STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
DESIGN DIVISION
NASHVILLE, TENNESSEE 37243-0348

INSTRUCTIONAL BULLETIN NO. 12-05

Regarding Revised and New Standard Drawings

Effective for the August 3rd Letting, the revised and new Standard Drawings are to be printed with the plans. These drawings shall be identified on the lower left side of the index sheet **"To be printed with plans"** until the drawings are formally distributed.

DRAWING NUMBER	CURRENT REVISION DATE	DESCRIPTION
RD-TS-9	02-01-12	DESIGN STANDARDS FOR SINGLE LANE URBAN AND RURAL ROUNDABOUTS
RD-TS-10	02-01-12	DESIGN STANDARDS FOR MULTI-LANE URBAN AND RURAL ROUNDABOUTS
RD01-TS-6A	01-24-12	TYPICAL CURB AND GUTTER SECTIONS WITHOUT SHOULDER
D-PB-2	02-01-12	STANDARD DETAILS FOR PLASTIC PIPE INSTALLATION
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 GRATE
D-PE-30B		30" CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE
D-PE-36A		36" CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE

DRAWING NUMBER	CURRENT REVISION DATE	DESCRIPTION
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-SEW-1A		SIDE DRAIN CONCRETE ENDWALL WITH STEEL PIPE GRATE
D-SEW-12D	03-01-12	CONCRETE ENDWALL TYPE "SD" WITH STEEL PIPE GRATE (FOR 15" AND 18" PIPES) (12:1 SLOPE)
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-17	02-12-12	DOWEL ASSEMBLY DETAILS
RP-J-18	02-12-12	DOWEL ASSEMBLY DETAILS
RP-J-19	02-12-12	DOWEL ASSEMBLY DETAILS
RP-J-23	02-12-12	DOWEL ASSEMBLY DETAILS
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
T-M-2	01-12-12	DETAILS FOR PAVEMENT MARKINGS FOR CONVENTIONAL ROADS
T-M-5	01-12-12	MARKING DETAILS FOR EXPRESSWAYS & FREEWAYS

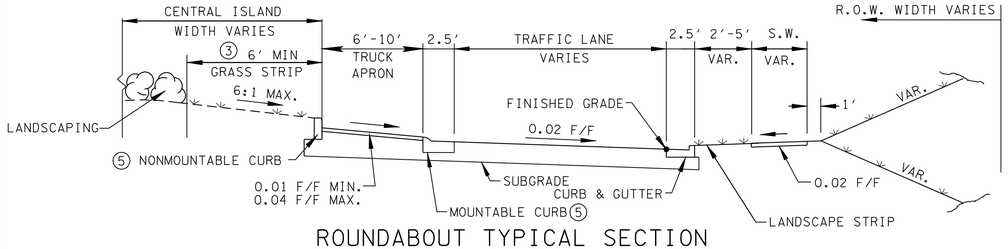
DRAWING NUMBER	CURRENT REVISION DATE	DESCRIPTION
T-M-6	01-12-12	MARKING DETAIL FOR EXPRESSWAY & FREEWAY INTERCHANGES
T-M-7	01-12-12	GORE MARKING DETAILS FOR EXPRESSWAY & FREEWAY INTERCHANGES
T-M-8	01-12-12	MARKING DETAILS FOR EXPRESSWAYS & FREEWAYS
T-WZ-55		SIDEWALK TRAFFIC CONTROL

Carolyn Stonecipher

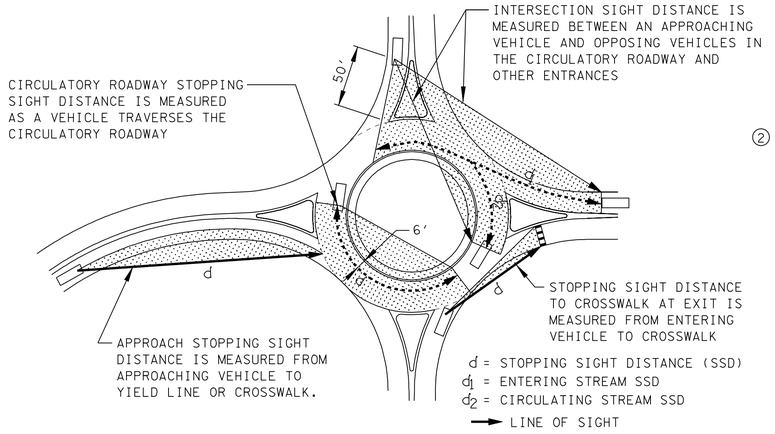
Carolyn Stonecipher, P.E.,
Civil Engineering Director
Design Division

March 16, 2012
CS:ARH: MWC
Attachment

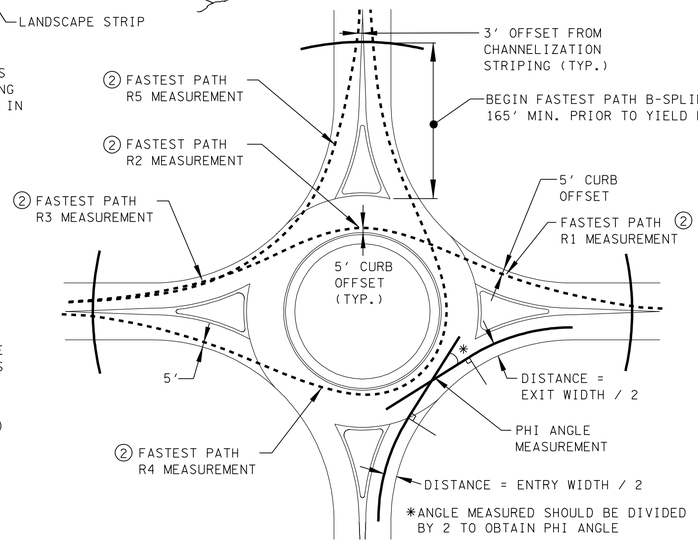
REV. 2-1-12: ADDED OPTIONAL PEDESTRIAN RAIL.



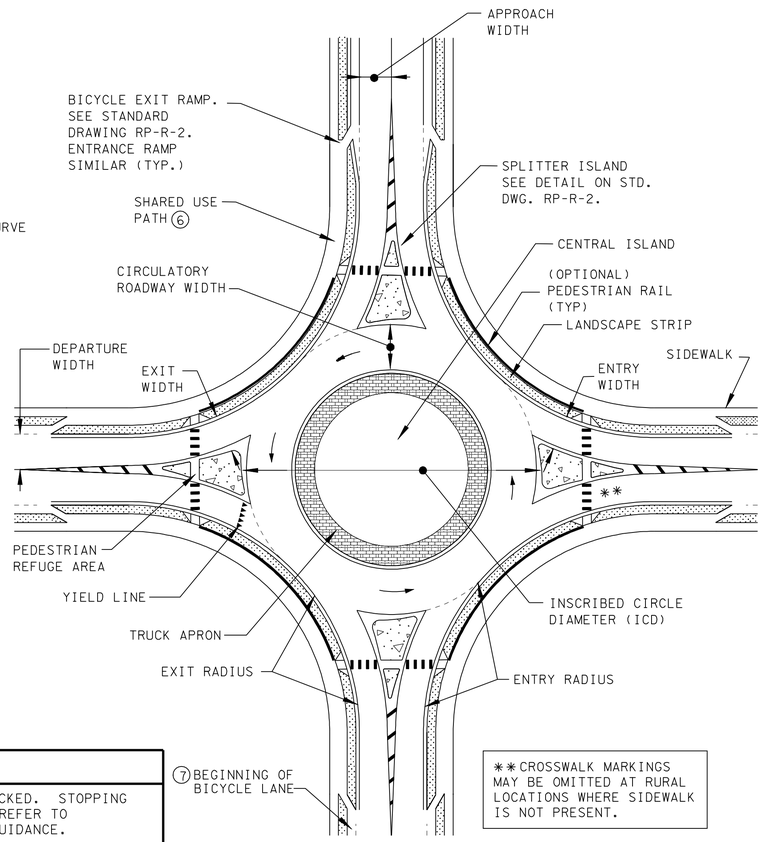
ROUNDABOUT TYPICAL SECTION



ROUNDABOUT SIGHT DISTANCE ①

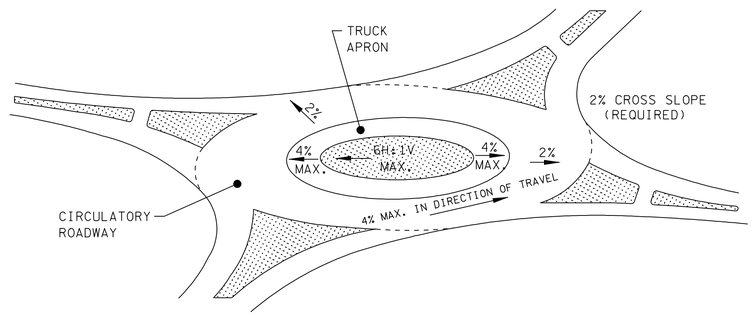


ROUNDABOUT DESIGN CHECKS



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.

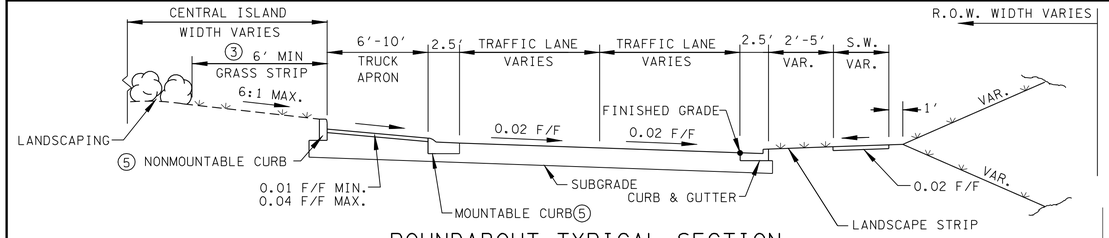
L. OPTIONAL PEDESTRIAN RAIL SHALL NOT CAUSE A CONFLICT WITH INTERSECTION SIGHT DISTANCE.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

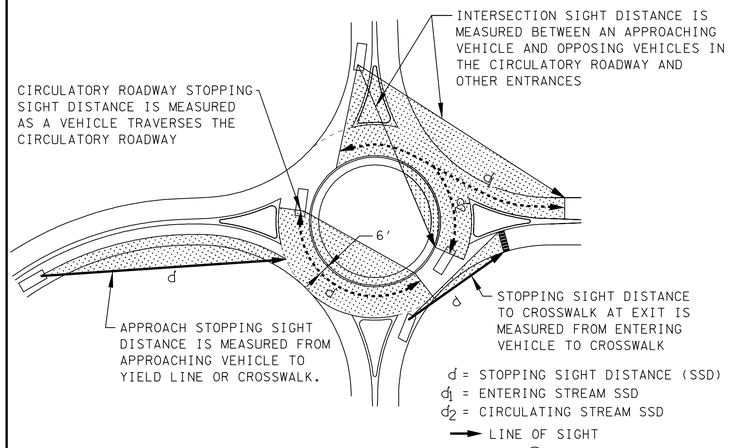
DESIGN STANDARDS FOR SINGLE LANE URBAN AND RURAL ROUNDABOUTS

4-28-10 | RD-TS-9

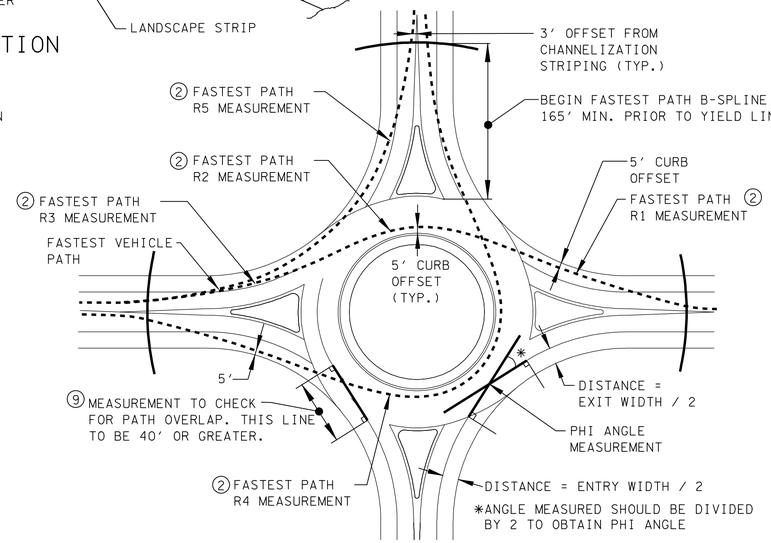
REV. 2-1-12: ADDED OPTIONAL PEDESTRIAN RAIL.



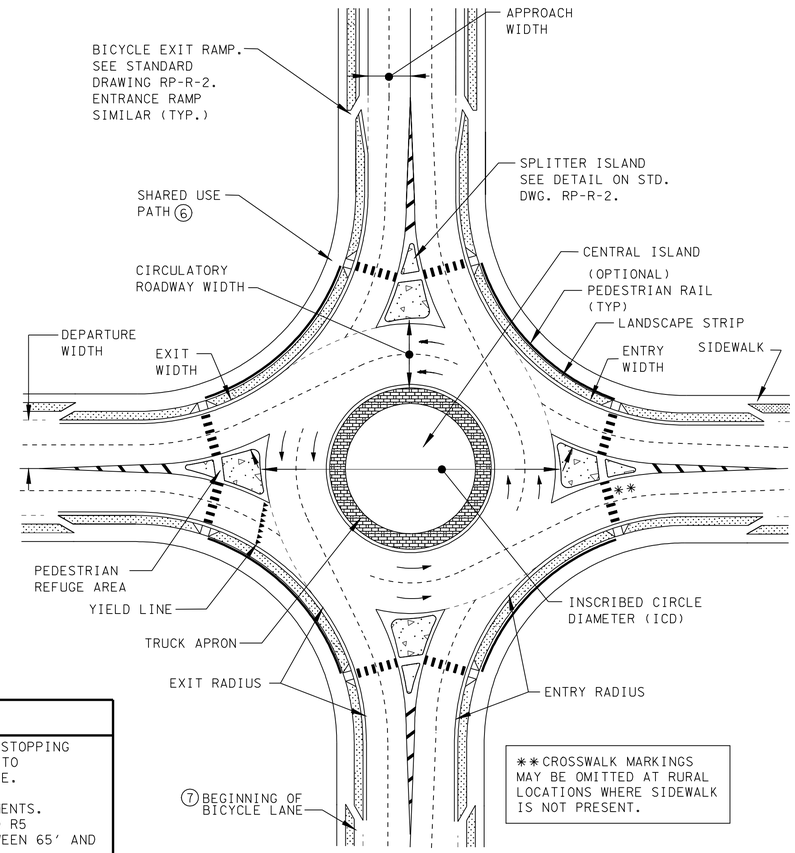
ROUNDABOUT TYPICAL SECTION



ROUNDABOUT SIGHT DISTANCE ①

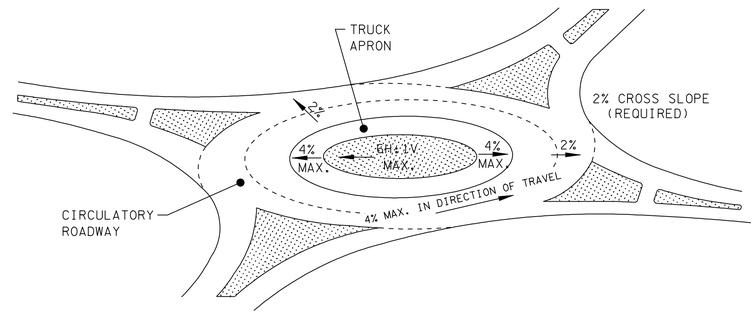


ROUNDABOUT DESIGN CHECKS



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.

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 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.

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

Ⓖ 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.

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

Ⓙ 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.

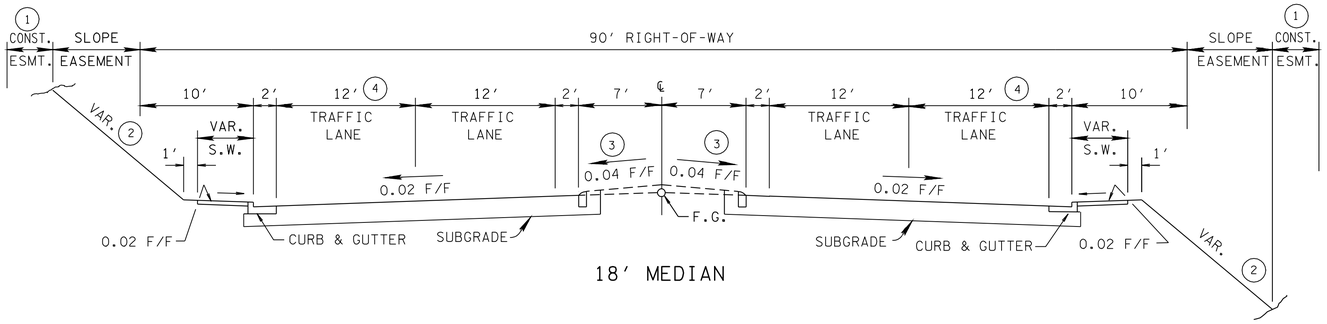
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DESIGN STANDARDS FOR MULTI-LANE URBAN AND RURAL ROUNDABOUTS

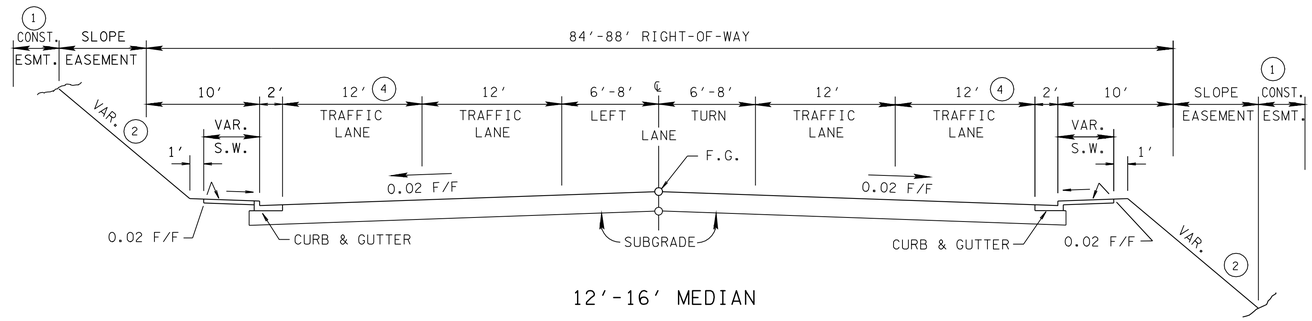
4-28-10 | RD-TS-10

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

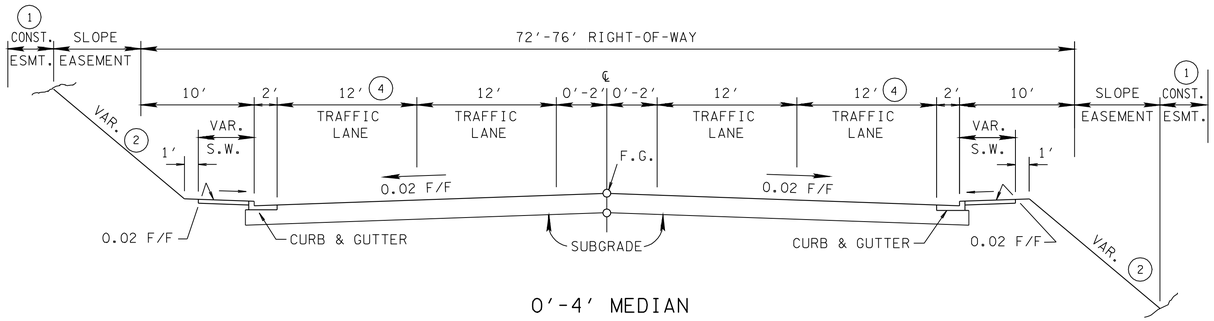
REV. 1-24-12: ADDED REFERENCE TO NOTE (4).



18' MEDIAN



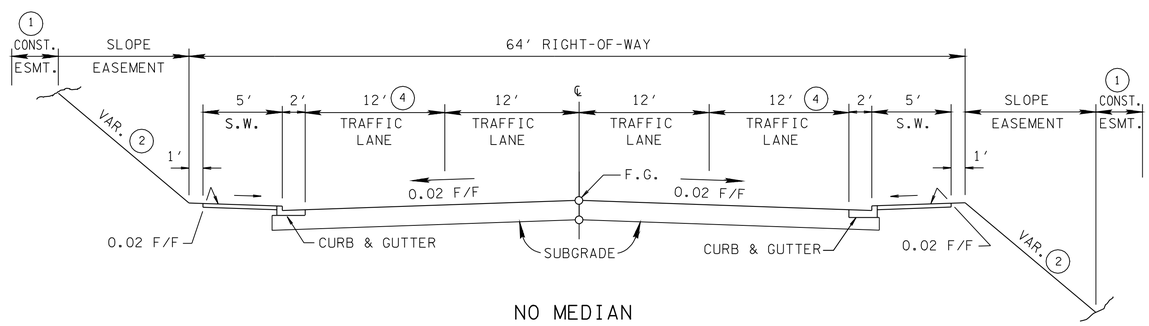
12'-16' MEDIAN



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

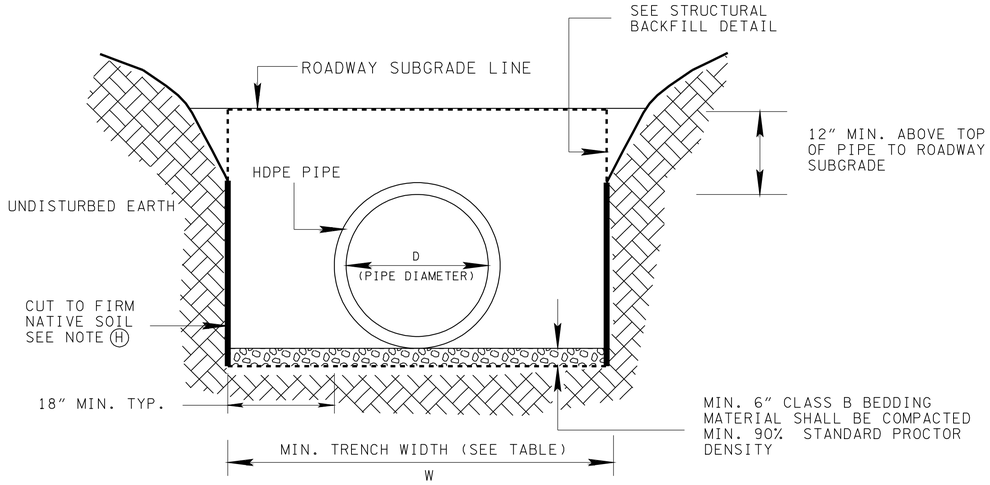
(4) 14 FEET TO 16 FEET OUTSIDE LANE WIDTH TO BE UTILIZED WHEN BICYCLE LANE PROVISIONS ARE REQUIRED. REFER T-M-15, 15A, AND 16 FOR MORE INFORMATION.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

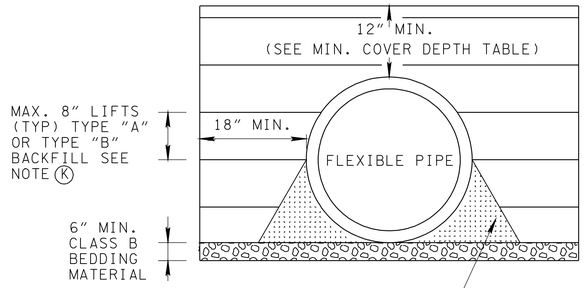
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TYPICAL CURB AND GUTTER SECTIONS WITHOUT SHOULDER

10-15-02 RD01-TS-6A



OPEN DITCH INSTALLATION (TYPICAL CROSS-SECTION)

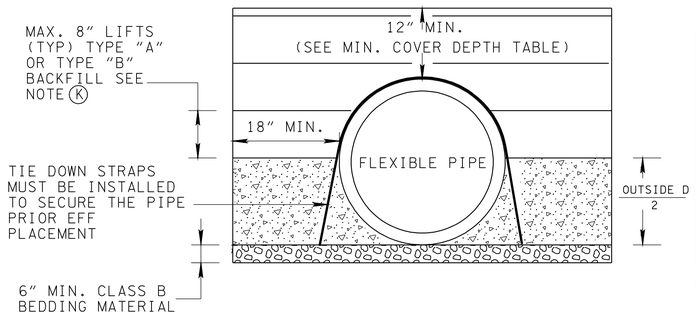


STRUCTURAL BACKFILL DETAIL (TYPE "A" OR TYPE "B" AGGREGATE, GRADING D OR E)

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).

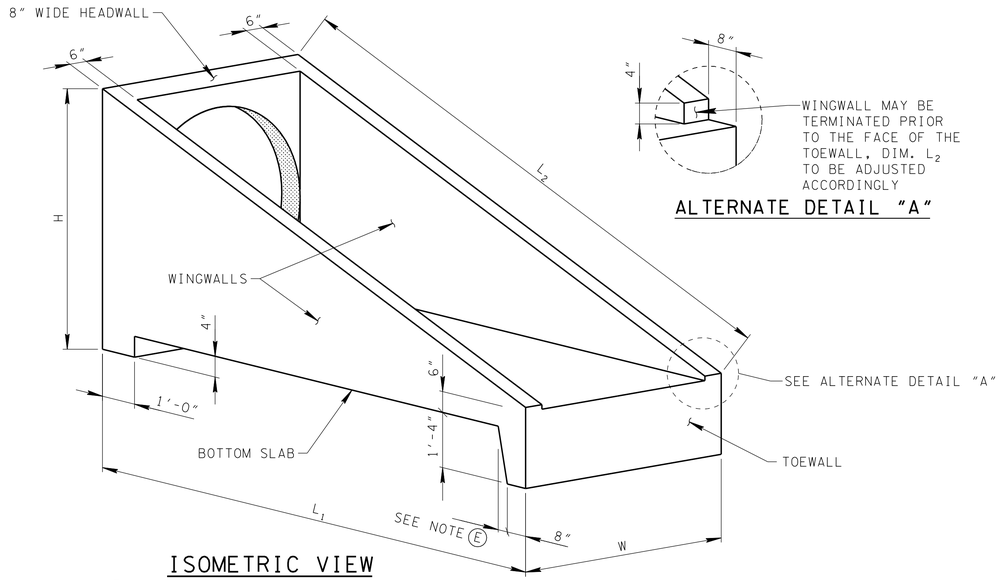
REV.2-1-12: REVISED DRAWING NAME ADDED EFF DETAIL. REVISED GENERAL NOTES AND TABLE. ADDED MINIMUM COVER TABLE.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STANDARD DETAILS FOR FLEXIBLE PIPE INSTALLATION

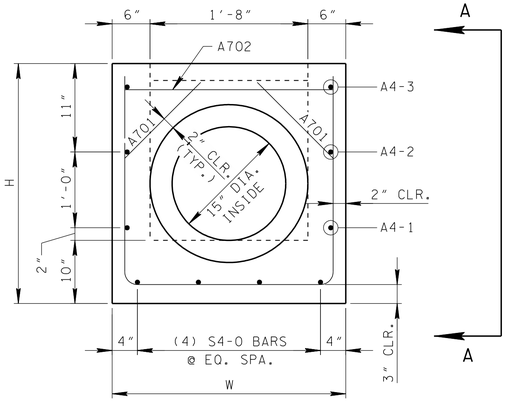
3-15-07 | D-PB-2



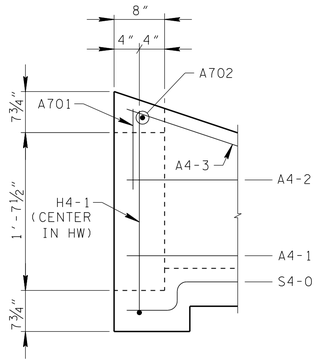
ALTERNATE DETAIL "A"

ISOMETRIC VIEW

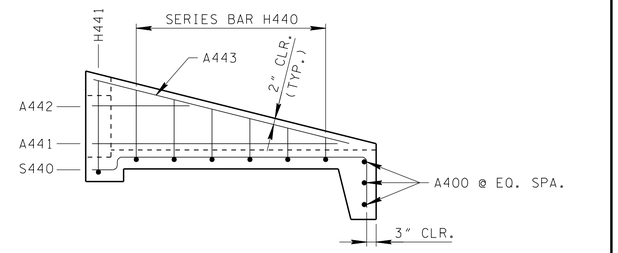
NOTE: ¾" CHAMFER REQUIRED ON ALL EXPOSED EDGES



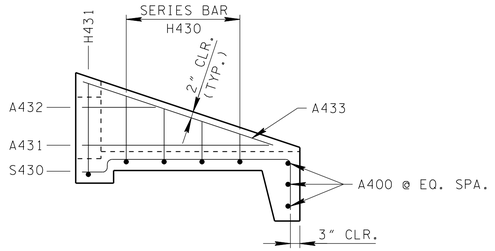
ELEVATION



PARTIAL VIEW A-A



BOTTOM SLAB PLAN

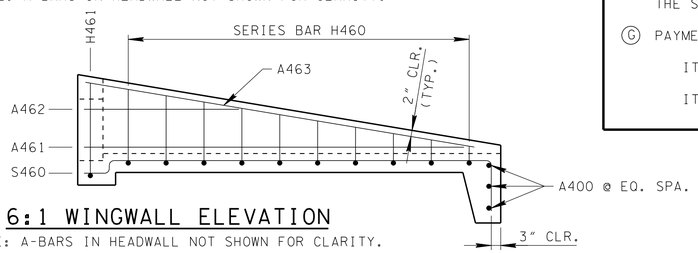


3:1 WINGWALL ELEVATION

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

4:1 WINGWALL ELEVATION

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

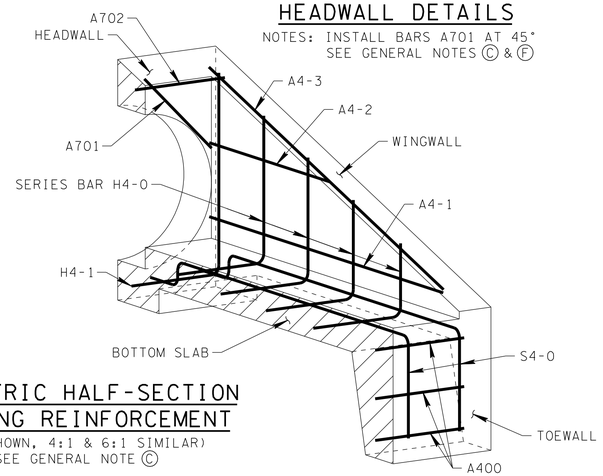


6:1 WINGWALL ELEVATION

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.

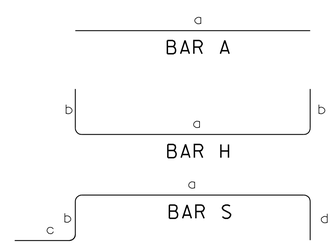
④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.

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.

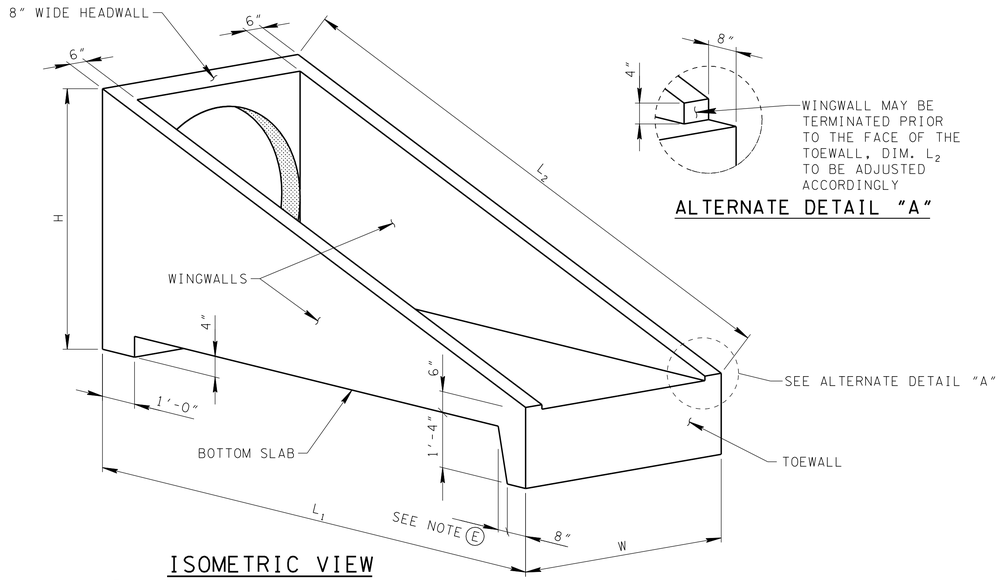
NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

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

3-01-12

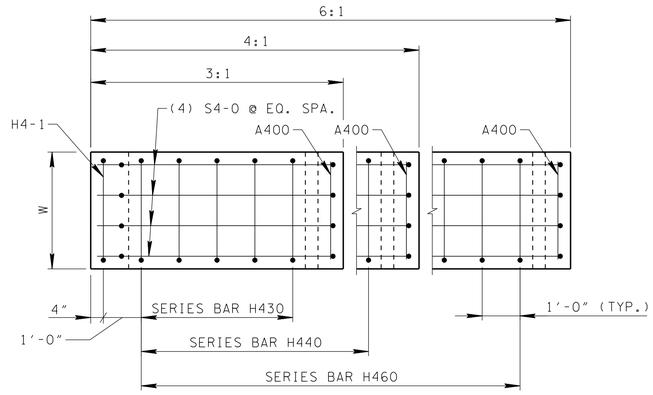
D-PE-15B



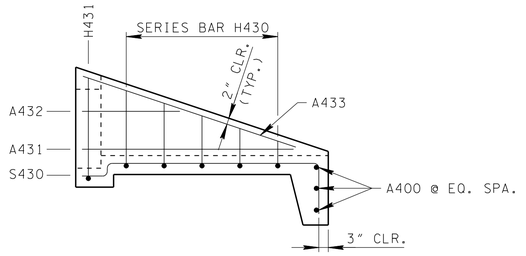
ISOMETRIC VIEW

NOTE: ¾" CHAMFER REQUIRED ON ALL EXPOSED EDGES

ALTERNATE DETAIL "A"

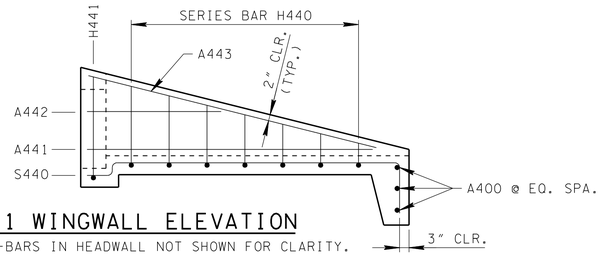


BOTTOM SLAB PLAN



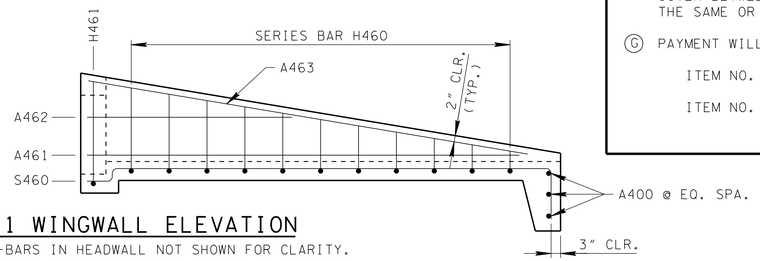
3:1 WINGWALL ELEVATION

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



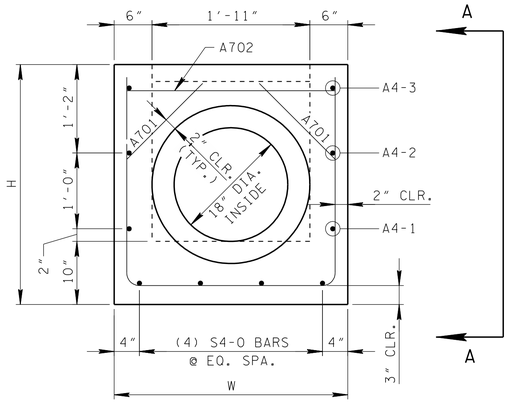
4:1 WINGWALL ELEVATION

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

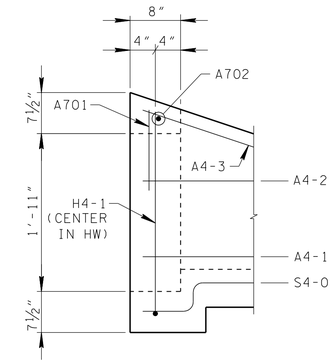


6:1 WINGWALL ELEVATION

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



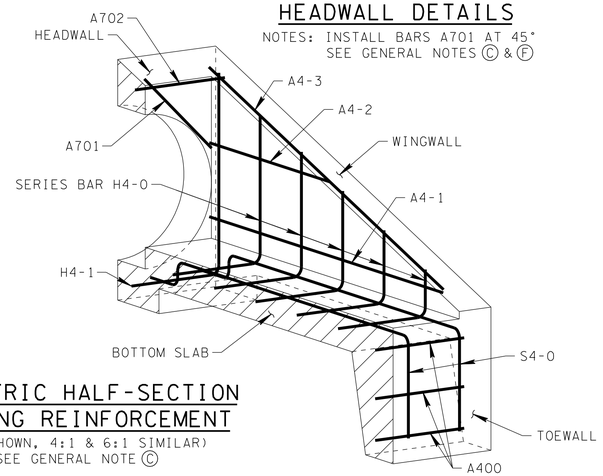
ELEVATION



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.

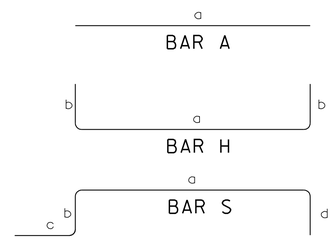
④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.

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.

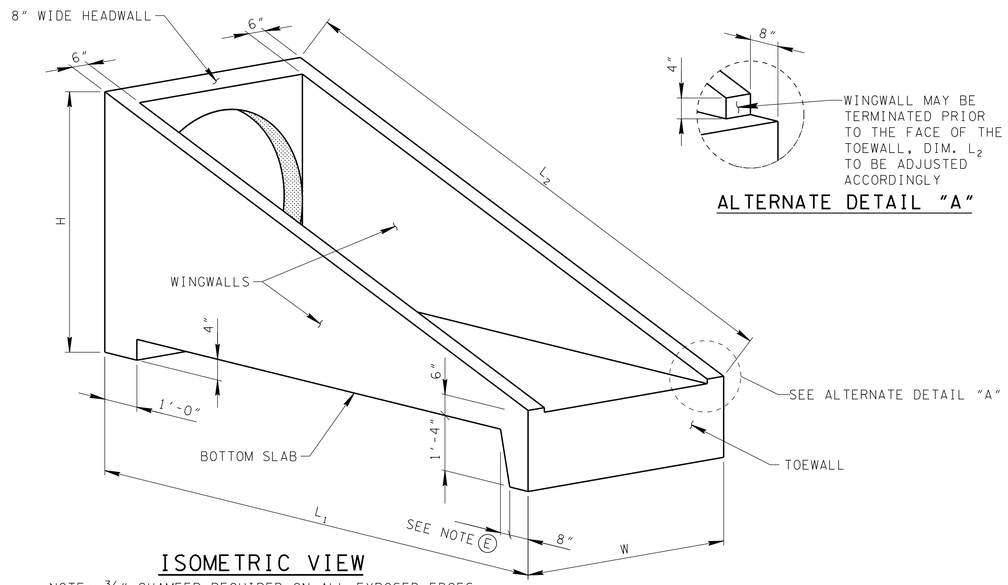
NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

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

3-01-12

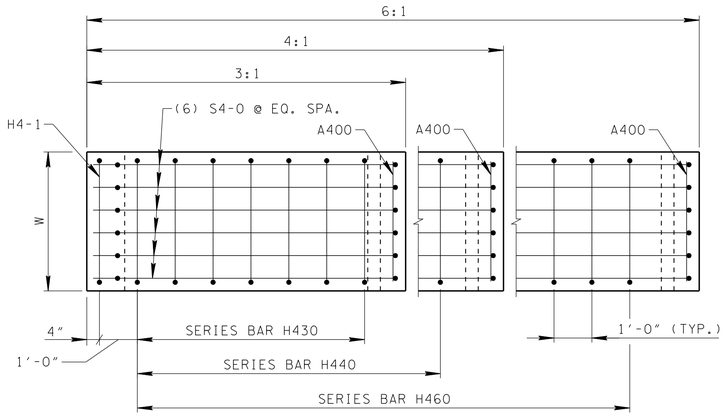
D-PE-18B



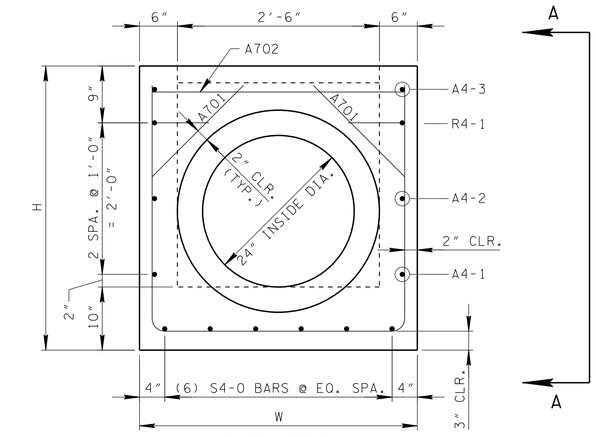
ISOMETRIC VIEW

NOTE: ¾" CHAMFER REQUIRED ON ALL EXPOSED EDGES

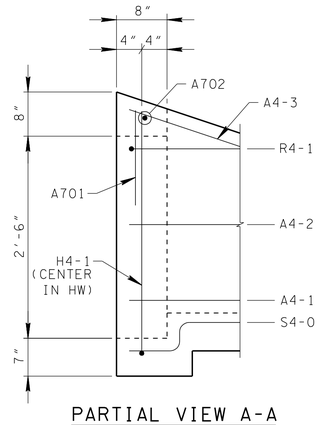
ALTERNATE DETAIL "A"



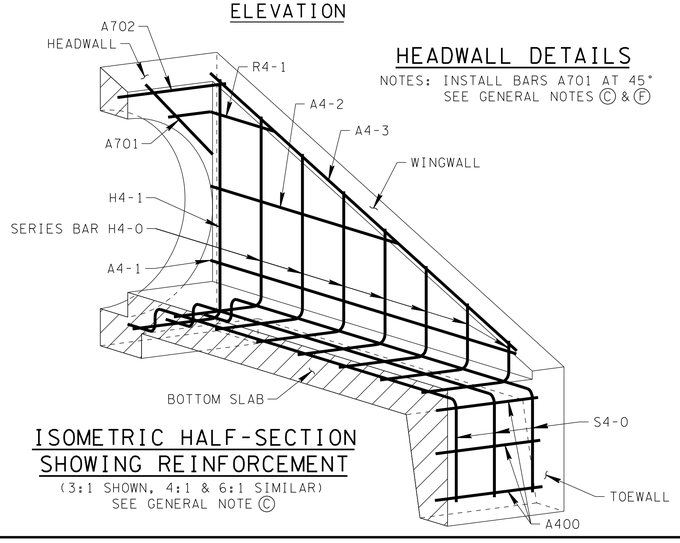
BOTTOM SLAB PLAN



ELEVATION



PARTIAL VIEW A-A

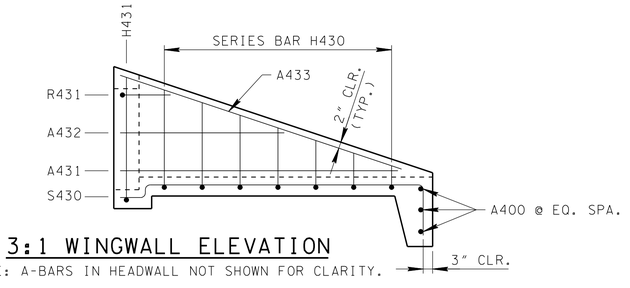


ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT

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

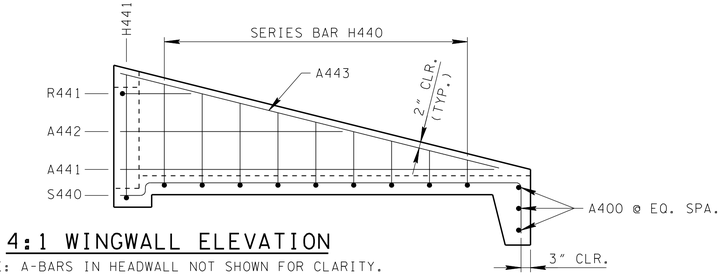
HEADWALL DETAILS

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



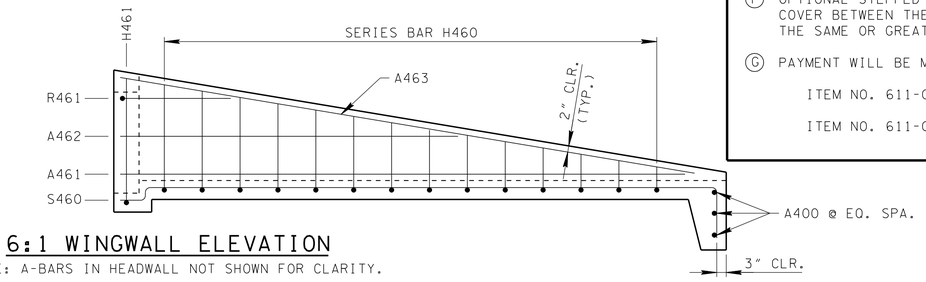
3:1 WINGWALL ELEVATION

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.

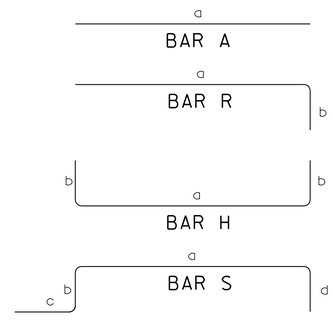
④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.

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.

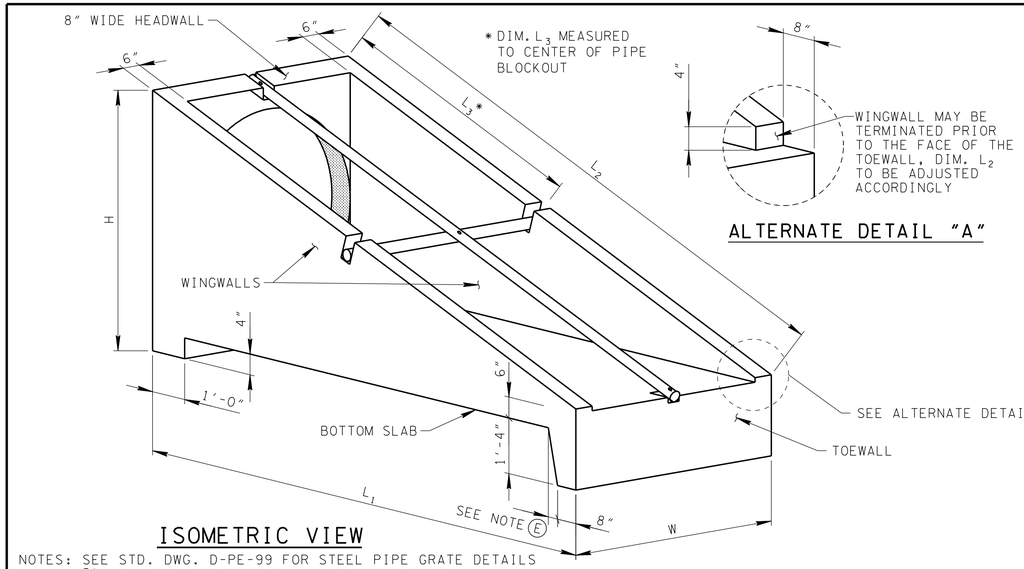
NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

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

3-01-12

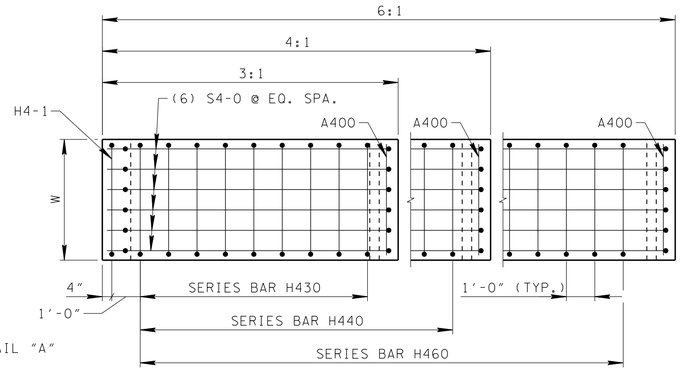
D-PE-24B



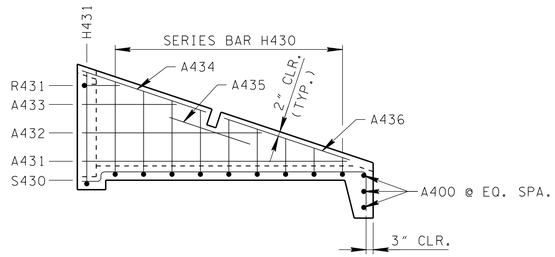
ISOMETRIC VIEW

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

ALTERNATE DETAIL "A"

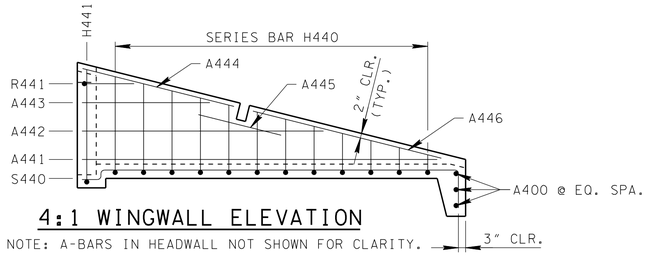


BOTTOM SLAB PLAN



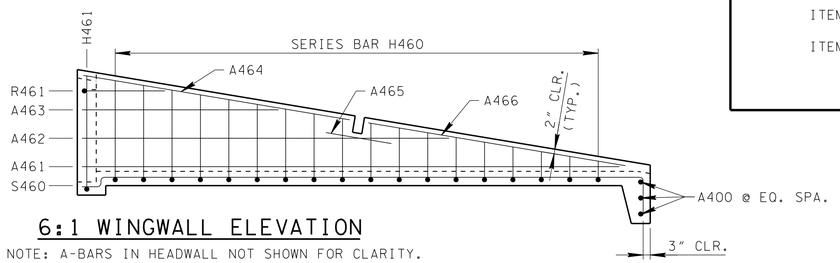
3:1 WINGWALL ELEVATION

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



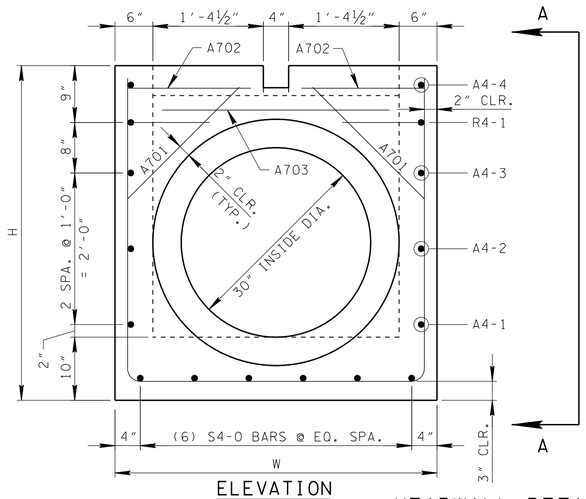
4:1 WINGWALL ELEVATION

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

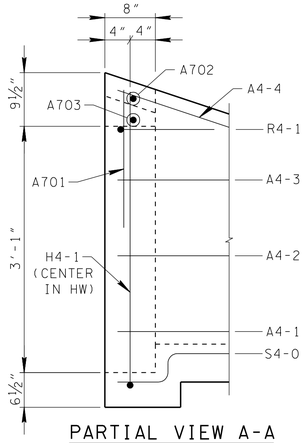


6:1 WINGWALL ELEVATION

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



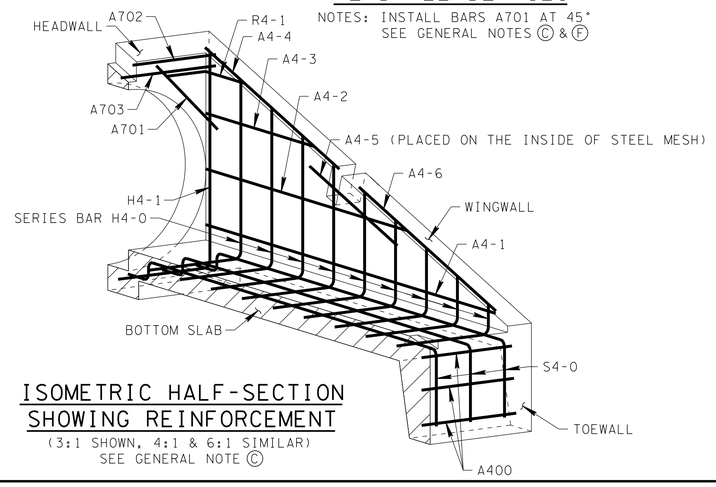
ELEVATION



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.

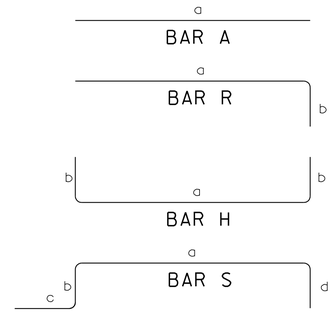
④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.

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.

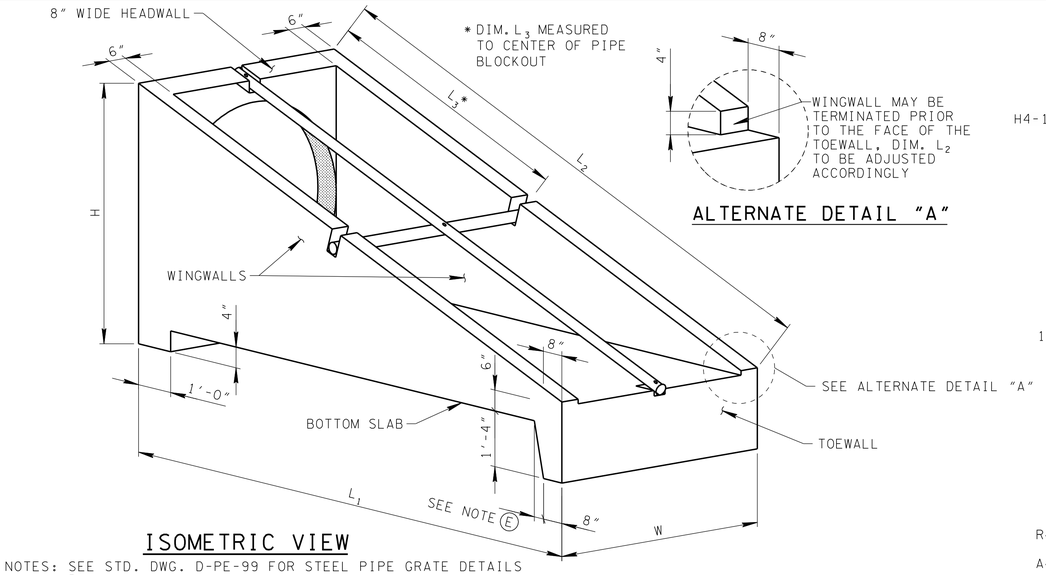
STANDARD C.R.S.I. HOOK DETAILS SHALL APPLY, EXCEPT AS NOTED.

NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

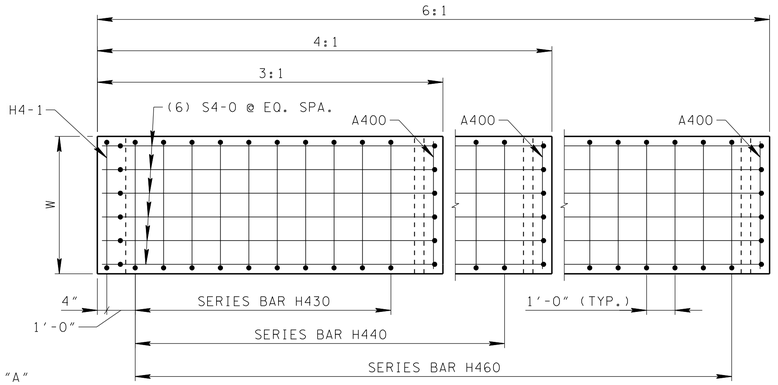
30" CONCRETE ENDWALL
CROSS DRAIN WITH
STEEL PIPE GRATE
(FOR 3:1, 4:1 & 6:1 SLOPES)

3-01-12 D-PE-30B



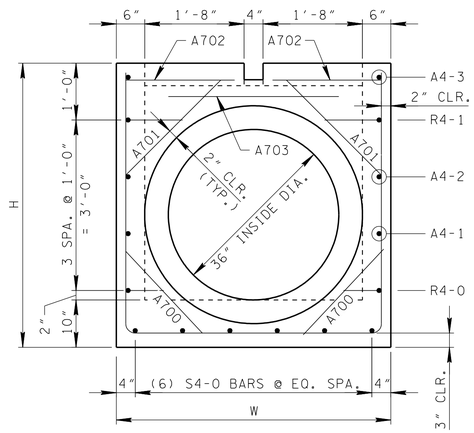
ISOMETRIC VIEW

ALTERNATE DETAIL "A"

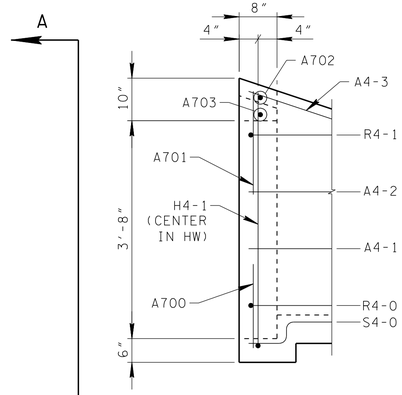


BOTTOM SLAB PLAN

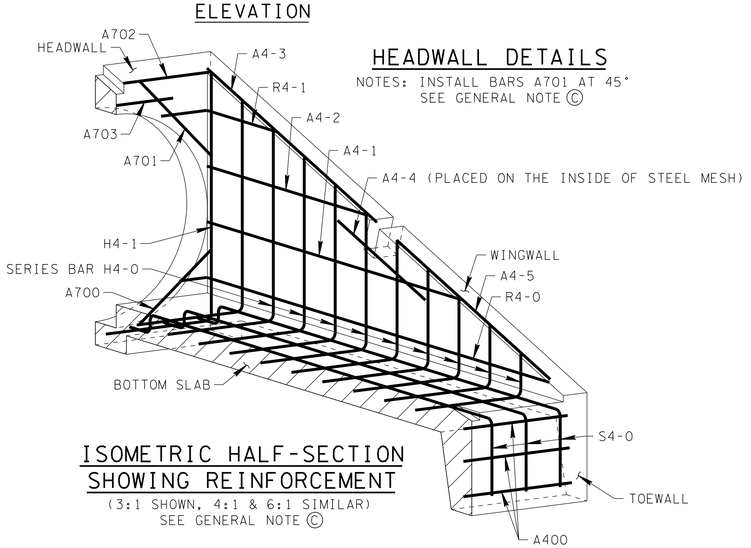
NOTES: SEE STD. DWG. D-PE-99 FOR STEEL PIPE GRATE DETAILS
¾" CHAMFER REQUIRED ON ALL EXPOSED EDGES



ELEVATION



PARTIAL VIEW A-A

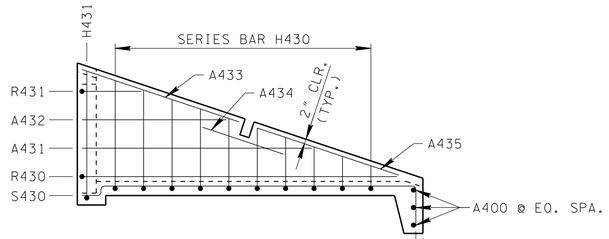


ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT

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

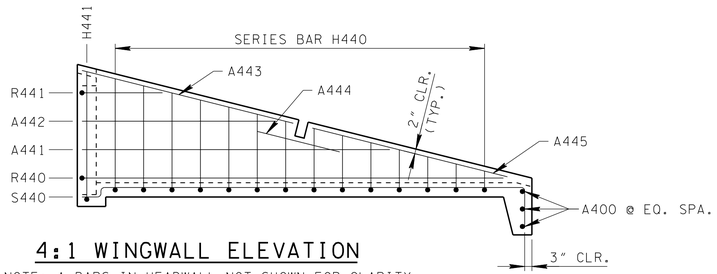
HEADWALL DETAILS

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



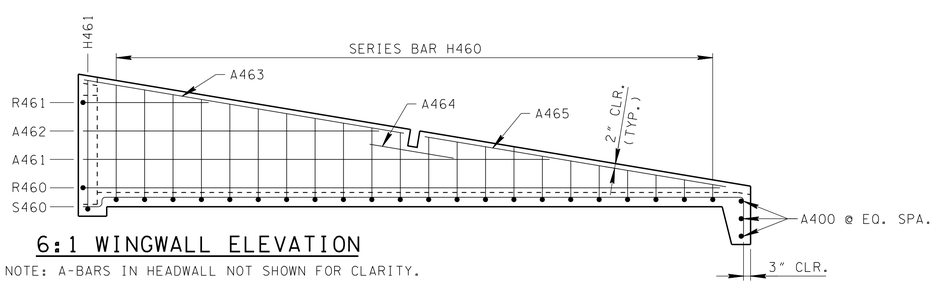
3:1 WINGWALL ELEVATION

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.

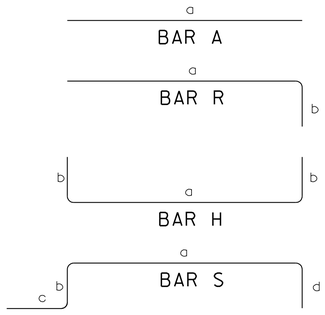
④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.

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

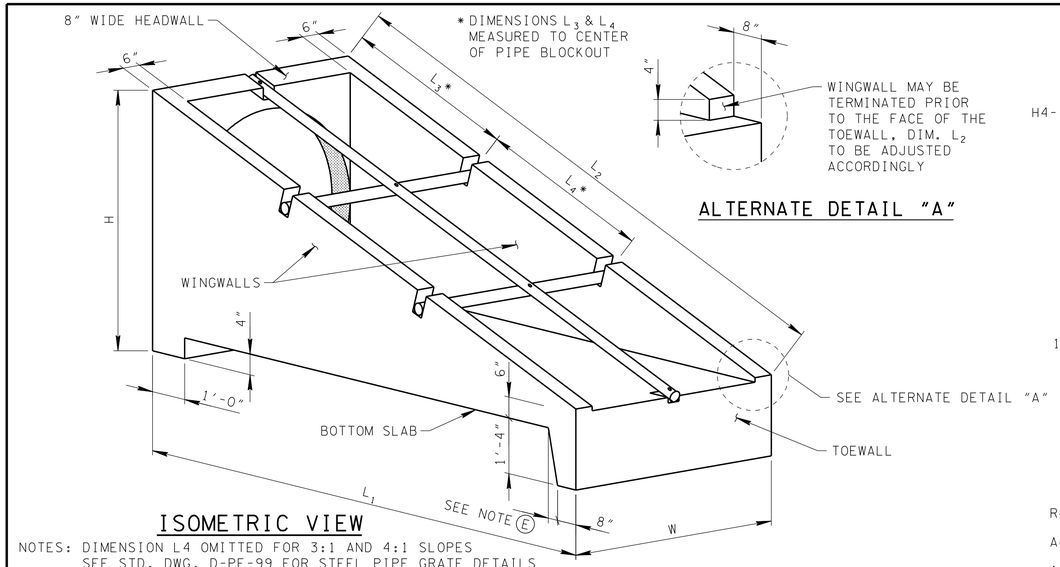
DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF BAR.

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)

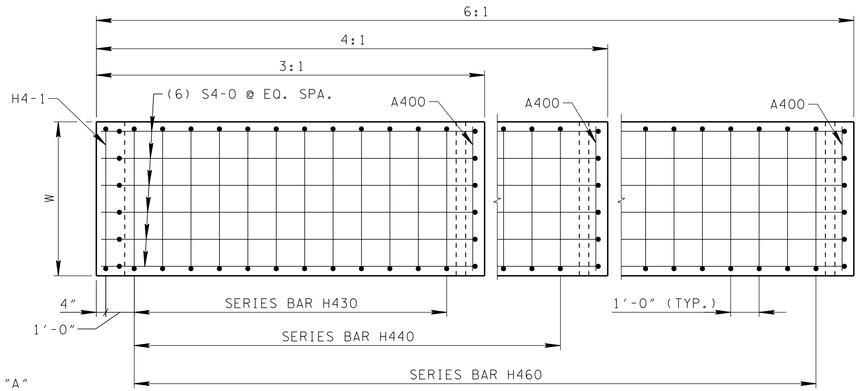
NOT TO SCALE | 3-01-12 | D-PE-36B



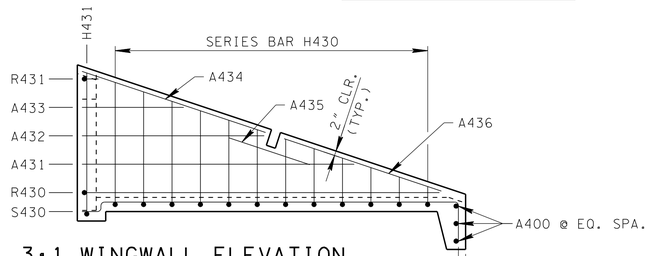
ISOMETRIC VIEW

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"

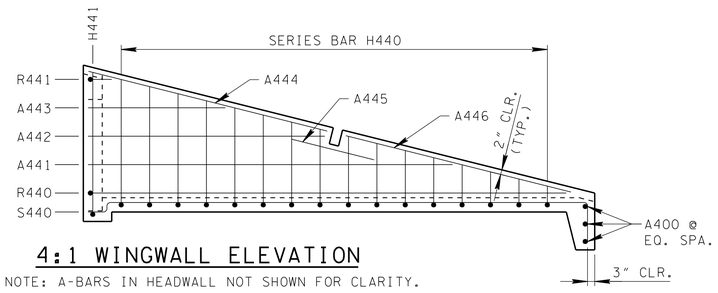


BOTTOM SLAB PLAN



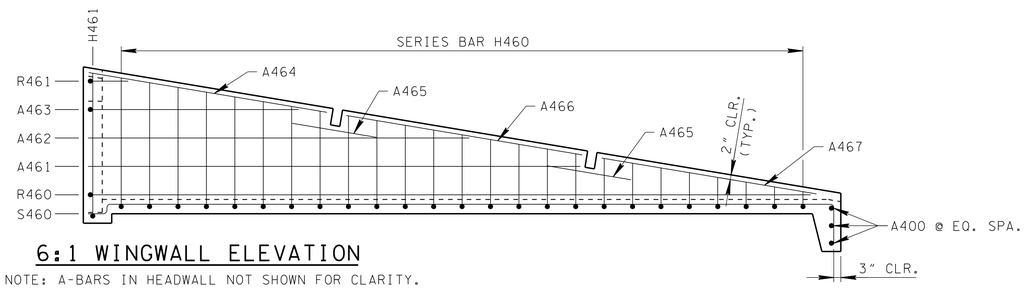
3:1 WINGWALL ELEVATION

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.

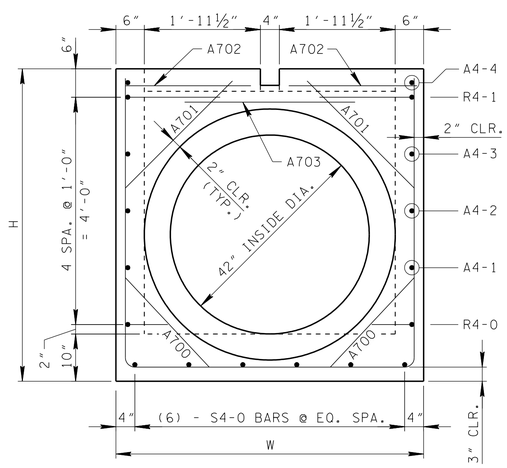
(C) "-" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.

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

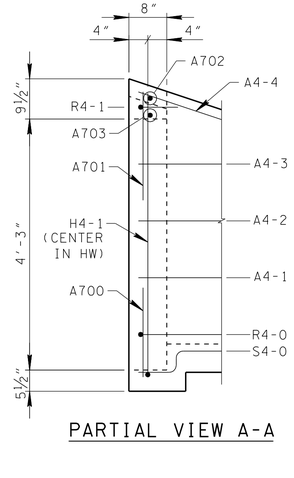
(E) TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.

(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.

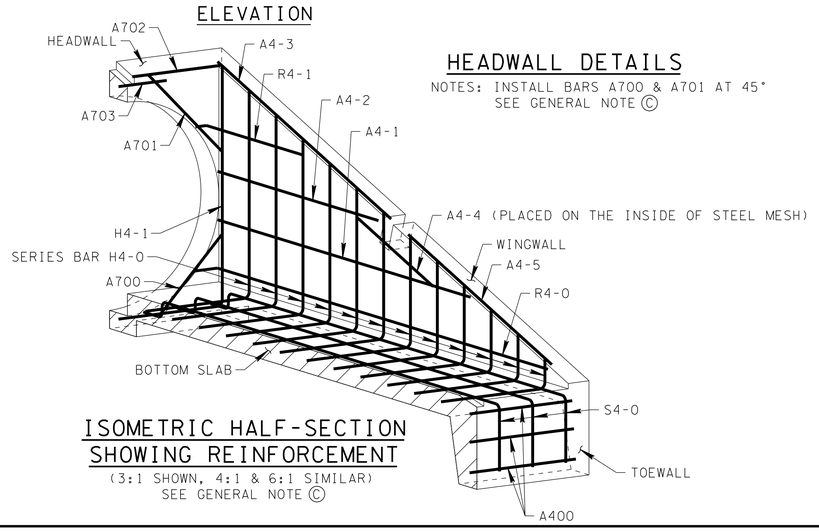


ELEVATION



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:

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.

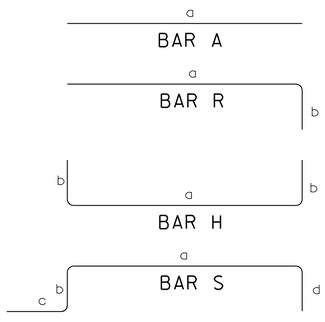
④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.

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

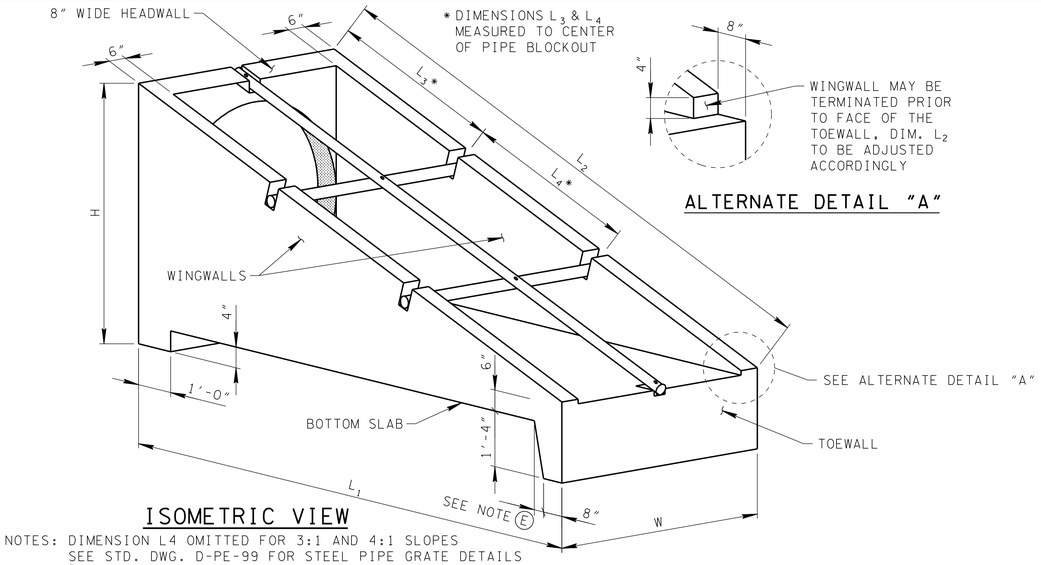
DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF BAR.

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

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

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

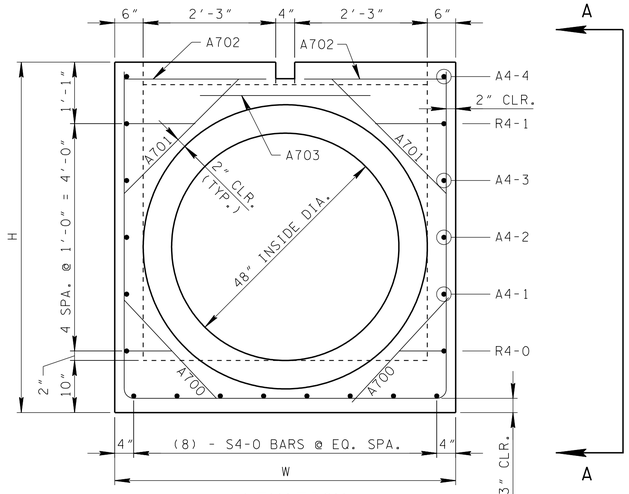
NOT TO SCALE | 3-01-12 | D-PE-42B



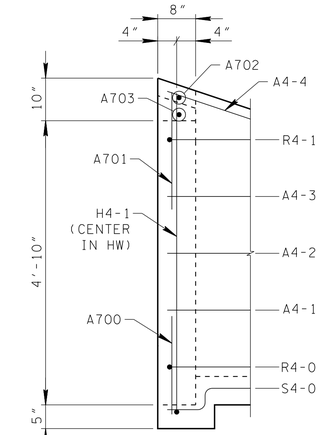
ISOMETRIC VIEW

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



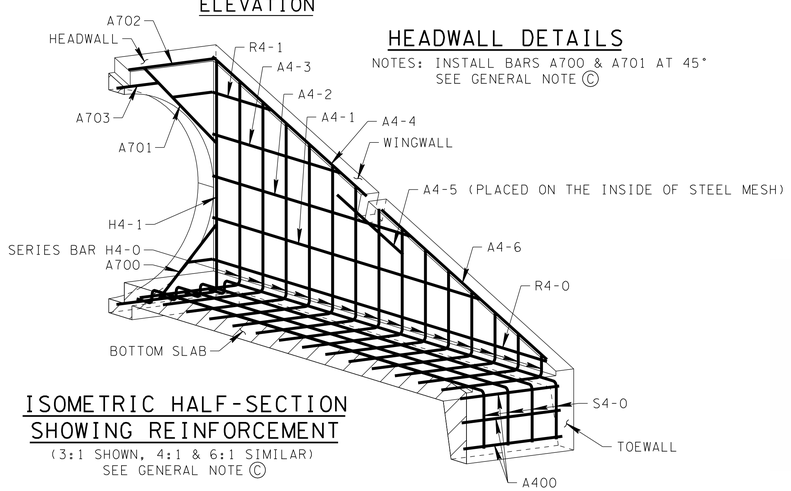
ELEVATION



PARTIAL VIEW A-A

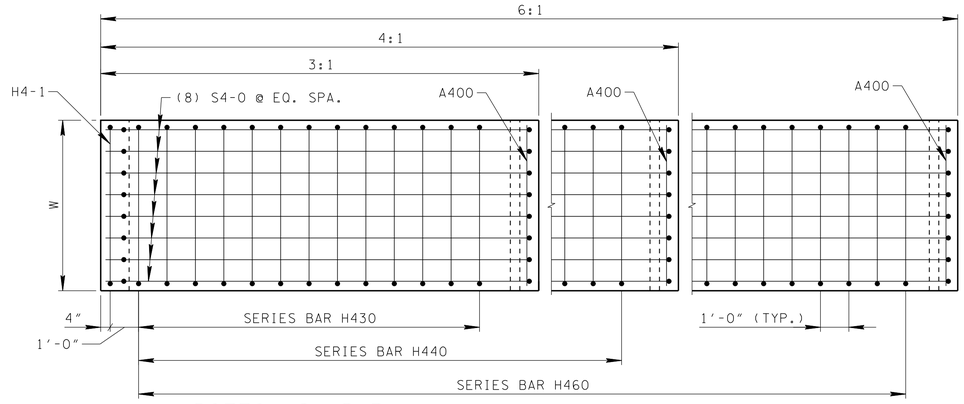
HEADWALL DETAILS

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

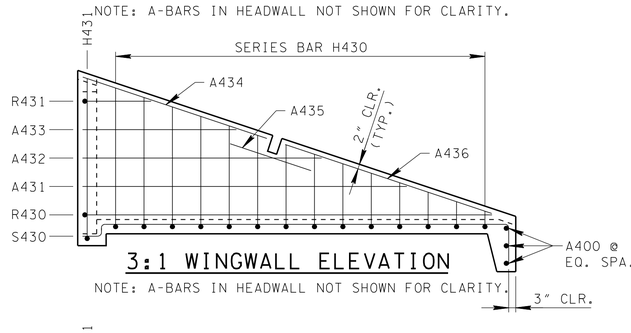


ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT

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

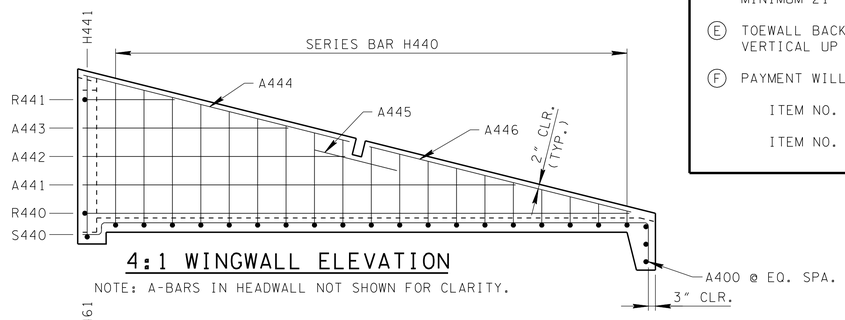


BOTTOM SLAB PLAN



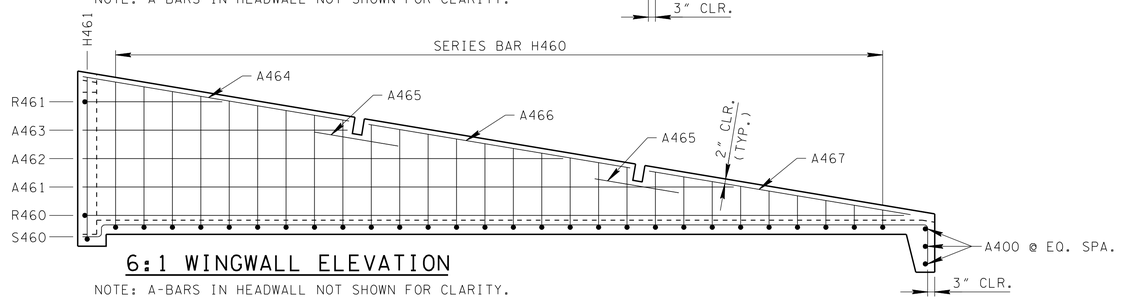
3:1 WINGWALL ELEVATION

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:

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 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.

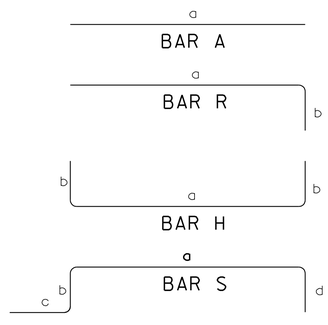
④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.

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.

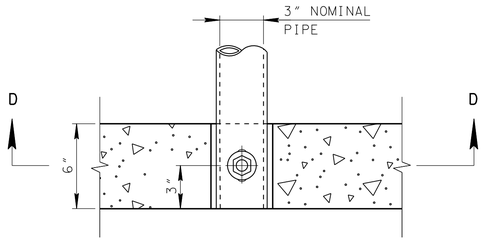
NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

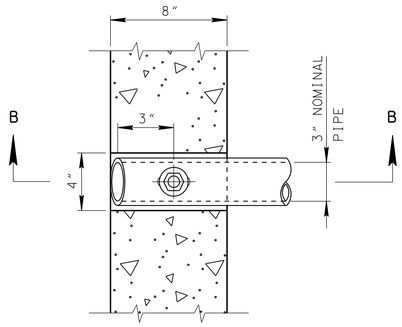
48" CONCRETE ENDWALL
CROSS DRAIN WITH
STEEL PIPE GRATE
(FOR 3:1, 4:1 & 6:1 SLOPES)

3-01-12

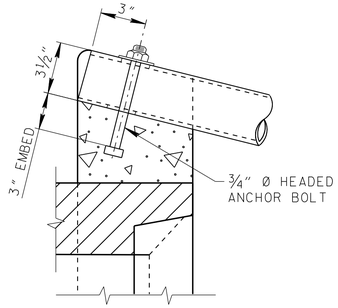
D-PE-48B



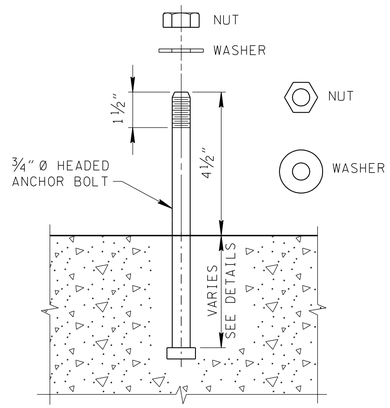
DETAIL PLAN AT WINGWALL



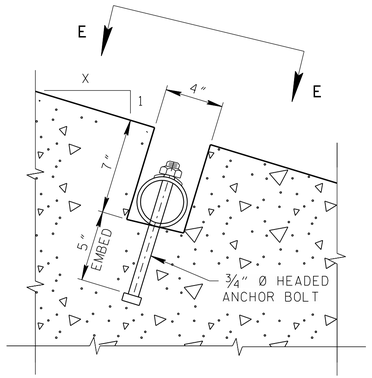
DETAIL PLAN AT HEADWALL

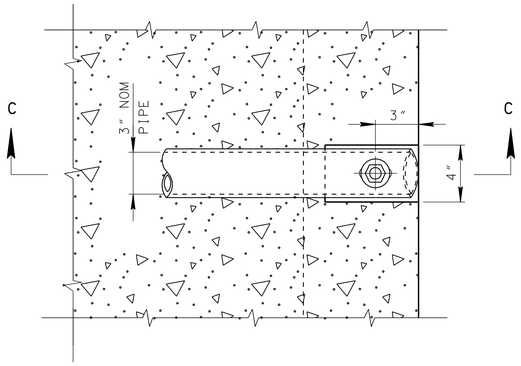


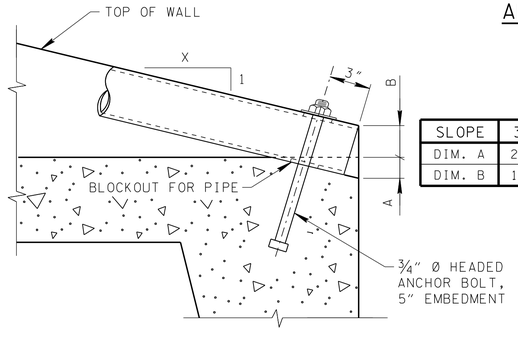
SECTION B-B THRU HEADWALL



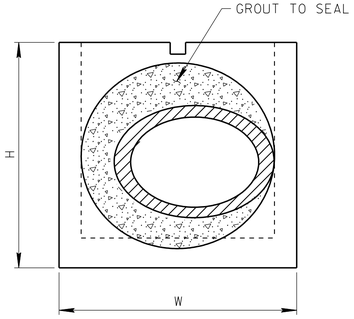
ANCHOR BOLT ASSEMBLY







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

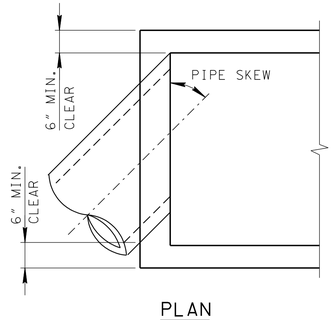


HEADWALL ELEVATION

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

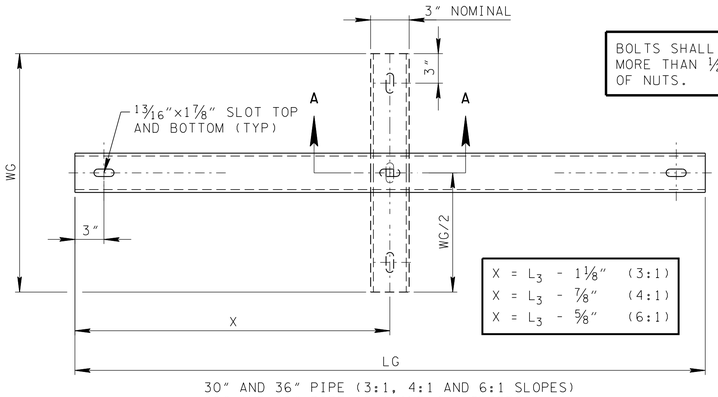
PIPE CULV. DIA.	PIPE SKEW		
	75°	60°	45°
18"	24"	24"	30"
24"	30"	36"	42"
30"	36"	42"	48"
36"	42"	48"	*
42"	48"	*	*
48"	*	*	*

* EXCEEDS 48" TYPE "U" ENDWALL OPENING



PLAN

SECTION D-D THRU WINGWALL



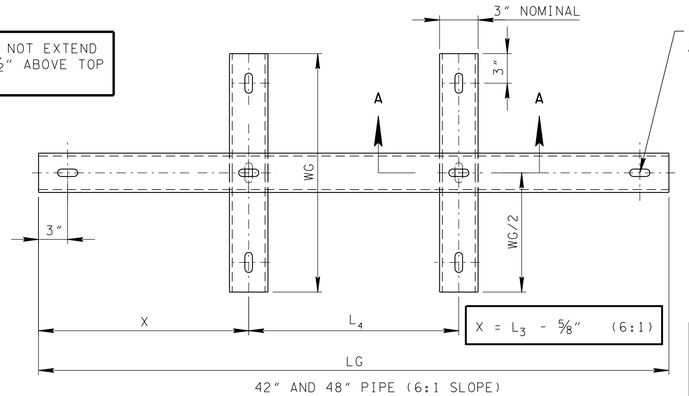
$X = L_3 - 1\frac{1}{8}"$ (3:1)
$X = L_3 - \frac{7}{8}"$ (4:1)
$X = L_3 - \frac{5}{8}"$ (6:1)

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

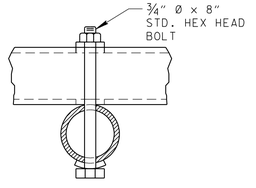
BOLTS SHALL NOT EXTEND MORE THAN ½" ABOVE TOP OF NUTS.

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

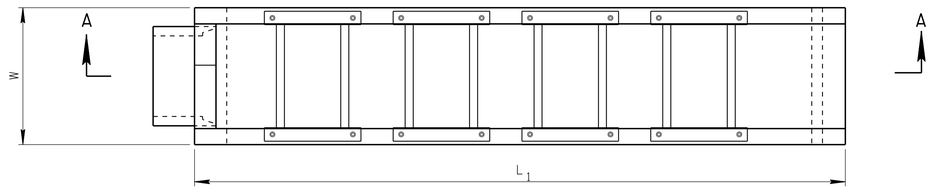
PIPE GRATE & SKEWED CONNECTION DETAILS FOR "U" ENDWALLS

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

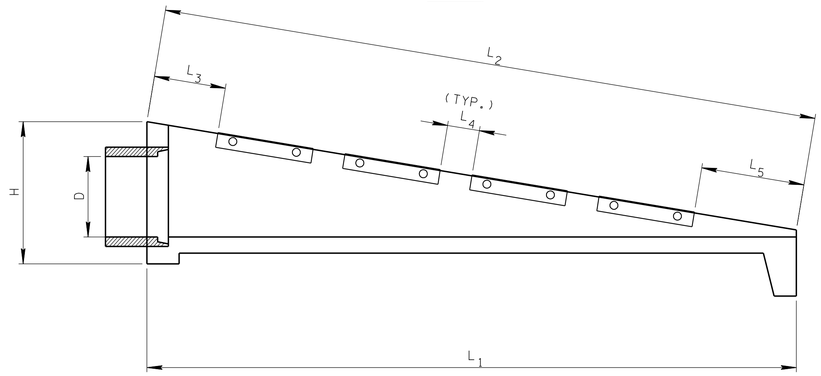
NOT TO SCALE

3-01-12

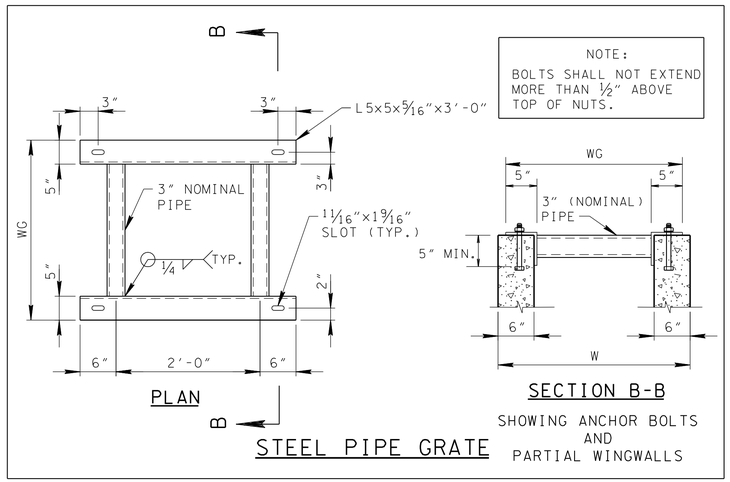
D-PE-99



PLAN



SECTION A-A

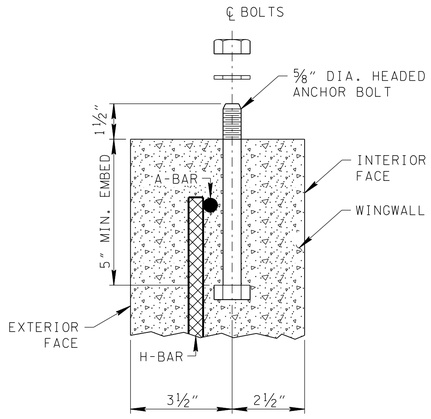


PLAN

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.

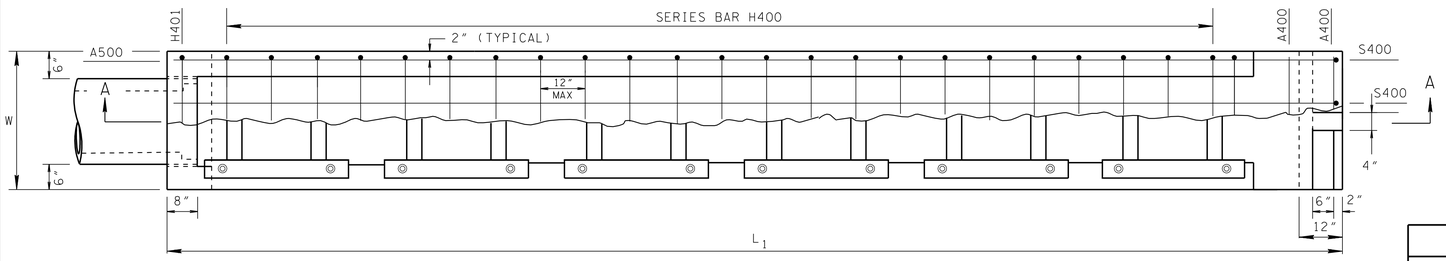
SIDE DRAIN DIA. (D)	DIMENSIONS AND QUANTITIES FOR ONE ENDWALL									
	CONCRETE ENDWALL DIMENSIONS				GRATE PLACEMENT DIMENSIONS			STRUCTURAL STEEL GRATE DIMENSIONS AND QUANTITY		STRUCT. STEEL
	H	W	L_1	L_2	L_3	L_4	L_5	WG	NO. REQ'D.	LB.
15"	SEE STD. DWG. D-PE-15A				1'-9 7/16"	1'-0"	2'-6"	2'-5"	2	172 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.

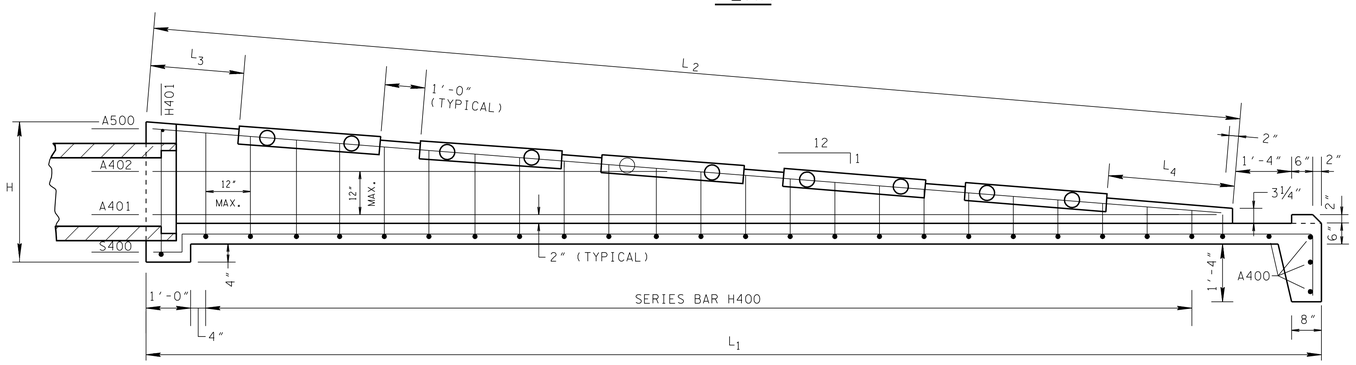
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

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

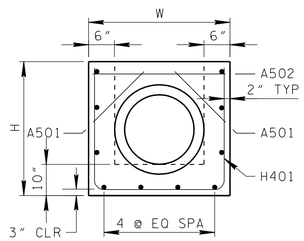
NOT TO SCALE | 3-01-12 | D-SEW-1A



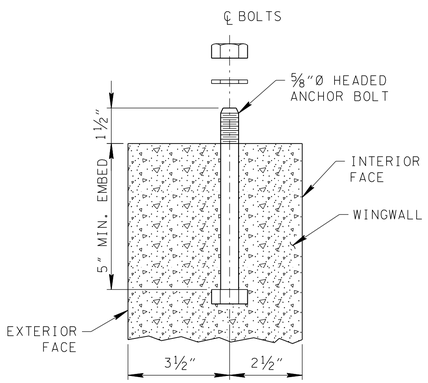
PLAN



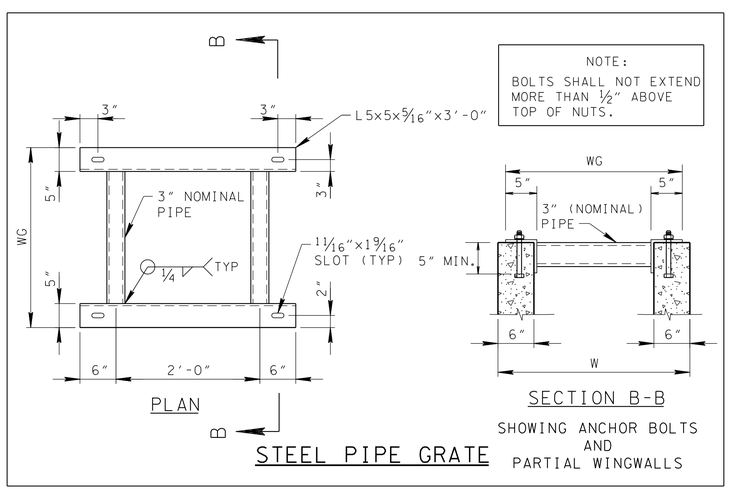
SECTION A-A



HEADWALL ELEVATION



ANCHOR BOLT ASSEMBLY

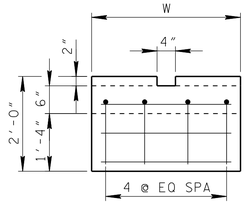


PLAN

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

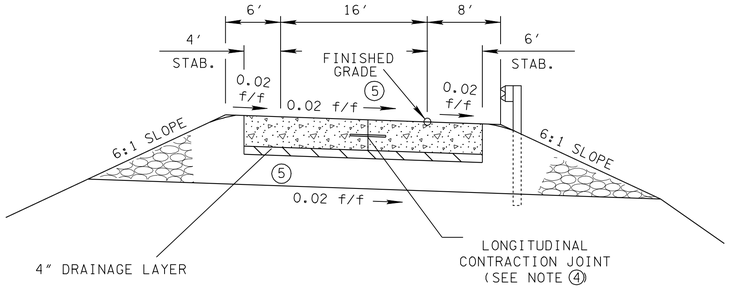
NOT TO SCALE

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

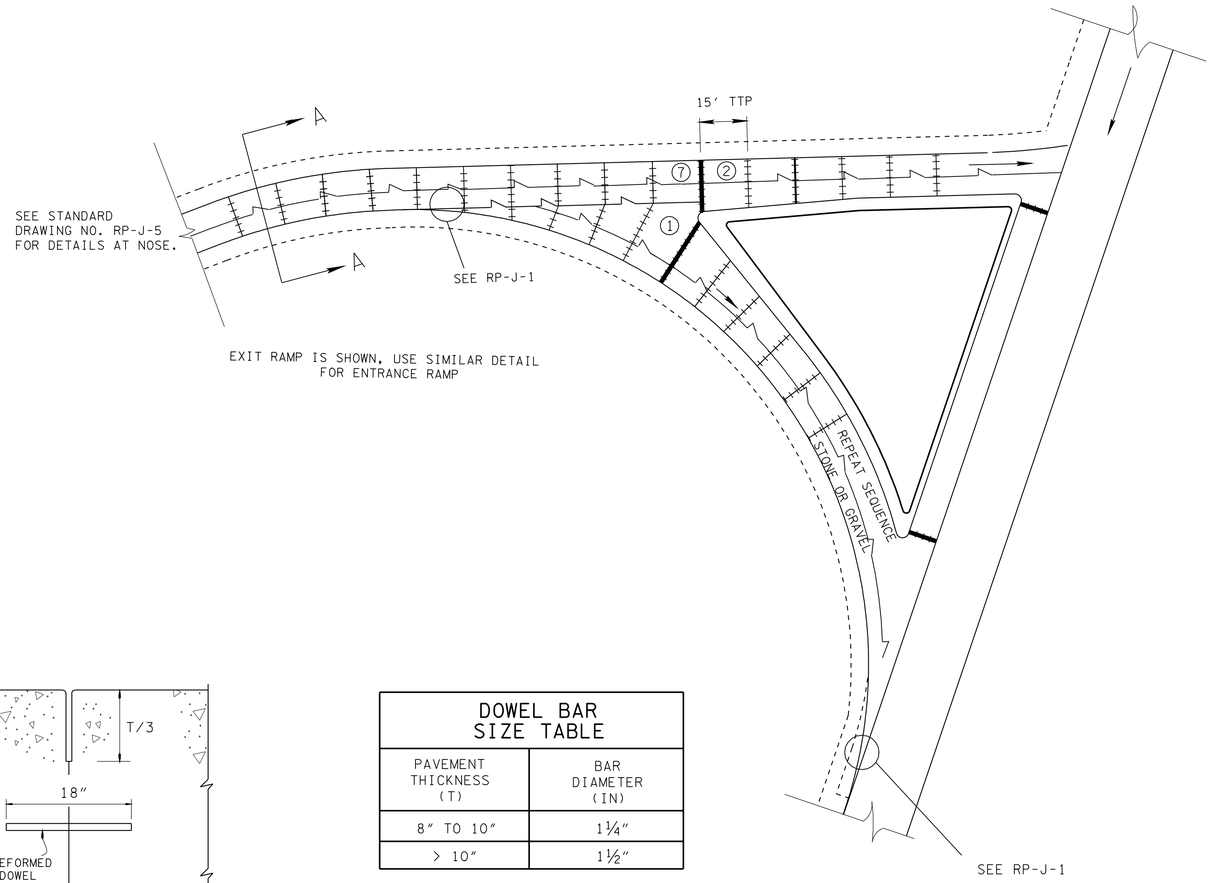
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

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

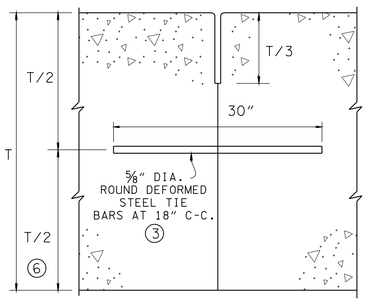
D-SEW-12D



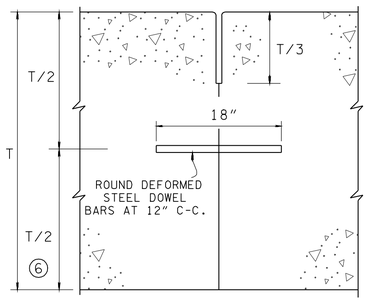
SECTION A-A



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.

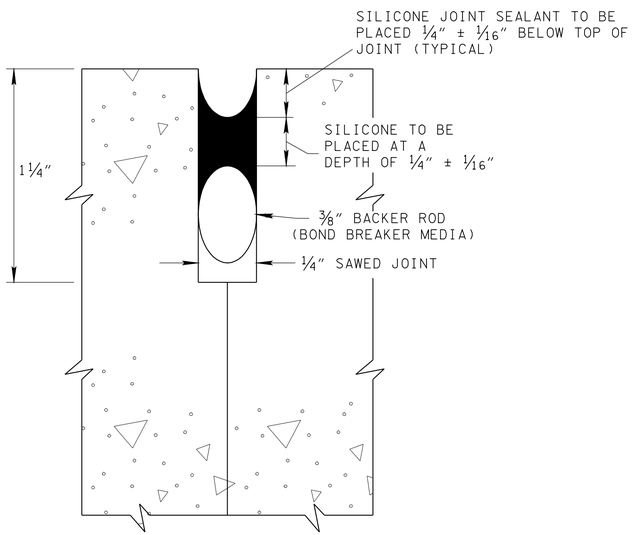
REV. 1-30-12: ADDED LONGITUDINAL CONTRACTION JOINT DETAILS.

□ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

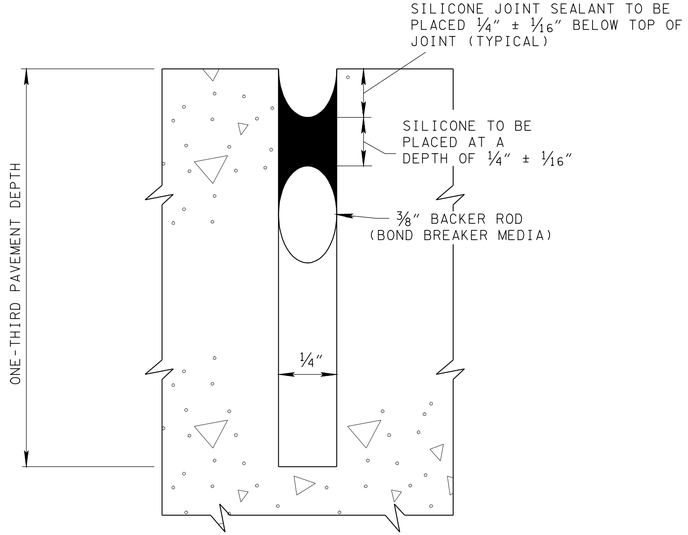
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

CONCRETE RAMP JOINT TYPES AND SPACING

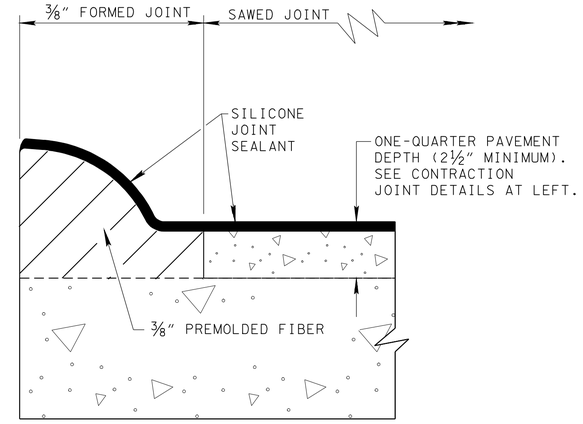
RP-J-7



CONSTRUCTION JOINT

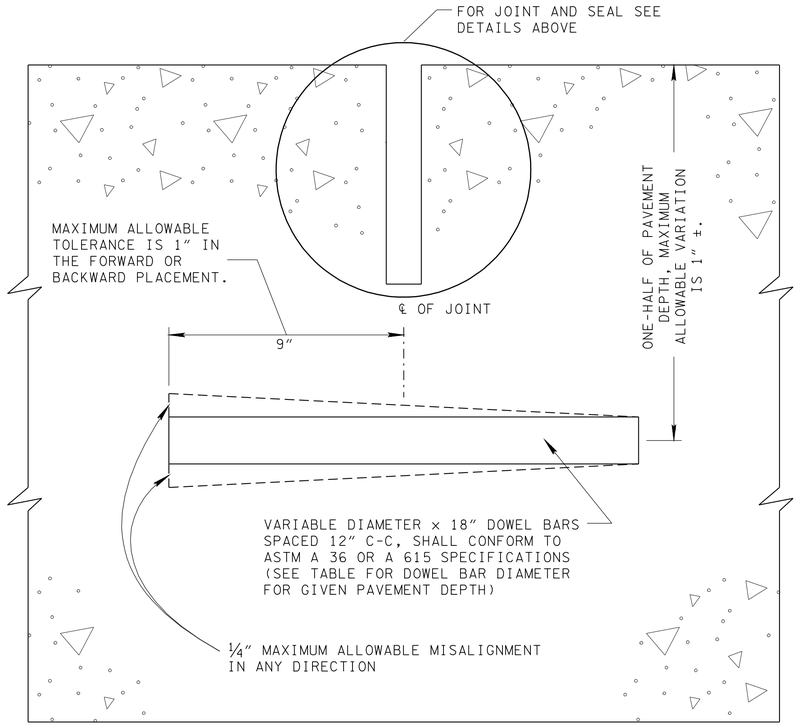


PLAIN SAWED GROOVE CONTRACTION JOINT



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	1¼"
9	1¼"
10	1¼"
11	1⅜"
12	1½"
13	1⅝"
14	1¾"

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.

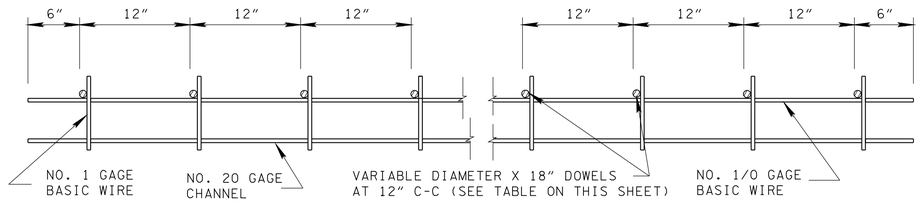
☐ REV. 9-24-10: ADDED 8" PAVEMENT THICKNESS.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

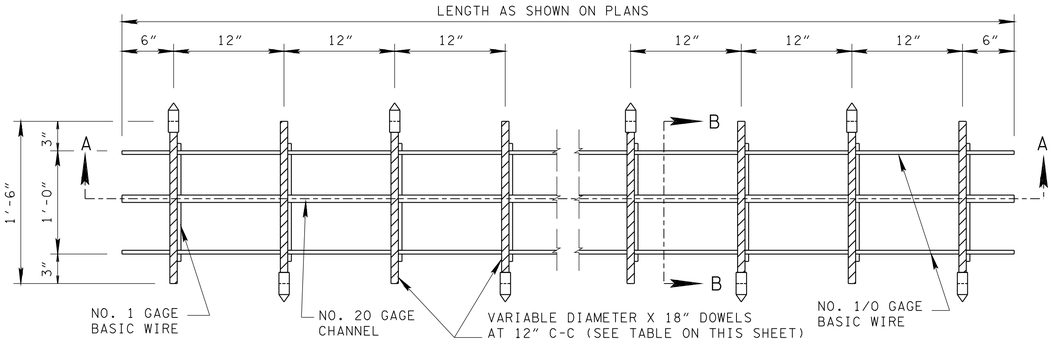
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

CONTRACTION AND CONSTRUCTION JOINTS FOR CONCRETE PAVEMENT

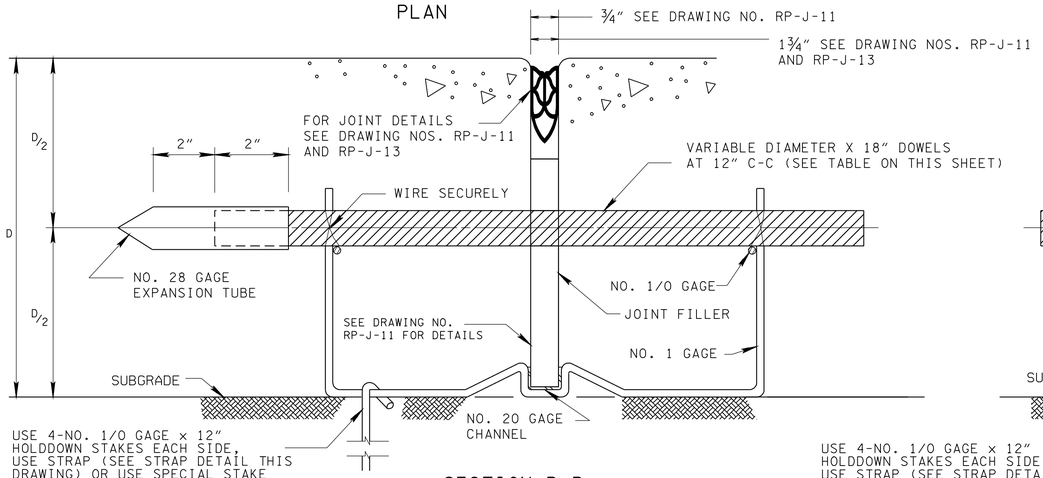
RP-J-9



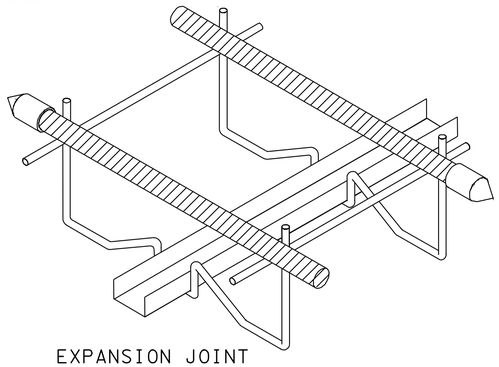
SECTION A-A
(EXPANSION TYPE)



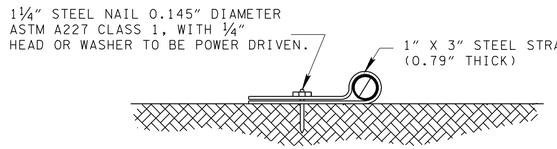
PLAN



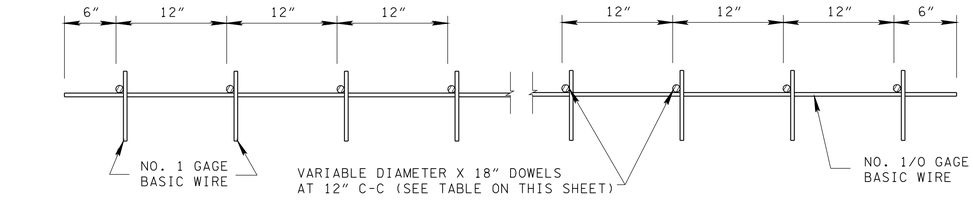
SECTION B-B
(EXPANSION TYPE)



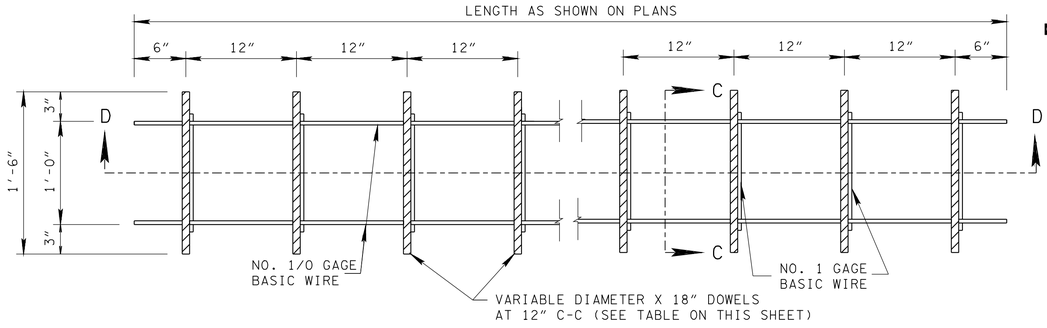
EXPANSION JOINT



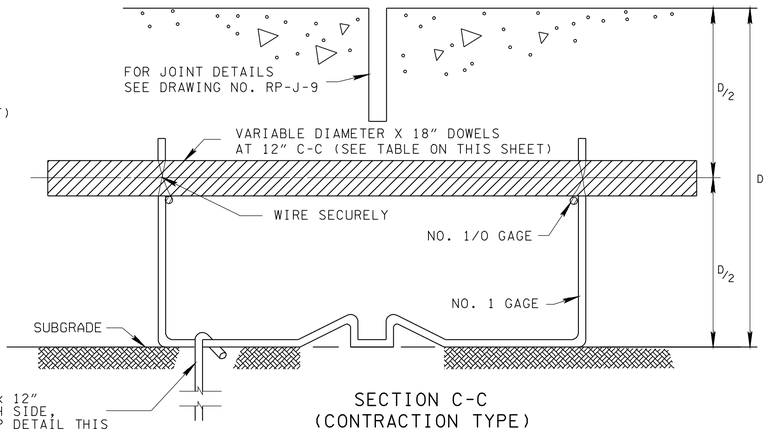
STRAP DETAIL



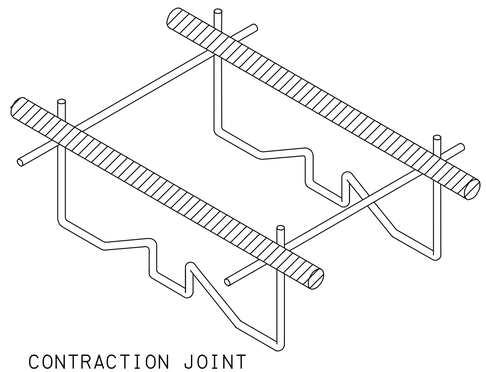
SECTION D-D
(CONTRACTION TYPE)



PLAN



SECTION C-C
(CONTRACTION TYPE)



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"

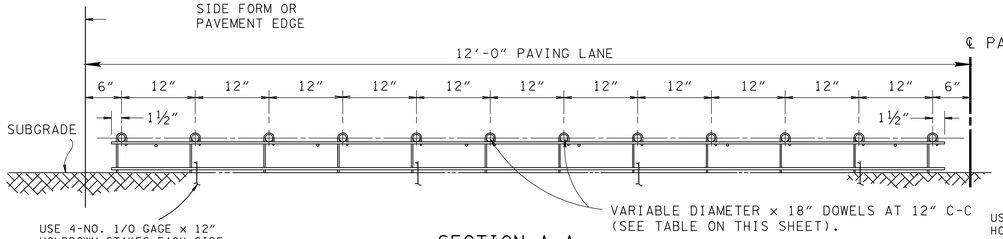
CROSS-REFERENCE DRAWING FOR THIS SHEET: RP-J-9, RP-J-11, RP-J-13, RP-J-18 AND RP-J-19.

☒ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

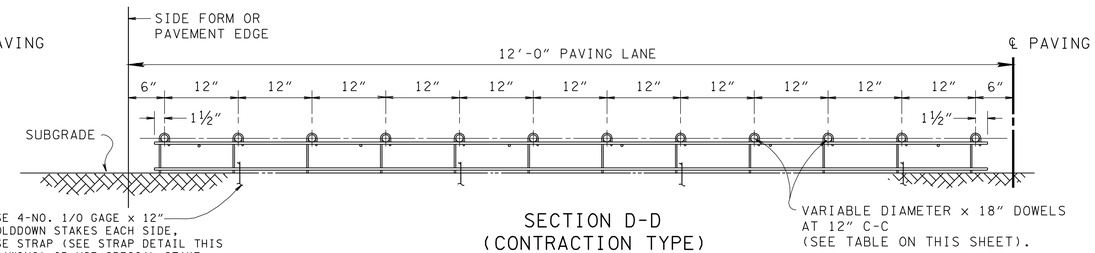
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DOWEL ASSEMBLY DEVICES

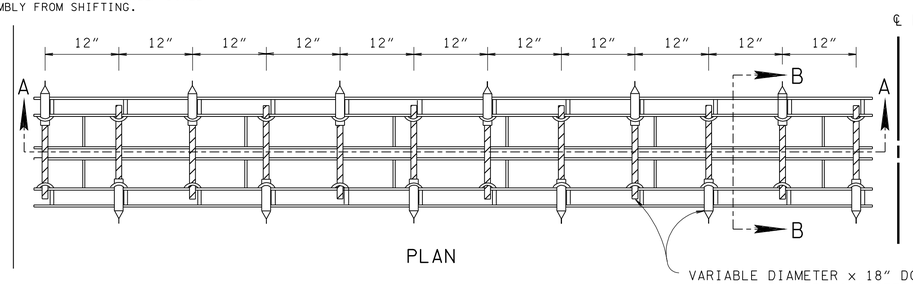
RP-J-17



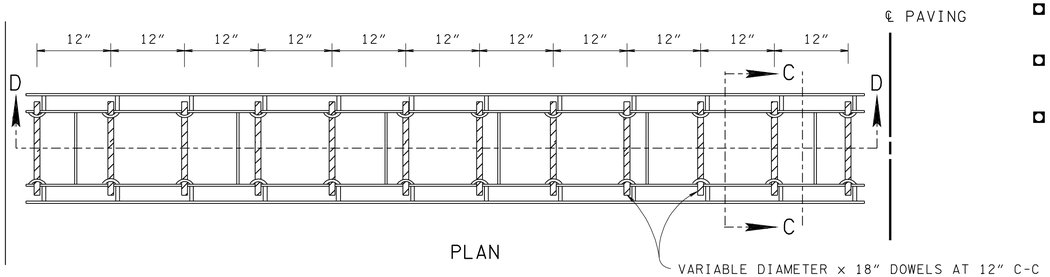
SECTION A-A
(EXPANSION TYPE)



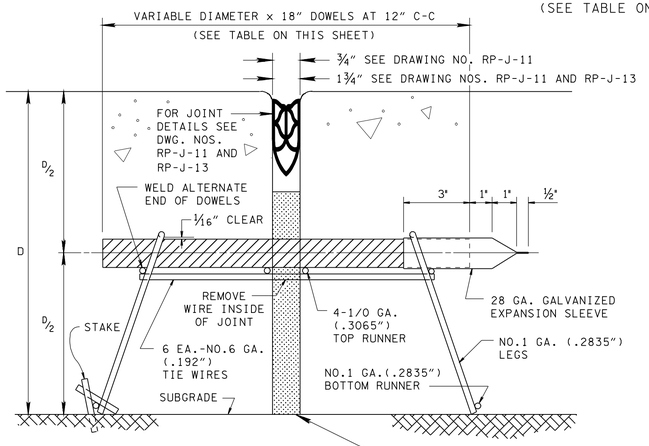
SECTION D-D
(CONTRACTION TYPE)



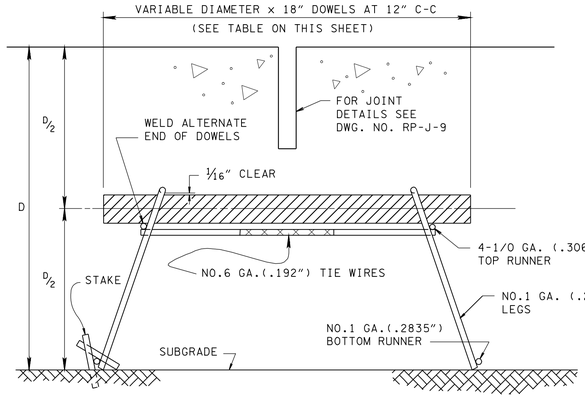
PLAN



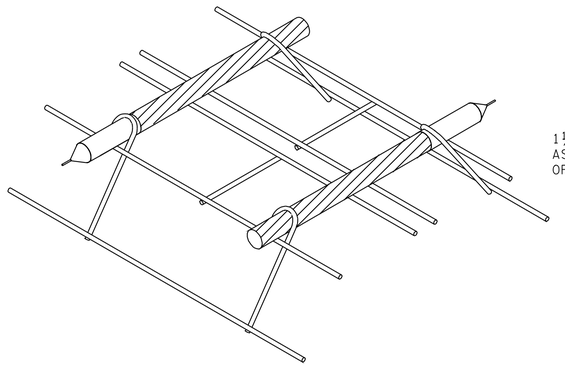
PLAN



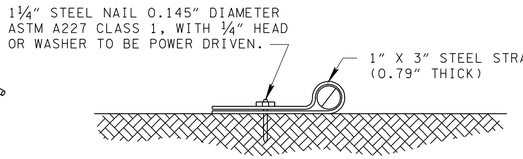
SECTION B-B
(EXPANSION TYPE)



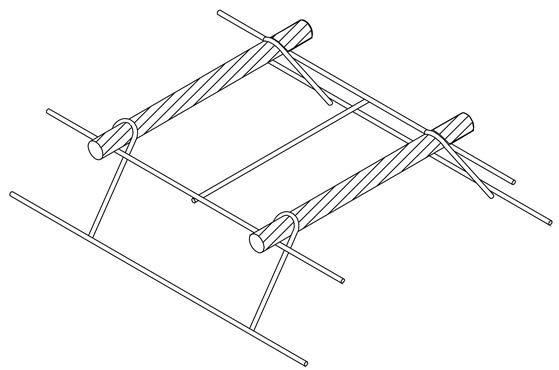
SECTION C-C
(CONTRACTION TYPE)



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.

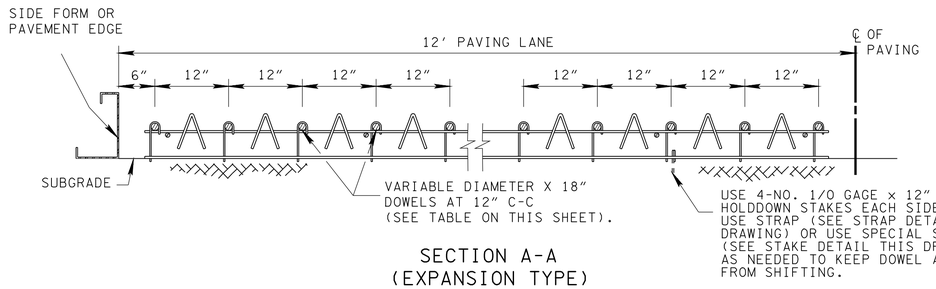
- REV. 7-29-93: REMOVED REFERENCE TO THE ORIGINAL MANUFACTURE'S NAME AND CROSS-REFERENCE TO DRAWING NO. RP-J-19. CHANGED GAGE OF BOTTOM WIRE AND VERTICAL SUPPORT WIRE FROM NO. 2 TO NO. 1. CHANGED CUTTING OF TIE WIRE NOTE ON CONTRACTION PLAN VIEW AND SECTION C-C VIEW.
- REV. 12-18-94: CHANGED CROSS-REFERENCE 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.

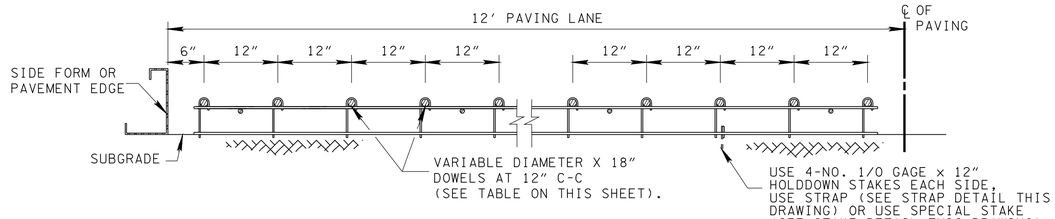
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DOWEL ASSEMBLY DEVICES

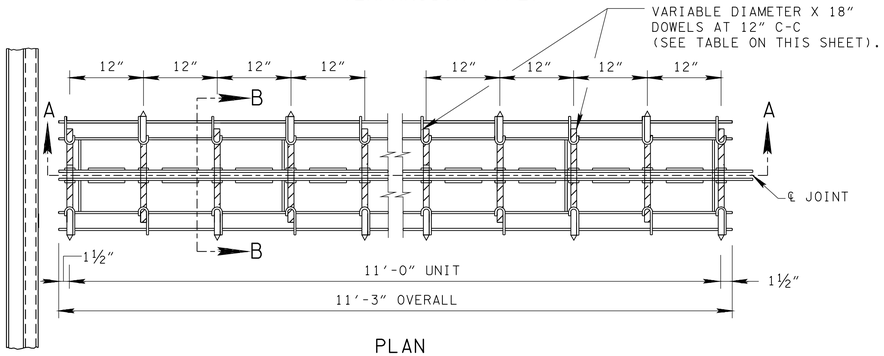
10-22-79 | RP-J-18



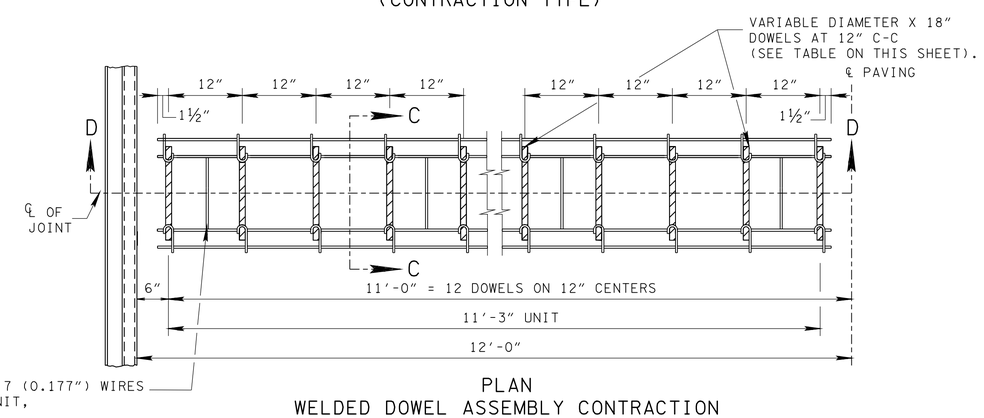
SECTION A-A
(EXPANSION TYPE)



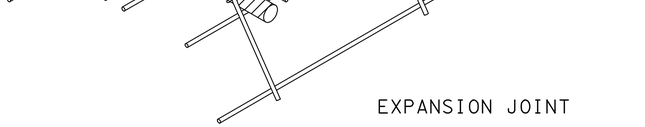
SECTION D-D
(CONTRACTION TYPE)



PLAN
WELDED DOWEL ASSEMBLY EXPANSION
TYPE U

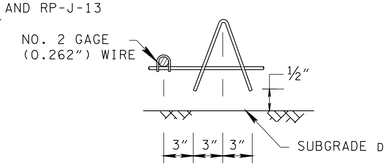


PLAN
WELDED DOWEL ASSEMBLY CONTRACTION
TYPE U

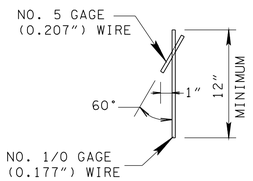


NOTE: THE FIXED END ALTERNATES FROM SIDE TO SIDE ON THIS ASSEMBLY.

SECTION B-B
(EXPANSION TYPE)



JOINT HOLDER

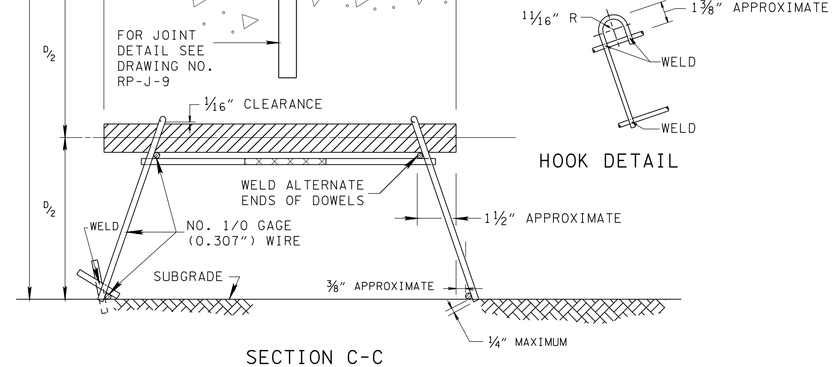


STAKE DETAIL

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″

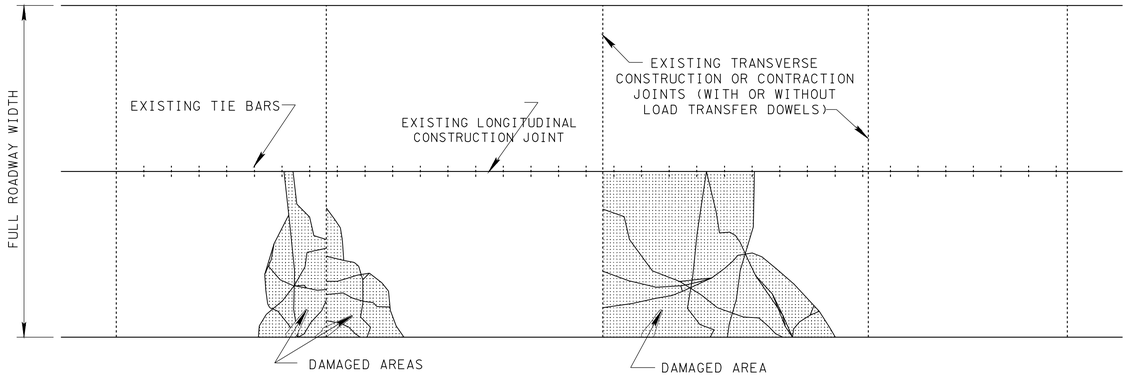
CROSS-REFERENCE DRAWING FOR THIS SHEET: RP-J-9, RP-J-11, RP-J-13, RP-J-17 AND RP-J-18.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

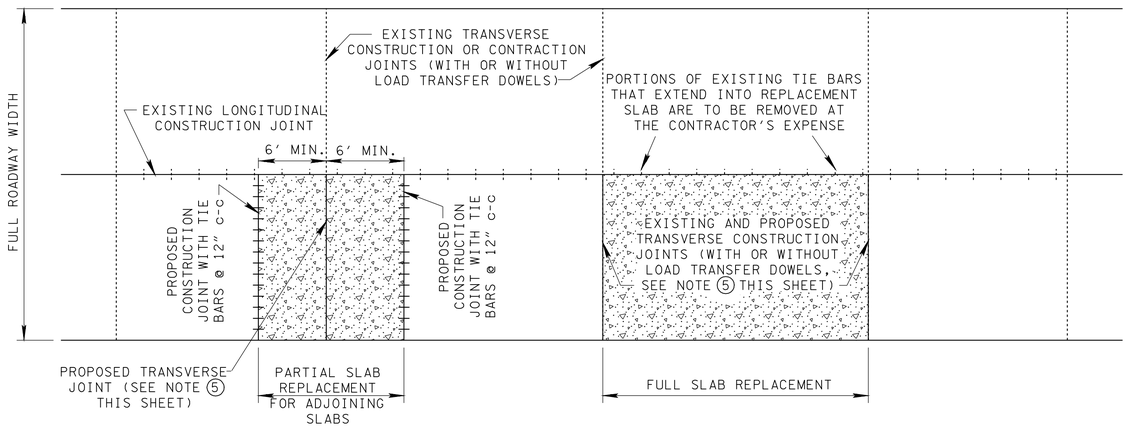
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DOWEL ASSEMBLY DEVICES

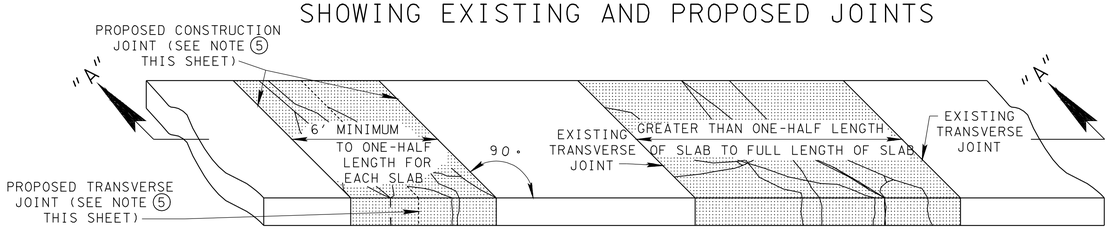
RP-J-19



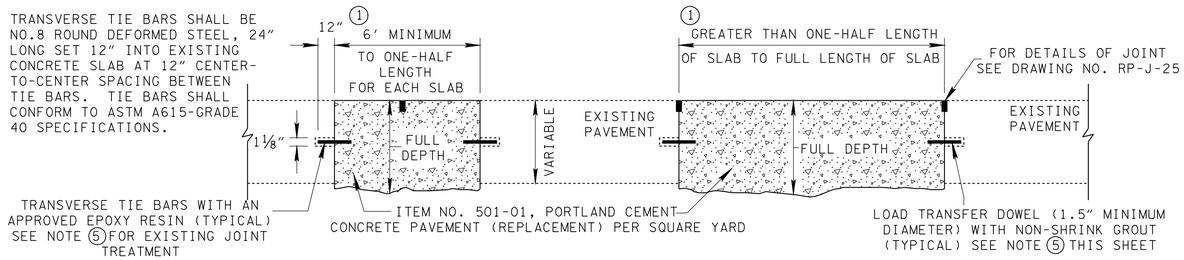
PLAN VIEW OF EXISTING LAYOUT OF CONCRETE PAVEMENT REPLACEMENT SHOWING EXISTING JOINTS



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.

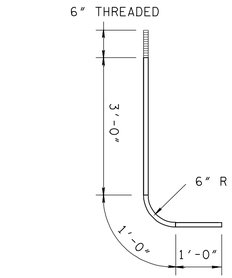
- REV. 12-18-94: ELIMINATED USE OF TIE BARS BETWEEN REPLACEMENT AND EXISTING SLAB.
- REV. 5-27-96: CHANGED MINIMUM SIZE OF LOAD TRANSFER DOWEL TO 1.5".
- REV. 7-29-96: CHANGED GENERAL NOTES (3) AND (8).
- REV. 5-27-01: CHANGED ITEM NO. 501-04.03.
- REV. 1-19-02: IN GENERAL NOTE (9) REMOVED REFERENCE 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

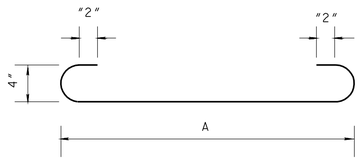
CONCRETE PAVEMENT REPAIR DETAILS

RP-J-23

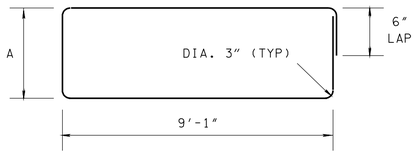


ANCHOR BOLT DETAIL

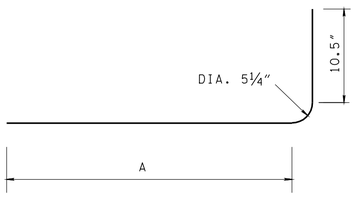
ASTM A-687 GALVANIZED STEEL



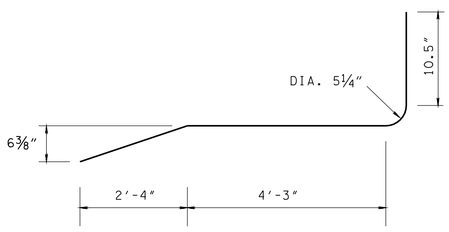
D BARS



L BARS

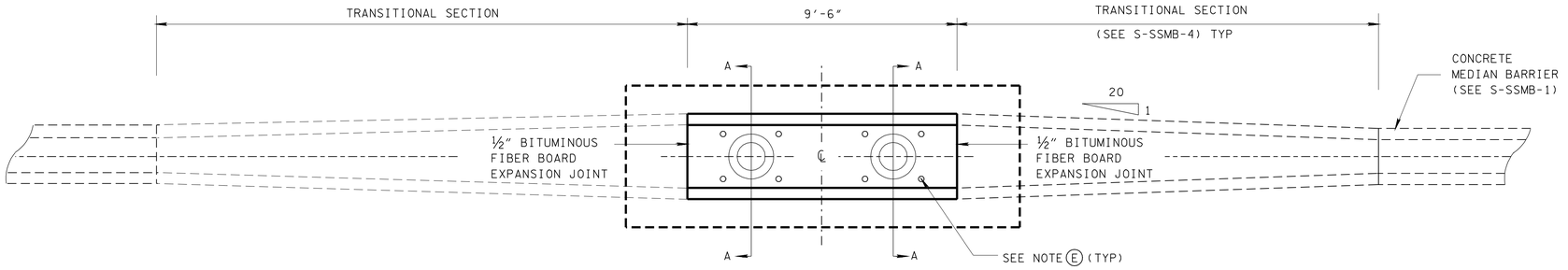


C BARS

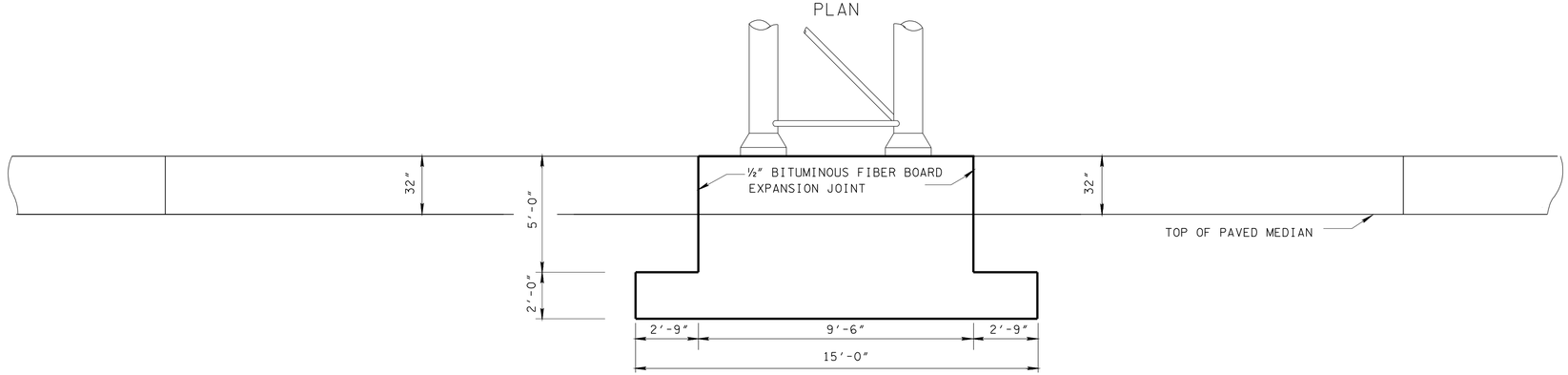


BARS CA 700

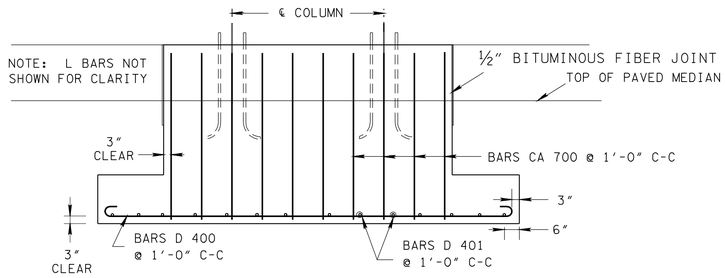
BAR DETAIL



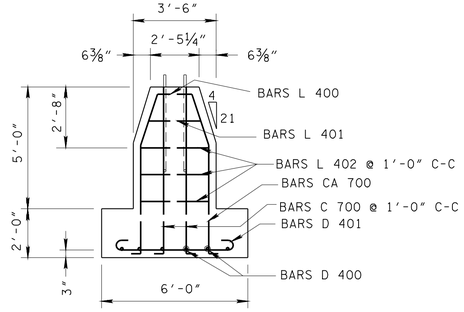
PLAN



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.

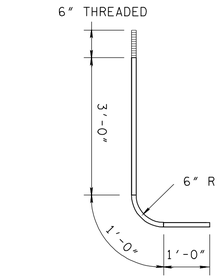
Ⓕ ANCHOR BOLTS, NUTS AND WASHERS ARE TO BE GALVANIZED STEEL.

Ⓖ 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

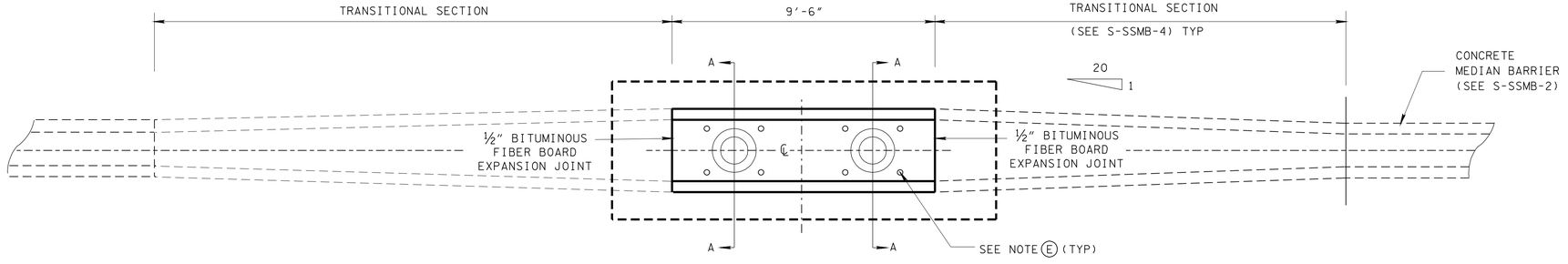
FOOTING DETAILS FOR OVERHEAD SIGN STRUCTURE 32″ MEDIAN BARRIER WALL

2-29-12 | S-SSMB-7

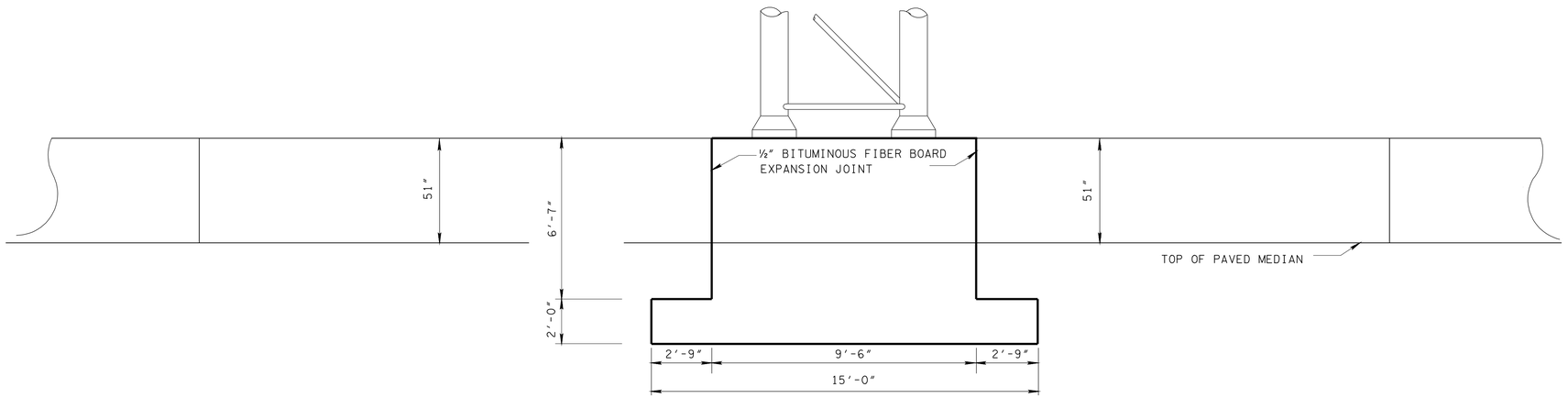


ANCHOR BOLT DETAIL

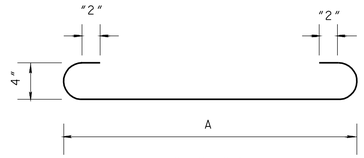
ASTM A-687 GALVANIZED STEEL



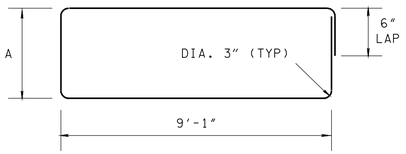
PLAN



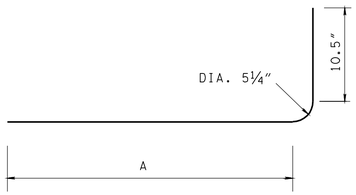
ELEVATION



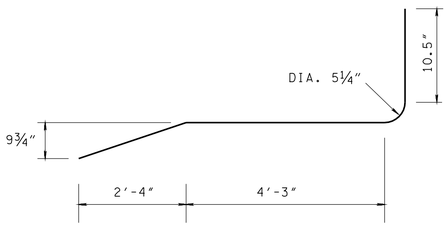
D BARS



L BARS



C BARS

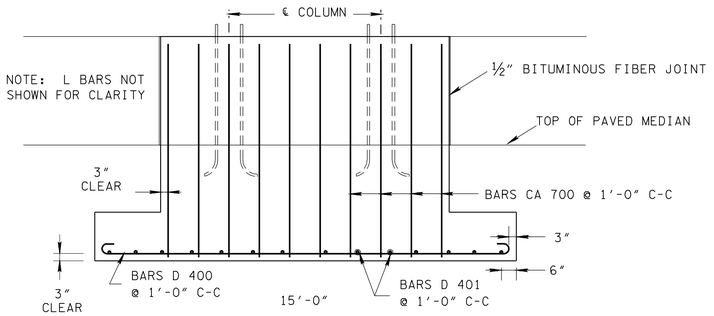


BARS CA 700

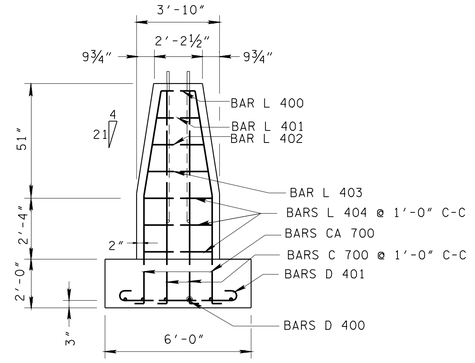
BAR DETAIL

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

Ⓐ 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.

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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.

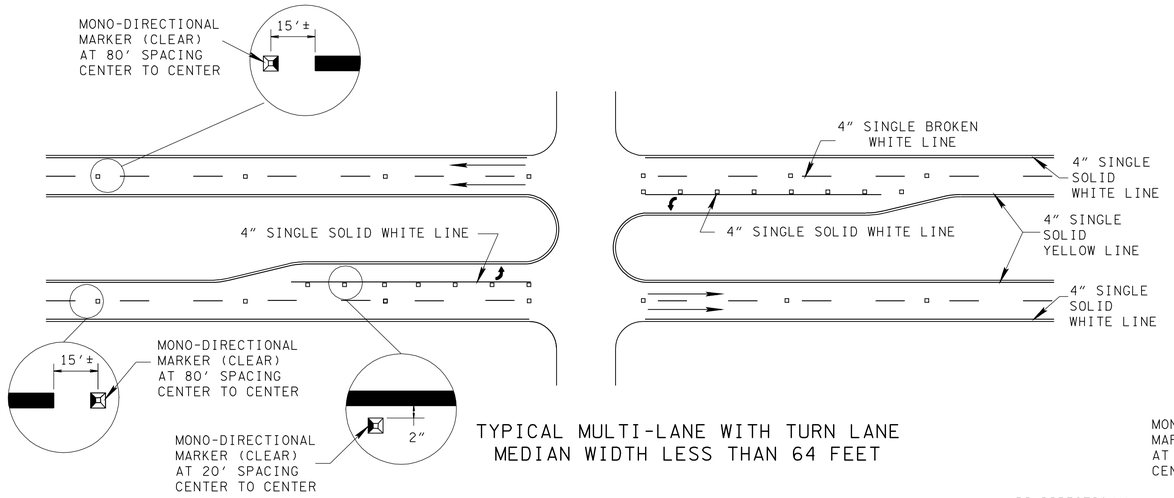
Ⓕ ANCHOR BOLTS, NUTS AND WASHERS ARE TO BE GALVANIZED STEEL.

Ⓖ 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 .

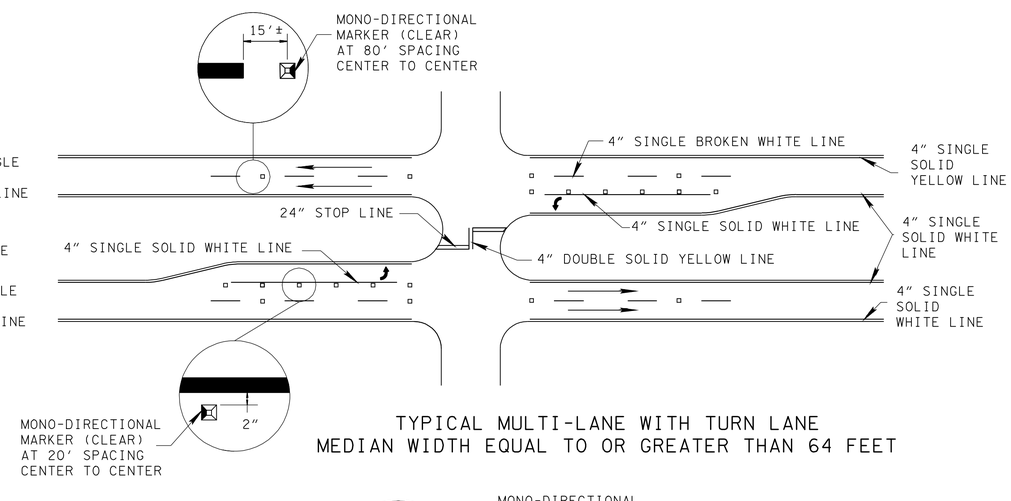
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

FOOTING DETAILS FOR OVERHEAD SIGN STRUCTURE 51″ MEDIAN BARRIER WALL

2-29-12 | S-SSMB-8



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.

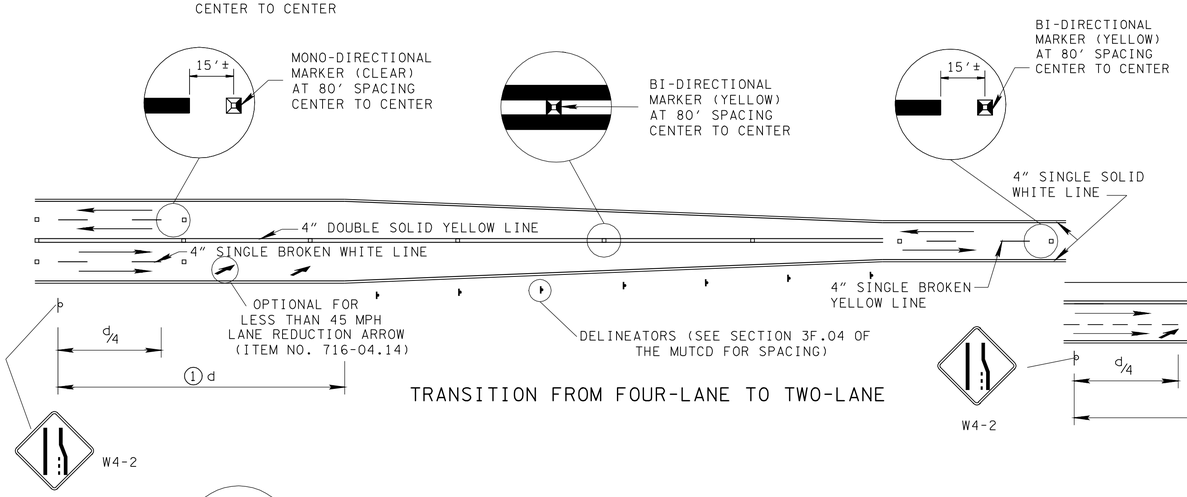
☐ REV. 1-19-94: CHANGED WIDTH CRITERION FOR MEDIAN WIDTH FROM 44 FEET TO 64 FEET.

☐ REV. 1-19-96: CHANGED DETAIL ON LEFT BOTTOM OF SHEET.

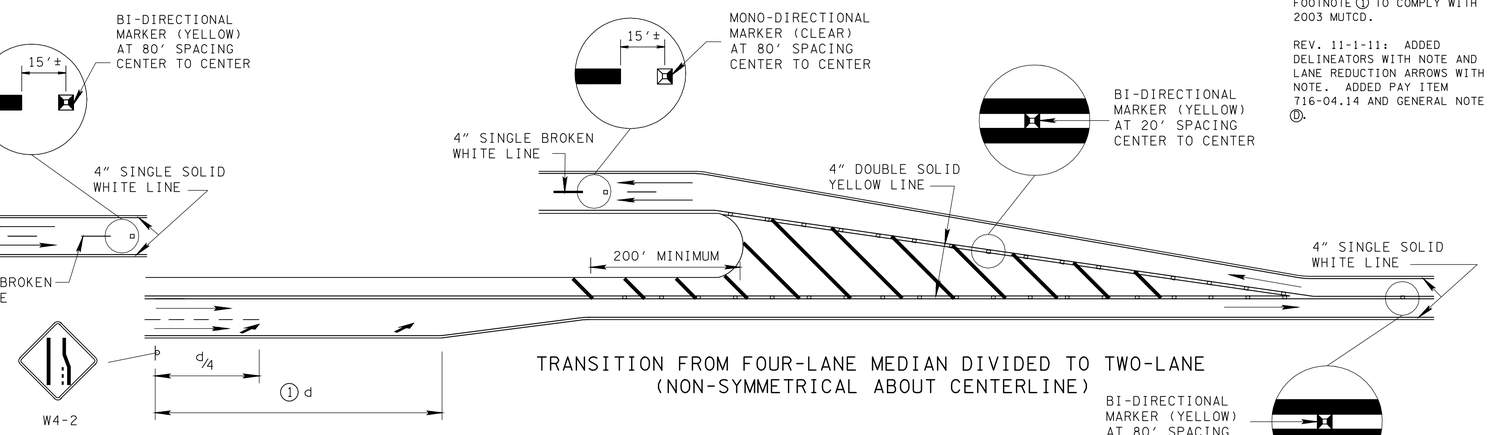
☐ REV. 4-15-04: CHANGED W4-2 SIGNS AND FOOTNOTE ① TO COMPLY WITH 2003 MUTCD.

☐ REV. 9-5-04: CHANGED FOOTNOTE ① TO COMPLY WITH 2003 MUTCD.

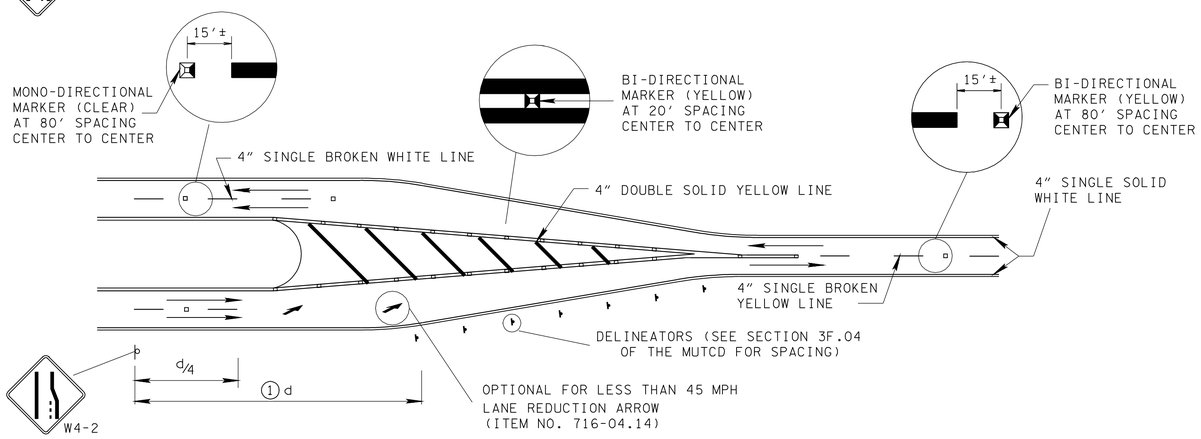
REV. 11-1-11: ADDED DELINEATORS WITH NOTE AND LANE REDUCTION ARROWS WITH NOTE. ADDED PAY ITEM 716-04.14 AND GENERAL NOTE Ⓓ.



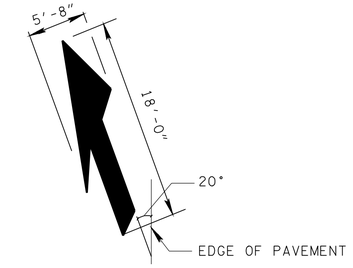
TRANSITION FROM FOUR-LANE TO TWO-LANE



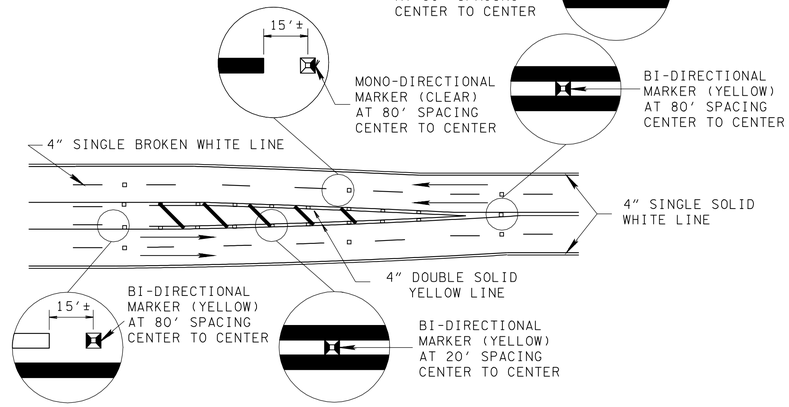
TRANSITION FROM FOUR-LANE MEDIAN DIVIDED TO TWO-LANE
(NON-SYMMETRICAL ABOUT CENTERLINE)



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

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

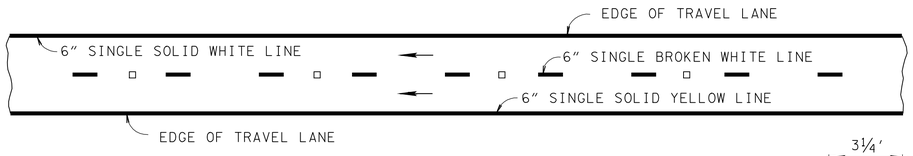
FOOTNOTE
① SEE TABLE 2C-4 OF PART 2 OF THE MANUAL ON UNIFORM TRAFFIC DEVICES (MUTCD) FOR GUIDELINES FOR ADVANCE PLACEMENT OF WARNING SIGNS DISTANCE d.

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.

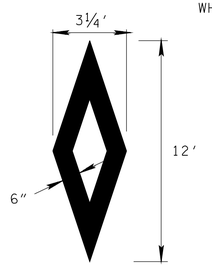
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DETAILS OF PAVEMENT MARKINGS FOR CONVENTIONAL ROADS

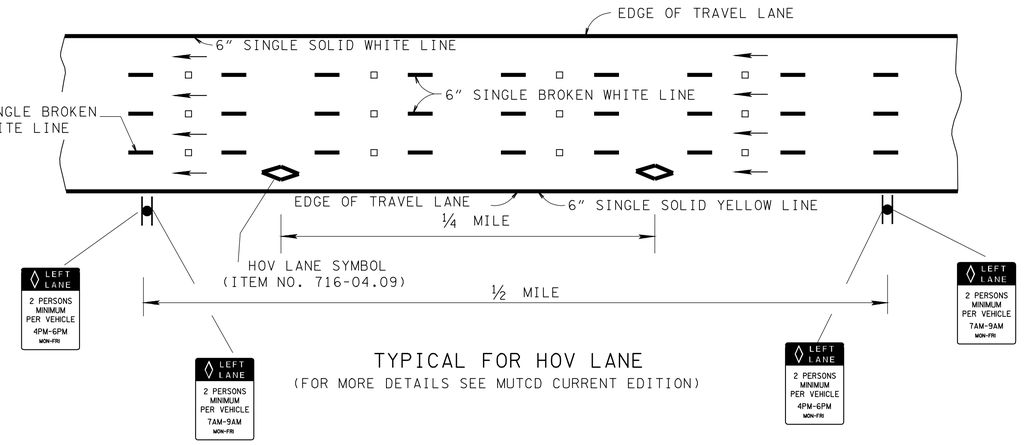
T-M-2



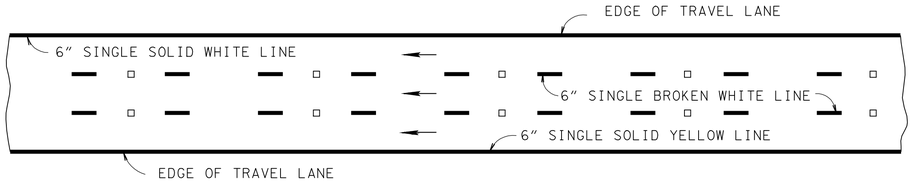
TYPICAL TWO LANE



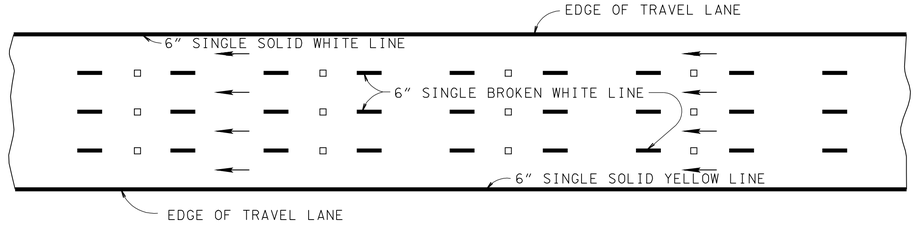
HOV LANE SYMBOL



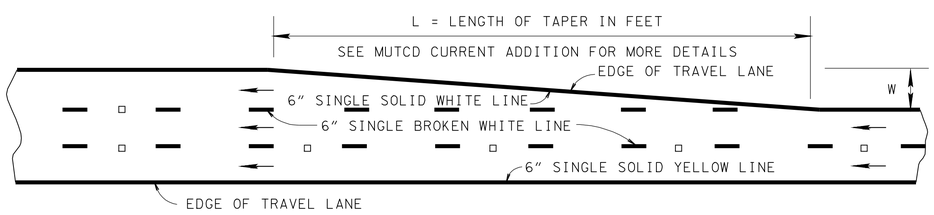
TYPICAL FOR HOV LANE
(FOR MORE DETAILS SEE MUTCD CURRENT EDITION)



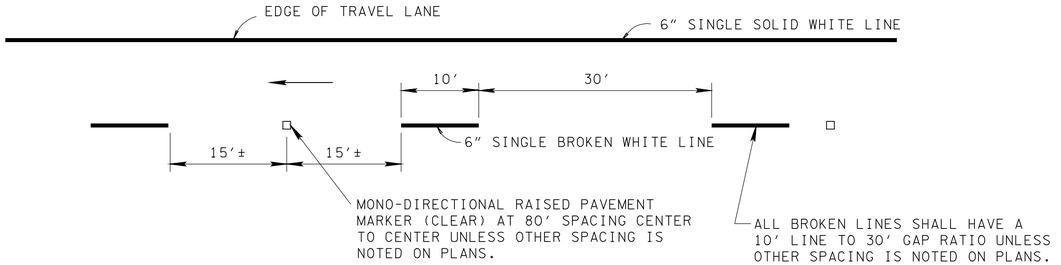
TYPICAL THREE LANE



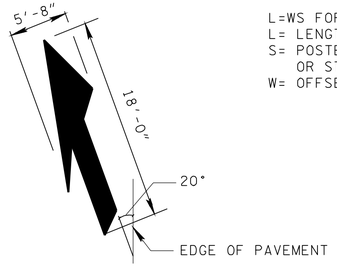
TYPICAL FOUR LANE



TYPICAL SHOWING
BEGINNING OF ADDITIONAL LANE

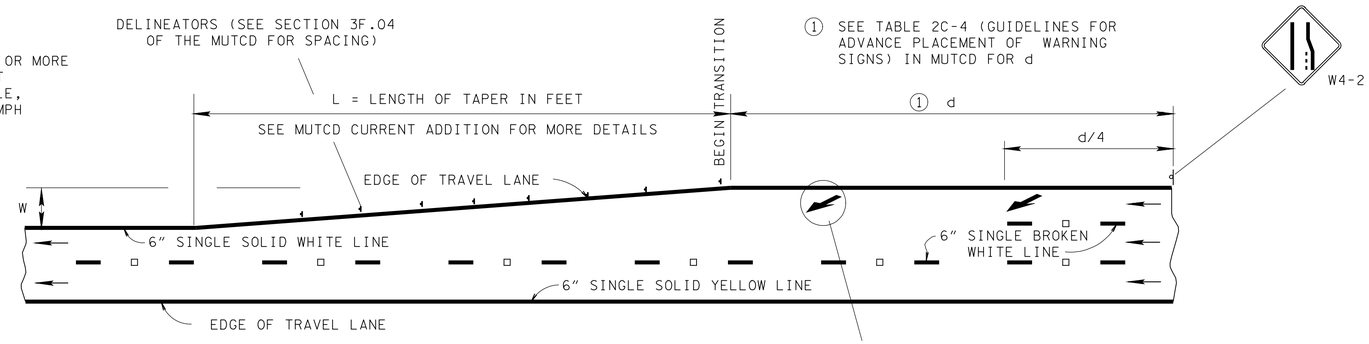


SPACING DETAILS



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

LANE-REDUCTION ARROW



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.

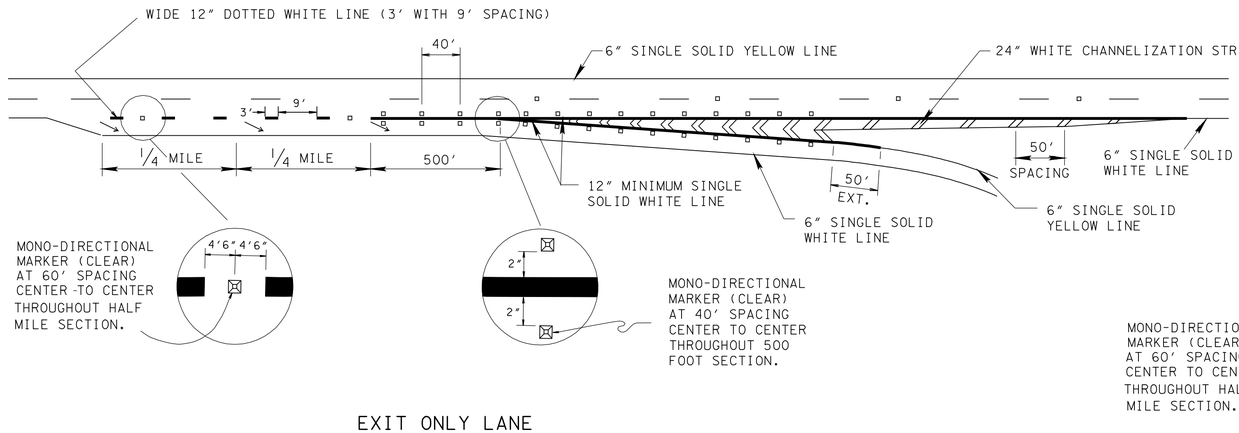
REV. 11-1-11: ADDED HOV SIGNS AND PAVEMENT MARKING DETAILS. ADDED LANE REDUCTION ARROWS WITH DETAILS, REVISED PAVEMENT MARKINGS TYPICAL DETAILS.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

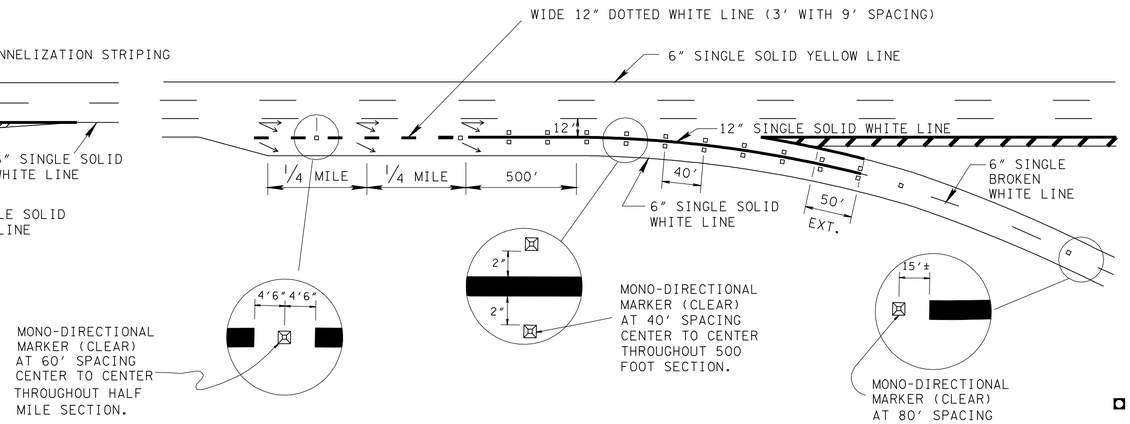
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

MARKING DETAILS FOR EXPRESSWAYS & FREEWAYS

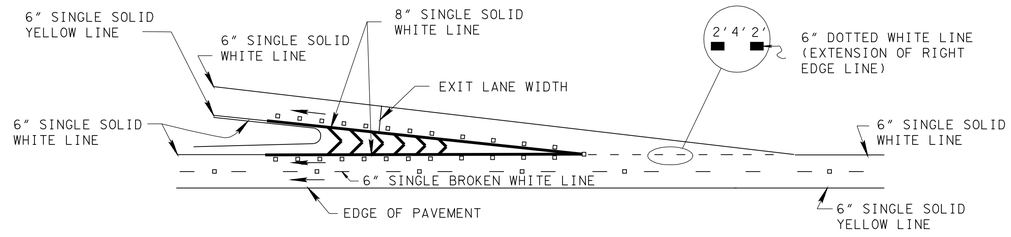
T-M-5



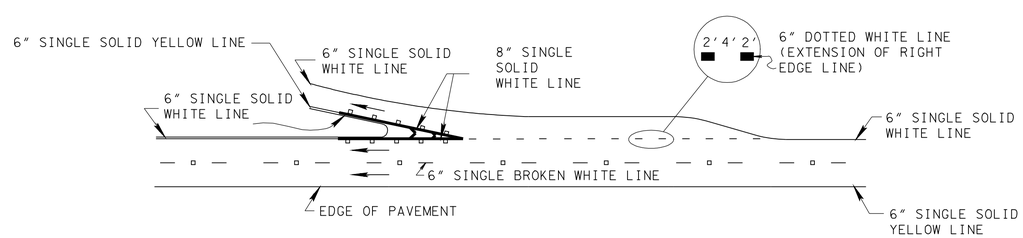
EXIT ONLY LANE



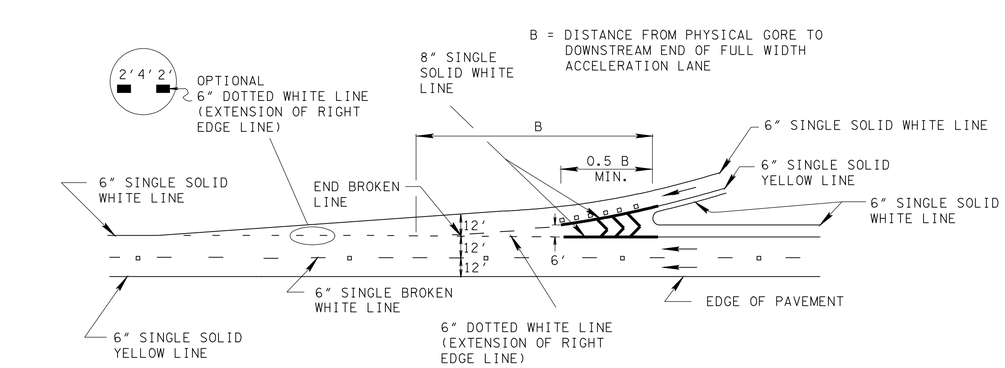
EXIT ONLY LANE WITH OPTIONAL LANE



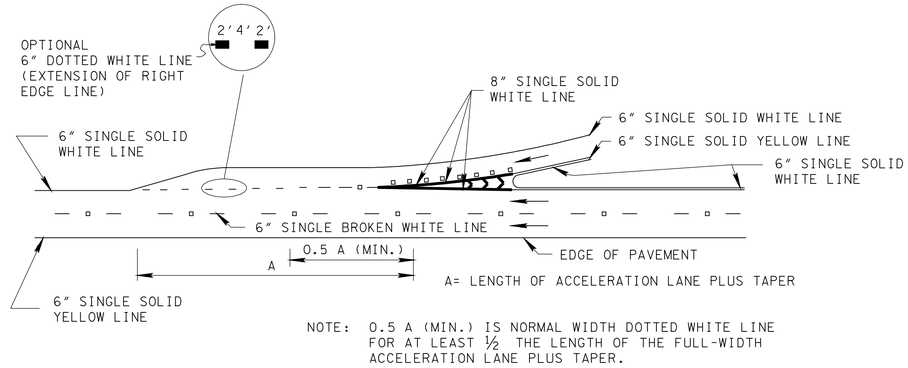
TAPERED DECELERATION LANE
EXIT RAMP



PARALLEL DECELERATION LANE

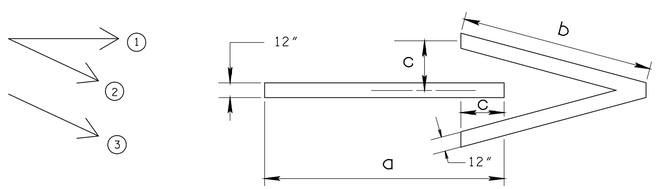


TAPERED ACCELERATION LANE
ENTRANCE RAMPS



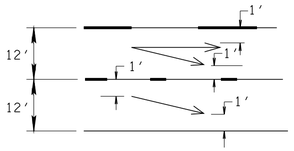
NOTE: 0.5 A (MIN.) IS NORMAL WIDTH DOTTED WHITE LINE FOR AT LEAST ½ THE LENGTH OF THE FULL-WIDTH ACCELERATION LANE PLUS TAPER.

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).

☐ 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).

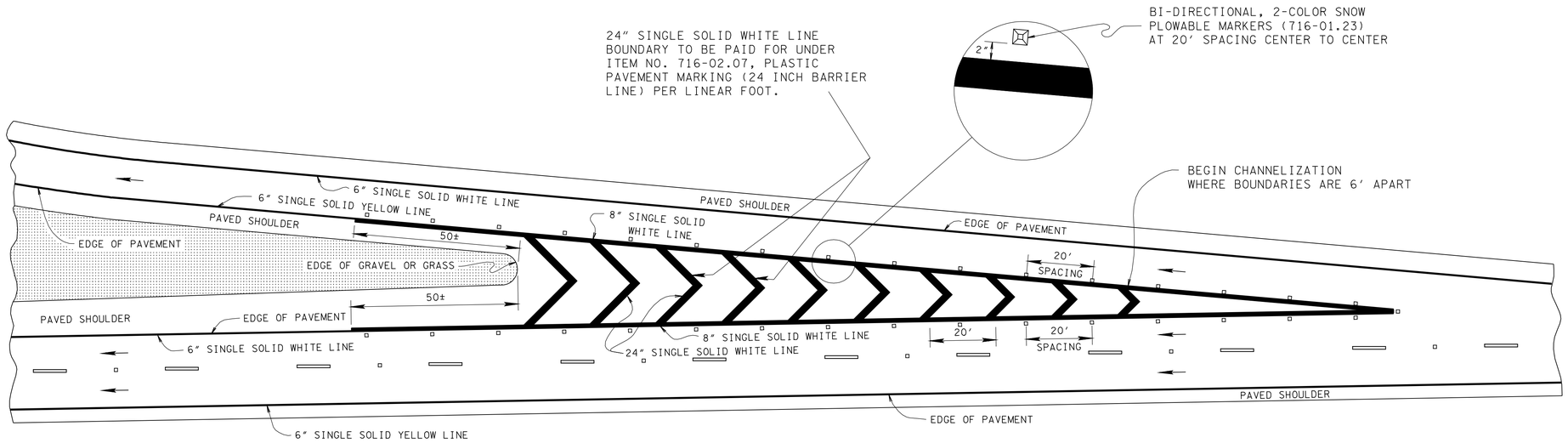
REV. 10-26-92: ADDED GENERAL NOTE Ⓒ.

REV. 12-18-92: MOVED MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR) FROM INSIDE OF CHANNELIZATION MARKING TO OUTSIDE OF CHANNELIZATION MARKING.

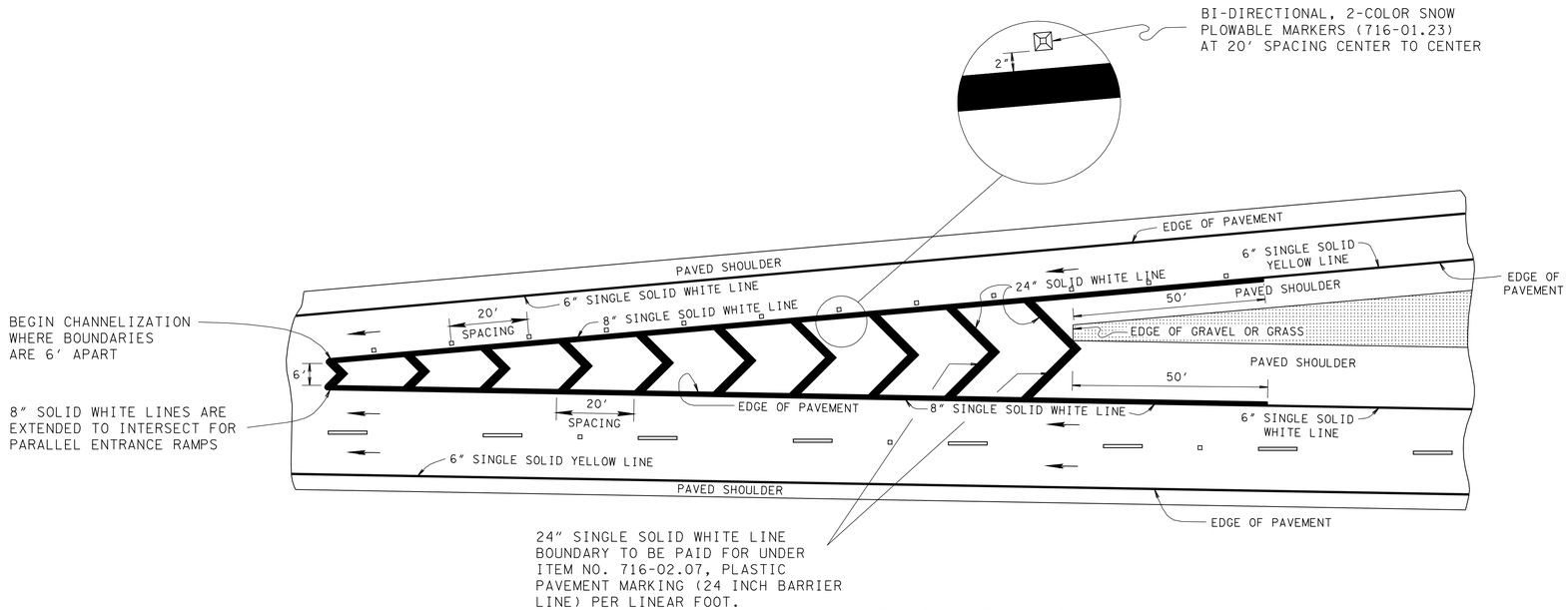
REV. 7-29-98: CHANGED WIDTH OF CENTERLINES, EDGELINES AND DOTTED WHITE LANE LINES FROM 4 TO 6 INCHES.

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.

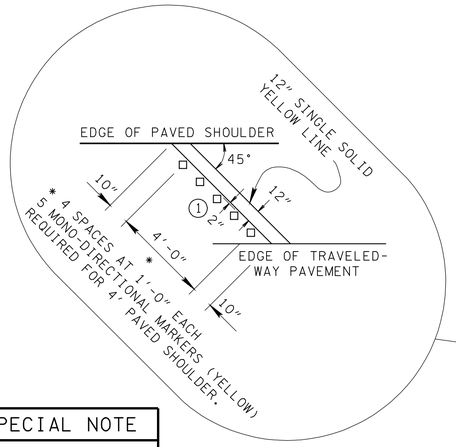
(C) PAVEMENT MARKERS ARE REQUIRED ONLY WHEN SPECIFIED IN THE PLANS.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

GORE MARKING DETAILS FOR EXPRESSWAY & FREEWAY INTERCHANGES

T-M-7

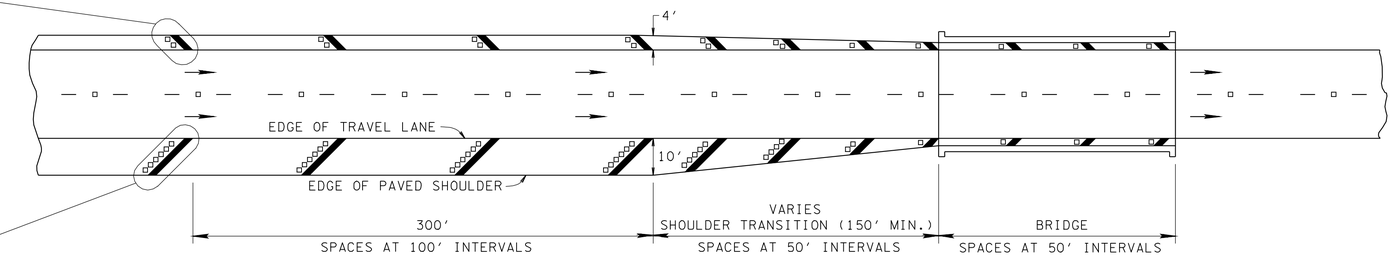


① SPECIAL NOTE

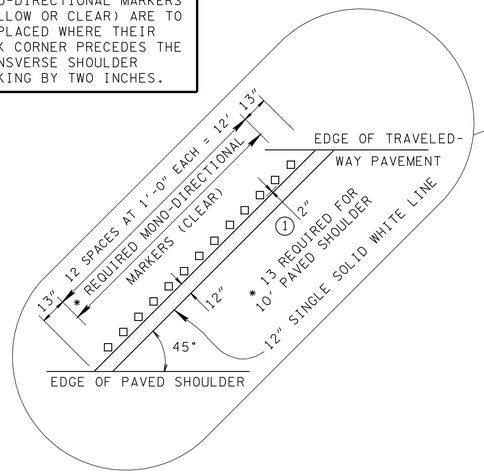
MONO-DIRECTIONAL MARKERS (YELLOW OR CLEAR) ARE TO BE PLACED WHERE THEIR BACK CORNER PRECEDES THE TRANSVERSE SHOULDER MARKING BY TWO INCHES.

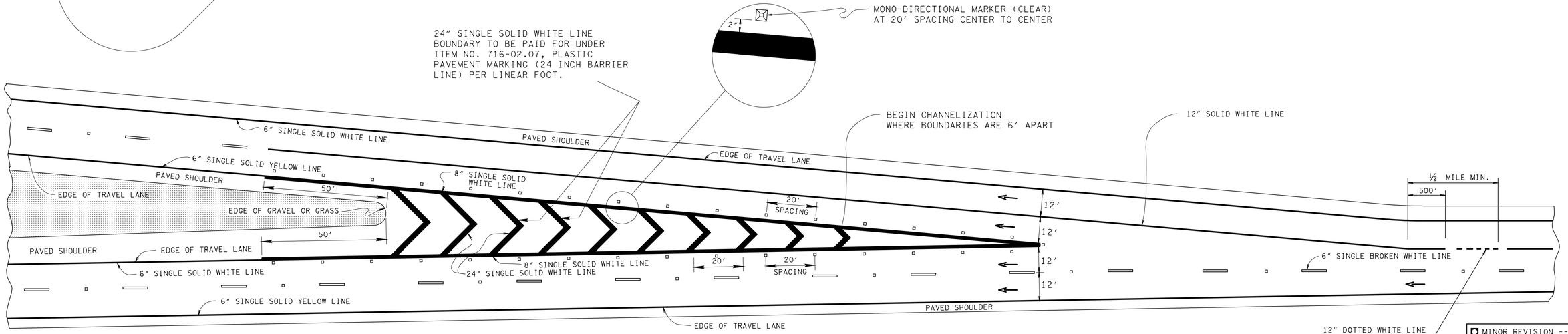
GENERAL NOTE

Ⓐ PAVEMENT MARKERS ARE REQUIRED ONLY WHEN SPECIFIED IN THE PLANS.



DETAILS DELINEATING NARROW BRIDGES
TO BE USED ON ALL BRIDGES WITH LESS THAN A FULL SHOULDER





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.

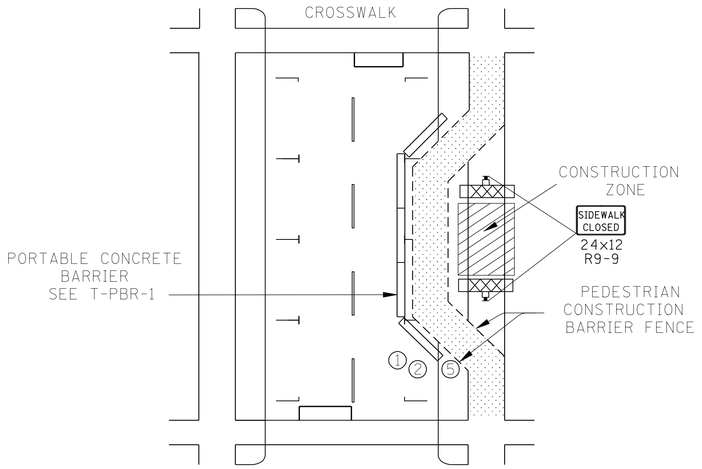
REV. 11-1-11: REVISED TYPICAL GORE DETAILS FOR SPLITS.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

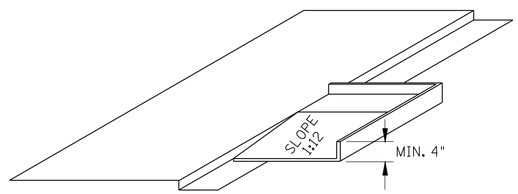
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

MARKING DETAILS FOR EXPRESSWAYS & FREEWAYS

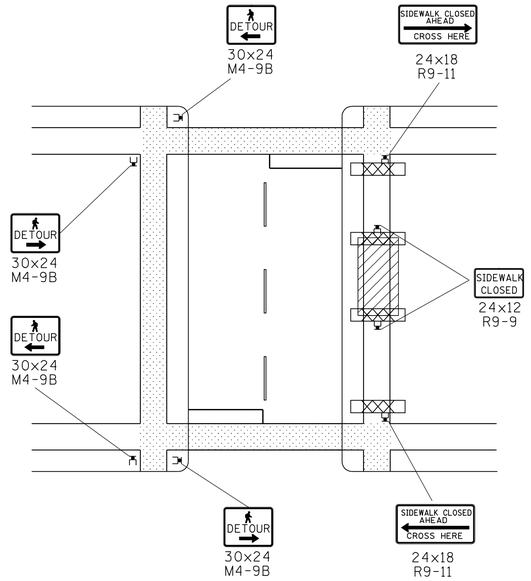
T-M-8



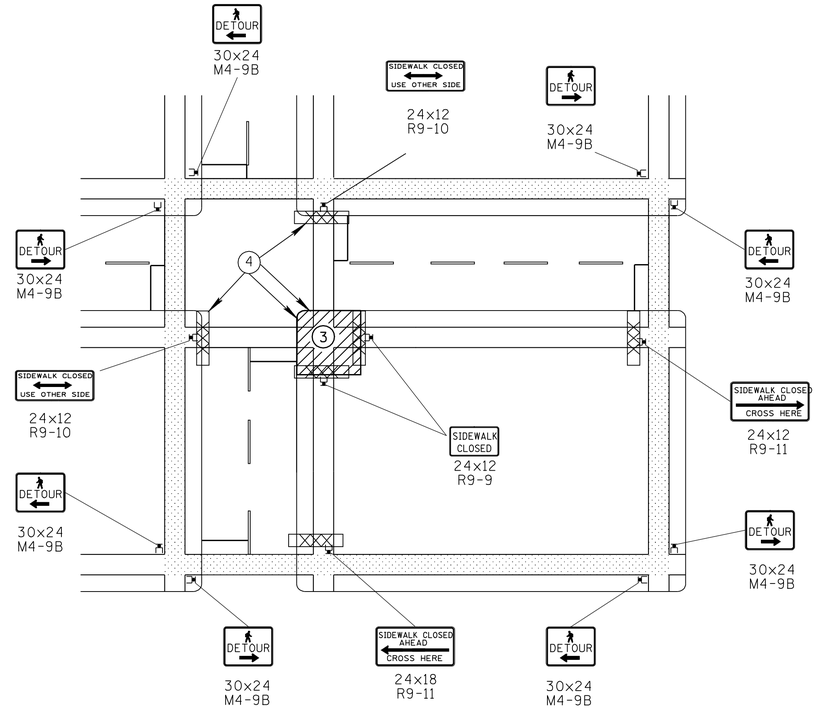
SIDEWALK DIVERSION



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