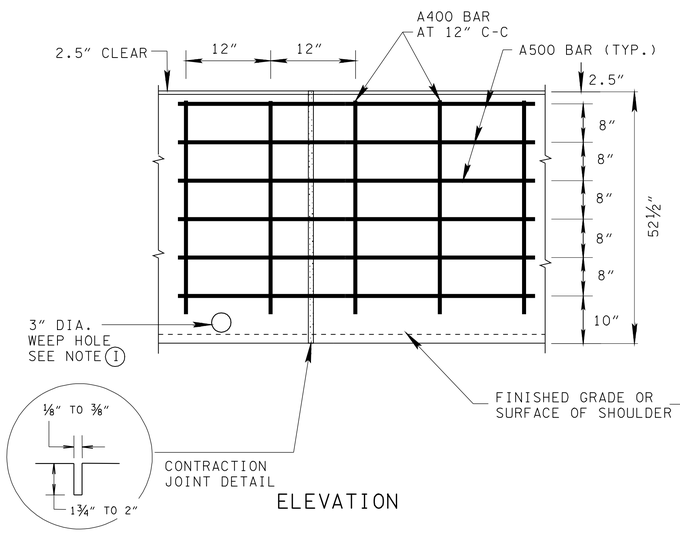


PLAN

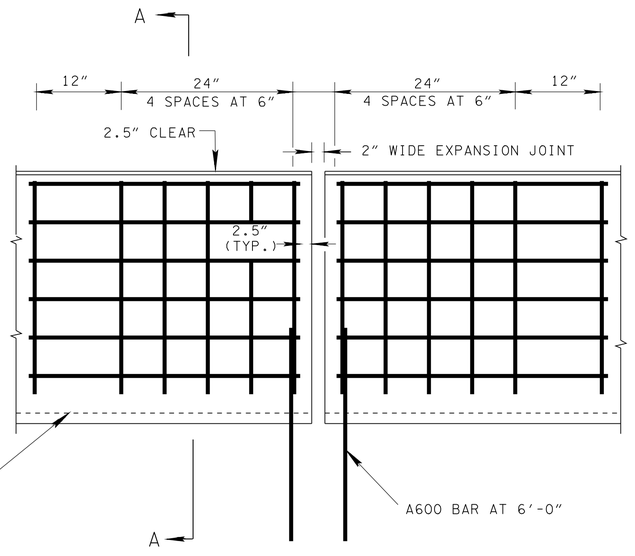


PLAN

NOTE: ALL A400, A500, AND A600 REINFORCING STEEL BARS ARE TO BE EPOXY COATED MEETING ALL REQUIREMENTS OF ASTM D3963.



ELEVATION



ELEVATION

REINFORCING STEEL LEGEND

47.5"	A400
VARIABLE	A500
48"	A600

GENERAL NOTES

(A) HALF SIZE SINGLE SLOPE CONCRETE BARRIER WALL IS TO BE USED IN CONJUNCTION WITH NOISE BARRIER OR RETAINING WALL INSIDE THE CLEAR ZONE AS SHOWN ON THIS DRAWING.

(B) CONCRETE BARRIER WALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SECTION 711 AND/OR CURRENT SPECIAL PROVISIONS.

(C) CONCRETE: F_c = 3,000 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.

(D) THE CONCRETE BARRIER WALL SHALL BE GIVEN AN APPLIED TEXTURE FINISH. THE COLOR OF THE FINISH SHALL BE WHITE, FEDERAL SPECIFICATION NO. 37886. THE COST OF MATERIALS AND LABOR FOR THE TEXTURE FINISH SHALL BE INCLUDED IN THE BID PRICE FOR CONCRETE MEDIAN BARRIER.

(E) THE TWO (2) INCH OPEN EXPANSION JOINTS SHALL BE PLACED IN THE PROPOSED SINGLE SLOPE BARRIER WALL AT A MAXIMUM SPACING NOT TO EXCEED 300 FEET. IF FIXED OBJECTS SUCH AS BRIDGE PIERS, BRIDGE ENDS, OVERHEAD SIGN SUPPORTS, OR OTHER FEATURES PROJECTING THROUGH, INTO OR AGAINST THE BARRIER EXIST THAT REQUIRE TWO INCH EXPANSION JOINTS, THEN THE DISTANCE BETWEEN THE EXPANSION JOINTS IS TO BE REDUCED IN ORDER TO ALLOW AN EQUAL DISTANCE BETWEEN JOINTS THAT IS LESS THAN 300 FEET. ALL ADDITIONAL STEEL REQUIRED AT EXPANSION JOINTS TO BE EPOXY COATED REINFORCING STEEL. THE COST OF MATERIAL AND LABOR FOR THE JOINT INSTALLATION INCLUDING SAWING EXPANSION JOINTS SHALL BE INCLUDED IN THE BID PRICE FOR CONCRETE MEDIAN BARRIER.

THE CONTRACTION JOINTS ARE TO BE SPACED AT 20 TO 25 FOOT INTERVALS WHEN CONSTRUCTED ON ASPHALT PAVEMENT. WHEN THE CONCRETE BARRIER WALL IS ATTACHED TO CONCRETE PAVEMENT THE CONTRACTION JOINTS WILL RESPOND TO THE JOINTS IN THE CONCRETE PAVEMENT. THE COST OF MATERIAL AND LABOR FOR THE JOINT INSTALLATION SHALL BE INCLUDED IN THE BID PRICE FOR CONCRETE MEDIAN BARRIER.
IF SAWED CONTRACTION JOINTS ARE USED, THE JOINTS MUST BE SAWED WITHIN FOUR (4) HOURS AFTER THE CONCRETE IS PLACED.

(F) THE COST OF FURNISHING AND INSTALLING BARRIER WALL DELINEATORS, INCLUDING ALL MATERIALS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE INSTALLATION, SHALL BE INCLUDED IN PRICE BID FOR CONCRETE BARRIER WALL. SEE STANDARD DRAWING S-MB-1 FOR LOCATION. BARRIER WALL DELINEATOR WILL NOT BE REQUIRED IN AREAS WHERE ROADWAY IS LIGHTED.

(G) CHAMFER ALONG TOP EDGES ¾".

(H) FOR CONCRETE PAVEMENT:
ANY METHOD DEVISED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT WILL ASSURE THE LONGITUDINAL ROADWAY REINFORCING STEEL WILL BE FIXED AGAINST MOVEMENT AND POSITIONED ± 0.5" AS DIMENSIONED WHEN TIED TO THE TRANSVERSE ROADWAY REINFORCING STEEL WILL BE SATISFACTORY.

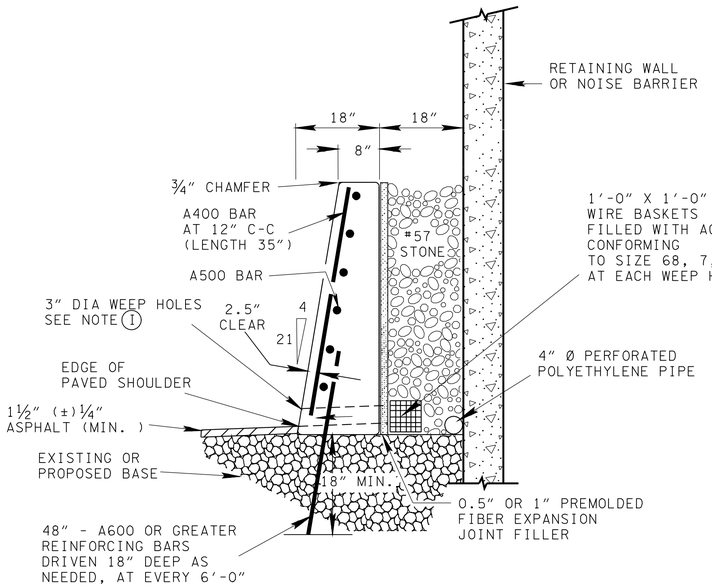
(I) 3" DIAMETER WEEP HOLES AT 10'-0" CENTER-TO-CENTER MAXIMUM ARE TO BE PLACED AT LOWEST POINT PRACTICAL FOR PROPER DRAINAGE WITH MIN. 4% SLOPE. WEEP HOLES SHOULD ALIGN WITH THE RETAINING WALL WEEP HOLES IF EXIST. CONSTRUCTION OF WEEP HOLES ARE TO BE PAID FOR UNDER THE PRICE BID FOR OTHER ITEMS OF CONSTRUCTION.

(J) FIBER EXPANSION JOINT FILLER MATERIAL TO BE 0.5" OR 1.0" PREMOLDED FIBER IN ACCORDANCE WITH SECTION 905 OF STANDARD SPECIFICATIONS.

(K) PAYMENT WILL BE MADE UNDER ITEM NO. 711-05.72 SINGLE SLOPE HALF CONCRETE BARRIER WALL PER LINEAR FOOT.

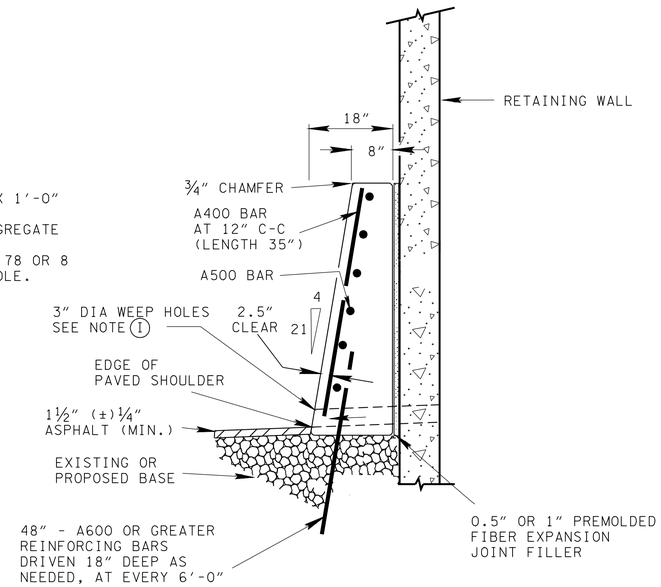
(L) MIN. SAFETY PERFORMANCE OF 52½" SINGLE SLOPE WALL IS ACCEPTABLE ACCORDING TO THE TL-3 EVALUATION CRITERIA SPECIFIED IN NCHRP REPORT 350.

DETAILS OF REINFORCING AT CONTRACTION JOINT FOR CONCRETE BARRIER



REINFORCING STEEL AT SECTION A-A
(AT RETAINING WALL OR NOISE BARRIER)
(ALTERNATE OFFSET PLACEMENT)

DETAILS OF REINFORCING AT WALL ENDS OR EXPANSION JOINT FOR CONCRETE BARRIER



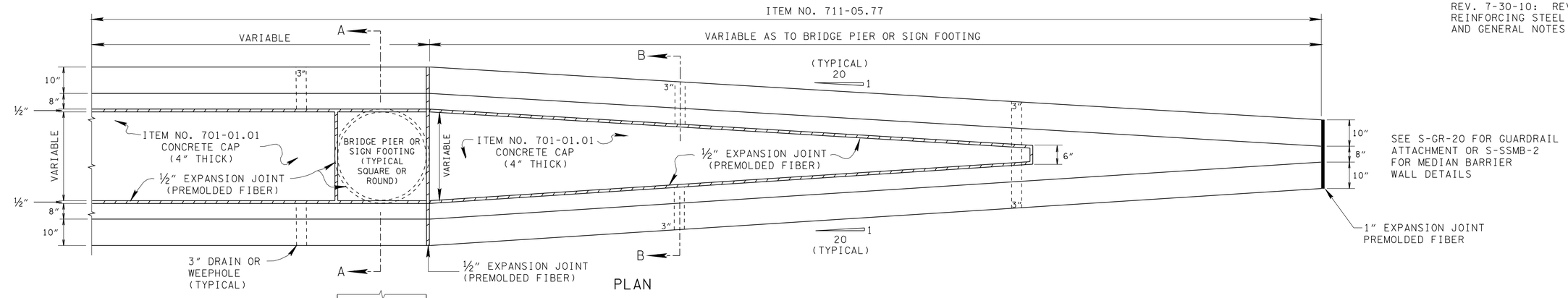
REINFORCING STEEL AT SECTION A-A
(AT RETAINING WALL)

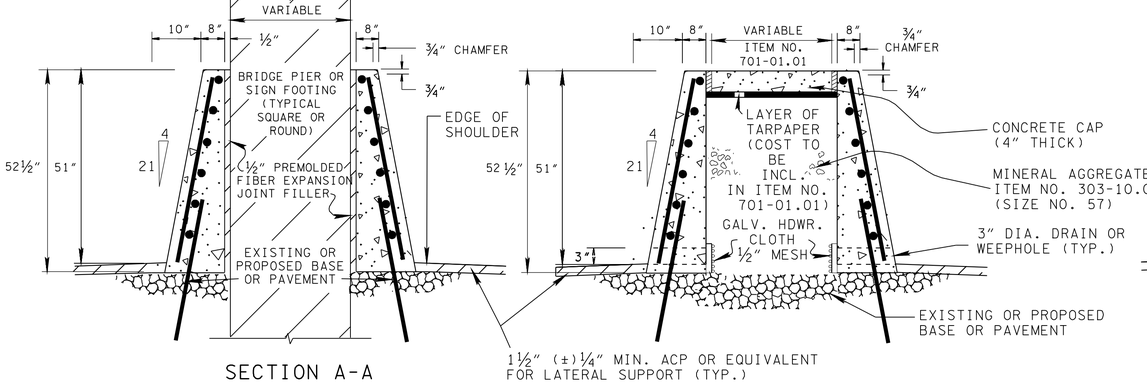
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

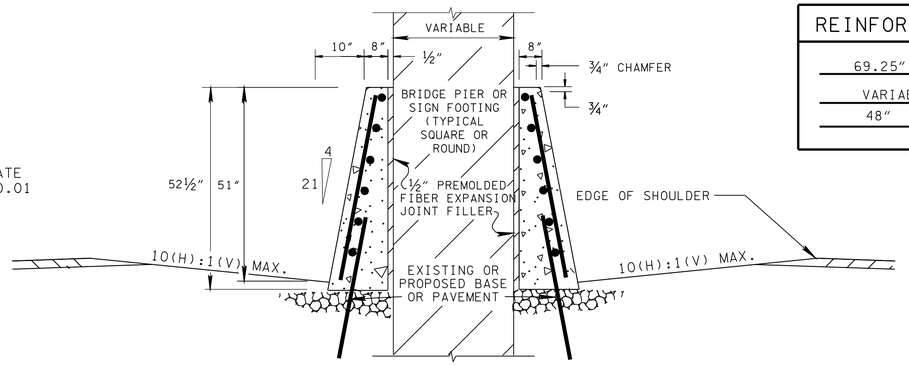
51" HALF SIZE SINGLE SLOPE CONCRETE BARRIER WALL

10-15-09 | S-SSMB-3

REV. 7-30-10: REVISED REINFORCING STEEL DETAILS AND GENERAL NOTES.

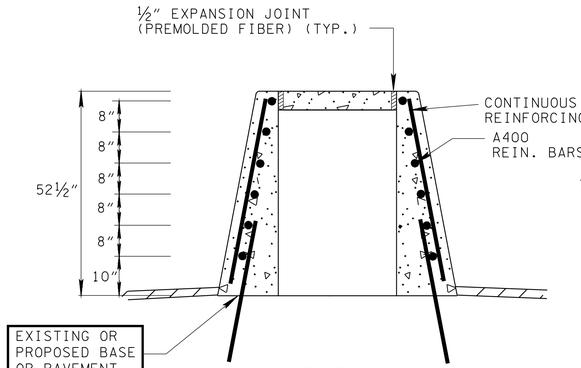


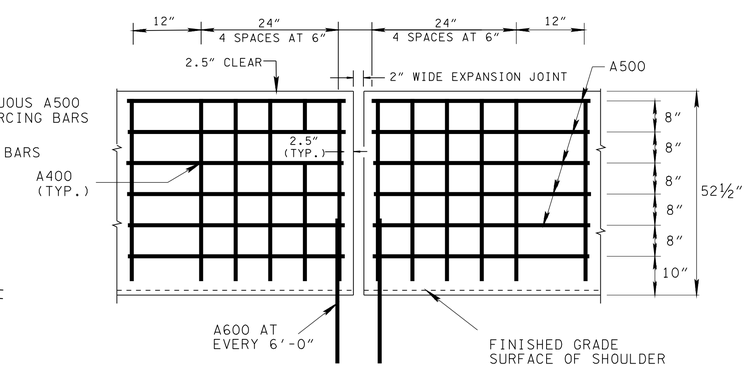




REINFORCING STEEL LEGEND

69.25"	A400
VARIABLE	A500
48"	A600





GENERAL NOTES

Ⓐ CONCRETE MEDIAN BARRIER SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SECTION 711 AND/OR CURRENT SPECIAL PROVISIONS.

Ⓑ 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

Ⓒ SEE STANDARD DRAWING S-MB-1 FOR DETAILS AND REQUIREMENTS FOR MEDIAN BARRIER DELINEATOR. MEDIAN BARRIER DELINEATORS WILL NOT BE REQUIRED IN AREAS WHERE ROADWAY IS LIGHTED.

Ⓓ ALONG TOP EDGES OF CONCRETE MEDIAN BARRIER THE CONTRACTOR MAY USE ¾" RADIUS IN LIEU OF ¾" CHAMFER SHOWN ON THIS DRAWING.

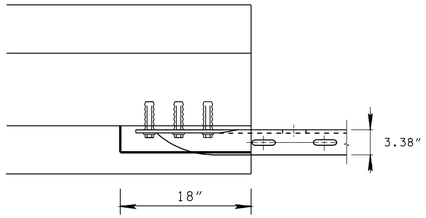
Ⓔ MAXIMUM SLOPE IN FRONT OF SINGLE SLOPE MEDIAN BARRIER WALL SHALL BE 10(H):1(V)

Ⓕ PAYMENT WILL BE MADE UNDER ITEM NO. 711-05.77, FLARED SINGLE SLOPE CONCRETE MEDIAN BARRIER WALL PER LINEAR FOOT.

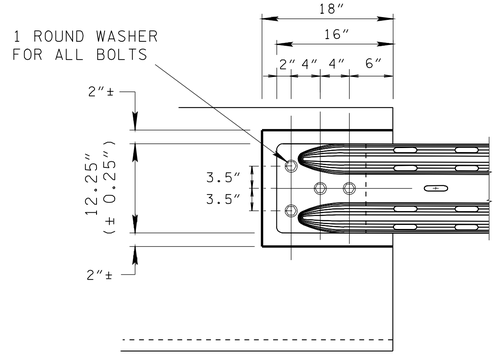
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

FLARED SINGLE SLOPE CONCRETE MEDIAN BARRIER WALL
(VERTICAL BACK)

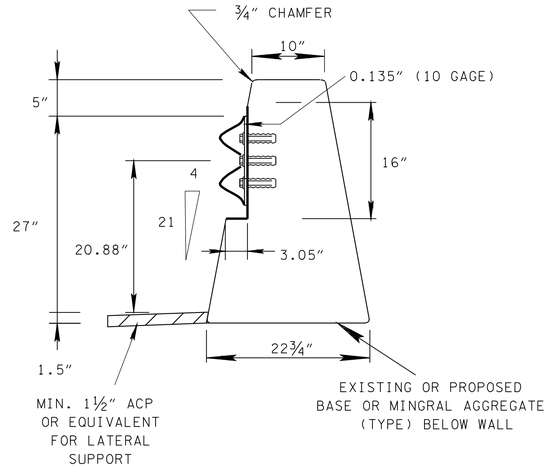
10-15-09 | S-SSMB-4



TOP VIEW

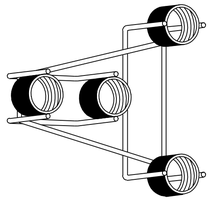


FRONT VIEW



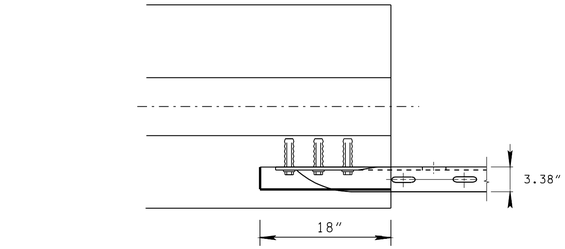
SIDE VIEW

GUARDRAIL CONNECTION TO 32″ SINGLE SLOPE CONCRETE BARRIER WALL

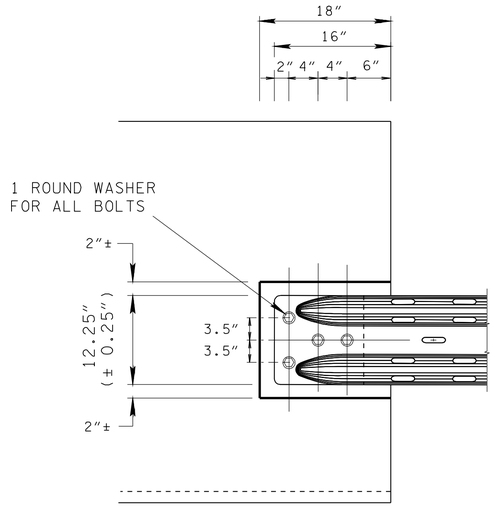


ANCHOR BLOCK INSERT ASSEMBLY

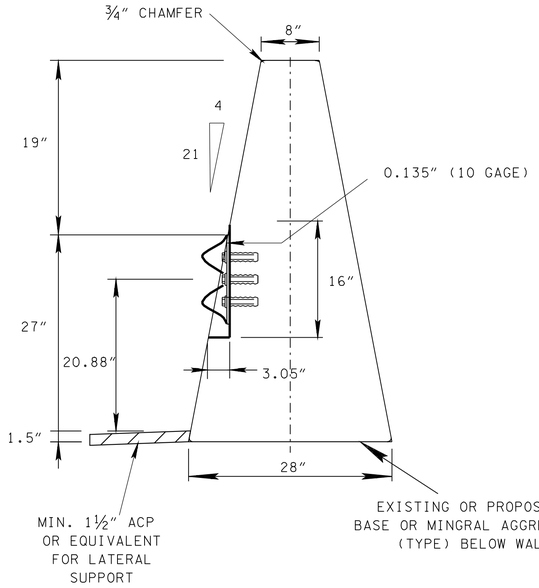
CAST IN PLACE THREADED STEEL INSERT WITH
⅞" DIA. X 2" HEX HEAD GALVANIZED BOLTS (ASTM A307)
HOT DIP ZINC COATING ASTM A153



TOP VIEW



FRONT VIEW



SIDE VIEW

GUARDRAIL CONNECTION TO 51″ SINGLE SLOPE CONCRETE BARRIER WALL

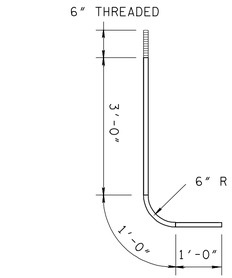
GENERAL NOTES

1. REQUIREMENTS FOR ANCHOR INSERT BOLTS SHALL BE ⅞″ HEX HEAD INSTALLED IN ⅞″ MASONRY ANCHOR. THE INSERTS ARE TO BE THREADED A MINIMUM OF 1¾ INCHES. THE CONTRACTOR SHALL FURNISH ANCHOR PULL-OUT DATA FROM AN INDEPENDENT TESTING LABORATORY USING CLASS "A" CONCRETE IN ACCORDANCE WITH STATE OF TENNESSEE "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION" THE ULTIMATE LOAD FOR⅞″ ANCHOR SHALL BE 19,000 POUNDS. BOLTS SHALL CONFORM TO ASTM A307.
2. THE MASONRY ANCHORS SHALL BE SUB-SET IN THE CONCRETE AT A DEPTH OF BETWEEN 3⁄32″ TO ¼′ AND TORQUED WITH THE END TERMINAL IN THE PLACE TO AN EQUIVALENT DIRECT PULL-OUT LOAD OF 12,000 POUNDS. SLIPPAGE SHALL NOT EXCEED ¼″.
3. THE CONTRACTOR WILL PERFORM ON-SITE TESTING OF EACH BOLT IN THE PRESENCE OF DOT PERSONNEL TO INSURE THESE REQUIREMENTS. ANY INSTALLATION NOT MEETING
4. BOLTS AND WASHERS TO BE GALVANIZED CONFORMING TO REQUIREMENTS OF ASTM A153.
5. SEE S-SSMB-1, AND S-SSMB-2 FOR ADDITIONAL DETAILS.
6. PAYMENT WILL BE MADE UNDER ITEM NO. 711-05.70 SINGLE SLOPE CONCRETE MEDIAN BARRIER WALL PER LINEAR FOOT.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

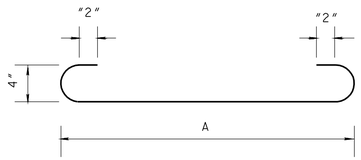
GUARDRAIL ATTACHMENT TO SINGLE SLOPE CONCRETE BARRIER WALL

8-30-10 | S-SSMB-6

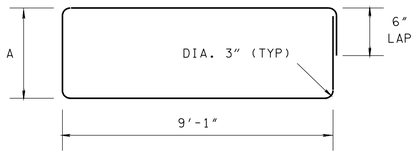


ANCHOR BOLT DETAIL

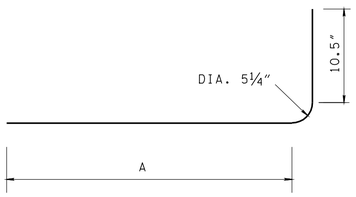
ASTM A-687 GALVANIZED STEEL



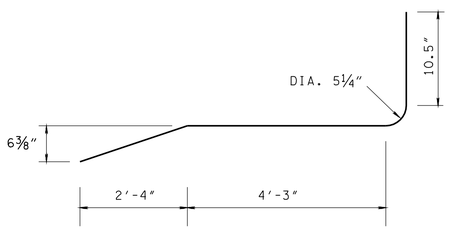
D BARS



L BARS

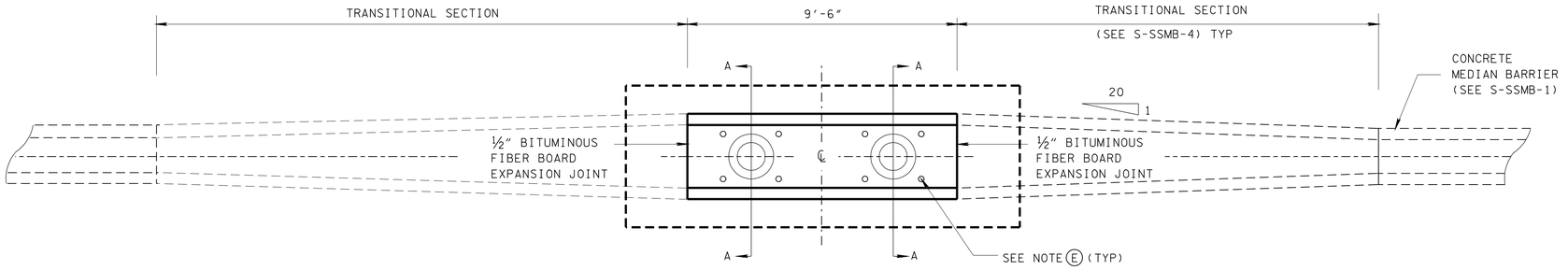


C BARS

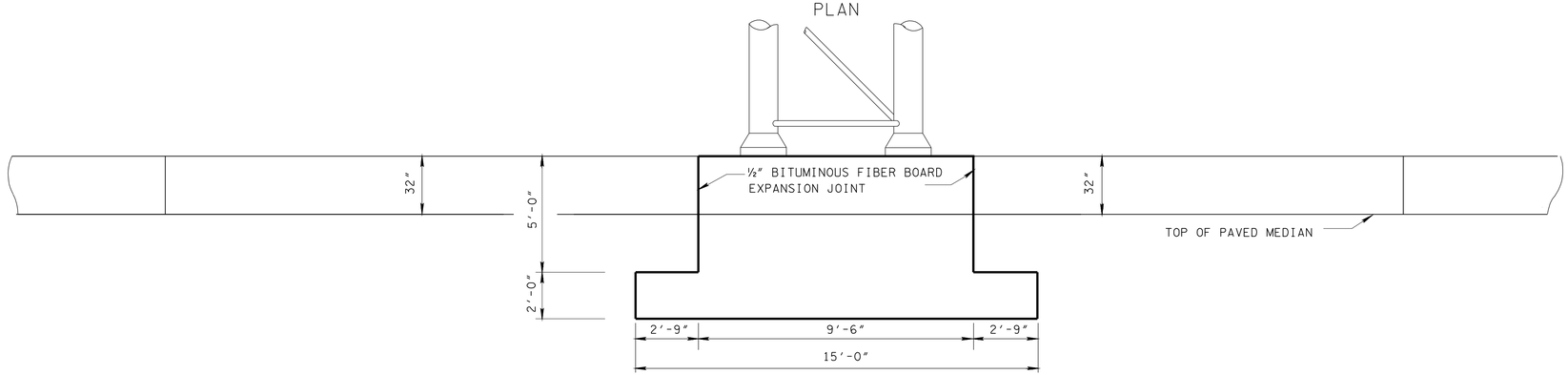


BARS CA 700

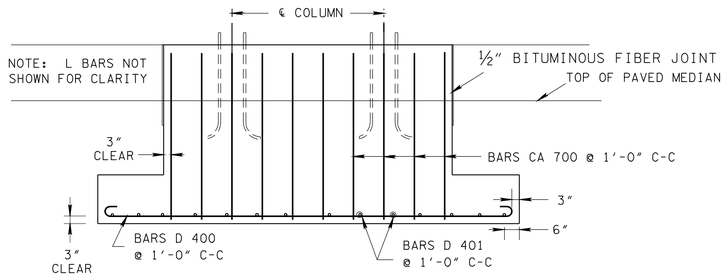
BAR DETAIL



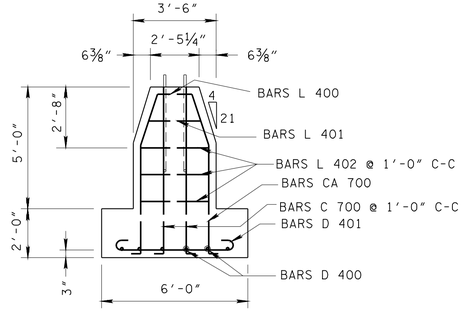
PLAN



ELEVATION



FOOTING



SECTION "A-A"

BILL OF STEEL - PER FOOTING				
BAR	SIZE	NO. REQ'D.	DIM A	LENGTH
C 700	7	4	6′-6″	7′-6″
CA 700	7	20		7′-9″
D 400	4	6	14′-6″	15′-10″
D 401	4	15	5′-6″	6′-10″
L 400	4	1	2′-1″	21′-10″
L 401	4	1	2′-4″	23′-4″
L 402	4	3	3′-1″	24′-10″

QUANTITIES	
CLASS "A" CONCRETE	12.0 C.Y.
REINFORCING STEEL	589 LB.

GENERAL NOTES

Ⓐ FINISHED CONCRETE SURFACES: CONCRETE FINISHING SHALL BE IN ACCORDANCE WITH SECTION 604.22 OF THE TENNESSEE STANDARD SPECIFICATIONS EXCEPT AS MODIFIED BY THE SPECIAL PROVISION NO. 130 REGARDING SECTION 604-CONCRETE STRUCTURES. A TEXTURED COATED FINISH SHALL BE USED IN LIEU OF A CLASS 2 FINISH. THE COLOR OF THE FINISH SHALL BE SIMILAR TO WHITE FEDERAL SPECIFICATION NO. 37778, A COLOR SAMPLE SHALL BE SUBMITTED TO THE MATERIALS AND TEST ENGINEER FOR APPROVAL.

Ⓑ EPOXY COATED DOWEL BARS WILL BE PERMITTED AS AN ALTERNATE TO PAINTED AND GREASED DOWEL BARS. THE EPOXY COATING SHALL BE AN APPROVED HIGH DENSITY POLYETHYLENE 17 MILS (± 2 MILS) BONDED TO THE BAR WITH AN APPROVED ADHESIVE 1 TO 8 MILS THICK (4 MILS NOMINAL).

Ⓒ IF A STORM DRAINAGE SYSTEM IS PLACED UNDER THE CENTER LINE OF THE MEDIAN BARRIER, THE PIPE SHALL BE SHIFTED HORIZONTALLY AROUND THE FOOTING.

Ⓓ OVERHEAD SIGN FOOTING COST IS TO BE INCLUDED IN THE COST OF THE OVERHEAD SIGN STRUCTURE.

Ⓔ LOCATION OF ANCHOR BOLTS TO BE DETERMINED IN THE FIELD BY THE ENGINEER TO MATCH SIGN STRUCTURE MANUFACTURERS SHOP DRAWING.

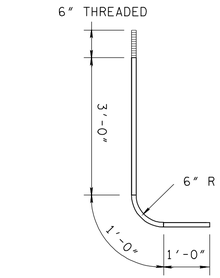
Ⓕ ANCHOR BOLTS, NUTS AND WASHERS ARE TO BE GALVANIZED STEEL.

Ⓖ CONCRETE: F_c= 4000 POUNDS PER SQUARE INCH AT 28 DAYS.
REINFORCING STEEL: ASTM A615, F_y = 60,000 POUNDS PER SQUARE INCH
ALL REINFORCEMENT IS TO BE INSTALLED AS DETAILED ON THIS DRAWING .

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

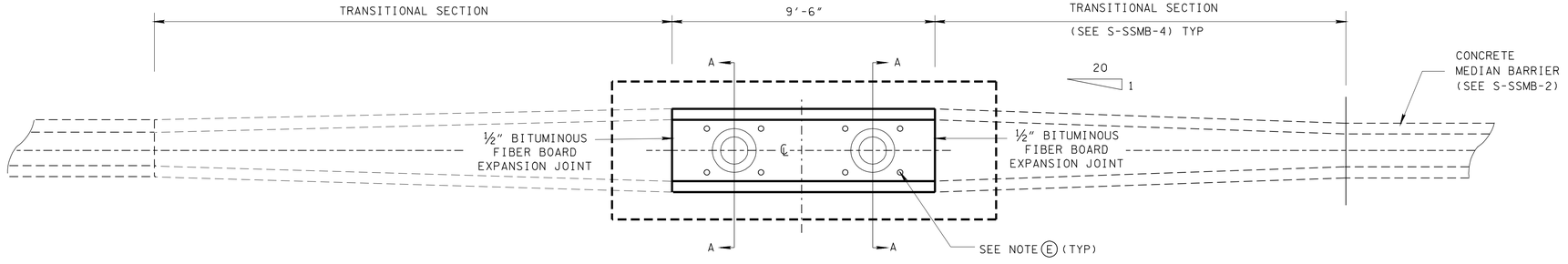
FOOTING DETAILS FOR OVERHEAD SIGN STRUCTURE 32″ MEDIAN BARRIER WALL

2-29-12 | S-SSMB-7

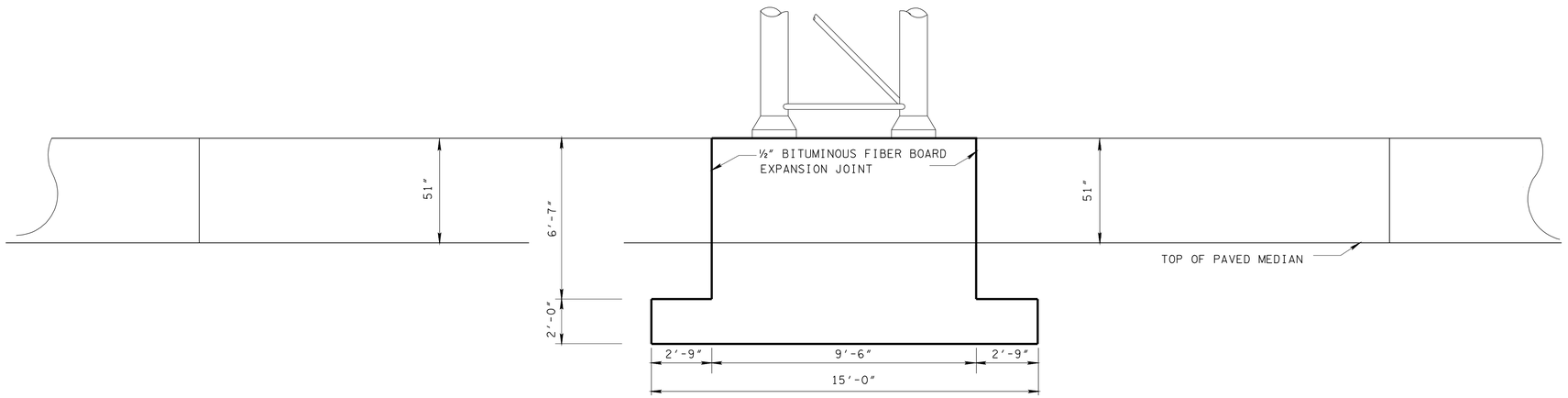


ANCHOR BOLT DETAIL

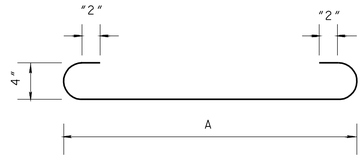
ASTM A-687 GALVANIZED STEEL



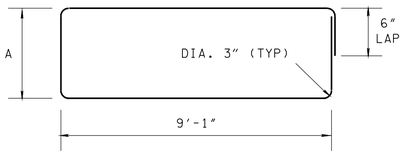
PLAN



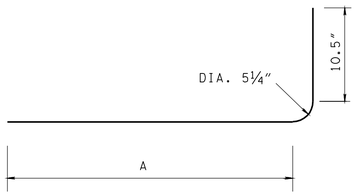
ELEVATION



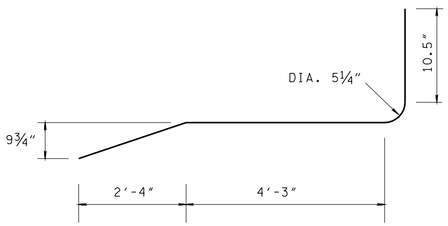
D BARS



L BARS



C BARS

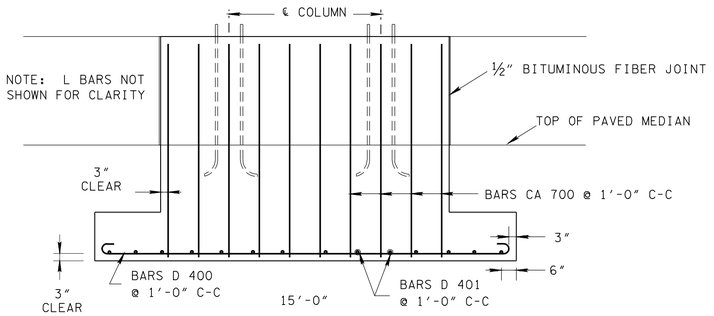


BARS CA 700

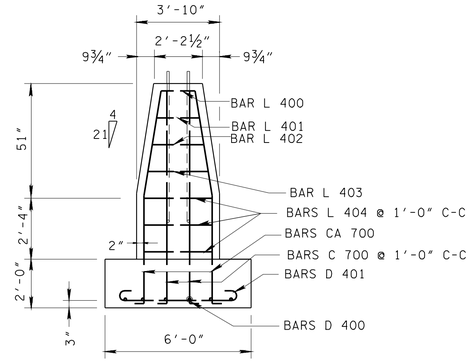
BAR DETAIL

BILL OF STEEL - PER FOOTING				
BAR	SIZE	NO. REQ'D.	DIM "S"	LENGTH
C 700	7	4	8′-2″	9′-3″
CA 700	7	20		9′-1″
D 400	4	6	14′-6″	15′-6″
D 401	4	15	5′-6″	6′-6″
L 400	4	3	2′-1″	22′-2″
L 401	4	1	2′-2″	23′-0″
L 402	4	1	2′-8″	24′-0″
L 403	4	1	3′-1″	25′-10″
L 404	4	3	3′-7″	25′-10″

QUANTITIES	
CLASS "A" CONCRETE	13.3 C.Y.
REINFORCING STEEL	658 LB.



FOOTING



SECTION "A-A"

GENERAL NOTES

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Ⓒ IF A STORM DRAINAGE SYSTEM IS PLACED UNDER THE CENTER LINE OF THE MEDIAN BARRIER, THE PIPE SHALL BE SHIFTED HORIZONTALLY AROUND THE FOOTING.

Ⓓ OVERHEAD SIGN FOOTING COST IS TO BE INCLUDED IN THE COST OF THE OVERHEAD SIGN STRUCTURE.

Ⓔ LOCATION OF ANCHOR BOLTS TO BE DETERMINED IN THE FIELD BY THE ENGINEER TO MATCH SIGN STRUCTURE MANUFACTURERS SHOP DRAWING.

Ⓕ ANCHOR BOLTS, NUTS AND WASHERS ARE TO BE GALVANIZED STEEL.

Ⓖ CONCRETE: F_c = 4000 POUNDS PER SQUARE INCH AT 28 DAYS.
REINFORCING STEEL: ASTM A615, F_y = 60,000 POUNDS PER SQUARE INCH
ALL REINFORCEMENT IS TO BE INSTALLED AS DETAILED ON THIS DRAWING .

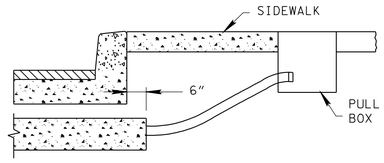
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

FOOTING DETAILS FOR OVERHEAD SIGN STRUCTURE 51″ MEDIAN BARRIER WALL

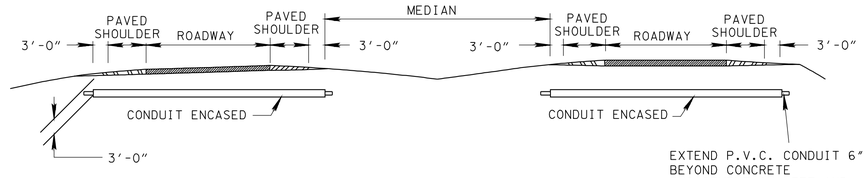
2-29-12 | S-SSMB-8

- REV. 5-25-11: ADDED CONDUIT RISER ATTACHMENT DETAIL FOR SHARED USE UTILITY POLES.
- REV. 7-29-96: REDREW SHEET ON CADD AND MADE MINOR CHANGES.

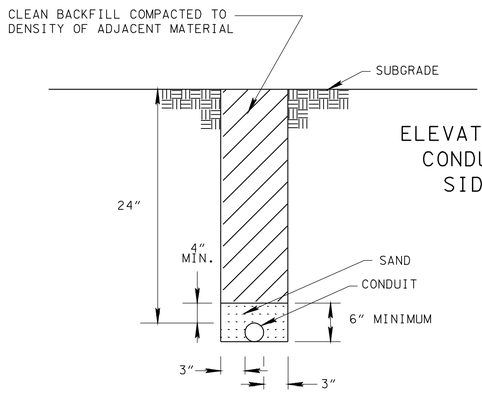
  REV. 12-16-03: DELETED SPLICING DETAIL AND ADDED COMM/POWER BACKBONE TRENCH LAYOUT.
- REV. 7-29-04: ADDED TRENCH LAYOUT FOR COMM/ POWER BACKBONE DETAIL. DELETE DIRECT BURIAL DETAIL & TYPICAL SPLICING TAPING DETAILS.



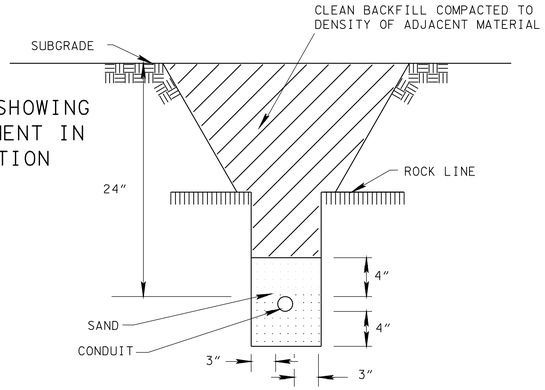
ELEVATION VIEW SHOWING CONDUIT PLACEMENT IN SIDEWALK SECTION



ELEVATION VIEW SHOWING CONDUIT PLACEMENT IN ROADWAY WITH PAVED SHOULDERS

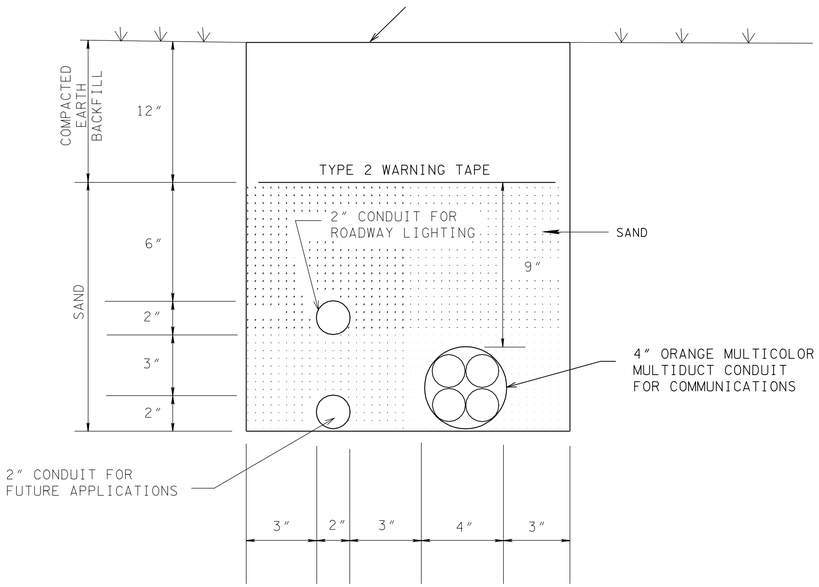


ELEVATION VIEW SHOWING CONDUIT PLACEMENT IN SIDEWALK SECTION



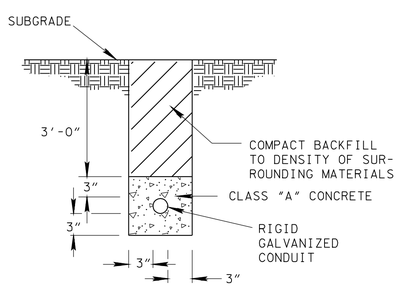
DIRECT BURIAL CONDUIT DETAILS IN EARTH

DIRECT BURIAL CONDUIT DETAILS IN ROCK

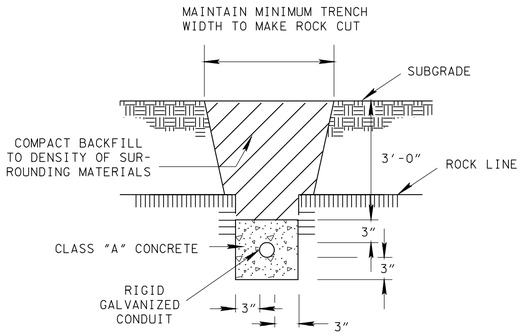


TYPICAL TRENCH LAYOUT FOR COMM/ POWER BACKBONE

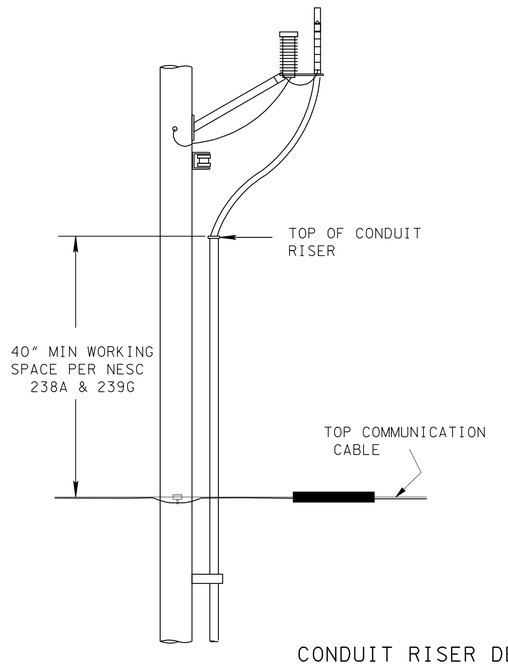
NOTE : WHERE THERE IS MORE THAN ONE CONDUIT PER TRENCH, CONDUITS SHALL NOT BE PLACED CLOSER THAN 203 mm CENTER TO CENTER.

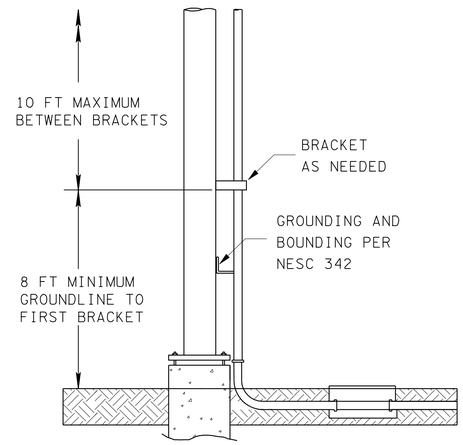


CONCRETE ENCASED CONDUIT IN EARTH



CONCRETE ENCASED CONDUIT IN ROCK





CONDUIT RISER DETAIL FOR SHARED USE POLE

- MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STANDARD LIGHTING DETAILS CONDUIT, CABLE INSTALLATION

T-L-4

MARKING ABBREVIATIONS

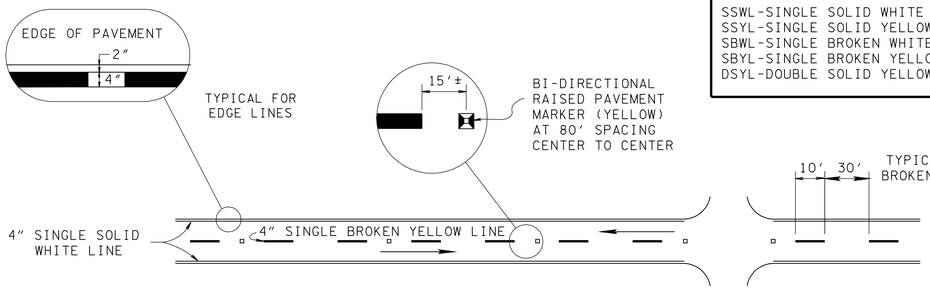
SSWL-SINGLE SOLID WHITE LINE	DBYL-DOUBLE BROKEN YELLOW LINE
SSYL-SINGLE SOLID YELLOW LINE	DWL-DOTTED WHITE LINE
SBWL-SINGLE BROKEN WHITE LINE	DYL-DOTTED YELLOW LINE
SBYL-SINGLE BROKEN YELLOW LINE	HWL-HASHED WHITE LINE
DSYL-DOUBLE SOLID YELLOW LINE	HYL-HASHED YELLOW LINE

REV. 2-22-88: ADDED EDGELINES, NOTES AND VARIOUS STRIPING AND MARKING DETAILS. CHANGED DWG. NO. FROM T-M-7 TO T-M-1. CHANGED SPACING & LOCATION OF VARIOUS RAISED PAVEMENT MARKERS. ADDED MARKING ABBREVIATIONS.

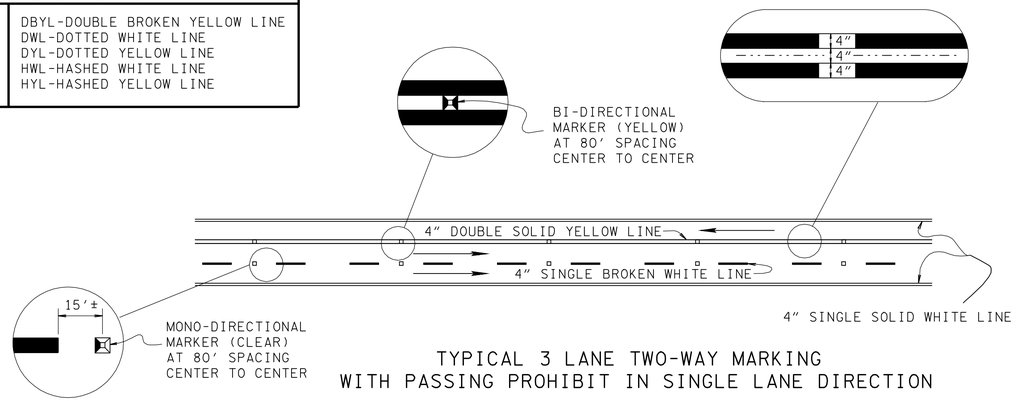
REV. 3-20-91: REDREW SHEET. CHANGED TYPE 2 PAVEMENT MARKERS (CLEAR) TO MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR) AND CHANGED TYPE 1 PAVEMENT MARKERS (YELLOW) TO BI-DIRECTIONAL MARKERS (YELLOW).

- REV. 10-26-92: ADDED GENERAL NOTE Ⓒ.
- REV. 7-29-98: REVISED DISTANCE BETWEEN EDGELINE PAVEMENT MARKING AND EDGELINE FROM 4" TO 2".
- REV. 4-15-04: CHANGED SPACING BETWEEN DOUBLE LEFT TURN ARROWS TO COMPLY WITH 2003 MUTCD.

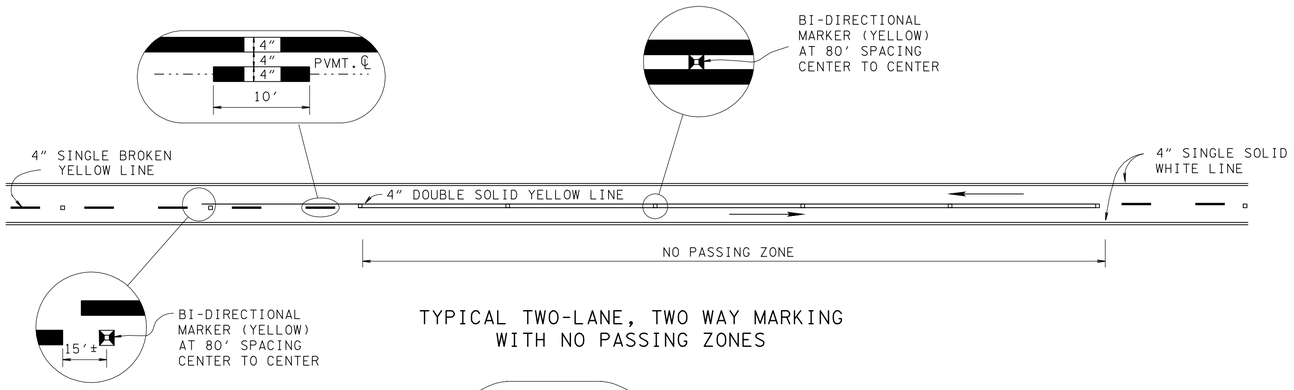
REV. 11-1-11; UPDATED TYPICAL DETAILS TO CONFORM WITH 2009 MUTCD STANDARD DETAILS.



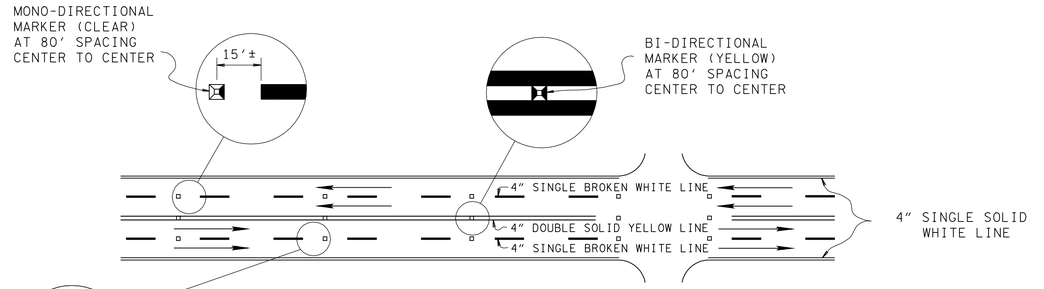
TYPICAL TWO-LANE, TWO WAY MARKING
WITH PASSING PERMITTED IN BOTH DIRECTIONS



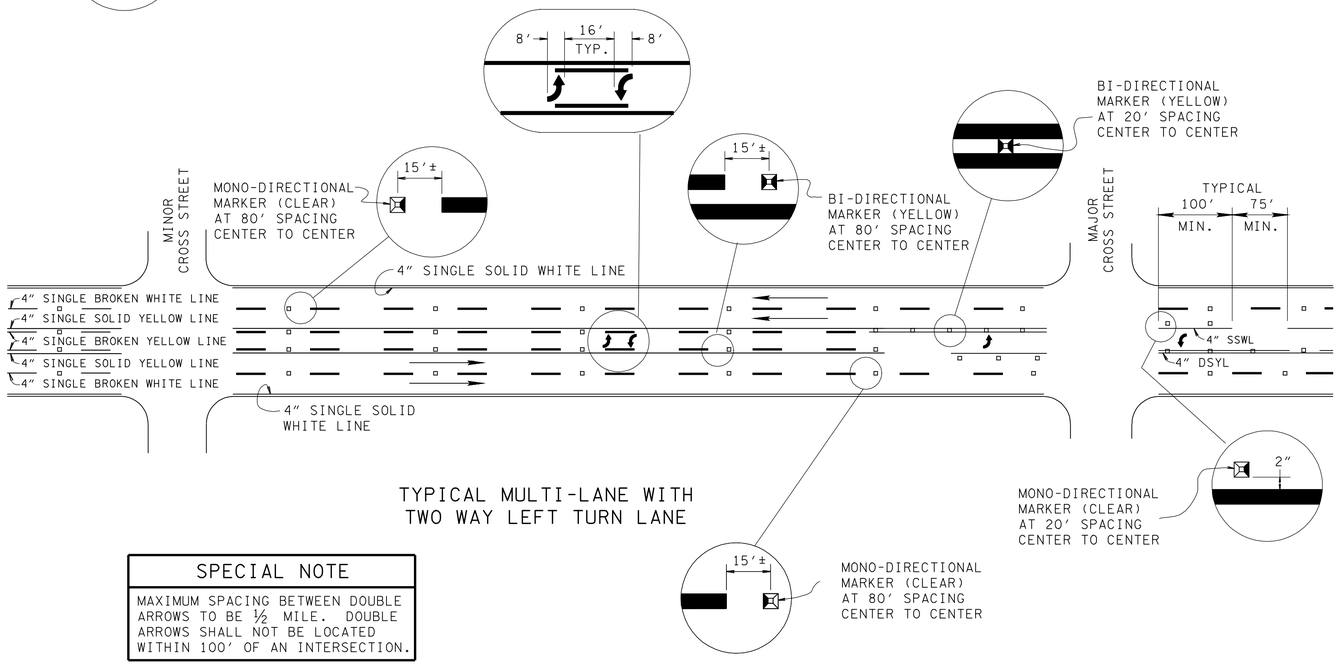
TYPICAL 3 LANE TWO-WAY MARKING
WITH PASSING PROHIBIT IN SINGLE LANE DIRECTION



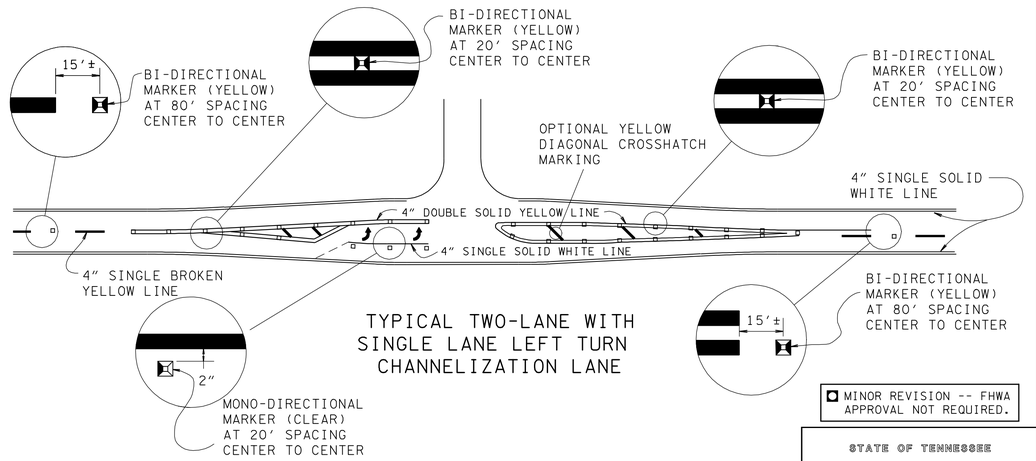
TYPICAL TWO-LANE, TWO WAY MARKING
WITH NO PASSING ZONES



TYPICAL MULTI-LANE, TWO-WAY MARKING



TYPICAL MULTI-LANE WITH
TWO WAY LEFT TURN LANE



TYPICAL TWO-LANE WITH
SINGLE LANE LEFT TURN
CHANNELIZATION LANE

SPECIAL NOTE

MAXIMUM SPACING BETWEEN DOUBLE ARROWS TO BE ½ MILE. DOUBLE ARROWS SHALL NOT BE LOCATED WITHIN 100' OF AN INTERSECTION.

GENERAL NOTES

Ⓐ EDGE LINES ARE NOT REQUIRED FOR PAVEMENT WIDTH LESS THAN 16 FEET ON CURB AND GUTTER SECTIONS UNLESS SPECIFIED IN PLANS.

Ⓑ SEE STANDARD DRAWING NOS. T-M-3 AND T-M-4 FOR CHANNELIZATION MARKING AND INTERSECTION MARKING DETAILS.

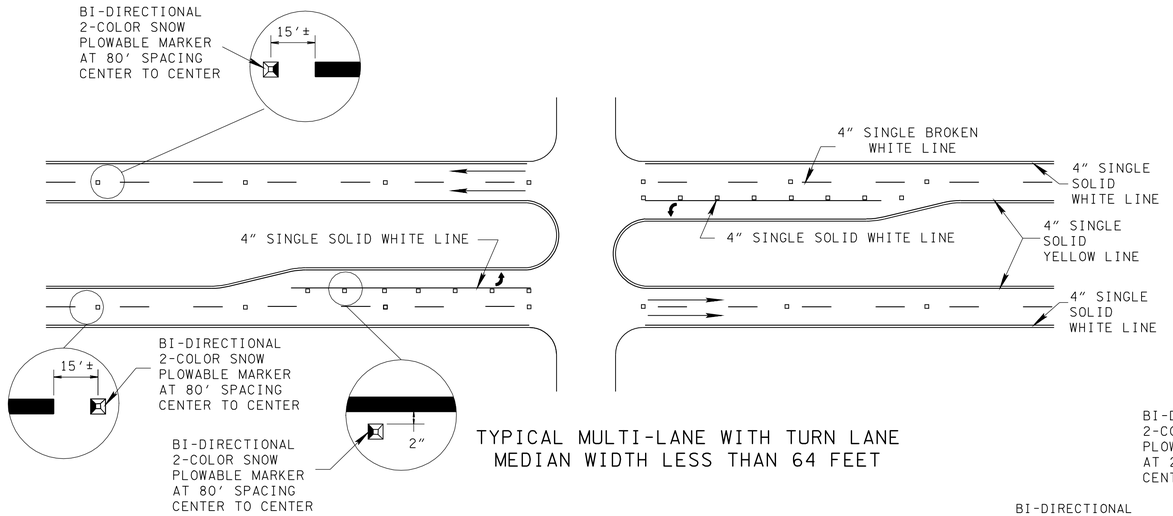
Ⓒ PAVEMENT MARKERS ARE REQUIRED ONLY WHEN SPECIFIED IN THE PLANS.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

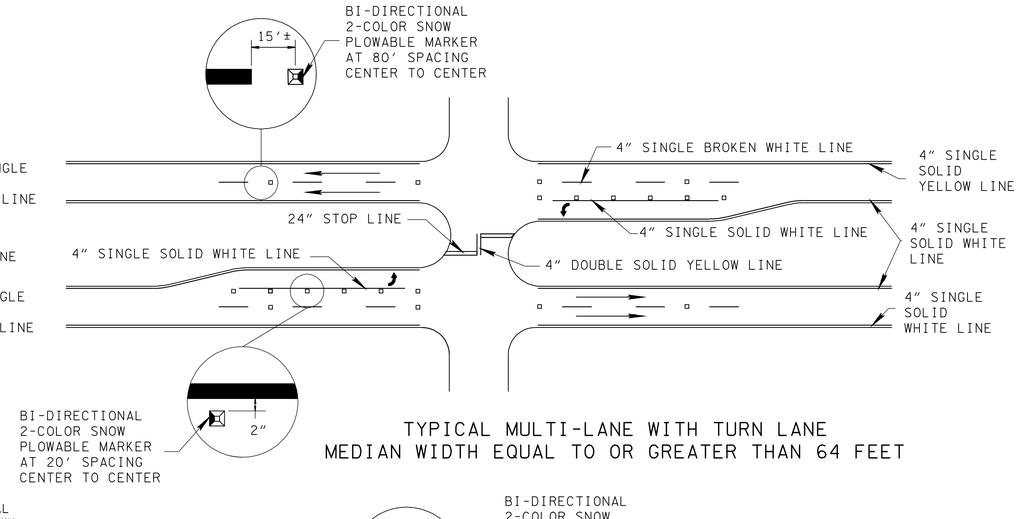
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DETAILS OF PAVEMENT MARKINGS FOR CONVENTIONAL ROADS AND MARKING ABBREVIATIONS

T-M-1



TYPICAL MULTI-LANE WITH TURN LANE
MEDIAN WIDTH LESS THAN 64 FEET



TYPICAL MULTI-LANE WITH TURN LANE
MEDIAN WIDTH EQUAL TO OR GREATER THAN 64 FEET

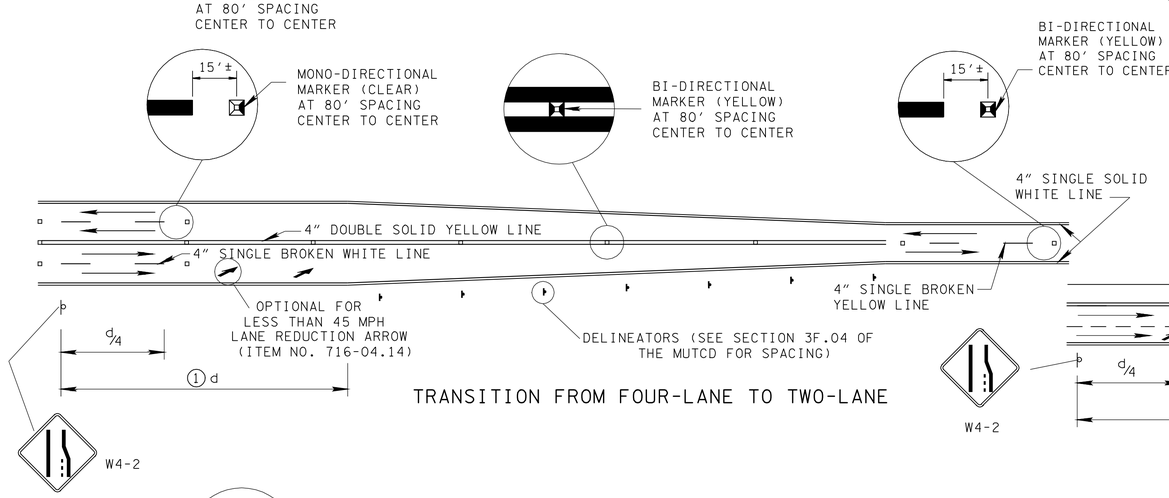
REV. 2-22-88: ADDED EDGE-LINES, NOTES, AND DETAILS FOR TRANSITION MARKING. CHANGED SHEET TITLE AND DRAWING NO. FROM T-M-8 TO T-M-2. ADDED DETAILS ON RIGHT OF SHEET.

REV. 3-20-91: REDREW SHEET. CHANGED TYPE 2 PAVEMENT MARKERS (CLEAR) TO MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR) AND TYPE 1 PAVEMENT MARKERS (YELLOW) TO BI-DIRECTIONAL MARKERS (YELLOW).

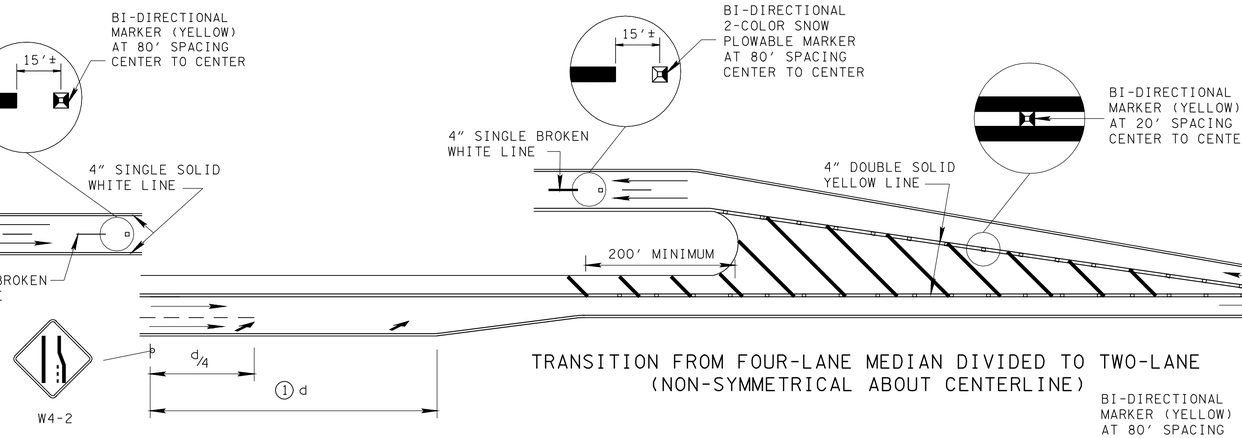
- REV. 10-26-92: ADDED GENERAL NOTE Ⓒ.
- REV. 12-18-93: ADDED EDGELINES INSIDE MEDIAN CROSSOVERS FOR MEDIAN WIDTHS LESS THAN 44 FEET.
- REV. 1-19-94: CHANGED WIDTH CRITERION FOR MEDIAN WIDTH FROM 44 FEET TO 64 FEET.
- REV. 1-19-96: CHANGED DETAIL ON LEFT BOTTOM OF SHEET.
- REV. 4-15-04: CHANGED W4-2 SIGNS AND FOOTNOTE ① TO COMPLY WITH 2003 MUTCD.
- REV. 9-5-04: CHANGED FOOTNOTE ① TO COMPLY WITH 2003 MUTCD.

REV. 11-1-11: ADDED DELINEATORS WITH NOTE AND LANE REDUCTION ARROWS WITH NOTE. ADDED PAY ITEM 716-04.14 AND GENERAL NOTE Ⓓ.

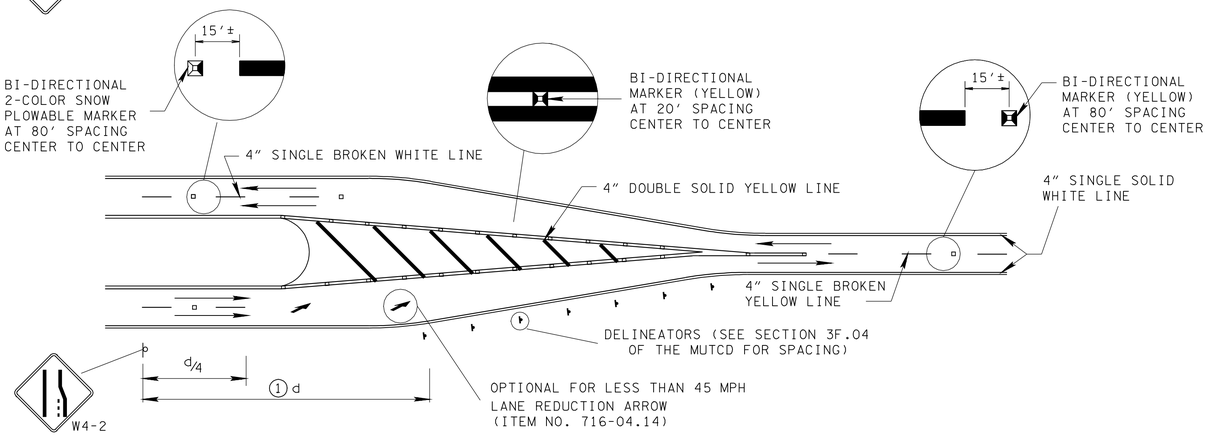
- REV. 1-12-12: CHANGED SNOW PLOWABLE MARKERS FROM MONO-DIRECTIONAL TO BI-DIRECTIONAL 2-COLOR.



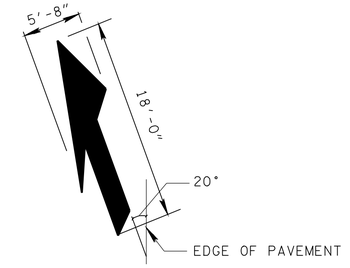
TRANSITION FROM FOUR-LANE TO TWO-LANE



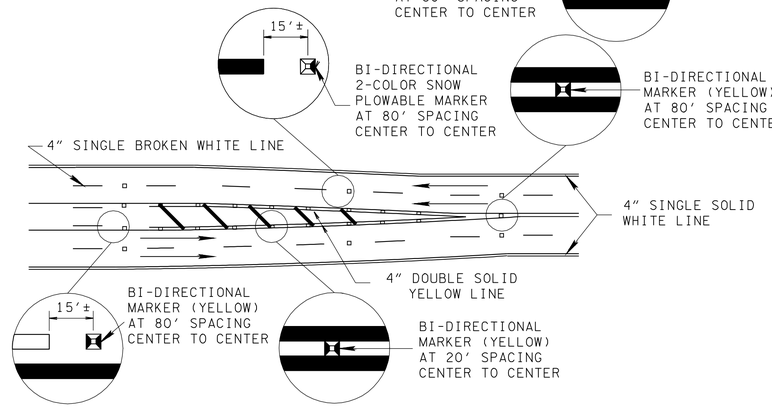
TRANSITION FROM FOUR-LANE MEDIAN DIVIDED TO TWO-LANE
(NON-SYMMETRICAL ABOUT CENTERLINE)



TRANSITION FROM FOUR-LANE MEDIAN DIVIDED TO TWO-LANE (SYMMETRICAL ABOUT CENTERLINE)
(SIMILAR FOR MULTI-LANE WITH TWO WAY LEFT TURN LANE TO TWO-LANE)



LANE-REDUCTION ARROW



TRANSITION FROM MULTI-LANE WITH TWO WAY
LEFT TURN LANE TO FOUR-LANE

FOOTNOTE

① SEE TABLE 2C-4 OF PART 2 OF THE MANUAL ON UNIFORM TRAFFIC DEVICES (MUTCD) FOR GUIDELINES FOR ADVANCE PLACEMENT OF WARNING SIGNS DISTANCE d.

GENERAL NOTES

Ⓐ EDGE LINES ARE NOT REQUIRED FOR PAVEMENT WIDTH LESS THAN 16 FEET OR ON CURB AND GUTTER SECTIONS UNLESS SPECIFIED IN PLANS.

Ⓑ SEE STANDARD DRAWING NOS. T-M-3 AND T-M-4 FOR CHANNELIZATION MARKING AND INTERSECTION MARKING DETAILS.

Ⓒ PAVEMENT MARKERS ARE REQUIRED ONLY WHEN SPECIFIED IN THE PLANS.

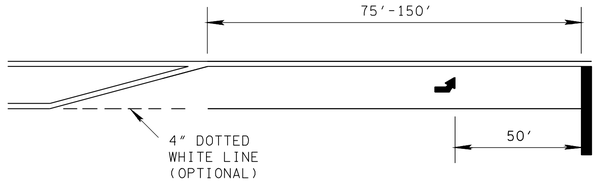
Ⓓ SEE STD. DWG. T-S-11 FOR DETAILS OF DELINEATORS.

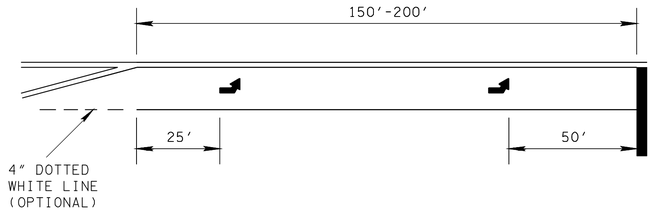
☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

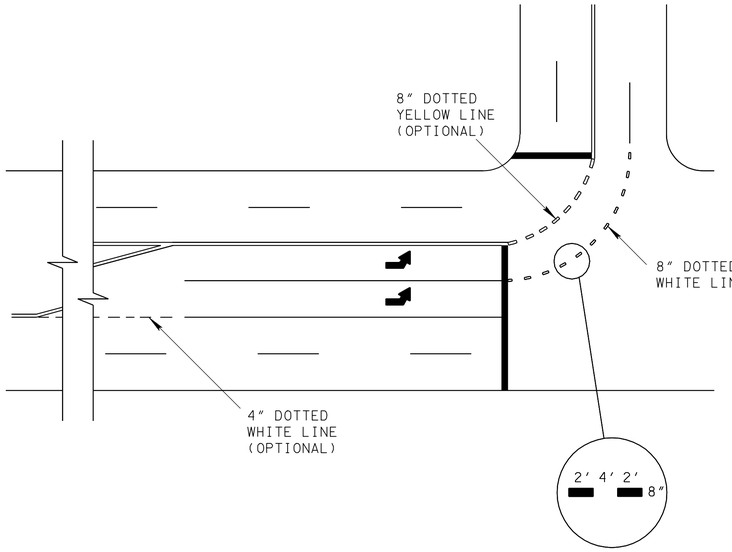
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DETAILS OF PAVEMENT MARKINGS FOR CONVENTIONAL ROADS

T-M-2



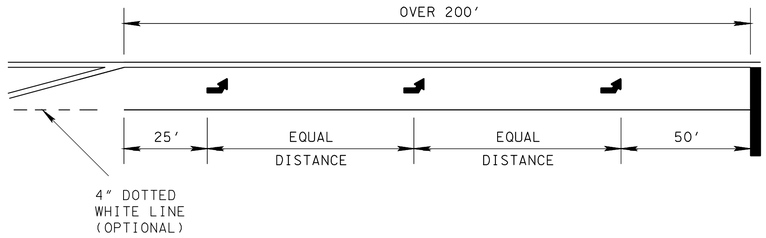


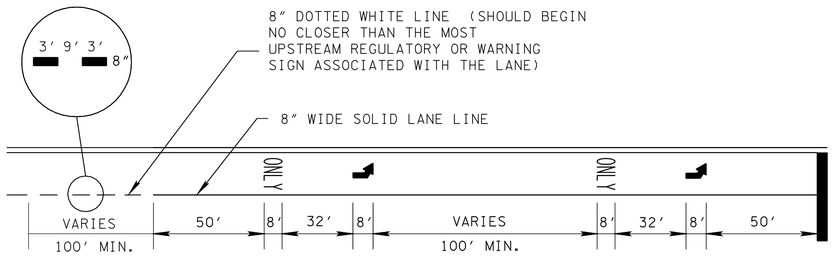


LEFT TURN ARROWS SHALL BE PAID FOR UNDER ITEM NO. 716-02.06, PLASTIC PAVEMENT MARKING (TURN LANE ARROWS) PER EACH.

EIGHT INCH DOTTED WHITE LINE SHALL BE PAID FOR UNDER ITEM NO. 716-02.08, PLASTIC PAVEMENT MARKING (8″ DOTTED LINE) PER LINEAR FOOT.

TYPICAL MARKING FOR DOUBLE LEFT TURN LANES

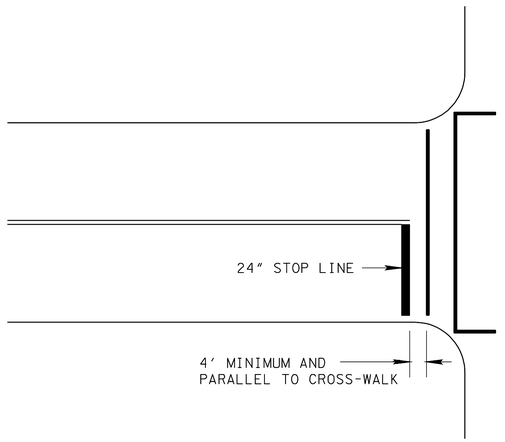




IF A THROUGH LANE BECOMES AN EXCLUSIVE LEFT TURN LANE, AN "ONLY" MESSAGE IS REQUIRED FOR EACH ARROW. THE "ONLY" MESSAGE SHALL BE PAID FOR UNDER ITEM NO. 716-03.01, PLASTIC WORD PAVEMENT MARKING (ONLY) PER EACH.

TYPICAL MARKING FOR LEFT TURN LANES
ALSO APPLICABLE FOR RIGHT TURN LANES

NOTE: STOP LINES REQUIRED ONLY ON APPROACHES CONTROLLED BY STOP SIGNS OR TRAFFIC SIGNALS.

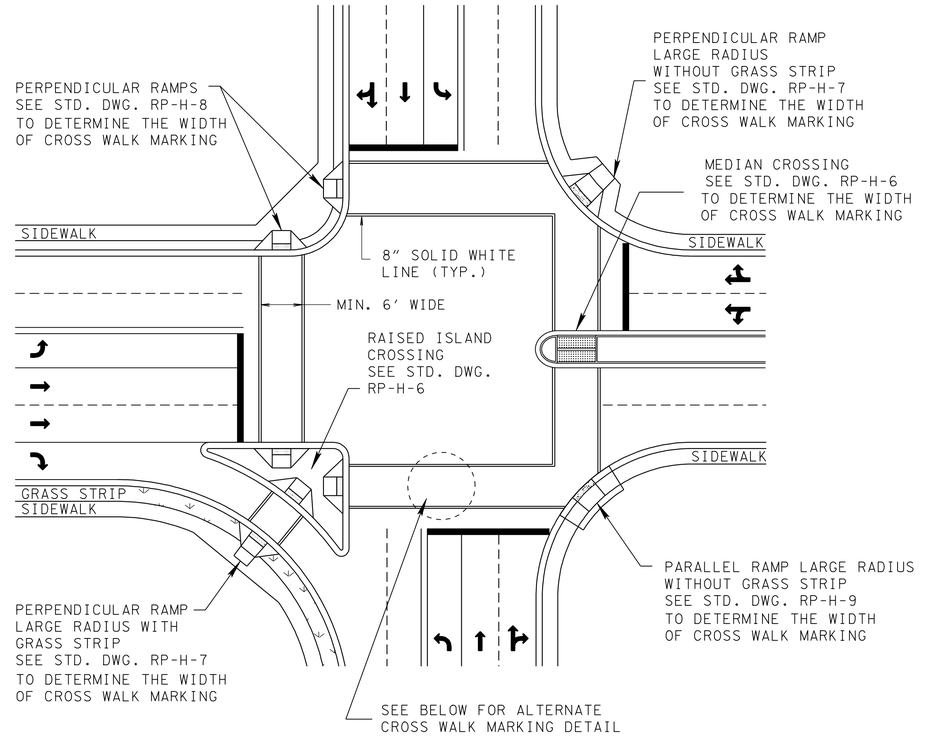


IF CROSS-WALKS ARE NOT USED, STOP LINE SHALL BE NOT MORE THAN 30 FEET NOR LESS THAN 4′ FROM NEAREST EDGE OF INTERSECTING TRAVELED WAY.

LOCATION SHALL BE DETERMINED BY VEHICLE TURNING PATHS FROM THE INTERSECTING ROADWAY, AND IF SIGNALIZED, ITS POSITION RELATIVE TO SIGNAL HEADS, PER MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

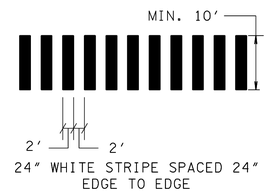
STOP LINES SHALL BE PAID FOR UNDER ITEM NO. 716-02.05, PLASTIC PAVEMENT MARKING (STOP LINE) PER LINEAR FOOT.

TYPICAL STOP LINE PLACEMENT



TYPICAL PLAN VIEW OF STANDARD CROSS WALK MARKING

STANDARD CROSS-WALK MARKING SHALL BE PAID FOR UNDER ITEM NO. 716-02.03, PLASTIC PAVEMENT MARKING (CROSS-WALK) PER LINEAR FOOT.



CROSS-WALK MARKING WITH LONGITUDINAL LINES SHALL BE PAID FOR UNDER ITEM NO. 716-02.09, PLASTIC PAVEMENT MARKING (LONGITUDINAL CROSS-WALK) PER LINEAR FOOT.

CROSS-WALK MARKING WITH LONGITUDINAL LINES

- REV.3-15-07: REVISED TO REFER THE HANDICAP RAMP STANDARDS TO DETERMINE THE MINMUM WIDTH OF CROSS WALK MARKINGS.
- REV.6-1-09: TYPICAL STOP LINE PLACEMENT NOTE REVISED.

REV. 11-1-11: REVISED PAVEMENT MARKINGS FOR LEFT TURN DETAILS.

REV. 2-22-88: REVISED DETAIL LEFT TURN LANE MARKING. ADDED NOTE FOR STOP LINE TO BE PARALLEL TO CROSS-WALK. NOTED LONGITUDINAL CROSS-WALK LINES TO BE WHITE. CHANGED DWG. NO. FROM T-M-11 TO T-M-4. ADDED DETAIL FOR DOUBLE LEFT TURN LANE.

REV. 3-20-91: REDREW AND REORGANIZED SHEET. ADDED PAY ITEMS AND THEIR DESCRIPTIONS.

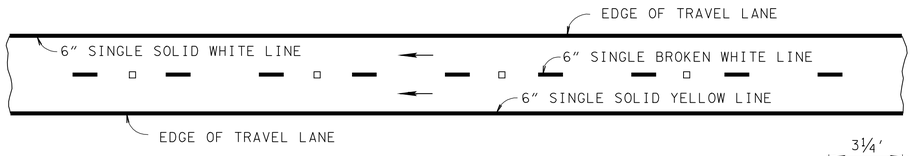
- REV. 5-27-01: CHANGED DESCRIPTION IN ITEM NO. 716-02.09.
- REV. 9-5-01: CHANGED DESCRIPTION IN ITEM NO. 716-02.03.
- REV.1-19-05: CHANGED HANDICAP RAMP DETAIL SHOWN ON CROSSWALK MARKING DETAILS.

- MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

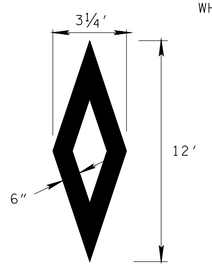
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STANDARD INTERSECTION PAVEMENT MARKINGS

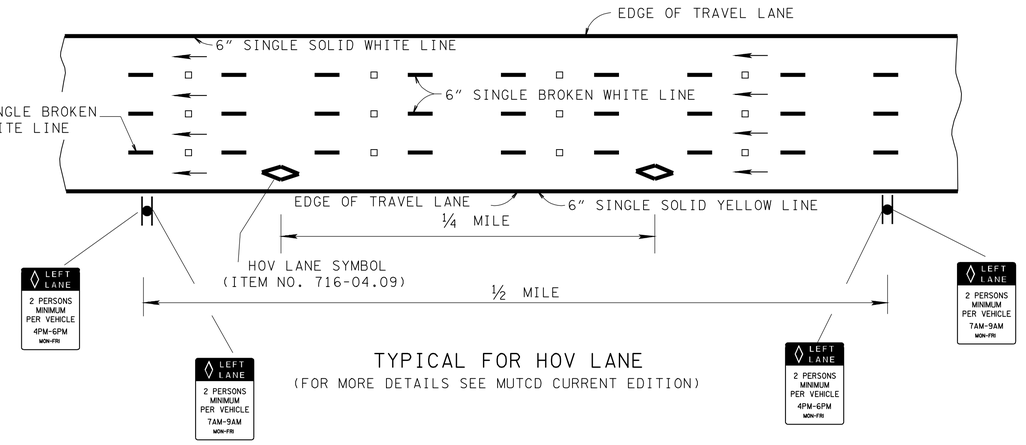
T-M-4



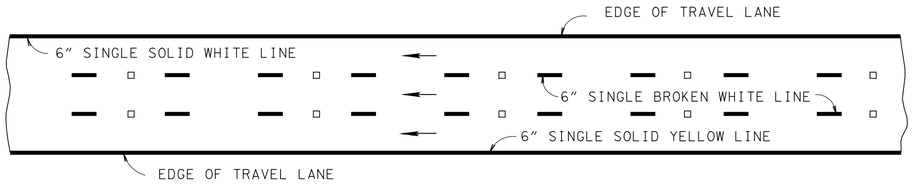
TYPICAL TWO LANE



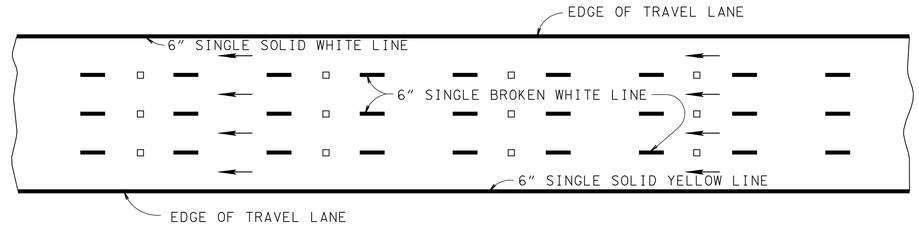
HOV LANE SYMBOL



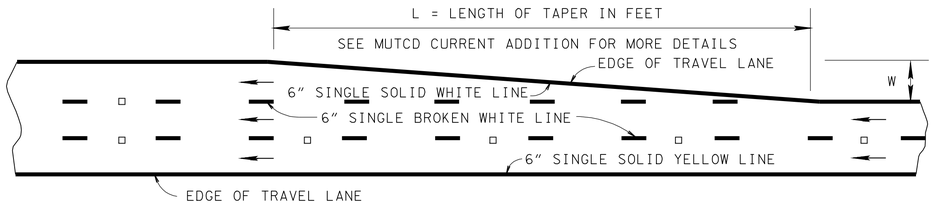
TYPICAL FOR HOV LANE
(FOR MORE DETAILS SEE MUTCD CURRENT EDITION)



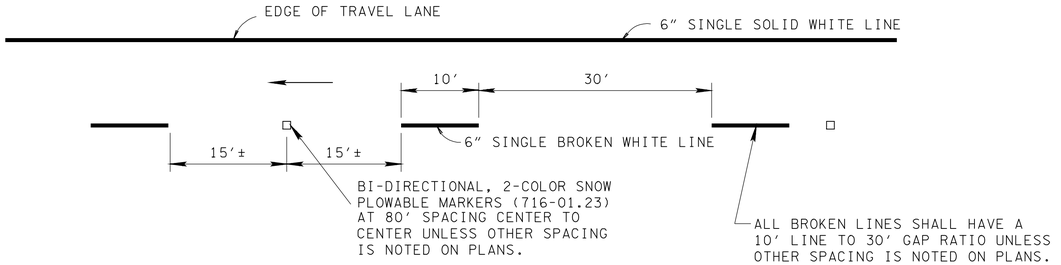
TYPICAL THREE LANE



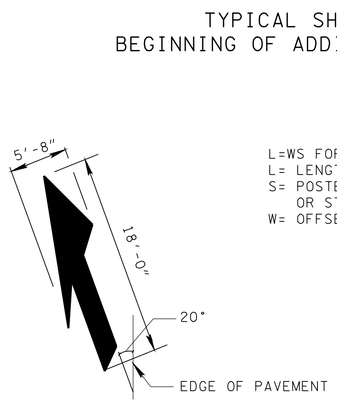
TYPICAL FOUR LANE



TYPICAL SHOWING
BEGINNING OF ADDITIONAL LANE

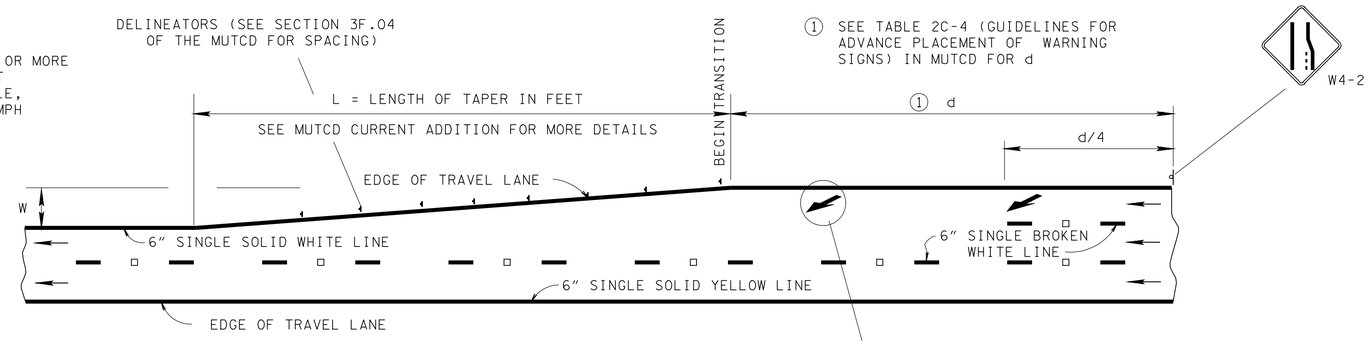


SPACING DETAILS



LANE-REDUCTION ARROW

L=WS FOR SPEEDS OF 45 MPH OR MORE
L= LENGTH OF TAPER IN FEET
S= POSTED, 85 TH-PERCENTILE, OR STATUTORY SPEED IN MPH
W= OFFSET IN FEET



TYPICAL LANE REDUCTION TRANSITION

REV. 2-22-88: REVISED TO SHOW RAISED REFLECTIVE PAVEMENT MARKERS CENTERED BETWEEN BROKEN LINES. CHANGED DRAWING NO. FROM T-M-2 TO T-M-5.

REV. 3-20-91: REDREW SHEET. CHANGED TYPE 2 PAVEMENT MARKERS (CLEAR) TO MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR).

☐ REV. 10-26-92: ADDED GENERAL NOTE Ⓐ.

☐ REV. 7-29-98: CHANGED WIDTH OF CENTERLINES, EDGE LINES, AND DOTTED WHITE LANE LINES FROM 4 TO 6 INCHES.

☐ REV. 4-15-04: CHANGED W4-2 SIGNS AND TRANSITION NOTE IN LOWER RIGHT CORNER TO COMPLY WITH 2003 MUTCD.

☐ REV. 9-5-04: IN TYPICAL SHOWING ENDING OF ADDITIONAL LANE CHANGE NOTE ①.

REV. 11-1-11: ADDED HOV SIGNS AND PAVEMENT MARKING DETAILS. ADDED LANE REDUCTION ARROWS WITH DETAILS, REVISED PAVEMENT MARKINGS TYPICAL DETAILS.

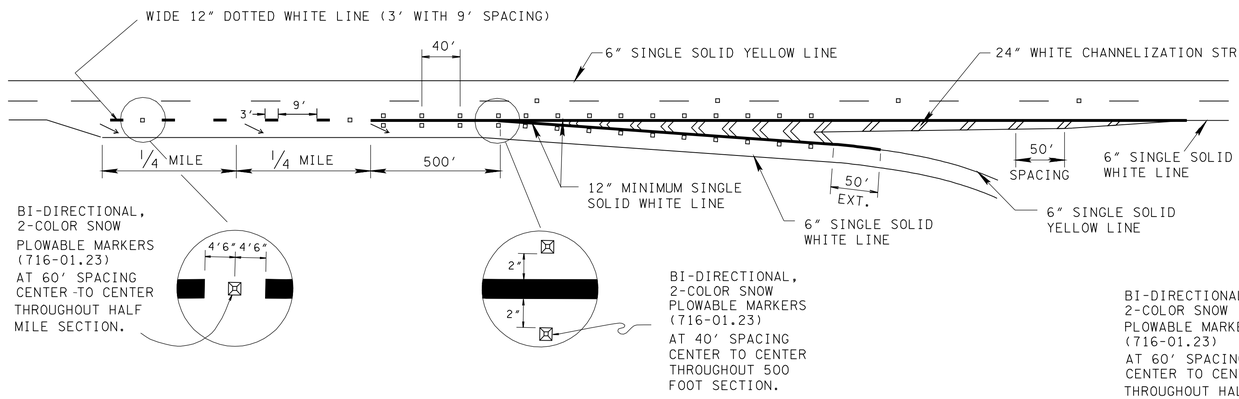
☐ REV. 1-12-12: CHANGED SNOW PLOWABLE MARKERS FROM MONO-DIRECTIONAL TO BI-DIRECTIONAL 2-COLOR.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

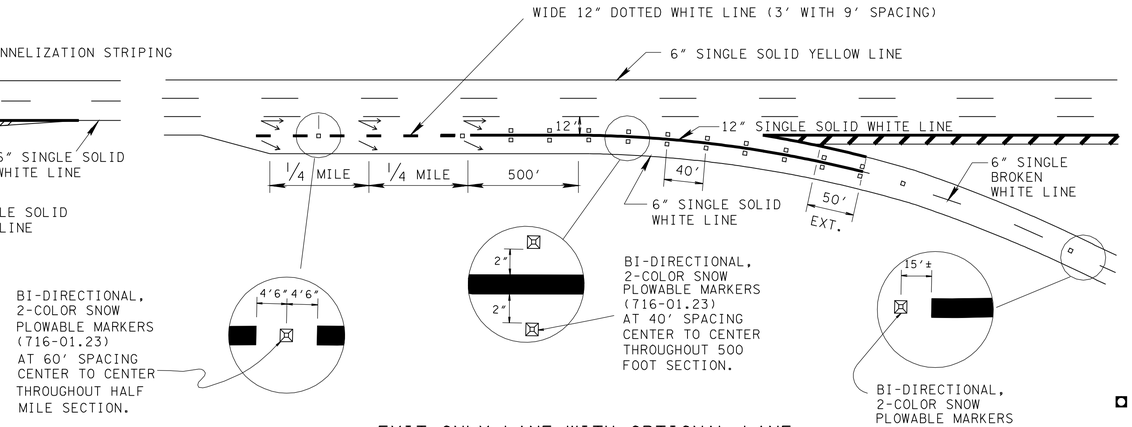
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

MARKING DETAILS FOR EXPRESSWAYS & FREEWAYS

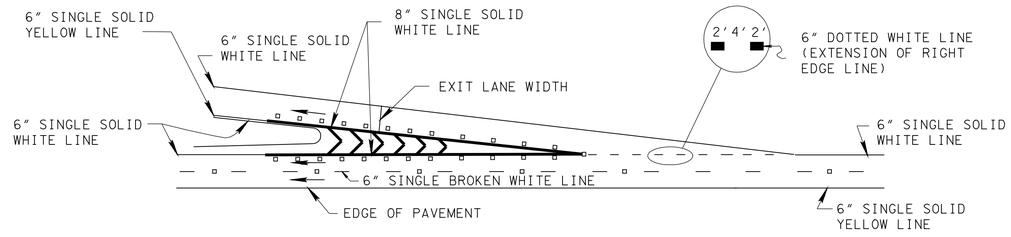
T-M-5



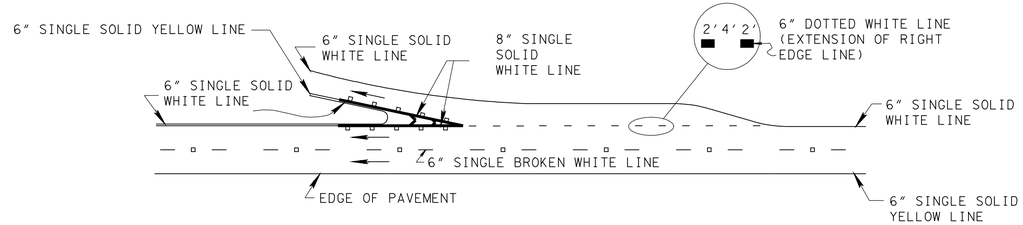
EXIT ONLY LANE



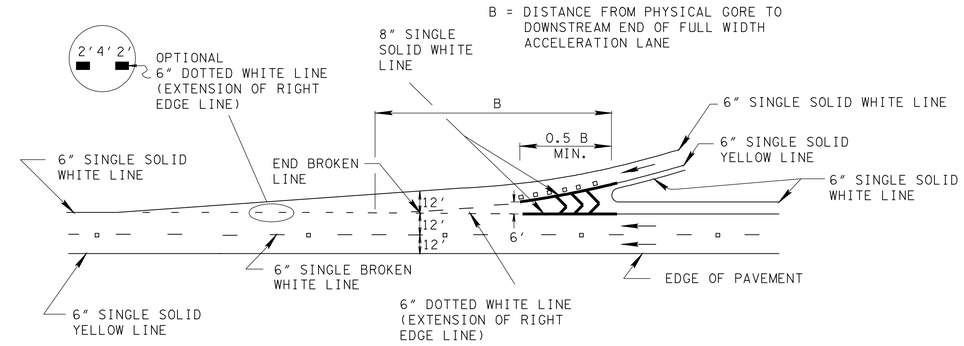
EXIT ONLY LANE WITH OPTIONAL LANE



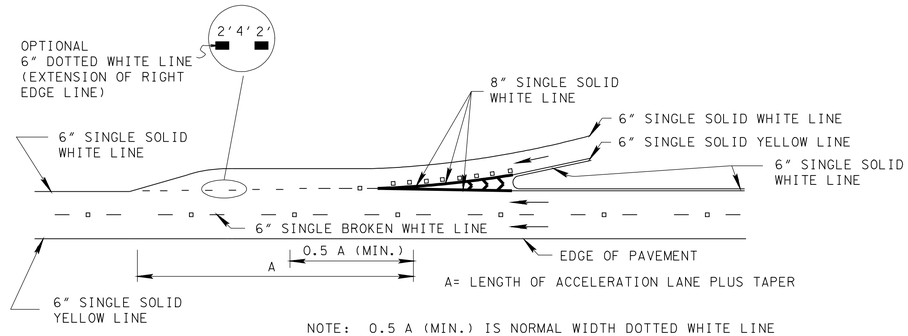
TAPERED DECELERATION LANE
EXIT RAMP



PARALLEL DECELERATION LANE

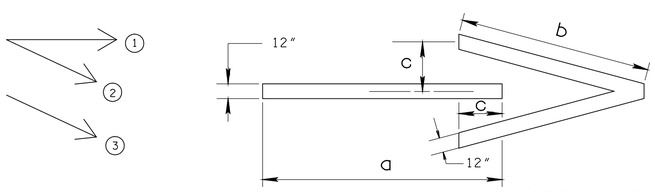


TAPERED ACCELERATION LANE
ENTRANCE RAMPS

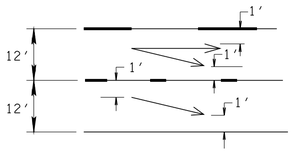


NOTE: 0.5 A (MIN.) IS NORMAL WIDTH DOTTED WHITE LINE FOR AT LEAST ½ THE LENGTH OF THE FULL-WIDTH ACCELERATION LANE PLUS TAPER.

PARALLEL ACCELERATION LANE



DIMENSIONS			
ARROW	a	b	c
1	14'-0"	8'-6"	2'-2"
2	10'-4"	8'-6"	2'-2"
3	16'-6"	10'-0"	2'-6"



ARROW LOCATION SKETCH

DETAILS FOR EXIT PAVEMENT ARROWS AT 1/4 MILE SPACING

GENERAL NOTES

(A) SEE STANDARD DRAWING NO. T-M-7 FOR GORE MARKING DETAILS.

REV. 2-22-88: ADDED DETAIL FOR "EXIT ONLY" AND FOR PARALLEL ACCELERATION LANE MARKING. CHANGED SHEET TITLE AND DWG. NO. FROM T-M-3 TO T-M-6. ADDED NOTES. ADDED DETAILS FOR TWO LANE EXIT AND PAVEMENT ARROWS. ADDED DOTTED LINES AT EXIT RAMPS.

REV. 10-30-90: REDREW AND REORGANIZED SHEET, CHANGED WIDTH OF EXIT PAVEMENT ARROWS TO 12".

REV. 3-20-91: ADDED MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR) TO EXIT ONLY LANE DETAIL AND TWO LANE EXIT WITH OPTIONAL LANE DETAIL. CHANGED GENERAL NOTES. ON REMAINDER OF SHEET CHANGED TYPE 2 PAVEMENT MARKERS (CLEAR) TO MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR).

- REV. 10-26-92: ADDED GENERAL NOTE (B).
- REV. 12-18-92: MOVED MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR) FROM INSIDE OF CHANNELIZATION MARKING TO OUTSIDE OF CHANNELIZATION MARKING.
- REV. 1-19-94: IN DETAIL FOR TWO LANE EXIT WITH OPTIONAL LANE, EXTEND RAMP AND ADD PAVEMENT MARKERS.
- REV. 7-29-98: CHANGED WIDTH OF CENTERLINES, EDGELINES AND DOTTED WHITE LANE LINES FROM 4 TO 6 INCHES. CHANGED USE OF DOTTED WHITE LANE LINES IN PARALLEL AND TAPERED ACCELERATION AND DECELERATION DETAILS.
- REV. 9-1-09: ADDED 6" BROKEN WHITE LINE TO PARALLEL ACCELERATION LANE.

REV. 11-1-11: REVISED PAVEMENT MARKINGS FOR EXIT ONLY LANE DETAIL, EXIT ONLY WITH OPTIONAL LANE DETAIL, TAPERED ACCELERATION LANE DETAIL AND PARALLEL ACCELERATION LANE DETAIL. DELETED GENERAL NOTE (B).

- REV. 1-12-12: CHANGED SNOW PLOWABLE MARKERS FROM MONO- DIRECTIONAL TO BI-DIRECTIONAL 2-COLOR.

- MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

MARKING DETAIL FOR EXPRESSWAY & FREEWAY INTERCHANGES

T-M-6

REV. 2-22-88: ADDED GORE MARKING AND NOTES. CHANGED DWG. NO. FROM T-M-4 TO T-M-7. CHANGED DOUBLE MARKERS ON EXIT RAMP TO SINGLE MARKER.

REV. 10-30-90: REDREW AND RENAMED SHEET. DELETED 12′ LANE DIMENSIONS ON EXIT RAMP DETAIL.

REV. 3-20-91: CHANGED TYPE 2 PAVEMENT MARKERS (CLEAR) TO MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR).

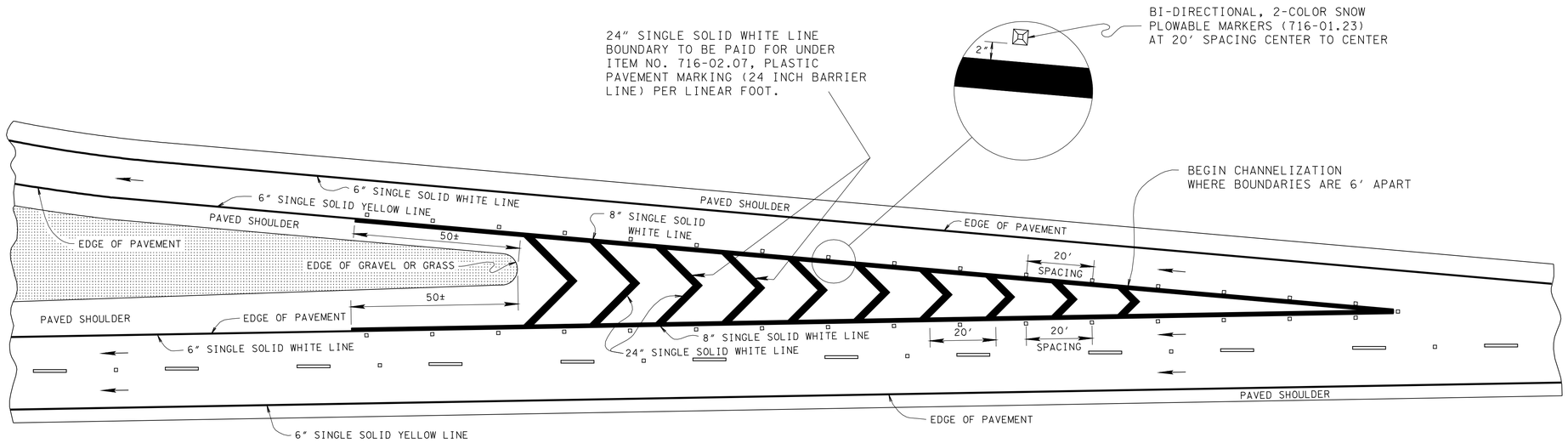
REV. 10-26-92: ADDED GENERAL NOTE Ⓒ.

REV. 12-18-92: MOVED MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR) FROM INSIDE OF CHANNELIZATION MARKING TO OUTSIDE OF CHANNELIZATION MARKING.

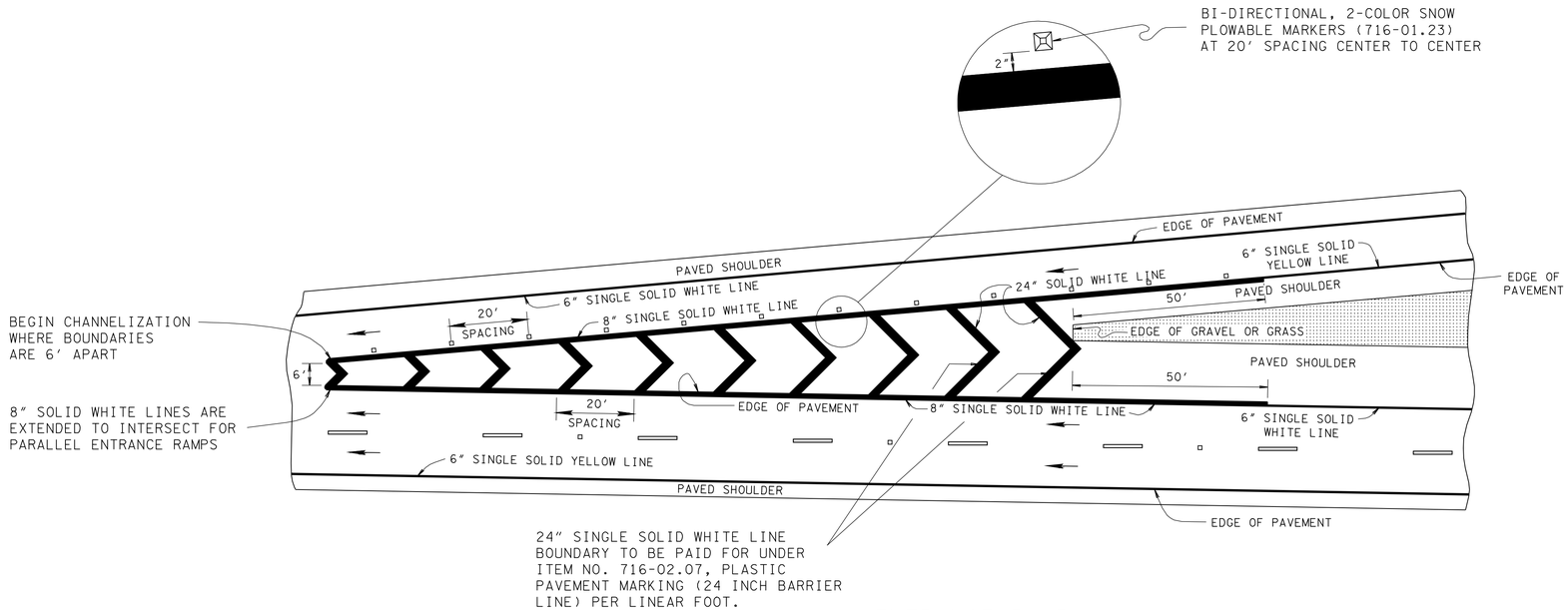
REV. 7-29-98: CHANGED WIDTH OF CENTERLINES, EDGELINES AND DOTTED WHITE LANE LINES FROM 4 TO 6 INCHES.

REV. 10-10-06: 24″ SINGLE SOLID WHITE LINE BOUNDARY TO BE PAID FOR UNDER ITEM NO. 716-02.07, PLASTIC PAVEMENT MARKING (24 INCH BARRIER LINE) PER LINEAR FOOT.

REV. 1-12-12: CHANGED SNOW PLOWABLE MARKERS FROM MONO-DIRECTIONAL TO BI-DIRECTIONAL 2-COLOR.



GORE MARKING DETAILS
ON EXIT RAMP



ENTRANCE RAMP
MARKING DETAILS

GENERAL NOTES

(A) GORE AREAS SHALL HAVE A MINIMUM OF FIVE CHEVRON MARKINGS AT THE REQUIRED SPACING. OTHERWISE, NO DIAGONAL MARKING SHALL BE USED.

(B) SEE STANDARD DRAWING T-M-6 FOR FURTHER MARKING DETAILS REGARDING ACCELERATION AND DECELERATION LANES IN EXPRESSWAY AND FREEWAY INTERCHANGE AREAS.

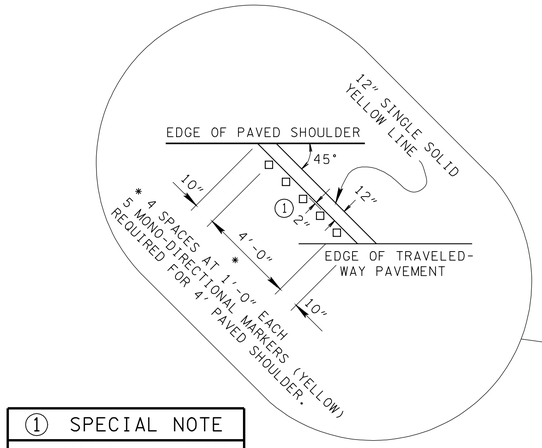
(C) PAVEMENT MARKERS ARE REQUIRED ONLY WHEN SPECIFIED IN THE PLANS.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

GORE MARKING DETAILS FOR EXPRESSWAY & FREEWAY INTERCHANGES

T-M-7

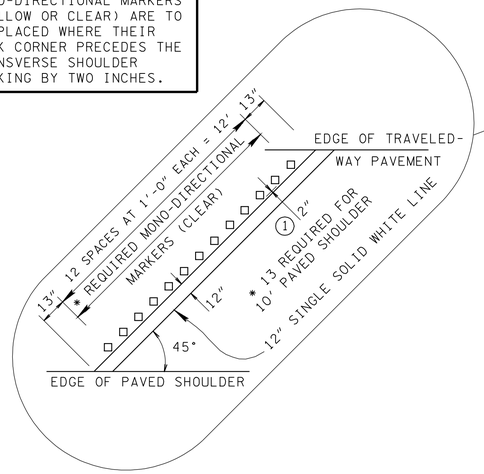


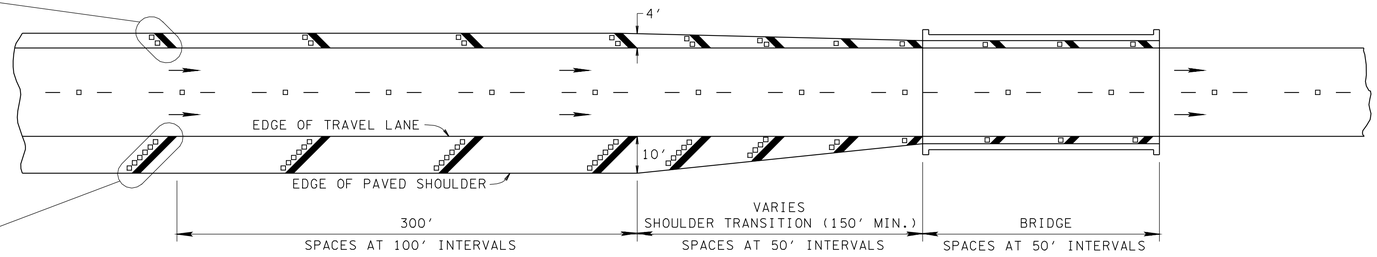
GENERAL NOTE

Ⓐ PAVEMENT MARKERS ARE REQUIRED ONLY WHEN SPECIFIED IN THE PLANS.

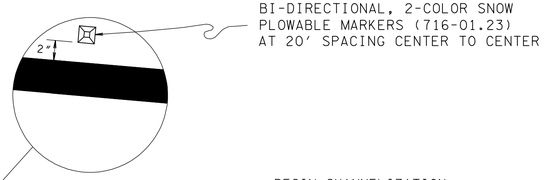
① SPECIAL NOTE

MONO-DIRECTIONAL MARKERS (YELLOW OR CLEAR) ARE TO BE PLACED WHERE THEIR BACK CORNER PRECEDES THE TRANSVERSE SHOULDER MARKING BY TWO INCHES.

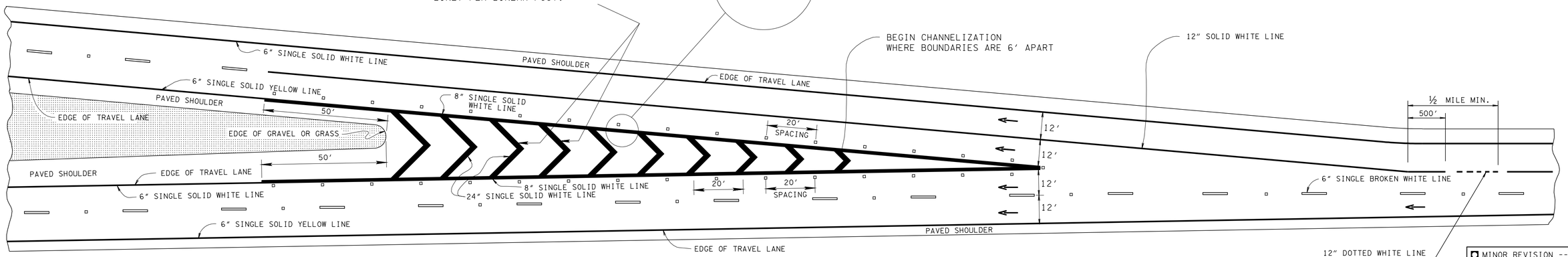




DETAILS DELINEATING NARROW BRIDGES
TO BE USED ON ALL BRIDGES WITH LESS THAN A FULL SHOULDER



24" SINGLE SOLID WHITE LINE BOUNDARY TO BE PAID FOR UNDER ITEM NO. 716-02.07, PLASTIC PAVEMENT MARKING (24 INCH BARRIER LINE) PER LINEAR FOOT.



TYPICAL GORE DETAILS FOR SPLITS

REV. 2-22-88: CHANGED WIDTH OF SOLID YELLOW AND WHITE LINES ON SHOULDER OF "NARROW BRIDGE DETAIL" TO 12 INCHES. CHANGED GORE STRIPING TO 24" LINE AT 20' SPACING. ADDED 12' LANE WIDTHS. REVISED RAISED REFLECTIVE PAVEMENT MARKER LOCATIONS TO CENTERED BETWEEN BROKEN LINES AND CHANNELIZATION STRIPING. ADDED NOTE. CHANGED DRAWING NO. FROM T-M-5 TO T-M-8.

REV. 3-20-91: REDREW SHEET. CHANGED TYPE 2 PAVEMENT MARKERS (CLEAR) TO MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR). REDUCED NUMBER OF MONO-DIRECTIONAL PAVEMENT MARKERS IN BLOW-UP DETAIL AND MODIFIED SPACING SLIGHTLY.

- REV. 10-26-92: ADDED GENERAL NOTE Ⓐ.
- REV. 12-18-92: MOVED MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR) FROM INSIDE OF CHANNELIZATION MARKING TO OUTSIDE OF CHANNELIZATION MARKING.
- REV. 7-29-98: CHANGED WIDTH OF CENTERLINES, EDGELINES AND DOTTED WHITE LANE LINES FROM 4 TO 6 INCHES.
- REV. 10-10-06: 24" SINGLE SOLID WHITE LINE BOUNDARY TO BE PAID FOR UNDER ITEM NO. 716-02.07, PLASTIC PAVEMENT MARKING (24 INCH BARRIER LINE) PER LINEAR FOOT.

REV. 11-1-11: REVISED TYPICAL GORE DETAILS FOR SPLITS.

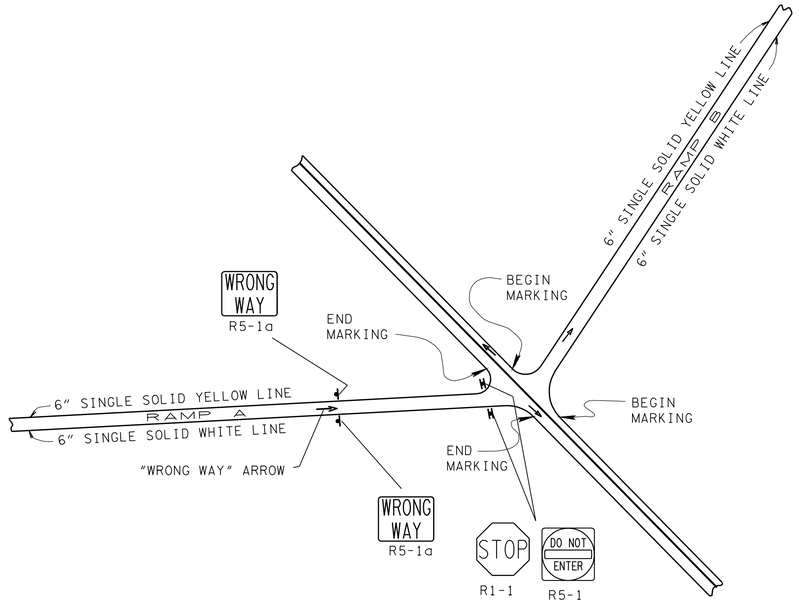
- REV. 1-12-12: CHANGED SNOW PLOWABLE MARKERS FROM MONO-DIRECTIONAL TO BI-DIRECTIONAL 2-COLOR.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

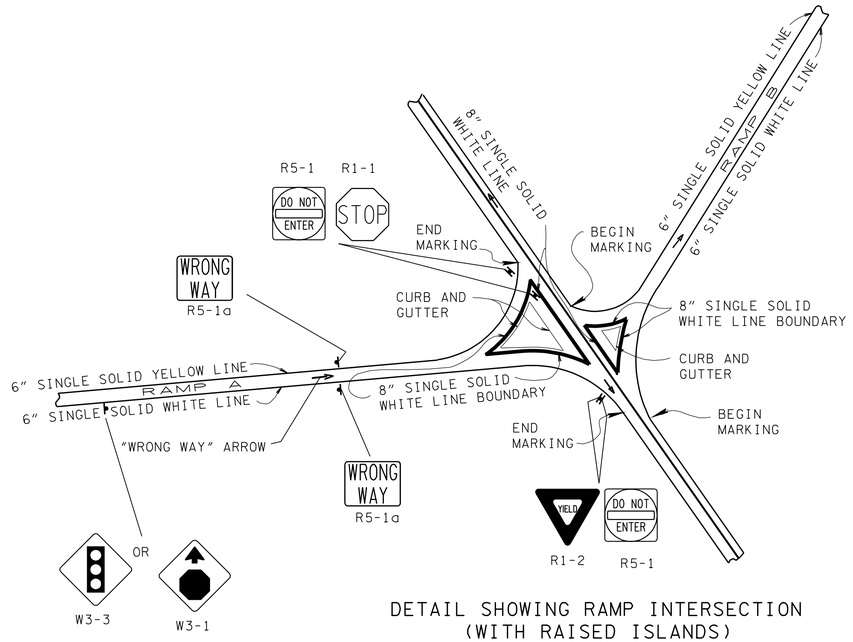
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

MARKING DETAILS FOR EXPRESSWAYS & FREEWAYS

T-M-8



DETAIL SHOWING RAMP INTERSECTION
(WITHOUT ISLANDS)



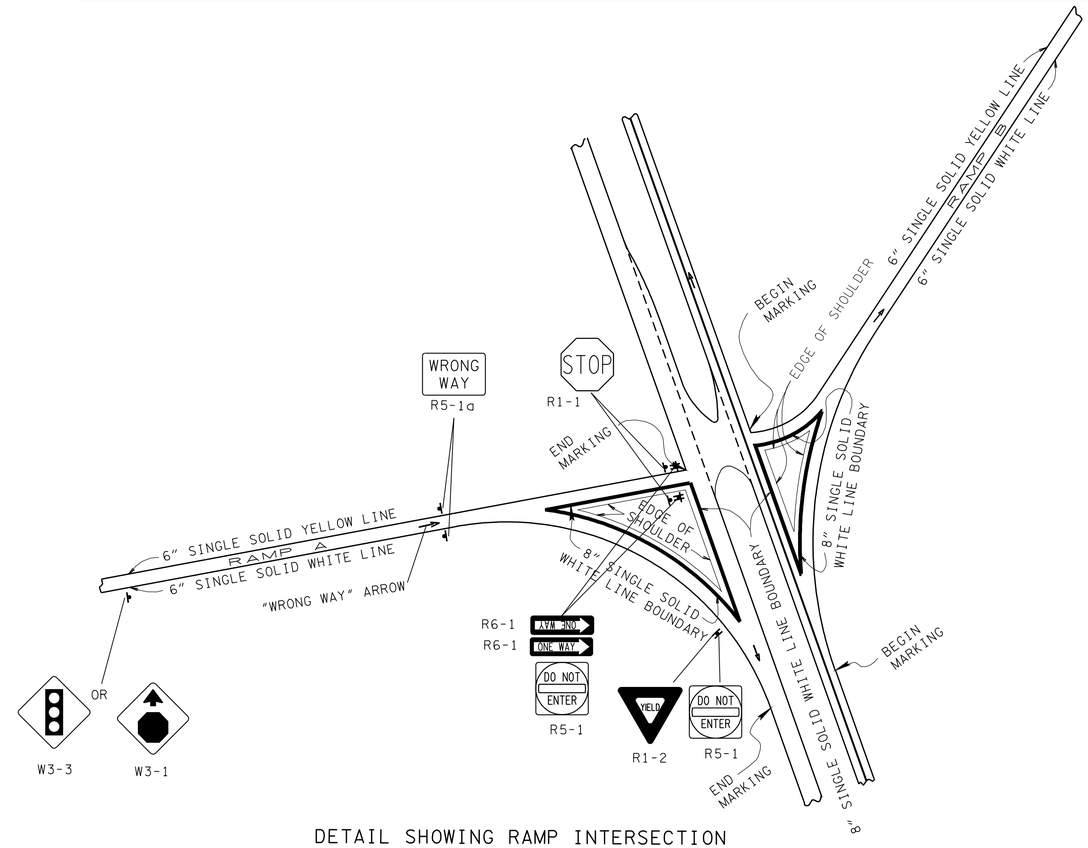
DETAIL SHOWING RAMP INTERSECTION
(WITH RAISED ISLANDS)

REV. 3-22-85: REVISED TO SHOW 8" BOUNDARY AROUND ISLANDS.

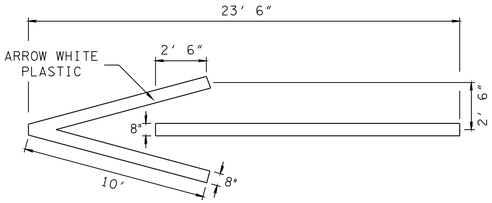
REV. 2-22-88: ADDED REFERENCE NOTE FOR DWG. NO. T-M-3. CHANGED DWG. NO. FROM T-M-6 TO T-M-9.

REV. 7-15-91: REDREW AND REORGANIZED SHEET.

- REV. 7-29-98: CHANGED WIDTH OF CENTERLINES, EDGELINES AND DOTTED WHITE LANE LINES FROM 4 TO 6 INCHES.
- REV. 12-12-00: MOVED WRONG WAY PAVEMENT ARROW DETAILS FROM STD. DWG. NO. T-S-11. ADDED WRONG WAY SIGNS AND ARROWS TO ALL PLAN VIEWS. ADDED GENERAL NOTE Ⓑ.
- REV.11-30-04: CHANGED WRONG WAY SIGN DESIGNATION FROM R5-9 TO R5-1a.
- REV. 11-1-11: ADDED ADDITIONAL SIGNS TO RAMP INTERSECTION DETAIL.



DETAIL SHOWING RAMP INTERSECTION
(WITH DEPRESSED ISLANDS)



WRONG WAY
PAVEMENT ARROW DETAILS

PAVEMENT FOR WRONG WAY PAVEMENT ARROW IN PLACE WILL BE MADE UNDER ITEM NUMBER 716-04.06 PLASTIC PAVEMENT MARKING (WRONG WAY ARROW) PER EACH.

GENERAL NOTE

Ⓐ SEE STANDARD DRAWING NO. T-M-3 FOR ADDITIONAL DETAILS FOR ISLAND CHANNELIZATION MARKINGS.

Ⓑ "WRONG WAY" ARROWS TO BE LOCATED APPROXIMATELY 200 FEET FROM STOP BAR OR AT THE SAME LOCATION AS THE WRONG WAY SIGNS. "WRONG WAY" ARROWS SHALL BE USED ON SINGLE LANE RAMPS ONLY. FOR RAMPS WITH MORE THAN ONE LANE TURN LANE ARROWS SHOULD BE USED.

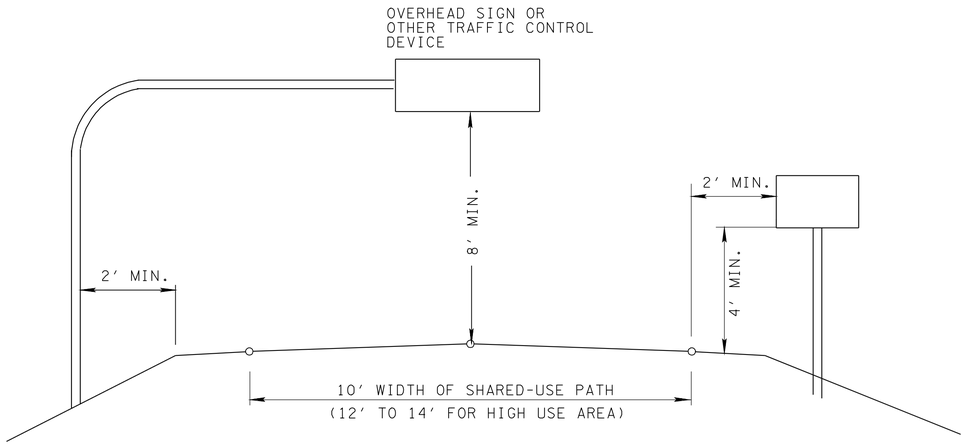
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKING AND SIGNING DETAILS FOR RAMP INTERSECTIONS

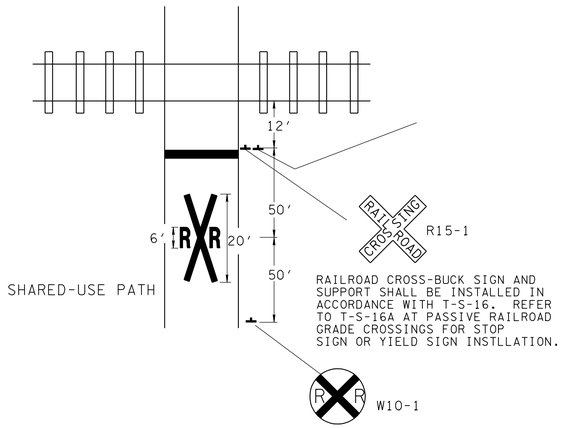
T-M-9

REV. 11-1-11: REVISED OVERHEAD SIGN DETAIL. DELETED NOTE (E) REGARDING 4" SBYL ADDED SIGNS D11-1, M4-6, M6-1 AND M6-4. DELETED SIGNS M4-12 M7-1 AND M7-5. REASSIGNED NOTE (E) AND ADDED GENERAL NOTE (F).

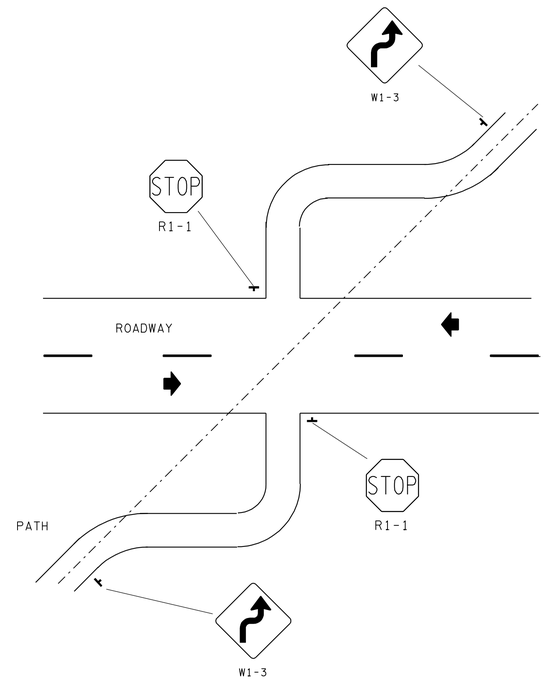


SIGN PLACEMENT ON SHARED-USE PATHS

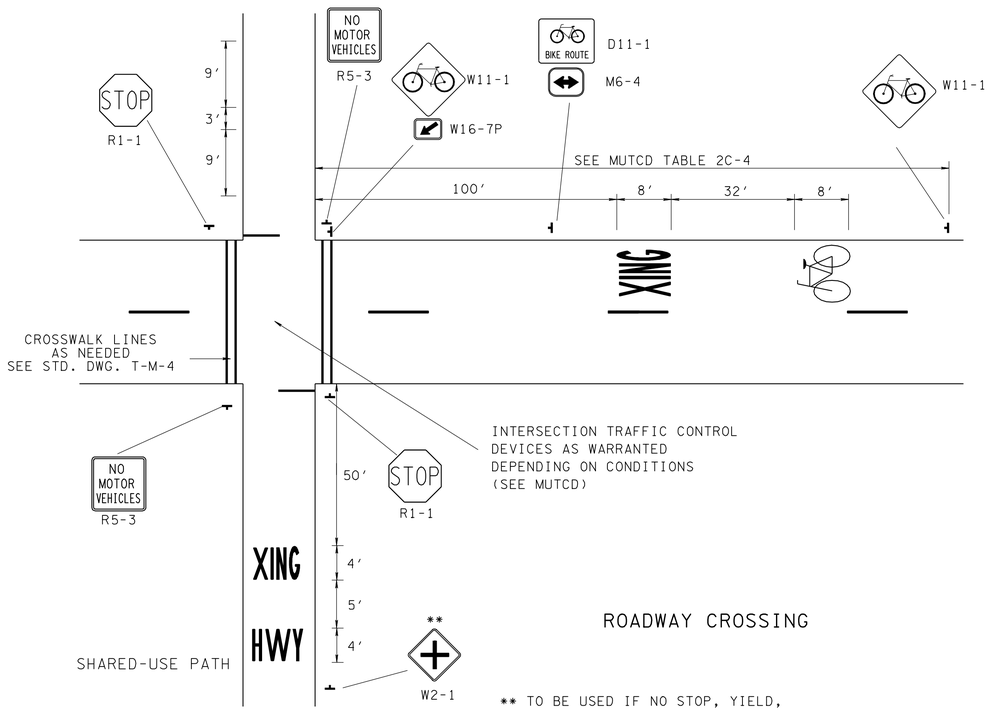
(SEE RD-TS-8 FOR TYPICAL CROSS SECTION DETAILS)



RAILROAD CROSSING

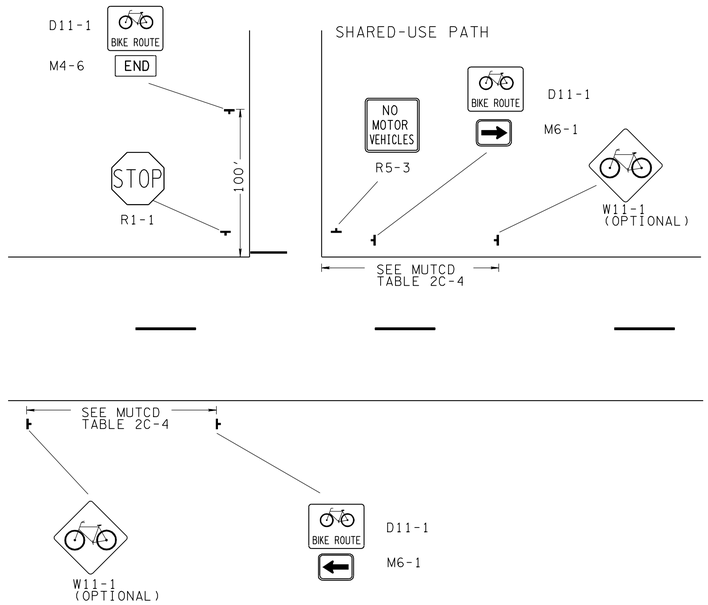


TYPICAL REDESIGN OF A DIAGONAL ROAD CROSSING



ROADWAY CROSSING

** TO BE USED IF NO STOP, YIELD, OR SIGNAL CONTROL IS USED.



BEGINNING AND END OF A DESIGNATED BICYCLE ROUTE ON A SHARED-USE PATH

GENERAL NOTES

(A) WHEN OVERHEAD SIGNS ARE USED ON SHARED-USE PATHS, THE CLEARANCE FROM THE BOTTOM EDGE OF THE SIGN TO THE PATH SURFACE DIRECTLY UNDER THE SIGN SHALL BE A MINIMUM OF 8 FEET.

(B) WHEN PLACEMENT OF STOP OR YIELD SIGNS IS CONSIDERED, PRIORITY AT A SHARED-USE PATHS/ROADWAY INTERSECTION SHOULD BE ASSIGNED WITH CONSIDERATION OF THE FOLLOWING:

1. RELATIVE SPEEDS OF SHARED-USE PATH AND ROADWAY USERS;
2. RELATIVE VOLUMES OF SHARED-USE PATH AND ROADWAY TRAFFIC; AND
3. RELATIVE IMPORTANCE OF SHARED-USE PATH AND ROADWAY.

(C) WHEN ENGINEERING JUDGMENT DETERMINES THAT THE VISIBILITY OF THE INTERSECTION IS LIMITED ON THE SHARED-USE PATH APPROACH, INTERSECTION WARNING SIGNS SHOULD BE USED. INTERSECTION WARNING SIGNS SHOULD NOT BE USED WHERE THE SHARED-USE PATH APPROACH TO THE INTERSECTION IS CONTROLLED BY A STOP SIGN, YIELD SIGN, OR A TRAFFIC CONTROL SIGNAL.

(D) A SOLID WHITE LINE MAY BE USED ON SHARED-USE PATHS TO SEPARATE DIFFERENT TYPES OF USERS. THE R9-7 SIGN MAY BE USED TO SUPPLEMENT THE SOLID WHITE LINE. SMALLER SIZE LETTERS AND SYMBOLS MAY BE USED ON SHARED-USE PATHS. FIXED OBJECTS ADJACENT TO SHARED-USE PATHS MAY BE MARKED WITH OBJECT MARKERS.

(E) THE MINIMUM SIGN SIZES FOR SHARED-USE PATHS, SHALL BE THOSE SHOWN IN TABLE 9B-1 IN MUTCD, PART 9 AND SHALL BE USED ONLY FOR SIGNS INSTALLED SPECIFICALLY FOR BICYCLE TRAFFIC APPLICATIONS. THE MINIMUM SIGN SIZES FOR BICYCLE FACILITIES SHALL NOT BE USED FOR SIGNS THAT ARE PLACED IN A LOCATION THAT WOULD HAVE ANY APPLICATION TO OTHER VEHICLES.

(F) SEE T-M-12 FOR OTHER SIGNING AND PAVEMENT MARKINGS.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

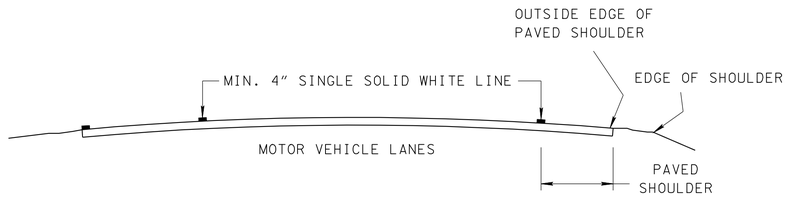
SIGNING AND PAVEMENT MARKINGS FOR SHARED-USE PATHS

5-1-07 | T-M-10

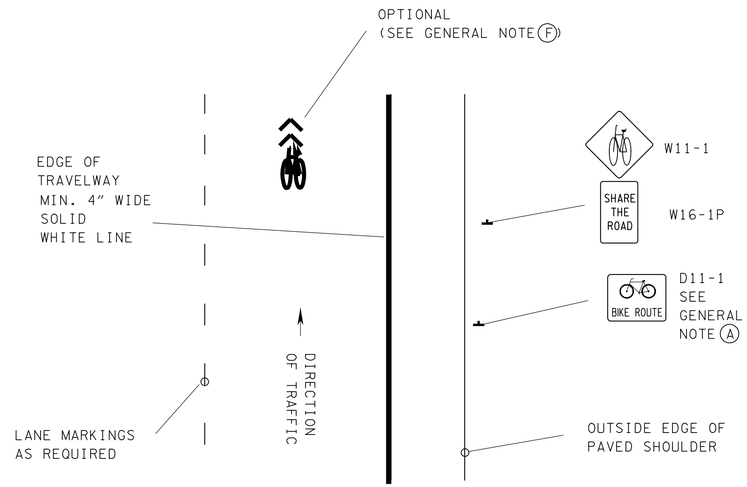
REV. 12-1-09: REMOVED RUMBLE DETAILS TO T-M-15 AND 15A.

REV. 11-1-11: REVISED GENERAL NOTE (A). ADDED GENERAL NOTE (E) AND (F). UPDATED PLAN VIEW, AND ADDED BIKE SYMBOL/ARROW SHARED LANE MARKING DETAIL.

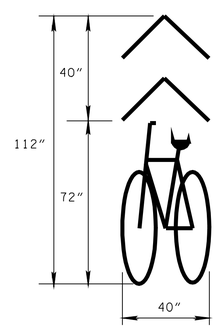
TYPICAL **BIKE ROUTE** CROSS SECTION FOR NON-ACCESS CONTROLLED RURAL ROUTES



ELEVATION VIEW



PLAN VIEW



BIKE SYMBOL/ARROW SHARED LANE MARKING

(ITEM NO. 716-04.15)

NOTE: TO BE PLACED IMMEDIATELY AFTER AN INTERSECTION AND SPACED AT INTERVALS NOT GREATER THAN 250 FEET.

GENERAL NOTES

(A) SIGNS SHOULD BE PLACED APPROXIMATELY EVERY 0.25 MILES, AT EVERY TURN, AND AT ALL SIGNALIZED INTERSECTIONS. SIGN SPACING SHOULD NOT EXCEED A MILE ON RURAL ROADS.

(B) SEE STD. DWG. T-M-11A IF RUMBLE STRIP OR RUMBLE STRIPE IS PROPOSED IN CONJUNCTION WITH BIKE ROUTE.

(C) BIKE LANES AND BIKE ROUTES ARE NOT PERMITED ON ACCESS CONTROLLED FACILITIES.

(D) IF BIKE LANE IS PROPOSED ON PAVED SHOULDER, RUMBLE STRIPS SHOULD NOT BE USED WHEN THEIR INSTALLATION WOULD LEAVE A CLEAR SHOULDER PATHWAY LESS THAN 4 FEET WIDE (OR LESS THAN 5 FEET WIDE IF THERE IS AN OBSTRUCTION SUCH AS A CURB OR GUARDRAIL) TO THE RIGHT OF THE RUMBLE STRIP FOR BICYCLE USE SEE T-M-15 FOR FURTHER INFORMATION.

(E) SEE SECTIONS 9B.06, 9B.18, 9B.19, 9B.20, 9C.04, AND 9C.07 FOR ADDITIONAL SIGNING AND PAVEMENT MARKING INFORMATION IN THE MUTCD.

(F) OPTIONAL, SHARED BIKE LANE MARKINGS SHOULD NOT BE PLACED ON ROADWAYS THAT HAVE A SPEED LIMIT ABOVE 35 MPH.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SIGNING AND PAVEMENT MARKINGS FOR BICYCLE ROUTES ON RURAL ROADS

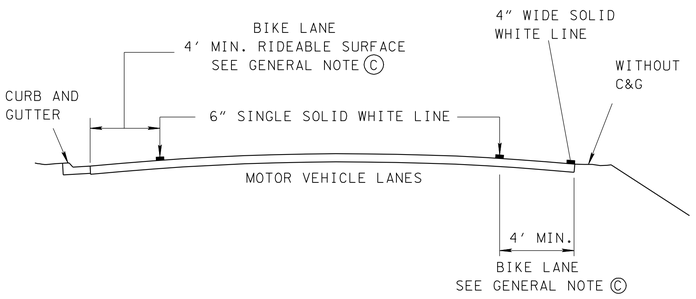
5-1-07 | T-M-11

REV. 12-1-09: ADDED SIGN NO.W5-4a AND CHANGED GENERAL NOTE (D) REARRANGED.

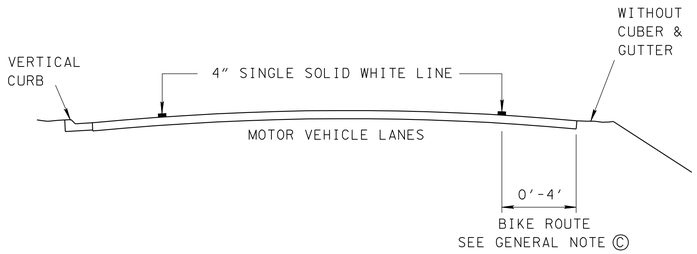
REV. 11-1-11: ADDED BARRIER POST STRIPING DETAIL AND REVISED GENERAL NOTE (E).

TYPICAL **BIKE LANE** CROSS SECTIONS FOR URBAN COLLECTORS AND STREETS

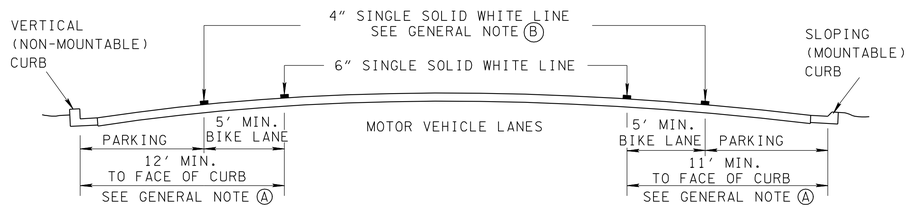
URBAN COLLECTORS AND STREETS WITH **BIKE LANE** MIN. PAVED SHOULDER WIDTH 4′ - 8′



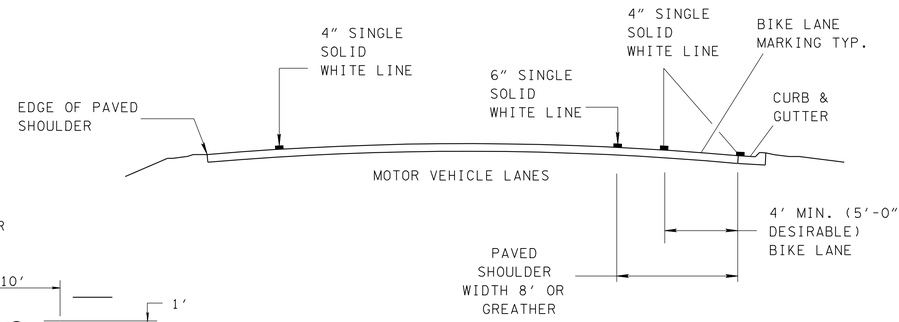
URBAN COLLECTORS AND STREETS WITH **BIKE ROUTE** MIN. PAVED SHOULDER WIDTH LESS THAN 4′



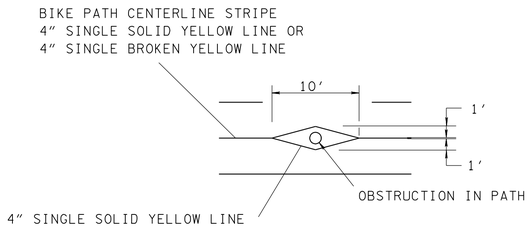
4-5 LANE URBAN COLLECTORS AND STREETS (CURB AND GUTTER) WITH **BIKE LANE** MIN. PAVED SHOULDER WIDTH 8′ OR GREATER



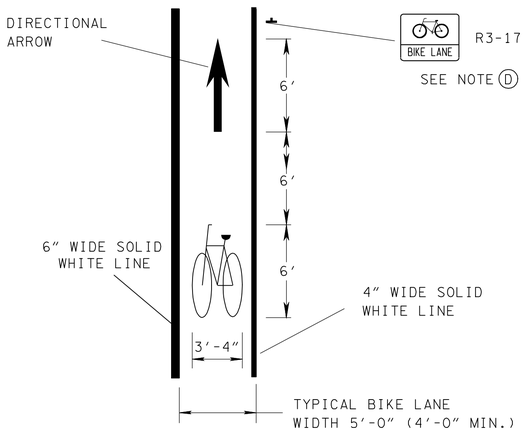
PARKING IS PERMITTED



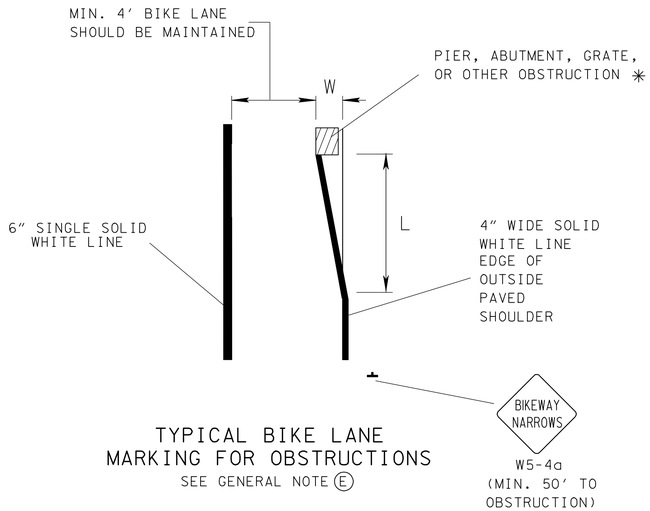
PARKING IS PROHIBITED



BARRIER POST STRIPING



TYPICAL PAVEMENT MARKING FOR BICYCLE LANES (MIN. 1000′ INTERVALS)



TYPICAL BIKE LANE MARKING FOR OBSTRUCTIONS

SEE GENERAL NOTE Ⓔ

NOTE:
WHERE THE ROADWAY DESIGN SPEEDS IS MORE THAN 40 mph SHARED USE BIKE ROUTES ARE NOT RECOMMENDED.

GENERAL NOTES

(A) 13′ IS RECOMMENDED WHERE THERE IS SUBSTANTIAL PARKING OR TURNOVER OF PARKED CARS IS HIGH (E.G. COMMERCIAL AREAS).

(B) THE OPTIONAL SOLID WHITE LINE MAY BE ADVISABLE WHERE PARKING STALLS ARE UNNECESSARY (BECAUSE PARKING IS LIGHT) BUT THERE IS CONCERN THAT MOTORISTS MAY MISCONSTRUE THE BIKE LANE TO BE A TRAFFIC LANE.

(C) AREAS WHERE MIN. OF 4′ BIKE LANE CAN NOT BE PROVIDED " SHARE THE ROAD" (W16-1) SIGN SHOULD BE PLACED TO WARN THE MOTOREST FOR SHARED ROADWAY USE SEE T-M-11 FOR BIKE ROUTE PAVEMENT MARKINGS AND SIGNING REQUIREMENTS.

(D) SIGNS SHOULD BE PLACED APPROXIMATELY EVERY 0.25 MILES AND AT ALL MAJOR INTERSECTIONS.

(E) WHEN PIER, BRIDGE ABUTMENT, GRATE, OR OTHER ROADWAY OBSTRUCTION INTRUDES IN THE BIKE PATH, THE BIKE LANE SHOULD BE MARKED AS SHOWN; L=WS, WHERE W IS WIDTH OF THE OBSTRUCTION IN FEET IN BIKE LANE AND S IS BICYCLE AVERAGE APPROACH SPEED 20 MPH. ✳ PROVIDE AN ADDITIONAL FOOT OF OFFSET FOR A RAISED OBSTRUCTION AND USE THE FORMULA L=(W+1) S FOR THE TAPER LENGTH. SEE SECTION 9C.06 OF THE MUTCD FOR ADDITIONAL INFORMATION.

(F) FOR BIKE ROUTE SIGNING REQUIREMENTS SEE T-M-11.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

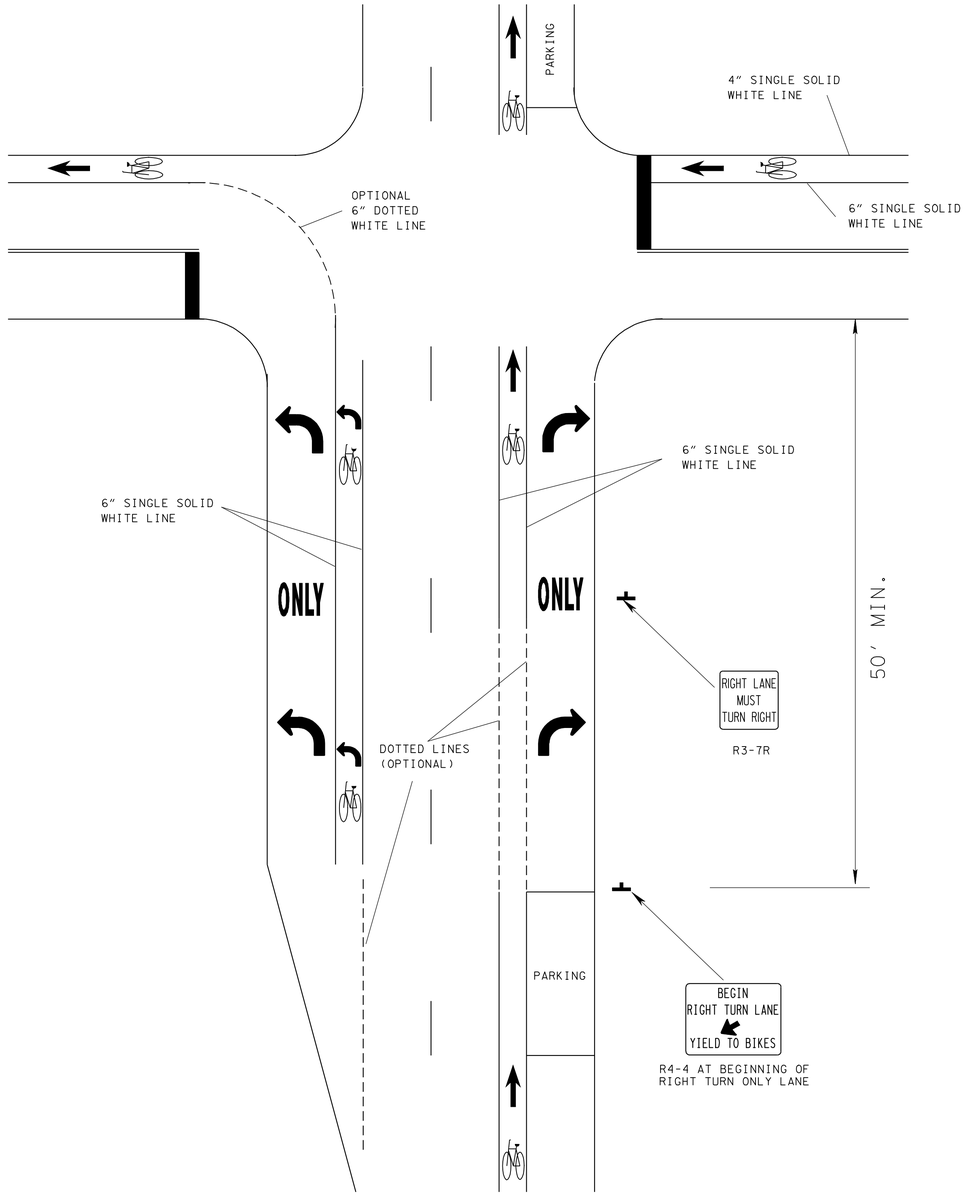
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SIGNING AND PAVEMENT MARKINGS FOR BICYCLE LANES ON URBAN ROADWAYS

5-1-07 | T-M-12

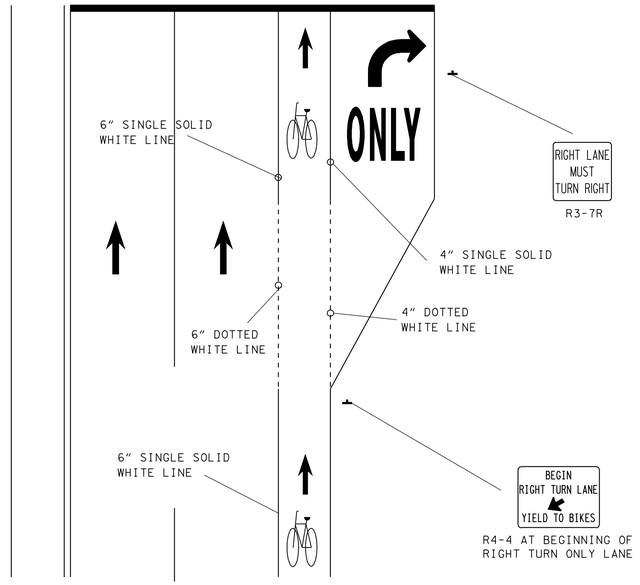
REV. 11-1-11: REVISED PAVEMENT MARKINGS AND ADDED R3-7R SIGNS.

DESIGNATED BICYCLE LANE WITH LEFT-TURN AREA, FOR HEAVY TURN VOLUMES, ON-STREET PARKING, ONE-WAY TRAFFIC, OR DIVIDED HIGHWAY

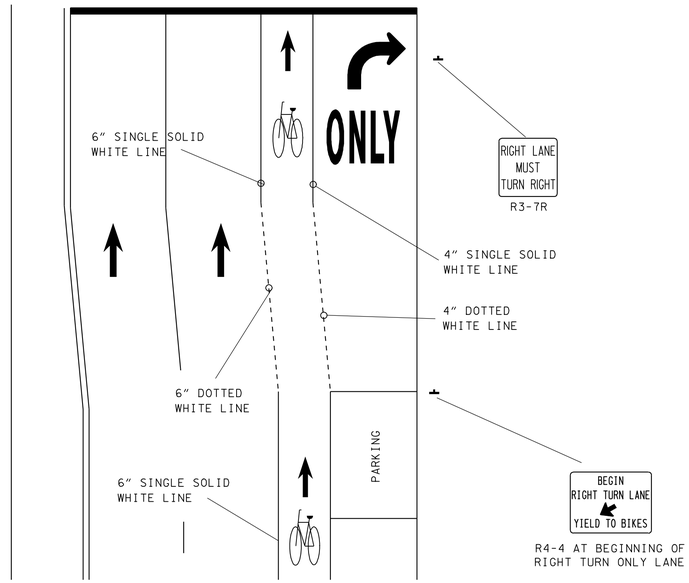


SEE T-M-13 FOR GENERAL NOTES

TYPICAL BICYCLE LANE TREATMENT AT A RIGHT TURN ONLY LANE



TYPICAL BICYCLE LANE TREATMENT AT PARKING LANE INTO A RIGHT TURN ONLY LANE



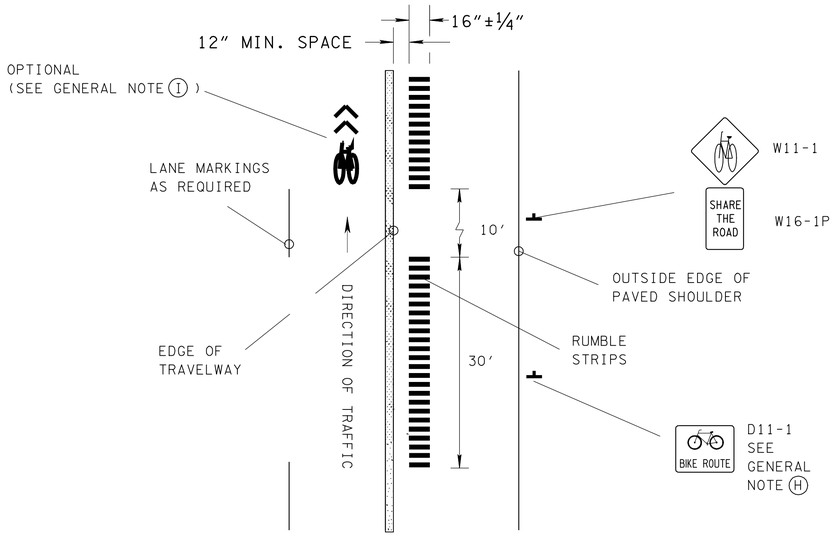
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SIGNING AND PAVEMENT MARKINGS FOR BICYCLE LANES AT INTERSECTIONS

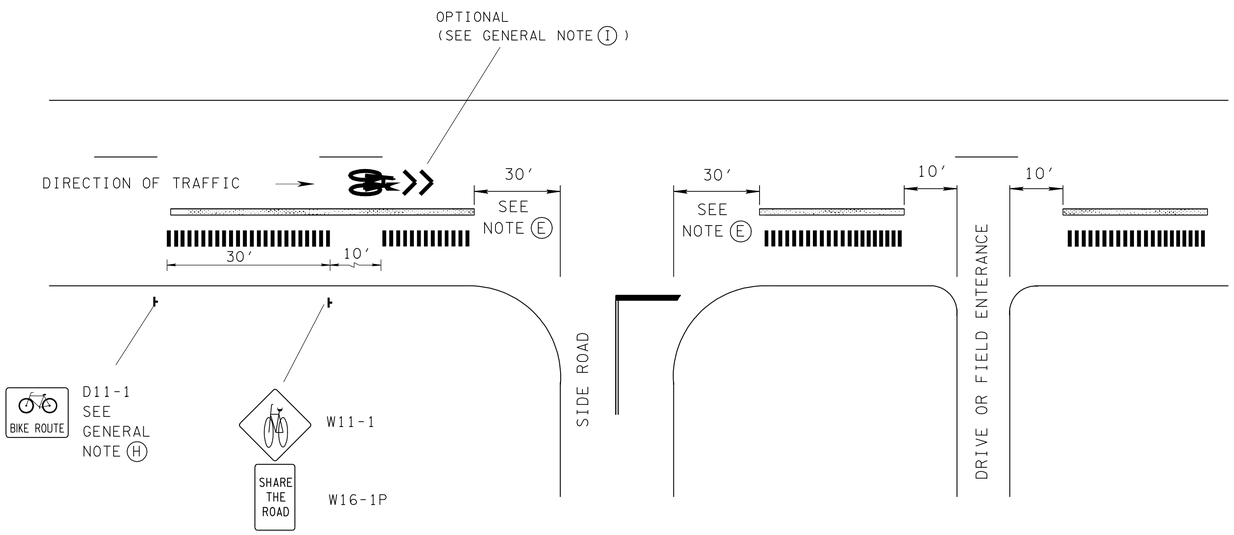
5-1-07 | T-M-14

REV. 11-1-11: ADDED BIKE SYMBOL/ ARROW SHARED LANE MARKINGS DETAILS AND ADDED GENERAL NOTE (H) AND (I).

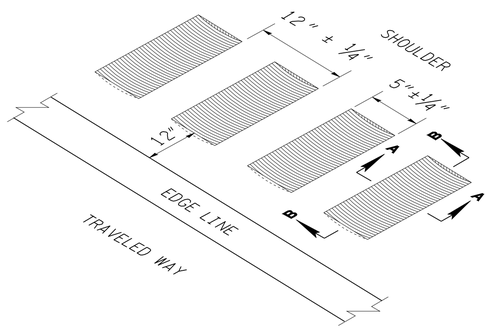
TYPICAL **RUMBLE STRIP** INSTALLATION DETAILS FOR NON-ACCESS CONTROLLED ROUTES



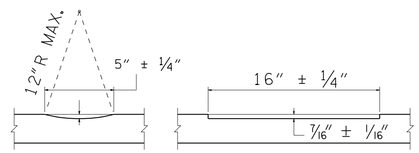
AVAILABLE PAVED SHOULDER
WIDTH 8' OR GREATER



SIDE ROAD AND DRIVEWAY
RUMBLE STRIP INSTALLATION DETAILS



ISOMETRIC VIEW



SECTION A-A SECTION B-B

TYPICAL RUMBLE STRIP INSTALLATION

RUMBLE STRIP GENERAL NOTES

(A) WHEN RUMBLE STRIPS ARE USED ON NON-ACCESS CONTROLLED FACILITIES, THEY SHOULD BE DISCONTINUED IN ADVANCE OF DRIVEWAYS, INTERSECTIONS, AND MEDIAN OPENINGS.

(B) MILLED-IN RUMBLE STRIP WITH 5"± ¼" GROOVES, 7/16"± 1/16" DEEP, ON 12" ± ¼" SPACING.

(C) A 10 FOOT LONG GAP BETWEEN 30 FOOT LONG SECTIONS OF RUMBLE STRIPS IS REQUIRED TO ACCOMMODATE BICYCLES.

(D) ON NON-ACCESS CONTROLLED ROUTES WITH A MEDIAN AND/OR INSIDE SHOULDERS,CONTINUOUS RUMBLE STRIPS SHOULD BE PLACED IN ACCORDANCE WITH STD. DWG. T-M-16. INSTALLATION SHOULD BE PAID UNDER ITEM 411-12.01 SCORING SHOULDERS (CONTINUOUS) (16" WIDTH) PER L.M. BREAKS, SHALL BE MADE AT SIDE ROADS AND MEDIAN OPENINGS BREAKS SHALL BEGIN 10' PRIOR TO OPENING.

(E) WHEN THE SIDE ROAD RADIUS IS GREATER THAN 30' RUMBLE STRIP APPLICATION SHOULD BE DISCONTINUED 50' IN ADVANCE OF THE INTERSECTION.

(F) RUMBLE STRIPS SHOULD ONLY BE PLACED ON PAVED SHOULDERS 8'.

(G) RUMBLE STRIP INSTALLATION SHALL BE PAID UNDER ITEM NUMBER

411-12.02. SCORING SHOULDERS (NON-CONTINUOUS) (16" WIDTH) PER L.M.

(H) SIGNS SHOULD BE PLACED APPROXIMATELY EVERY 0.25 MILES, AT EVERY TURN, AND AT ALL SIGNALIZED INTERSECTIONS. SIGN SPACING SHOULD NOT EXCEED A MILE ON RURAL ROADS.

(I) OPTIONAL, SHARED BIKE LANE MARKINGS SHOULD NOT BE PLACED ON ROADWAYS THAT HAVE A SPEED LIMIT ABOVE 35 MPH.

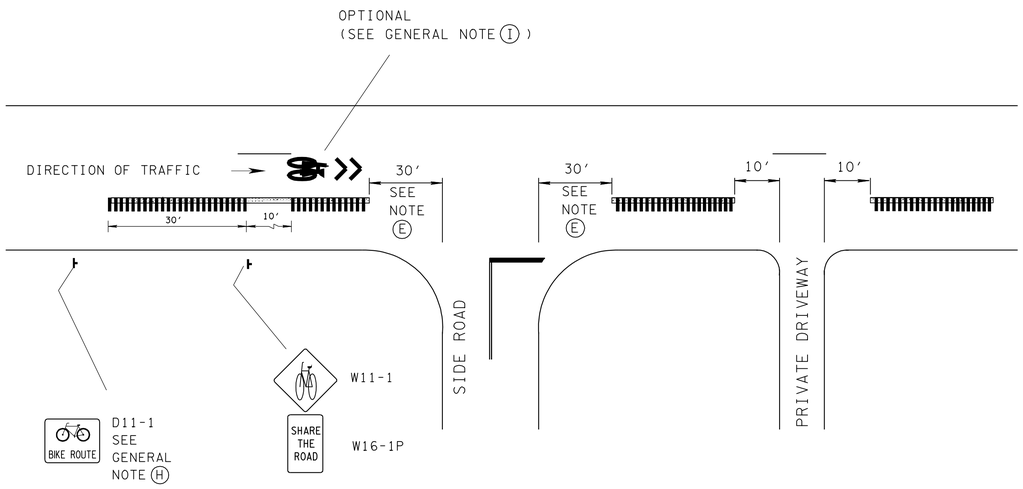
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

ASPHALT SHOULDER RUMBLE STRIP INSTALLATION DETAILS FOR NON-ACCESS CONTROLLED ROUTES

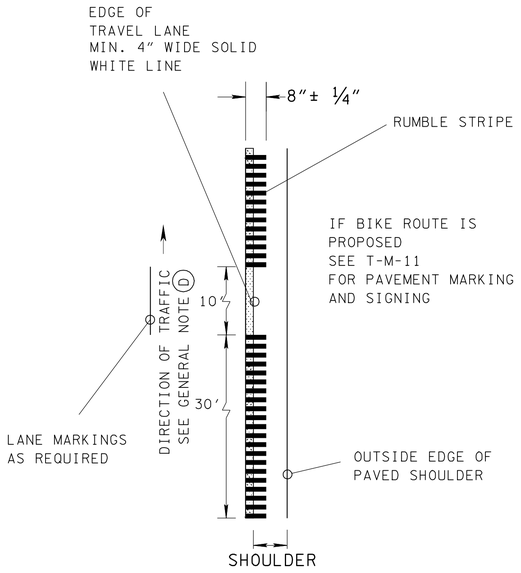
12-1-09 | T-M-15A

REV. 11-1-11: CHANGED GENERAL NOTES (E), (F), AND (G). DELETED T-M-11A. ADDED BIKE SYMBOL/ARROW SHARED LANE MARKING DETAILS AND ADDED GENERAL NOTE (H) AND (I).

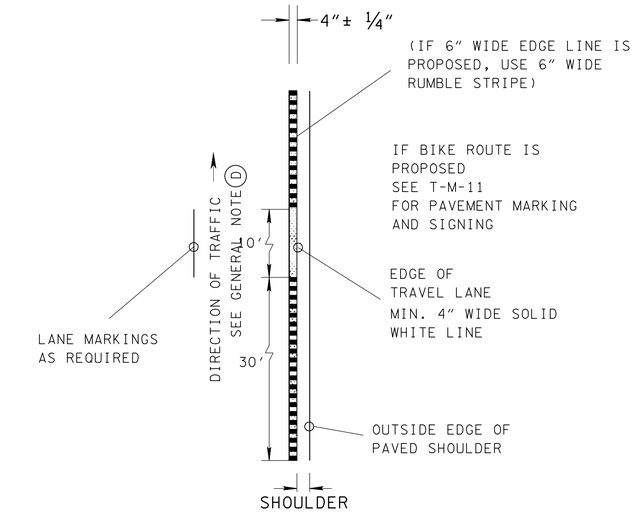
TYPICAL **RUMBLE STRIPE** INSTALLATION DETAILS FOR NON-ACCESS CONTROLLED ROUTES



SIDE ROAD AND DRIVEWAY
RUMBLE STRIPE INSTALLATION DETAILS



AVAILABLE PAVED SHOULDER
WIDTH 2' OR GREATER



AVAILABLE PAVED SHOULDER WIDTH 0'- 2'

RUMBLE STRIPE GENERAL NOTES

(A) WHEN RUMBLE STRIPES ARE USED ON NON-ACCESS CONTROLLED FACILITIES, THEY SHOULD BE DISCONTINUED IN ADVANCE OF DRIVEWAYS, INTERSECTIONS, AND MEDIAN OPENINGS.

(B) MILLED-IN RUMBLE STRIPE WITH 5"± ¼" GROOVES, 7/16"± 1/16" DEEP, ON 12" ± ¼" SPACING.

(C) WHEN RUMBLE STRIPES ARE INSTALLED ON ACCESS CONTROLLED ROUTES, THE RUMBLE STRIPE IS TO BE INSTALLED CONTINUOUSLY WITHOUT THE 10' GAP. RUMBLE STRIPE WIDTH SHALL BE 16" WIDE AS DETAILED ON STD. DWG. T-M-15.

(D) A 10 FOOT LONG GAP BETWEEN 30 FOOT LONG SECTIONS OF RUMBLE STRIPES IS REQUIRED TO ACCOMMODATE BICYCLES.

(E) WHEN THE SIDE ROAD RADIUS IS GREATER THAN 30', RUMBLE STRIPE APPLICATION SHOULD BE DISCONTINUED 50' IN ADVANCE.

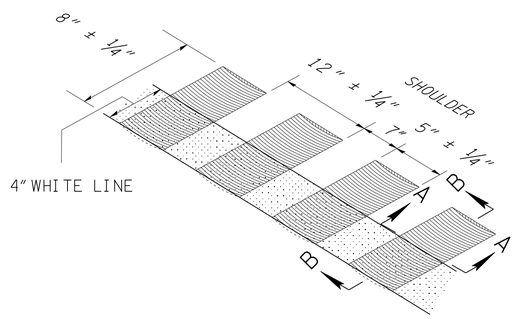
(F) RUMBLE STRIPE INSTALLATION SHALL BE PAID UNDER THE FOLLOWING ITEM NUMBERS

411-12.03. SCORING FOR RUMBLE STRIPE (NON-CONTINUOUS) (8" WIDTH) PER L.M.
411-12.04. SCORING FOR RUMBLE STRIPE (NON-CONTINUOUS) (4" WIDTH) PER L.M.

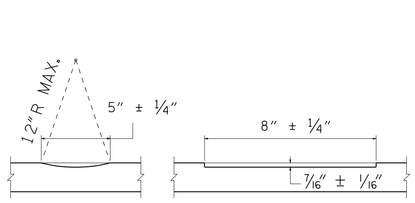
(G) THE COLOR OF AN EDGE LINE OR CENTER LINE ASSOCIATED WITH LONGITUDINAL RUMBLE STRIPE SHALL BE ACCORDANCE WITH SECTION 3A.05 OF THE MUTCD.

(H) SIGNS SHOULD BE PLACED APPROXIMATELY EVERY 0.25 MILES, AT EVERY TURN, AND AT ALL SIGNALIZED INTERSECTIONS. SIGN SPACING SHOULD NOT EXCEED A MILE ON RURAL ROADS.

(I) OPTIONAL, SHARED BIKE LANE MARKINGS SHOULD NOT BE PLACED ON ROADWAYS THAT HAVE A SPEED LIMIT ABOVE 35 MPH.

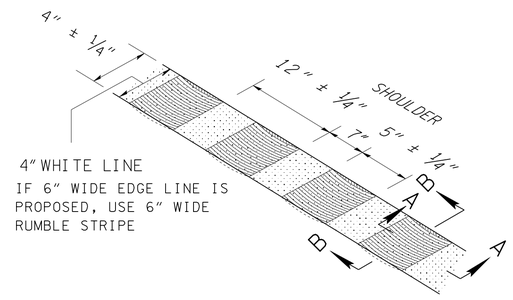


ISOMETRIC VIEW

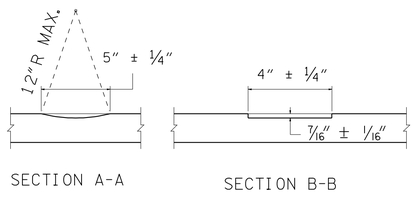


SECTION A-A SECTION B-B

TYPICAL 8"WIDE RUMBLE STRIPE INSTALLATION



ISOMETRIC VIEW



SECTION A-A SECTION B-B

TYPICAL 4" WIDE RUMBLE STRIPE INSTALLATION

NOTE:

4" WIDE RUMBLE IS NOT A PREFERRED APPLICATION IT SHOULD BE USED LOCATIONS WHERE NO SHOULDER IS AVAILABLE AND RUMBLE STRIP IS REQUIRED FOR A SAFETY UPGRADE.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

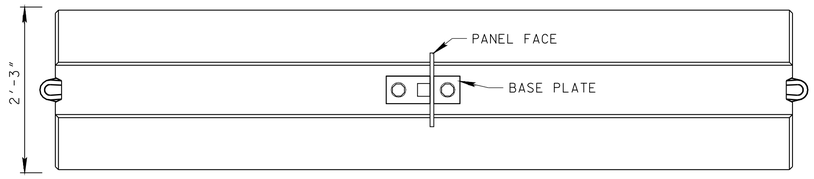
ASPHALT SHOULDER RUMBLE STRIPE INSTALLATION DETAILS FOR NON-ACCESS CONTROLLED ROUTES

12-1-09 | T-M-16

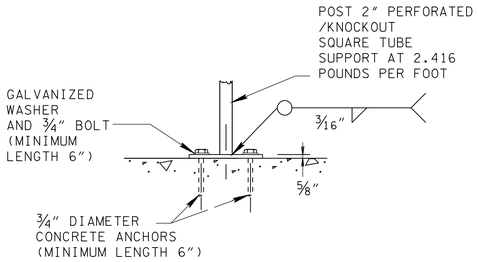
REV. 10-10-06: ADDED DETAIL FOR GROUND MOUNTED FLEXIBLE DELINEATOR AND GENERAL NOTES.

REV. 11-1-11: REVISED SHOULDER DETAILS.

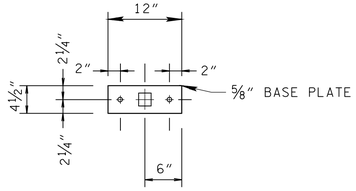
VERTICAL PANEL MOUNTED ON INTERCONNECTED PORTABLE BARRIER RAIL



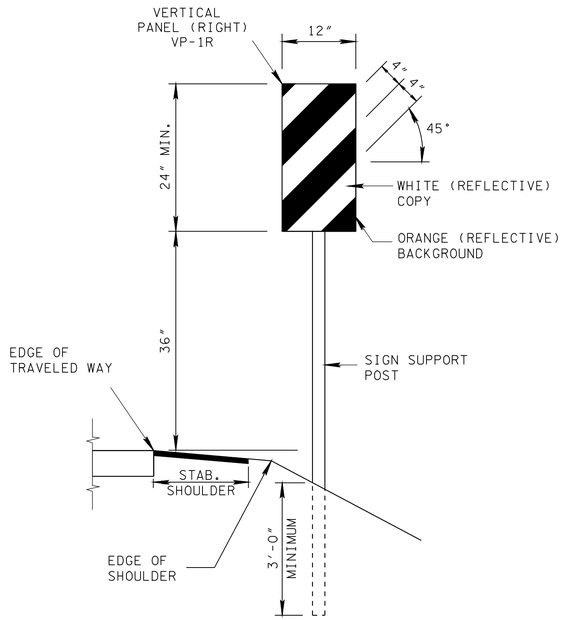
PLAN VIEW



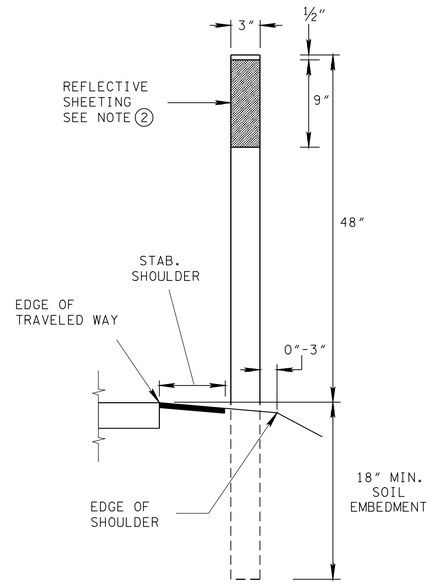
ELEVATION



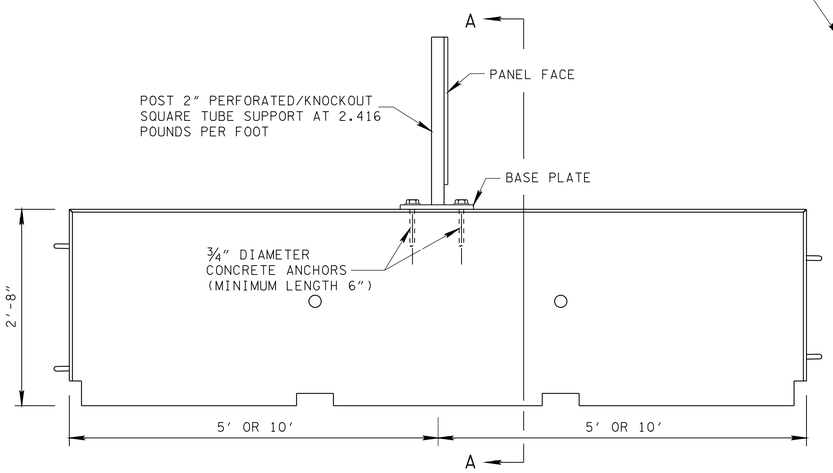
BASE PLATE DETAIL



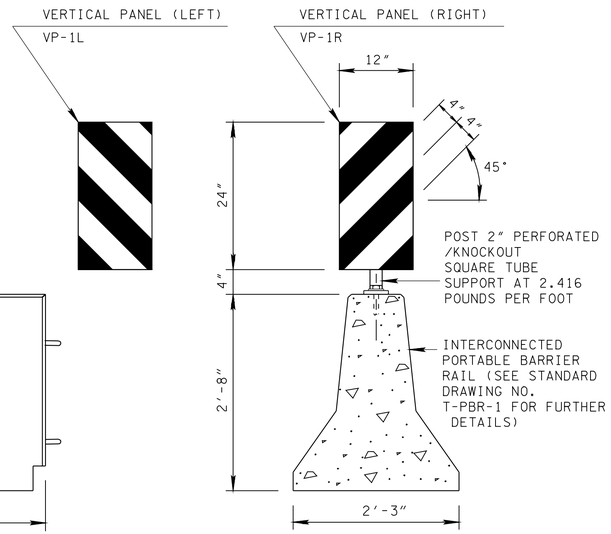
DETAIL FOR VERTICAL PANEL
WHICH IS TO BE GROUND MOUNTED



GROUND MOUNTED
FLEXIBLE DELINEATOR



ELEVATION VIEW



SECTION A-A

VERTICAL PANEL GENERAL NOTES

(A) SPACING FOR VERTICAL PANELS NOT IN A TAPER SHOULD BE A DISTANCE IN FEET APPROXIMATELY EQUAL TO TWO TIMES THE POSTED SPEED LIMIT IN MILES PER HOUR. THE MAXIMUM SPACING IN FEET BETWEEN PANELS IN A TAPER SHOULD BE APPROXIMATELY EQUAL TO THE POSTED SPEED IN MILES PER HOUR, BUT WILL NOT EXCEED ONE HALF THE SPACING OF THE PANELS NOT IN A TAPER.

(B) FOR TRAFFIC MOVING TO THE LEFT OF THE VERTICAL PANELS, USE SIGN VP-1R. FOR TRAFFIC MOVING TO THE RIGHT OF THE VERTICAL PANELS, USE SIGN VP-1L.

(C) IF USED FOR TRAFFIC IN TWO DIRECTIONS, BACK TO BACK PANELS SHALL BE USED.

(D) THE VERTICAL PANELS FACE, SUPPORT, INSTALLATION AND HARDWARE ARE TO BE PAID FOR UNDER THE PRICE BID FOR ITEM NUMBER 712-06.01, VERTICAL PANEL PER SQUARE FOOT.

GROUND MOUNTED FLEXIBLE DELINEATOR GENERAL NOTES

(1) THE REFLECTIVE SHEETING SHALL MEET THE REQUIREMENTS OF AASHTO M268, TYPE III OR HIGHER RETROREFLECTION PERFORMANCE LEVEL.

(2) THE REFLECTIVE SHEETING STRIP ON THE DELINEATORS SHALL BE MIN. 9 INCHES IN LENGTH AND SUFFICIENT WIDTH TO PROVIDE A MIN. 3 INCHES WIDE PROFILE FACING APPROACHING TRAFFIC. THE VARIATIONS IN REFLECTIVE SHEETING DIMENSION SHOULD NOT EXCEED ± 10%.

(3) THE CONTRACTOR SHALL SELECT MATERIAL FROM THE DEPARTMENT'S QPL.

(4) THE COLOR OF THE DELINEATOR POST SHALL BE WHITE UNLESS OTHERWISE NOTED ON THE PLANS.

(5) THE COLOR OF THE REFLECTIVE SHEETING SHALL CONFORM TO THE COLOR OF EDGE LINES STIPULATED IN SUBSECTION 3B-6 (PAGE 3B-8 AND 3B-11) OF THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

(6) PAYMENT FOR GROUND MOUNTED FLEXIBLE DELINEATORS WILL BE MADE AS FOLLOWS:
ITEM NUMBER 713-02.14, FLEXIBLE DELINEATOR (WHITE) PER EACH.
ITEM NUMBER 713-02.15, FLEXIBLE DELINEATOR (YELLOW) PER EACH.

(7) SPACING FOR FLEXIBLE DELINEATOR POSTS SHALL BE 20' OR LESS.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

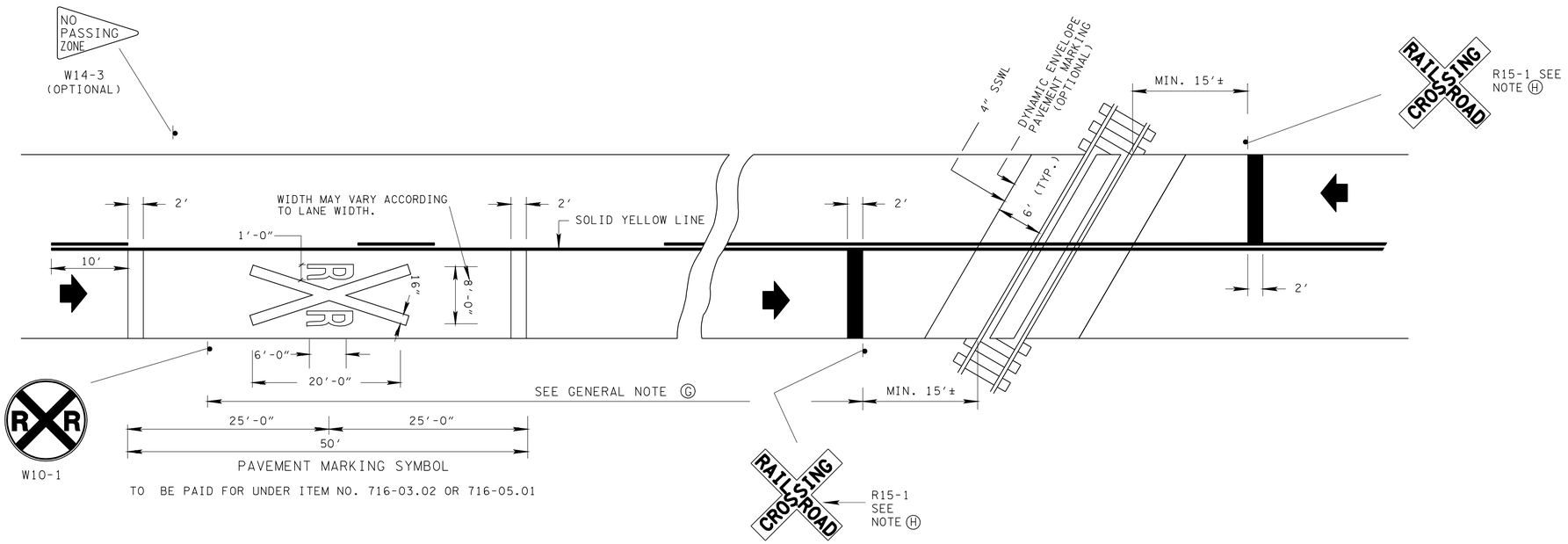
SEE STANDARD DRAWING NO. T-PBR-1 FOR DETAILS REGARDING INTERCONNECTED PORTABLE BARRIER RAIL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DETAIL FOR VERTICAL PANELS AND FLEXIBLE DELINEATORS

1-19-92 | T-PBR-2

22-FEB-2012 08:58
\\JJ0019083WF013.tdot.state.tn.us\13SHARED\StandDraw\STANDARD DRAWINGS\2012-MARCH DISTRUBUTION\TPBR2.ILLIII.DGN



TO BE PAID FOR UNDER ITEM NO. 716-03.02 OR 716-05.01

TYPICAL PAVEMENT MARKINGS AT **ACTIVE** RAILROAD-HIGHWAY GRADE CROSSINGS

GENERAL NOTES

Ⓐ A PORTION OF THE X SYMBOL SHOULD BE DIRECTLY OPPOSITE THE GRADE CROSSING ADVANCE WARNING SIGN (W10-1). THE X SYMBOL AND LETTERS SHOULD BE ELONGATED TO ALLOW FOR THE LOW ANGLE AT WHICH THEY WILL BE VIEWED.

Ⓑ A THREE LANE ROADWAY SHOULD BE MARKED WITH A CENTERLINE FOR TWO LANE APPROACH OPERATION ON THE APPROACH TO A CROSSING.

Ⓒ ON MULTI-LANE ROADS THE TRANSVERSE BANDS SHOULD EXTEND ACROSS ALL APPROACH LANES, AND INDIVIDUAL "RxR" SYMBOLS SHOULD BE USED IN EACH APPROACH LANE.

Ⓓ PAVEMENT MARKINGS MATERIAL CAN BE EITHER PAINT OR PLASTIC AS SHOWN ON THE PLANS OR DIRECTED BY THE ENGINEER.

Ⓔ REFER TO STANDARD ALPHABET FOR HIGHWAY SIGNS AND MARKINGS FOR RxR SYMBOLS DETAILS.

Ⓕ THE COST OF ALL TRANSVERSE BANDS SHALL BE IN THE PRICE BID FOR THE "RxR" SYMBOLS AT EACH RAILROAD CROSSING.

Ⓖ PLACEMENT OF THE RAILROAD ADVANCE WARNING SIGN SHALL GENERALLY BE IN ACCORDANCE WITH SECTION 2C.05 TABLE 2C-4 CONDITION B OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES

Ⓗ RAILROAD CROSS-BUCK SIGN AND SUPPORT SHALL BE INSTALLED IN ACCORDANCE WITH T-S-16.

REV. 5-16-75: ADDED NOTE PERTAINING TO HEIGHT OF RAILROAD ADVANCE WARNING SIGN IN RURAL, BUSINESS, COMMERCIAL & RESIDENTIAL DISTRICTS.

REV. 10-10-75: ADDED NOTE REGARDING PAVEMENT MARKING MATERIAL.

REV. 5-9-78: ADDED RAILROAD ADVANCED WARNING SIGN NUMBER AND REQUESTED DISTANCES FOR SIGN AND PAVEMENT MARKINGS.

REV. 9-14-78: ADJUSTED STOP BARS AT TRACK.

REV. 7-30-79: ADDED TABLE SHOWING DIMENSION C. ADDED DIMENSIONS TO TYPICAL PAVEMENT MARKINGS DRAWING. DELETED TABLE SHOWING DISTANCES FOR WARNING DEVICES. DELETED NOTE REGARDING WARNING SIGNS IN RURAL AREAS AND NOTE REGARDING DISTANCE FROM MARKINGS TO TRACKS BASED ON SPEED AND SIGHT DISTANCE.

REV. 4-3-80: CHANGED DIMENSION BETWEEN CROSS BARS TO THE CENTER OF THE R/R "X" SYMBOL TO 25′-0″. CHANGED THE HEIGHT OF THE "R" TO 6′-0″. CARRIED THE CENTER LINE STRIPES THRU THE CROSSING. DELETED THE "12′ MINIMUM" DIMENSION FROM THE CENTER LINE OF THE TRACK TO THE STOP BAR.

REV. 4-10-80: UPDATE TO CONFORM WITH THE M.U.T.C.D.

REV. 4-10-80: CHANGED DRAWING NUMBER FROM AW-01 TO T-RR-1.

REV. 6-15-82: CORRECTED NOTE REGARDING OFFSET DISTANCE TO WARNING SIGN. ADDED NOTE REGARDING PAYMENT FOR TRANSVERSE LINES AT EACH CROSSING.

REV. 5-22-84: WIDTH OF "R" CORRECTED TO 1′-0″.

REV. 8-5-85: CHANGED DIMENSION "C". ADDED GENERAL NOTE. CHANGED PAVEMENT MARKING NOTE AND SIGN NOTE.

REV. 6-22-88: CHANGED WEIGHT OF STEEL POST.

REV. 11-1-88: ADDED SIGN SHEET THICKNESS.

REV. 8-22-91: RELOCATED PLACEMENT OF W10-1 SIGN. ADDED NOTE Ⓐ AND REVISED NOTE Ⓖ.

☐ REV. 7-29-96: CHANGED MATERIAL ON BACKGROUND OF RAILROAD ADVANCE WARNING SIGN

☐ REV. 1-19-99: ADDED FOOTNOTE ③.

☐ REV. 7-29-04: CHANGED PLAN VIEW TO CLARIFY DETAIL.

☐ REV. 10-23-06: ADDED CROSSBUCK SIGN AND GENERAL NOTE Ⓗ.

REV. 11-1-11: REVISED GENERAL NOTES A, G, AND H. MOVED RAILROAD ADVANCE WARNING SIGN DETAIL WITH FOOTNOTES TO T-S-16. REVISED TYPICAL PAVEMENT MARKING DETAIL. ADDED OPTIONAL SIGN W14-3.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TYPICAL PAVEMENT MARKING AT RAILROAD ACTIVE HIGHWAY GRADE CROSSINGS AND RAILROAD ADVANCE WARNING SIGN

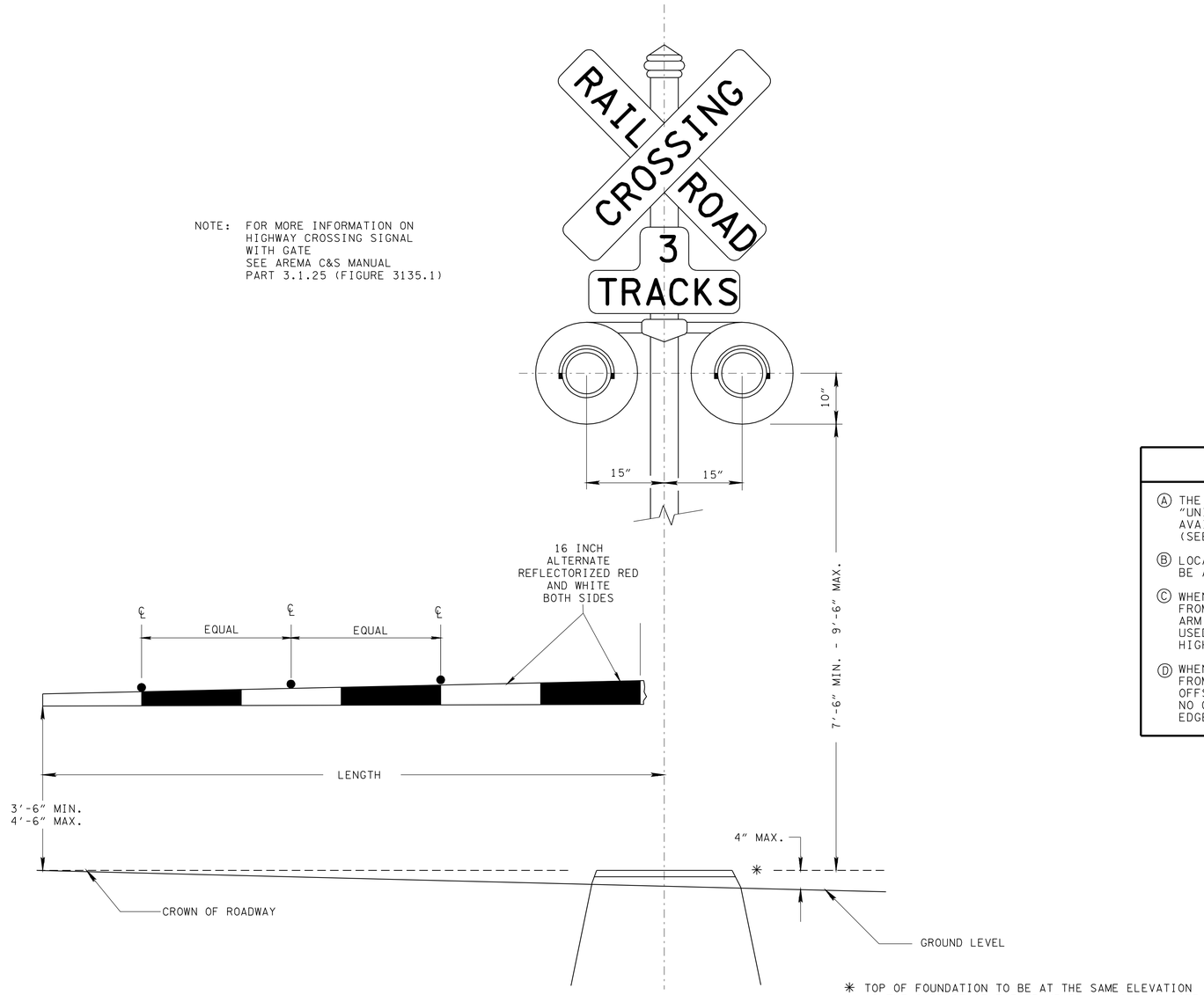
T-RR-1

REV. 4-11-80: CHANGED DRAWING NO. FROM RH-CS-01 TO T-RR-2.

REV. 7-29-96: REDREW ON CADD. MADE MINOR CHANGES.

REV. 11-1-11: REVISED GATE DETAIL AND ADDED GENERAL NOTES Ⓐ THROUGH Ⓓ. REVISED NOTE FOR SIGNAL MANUAL DRAWING 1489.

NOTE: FOR MORE INFORMATION ON HIGHWAY CROSSING SIGNAL WITH GATE SEE AREMA C&S MANUAL PART 3.1.25 (FIGURE 3135.1)



✱ TOP OF FOUNDATION TO BE AT THE SAME ELEVATION AS THE SURFACE OF THE TRAVELED WAY AND NO MORE THAN 4 INCHES ABOVE THE SURFACE OF THE GROUND (FOR CURBED SECTIONS SEE DRAWING T-RR-4).

GENERAL NOTES

Ⓐ THE MEANING OF FLASHING- LIGHT SIGNALS AND GATES SHALL BE AS STATED IN THE "UNIFORM VEHICLE CODE" (SEE SECTIONS 11-701 AND 11-703 OF THE UVC), WHICH IS AVAILABLE FROM THE NATIONAL COMMITTEE ON UNIFORM TRAFFIC LAWS AND ORDINANCES (SEE PAGE I OF THE MUTCD FOR THE ADDRESS.

Ⓑ LOCATION AND CLEARANCE DIMENSIONS FOR FLASHING-LIGHT SIGNALS AND GATES SHALL BE AS SHOWN IN FIGURE 8C-1 OF THE MUTCD.

Ⓒ WHEN THERE IS A CURB, A HORIZONTAL OFFSET OF AT LEAST 2 FEET SHALL BE PROVIDED FROM THE FACE OF THE VERTICAL CURB TO THE CLOSEST PART OF THE SIGNAL OR GATE ARM IN ITS UPRIGHT POSITION. WHEN A CANTILEVERED-ARM FLASHING-LIGHT SIGNAL IS USED, THE VERTICAL CLEARANCE SHALL BE AT LEAST 17 FEET ABOVE THE CROWN OF THE HIGHWAY TO THE LOWEST POINT OF THE SIGNAL UNIT.

Ⓓ WHEN THERE IS A SHOULDER, BUT NO CURB, A HORIZONTAL OFFSET OF AT LEAST 2 FEET FROM THE EDGE OF THE A PAVED OR SURFACED SHOULDER SHALL BE PROVIDED, WITH AN OFFSET OF AT LEAST 6 FEET FROM THE EDGE OF THE TRAVELED WAY. WHERE THERE IS NO CURB OR SHOULDER, THE MINIMUM HORIZONTAL OFFSET SHALL BE 6 FEET FROM THE EDGE OF THE TRAVELED WAY.

RAILROAD-HIGHWAY CROSSING SIGNAL WITH GATE

CROSS-REFERENCE DRAWINGS NOTED ON THIS SHEET: T-RR-4

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STANDARD DRAWING FOR RAILROAD AND HIGHWAY CROSSING SIGNAL WITH GATE

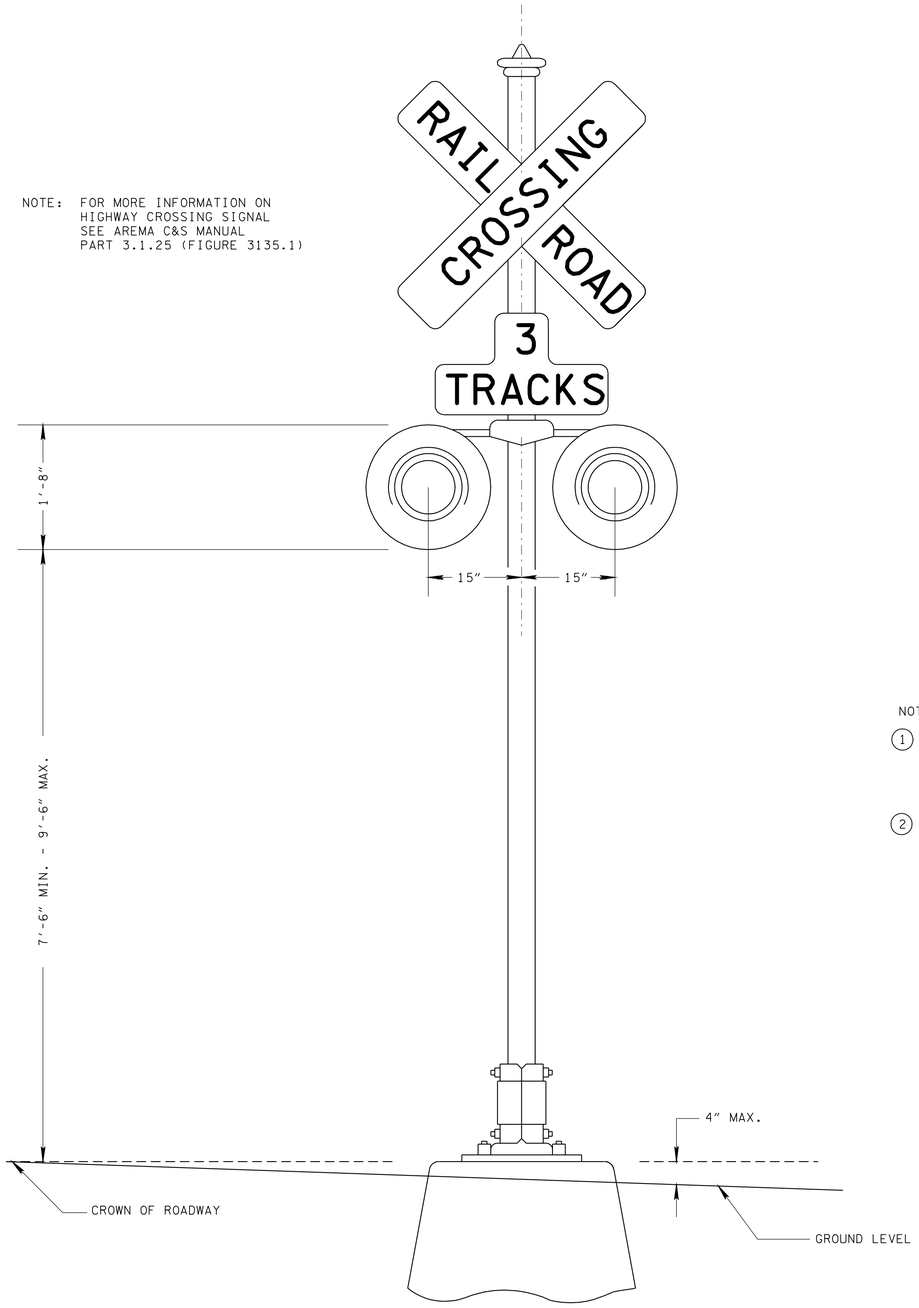
T-RR-2

REV. 4-11-80: CHANGED DRAWING NO. FROM RH-CS-02 TO T-RR-3.

REV. 7-29-96: REDREW ON CADD. MADE MINOR CHANGES.

REV. 11-1-11: REVISED DETAIL AND ADDED NOTES (1) AND (2).

NOTE: FOR MORE INFORMATION ON HIGHWAY CROSSING SIGNAL SEE AREMA C&S MANUAL PART 3.1.25 (FIGURE 3135.1)



NOTE: DETAILS SHOWN ON SIGNAL MANUAL DRAWING 1653.

NOTE;

(1) TOP OF THE SIGNAL FOUNDATION SHOULD BE NO MORE THAN 4 INCHES ABOVE THE SURFACE OF THE GROUND AND SHOULD BE AT THE SAME ELEVATION AS THE CROWN OF THE ROADWAY (FOR CURB SECTION SEE DRAWING T-RR-4).

(2) SEE T-RR-2 FOR LATERAL OFFSET INFORMATION.

CROSS-REFERENCE DRAWINGS NOTED ON THIS SHEET: T-RR-4

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STANDARD DRAWING FOR RAILROAD-HIGHWAY CROSSING SIGNAL

T-RR-3

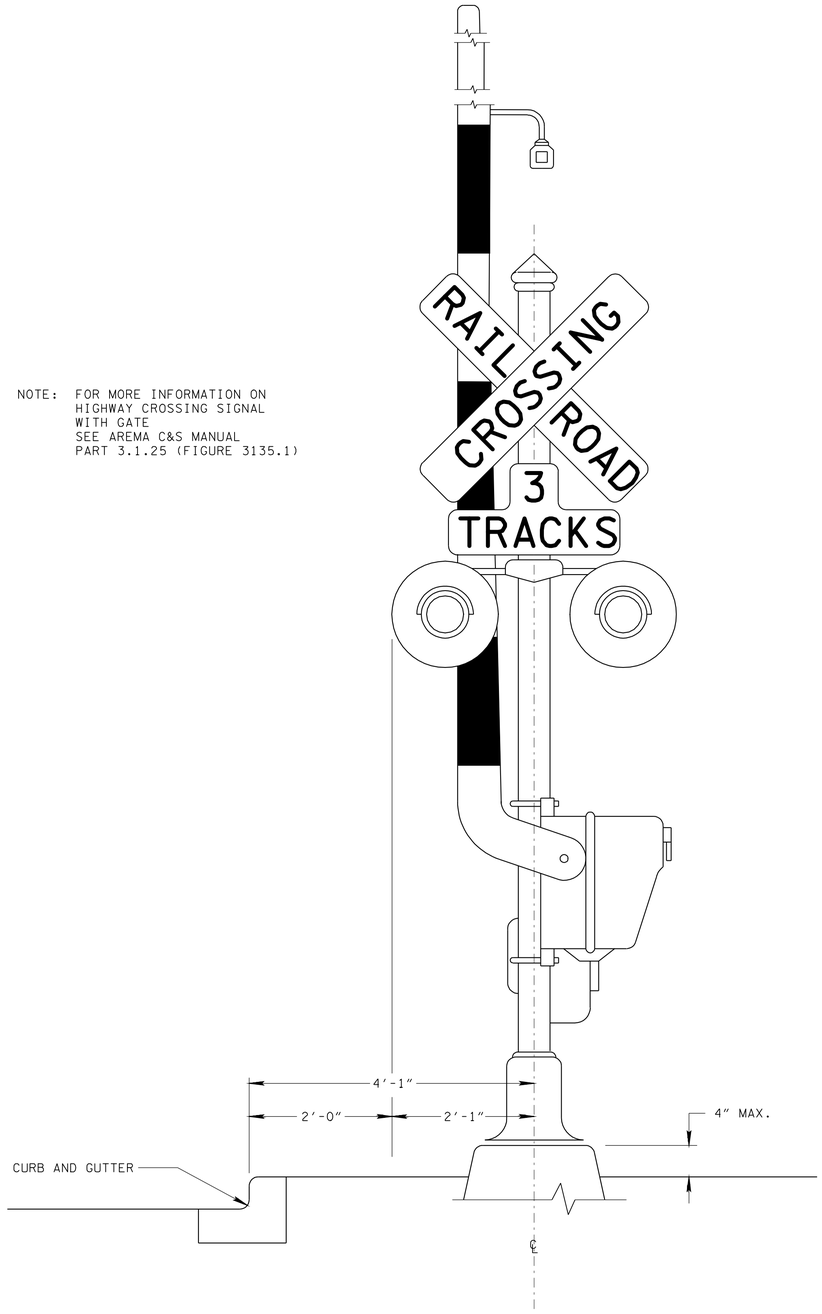
RAILROAD-HIGHWAY CROSSING SIGNAL

REV. 4-11-80: CHANGED DRAWING NO. FROM RH-CS-03 TO T-RR-4.

REV. 7-29-96: REDREW ON CADD. MADE MINOR CHANGES.

REV. 11-1-11: REVISED GENERAL NOTE (A), CHANGED NOTE (B) TO (I) IN GENERAL NOTES. ADDED GENERAL NOTES (B), (C), (D), (E), (F), (G), AND (H).

NOTE: FOR MORE INFORMATION ON HIGHWAY CROSSING SIGNAL WITH GATE SEE AREMA C&S MANUAL PART 3.1.25 (FIGURE 3135.1)



TYPICAL CURB AND GUTTER PLAN
FOR RAILROAD-HIGHWAY CROSSING SIGNALS
WITH OR WITHOUT GATES

GENERAL NOTES

(A) WHEN THERE IS A CURB, A HORIZONTAL OFFSET OF AT LEAST 2 FEET SHALL BE PROVIDED FROM THE FACE OF THE VERTICAL CURB TO THE CLOSEST PART OF THE SIGNAL OR GATE ARM IN ITS UPRIGHT POSITION.

(B) WHEN THERE IS A SHOULDER, BUT NO CURB, A HORIZONTAL OFFSET OF AT LEAST 2 FEET FROM THE EDGE OF A PAVED OR SURFACED SHOULDER SHALL BE PROVIDED, WITH AN OFFSET OF AT LEAST 6 FEET FROM THE EDGE OF THE TRAVELED WAY.

(C) WHEN THERE IS NO CURB OR SHOULDER, THE MINIMUM HORIZONTAL OFFSET SHALL BE 6 FEET FROM THE EDGE OF TRAVELED WAY.

(D) EQUIPMENT HOUSINGS (CONTROLLER CABINETS) SHOULD HAVE A LATERAL OFFSET OF AT LEAST 30 FEET FROM THE EDGE OF THE HIGHWAY, AND WHERE RAILROAD OR LIGHT RAIL TRANSIT PROPERTY AND CONDITIONS ALLOW, AT LEAST 25 FEET FROM THE NEAREST RAIL.

(E) IF A PEDESTRIAN ROUTE ID PROVIDED, SUFFICIENT CLEARANCE FROM SUPPORTS, POSTS, AND GATE MECHANISMS SHOULD BE MAINTAINED FOR PEDESTRIAN TRAVEL.

(F) WHEN DETERMINED BY AN ENGINEERING STUDY, A LATERAL ESCAPE ROUTE TO THE RIGHT OF THE HIGHWAY IN ADVANCE OF THE GRADE CROSSING TRAFFIC CONTROL DEVICES SHOULD BE KEPT FREE OF GUARDRAIL OR OTHER GROUND OBSTRUCTIONS. WHERE GUARDRAIL IS NOT DEEMED NECESSARY OR APPROPRIATE, BARRIER SHOULD NOT BE USED FOR PROTECTING SIGNAL SUPPORTS.

(G) THE SAME LATERAL OFFSET AND ROADSIDE SAFETY FEATURES SHOULD APPLY TO FLASHING-LIGHT SIGNAL AND AUTOMATIC GATE LOCATION ON BOTH THE RIGHT-HAND AND LEFT-HAND SIDES OF THE ROADWAY.

(H) WHERE BOTH TRAFFIC CONTROL SIGNAL AND FLASHING-LIGHT SIGNAL (WITH OR WITHOUT AUTOMATIC GATES) ARE IN OPERATION AT THE SAME HIGHWAY-LRT GRADE CROSSING, THE OPERATION OF THE DEVICES SHOULD BE COORDINATED TO AVOID ANY DISPLAY OF CONFLICTING SIGNAL INDICATIONS.

(I) WHERE GATES ARE LOCATED IN THE MEDIAN, ADDITIONAL MEDIAN WIDTH MAY BE REQUIRED TO PROVIDE THE MINIMUM CLEARANCE FOR THE COUNTERWEIGHT SUPPORTS.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STANDARD DRAWING FOR TYPICAL CURB & GUTTER PLAN FOR RAILROAD-HIGHWAY CROSSING WITH OR WITHOUT GATES

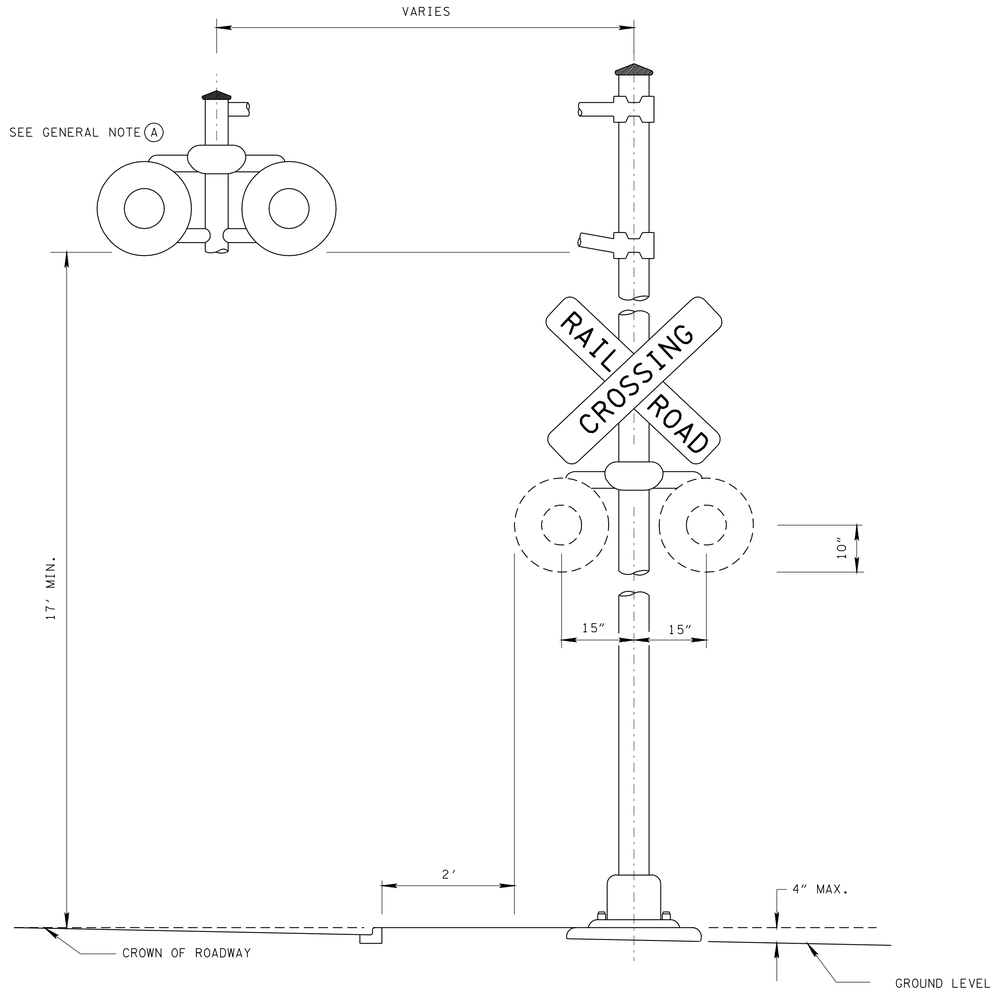
T-RR-4

REV. 4-11-80: CHANGED DRAWING NO. FROM RH-CS-04 TO T-RR-5.

REV. 7-29-96: REDREW ON CADD. MADE MINOR CHANGES.

REV. 11-1-11: REVISED TYPICAL FOR CANTILEVER SPAN. ADDED GENERAL NOTES.

NOTE: FOR MORE INFORMATION ON HIGHWAY CROSSING SIGNAL CANTILEVER SPAN SEE AREMA C&S MANUAL PART 3.1.25 (FIGURE 3135.1)



RAILROAD-HIGHWAY CROSSING CROWN
TYPICAL CANTILEVER SPAN

GENERAL NOTES

(A) MAST MOUNTED LIGHT UNITS MAY BE PROVIDED AS CONDITIONS REQUIRE.

(B) TOP OF FOUNDATION TO BE AT THE SAME ELEVATION AS THE SURFACE OF THE TRAVELED WAY AND NO MORE THAN 4 INCHES ABOVE THE SURFACE OF THE GROUND.

(C) SEE SECTIONS 8C.01 AND 8C.02 OF THE MUTCD FOR ADDITIONAL INFORMATION.

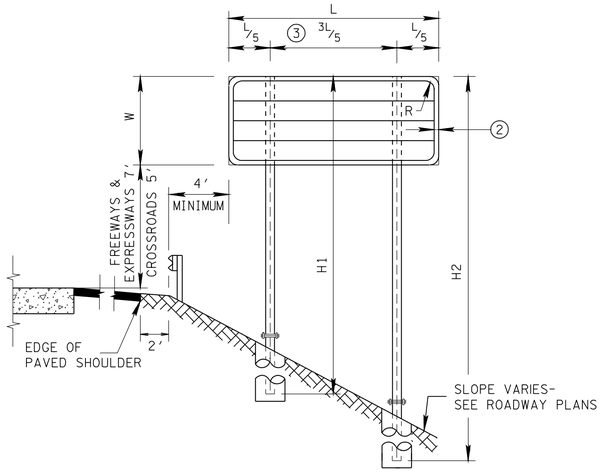
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

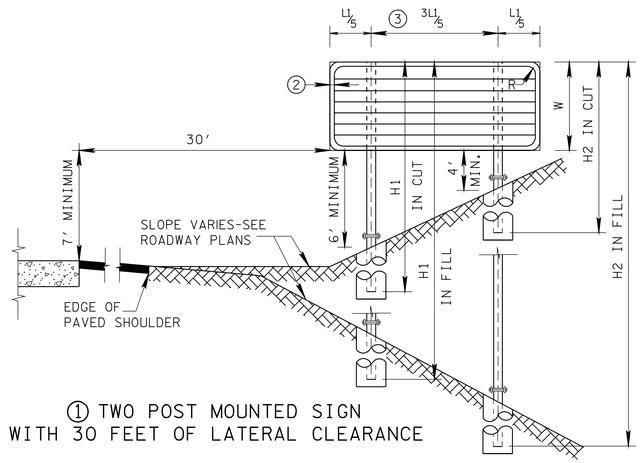
RAILROAD-HIGHWAY CROSSING SIGNAL WITH CANTILEVER SPAN

T-RR-5

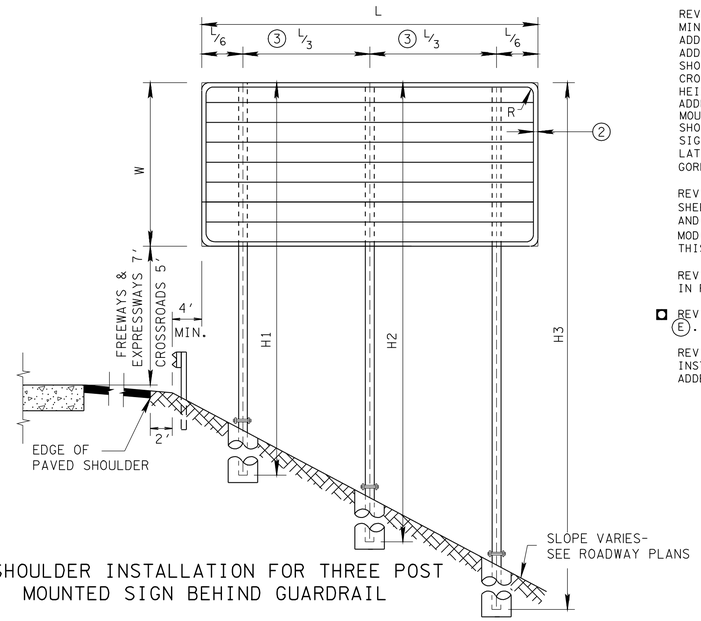
22-FEB-2012 08:59
\\J0019083WF013.rdot.state.tn.us\J3SHARED\StandDraw\STANDARD DRAWINGS\2012-MARCH DISTRUBUTION\TRR5_II0111.DGN



① SHOULDER INSTALLATION FOR TWO POST MOUNTED SIGN BEHIND GUARDRAIL



① TWO POST MOUNTED SIGN WITH 30 FEET OF LATERAL CLEARANCE



① SHOULDER INSTALLATION FOR THREE POST MOUNTED SIGN BEHIND GUARDRAIL

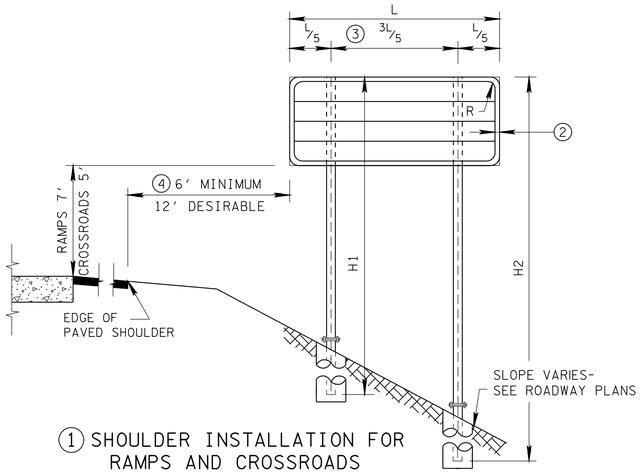
REV. 1-30-85: REDREW SHEET. CHANGED MINIMUM OFFSET ON ALL SIGNS AND NOTE. ADDED EXIT PANEL MOUNTING DETAIL, ADDITIONAL PANEL MOUNTING DETAIL, AND SHOULDER INSTALLATION RAMPS AND CROSSROADS. CHANGED MINIMUM MOUNTING HEIGHT, ELIMINATED SECONDARY SIGN AND ADDED BREAKAWAY TO THREE POST MOUNTED SIGN. ADDED GUARDRAILTO SHOULDER INSTALLATION TWO POST MOUNTED SIGN. ADDED FILL SLOPE DETAIL TO 30' LATERAL CLEARANCE. ELIMINATED TYPICAL GORE SIGN LOCATION.

REV. 12-7-90: REDREW AND REORGANIZED SHEET. NUMBERED ALL GENERAL NOTES AND FOOTNOTES. ADDED FOOTNOTE NO. (3). MODIFIED EXIT PANEL MOUNTING DETAILS ON THIS SHEET.

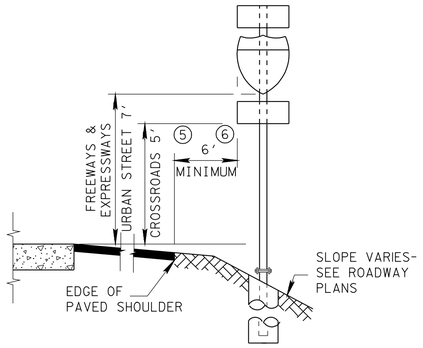
REV. 8-16-91: CHANGED MINIMUM DIMENSION IN FOOTNOTE NO. (3) FROM 7'-0" TO 7'-6".

☐ REV. 5-27-03: CORRECTED GENERAL NOTE (E).

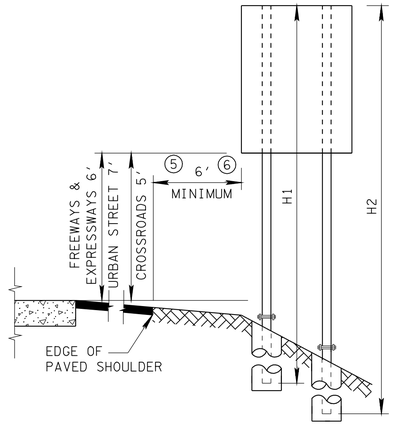
REV. 11-1-11: REVISED SHOULDER INSTALLATION HEIGHT FOR FREEWAYS AND ADDED GENERAL NOTE (G)



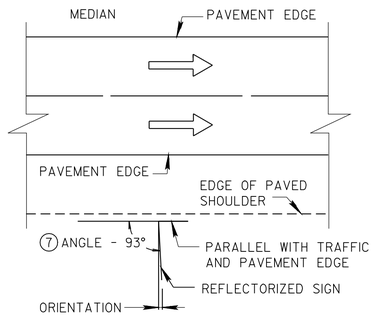
① SHOULDER INSTALLATION FOR RAMPS AND CROSSROADS



SHOULDER INSTALLATION FOR ROUTE MARKERS

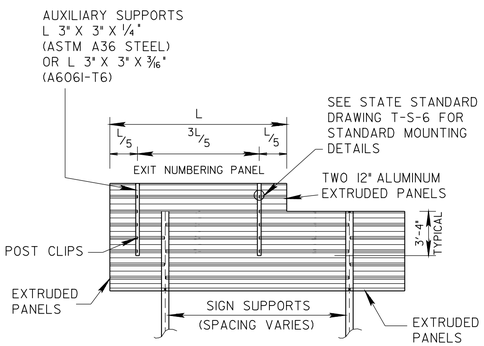


① SHOULDER INSTALLATION FOR TWO POST MOUNTED REGULATORY AND WARNING SIGNS



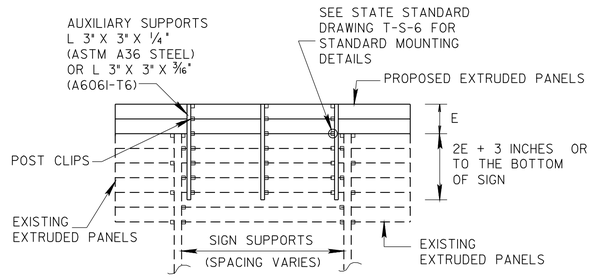
NOTE: SIGNS SHALL NORMALLY BE ERECTED SO THAT THE SIGN FACE IS TRULY VERTICAL AND AT 93° AWAY FROM THE CENTER OF THE LANE WHICH THE SIGN SERVES AND THE DIRECTION OF TRAVEL. WHERE LANES DIVIDE OR ARE ON CURVES, SIGN FACES SHALL BE ORIENTED SO AS TO BE MOST EFFECTIVE BOTH DAY AND NIGHT AND TO AVOID THE POSSIBILITY OF SPECULAR REFLECTION.

⑦ ANGLE OF REFLECTORIZED SIGN TO APPROACHING TRAFFIC DETAIL



EXIT PANEL MOUNTING DETAIL

ITEM NO. 713-17.02, INSTALL AUXILIARY SUPPORT FOR EXIT NUMBER PANEL PER EACH (INCLUDES THE COST OF AUXILIARY SUPPORTS AND POST CLIPS).



ADDITIONAL PANEL MOUNTING DETAIL

ITEM NO. 713-17.03, INSTALL AUXILIARY SUPPORT ON EXISTING SIGN PER EACH (INCLUDES THE COST OF AUXILIARY SUPPORTS AND POST CLIPS).

NOTE: TO BE USED WHERE ADDITIONAL PANELS ARE REQUIRED.

GENERAL NOTES

(A) THE LAYOUTS SHOWN ON THIS PAGE ARE TYPICAL FOR ALL SIGNS ERECTED ON THE FREEWAY AND THE EXPRESSWAY SYSTEM AND WITHIN THEIR RESPECTIVE INTERCHANGE AREAS, UNLESS OTHERWISE SPECIFIED IN THE ROADWAY PLANS FOR A SPECIFIC PROJECT.

(B) ALL SIGNS SHALL BE ERECTED SO THAT THE INSIDE EDGE OF THE PROPOSED SIGN OR ITS ASSEMBLY IS A MINIMUM OF SIX FEET BEYOND THE EDGE OF PAVED SHOULDER OR TWO FEET FROM THE BACK FACE OF THE CURB.

(C) ALL DIRECTIONAL SIGNS ON THE FREEWAY AND EXPRESSWAY SYSTEM SHALL BE ERECTED SO THAT THE BOTTOM OF THE SIGN ASSEMBLY IS SEVEN FEET ABOVE THE EDGE OF PAVED SHOULDER.

(D) WHEN ANAUXILIARY SIGN IS MOUNTED BELOW THE MAJOR SIGN, THE MAJOR SIGN OR ITS ASSEMBLY SHALL BE ERECTED AT LEAST EIGHT FEET ABOVE THE EDGE OF PAVED SHOULDER AND THE AUXILIARY SIGN SHALL BEERECTED AT LEAST FIVE FEET ABOVE THE EDGE OF PAVED SHOULDER.

(E) ALL ROUTE MARKERS, WARNING SIGNS AND REGULATORY SIGNS ON THE FREEWAY AND THE EXPRESSWAY SYSTEM SHALL BE AT LEAST SIX FEET ABOVE THE EDGE OF PAVED SHOULDER.

(F) ALL SIGNS FOR ROADS OTHER THAN ON THE FREEWAY AND THE EXPRESSWAY SYSTEM SHALL BE ERECTED SO THAT THE BOTTOM EDGE OF THE PROPOSED SIGN OR ITS ASSEMBLY IS A MINIMUM OF FIVE FEET ABOVE THE EDGE OF PAVED SHOULDER, UNLESS OTHERWISE NOTED.

(G) SEE SECTIONS 2A.18 THROUGH 2A.23 OF THE MUTCD FOR ADDITIONAL INFORMATION.

FOOTNOTES

(1) SEE SIGN SCHEDULE SHEET IN THE PLANS FOR DIMENSIONS E, L, H, H1, H2, H3, R, AND W.

(2) SEE SIGN SCHEDULE SHEET FOR WIDTH OF BORDER.

(3) THIS DIMENSION SHALL BE A MINIMUM OF SEVEN FEET SIX INCHES WHEN USING POST SIZE OF W6 X 15 OR LARGER.

(4) DISTANCE OF FOUR FEET IS TO BE USED BEHIND GUARDRAIL.

(5) DISTANCE OF TWENTY FEET IS DESIRABLE ON FREEWAYS AND EXPRESSWAYS.

(6) DISTANCE OF TWO FEET MINIMUM IS TO BE USED ON URBAN STREETS WITH CURB AND GUTTER SECTIONS.

(7) ANGLE OF REFLECTORIZED SIGN TO APPROACHING TRAFFIC DETAIL DOES NOT APPLY WHEN PROPOSED SIGNS ARE SET BACK THIRTY FEET OR MORE. SIGNS ON TANGENTS THAT ARE SET BACK THIRTY FEET OR MORE FROM THE EDGE OF PAVEMENT SHALL BE ORIENTED AT NINETY DEGREES.

LEGEND

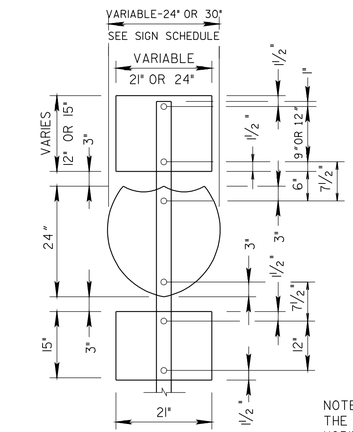
W-HEIGHT OF SIGN FACE
L-LENGTH OF SIGN FACE
R-RADIUS OF BORDER
E-HEIGHT OF AUXILIARY EXTRUDED PANELS
H-HEIGHT OF SIGN SUPPORT

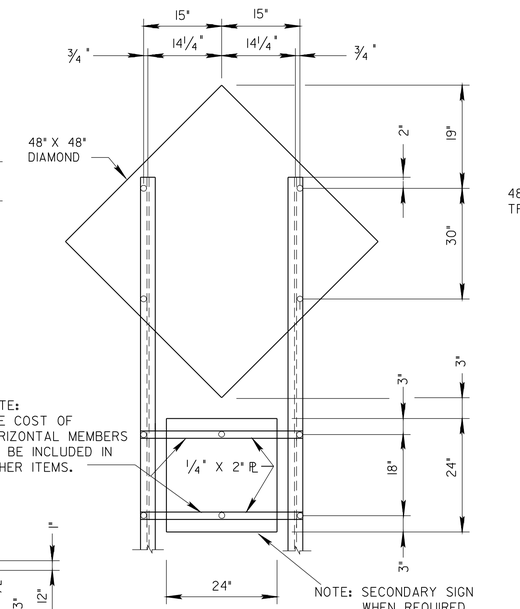
☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

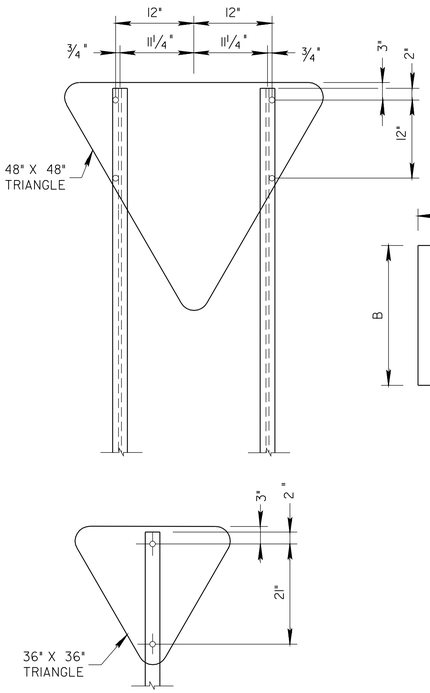
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

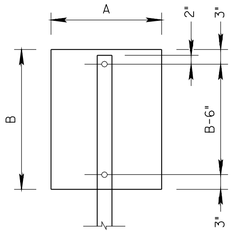
STANDARD LAYOUT GROUND MOUNTED SIGNS

1-19-96 | T-S-9

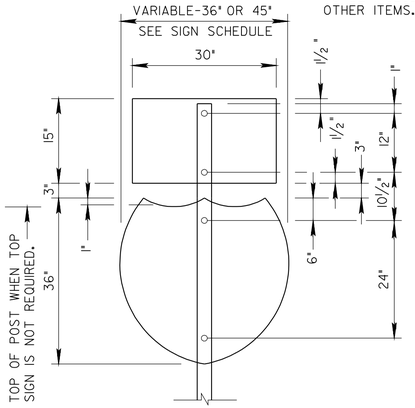


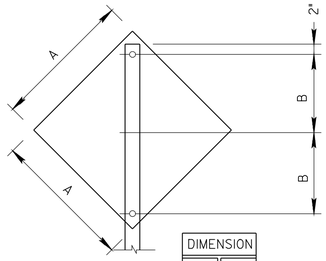




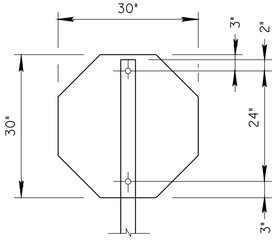


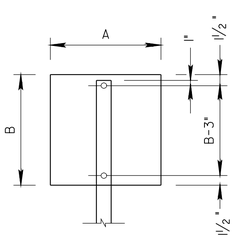
DIMENSION	
A	B
12"	36"
18"	18"
18"	24"
24"	24"
24"	30"
30"	30"
30"	36"
36"	30"



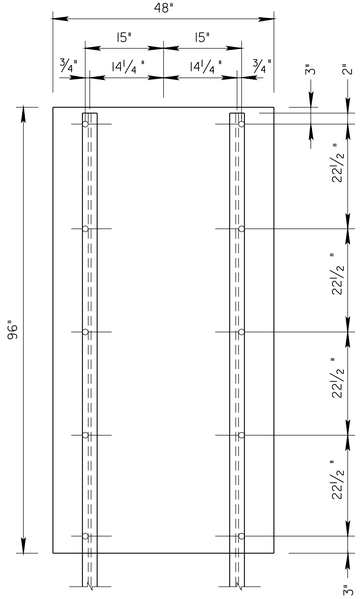


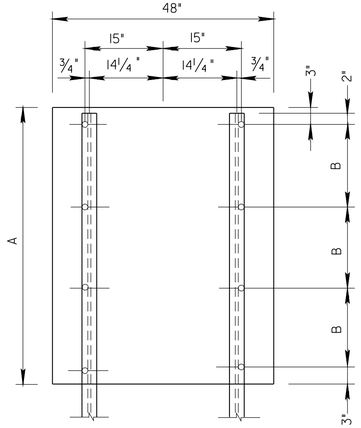
DIMENSION	
A	B
30"	15"
36"	18"



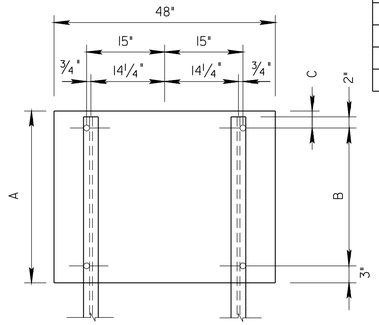


DIMENSION	
A	B
12"	18"
21"	9"
21"	15"
24"	12"
30"	15"
36"	12"



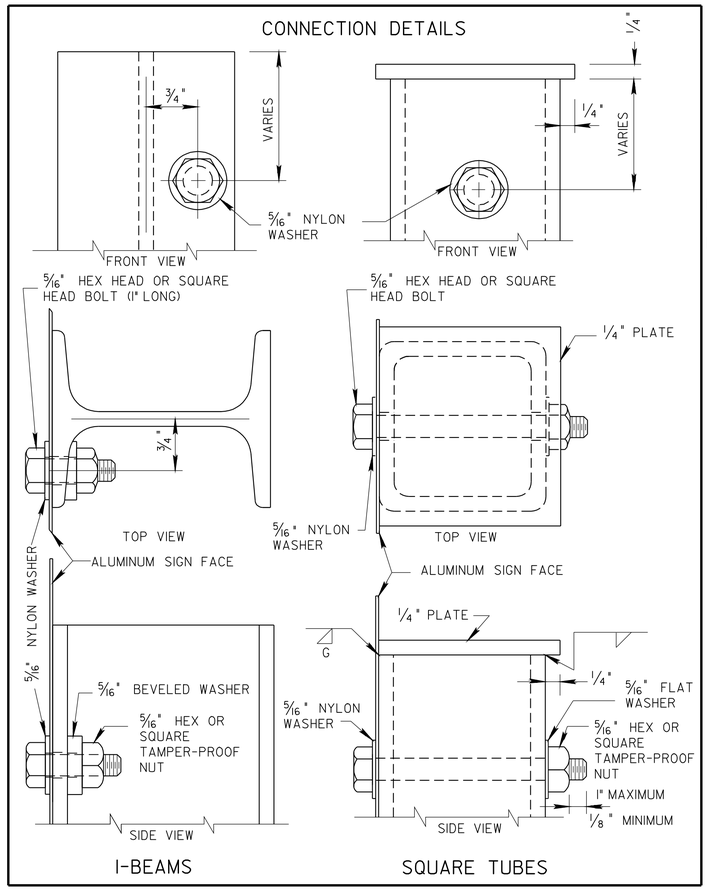


DIMENSION	
A	B
60"	18"
78"	24"



DIMENSION		
A	B	C
24"	18"	3"
36"	24"	6"

CONNECTION DETAILS



STEEL MATERIAL NOTES

(S1) ALL STEEL SHALL BE GALVANIZED AFTER FABRICATION CONFORMING TO THE REQUIREMENTS OF ASTM A123 OR THE ELECTRO-GALVANIZED PROCESS. DAMAGE TO THE COATING SHALL BE REPAIRED SUBSEQUENT TO ERECTION.

(S2) MATERIAL FOR TUBES SHALL BE ASTM A500, GRADE B.

(S3) PLATES SHALL BE IN ACCORDANCE WITH ASTM A36 OR ASTM A242 STEEL.

(S4) BOLTS, NUTS AND WASHERS SHALL BE MADE OF MATERIAL CONFORMING TO ASTM A307.

(S5) HARDWARE SHALL BE GALAVANIZED CONFORMING TO ASTM A153 OR FEDERAL SPECIFICATION QQ-Z-325-B, TYPE I, CLASS 3 OR CADMIUM PLATED TO CONFORM TO ASTM A-165 OR FEDERAL SPECIFICATION QQ-P-416, TYPE III, CLASS 3.

ALUMINUM MATERIAL NOTES

(A1) MATERIAL FOR TUBES SHALL BE ASTM B-221, ALLOY 6061-T6.

(A2) FLAT SHEETS AND PLATES SHALL BE IN ACCORDANCE WITH ASTM B-209, ALLOY 6061-T6 OR 5052-H38.

(A3) BOLTS SHALL BE MADE FROM MATERIAL CONFORMING TO ASTM B-211, ALLOY 2024-T4.

(A4) MATERIAL FOR NUTS TO BE ASTM B-211, ALLOY 6262-T9.

(A5) MATERIAL FOR WASHERS TO BE ASTM B-209, ALLOY ALCLAD 2024-T4.

(A6) MATERIAL FOR WELD FILLER WIRE TO BE ASTM B-285, ALLOY ER 5356, ER 5556 OR ER 5183.

(A7) ALL BOLTS AND NUTS SHALL HAVE AN ANODIC COATING OF 0.0002 INCH MINIMUM THICKNESS WITH DICHROMATE OR BOILING WATER SEAL.

GENERAL NOTES

(G1) ALL HOLES SHALL BE ⅜" IN DIAMETER.

(G2) WELDING SHALL BE DONE IN ACCORDANCE WITH ASSHTO STANDARD SPECIFICATIONA FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES AND TRAFFIC SIGNALS (CURRENT EDITION.)

(G3) ALL BOLTS AND NUTS SHALL BE COATED WITH A SUITABLE LUBRICANT. STAINLESS STEEL BOLTS, NUT AND WASHERS MAY BE SUBSTITUTED.

(G4) IF A RECTANGULAR SIGN WIDER THAN 48" MUST BE MOUNTED ON A SIGNAL POST, 3/16" X 3" STEEL PLATE SIGN STIFFENERS ARE REQUIRED. THE COST OF STIFFENERS SHALL BE INCLUDED IN THE COST OF THE SIGN.

(G5) STIFFENERS ARE TO BE PLACED AT A MAXIMUM SPACING OF 1'-0", NO FURTHER THAN 9" FROM THE TOP AND BOTTOM OF THE SIGN AND THE STIFFENERS SHALL EXTEND TO WITHIN 3" FROM THE LEFT AND RIGHT EDGE OF THE SIGN.

REV. 6-11-71: NOTE ADDED TO GENERAL NOTES.

REV. 7-1-72: CHANGED DEPARTMENT NAME.

REV. 1-1-76: CHANGED DRAWING NO. FROM RD-S-12 TO T-S-12.

REV. 7-29-76: GENERAL REVISIONS.

REV. 4-12-77: ALUMINUM FLAT SHEETS AND PLATES.

REV. 10-24-79: LOCKNUTS REQUIRED.

REV. 12-12-83: CHANGED ROUND HEAD MACHINED SCREW TO HEX HEAD BOLT AND CORRECTED ALL DIMENSIONS AS NEEDED.

REV. 12-7-90: REDREW AND REORGANIZED SHEET. CHANGED SHEET NO. FROM T-S-12 TO T-S-10.

☐ REV. 5-27-03: CORRECTED GENERAL NOTE (62).

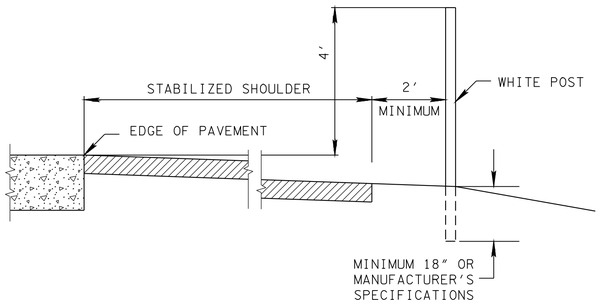
☐ REV. 2-21-12: ADDED GENERAL NOTES (64) AND (65).

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

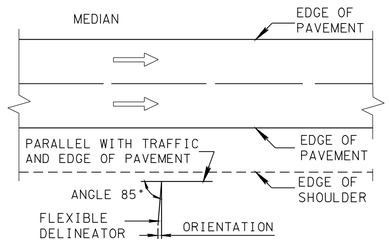
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STANDARD MOUNTING DETAILS FLAT SHEET SIGNS ALUMINUM-STEEL DESIGN

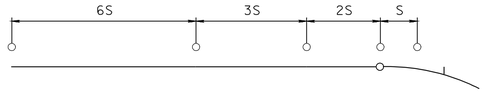
T-S-10



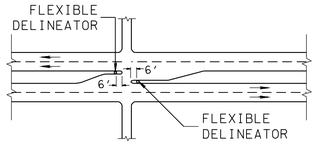
FLEXIBLE DELINEATOR MOUNTING DETAIL



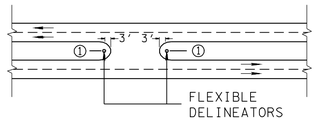
ANGLE OF FLEXIBLE DELINEATOR TO APPROACHING TRAFFIC DETAIL



DELINEATOR SPACING DETAIL FOR APPROACHING A CURVE



INTERSECTING ROADWAY WITH MEDIAN DETAIL
DELINEATOR LOCATION FOR



DELINEATOR LOCATION FOR MEDIAN CROSS-OVER DETAIL

(WHITE REFLECTIVE SHEETING ON NEAR SIDE APPROACH FACE AND YELLOW REFLECTIVE SHEETING ON FAR SIDE APPROACH FACE BOTH CASES.)

① DELINEATOR TO BE PLACED IN CENTER OF MEDIAN

DELINEATOR SPACING ON HORIZONTAL CURVE TABLE

RADIUS IN FEET	SPACING ON CURVE IN FEET	RADIUS IN FEET	SPACING ON CURVE IN FEET	RADIUS IN FEET	SPACING ON CURVE IN FEET
50	20	1700	125	3500	215
150	30	1800	130	3600	220
200	35	1900	135	3700	225
250	40	2000	140	3800	230
300	50	2100	145	3900	235
400	55	2200	150	4000	240
500	65	2300	155	4100	245
600	70	2400	160	4200	250
700	75	2500	165	4300	255
800	80	2600	170	4400	260
900	85	2700	175	4500	265
1000	90	2800	180	4600	270
1100	95	2900	185	4700	275
1200	100	3000	190	4800	280
1300	105	3100	195	4900	285
1400	110	3200	200	5000	290
1500	115	3300	205	5100	295
1600	120	3400	210	5200	300

IF RADIUS IS MORE THAN 5200 FEET, USE SPACING OF 300 FEET. DISTANCE S IN BELOW DETAIL IS THE SAME AS SPACING ON CURVE IN TABLE. DESIGNATION 6S, 3S, 2S, AND S ARE TO NEVER EXCEED 300 FEET. AFTER SPACING DESIGNATION OF 6S ON BEGINNING OR END OF CURVE RESUME 528 FEET SPACING AS USED ON TANGENTS.

FLEXIBLE DELINEATOR GENERAL NOTES

(D1) THE COLOR OF DELINEATORS SHALL CONFORM TO THE COLOR OF EDGE LINES STIPULATED IN SUBSECTION 3B-6 (PAGE 3B-8 AND 3B-11) OF THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

(D2) THE WHITE REFLECTOR UNIT SHALL BE PLACED CONTINUOUSLY ON ALL EXPRESSWAYS AND FREEWAYS, EXCEPT ON THOSE SECTIONS BETWEEN INTERCHANGES WHERE FIXED LIGHTING IS INSTALLED AND IN OPERATION.

(D3) DELINEATORS ARE TO BE INSTALLED ON ALL ROADWAYS WITHIN INTERCHANGES (LIGHTED OR NOT).

(D4) THE DELINEATORS SHALL BE PLACED ALONG THE RIGHT SIDE OF THE THROUGH EXPRESSWAYS AND FREEWAYS, TWO FEET BEYOND THE OUTER EDGE OF THE ROADWAY SHOULDER OR THE FACE OF AN UNMOUNTABLE CURB, OR IN THE LINE OF THE GUARDRAIL.

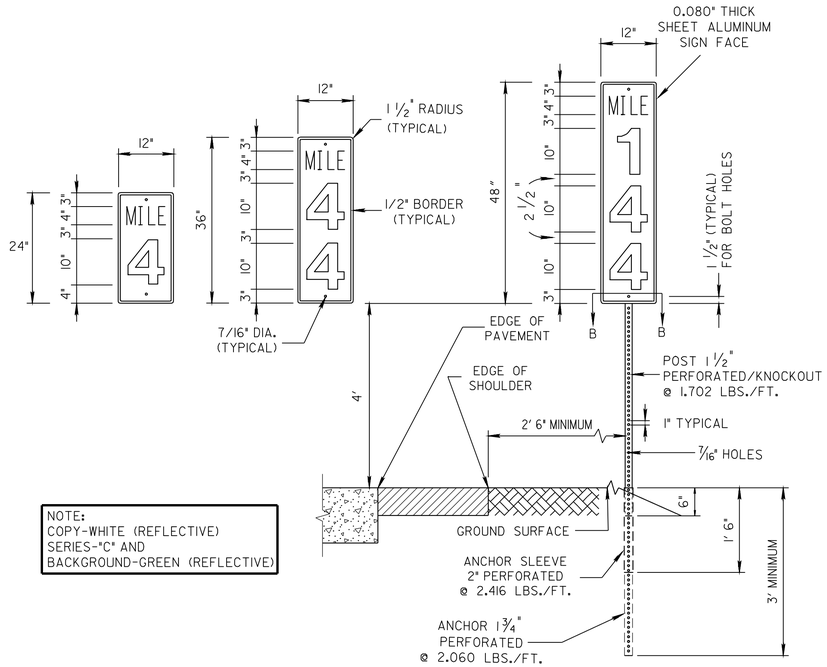
(D5) AT INTERCHANGES, DELINEATORS SHALL BE LOCATED ALONG THE OUTSIDE OF THE CURVE OF TURNING RAMPS, ON THE LEFT SIDE FOR RIGHT CURVING RAMPS AND ON THE RIGHT FOR OTHERS.

(D6) ALONG THE THROUGH ROADWAYS, THE WHITE DELINEATORS SHALL BE SPACED AT 528 FEET ON TANGENTS. ON HORIZONTAL CURVES THE SPACING SHOULD BE ACCORDING TO THE HORIZONTAL CURVE TABLE ON THIS SHEET. THE RAMP DELINEATORS AT INTERCHANGES SHALL BE SPACED AT A MAXIMUM OF 100 FEET. THE TABLE AT LEFT SHOULD BE USED AS A GUIDE.

(D7) SEE TDOT STANDARD SPECIFICATION 916.08 REGARDING SPECIFICATIONS FOR FLEXIBLE DELINEATOR POST AND HIGH GRADE REFLECTIVE SHEETING BONDED TO THEIR SURFACE AREA.

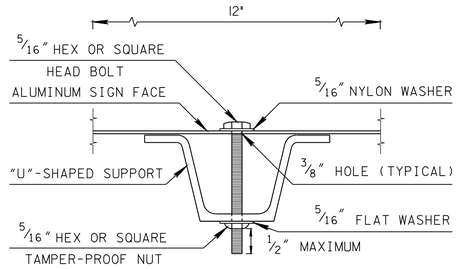
(D8) PAYMENT FOR FLEXIBLE DELINEATORS IN PLACE WILL BE MADE AS FOLLOWS:
ITEM NUMBER 713-02.14, FLEXIBLE DELINEATOR (WHITE) PER EACH.
ITEM NUMBER 713-02.15, FLEXIBLE DELINEATOR (YELLOW) PER EACH.
ITEM NUMBER 713-02.16, FLEXIBLE TYPE II OBJECT MARKER PER EACH.

(D9) ONLY FLEXIBLE DELINEATORS LISTED ON THE QPL, LIST 1. SECTION G. MAY BE USED.



NOTE:
COPY-WHITE (REFLECTIVE)
SERIES-"C" AND
BACKGROUND-GREEN (REFLECTIVE)

MILEPOST SIGN DETAILS
(INTERSTATE ONLY)

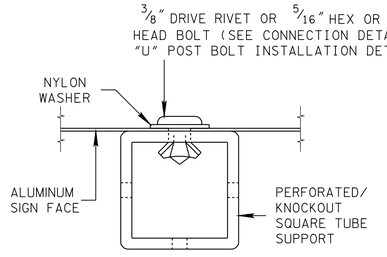


NOTE: NUTS TO BE TIGHTENED TO A SNUG FIT ONLY.

CONNECTION DETAIL FOR "U" POST

GALVANIZED STEEL POST WITH WEIGHT OF 2 LBS./FT. MUST BE PLACED A MINIMUM DEPTH BELOW GROUND OF 3'6".

SECTION B-B



CONNECTION DETAIL FOR PERFORATED/KNOCKOUT SQUARE TUBE POST

GALVANIZED PERFORATED/KNOCKOUT SQUARE TUBE POST WITH WEIGHT OF 1.702 LBS./FT. MUST BE PLACED A MINIMUM DEPTH BELOW GROUND OF 3'.

SECTION B-B

MILEPOST SIGN GENERAL NOTES

(M1) PAYMENT FOR MILEPOST IN PLACE WILL BE MADE UNDER ITEM NUMBER 713-02.04, DELINEATOR (MILE MARKER) AND STEEL POST PER EACH.

(M2) THE SUPPORT SHALL BE EITHER "U"-CHANNEL OR PERFORATED/KNOCKOUT SQUARE TUBE.

(M3) PERFORATED/KNOCKOUT POSTS SHALL BE SQUARE TUBE FORMED FROM 0.105" USS GAGE ASTM A-446 COLD ROLLED CARBON STEEL. THE SQUARE TUBES SHALL BE WELDED DIRECTLY IN THE CORNER BY HIGH FREQUENCY RESISTANCE WELDING OR EQUAL. THE POSTS TO BE EXTERNALLY SCARFED TO AGREE WITH STANDARD CORNER RADII OF 5/32±1/64.

(M4) PERFORATED/KNOCKOUT POSTS SHALL BE GALVANIZED TO CONFORM TO ASTM A-525.

(M5) ALL HARDWARE SHALL CONFORM TO THE REQUIREMENTS OF ASTM A-307, CLASS A.

(M6) ALL HARDWARE SHALL BE GALVANIZED TO CONFORM TO THE REQUIREMENTS OF ASTM A-153 OR CADIUM PLATED TO CONFORM TO THE REQUIREMENTS OF ASTM A-165.

REV. 2-12-85: REDREW SHEET. CHANGED FROM STEEL POST DELINEATOR TO FLEXIBLE DELINEATORS. CHANGED ITEM NUMBER OF WRONG WAY ARROW.

REV. 3-29-85: CHANGED ITEM NUMBERS OF FLEXIBLE DELINEATORS.

REV. 6-7-85: CHANGED ITEM DESCRIPTION ON WRONG WAY PAVEMENT ARROW DETAILS NOTE.

REV. 2-13-86: CHANGED DESCRIPTION OF PAY ITEMS FOR FLEXIBLE DELINEATORS.

REV. 9-4-87: DETAILS REGARDING DELINEATORS LOCATED IN MEDIAN ADDED. TYPE B POST ADDED.

REV. 5-24-88: CHANGED SECTION ON TYPE "A" POST FLEXIBLE DELINEATOR.

REV. 10-26-90: REDREW, REORGANIZED AND CHANGED NAME OF DRAWING. CHANGED MINIMUM DEPTH OF "U"-POST IN GROUND FROM 3' TO 3'6".

REV. 12-7-90: CHANGED CONNECTION DETAIL FOR PERFORATED/KNOCKOUT SQUARE TUBE POST.

☒ REV. 12-18-93: REMOVED REFERENCE TO TYPE A AND TYPE B DELINEATOR POST, AS WELL AS SECTION "A-A" FOR TYPE A DELINEATOR POST. ELIMINATED OLD GENERAL NOTE (D7).

☒ REV. 4-30-00: ADDED NEW GENERAL NOTE (D7). CHANGED DESIGNATION OF OLD GENERAL NOTE (D7) TO (D8).

☒ REV. 12-12-00: MOVED WRONG WAY PAVEMENT ARROW DETAILS TO STD. DWG. NO. T-M-9. CHANGED DRAWING NAME.

☒ REV. 5-27-01: CHANGED DESCRIPTIONS FOR ITEM NOS.713-02.14, 713-02.15 AND 713-02.16.

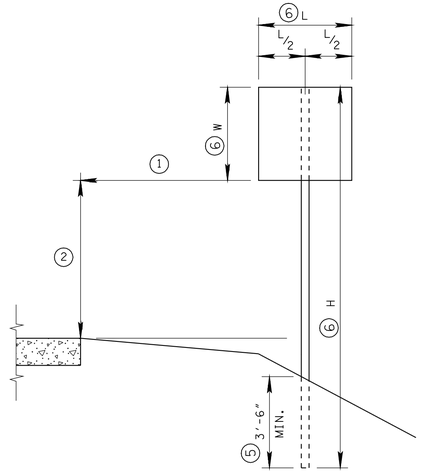
REV. 6-6-11: REORGANIZED SHEET AND ADDED GENERAL NOTE (D9).

☒ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

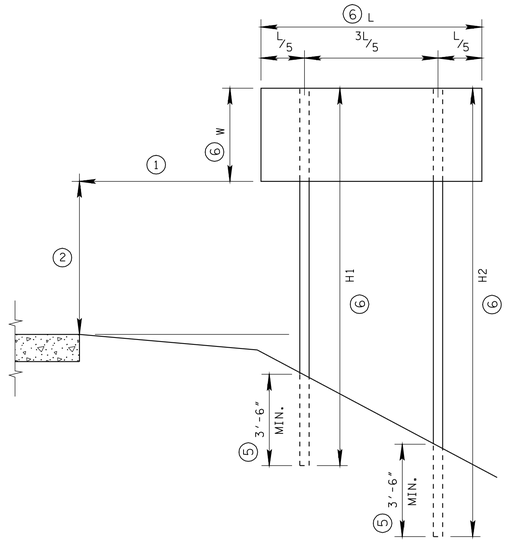
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DELINEATOR AND MILEPOST DETAILS

T-S-11

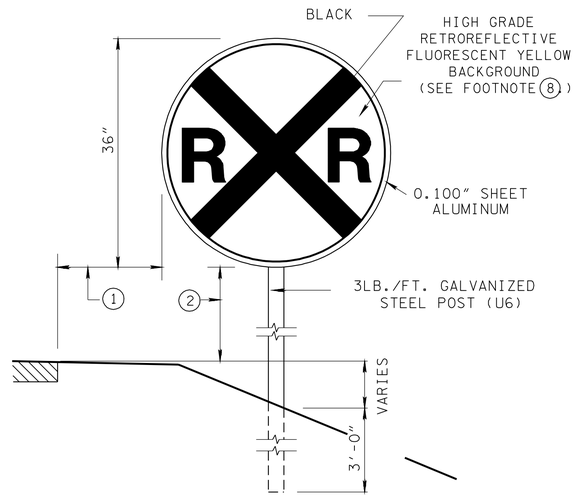


SHOULDER INSTALLATION
FOR ONE "U" POST SUPPORT



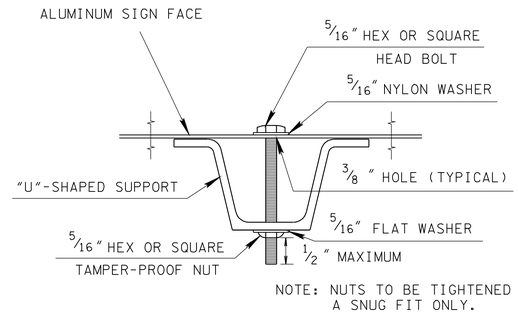
SHOULDER INSTALLATION
FOR TWO "U" POST SUPPORTS

W10-1



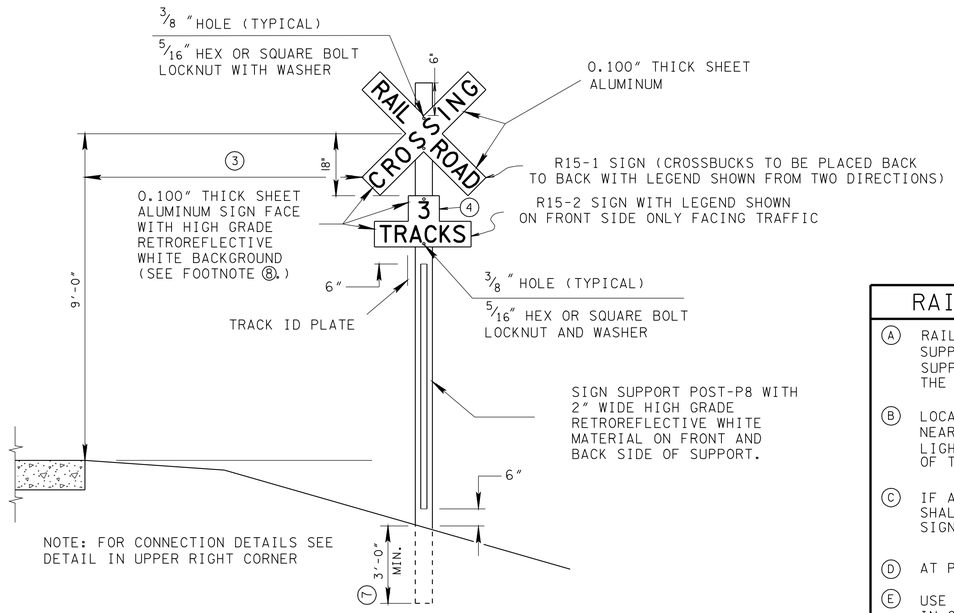
(36 INCH DIAMETER SIGN)
TO BE PAID FOR UNDER ITEM 713-16.09 RAILROAD ADVANCE WARNING SIGN AND SUPPORT.

RAILROAD ADVANCE WARNING SIGN
"U" POST SUPPORT



NOTE: NUTS TO BE TIGHTENED TO A SNUG FIT ONLY.

CONNECTION DETAIL FOR
"U" POST



RAILROAD CROSSBUCK SIGN
AND SUPPORT DETAIL
PERFORATED/KNOCKOUT SQUARE TUBE SUPPORT

LEGEND
W-HEIGHT OF SIGN FACE
L-LENGTH OF SIGN FACE
H-HEIGHT OF SIGN SUPPORT

RAILROAD CROSSBUCK SIGN AND SUPPORT GENERAL NOTES

(A) RAILROAD CROSS-BUCK SIGN, NUMBER OF TRACKS AUXILIARY SIGN, TRACK ID PLATE, AND SUPPORT IS TO BE PAID FOR UNDER ITEM NO. 713-16.05, RAILROAD CORSS-BUCK SIGN AND SUPPORT PER EACH. THIS PAY ITEM SHALL INCLUDE THE FURNISHING AND INSTALLING OF THE SIGNS, SUPPORT AND HARDWARE.

(B) LOCATION OF THE CROSSBUCK SIGN AND SUPPORT WITH RESPECT TO THE CENTERLINE OF THE NEAREST TRACK SHALL BE IN ACCORDANCE WITH THE TYPICAL LOCATION PLAN FOR FLASHING LIGHT SIGNAL LOCATIONS AS SHOWN ON FIGURE 8-7 (PAGE 8C-6) OF THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

(C) IF AN EXISTING CROSSBUCK SIGN AND SUPPORT IS TO BE REMOVED, THE CONTRACTOR SHALL REMOVE AND INSTALL THE EXISTING TRACK ID PLATE ON THE PROPOSED CROSS-BUCK SIGN. ALL COST ARE TO BE INCLUDED IN THE PRICE BID FOR ITEM NO. 713-16.05.

(D) AT PASSIVE RAILROAD CROSSINGS REFER TO T-S-16A FOR STOP OR YIELD SIGN INSTALLATION.

(E) USE SIGN SUPPORT POST-P6 FOR STOP OR YIELD SIGN ATTACHMENTS P POST EMBEDMENT IN GROUND SHALL BE MIN. 3'-6".

FOOTNOTES

① FOR STANDARDIZATION OF LOCATION AND LATERAL CLEARANCE SEE SUBSECTIONS 2A-16 AND 2A-19 OF THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

② FOR HEIGHT SEE SUBSECTION 2A-18 OF THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

③ FOR LATERAL CLEARANCE OF CROSSBUCK SIGN SEE SUBSECTION 2A-19 OF THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

④ IF THERE ARE TWO OR MORE TRACKS, INCLUDING SIDINGS, THE NUMBER OF TRACKS SHALL BE INDICATED ON AN AUXILIARY SIGN OF INVERTED T-SHAPE MOUNTED BELOW THE CROSSBUCK.

⑤ IF ROCK IS ENCOUNTERED DURING THE INSTALLATION OF SUPPORT POSTS, THE HOLES FOR THE SUPPORTS SHALL BE DRILLED TO PROVIDE THE MINIMUM 3'-6" DEPTH IN GROUND.

⑥ SEE SIGN SCHEDULE SHEET IN THE PLANS FOR DIMENSIONS L, H, H1, H2, H3 AND W.

⑦ IF ROCK IS ENCOUNTERED DURING THE INSTALLATION OF SUPPORT POSTS, THE HOLES FOR THE SUPPORTS SHALL BE DRILLED TO PROVIDE THE MINIMUM 3'-0" DEPTH IN GROUND.

⑧ SEE TDOT SPECIAL PROVISION 713A REGARDING SPECIFICATIONS FOR HIGH GRADE REFLECTIVE SHEETING.

REV. 7-1-72: CHANGED DEPARTMENT NAME.

REV. 7-26-73: CORRECT VERTICAL AND LATERAL CLEARANCES AND RAILROAD CROSSBUCK SIGN TO AGREE WITH 1971 MUTCD. ELIMINATED USE OF WOOD POST SUPPORTS AND CHANGEABLE NUMERAL DETAIL.

REV. 8-24-73: BREAKAWAY ADDED TO SQUARE TUBE POST DESCRIPTION. REFERENCE ARROWS ADDED FROM RI5-2 TO THE APPROPRIATE SIGNS.

REV. 2-21-74: PAY ITEM AND NOTE ADDED REGARDING RAILROAD CROSS-BUCK SIGN AND SUPPORT.

REV. 1-1-76: CHANGED DWG. NO. FROM RD-S-16 (68) TO T-S-16.

REV. 3-15-76: DELETED REFERENCE TO OLD DWG. NO., SUBSTITUTED NEW DWG. NO.

REV. 2-25-77: THE WORD "STEEL" ELIMINATED FROM U-POST.

REV. 10-24-79: U-POST CONNECTION DETAIL REVISED.

REV. 12-12-83: CONNECTION DETAIL U-POST CHANGED.

REV. 5-28-84: CONNECTION DETAIL U-POST AND RAILROAD CROSSBUCK SIGN AND SUPPORT CHANGED.

REV. 10-31-84: ADDED TAMPER PROOF NUT TO CONNECTION DETAIL U-POST.

REV. 2-12-85: ADDED POP-RIVET ALTERNATE TO U-POST CONNECTION DETAIL.

REV. 4-10-86: ADDED REFERENCE TO SECTION 2A-21 OF MUTCD.

REV. 7-8-86: REDREW SHEET. DELETED POP-RIVET ALTERNATE. ADDED NOTES.

REV. 10-15-90: REDREW AND REORGANIZED SHEET. CHANGED MINIMUM DEPTH OF "U" POST IN GROUND FROM 3'-0" TO 3"-6".

REV. 1-16-91: ELIMINATED SHOULDER INSTALLATION USING THREE SUPPORTS.

REV. 2-12-91: CORRECTED FOOTNOTE NUMBERS IN BOTH SHOULDER INSTALLATION DETAILS.

☐ REV. 7-29-92: CHANGED U7 POST TO P8 POST IN RAILROAD CROSSBUCK SIGN AND SUPPORT DETAIL.

☐ REV. 7-29-96: CHANGED MATERIAL ON CROSSBUCK AND TRACK NUMBER SIGN. ADDED WHITE RETROREFLECTIVE STRIP TO CROSSBUCK SUPPORT.

☐ REV. 1-19-99: ADDED FOOTNOTE ⑧.

☐ REV. 5-27-01: CHANGED DESCRIPTION IN ITEM NO. 713-16.05.

☐ REV. 7-29-04: IN RAILROAD CROSSBUCK SIGN AND SUPPORT DETAIL MOVED 18" DIMENSION LINE.

☐ REV. 10-23-06: ADDED GENERAL NOTE (D), (E) AND TRACK ID PLATE.

REV. 11-1-11: ADDED RAILROAD ADVANCE WARNING SIGN DETAIL.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

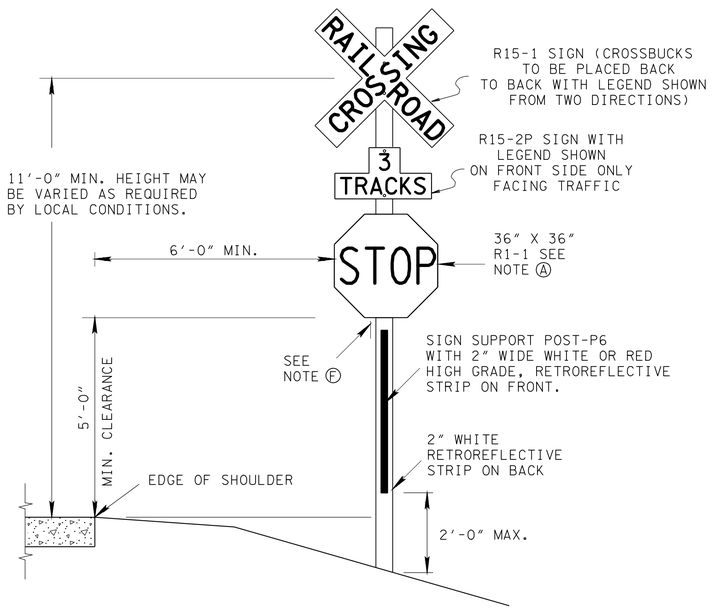
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

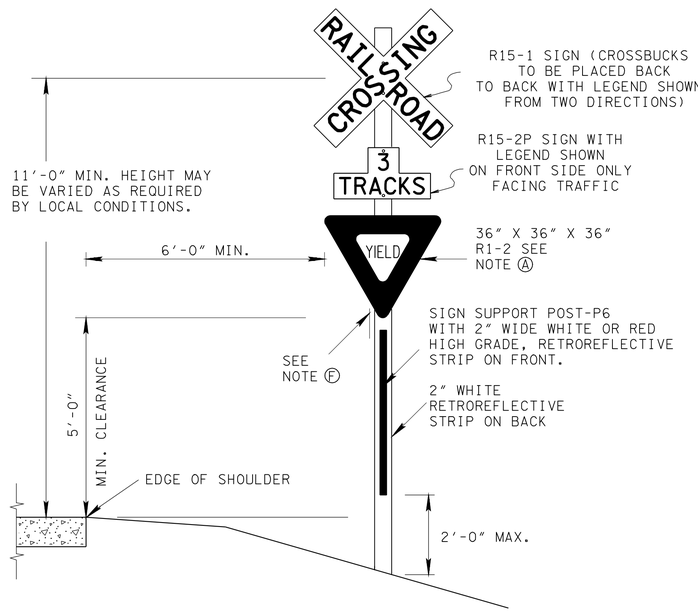
GROUND MOUNTED
ROADSIDE
SIGN AND DETAILS

T-S-16

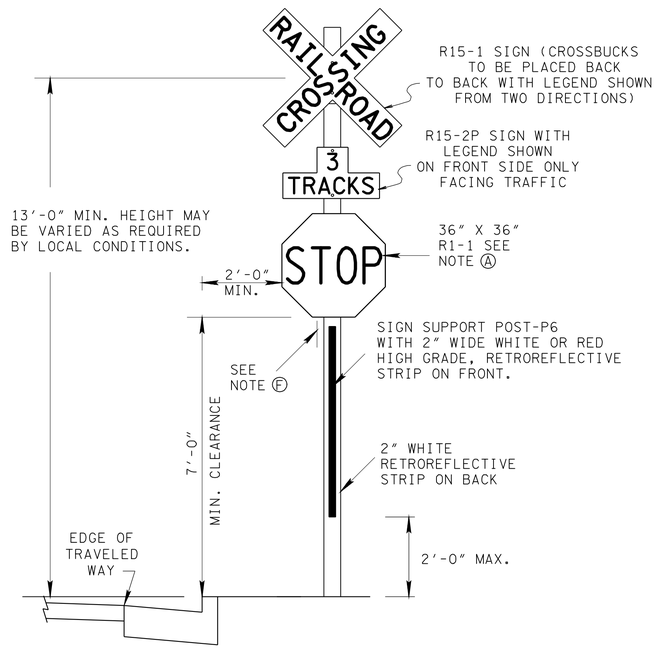
REV. 11-1-11: REVISED GENERAL NOTES Ⓐ AND Ⓓ. ADDED GENERAL NOTE Ⓖ. CHANGED R-15-2 SIGNS TO R15-2P.

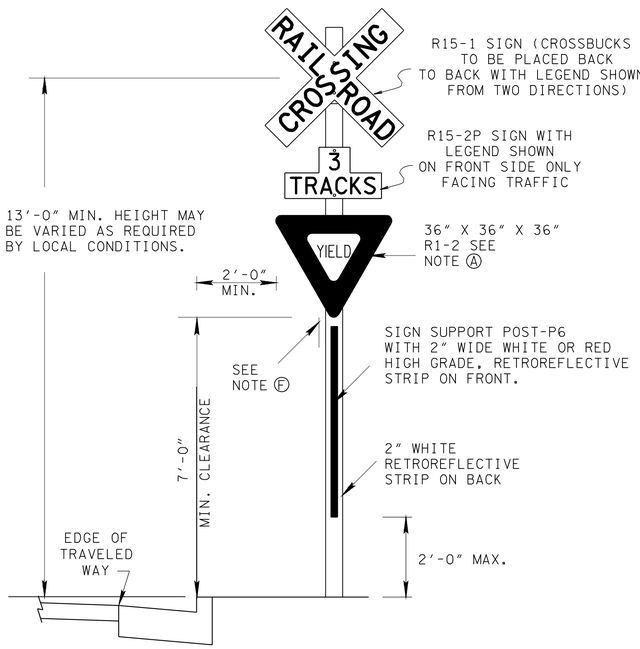
STOP OR YIELD SIGN ON SAME POST WITH THE CROSSBUCK SIGN AT PASSIVE HIGHWAY-RAIL GRADE CROSSINGS





RURAL DISTRICT





BUSINESS OR RESIDENCE DISTRICT

GENERAL NOTES

Ⓐ YIELD SIGNS SHALL BE THE DEFAULT SIGN AND SHALL BE USED UNLESS AN ENGINEERING STUDY DETERMINES THAT A STOP SIGN IS REQUIRED. IF A STOP SIGN IS REQUIRED, A 36″ X 36″ STOP AHEAD (W3-1) SHALL BE PLACED IN ADVANCE OF THE RAILROAD SIGN (W10-1) ACCORDING TO SECTION 2C.05 AND TABLE 2C-4 IN THE MUTCD. FOR SINGLE LANE CONVENTIONAL ROADS USE 36″X36″X36″ YIELD SIGN. FOR MULTI-LANE CONVENTIONAL ROADS USE 48″X48″X48″ YIELD SIGN FOR ADDITIONAL INFORMATION FOR STOP AND YIELD SIGN SIZES, SEE TABLE 8B-1 OF THE MUTCD.

Ⓑ SEE STD-DWG T-S-16 FOR RAILROAD CROSSBUCK SIGN AND SUPPORT DETAILS.

Ⓒ RAILROAD CROSS-BUCK SIGN AND SUPPORT, YIELD/STOP SIGN, NUMBER OF TRACKS AUXILIARY SIGN, AND TRACK ID PLATE IS TO BE PAID FOR UNDER ITEM NO. 713-16.05, RAILROAD CROSS-BUCK SIGN AND SUPPORT PER EACH. THIS PAY ITEM SHALL INCLUDE THE FURNISHING AND INSTALLING OF THE SIGNS, SUPPORT AND HARDWARE.

Ⓓ LOCATION OF THE CROSSBUCK SIGN AND SUPPORT WITH RESPECT TO THE CENTERLINE OF THE NEAREST TRACK SHALL BE IN ACCORDANCE WITH THE TYPICAL LOCATION PLAN FOR FLASHING LIGHT SIGNAL LOCATIONS AS SHOWN ON FIGURE 8C-2 OF THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). SEE SECTION 8C.06 OF THE MUTCD FOR ADDITIONAL INFORMATION.

Ⓔ IF AN EXISTING CROSSBUCK SIGN AND SUPPORT IS TO BE REMOVED, THE CONTRACTOR SHALL REMOVE AND INSTALL THE EXISTING AAR NUMBER PLATE ON THE PROPOSED CROSSBUCK SIGN. ALL COST ARE TO BE INCLUDED IN THE PRICE BID FOR ITEM NO. 713-16.05.

Ⓕ TRACK ID PLATE TO BE MOUNTED ON LEFT SIDE FACING TRACK.

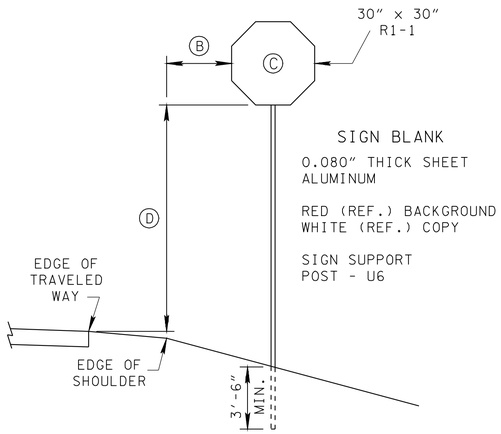
Ⓖ SEE FIGURE 8B-2 AND SECTION 8B.04 OF THE MUTCD FOR ADDITIONAL INFORMATION FOR PASSIVE GRADE CROSSINGS.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

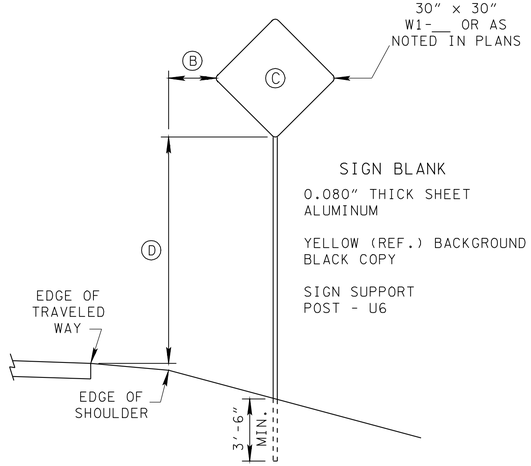
GROUND MOUNTED ROADSIDE SIGN PLACEMENT DETAILS

T-S-16A



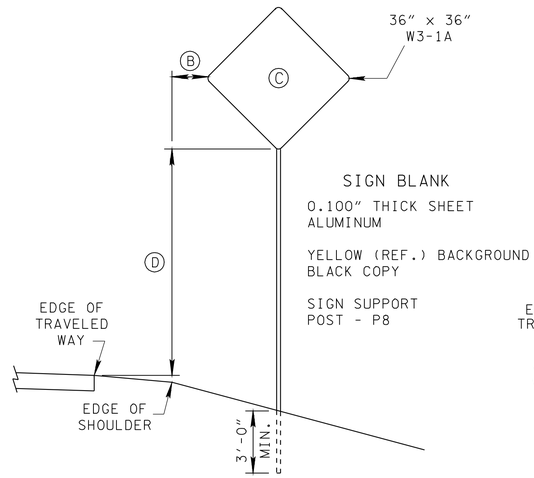
STOP SIGN DETAIL

SEE NOTE (A), (E)



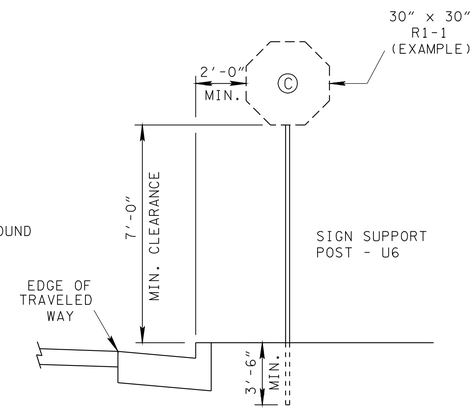
30" x 30" DIAMOND SIGN DETAIL

SEE NOTE (A), (E)

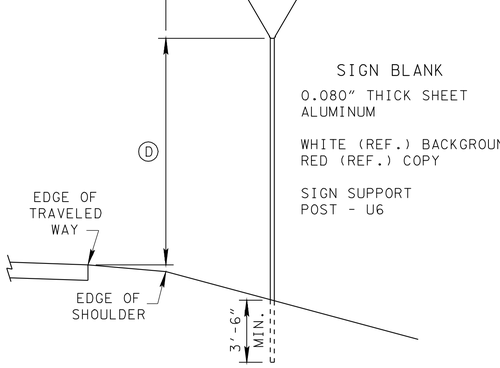


36" x 36" DIAMOND SIGN DETAIL

SEE NOTE (A)

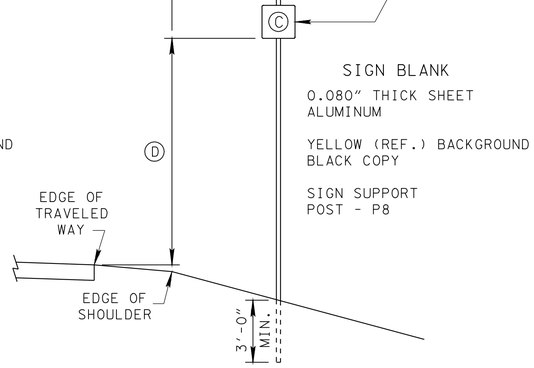


TYPICAL CURB & GUTTER SECTION SIGN DETAIL



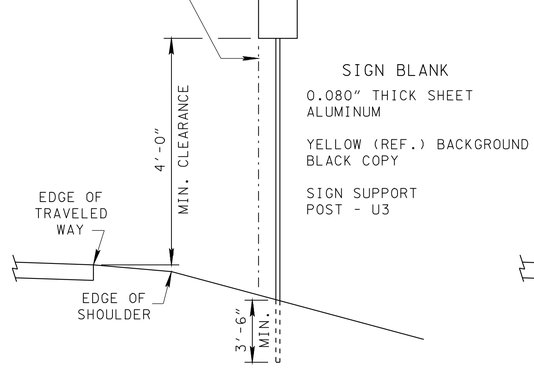
YIELD SIGN DETAIL

SEE NOTE (A), (E)



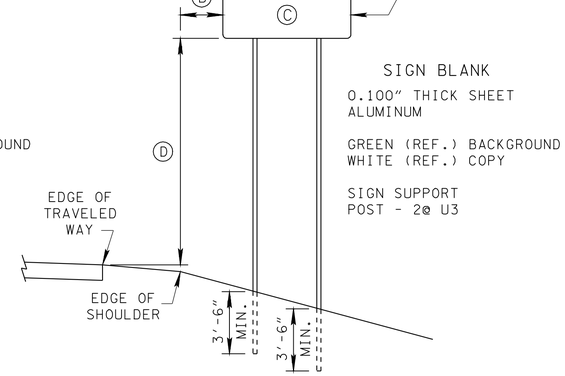
30" x 30" DIAMOND SIGN WITH SUPPLEMENTAL PLATE DETAIL

SEE NOTE (A), (E)



OBJECT MARKER SIGN DETAIL

SEE NOTE (A)



STREAM OR COUNTY LINE SIGN DETAIL

SEE NOTE (A)

GENERAL NOTES

(A) SIGN FACE, SUPPORT, INSTALLATION, AND HARDWARE INCLUDED IN ITEM NOS. 713-16.20 THROUGH 713-16.29 SIGNS (DESCRIPTION) PER EACH.

(B) 6'-0" DESIRABLE FROM EDGE OF SHOULDER, OR IF NONE, 12'-0" DESIRABLE FROM EDGE OF TRAVELED WAY (SEE CURRENT EDITION MUTCD SECTIONS 2A.19 THROUGH 2A.21). 4'-0" DESIRABLE FROM FACE OF GUARDRAIL.

(C) LETTERS, BORDERS, AND ALPHABET ACCESSORIES SHALL BE APPLIED BY SILK SCREENING PROCESS. SEE SECTIONS 2A.06 THROUGH 2A.15 OF THE MUTCD FOR ADDITIONAL INFORMATION.

(D) THE MINIMUM HEIGHT, MEASURED VERTICALLY FROM THE BOTTOM OF THE SIGN TO THE NEAR EDGE OF THE PAVEMENT, OF SIGNS INSTALLED AT THE SIDE OF THE ROAD IN RURAL AREAS SHALL BE 5 FEET. THE MINIMUM HEIGHT, MEASURED VERTICALLY FROM THE BOTTOM OF THE SIGN TO THE TOP OF THE CURB, OR IN THE ABSENCE OF CURB, MEASURED VERTICALLY FROM THE BOTTOM OF THE SIGN TO THE ELEVATION OF THE NEAR EDGE OF THE TRAVELED WAY, OF SIGNS INSTALLED AT THE SIDE OF THE ROAD IN BUSINESS, COMMERCIAL, OR RESIDENTIAL AREAS WHERE PARKING OR PEDESTRIAN MOVEMENTS ARE LIKELY TO OCCUR, WHERE THE VIEW OF THE SIGN MIGHT BE OBSTRUCTED, SHALL BE 7 FEET. THE HEIGHT TO THE BOTTOM OF A SECONDARY SIGN MOUNTED BELOW ANOTHER SIGN MAY BE 1 FOOT LESS THAN THE APPROPRIATE HEIGHT SPECIFIED ABOVE. SEE FIGURE 2A-2 AND SECTION 2A.18 OF THE MUTCD FOR ADDITIONAL INFORMATION.

(E) FOR MULTI-LANE CONVENTIONAL ROADS USE 48"X48"X48" YIELD SIGN AND USE 36"X36"X36" W1 SIGN. FOR ADDITIONAL INFORMATION FOR STOP AND YIELD SIGN SIZES, SEE TABLE 2B-1 AND TABLE 2C-2 OF THE MUTCD.

REV. 10-15-90: CHANGED MINIMUM DEPTH OF "U" POST IN GROUND FROM 3'-0" TO 3'-6". ADDED GENERAL NOTE REGARDING SILK SCREENING.

REV. 7-29-92: CHANGED U7 POST TO P8 POST IN VARIOUS DETAILS.

REV. 7-29-96: CHANGED DEPTH OF EMBEDMENT OF POST FOR DIAMOND SIGNS.

REV. 12-18-97: CHANGED GENERAL NOTE (A) REGARDING PAY ITEM NUMBERS.

REV. 5-27-01: CHANGED GENERAL NOTE (A).

REV. 11-1-11: REVISED GENERAL NOTES (B), (C), AND (D). ADDED GENERAL NOTE (E).

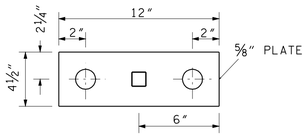
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

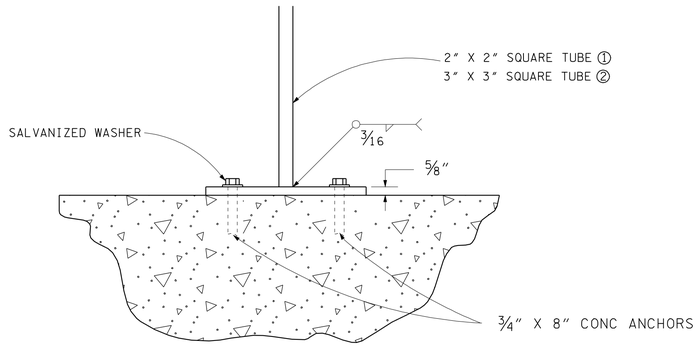
SIGN DETAILS

NOT TO SCALE

7-29-96 | T-S-20



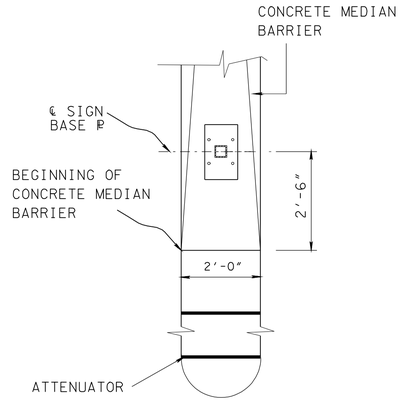
BASE PLATE DETAIL



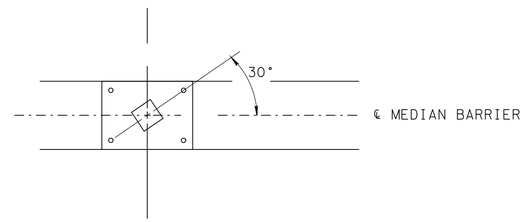
ELEVATION

DETAILS FOR MOUNTING
SMALL AND REGULAR
SIGNS ON CONCRETE MEDIAN BARRIERS ①②

(TO BE PAID FOR UNDER ITEM NO. 713-30.09)



LOCATION DETAIL FOR
MOUNTING EXIT GORE SIGNS ON
CONCRETE MEDIAN BARRIERS ③



SIGN ORIENTATION
DETAIL FOR
H.O.V. SIGNS MOUNTED
ON CONCRETE MEDIAN BARRIERS ④

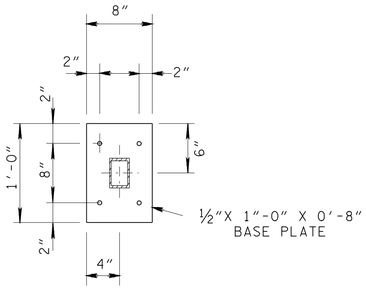
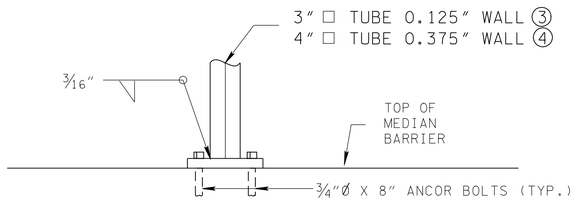


PLATE DETAIL



ELEVATION

DETAILS FOR MOUNTING
LARGE SIGNS ON CONCRETE MEDIAN BARRIERS ③④

(TO BE PAID FOR UNDER ITEM NO. 713-30.10)

GENERAL NOTES

- (A) WELDING SHALL BE IN ACCORDANCE WITH AASHTO SPECIFICATIONS.
- (B) ALL STEEL SHALL BE GALVANIZED AFTER FABRICATION AND CONFORMING TO THE REQUIREMENTS OF ASTM A123. DAMAGE TO THE COATING SHALL BE REPAIRED SUBSEQUENT TO ERECTION.
- (C) MATERIAL FOR PLATES SHALL BE ASTM A36 STEEL.
- (D) MATERIAL FOR TUBES TO BE ASTM A500 GRADE B STEEL.
- (E) ALL BOLTS AND WASHERS SHALL BE MADE OF MATERIAL CONFORMING TO ASTM A307.
- (E) MINIMUM CLEARANCE BETWEEN BOTTOM OF THE SIGN AND TOP OF BARRIER SHALL BE 48″.
- (G) PLATE TO BE CENTERED ON BARRIER CENTER LINE.

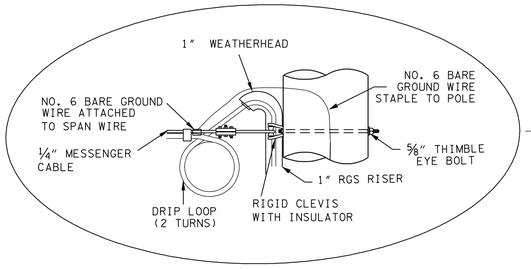
DESIGN NOTES

1. FOR (18″X48″) EMERGENCY MILE MARKER OR (12″X24″, 12″X36″ OR 12′X48″) STANDARD MILE MARKERS.
2. FOR (36″X48″) SPEED LIMIT, (48″X72″ OR 48″X60″) TRUCK RESTRICTION SIGNS (IF DIRECTED BY REGIONAL TRAFFIC ENGINEER) OR (36″X36″) DIAMOND WARNING SIGNS.
3. FOR EXIT GORE SIGNS (72″ X 48″ OR 90″ X 48″).
4. FOR H.O.V. SIGNS (84″ X 60″).

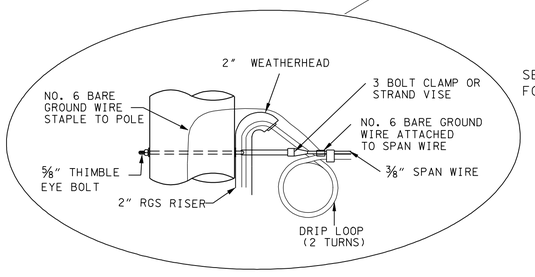
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DETAILS FOR
SIGNS MOUNTS
ON CONC.
MEDIAN BARRIERS

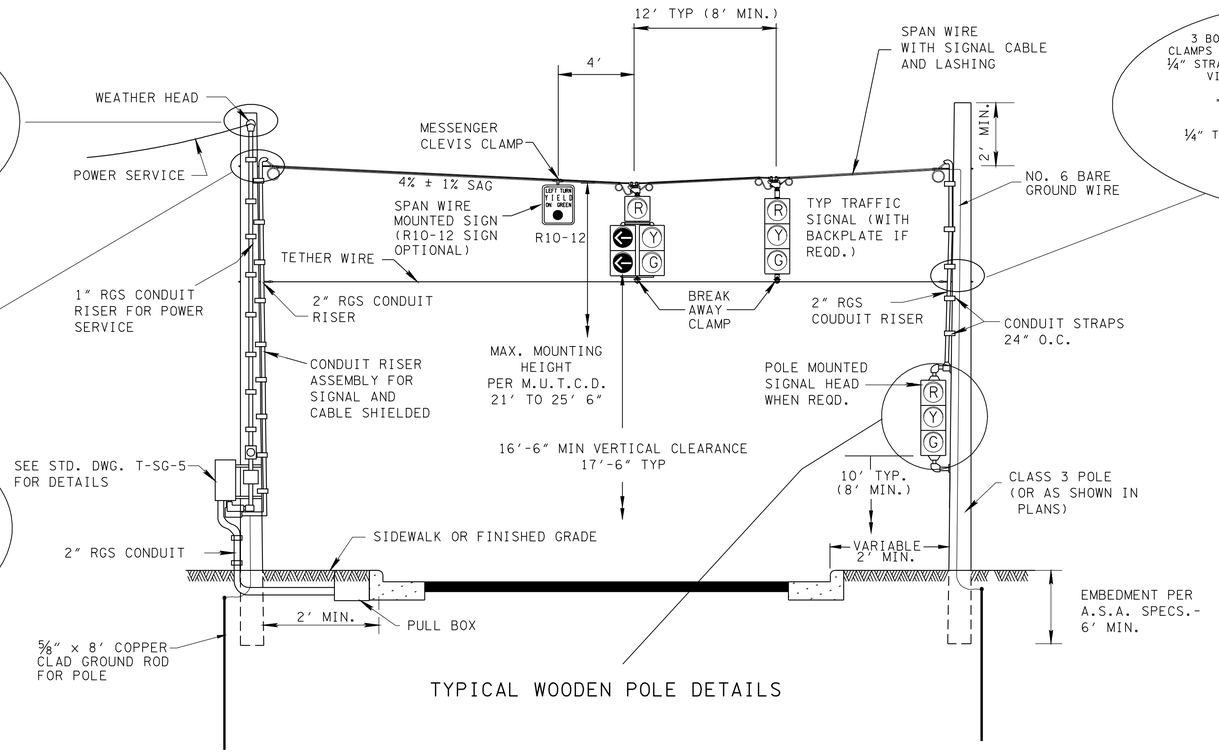
2-29-12 | T-S-21



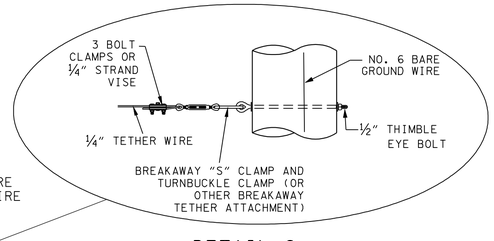
DETAIL A



DETAIL B



TYPICAL WOODEN POLE DETAILS



DETAIL C

REV. 6-7-72: ADDED PULL BOX TO CONTROLLER CABINET CONNECTION & CONDUIT RISER ASSEMBLY.

REV. 7-1-72: CHANGED DEPARTMENT NAME.

REV. 11-22-72: CHANGED MINIMUM CLEARANCE ON SIGNAL HEADS.

REV. 11-30-72: ADDED HORIZONTAL CLEARANCE TO POLE MOUNTED SIGNAL HEAD.

REV. 3-3-75: ADDED DETAIL OF DEAD END.

REV. 1-1-76: CHANGED DWG. NO. FROM TR-S-1 TO T-SG-1.

REV. 9-1-77: CHANGED PERCENT OF SAG ON SPAN WIRE.

REV. 5-7-79: ADDED SPAN WIRE TO ALTERNATE GUYING DETAIL.

REV. 4-13-84: DELETED REFERENCES TO SIZE 502 STRAIN INSULATOR. ADDED DETAIL FOR SPAN INSULATOR.

REV. 4-12-85: ADDED NOTE FOR POLE EMBEDMENT. CHANGED POLE SIZE TO CLASS 3. CHANGED 'SPAN' INSULATOR TO STRAIN INSULATOR.

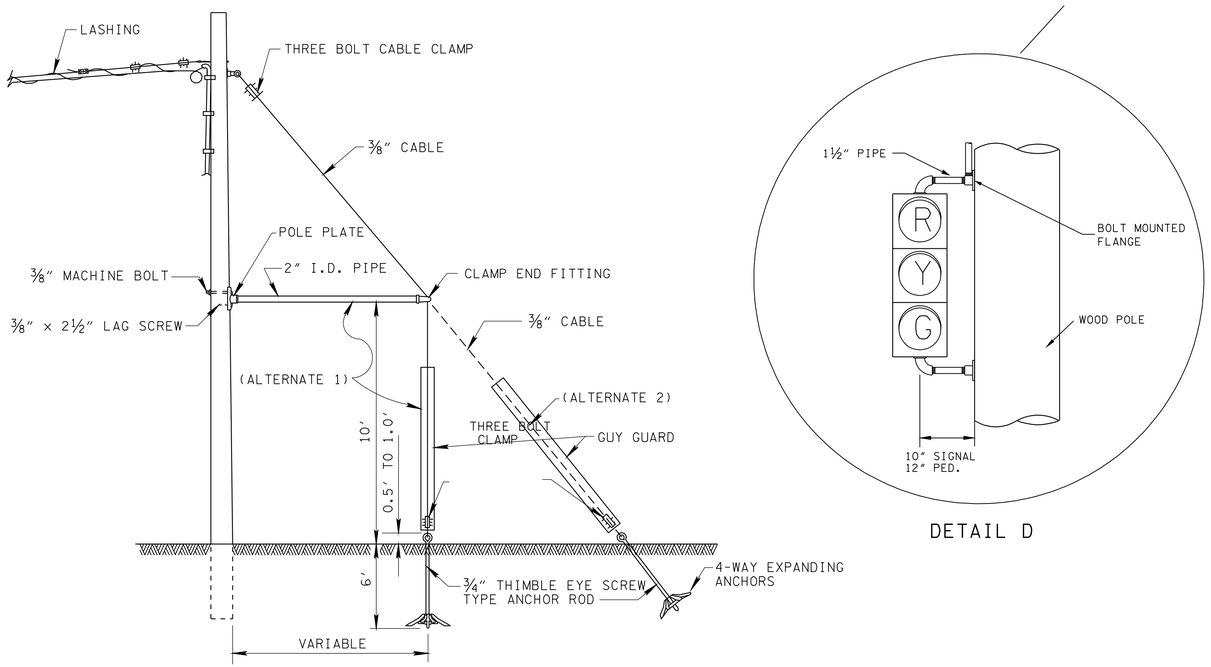
REV. 8-22-91: ADDED GUY GUARD. CHANGED GUY CABLE SIZE TO ⅜ INCH. CHANGED SERVICE CABLE CONDUIT SIZE TO 1". DELETED FUSE BOX.

☐ REV. 7-29-96: REDREW SHEET ON CADD AND MADE MINOR CHANGES.

REV. 12-16-03: ADDED QUICK DISCONNECT, ADDED TETHER CABLE, CHANGED SAG TO 5% MAX., ADDED SIGNAL MOUNTING DETAIL, AND REVISED SHEET TITLE.

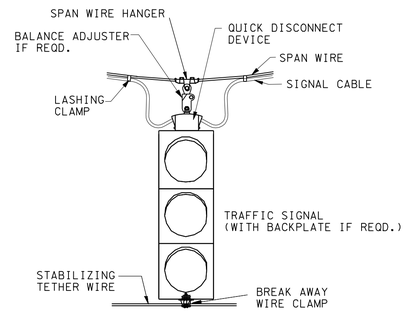
REV. 7-29-04: REDREW, RENAMED AND REDESIGNED SHEET.

REV. 11-1-11: REVISED R10-12 SIGN TO BE USED AS AN OPTIONAL SIGN.

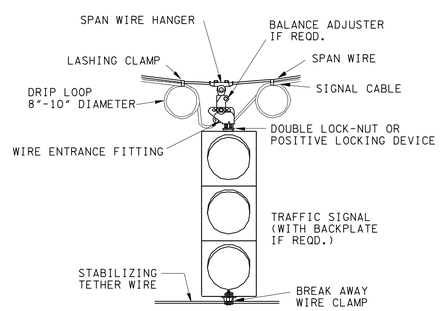


TYPICAL WOODEN POLE GUYING DETAILS

DETAIL D



ALTERNATE QUICK DISCONNECT MOUNTING HARDWARE DETAIL
(IF REQD.)



TYPICAL SIGNAL MOUNTING HARDWARE DETAIL

WOOD POLE GENERAL NOTES

(A) LOCATIONS OF SIGNAL POLES SHOWN ON PLANS ARE APPROXIMATE AND CAN BE ADJUSTED UP TO 5' TO AVOID UTILITIES. ADUSTMENTS GREATER THAN 5' MUST BE REVIEWED AND APPROVED BY ENGINEER.

(B) POWER SERVICE CABLE SHALL BE RUN ON WOOD POLE IN SEPARATE 1" RGS RISER (SEE STD. DWG. T-SG-5).

(C) IF IT IS NECESSARY TO RUN POWER SERVICE CABLE FROM ONE POLE TO ANOTHER, IT SHALL BE RUN ON SEPARATE MESSENGER CABLE (2' ABOVE SPAN WIRE WITH SIGNAL OR DETECTOR CABLES).

(D) ALL WOOD SIGNAL SUPPORT POLES SHALL BE GUYED.

(E) SIGNALS TO BE MOUNTED WITH 17' 6" TYPICAL VERTICAL CLEARANCE (16' 6" MIN.). MAXIMUM MOUNTING HEIGHT SHALL BE CHECKED PER MUTCD AND HEIGHT ADJUSTED IF NECESSARY.

(F) RED INDICATIONS TO BE APPROX. SAME HEIGHT. HANGER CONNECTOR EXTENDER OR TETHER EXTENDER MAY BE REQUIRED.

(G) SEE STD. DWG. T-SG-4 FOR ADDITIONAL DETAILS.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

WOOD POLE DETAILS FOR SPAN MOUNTED SIGNALS

JAN 1970 | T-SG-1

REV. 7-29-04: CHANGED PEDESTRIAN CROSSWALK SIGNALS AND PEDESTRIAN PUSH BUTTON SIGN DETAIL 130A3, DELETED DETAIL 123A2V.

REV. 11-1-11: DELETED 130A2 SIGNAL HEAD. ADDED R10-3E SIGN AND NOTES. ADDED 150 A4H SIGNAL HEAD.

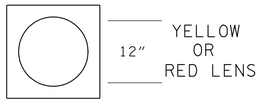
REV. 9-30-93: REDREW SHEET. CHANGED PED. PUSHBUTTON SIGNS.

REV.12-13-03: REVISED PED. SIGNAL HEAD.ADDED TYPE 130A3 SIGNAL HEAD.

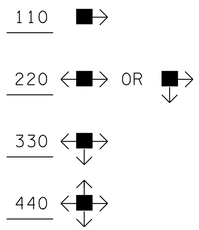
REV. 4-12-85: ADDED 4(12)O ASSEMBLY.

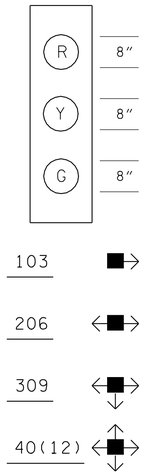
REV. 5-30-89: CENTERED RED INDICATION ON 150A2H

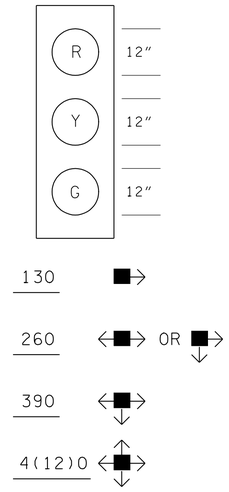
REV. 3-12-90: REDREW SHEET. REORGANIZED AND DELETED VARIOUS SIGNAL HEADS. ADDED DETAIL FOR PED. SIGNS.

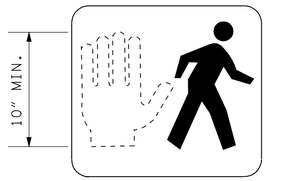


FLASHING BEACON HEADS

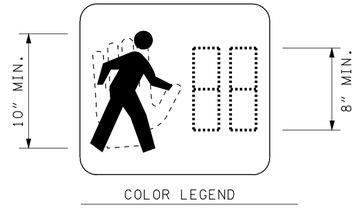






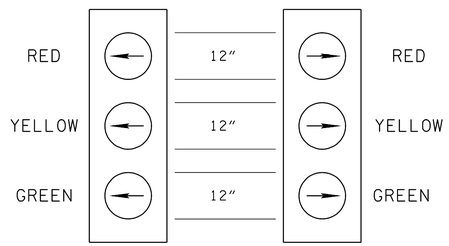


STANDARD PEDESTRIAN CROSSWALK SIGNAL

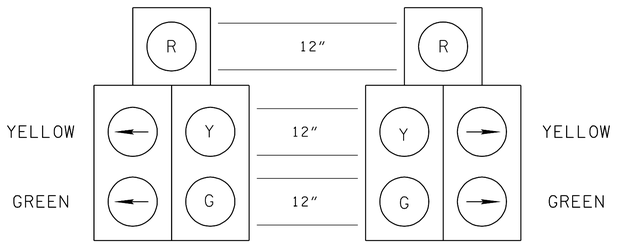


COUNTDOWN PEDESTRIAN CROSSWALK SIGNAL

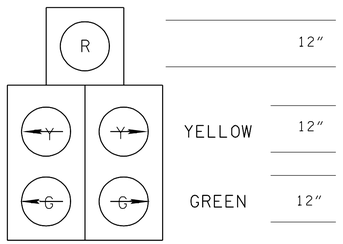
REQUIRED USE WHERE PED CHANGE INTERVAL (FLASHING HAND) > 7 SECOND



130A3

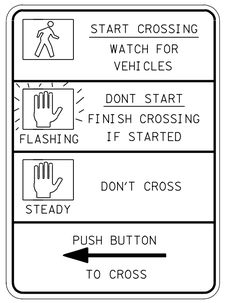


150A2H



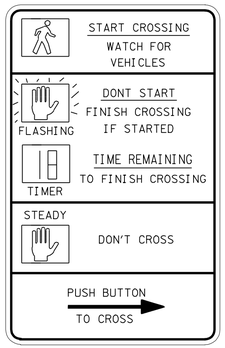
150A4H

NOTE: SEE SECTION 2B.52 OF THE MUTCD FOR ADDITIONAL INFORMATION.

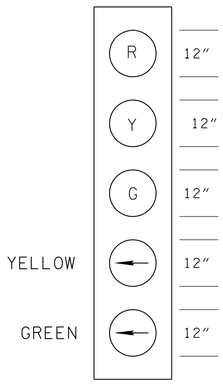


R10-3B (9″X12″)

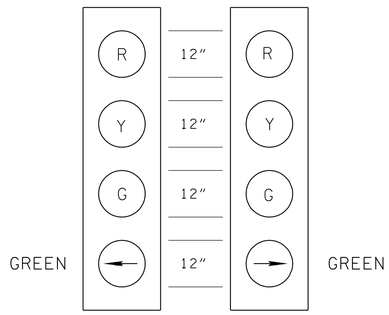
NOTE: SEE SECTION 4E.07 OF THE MUTCD FOR ADDITIONAL INFORMATION.



R10-3E (9″X15″)



150A2V



140A1

PEDESTRIAN PUSH BUTTON SIGNS LEFT & RIGHT

LEGEND - WHITE "WALK" (FIGURE) ON BLACK
ORANGE "DONT WALK" (HAND) ON BLACK
ALL ELSE BLACK
BACKGROUND - WHITE (REF.)
LOCATION - IMMEDIATELY ABOVE PUSH BUTTON

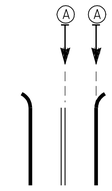
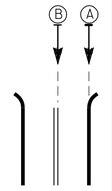
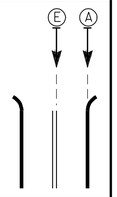
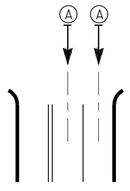
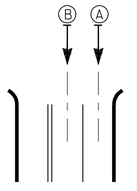
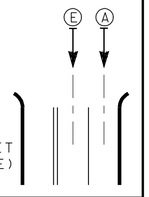
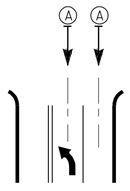
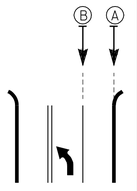
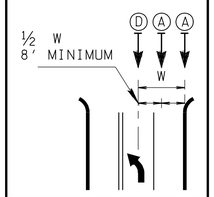
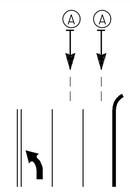
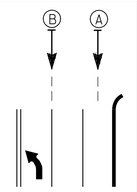
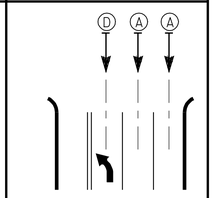
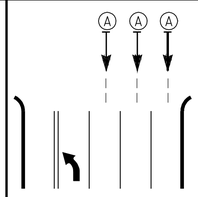
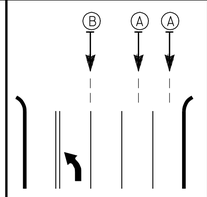
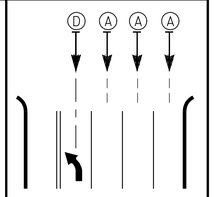
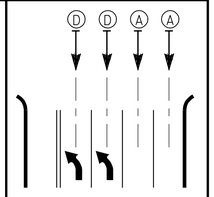
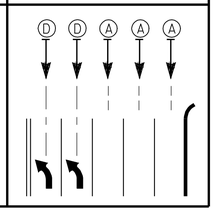
MATERIAL - TYPE II REFLECTIVE SHEETING
1) MOUNTED BY ADHESION ON STEEL STRAIN POLES.
2) MOUNTED ON 0.063" MINIMUM THICK FLAT SHEET ALUMINUM AND BANDED TO WOOD POLES OR PEDESTAL POLES.

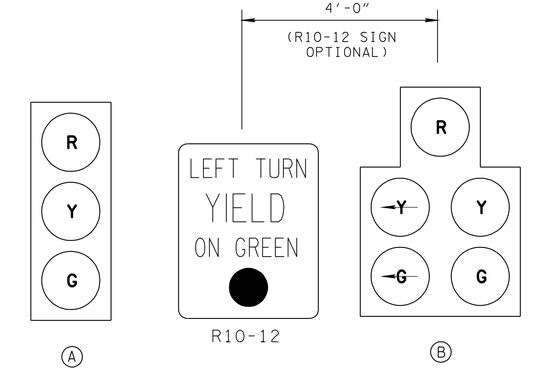
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

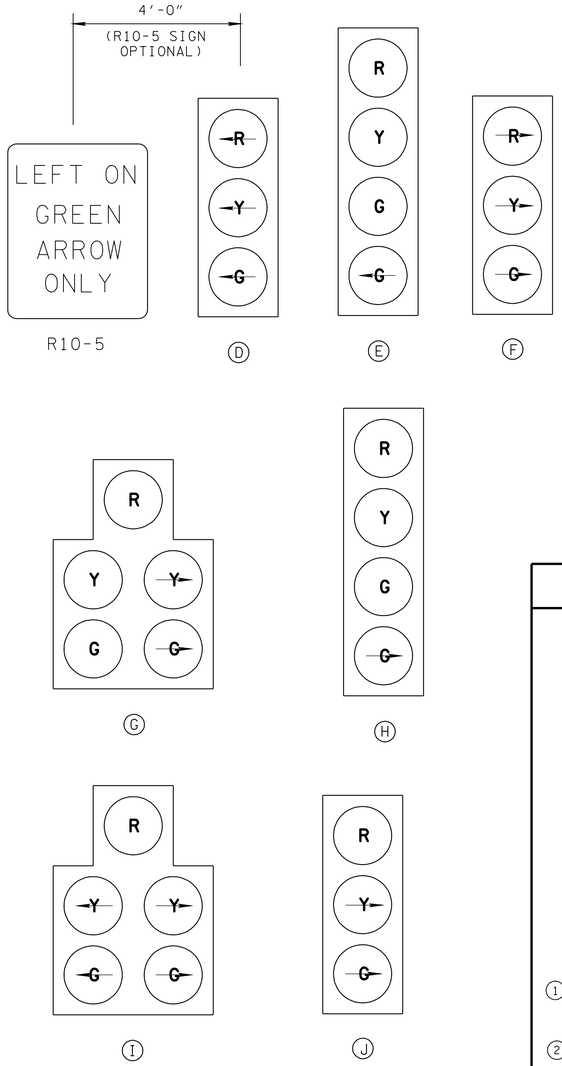
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SIGNAL HEAD ASSEMBLIES AND PEDESTRIAN PUSH BUTTON SIGNS

T-SG-7

APPROACH LANE USE (THRU/LEFT)	LEFT TURN TREATMENT		
	PERMISSIVE	PERMISSIVE/ PROTECTED	PROTECTED ONLY
1/0			 (SPLIT PHASE)
2/0			 (SPLIT PHASE)
1/1			 ½ W 8' MINIMUM W
2/1			
3/1			
2/2			
3/2			





SIGNAL DISPLAYS

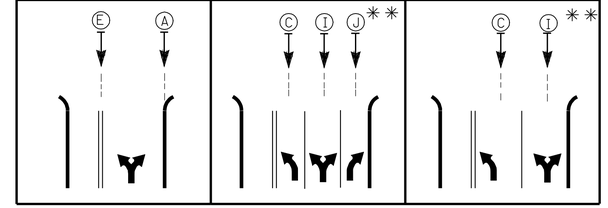
REV. 11-1-11: REVISED GENERAL NOTE 3, REVISED LEFT TURN TREATMENT AND SPLIT PHASE OPERATION. ADDED SHARED LEFT TURN /RIGHT TURN TREATMENT. ADDED SIGNS R10-5 AND R10-12. ADDED SIGNAL DISPLAY Ⓘ AND Ⓙ. CHANGED SIGNAL DISPLAY Ⓕ. DELETED R10-10 SIGN.

REV. 2-14-92: ADDED BLOCK FOR APPROACHES WITH OPTIONAL THRU-LEFT LANES.

REV. 12-16-03: REVISED SIGNAL HEADS TO BE USED FOR SPLIT PHASING. ADDITIONAL HEAD FOR PERMISSIVE LEFT TURN TREATMENT ON 7 LANE ROADWAY. ADDED ALTERNATE FOR PROTECTED LEFT TURN HEAD. REV. GENERAL NOTES.

REV. 7-29-04: ADDED NEW SIGNAL DISPLAYS Ⓓ, Ⓔ, Ⓕ, AND Ⓗ. MODIFIED SPLIT PHASE OPERATION TABLE AND LEFT TURN TREATMENT TABLE.

SHARED LEFT TURN/RIGHT TURN LANE AND NO THROUGH MOVEMENT

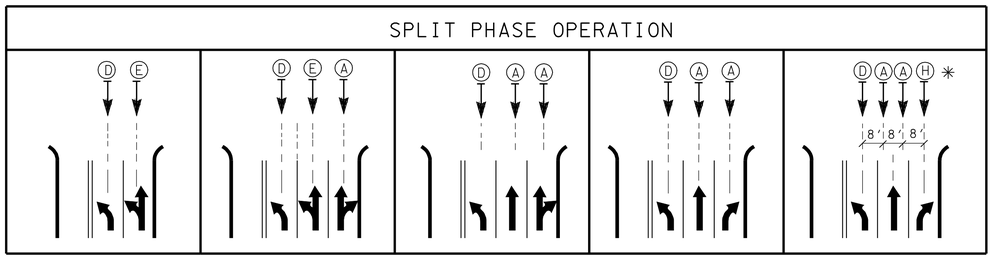


** IF CROSS-WALK WITH RIGHT TURNS CONFLICTS, THEN REPLACE Ⓙ WITH Ⓐ OR Ⓘ WITH Ⓑ.

NOTE: (1) SEE SECTIONS 4D.25, 4D.26 AND FIGURES 4D-20 IN THE MUTCD FOR ADDITIONAL INFORMATION.

(2) Ⓔ AND Ⓗ CAN ONLY BE USED IF THE GREEN ARROW AND CIRULAR GREEN ARE ALWAYS TERMINATED TOGETHER.

SPLIT PHASE OPERATION



* USE Ⓖ IF OVERLAPPED WITH MAIN STREET LEFT TURN PHASE

GENERAL NOTES

85 PERCENTILE OR POSTED SPEED (MILES PER HOUR)	MINIMUM VISIBILITY DISTANCE (FEET)
20	175
25	215
30	270
35	325
40	390
45	460
50	540
55	625
60	715

(1) ON CURVED APPROACHES, PLACEMENT SHALL BE ADJUSTED AS NECESSARY TO MEET MINIMUM VISIBILITY REQUIREMENTS OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CURRENT EDITION).

(2) SIGNAL HEAD PLACEMENT SHALL MEET MAXIMUM MOUNTING HEIGHT REQUIREMENTS OF THE MUTCD.

(3) SEE SECTIONS 4D.08 THROUGH 4D.33 FOR ADDITIONAL INFORMATION REGARDING LOCATIONS AND USEAGE OF SIGNAL HEADS IN THE CURRENT EDITION OF THE MUTCD.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TYPICAL SIGNAL HEAD PLACEMENT

9-19-91 | T-SG-7A

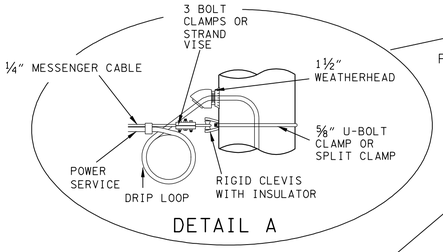
REV. 9-18-89: ADDED NOTES FOR CLAMPS AND SHAFT LENGTHS. CHANGED MAX. SAG TO 5 PERCENT ADDED DETAILS FOR CONNECTORS AND CABLE CLAMPS.

☐ REV. 7-29-96: REDREW SHEET ON CADD AND MADE MINOR CHANGES.

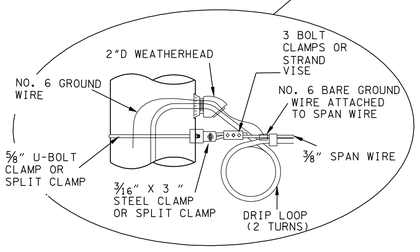
REV. 12-16-03: REDREW SHEET REMOVED PEDESTAL POLE DETAILS, REDREW TYPICAL SPAN WIRE LAYOUT, ADDED QUICK DISCONNECT DETAIL AND ADDED SIGNAL MOUNTING DETAIL. ADDED HAND HOLE DETAIL.

REV. 7-29-04: REDREW AND REDESIGNED SHEET.

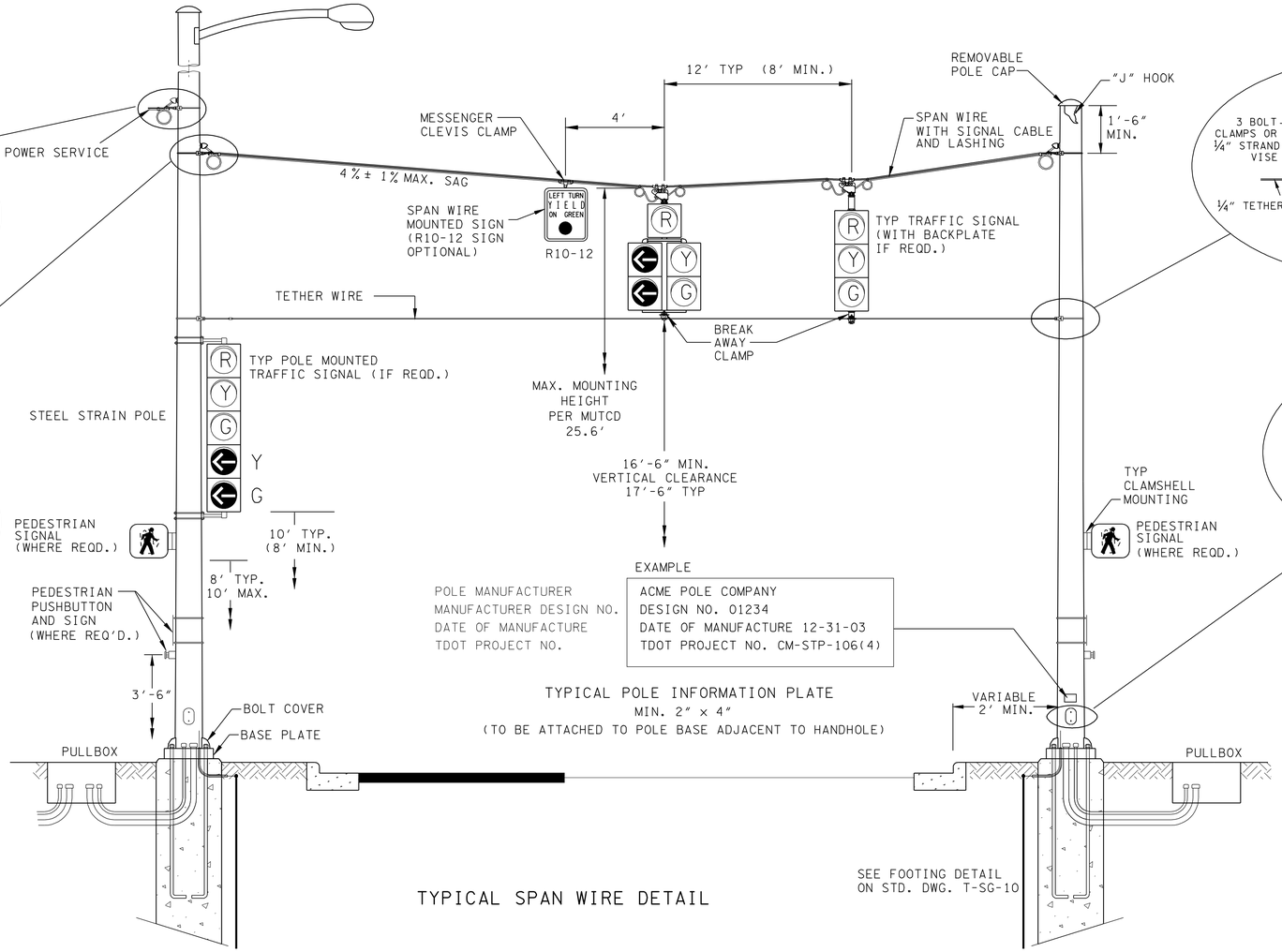
REV. 11-1-11: REVISED R10-12 SIGN TO BE USED AS AN OPTIONAL SIGN. REVISED GENERAL NOTE G.



DETAIL A



DETAIL B

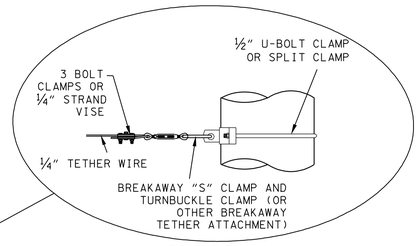


TYPICAL SPAN WIRE DETAIL

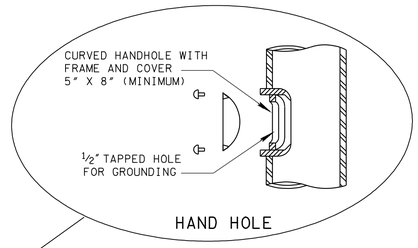
POLE MANUFACTURER	ACME POLE COMPANY
MANUFACTURER DESIGN NO.	DESIGN NO. 01234
DATE OF MANUFACTURE	DATE OF MANUFACTURE 12-31-03
TDOT PROJECT NO.	TDOT PROJECT NO. CM-STP-106(4)

EXAMPLE

TYPICAL POLE INFORMATION PLATE
MIN. 2" x 4"
(TO BE ATTACHED TO POLE BASE ADJACENT TO HANDHOLE)

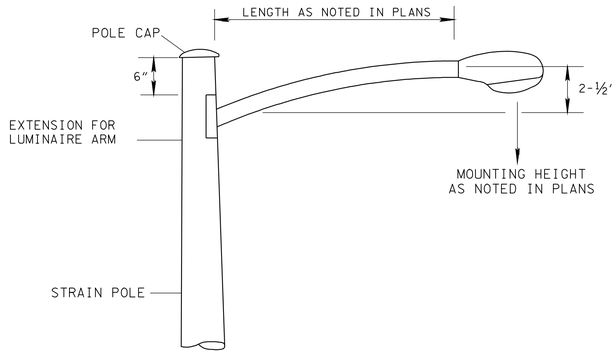


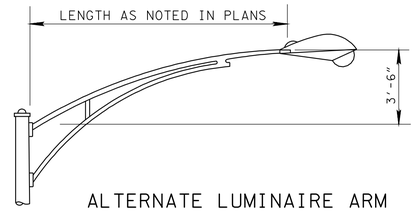
DETAIL C



HAND HOLE

DETAIL D





ALTERNATE LUMINAIRE ARM

DETAIL FOR LUMINAIRE EXTENSION AS REQUIRED BY PLANS

STRAIN POLE GENERAL NOTES

Ⓐ LOCATIONS OF SIGNAL POLES SHOWN ON PLANS ARE APPROXIMATE AND CAN BE ADJUSTED UP TO 5' TO AVOID UTILITIES. ADJUSTMENTS GREATER THAN 5' MUST BE REVIEWED AND APPROVED BY ENGINEER.

Ⓑ ALL STRAIN POLES AT AN INTERSECTION SHALL BE SAME DIAMETER AND BOLT CIRCLE.

Ⓒ TYPICAL AERIAL POWER SERVICE ENTRANCE IS THRU WEATHER HEAD AND DOWN POLE INTERNALLY. IF CABINET IS POLE MOUNTED, AS AN ALTERNATE POWER SERVICE CABLE MAY BE RUN DOWN OUTSIDE OF STEEL STRAIN POLE IN 1" RGS RISER. UNDERGROUND POWER SERVICE SHALL BE RUN THROUGH SEPARATE 1" RGS CONDUIT THROUGH POLE FOUNDATION (SEE STD. DWG. T-SG-5).

Ⓓ POWER SERVICE CABLE SHALL BE RUN ON SEPARATE MESSENGER CABLE(2' ABOVE SPAN WIRE WITH SIGNAL OR DETECTOR CABLES).

Ⓔ ADDITIONAL WEATHER HEADS MAY BE INSTALLED FOR EASE OF CABLE ENTRANCE IF NECESSARY (TO BE FIELD DRILLED AND TAPPED).

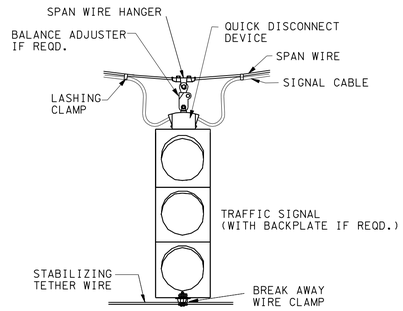
Ⓕ ENTRANCES FOR POLE MOUNTED SIGNAL HEADS SHALL BE FIELD DRILLED TO ENSURE PROPER PLACEMENT.

Ⓖ SIGNALS TO BE MOUNTED WITH 17' 6" TYPICAL VERTICAL CLEARANCE (16' 6" MIN.). MAXIMUM MOUNTING HEIGHT SHALL BE CHECKED PER MUTCD AND HEIGHT ADJUSTED IF NECESSARY. SEE SECTIONS 4D.12, 4D.13, 4D.15 AND 4D.16 OF THE CURRENT EDITION OF THE MUTCD FOR ADDITIONAL INFORMATION.

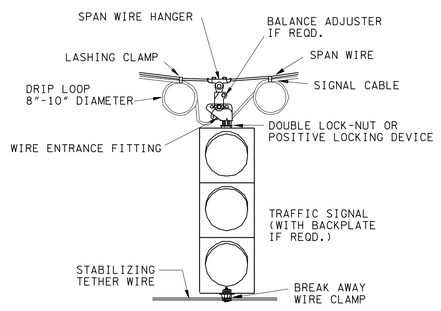
Ⓗ RED INDICATIONS TO BE APPROXIMATELY SAME HEIGHT. HANGER CONNECTOR EXTENDER OR TETHER EXTENDER MAY BE REQUIRED.

Ⓙ PEDESTRIAN SIGNAL HEADS TO BE CLAMSHELL MOUNTED UNLESS OTHERWISE SHOWN ON PLANS.

Ⓚ SEE STD. DWG. T-SG-4 FOR ADDITIONAL DETAILS.



ALTERNATE QUICK DISCONNECT MOUNTING HARDWARE DETAIL
(IF REQD.)



TYPICAL SIGNAL MOUNTING HARDWARE DETAIL

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

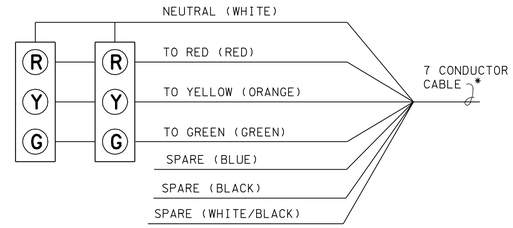
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STRAIN POLE DETAILS FOR SPAN MOUNTED SIGNALS

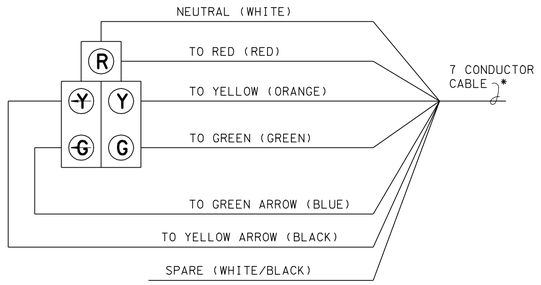
T-SG-8

VEHICLE SIGNAL HEAD WIRING

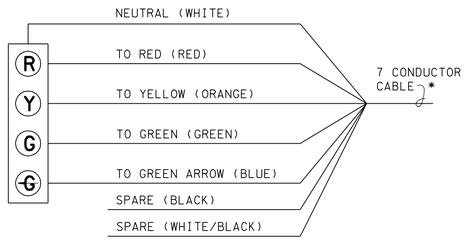
V1 3-SECTION SIGNAL HEAD (TYPE 130)



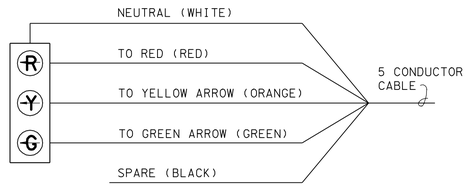
V2 5-SECTION SIGNAL HEAD (TYPE 150 A2H, 150 A2V AND 150 A4H)



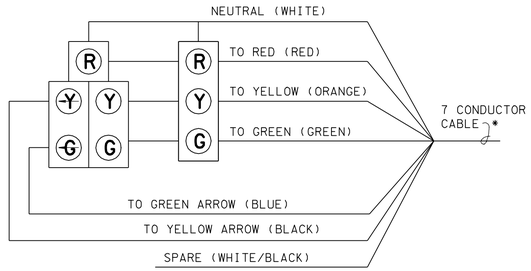
V3 4-SECTION SIGNAL HEAD (TYPE 140A1)



V4 3-SECTION SIGNAL HEAD (TYPE 130A2 OR 130A3)

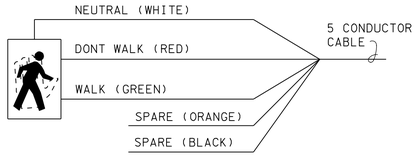


V5 COMBINATION, TYPES 130/150A2H (LEFT TURN PERM/PROT.)

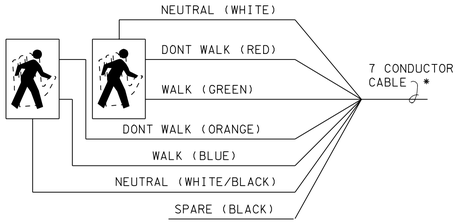


PEDESTRIAN SIGNAL HEAD & PUSHBUTTON WIRING

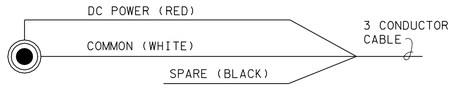
P1 SINGLE DISPLAY



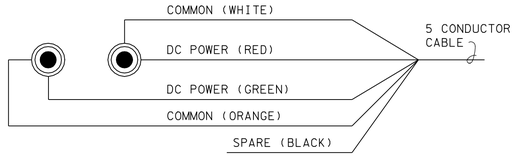
P2 DOUBLE DISPLAY (FOR SEPARATE PEDESTRIAN CROSSING INTERVALS)



P3 SINGLE PUSHBUTTON

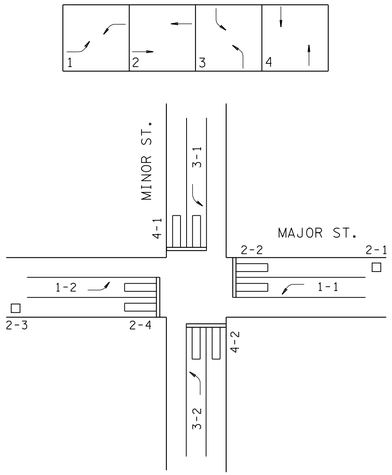


P4 DOUBLE PUSHBUTTON (FOR SEPARATE PEDESTRIAN CROSSING INTERVALS)



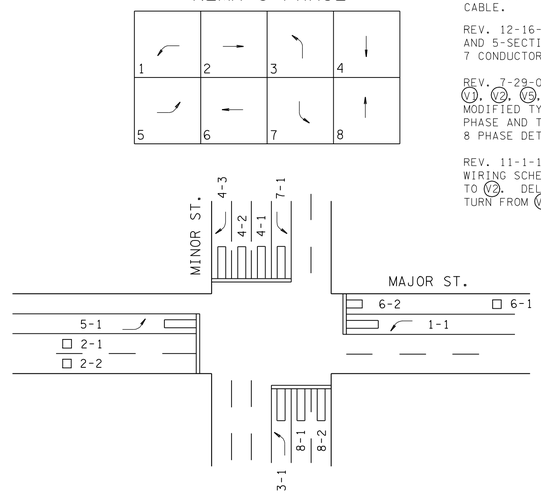
* 8c OR 9c MAY BE USED

4 PHASE



TYPICAL LOOP NUMBER-4 PHASE

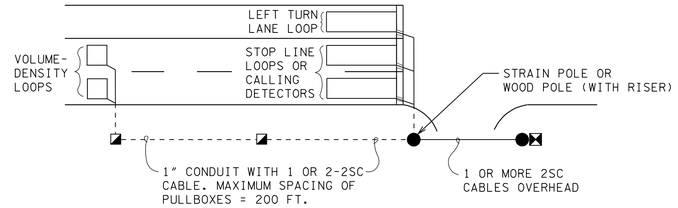
NEMA 8 PHASE



TYPICAL LOOP NUMBERING-8 PHASE

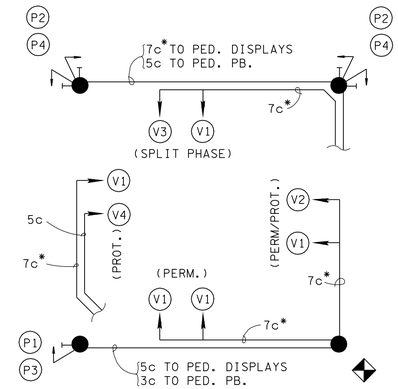
NOTE: WIRING SHALL BE LABELED TO CORRESPOND WITH THE APPROPRIATE LOOP(S).

1. LABEL LOOP LEAD-INS IN PULLBOX OR POLE BASE.
2. LABEL SHIELDED DETECTOR CABLE IN CONTROLLER.
3. LABEL DETECTOR UNITS AND HARNESSES IN CONTROLLER.



TYPICAL LOOP WIRING

NOTE: ANY OR ALL OF THE LOOPS DEPICTED MAY BE PROPOSED.



TYPICAL WIRING SCHEMATIC

(DEPICTING VARIOUS LEFT TURN TREATMENTS)

LEGEND
CONTROLLER
PULL BOX
POLE FOR SIGNAL SUPPORT

REV. 6-13-95: CHANGED 8 CONDUCTOR TO 9 CONDUCTOR CABLE.

REV. 12-16-03: CHANGE 3-SECTION AND 5-SECTION HEADS TO 7 CONDUCTOR CABLE.

REV. 7-29-04: MODIFIED DETAILS V1, V2, V5, P1, AND P2. MODIFIED TYPICAL LOOP NUMBER-4 PHASE AND TYPICAL LOOP NUMBERING-8 PHASE DETAILS.

REV. 11-1-11: REVISED TYPICAL WIRING SCHEMATIC. ADDED 150 A4H TO V2. DELETED THE WORDS LEFT TURN FROM V4.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

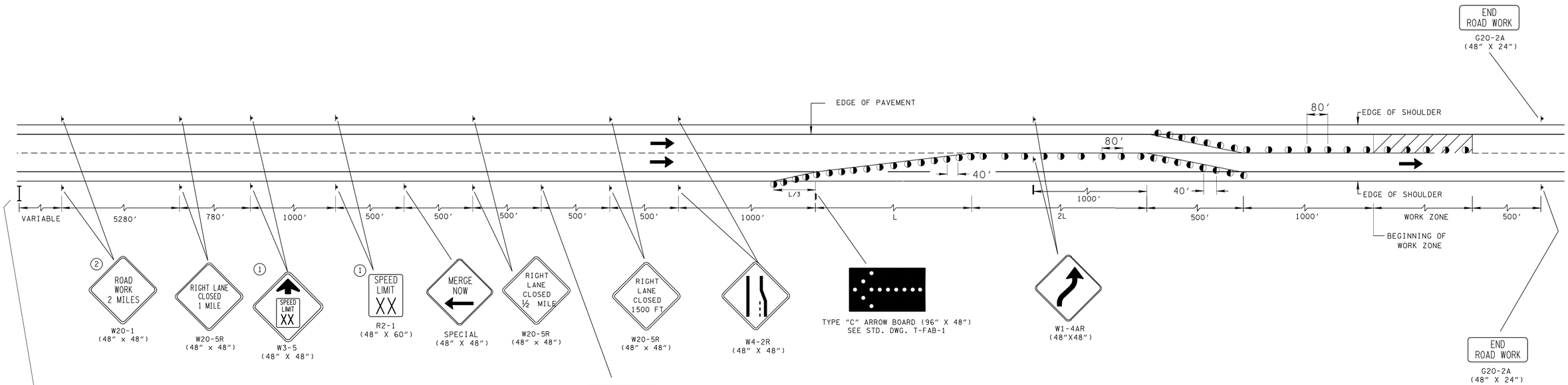
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TYPICAL WIRING FOR SIGNAL HEADS AND DETECTION LOOPS

2-14-92 | T-SG-12

- REV. 9-1-05: REMOVED TYPE "C" WARNING LIGHTS FROM FLEXIBLE DRUMS IN TAPER.
- REV. 3-15-11: CHANGED SIGN (R2-5A) TO SIGN (W3-5) AND CHANGED FOOTNOTE (1). REVISED FLEXIBLE DRUM SPACING AND COMPUTION FOR DISTANCE. REMOVED SIGN R4-1 (MOD).

TRAFFIC CONTROL FOR ONE LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY (WITH EARLY MERGE)



FOOTNOTES

(1) APPROVAL OF THE STATE TRAFFIC ENGINEER IS REQUIRED BEFORE PLACING THE "REDUCED SPEED AHEAD" (W3-5) AND THE "SPEED LIMIT" (R2-1) SIGNS.

(2) ADDITIONAL "ROAD WORK" (W20-1) SIGNS MAY BE USED FOR LONG TRAFFIC QUEUES.

COMPUTATION FOR DISTANCE L

$L = W \times S$ (FOR $S \geq 45$ mph)

$L = WS^2 / 60$ (FOR $S \leq 40$ mph)

L = TAPER LENGTH IN FEET
W = WIDTH OF OFFSET IN FEET
S = POSTED SPEED IN MPH

CHANNELIZATION DEVICE LEGEND

- FLEXIBLE DRUMS
- SIGN SUPPORT
- DIRECTION OF TRAFFIC
- WORK SITE
- FLASHING YELLOW ARROW BOARD (SEE STD. DWG. NO. T-FAB-1,FOR DETAILS AND SPECIFICATIONS)
- PORTABLE MESSAGE BOARDS

GENERAL NOTES

(A) PORTABLE BARRIER RAIL WILL BE REQUIRED WHERE DROP OFFS EXCEED 18 INCHES. PORTABLE BARRIER RAIL MAY BE USED WHERE DROP OFFS EXCEED 6 INCHES. FOR MORE SPECIFIC INFORMATION SEE TDOT DROP-OFF POLICY OR TRAFFIC CONTROL NOTES.

(B) SEE STANDARD DRAWING NO. T-WZ-10 FOR OTHER NEEDED ADVANCE SIGNING.

(C) PORTABLE MESSAGE BOARD SHOULD ONLY BE USED ONLY WHEN TRAFFIC CONDITIONS WARRANT.

(D) THIS DETAIL IS TO BE USED FOR WORK ZONES IN BOTH THE LEFT AND RIGHT LANES. WHEN THE WORK ZONE IS IN THE RIGHT LANE, THE "LANE SHIFT"(W1-4AR) SIGN AND THE LANE SHIFT SHALL BE DELETED.

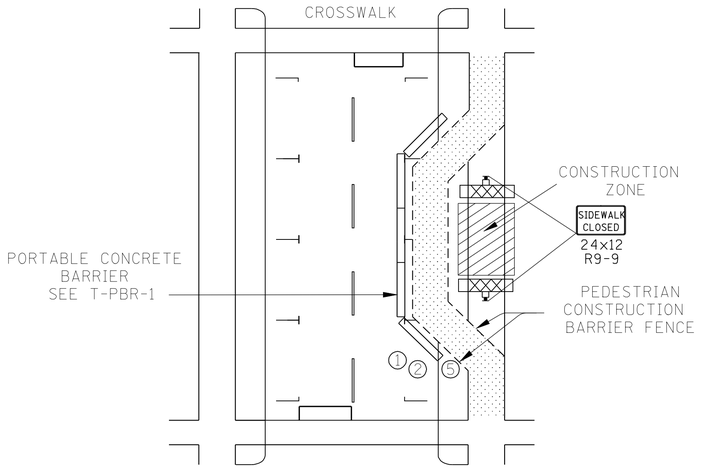
(E) REFER TO STANDARD DRAWING NO. T-WZ-11 FOR PORTABLE BARRIER RAIL PLACEMENT, TAPERS, AND END TREATMENT.

- MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

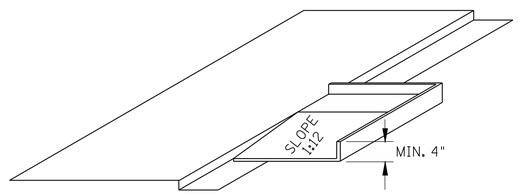
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

LANE CLOSURE WITH LEFT HAND MERGE AND LANE SHIFT

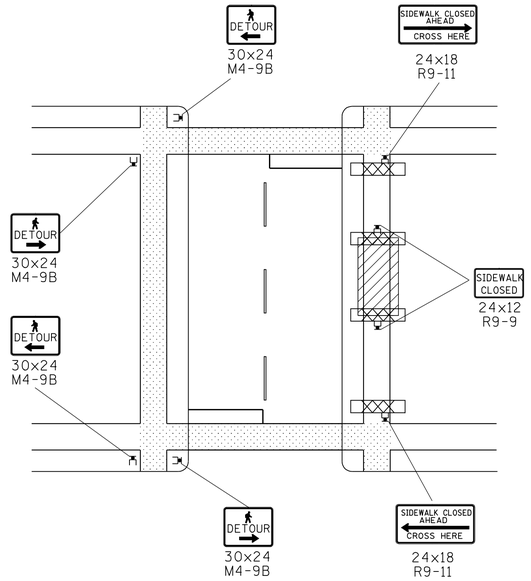
11-11-04 | T-WZ-21



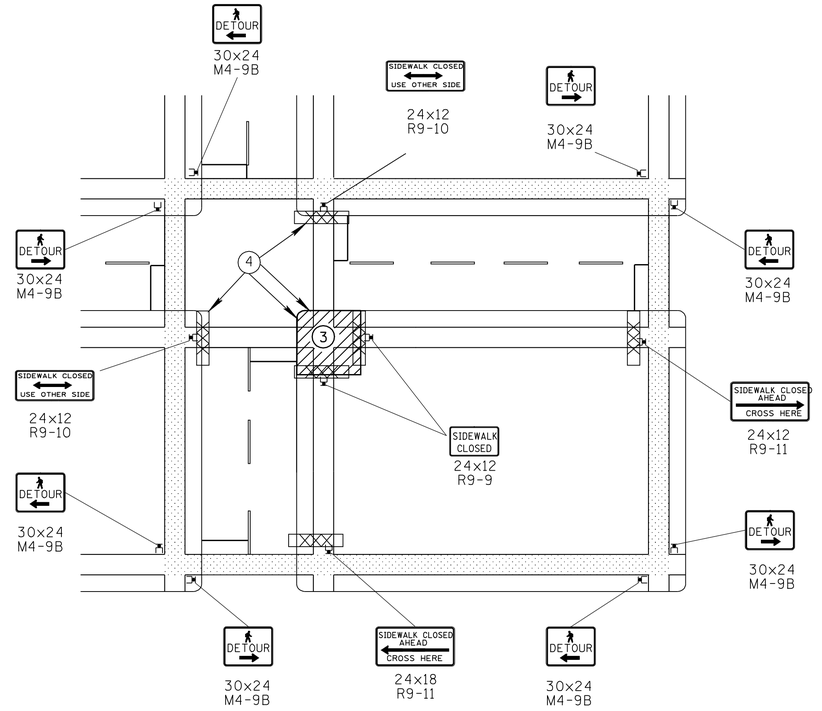
SIDEWALK DIVERSION



PLYWOOD CURB RAMP DETAIL



SIDEWALK CLOSURE, MIDBLOCK



SIDEWALK CLOSURE, CORNER

GENERAL NOTES FOR SIDEWALK DIVERSION

- (A) SIDEWALK DIVERSION MAY BE USED ON ROADS WITH ON STREET PARKING LANES ADJACENT TO THE SIDEWALK CLOSURE.
- (B) THE PEDESTRIAN WALKWAY SHALL BE AT LEAST 5′ WIDE.
- (C) TEMPORARY FACILITIES SHALL BE COMPLIANT WITH THE CURRENT VERSION OF THE AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG).
- (D) DIVERSIONS MUST BE CLEARLY IDENTIFIED, PROTECTED FROM TRAFFIC AND FREE FROM HAZARDS.
- (E) PEDESTRIAN CONSTRUCTION BARRIER FENCE SHALL BE CONTINUOUS THROUGHOUT THE LENGTH OF THE DIVERSION WITH A DETECTABLE EDGING WITH A BOTTOM NO HIGHER THAN 2.5″ ABOVE THE SURFACE AND TOP NO LESS THAN 6″ ABOVE THE SURFACE. THE PEDESTRIAN CHANNELIZATION DEVICE SHALL BE ORANGE. HIGH VISIBILITY FENCE, PED. RAIL, AND CHAIN LINK FENCE ARE ACCEPTABLE.
- (F) CROSSING THE DIVERSION PATH BY CONSTRUCTION VEHICLES SHOULD BE AVOIDED, WHEN NECESSARY IT SHALL BE CONTROLLED BY FLAGGER.
- (G) TRAFFIC CONTROL DEVICES FOR VEHICULAR TRAFFIC ARE NOT SHOWN BUT ARE REQUIRED FOR CLOSING THE LANE.
- (H) A SMOOTH, HARD, CONTINUOUS AND RIDEABLE SURFACE SHALL BE PROVIDED THROUGHOUT THE LENGTH OF THE DIVERSION.
- (I) THE COST OF MAINTAINING PEDESTRIAN DIVERSION, (INCLUDING HANDICAP RAMPS IF NEEDED) SHALL NOT BE PAID DIRECTLY BUT PAID FOR IN THE COST OF OTHER ITEMS.

FOOTNOTES

1. IF PARKING STALLS ARE USED FOR DIVERSION, CHANNELIZING DEVICES MAY BE SUBSTITUTED FOR PORTABLE BARRIER RAILS IF PORTABLE BARRIER RAILS ARE DEEMED UNNECESSARY BY ENGINEERING JUDGEMENT.
2. IF DIVERSION REQUIRES A LANE CLOSURE SEE T-WZ-SERIES FOR FURTHER INFORMATION.
3. LIMIT WORK TO ONE CORNER AT A TIME TO MINIMIZE DISRUPTION TO PEDESTRIAN TRAFFIC.
4. PEDESTRIAN TRAFFIC SIGNAL DISPLAYS CONTROLLING CLOSED CROSSWALKS SHALL BE COVERED.
5. AREAS WHERE THE ROUTE CROSSES GRASSY TERRAIN OR ELEVATION CHANGES PLYWOOD MAY BE USED WITH A HIGHLIGHTED BEVEL AT THE JOINT.

GENERAL NOTES FOR SIDEWALK CLOSURE

- (A) TRAFFIC CONTROL DEVICES FOR VEHICULAR TRAFFIC ARE NOT SHOWN BUT MAY BE REQUIRED TO CONTROL VEHICLES THROUGH WORK ZONE.
- (B) SIGNS R9-9, R9-10 AND R9-11 TO BE ATTACHED TO TYPE III BARRICADE. ALL OTHER SIGNS SHOWN ON THIS PLAN MAY BE PLACED ON PORTABLE SUPPORTS.
- (C) MINIMIZE PEDESTRIAN OUT-OF-DIRECTION TRAVEL. IT IS NOT ACCEPTABLE TO REQUIRE PEDESTRIANS TO RETRACE THEIR PATH TO FIND A SAFE CROSSING.
- (D) DETOUR SHALL BE DETECTABLE AND INCLUDE ACCESSIBILITY FEATURES CONSISTENT WITH THE FEATURES PRESENT IN THE EXISTING FACILITY.
- (E) BARRICADES SHALL BE PLACED ACROSS THE FULL WIDTH OF THE CLOSED SIDEWALK.
- (F) WORK SHALL BE EXPEDITED TO MINIMIZE IMPACTS TO BUSINESS CAUSED BY THE SIDEWALK CLOSURE.

PORTABLE BARRIER RAIL

UNDER PEDESTRIAN TRAFFIC

UNDER CONSTRUCTION

PEDESTRIAN CONSTRUCTION BARRIER FENCE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SIDEWALK TRAFFIC CONTROL

2-29-12 | T-WZ-55