MASS HIGHWAY

METRIC / ENGLISH SUPPLEMENTAL DRAWINGS

Supplement to the

1996 Metric Edition of the Construction and Traffic Standard Details

and the

1977 Mass. Department of Public Works Construction Standards

April 2003

Introduction to
The April 2003 M/E Construction Drawing Supplement

These drawings are the supplement to the **1996 Metric Edition of the Construction and Traffic Standard Details**, and the **1977 Mass. Department of Public Works Construction Standards**. They supercede any previously issued supplements or revisions to either document.

This document includes revised and newly issued drawings. These include drawings issued December 2001, April 2002, and October 2002.

This dual unit supplement, when combined with the 1996 Metric Construction and Traffic Standard Details or the 1977 English unit Construction Standards, forms a document updated to current MassHighway practice.

While these drawings are in dual units, all conversions are not exact (soft) conversions nor are they completely rationalized (hard) conversions. Therefore, it is important to work in only one system and not to try to convert from one set of units to the other.

The M/E preceding the number indicates that it is a dual unit drawing. In most cases, the number that follows is the metric unit standard or English unit standard that is being updated from the original document. In some cases a new drawing is being issued, and the number is a previously unused number. The exception to this is the concrete barrier drawings, which were grouped together and issued new numbers. Drawings with an "R" suffix have been revised from previously issued M/E Drawings.

The following lists are the drawings which have been deleted from current use. There are separate lists for the 1996 Metric Construction and Traffic Standard Details and for the 1977 English unit Construction Standards. There is a forwarding reference to the newly grouped concrete barrier drawings.

Deleted English Drawings

The following Drawings have been deleted from the Massachusetts Department of Public Works 1977 Standard Construction Drawings, or from subsequently issued revisions, and should no longer be referred to.

Drawing Number	Original Date of Issue or Latest Revision	Drawing Description
105.1.0	Mar 77	Granite Rumble Block Pavement at Ramps
107.1.0	Mar 77 Jun 88 Revised	Wheel Chair Ramps for Sidewalks up to 8 Feet Wide REV To: Wheel Chair Ramp Notes
107.10.0	Jun 88	Transition Curb Length Table
107.11.0	Jun 88	High Side Transition at Back of Side Walk
107.12.0	Jun 88	Low Side Transition at Back of Sidewalk
107.2.0	Mar 77 Jun 88 Revised	Wheel Chair Ramps for Sidewalks Over 8 Feet Wide REV To: Wheel Chair Ramps for Sidewalks 4 to 11 Feet Wide
107.3.0	Jun 88	Wheel Chair Ramps for Sidewalks Over 11 Feet Wide
107.4.0	Jun 88	Brick Ramp Detail
107.5.0	Jun 88	Apex Ramp Use
107.6.0	Jun 88	Paired Wheel Chair Ramps
107.7.0	Jun 88	Limited ROW - Continuous Direction of Travel Wheel Chair Ramps
201.2.0	Mar 77	Brick Catch Basin
202.1.0	Mar 77	Brick Manhole for Pipes up to 30 Inches in Diameter
204.1.0	Mar 77	Brick Gutter Inlet
206.10.0	Mar 77	Standard Joints for Plain Concrete Pipe
210.1.0	Mar 77	Erosion Control (text)
301.1.0	Mar 77	Reinforcing Steel Standard Sizes
401.1.1	Jun 93	Modified Eccentric Loading Cable Terminal Guard Rail End Treatment
401.1.1	Jun 93	Modified Eccentric Loading Cable Terminal Guard Rail End Treatment
401.1.10	Jun 93	Modified Eccentric Loading Cable Terminal Guard Rail End Treatment
401.1.2	Jun 93	Modified Eccentric Loading Cable Terminal Guard Rail End Treatment
401.1.3	Jun 93	Modified Eccentric Loading Cable Terminal Guard Rail End Treatment
401.1.4	Jun 93	Modified Eccentric Loading Cable Terminal Guard Rail End Treatment
401.1.5	Jun 93	Modified Eccentric Loading Cable Terminal Guard Rail End Treatment
401.1.6	Jun 93	Modified Eccentric Loading Cable Terminal Guard Rail End Treatment
401.1.7	Jun 93	Modified Eccentric Loading Cable Terminal Guard Rail End Treatment
401.1.8	Jun 93	Modified Eccentric Loading Cable Terminal Guard Rail End Treatment
401.9.0	Mar 77	"C" Post Guard Rail

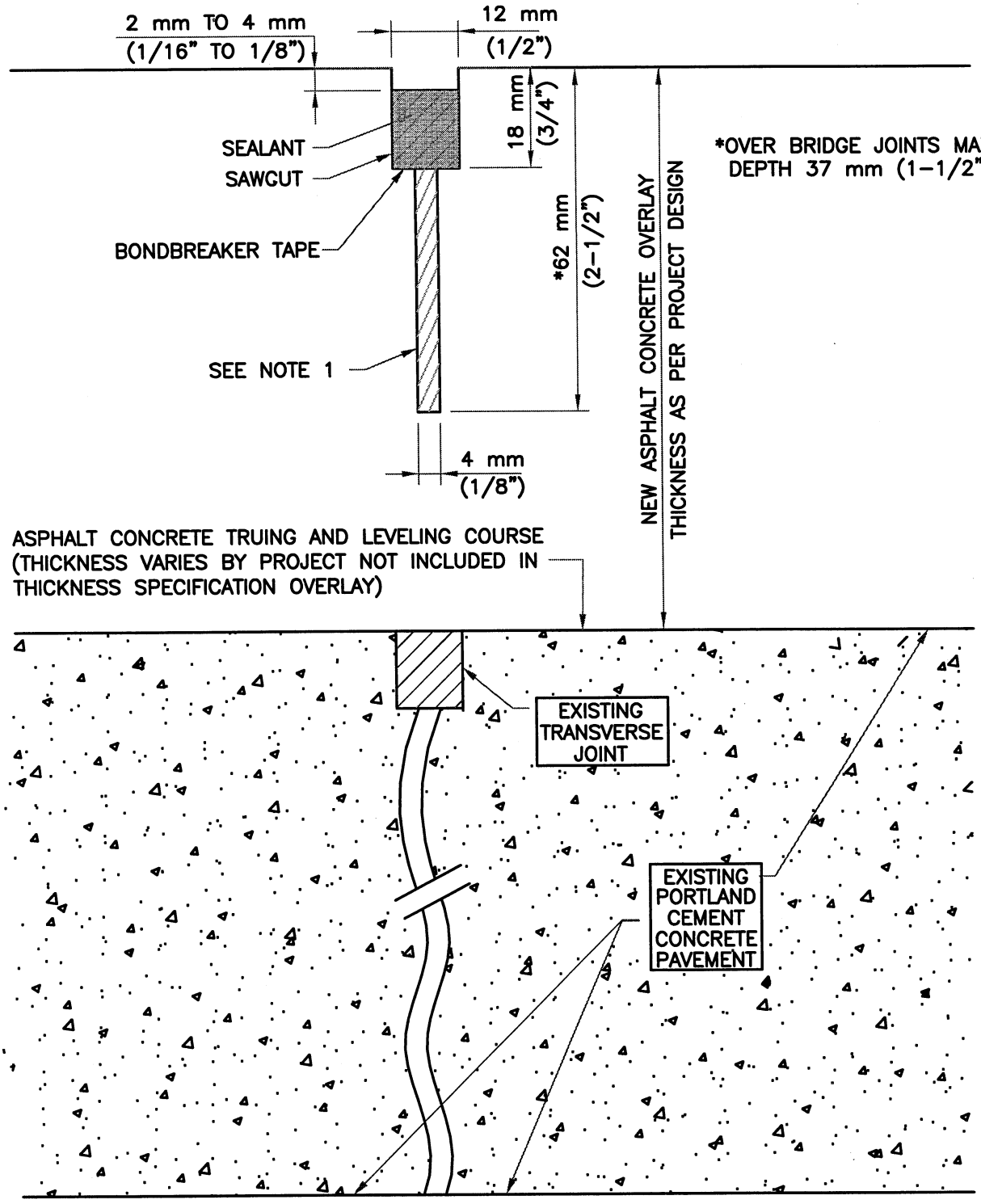
Deleted English Drawings (Cont.)

Drawing Number	Original Date of Issue or Latest Revision	Drawing Description
401.1.9	Jun 93	Modified Eccentric Loading Cable Terminal Guard Rail End Treatment
401.13.0	Mar 77	Pre-Cast Concrete Median Barrier Single Face
401.14.0	Mar 77	Pre-Cast Concrete Median Barrier Dowel Details **Now See $M/_E$ 402.13.0 & $M/_E$ 402.22.0**
401.15.0	Mar 77	Pre-Cast Concrete Median Barrier with Concrete Cap Separator **Now See $M/_E$ 402.10.0; $M/_E$ 402.11.0; $M/_E$ 402.12.0; $M/_E$ 402.20.0 & $M/_E$ 402.21.0**
401.15.1	Aug 79	Precast Median Barrier for Temporary Traffic Control
401.15.2	Aug 79	Precast Median Barrier for Temporary Traffic Control - Reinforcing Bar Details
402.1.0	Mar 77	Method of Placing W Guard Rail Terminal Connectors on Proposed Bridge Structures (Leading and Trailing Ends)
402.6.0	Mar 77	Method of Placing Thrie Beam Guard Rail Terminal Connectors on Proposed Bridge Structures (Leading and Trailing Ends)
403.1.0	Mar 77	Highway Guardrail Type C–2–C
403.10.0	Mar 77	Highway Guardrail Type C–3–C and C–3–S
403.11.0	Mar 77	Highway Guardrail Type C–3–C and C–3–S
403.2.0	Mar 77	Highway Guardrail Type C–3–C
403.3.0	Mar 77	Highway Guardrail Type C–3–C
403.4.0	Mar 77	Highway Guardrail Type C–3–C
403.5.0	Mar 77	Highway Guardrail Type C–3–C
403.6.0	Mar 77	Highway Guardrail Type C–3–S
403.7.0	Mar 77	Highway Guardrail Type C–3–S
403.8.0	Mar 77	Highway Guardrail Type C–3–S
403.9.0	Mar 77	Highway Guardrail Type C–3–S
405.1.0	Mar 77	Expanded Metal Glare Screen Barrier – Steel
405.2.0	Mar 77	Fabric Glare Screen
406.1.0	Mar 77	Illuminated Portable Barrier Fence
406.2.0	Mar 77	Portable Barrier Fence
406.3.0	Mar 77	Permanent Barrier Fence for Dead End Street
407.1.0	Mar 77	Woven Wire Fence
407.2.0	Mar 77	Woven Wire Fence Gate
409.1.0	Mar 77	Pipe Hand Rail on Stairs and Pipe Rail on Walls
507.1.0	Mar 77	Portable Office Building – Plan
507.2.0	Mar 77	Portable Office Building – Left and Right Elevation Views
507.3.0	Mar 77	Portable Office Building – Front and Back Elevation Views
507.4.0	Mar 77	Portable Office Building – Details
507.5.0	Mar 77	Plan Rack
508.1.0	Mar 77	Portable Sanitary Building – Plan
508.2.0	Mar 77	Portable Sanitary Building – Left and Right Elevation Views
508.3.0	Mar 77	Portable Sanitary Building – Front and Back Elevation Views
508.4.0	Mar 77	Portable Sanitary Building – Details

Deleted Metric Drawings

The following Drawings have been deleted from the MassHighway 1996 Construction and Traffic Standard Detail Drawings, or from subsequently issued revisions, and should no longer be referred to.

Drawing Number	Original Date of Issue or Latest Revision	Drawing Description
107.10.0	May 16, 1996 October 8, 1997 Revised	Ramp Length for Sidewalk Width and Profile Grade
107.11.0	May 16, 1996	Ramp Length for Sidewalk Width and Profile Grade 1%
107.12.0	May 16, 1996	Ramp Length for Sidewalk Width and Profile Grade 2%
107.13.0	May 16, 1996	Ramp Length for Sidewalk Width and Profile Grade 3%
107.14.0	May 16, 1996	Ramp Length for Sidewalk Width and Profile Grade 4%
107.15.0	May 16, 1996	Ramp Length for Sidewalk Width and Profile Grade 5%
107.1.1	October 8, 1997	Wheelchair Ramp Symbols
107.5.0	October 8, 1997	Paired Wheelchair Ramp Condition
107.6.1	October 8, 1997	Wheelchair Ramp for Limited Right-of-Way with Corner Radius less than 10 Meters Utilizing a 75 mm Reveal
107.6.2	October 8, 1997	Wheelchair Ramp typical for Limited Right-of-Way and Rounded Layout Line
210.1.0	May 16, 1996	Erosion Control (text)
401.9.0	September 22, 1995	Steel Beam Highway Guard Rail with "C" Posts
401.13.0	September 22, 1995	Pre-Cast Concrete Jersey Median Barrier Single Face
401.13.1	September 22, 1995	Pre-Cast Concrete Jersey Median Barrier Reinforcement Details
401.14.0	September 22, 1995	Pre-Cast Concrete Median Barrier Dowel Details **Now See M/E 402.13.0 & M/E 402.22.0**
401.15.0	September 22, 1995	Pre-Cast Median Barrier with Concrete Cap Separator
M/E 409.15.1	December 2001	Precast Median Barrier for Temporary Traffic Control Jersey Shape
M/E 409.15.2	December 2001	Precast Median Barrier for Temporary Traffic Control Jersey Shape
401.17.0	September 22, 1995	F-Shape Median Barrier **Now See M/E 402.10.0 & M/E 402.20.0**
401.18.0	September 22, 1995	F-Shape Median Barrier (Reinforcing Details) **Now See M/E 402.11.0; M/E 402.12.0 & M/E 402.21.0**
401.19.0	September 22, 1995	Pre-Cast Concrete Tall-Wall Median Barrier
401.9.0	September 22, 1995	Steel Beam Highway Guardrail with "C" Posts
401.5.5	January 1999	Wood Post for Use With Steel Beam Guardrail
402.1.0	September 22, 1995	Method of Placing Guardrail Terminal Connectors on Proposed Bridge Structures (Leading and Trailing Ends W-Rail)
402.6.0	September 22, 1995	Method of Placing Thrie Beam Guardrail Terminal Connectors on Proposed Bridge Structures (Leading and Trailing Ends)
409.1.0	September 22, 1995	Galvanized Steel Pipe Fence
M/E 409.15.1	December 2001	Precast Median Barrier for Temporary Traffic Control Jersey Shape
M/E 409.15.2	December 2001	Precast Median Barrier for Temporary Traffic Control Jersey Shape
503.1.0	September 22, 1995	Proprietary Wall Systems



NOTES:

1. WHEN THE TOTAL THICKNESS OF ASPHALT CONCRETE OVER THE EXISTING JOINT EXCEEDS 112mm (4-3/8"), A 4mm (1/8") SAWCUT SHALL BE INCLUDED IN THE JOINT AS SHOWN TO A MINIMUM DEPTH OF 62mm (2-1/2").
2. PRIOR TO PLACING THE OVERLAY, ALL JOINTS SHALL BE LOCATED AND REFERENCED.

MASS HIGHWAY
CONSTRUCTION
STANDARDS

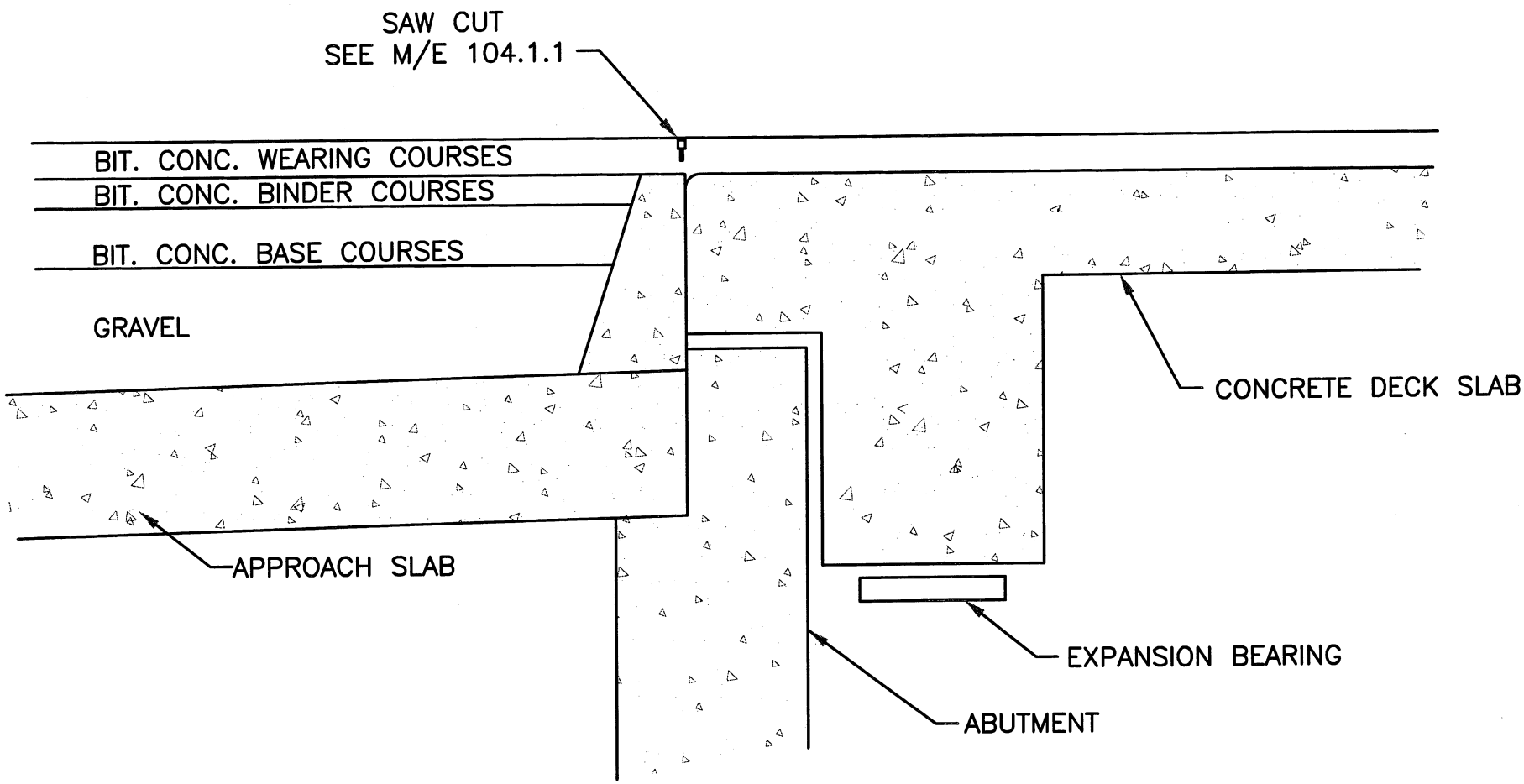
TRANSVERSE JOINTS AT EXPANSION JOINTS

DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 104.1.1

MASS HIGHWAY
CONSTRUCTION STANDARDS

LOCATION OF SAW CUT FOR TRANSVERSE JOINTS AT BRIDGE ABUTMENT



NOTES:

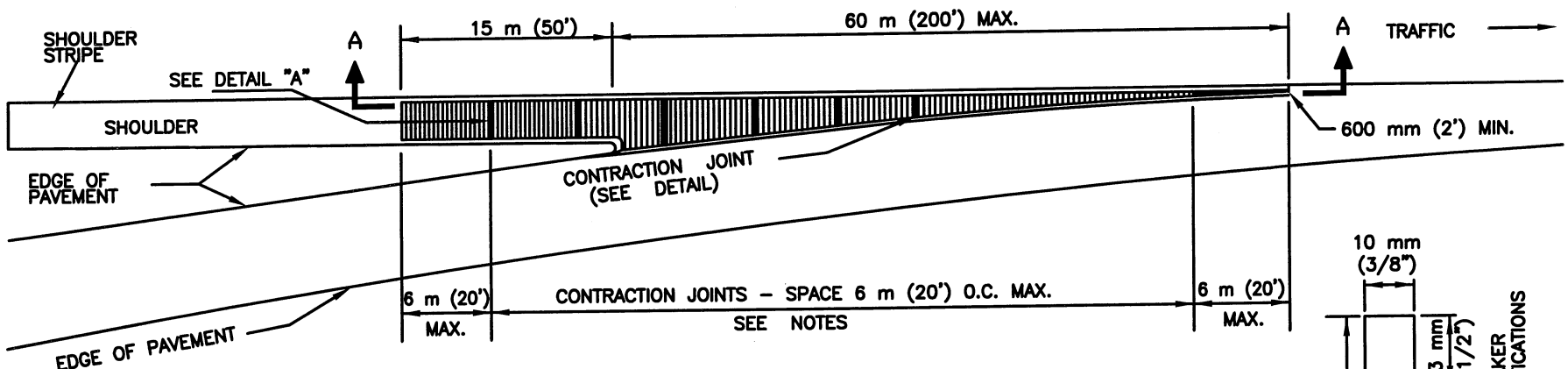
1. BEFORE SAW-CUTTING THE TRANSVERSE JOINT THE CONTRACTOR SHALL LOCATE THE END OF THE BRIDGE DECK. SAW-CUTTING MUST TAKE INTO ACCOUNT THE SKEW ANGLE OF THE BRIDGE.
2. ONLY EXPANSION JOINTS SHALL BE SAW-CUT AND SEALED.
3. ONLY REQUIRED WITH A CONTINUOUS BITUMINOUS CONCRETE SURFACE FROM ROADWAY TO BRIDGE.

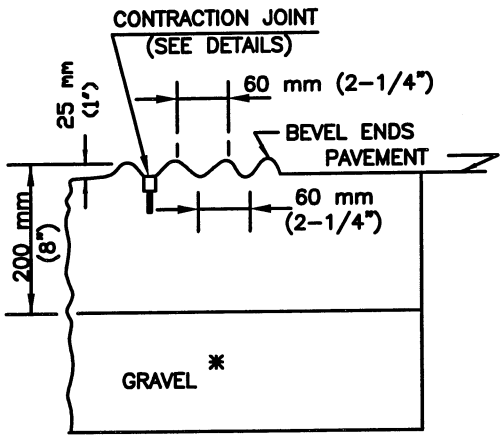
DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 104.1.2

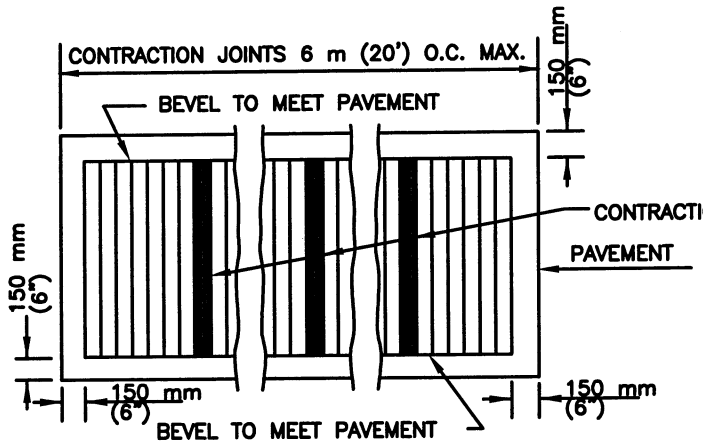
MASS HIGHWAY
CONSTRUCTION STANDARDS

SCORED CONCRETE PAVEMENT AT RAMPS

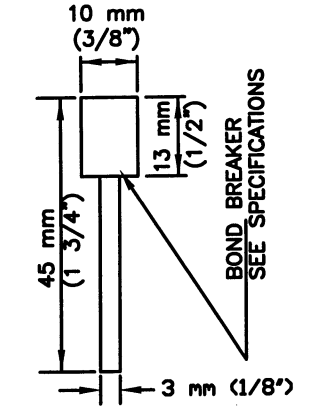




DETAIL OF CORRUGATIONS

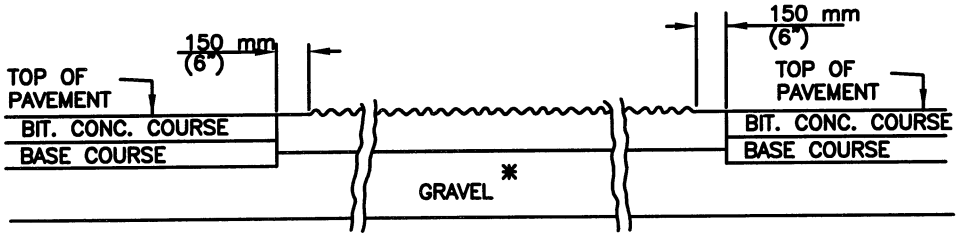


DETAIL "A"



CONTRACTION JOINT DETAIL

* THE DEPTH OF THE GRAVEL IS TO BE SUCH THAT ITS BOTTOM LINE MEETS THE BOTTOM OF THE GRAVEL LINE OF THE CONTIGUOUS PAVEMENT.



SECTION A – A

NOTES:

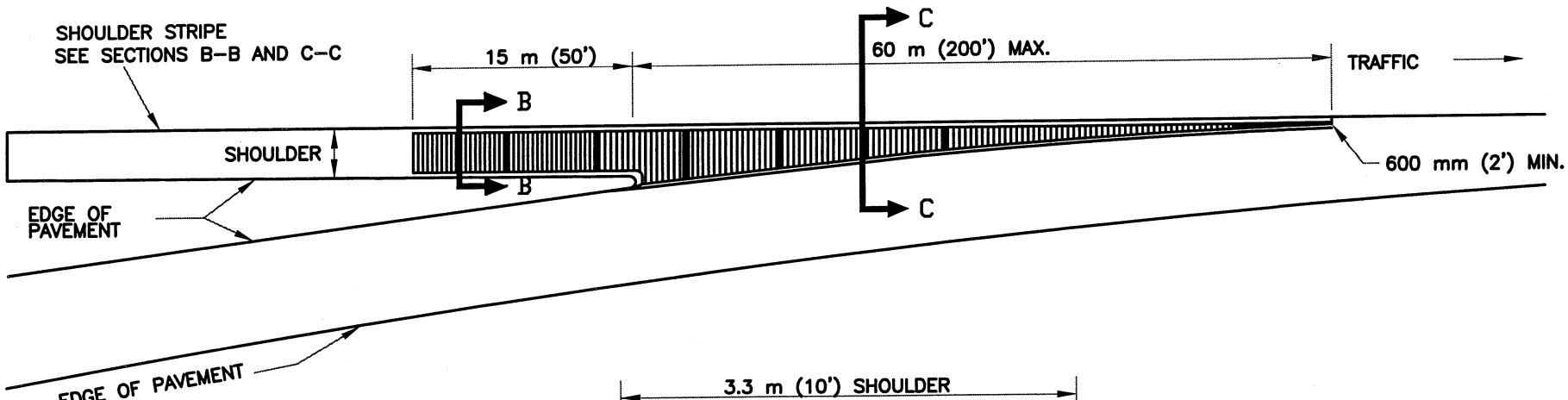
1. CONTRACTION JOINTS ARE TO BE SPACED AT A MAXIMUM OF 6 m (20') APART.
2. THE JOINTS ARE TO BE SAWED AND LOCATED IN THE DEPRESSIONS OF THE CORRUGATIONS, SEE DETAIL OF CORRUGATIONS.
3. END OF CORRUGATED RIDGES TO BE BEVELED.
4. FOR DESCRIPTON OF MATERIAL AND CONSTRUCTION METHODS SEE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS.
5. SCORED CEMENT CONCRETE TO BE: 35 MPa, 20 mm, 420 kg/m3 (5000 psi–3/4"–705 lb/Cu.Yd.)

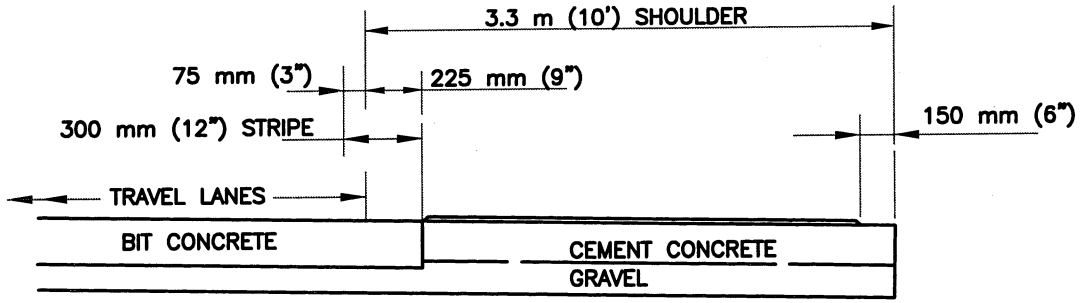
DRAWING NUMBER
M/E 105.2.0

DATE OF ISSUE
December 2001

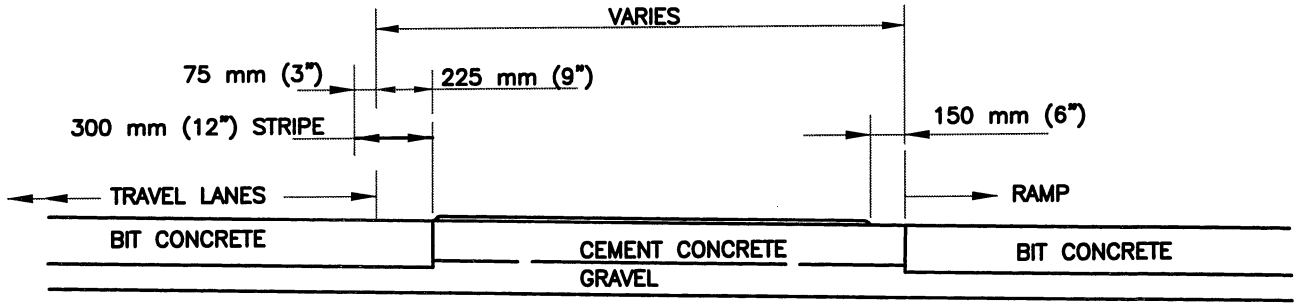
MASS HIGHWAY
CONSTRUCTION STANDARDS

SHOULDER SECTION OF SCORED CONCRETE PAVEMENT





SECTION B – B



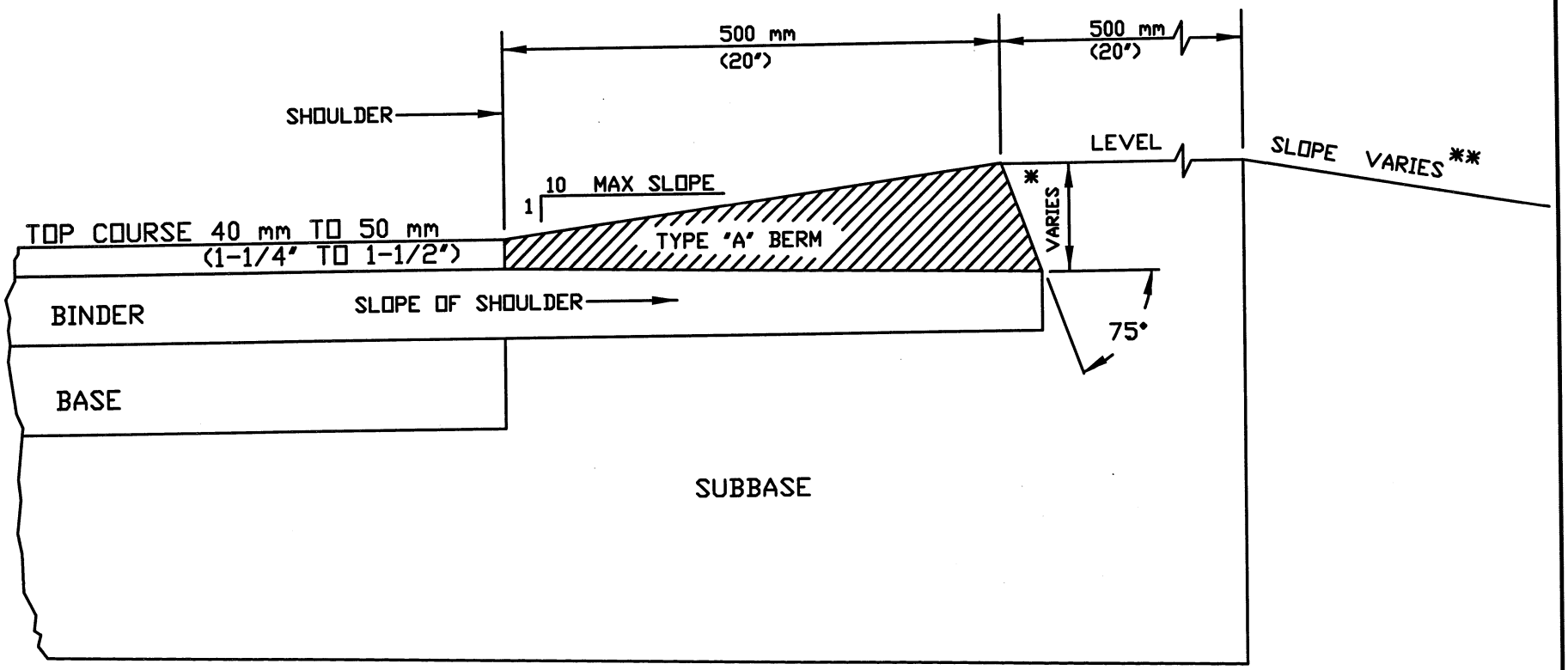
SECTION C – C

DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 105.2.1

MASSHIGHWAY
CONSTRUCTION STANDARDS

BITUMINOUS CONCRETE BERM
TYPE "A"



NOTE:

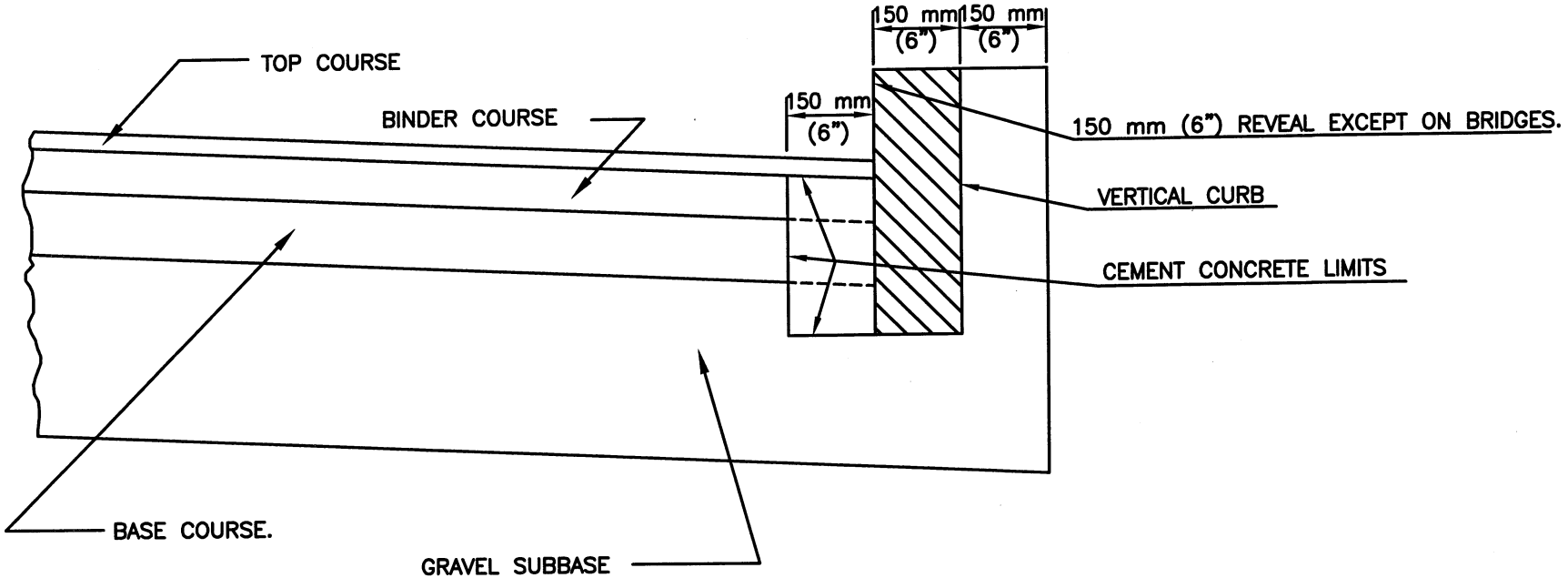
FOR MODIFIED BERM THE SLOPE REMAINS CONSTANT AT 1 (V) TO 10 (H)
* THIS DIMENSION VARIES WITH THE THICKNESS OF THE TOP COURSE AND SLOPE OF SHOULDER
** SEE TYPICAL SECTIONS FOR PROJECT

DRAWING NUMBER
M/E 106.1.0

DATE OF ISSUE
December 2001

MASS HIGHWAY
CONSTRUCTION STANDARDS

METHOD OF SETTING VERTICAL CURB



NOTES:

1. THIS PROCEDURE IS APPLICABLE ONLY IF CURB IS TO BE SET AFTER BASE AND/OR BINDER COURSES ARE IN PLACE.

2. CUT NEAT LINE 150mm (6") FROM CURB LINE AND REMOVE BINDER, BASE AND GRAVEL, REPLACE WITH CEMENT CONCRETE.

3. ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPTABLE UNDER SECTION M4 OF THE STANDARD SPECIFICATIONS MAY BE USED; ALL TEST REQUIREMENTS ARE WAIVED. BITUMINOUS CONCRETE SHALL NOT TO BE USED AS A SUBSTITUTE.

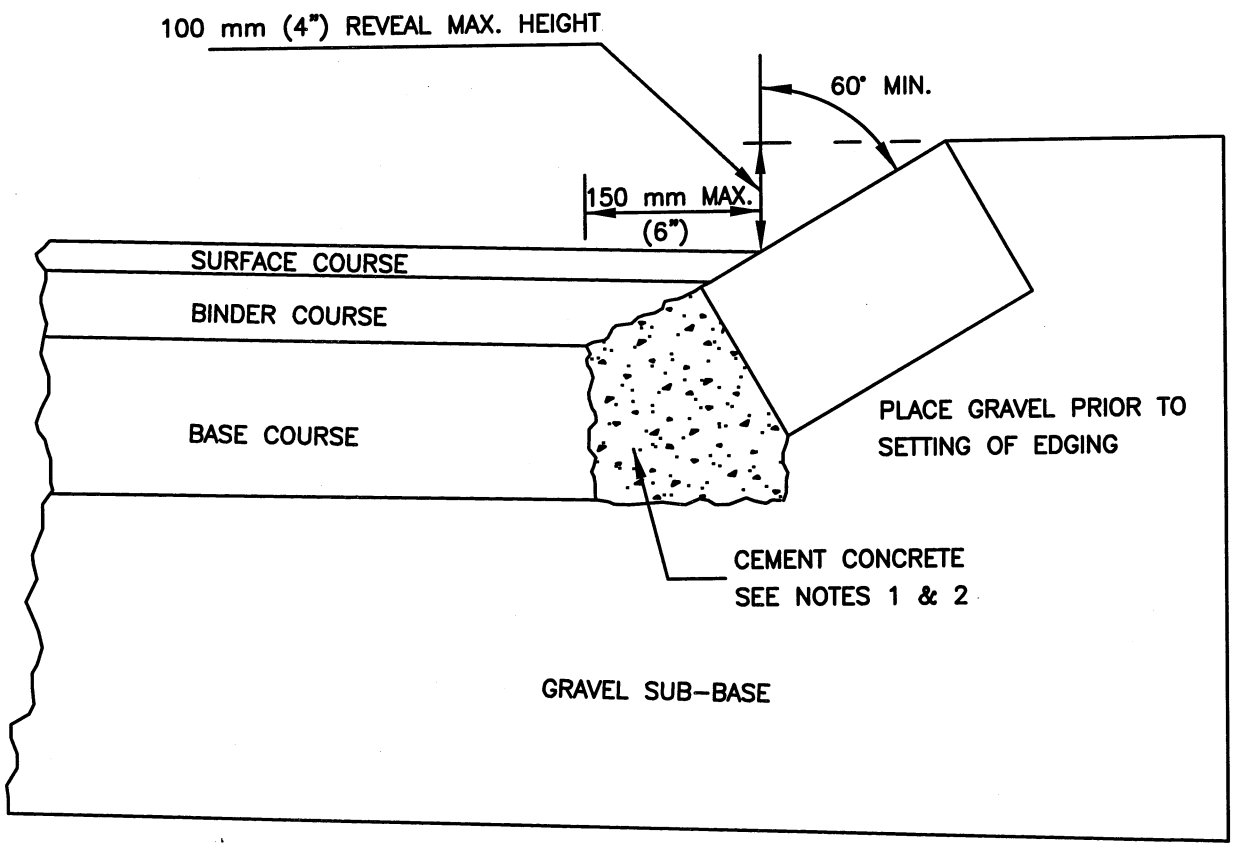
4. PAYMENT FOR CEMENT CONCRETE WILL BE INCLUDED IN THE PRICE PER METER (FOOT) OF CURBING.

DRAWING NUMBER M/E 106.3.0

DATE OF ISSUE December 2001

MASS HIGHWAY
CONSTRUCTION STANDARDS

METHOD OF SETTING
SLOPED EDGING



SLOPED EDGING

NOTES:

1. ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPTABLE TO THE DEPARTMENT UNDER SECTION M4 OF THE STANDARD SPECIFICATIONS; ALL TEST REQUIREMENTS ARE WAIVED. BITUMINOUS CONCRETE SHALL NOT TO BE USED AS A SUBSTITUTE.
2. PAYMENT FOR CEMENT CONCRETE WILL BE INCLUDED IN THE PRICE PER METER (FOOT) OF EDGING.
3. THE REVEAL IS TO BE A MAXIMUM OF 100 mm (4") UNDER ALL CONDITIONS.

DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 106.5.0

1. ROADWAY SIDEWALK CROSS SLOPES, FOR BRICK, CEMENT CONCRETE, AND BITUMINOUS CONCRETE, AS INDICATED IN THE STANDARD SPECIFICATIONS, WILL BE 1.5 %. A CONSTRUCTION TOLERANCE OF ±0.5 % IS ACCEPTABLE ON ROADWAY SIDEWALKS. SIDEWALKS ON BRIDGES WILL BE CONSTRUCTED TO A CROSS SLOPE OF 1.0 % IN ACCORD WITH BRIDGE POLICY. (REFER TO STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, SECTION 700.) IN ACCORDANCE WITH 521 CMR THE RULES AND REGULATIONS OF THE ARCHITECTURAL ACCESS BOARD (AAB), THE SIDEWALK CROSS SLOPE CANNOT EXCEED 2.0%.

2. AN UNOBSTRUCTED PATH OF TRAVEL WITH A **MINIMUM** WIDTH OF 1.00 m (3'-3") SHALL BE MAINTAINED PAST ALL OBSTRUCTIONS (UTILITY POLES, SIGNS, SIGNAL FOUNDATIONS AND MASTS, MAILBOXES, ALONG DRIVE OPENINGS, ETC.).

3. THE WHEELCHAIR RAMP SLOPES AND SIDE SLOPES (TRANSITIONS) WILL BE 7.5 % WITH A CONSTRUCTION TOLERANCE OF ±0.5 %. HOWEVER, THESE SLOPES MAY BE FLATTER WHEN WARRANTED BY SURROUNDING CONDITIONS.

4. WHERE THE ROAD PROFILE EXCEEDS 4 %, THE HIGH SIDE TRANSITION LENGTH UNDER ANY CONDITIONS NEED NOT EXCEED 4.57 m (15 FEET).

5. IN NO CASE WHERE A STOP LINE IS WARRANTED, SHALL A RAMP BE PLACED ON THE TRAFFIC APPROACH SIDE OF THAT STOP LINE.

6. FIXED OBJECTS (I.E. UTILITY POLES, HYDRANTS, SIGNS, SIGNAL FOUNDATIONS, ETC.) MUST NOT ENCROACH ON ANY PART OF THE WHEELCHAIR RAMP INCLUDING TRANSITION SLOPES.

7. AT NO TIME IS ANY PART OF THE WHEELCHAIR RAMP, EXCLUDING CURB TRANSITIONS, TO BE LOCATED OUTSIDE THE CROSSWALK. THE WHEELCHAIR RAMP ENTRANCE IS TO BE CENTERED IN THE CROSSWALK WHENEVER POSSIBLE.

8. CATCH BASINS WHICH ARE TO BE LOCATED IN THE VICINITY OF A WHEELCHAIR RAMP SHALL BE LOCATED UPGRADE OF THE RAMP ENTRANCE.

9. THE ENTRANCE OF A WHEELCHAIR RAMP SHALL BE FLUSH WITH THE ROADWAY.

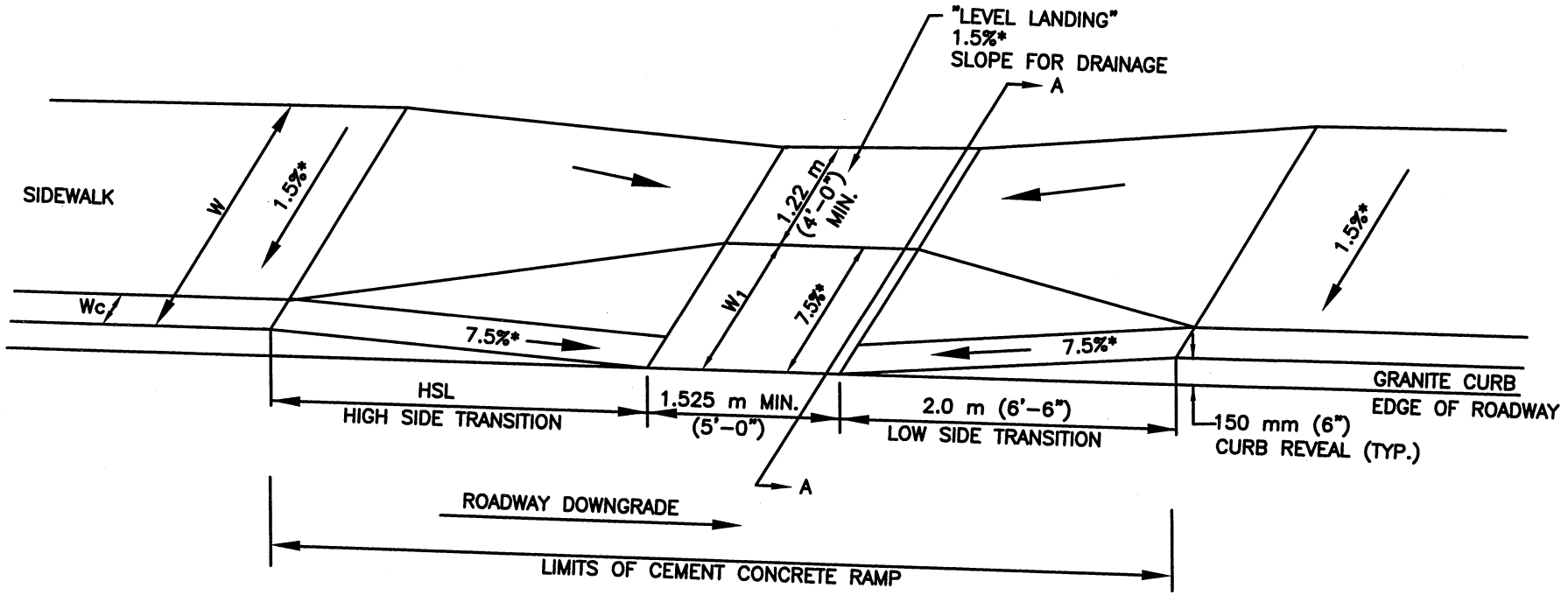
10. TESTING SURFACE: WHEN TESTING WITH A STRAIGHTEDGE PLACED PARALLEL TO THE LINE OF THE SLOPE THERE SHALL BE NO DEVIATION FROM A TRUE SURFACE IN EXCESS OF 6 mm (¼").

11. WHEELCHAIR RAMPS ON BRIDGES SHOULD BE AVOIDED. IF A WHEELCHAIR RAMP IS REQUIRED TO BE PLACED ON A BRIDGE, **PRIOR WRITTEN APPROVAL OF THE BRIDGE ENGINEER IS REQUIRED**. SPECIAL DETAILING OF THE REINFORCEMENT AND CURB REVEAL WILL BE REQUIRED TO MAINTAIN THE PERFORMANCE OF THE RAILING/BARRIER SYSTEM.

MASS HIGHWAY
CONSTRUCTION STANDARDS

WHEELCHAIR RAMPS

LESS THAN 3.75 m (12'–4") SIDEWALK



LEGEND

HSL = HIGH SIDE TRANSITION LENGTH (SEE M/E 107.9.0)

W = SIDEWALK WIDTH

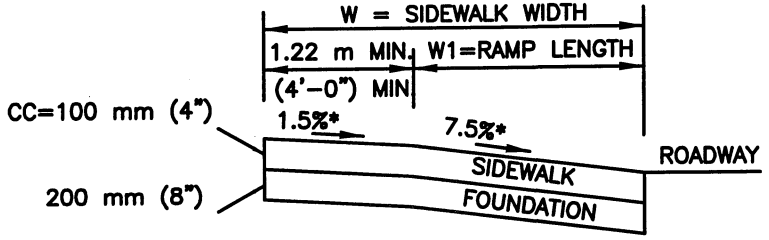
W_1 = PERPENDICULAR RAMP LENGTH

Wc = CURB WIDTH

* = TOLERANCE FOR CONSTRUCTION ±0.5%

USABLE SIDEWALK WIDTH PER AAB = W–Wc

RAMP LENGTH, W1 = W–1.22 m (4'–0") Min



SECTION A–A

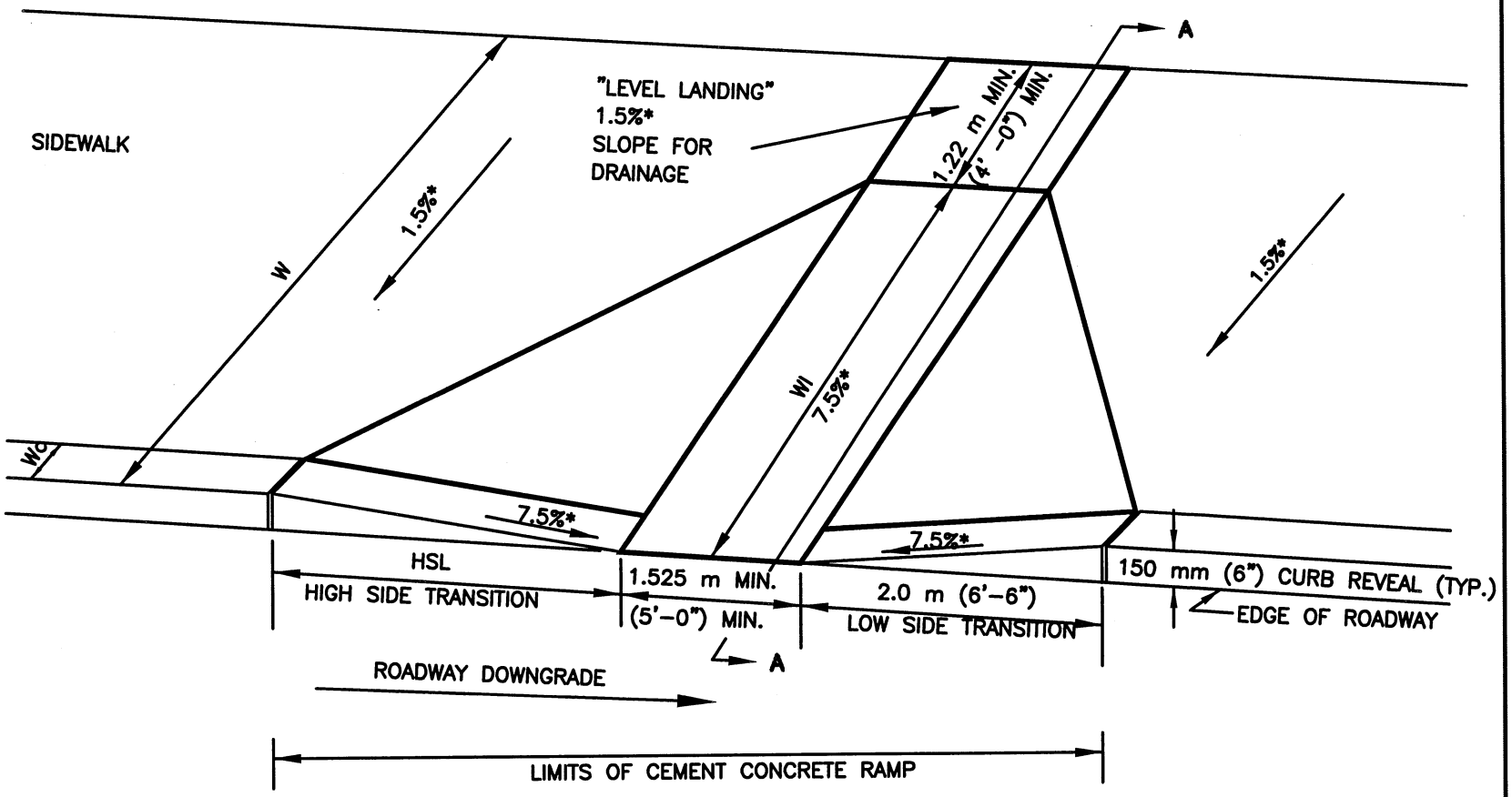
DRAWING NUMBER **M/E 107.2.0**

DATE OF ISSUE December 2001

MASS HIGHWAY
CONSTRUCTION STANDARDS

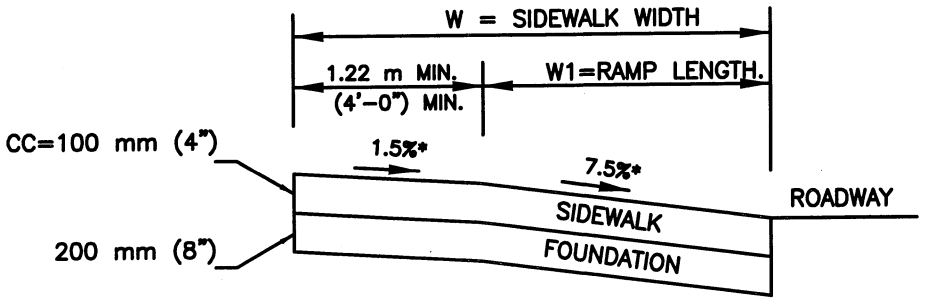
WHEELCHAIR RAMPS

GREATER THAN 3.75 m (12'-4") SIDEWALK



LEGEND

HSL = HIGH SIDE TRANSITION LENGTH (SEE M/E 107.9.0)
W = SIDEWALK WIDTH
W 1 = PERPENDICULAR RAMP LENGTH
Wc = CURB WIDTH
* = TOLERANCE FOR CONSTRUCTION ±0.5%
USABLE SIDEWALK WIDTH PER AAB = W–Wc
RAMP LENGTH, W1 = W–1.22 m (4'–0") Min



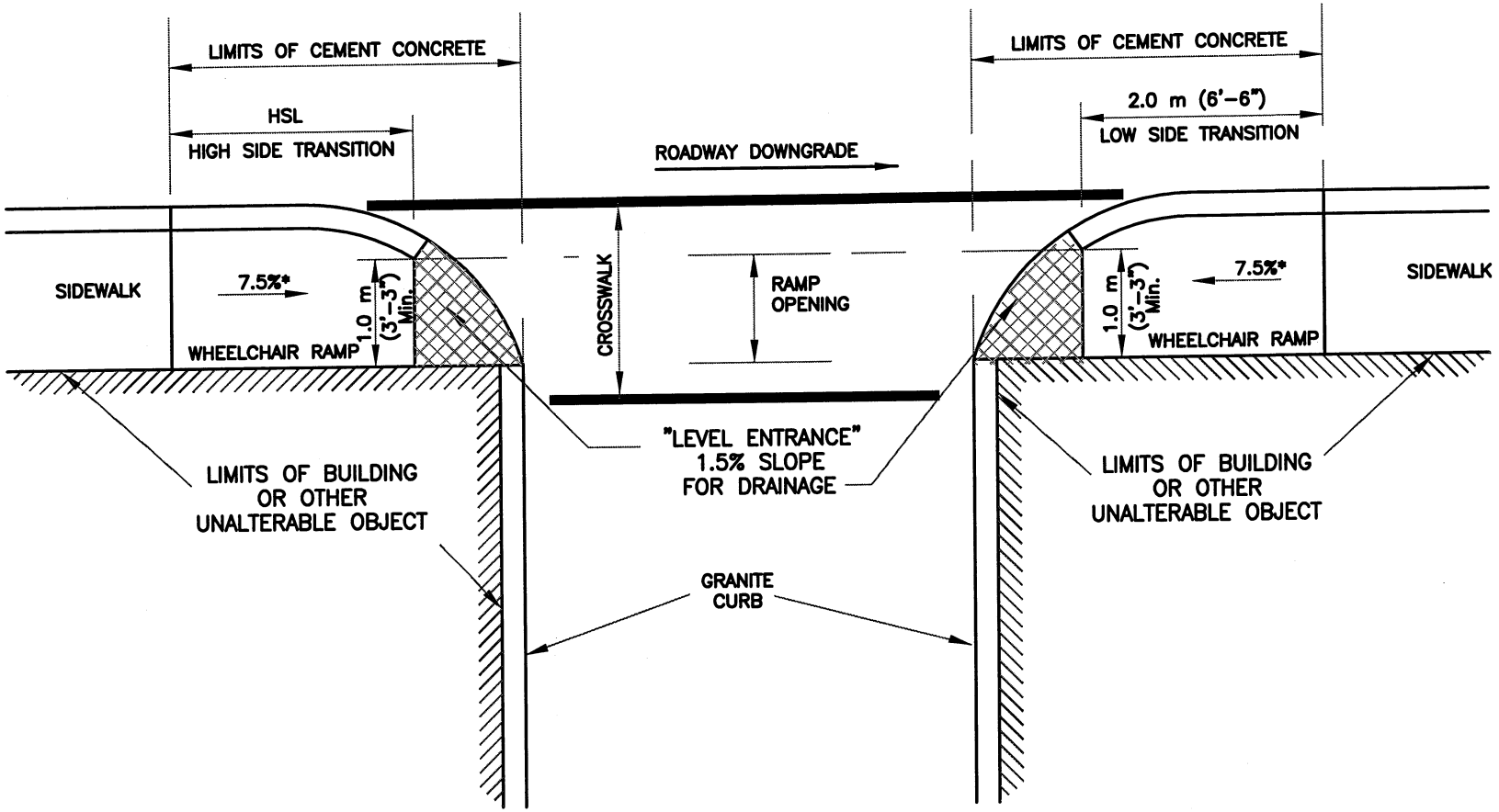
SECTION A–A

DRAWING NUMBER
M/E 107.3.0

DATE OF ISSUE
December 2001

MASS HIGHWAY
CONSTRUCTION STANDARDS

WHEELCHAIR RAMP FOR ONE CONTINUOUS DIRECTION OF PEDESTRIAN TRAVEL



LEGEND

HSL = HIGH SIDE TRANSITION LENGTH (SEE M/E 107.9.0)

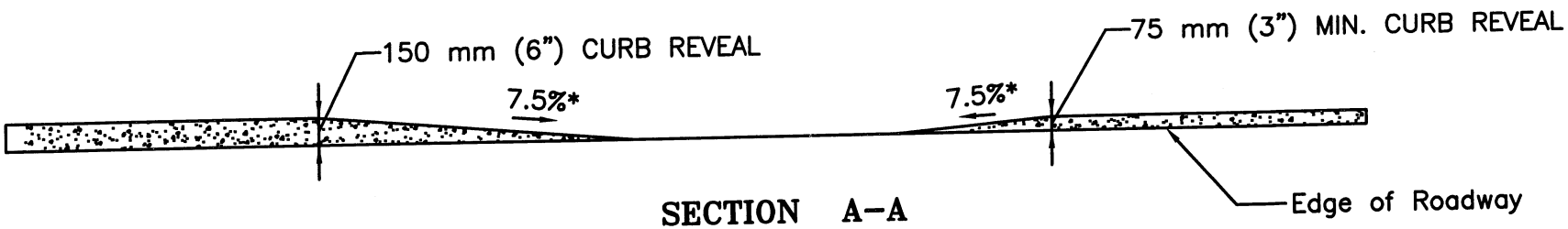
* = TOLERANCE FOR CONSTRUCTION ±0.5

DATE OF ISSUE
December 2001

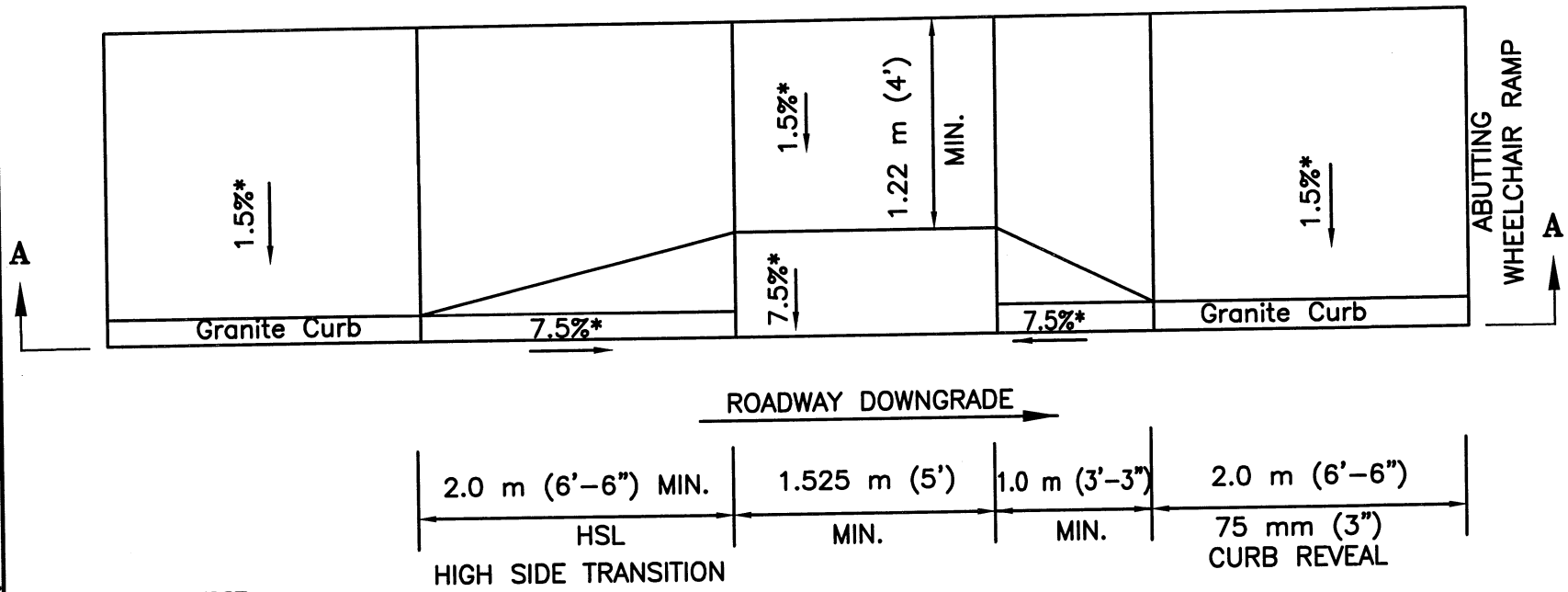
DRAWING NUMBER
M/E 107.6.0

MASS HIGHWAY
CONSTRUCTION STANDARDS

WHEELCHAIR RAMP WITH 75 mm (3") CURB REVEAL



SECTION A–A



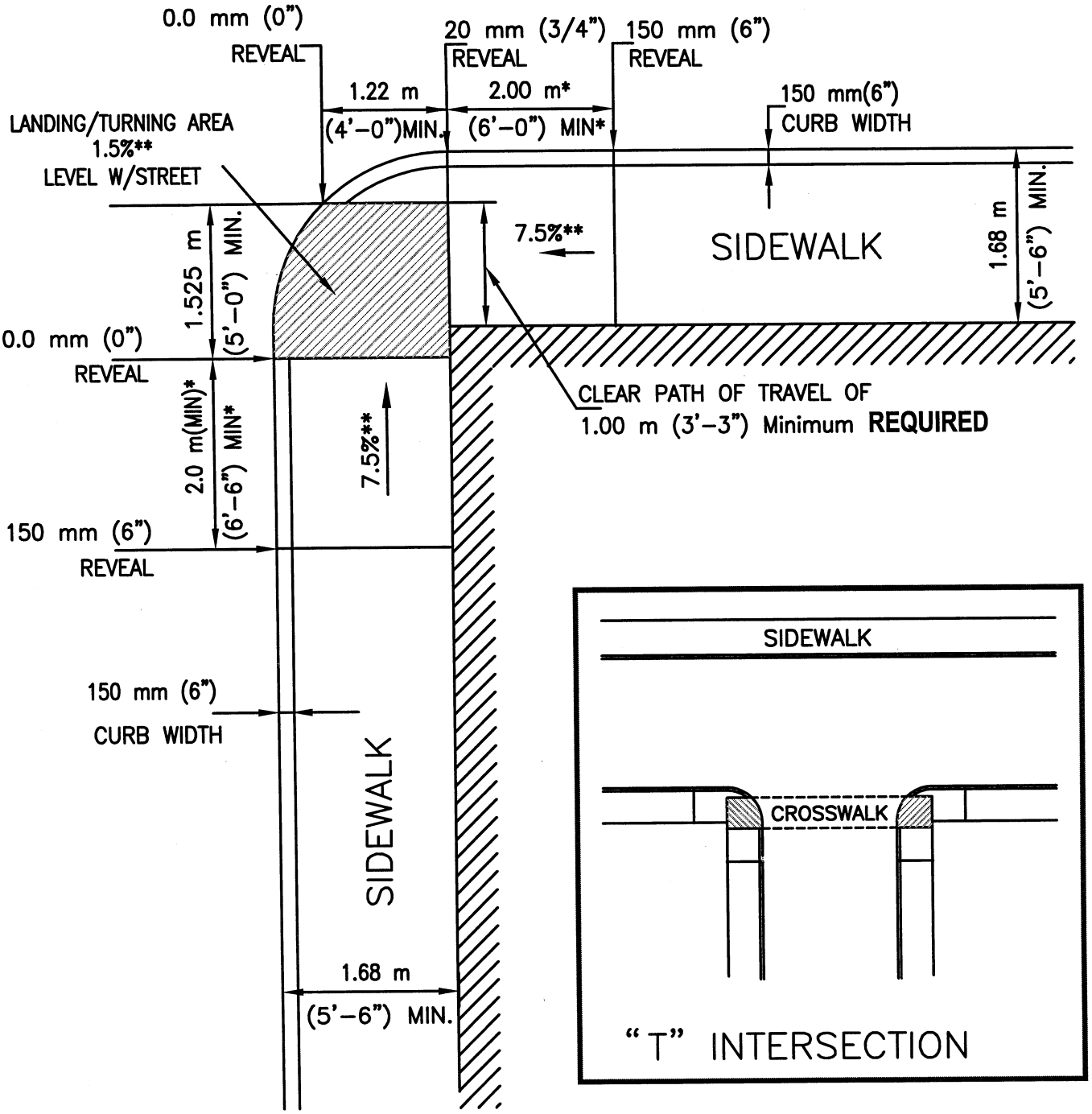
LEGEND

HSL = HIGH SIDE TRANSITION LENGTH
SEE M/E (107.9.0)

* TOLERANCE FOR CONSTRUCTION ±0.5%

DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 107.6.3



LEGEND

BUILDING OR OTHER UNALTERABLE CONDITION

* TRANSITION LENGTH SHOWN IS MINIMUM. (SEE M/E 107.9.0)

** TOLERANCE FOR CONSTRUCTION ±0.5%

MASS HIGHWAY CONSTRUCTION STANDARDS

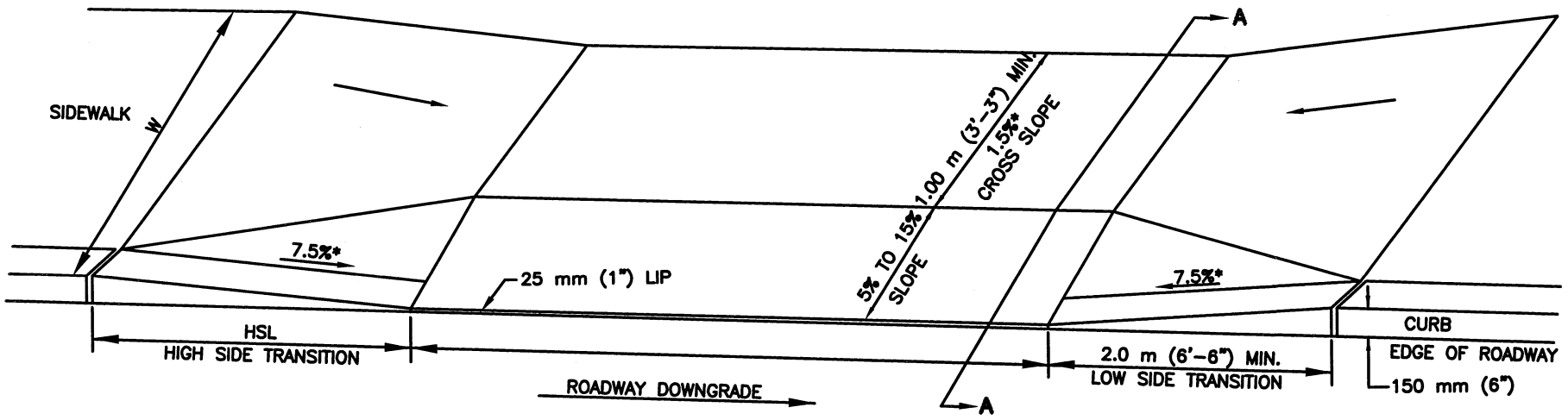
"T" INTERSECTION WHEELCHAIR RAMP

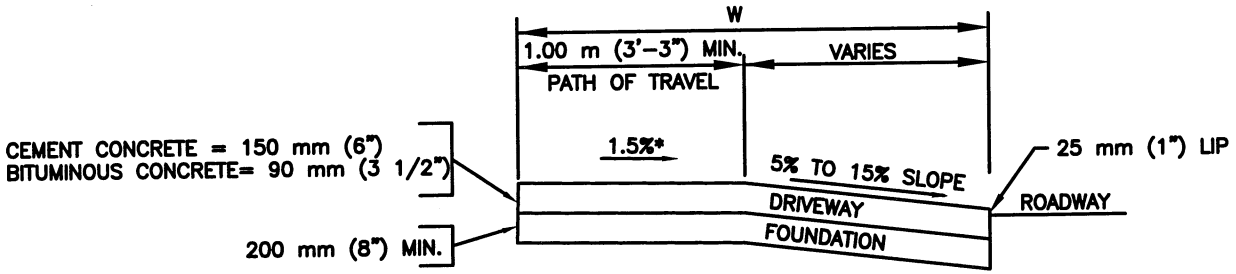
DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 107.6.4

MASS HIGHWAY
CONSTRUCTION STANDARDS

SIDEWALK THROUGH DRIVEWAYS WITHOUT CURB RETURNS
1.80 m (6')





SECTION A-A

LEGEND

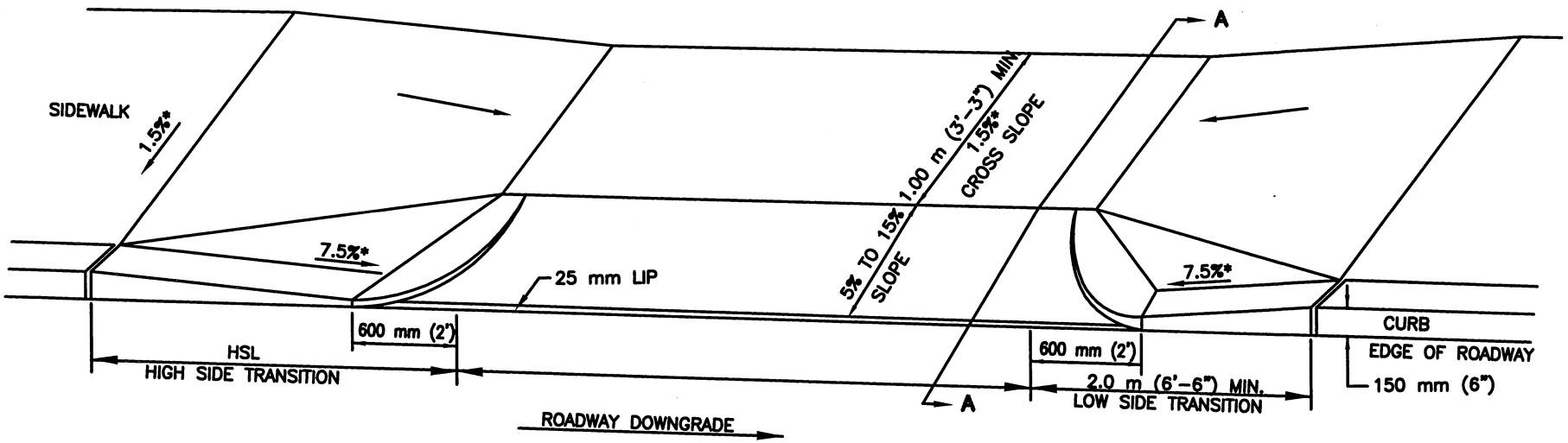
HSL = HIGH SIDE TRANSITION LENGTH. SEE M/E 107.9.0
W = SIDEWALK WIDTH
* = TOLERANCE FOR CONSTRUCTION ±0.5%

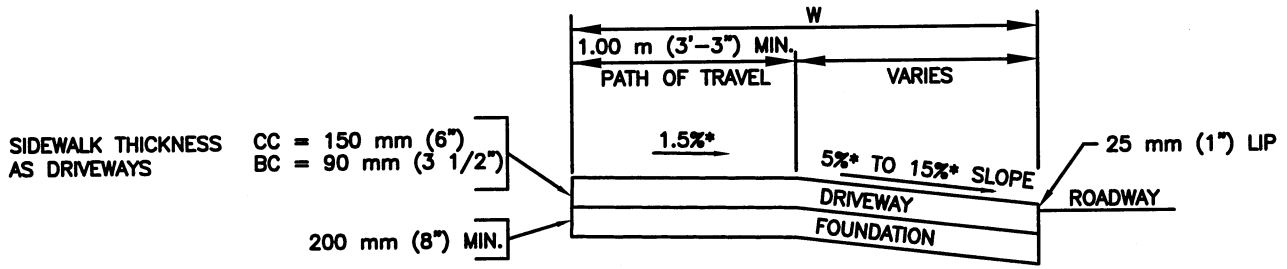
DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 107.7.0

MASS HIGHWAY
CONSTRUCTION STANDARDS

SIDEWALK THROUGH DRIVEWAYS WITH CURB RETURNS
600 mm (2') CURB CORNERS





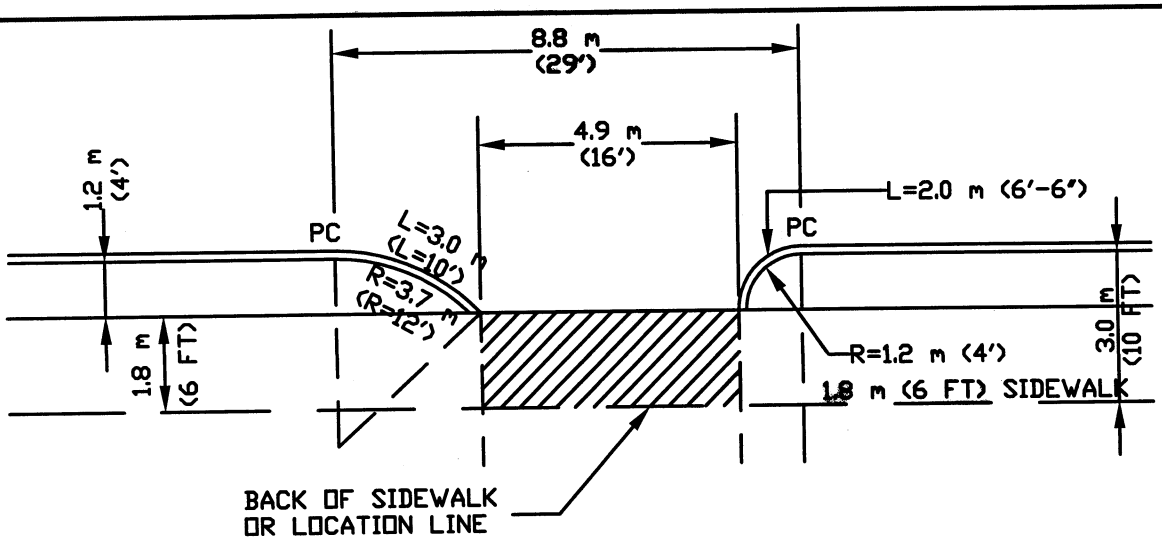
SECTION A-A

LEGEND

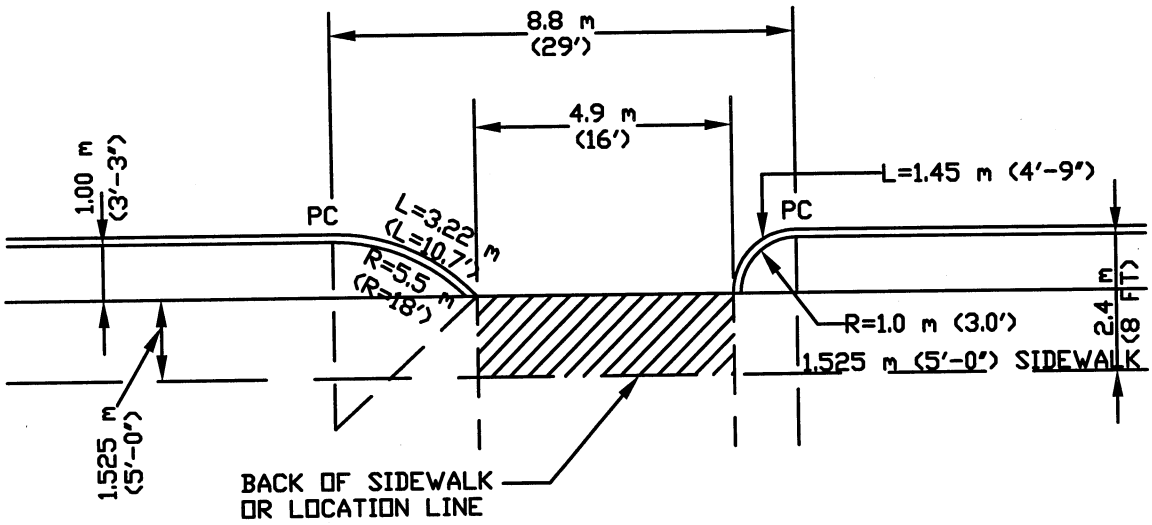
HSL = HIGH SIDE TRANSITION LENGTH
W = SIDEWALK WIDTH
* = TOLERANCE FOR CONSTRUCTION ±0.5%

DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 107.8.0



3.0 m (10 FT) SIDEWALK LAYOUT



2.4 m (8 FT) SIDEWALK LAYOUT

NOTES:

1. WHEN THE SIDEWALK IS PAVED TO THE CURB LINE, USE SHORT CURB RETURNS AT THE HIGHWAY CURB LINE PC'S, SHOWN IN THESE DESIGNS.

MUST MAINTAIN 1.00 m (3'-3") LEVEL PATH OF TRAVEL AT 1.5% CROSS SLOPE

MASS HIGHWAY
CONSTRUCTION STANDARDS

RESIDENTIAL DRIVEWAYS

DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 107.8.1

MASS HIGHWAY
CONSTRUCTION STANDARDS

CURB TRANSITION LENGTH FOR WHEELCHAIR RAMPS

ROADWAY PROFILE GRADE	*HIGH SIDE TRANSITION LENGTH	
%	METRIC UNITS	ENGLISH UNITS
0	2.0 m	6'–6"
>0⇒1	2.3 m	7'–8"
>1⇒2	2.7 m	9'–0"
>2⇒3	3.3 m	11'–0"
>3⇒4	4.3 m	14'–0"
>4	4.6 m Max	15'–0" Max

NOTE:

*BASED ON A DESIGN SLOPE OF 7.5% AND A REVEAL OF 150 mm (6").

DATE OF ISSUE December 2001

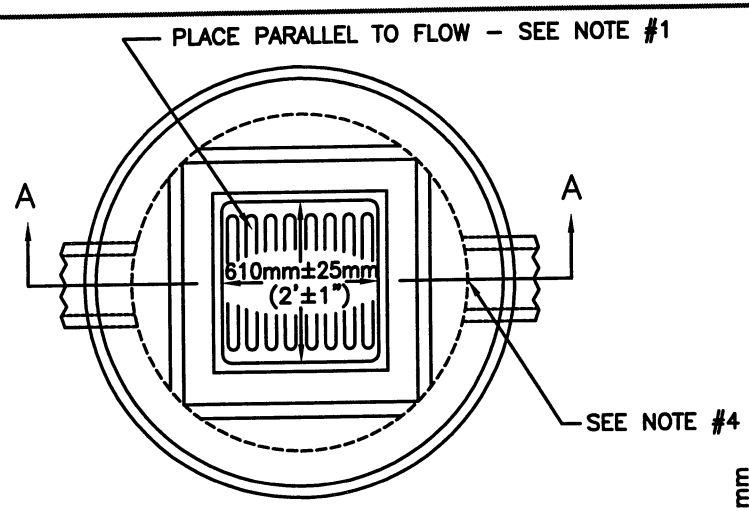
DRAWING NUMBER M/E 107.9.0

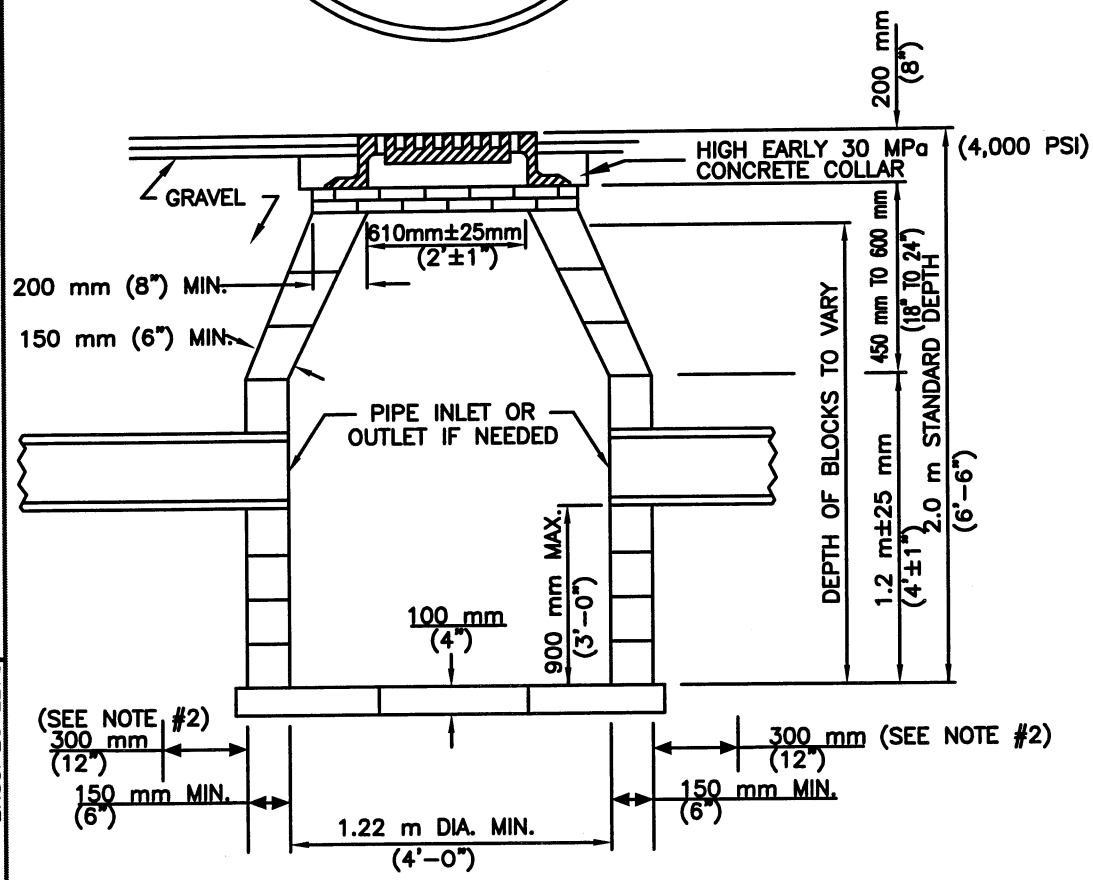
MASSHIGHWAY
CONSTRUCTION STANDARDS

CONCRETE BLOCK LEACHING BASIN

DRAWING NUMBER
M/E 205.2.0

DATE OF ISSUE
December 2001



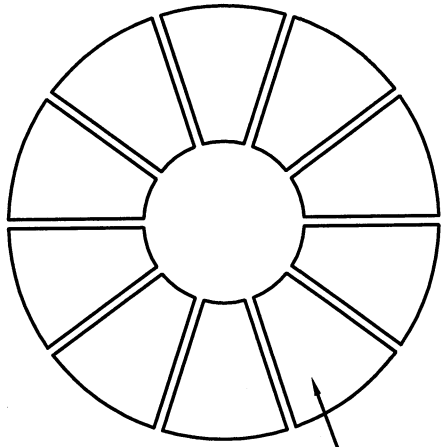


SECTION A–A

NOTES:

1. **USE CASCADE GRATE WHERE BICYCLE TRAVEL IS LEGALLY ALLOWED. SEE DRAWINGS 201.7.0 - 201.9.0.**
2. BACKFILL FOR FULL DEPTH OF BASIN EXCAVATION TO BE 13 mm (1/2") CRUSHED STONE.
3. FOR DESCRIPTION, MATERIALS, AND METHOD OF CONSTRUCTION SEE STANDARD SPECIFICATIONS.
4. FACE OF PIPE FLUSH OR NOT TO PROJECT MORE THAN 100 mm (4") FROM FACE OF WALL ALONG CENTERLINE OF PIPE.
5. THE LEACHING BASIN SHALL BE CONSTRUCTED OF CEMENT CONCRETE BLOCKS TO CONFORM TO THE REQUIREMENTS OF STANDARD SPECIFICATION SUBSECTION M4.05.1.

PLAN OF BASE



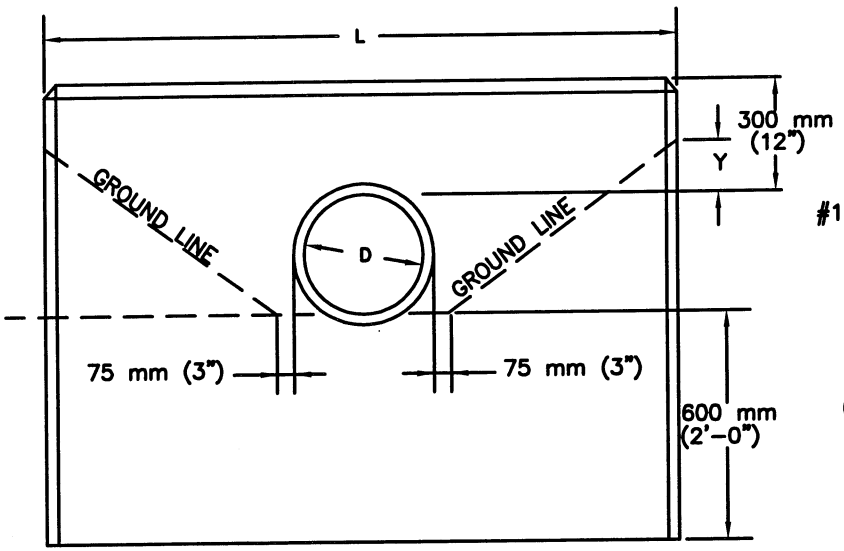
BOTTOM PLATES REQUIRE
10 PIECES PER CIRCLE WITH
13 mm (1/2") SPACING BETWEEN PLATES.
100mm (4") THICK

MASS HIGHWAY
CONSTRUCTION STANDARDS

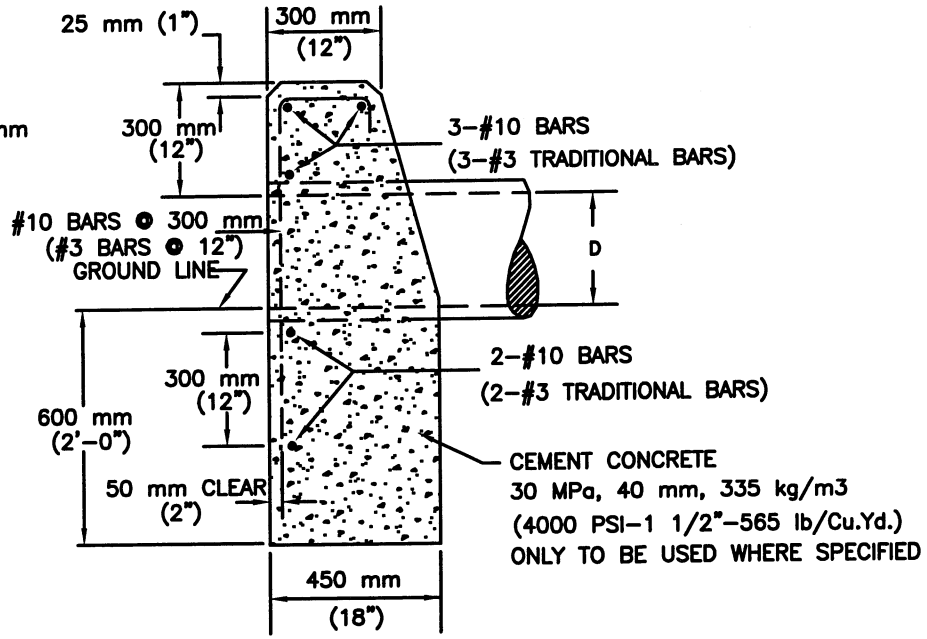
CONCRETE AND FIELD STONE MASONRY ENDS FOR CULVERTS 200 mm (8") to 750 mm (30") PIPE

DRAWING NUMBER M/E 206.4.0

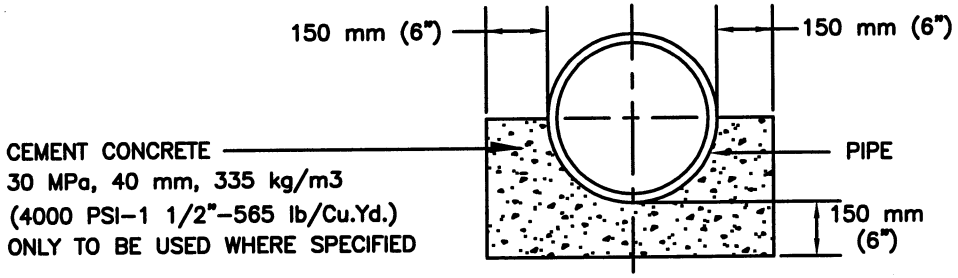
DATE OF ISSUE December 2001



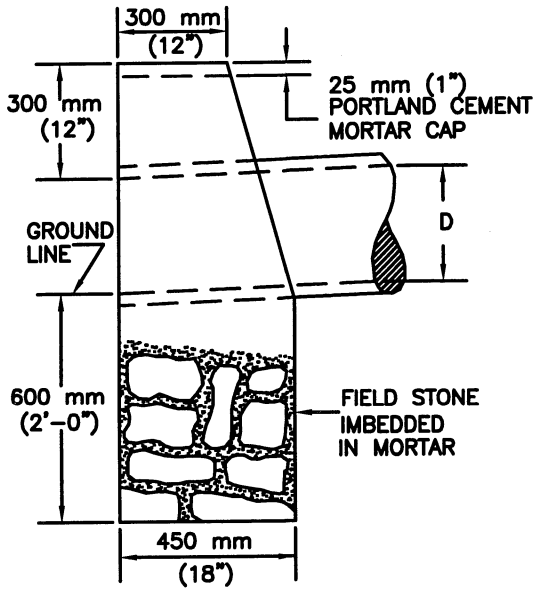
FRONT ELEVATION



END ELEVATION



CONCRETE CRADLE
FOR PIPE CULVERTS



END ELEVATION

NOTES:

1. FOR DESCRIPTIONS, MATERIALS AND CONSTRUCTION METHODS, SEE LATEST STANDARD SPECIFICATIONS.
2. ALL CONCRETE DIMENSIONS SHOWN ARE MINIMUM.
3. PAYMENTS WILL BE BASED ON THE ACCOMPANYING TABLE.
4. FOR QUANTITY TABLES SEE M/E 206.4.1

METRIC UNITS								
PIPE DIAM. D mm	1V : 1.5H SLOPE				1V : 2H SLOPE			
	L m	CONC. OR F.S.M. m^3	STEEL kg	TRENCH EXCAV. 300 mm DEPTH m^3	L m	CONC. OR F.S.M. m^3	STEEL kg	TRENCH EXCAV. 300 mm DEPTH m^3
200	1.25	0.56	6.00	0.58	1.75	0.79	9.00	0.74
250	1.45	0.67	8.00	0.65	2.00	0.93	10.00	0.82
300	1.65	0.79	8.00	0.71	2.25	1.08	12.00	0.90
375	1.95	0.97	10.00	0.80	2.63	1.33	14.00	1.02
450	2.25	1.18	12.00	0.90	3.00	1.59	17.00	1.13
525	2.55	1.39	14.00	0.99	3.38	1.87	20.00	1.25
600	2.85	1.62	17.00	1.09	3.75	2.17	22.00	1.37
750	3.45	2.11	21.00	1.28	4.50	2.81	29.00	1.61
		Y	100 mm FOR 1V : 1.5H SLOPE					
			150 mm FOR 1V : 2H SLOPE					

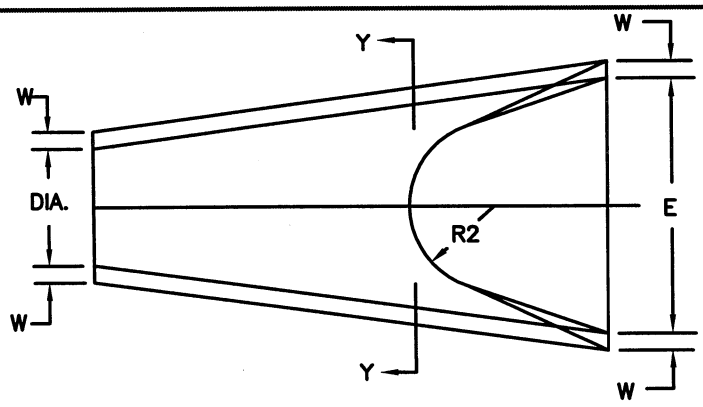
ENGLISH UNITS								
PIPE DIAM. D	1 1/2 : 1 SLOPE				2 : 1 SLOPE			
	L	CONG. OR F.S.M. CU. YDS.	STEEL LBS.	TRENCH EXCAV. 1'–0" DEPTH CU. FT.	L	CONC. OR F.S.M. CU. YDS.	STEEL LBS.	TRENCH EXCAV. 1'–0" DEPTH CU. FT.
8"	4'–2"	0.77	15	21.60	5'–10"	1.08	21	27.40
10"	4'–10"	0.92	20	23.91	6'–8"	1.28	23	30.35
12"	5'–6"	1.08	21	26.25	7'–6"	1.49	29	33.25
15"	6'–6"	1.34	24	29.75	8'–9"	1.82	32	37.63
18"	7'–6"	1.61	30	33.25	10'–0"	2.18	39	42.00
21"	8'–6"	1.95	34	37.35	11'–6"	2.62	43	47.25
24"	9'–3"	2.16	35	39.38	12'–6"	2.97	50	50.75
30"	10'–6"	2.63	44	43.75	15'–0"	3.86	62	59.50
		Y	4" FOR 1 1/2 : 1 SLOPE					
			6" FOR 2 : 1 SLOPE					

MASS HIGHWAY
CONSTRUCTION STANDARDS

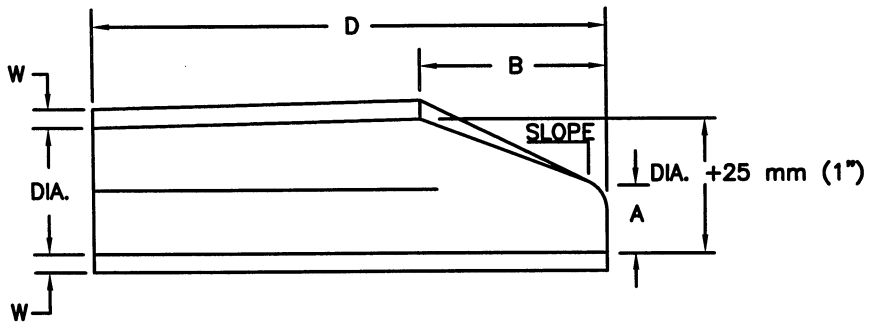
QUANTITY TABLES FOR CONCRETE AND FIELD STONE MASONRY ENDS

DATE OF ISSUE
December 2001

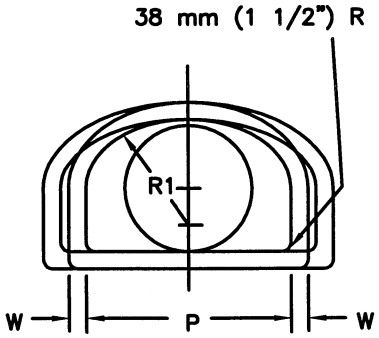
DRAWING NUMBER
M/E 206.4.1



PLAN



SECTION



SECTION Y–Y

TABLE
[ALL DIMENSIONS ARE mm (Inches) OR m (Feet)]

DIAMETER mm (Inch)	W	A	B	D	E	P	DIA. +25 mm(1")	R1	R2	SLOPE
300 mm (12)"	51 mm (2")	102 mm (4")	610 mm (2'–0")	1.829 m (6'–0")	610 mm (2'–0")	506 mm (19 15/16")	330 mm (13")	257 mm (10 1/8")	229 mm (9")	1V : 3H
375 mm (15")	57 mm (2 1/4")	152 mm (6")	686 mm (2'–3")	1.829 m (6'–0")	762 mm (2'–6")	618 mm (24 5/16")	406 mm (16")	318 mm (12 1/2")	279 mm (11")	1V : 3H
450 mm (18")	64 mm (2 1/2")	229 mm (9")	686 mm (2'–3")	1.829 m (6'–0")	914 mm (3'–0")	737 mm (29")	482 mm 19"	394 mm (15 1/2")	305 mm (12")	1V : 3H
525 mm (21")	70 mm (2 3/4")	229 mm (9")	838 mm (2'–11")	1.829 m (6'–0")	1.07 m (3'–6")	803 mm (31 5/8")	558 mm (22")	410 mm (16 1/8")	330 mm (13")	1V : 3H
600 mm (24")	76 mm (3")	241 mm (9 1/2")	1105 mm (3'–7 1/2")	1.829 m (6'–0")	1.22 m (4'–0")	843 mm (33 3/16")	635 mm (25")	427 mm (16 13/16")	356 mm (14")	1V : 3H
685 mm (27")	83 mm (3 1/4")	267 mm 10 1/2"	1219 mm (4'–0")	1.829 m (6'–0")	1.37 m (4'–6")	914 mm (36")	711 mm (28")	471 mm (18 9/16")	368 mm (14 1/2")	1V : 3H
760 mm (30")	89 mm (3 1/2")	305 mm (12")	1372 mm (4'–6")	1.829 m (6'–0")	1.52 m (5'–0")	940 mm (37")	787 mm (31")	470 mm (18 1/2")	381 mm (15")	1V : 3H
915 mm (36")	102 mm (4")	381 mm (15")	1600 mm (5'–3")	2.439 m (8'–0")	1.83 m (6'–0")	1214 mm (47 13/16")	939 mm (37")	618 mm (24 5/16")	508 mm (20")	1V : 3H
1.07 m (42")	114 mm (4 1/2")	533 mm (21")	1600 mm (5'–3")	2.439 m (8'–0")	1.98 m (6'–6")	1368 mm (53 7/8")	1092 mm (43")	699 mm (27 1/2")	559 mm (22")	1V : 3H
1.22 m (48")	127 mm (5")	610 mm (24")	1829 mm (6'–0")	2.439 m (8'–0")	2.13 m (7'–0")	1435 mm (56 1/2")	1244 mm (49")	724 mm (28 1/2")	559 mm (22")	1V : 3H

NOTES:
1. SEE STANDARD SPECIFICATIONS FOR THE TYPE OF PIPE TO BE USED (BELL & SPIGOT OR TONGUE & GROOVE)
2. SEE STANDARD SPECIFICATIONS FOR THE TYPE OF PIPE AND PLACING OF STEEL REINFORCEMENT.
3. THE JOINTS ARE TO BE COMPATIBLE WITH THE MAIN RUN OF PIPE.

MASS HIGHWAY CONSTRUCTION STANDARDS

REINFORCED CONCRETE PIPE FLARED ENDS

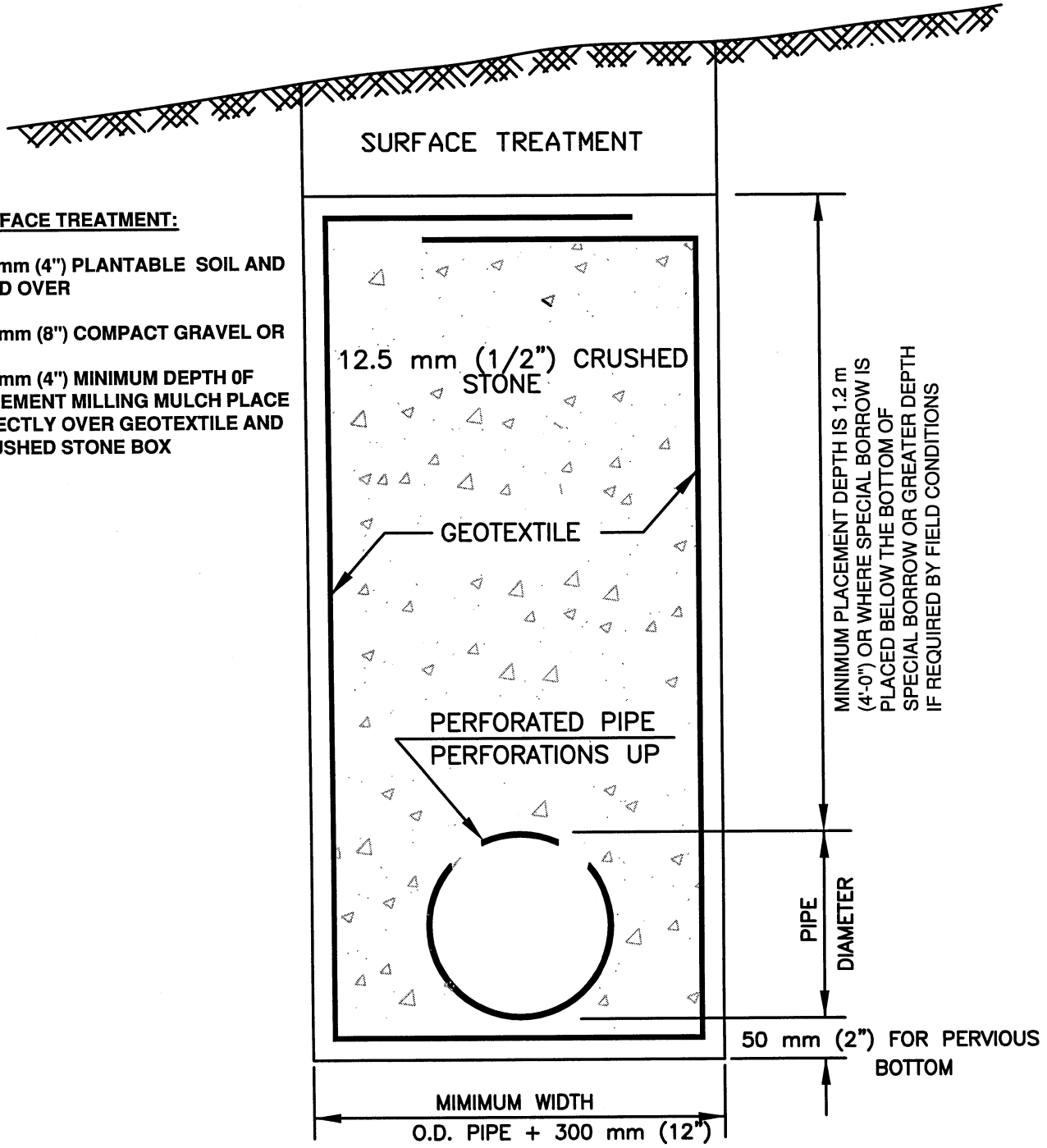
DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 206.8.0

NOTES:

ANY JOINT SYSTEM APPROVED AND ACCEPTED BY AASHTO AND MHD STANDARD SPECIFICATIONS FOR REINFORCED CEMENT CONCRETE PIPE WILL BE ACCEPTABLE.

MASS HIGHWAY CONSTRUCTION STANDARDS	STANDARD JOINTS FOR REINFORCED CONCRETE PIPE	DATE OF ISSUE December 2001
		DRAWING NUMBER M/E 206.11.0



SURFACE TREATMENT:

100 mm (4") PLANTABLE SOIL AND SEED OVER

200 mm (8") COMPACT GRAVEL OR

100 mm (4") MINIMUM DEPTH 0F PAVEMENT MILLING MULCH PLACE DIRECTLY OVER GEOTEXTILE AND CRUSHED STONE BOX

NOTES:

1. GEOTEXTILE FABRIC AS DESCRIBED IN SECTION M9.50

2. PIPE SHALL BE SET AT BOTTOM OF TRENCH FOR IMPERVIOUS BOTTOM.

3. SUBDRAIN LOCATED APPROXIMATELY AT INTERSECTION OF TANGENTS (SEE DWG.102.1.0)

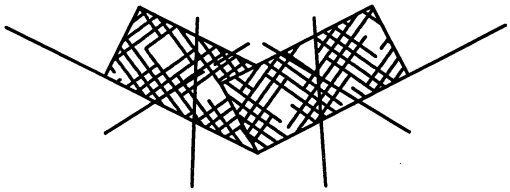
4. GRAVEL (AND SPECIAL BORROW WHERE REQUIRED) SHALL INTERSECT CRUSHED STONE FOR SUBDRAIN

MASS HIGHWAY CONSTRUCTION STANDARDS

SUBDRAIN

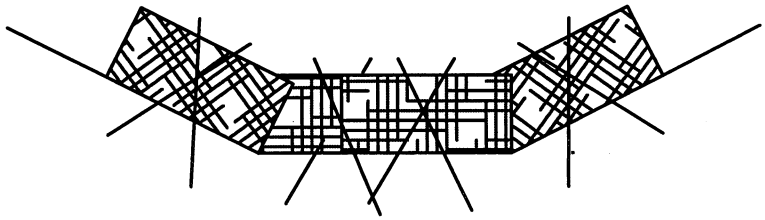
DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 209.1.0



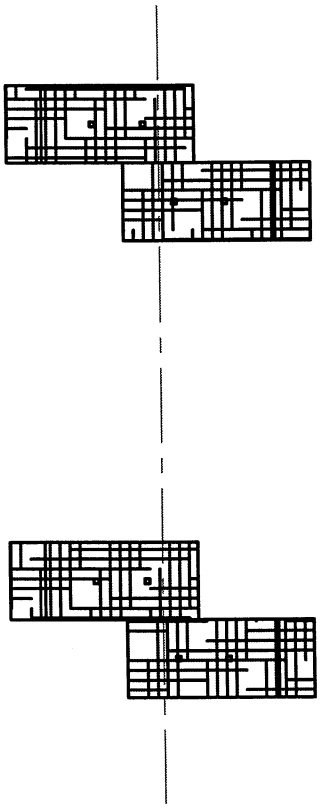
V DITCH

CROSS SECTION



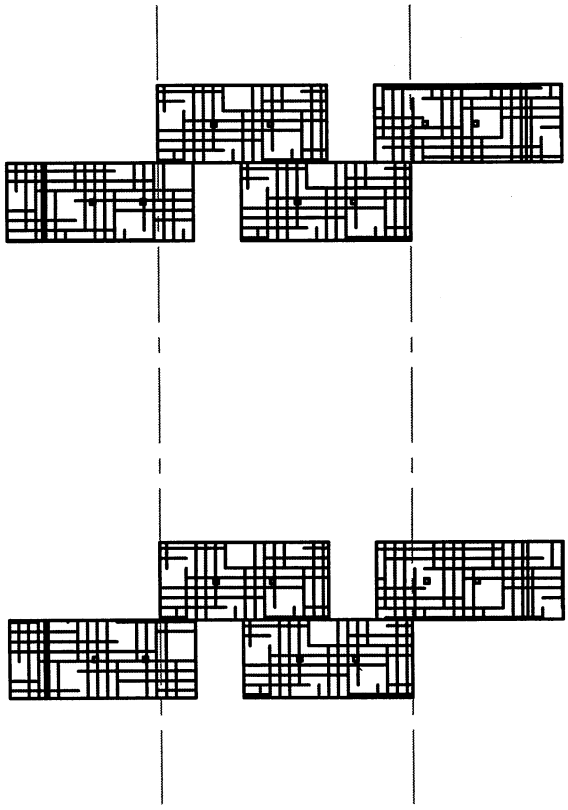
FLAT DITCH

CROSS SECTION



V DITCH

PLAN



FLAT DITCH

PLAN

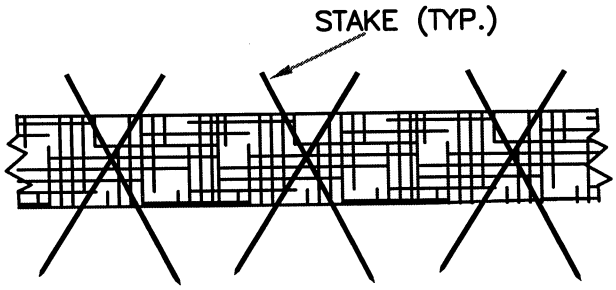
MASS HIGHWAY
CONSTRUCTION STANDARDS

DITCH CHECK DAMS

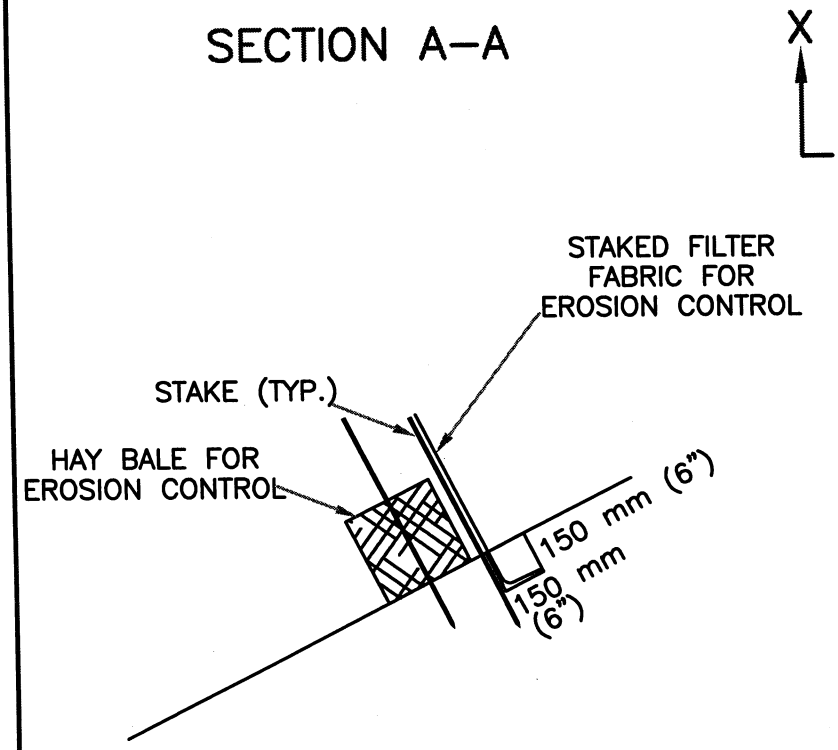
FOR EROSION CONTROL

DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 210.2.0

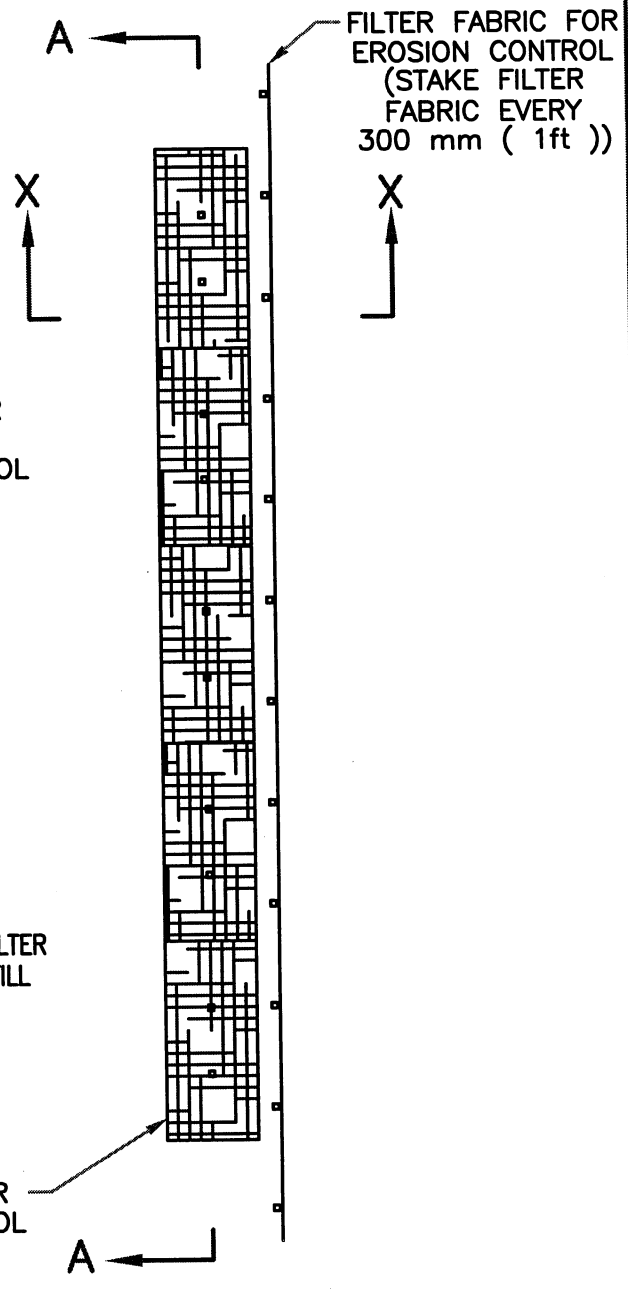


SECTION A–A



150 mm X 150 mm (6" X 6") TRENCH LAY FILTER FABRIC IN TRENCH END UP SLOPE AND BACK FILL

SECTION X–X



MASS HIGHWAY CONSTRUCTION STANDARDS

HAY BALES AND SILT FENCES FOR EROSION CONTROL

DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 210.3.0

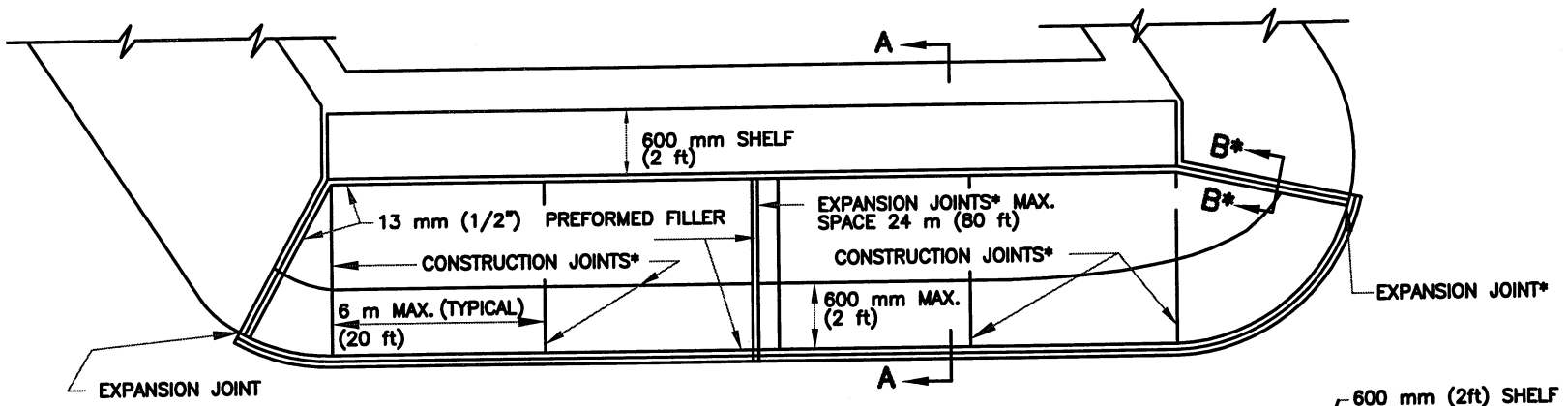
MASS HIGHWAY
CONSTRUCTION STANDARDS

SPECIAL SLOPE PAVING UNDER BRIDGES

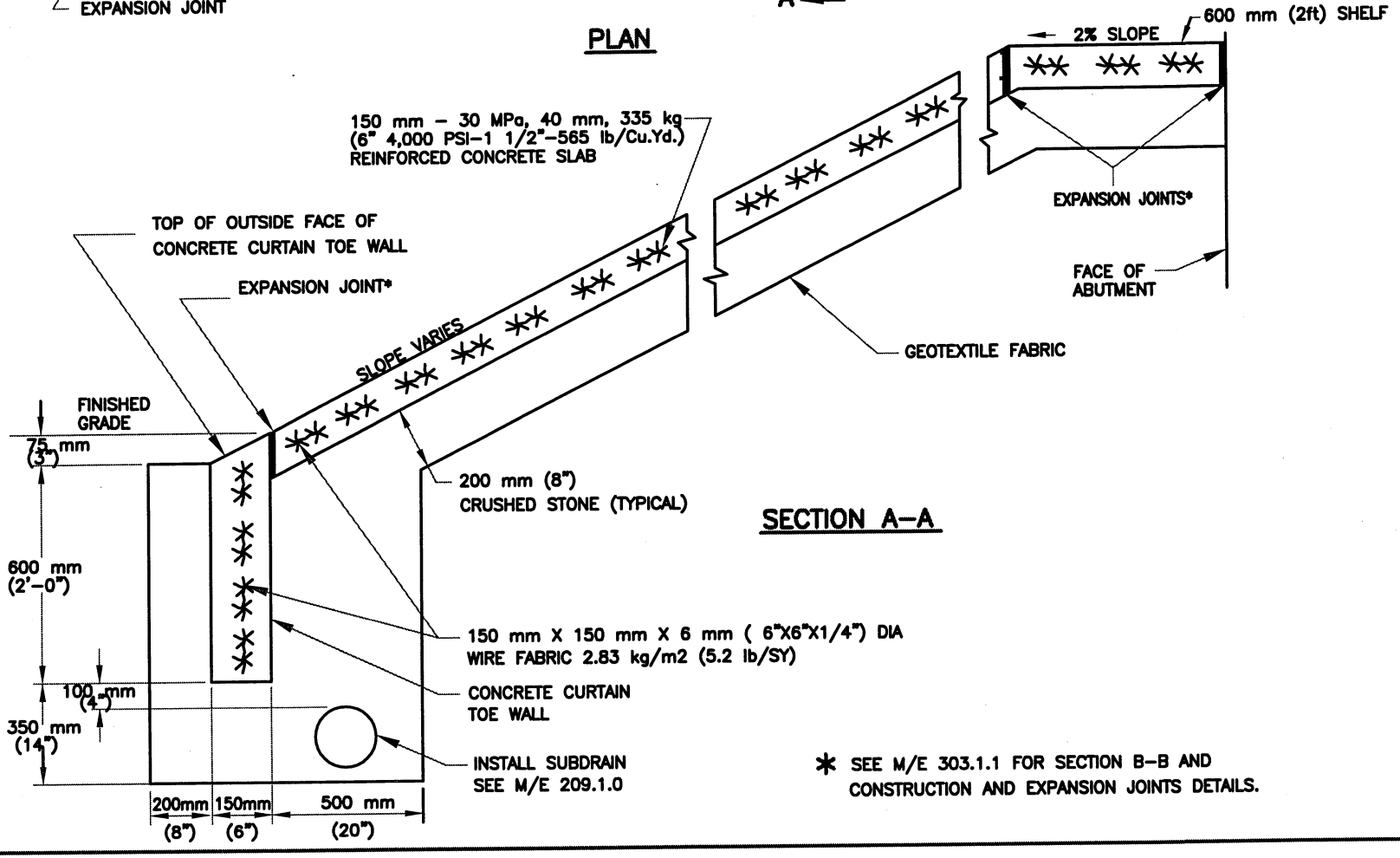
REINFORCED CONCRETE SLAB

DRAWING NUMBER
M/E 303.1.0

DATE OF ISSUE
December 2001



PLAN



SECTION A–A

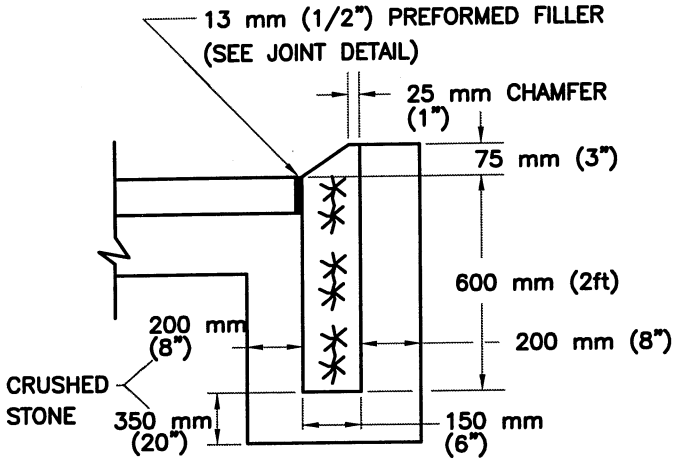
* SEE M/E 303.1.1 FOR SECTION B–B AND CONSTRUCTION AND EXPANSION JOINTS DETAILS.

MASS HIGHWAY
CONSTRUCTION STANDARDS

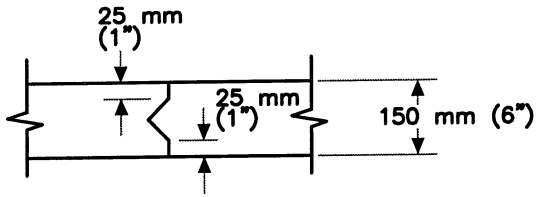
SPECIAL SLOPE PAVING UNDER BRIDGES
REINFORCED CONCRETE SLAB DETAILS

DRAWING NUMBER
M/E 303.1.1

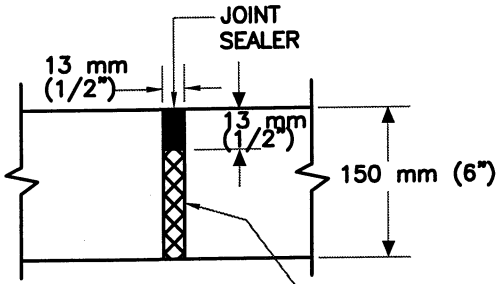
DATE OF ISSUE
December 2001



CURTAIN WALL ON SIDES OF SLABS SECTION B–B



CONSTRUCTION JOINT DETAIL



EXPANSION JOINT DETAIL

NOTES:

1. WIRE FABRIC TO HAVE 300 mm (12") MINIMUM LAP AT SPLICE AND SHOULD EXTEND WITHIN 75 mm (3") OF ALL EDGES
2. SLAB SHALL BE GROOVED PARALLEL TO AND NORMAL TO THE CURTAIN TOE WALL AT APPROXIMATELY 1.83 m (6') GRIDS. THE GROOVE DEPTH SHALL BE 25 mm (1")
3. FOR LIMITS OF SLOPE PAVING SEE BRIDGE MANUAL.
4. CONCRETE SHALL BE 30 MPa, 40 mm, 335 kg/m3 (4000 psi–1 1/2"–565 lb/Cu.Yd.)
5. EXTEND GEOTEXTILE FABRIC BENEATH CRUSHED STONE FROM TOP OF CONCRETE CURTAIN TOE WALL TO FACE OF ABUTMENT.
6. SEE M/E 303.1.0 FOR SLAB PLAN AND SECTION.

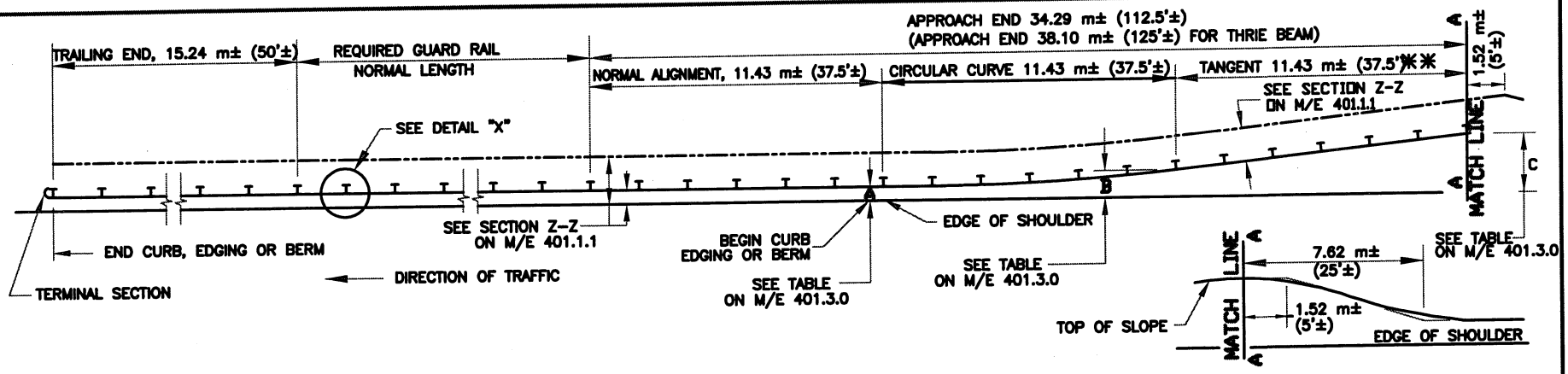
MASSHIGHWAY
CONSTRUCTION STANDARDS

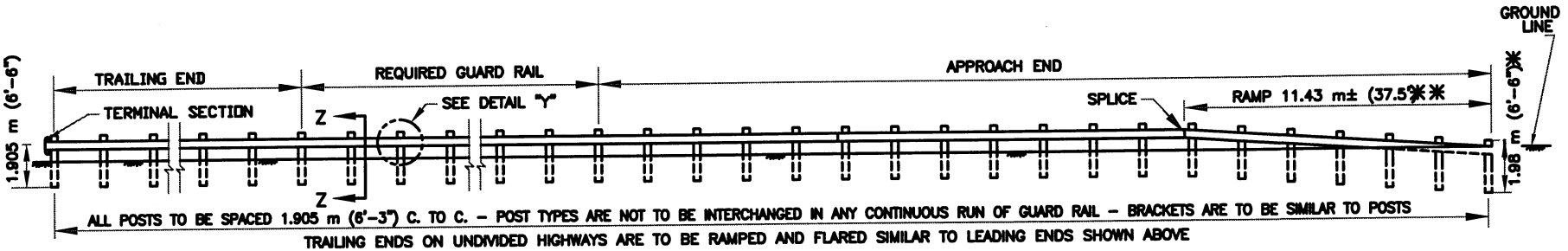
STEEL BEAM HWY GUARD–TYPE SS

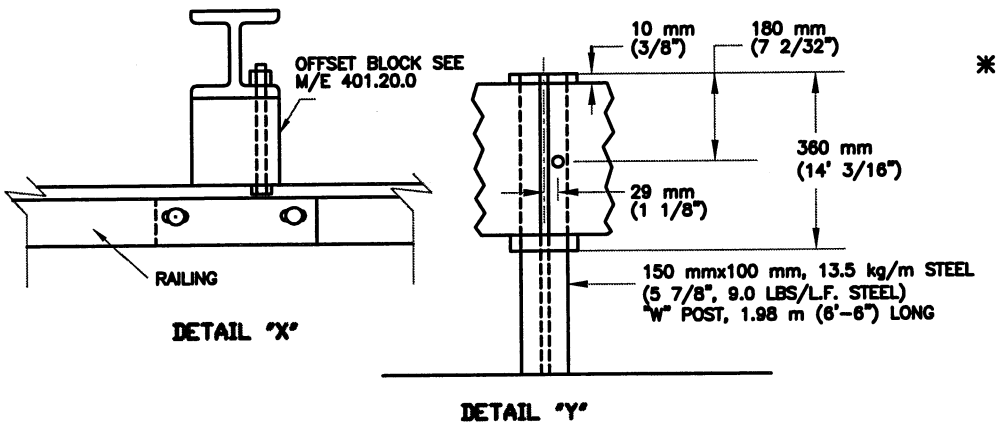
TYPICAL INSTALLATION

DRAWING NUMBER
M/E 401.1.0R

DATE OF ISSUE
April 2002





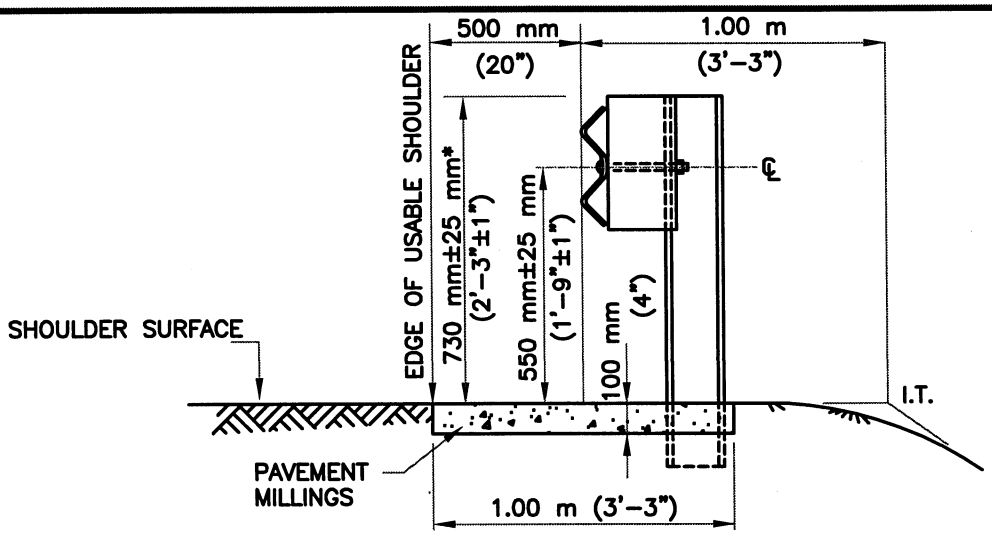


NCHRP 350 TEST LEVEL 3 GUARDRAIL TERMINAL SECTIONS ON ALL ROADWAYS WITH DESIGN SPEED OF 80 Km/Hr (50 MPH) OR GREATER.

BURIED ENDS ONLY FOR ROADWAYS WITH SPEEDS LESS THAN 80 Km/Hr (50 MPH).

* STANDARD LENGTH POST TO BE USED IN RAMPED SECTIONS.
** 15.24 m (50') FOR THRIE BEAM.
*** WHEN PLACED IN MEDIAN, CHANGE TO THRIE BEAM AND HEIGHT 827 mm±25 mm (2'–8 1/2"±1"). FOR SECTION Z–Z, (NOTE ℄ HEIGHT IS ALWAYS 550 mm)

NOTES:
1. THIS METHOD OF INSTALLATION IS APPLICABLE WHEN THE EMBANKMENT SLOPE ADJACENT TO THE ROADWAY IS 1V:2H OR STEEPER.
2. LENGTHS OF HIGHWAY GUARD SHOWN ARE MEASUREMENTS ALONG ALONG FACE OF THE RAILING.
3. OTHER DETAILS ARE SHOWN ON M/E 401.5.0 – M/E 401.10.0
4. FOR DESCRIPTION, MATERIALS AND CONSTRUCTION METHODS SEE STANDARD SPECIFICATIONS.
5. DETAILS SHOWN HERE ALSO APPLY TO THRIE BEAM GUARD RAIL EXCEPT AS OTHERWISE NOTED.

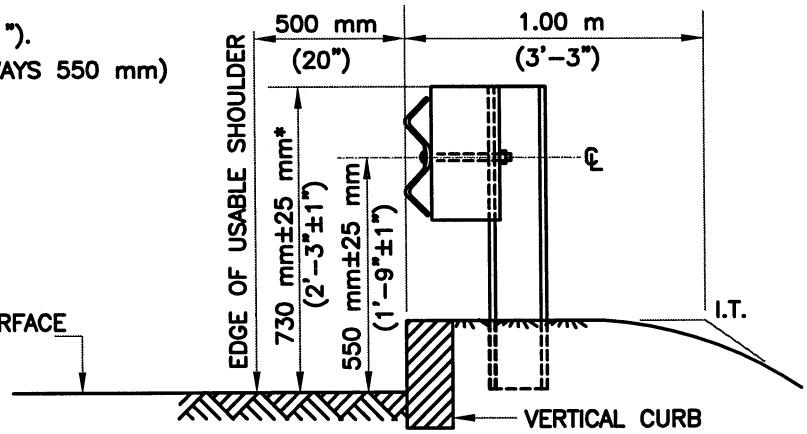


SECTION Z-Z**

PAVEMENT MILLING MULCH

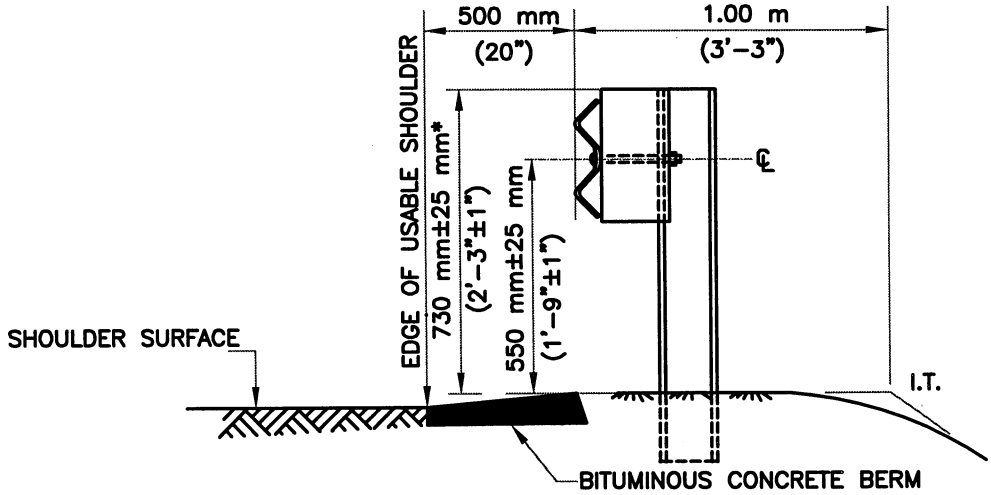
** WHEN PLACED IN MEDIAN, CHANGE TO THRIE BEAM AND HEIGHT TO 827 mm±25 mm (2'-8 1/2"±1"). (NOTE ℄ HEIGHT OF RAIL IS ALWAYS 550 mm)

* SEE M/E 401.01.0



SECTION Z-Z**

VERTICAL GRANITE CURB OR BITUMINOUS CONCRETE CURB ALONG EDGE OF SHOULDER



SECTION Z-Z**

TYPE "A" BERM ALONG EDGE OF SHOULDER

MASS HIGHWAY
CONSTRUCTION STANDARDS

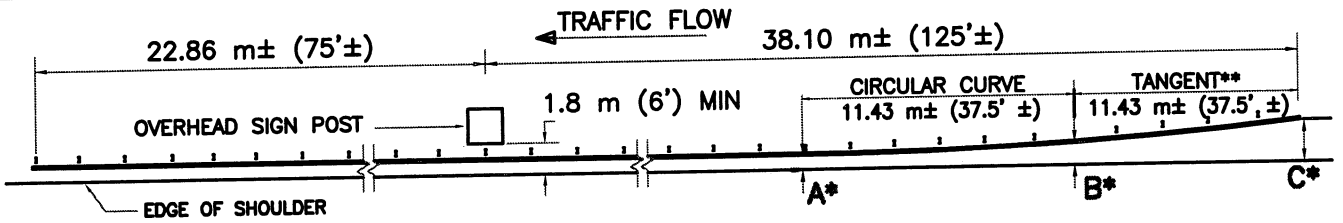
STEEL BEAM HWY GUARD–TYPE SS
TYPICAL INSTALLATION

DATE OF ISSUE
December 2001

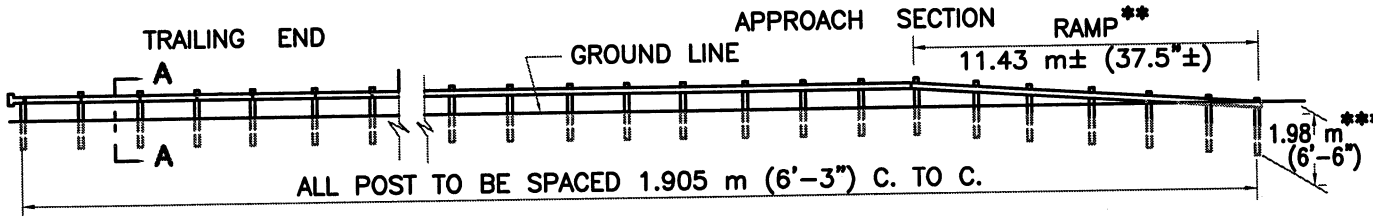
DRAWING NUMBER
M/E 401.1.1

MASSHIGHWAY
CONSTRUCTION STANDARDS

INSTALLATION FOR TYPE SS HIGHWAY GUARD FOR SIGN PROTECTION



PLAN VIEW

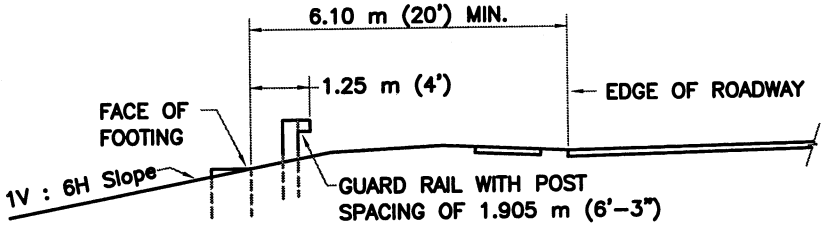


ELEVATION VIEW

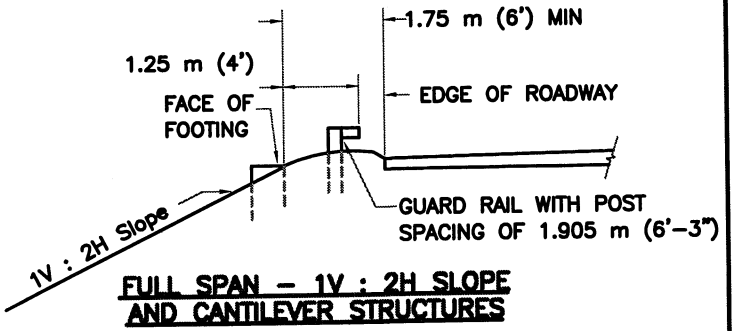
* SEE TABLE ON M/E 401.3.0 FOR DIMENSIONS
** 15.24 m (50') FOR THRIE BEAM
*** STANDARD LENGTH POSTS SHALL BE USED IN RAMPED SECTIONS

NOTES:

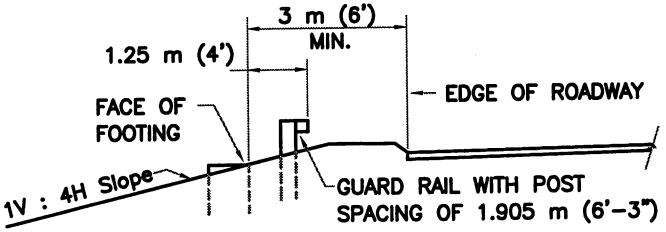
1. LENGTHS OF HIGHWAY GUARD SHOWN ARE MEASUREMENTS ALONG FACE OF RAILING.
2. FOR DESCRIPTIONS, MATERIAL AND AND CONSTRUCTION METHODS, SEE THE STANDARD SPECIFICATIONS AND CONSTRUCTION M/E 401.1.0 AND M/E 401.5.0 – M/E 401.10.0.
3. DETAILS SHOWN HEREIN ALSO APPLY TO THRIE BEAM GUARD RAIL, EXCEPT AS OTHERWISE NOTED.
4. WHEN PLACED IN MEDIAN, CHANGE TO THRIE BEAM & HEIGHT OF 827 mm ± 25 mm (2'-6 1/2"±1")
5. POST TYPES SHALL NOT BE INTERCHANGED IN ANY CONTINUOUS RUN OF GUARD RAIL. BRACKETS SHALL SIMILAR TO POST.



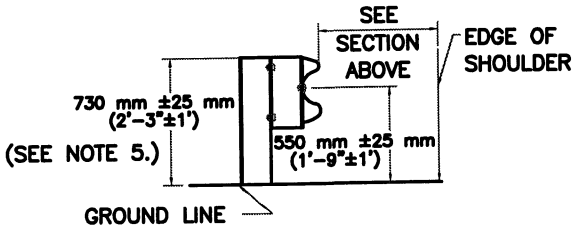
FULL SPAN – 1V : 6H SLOPE



FULL SPAN – 1V : 2H SLOPE AND CANTILEVER STRUCTURES



FULL SPAN – 1V : 4H SLOPE



SECTION A–A

DRAWING NUMBER M/E401.2.0R

DATE OF ISSUE April 2002

TYPICAL INSTALLATION *

	A	B	C	
			W SECTION	THRIE BEAM
ALL GUARDRAIL CONFIGURATION SHOWN ON M/E 401.1.1 SECTION Z–Z	0.5 m± (20")	1.0 m± (3'–3")	2.0 m± (6'–6")	2.3 m± (7'–7")

NOTE: ALL MEASUREMENTS ARE FROM EDGE OF USABLE SHOULDER

FOR OVERHEAD SIGN PROTECTION **

	A	B	C	
			W SECTION	THRIE BEAM
1V : 2H SLOPE 2:1 SLOPE	0.5 m± (20")	1.0 m± (3'–3")	2.0 m± (6'–6")	2.3 m± (7'–7")
1V : 4H SLOPE 4:1 SLOPE	1.83 m± (6'–0")	2.36 m± (7'–9")	3.35 m± (11'–0")	3.68 m± (12'–1")
1V : 6H SLOPE 6:1 SLOPE	4.88 m± (16'–0")	5.41 m± (17'–9")	6.40 m± (21'–0")	6.73 m± (22'–1")

* SEE M/E 401.1.0

** SEE M/E 401.2.0

MASS HIGHWAY CONSTRUCTION STANDARDS

TABLE OF OFFSETS FOR GUARDRAIL FLARED ENDS REINFORCED CONCRETE SLAB

DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 401.3.0

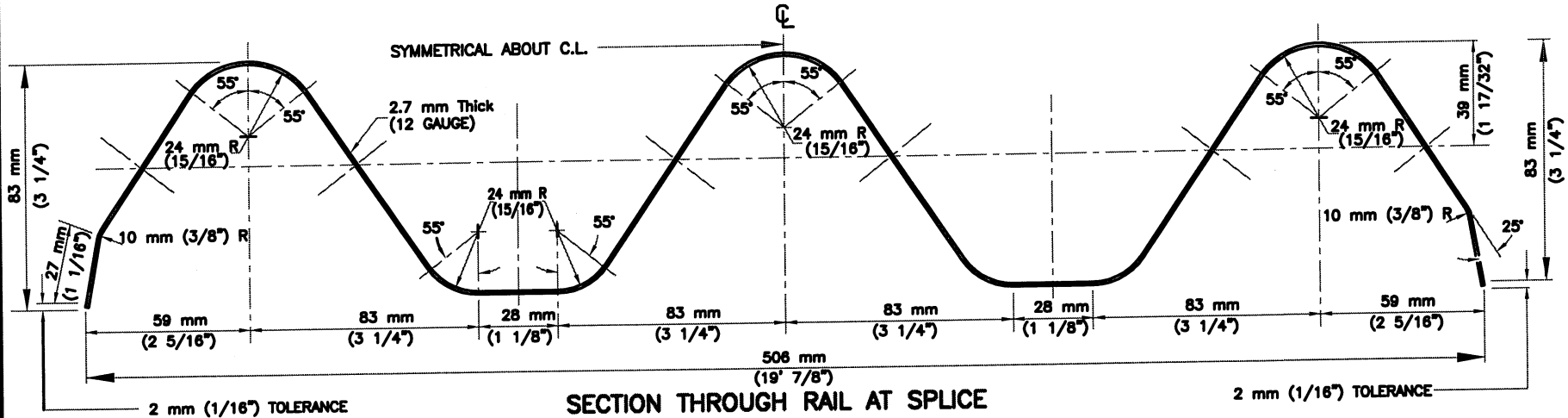
MASS HIGHWAY
CONSTRUCTION STANDARDS

STEEL THRIE BEAM HIGHWAY GUARD ON STEEL POSTS

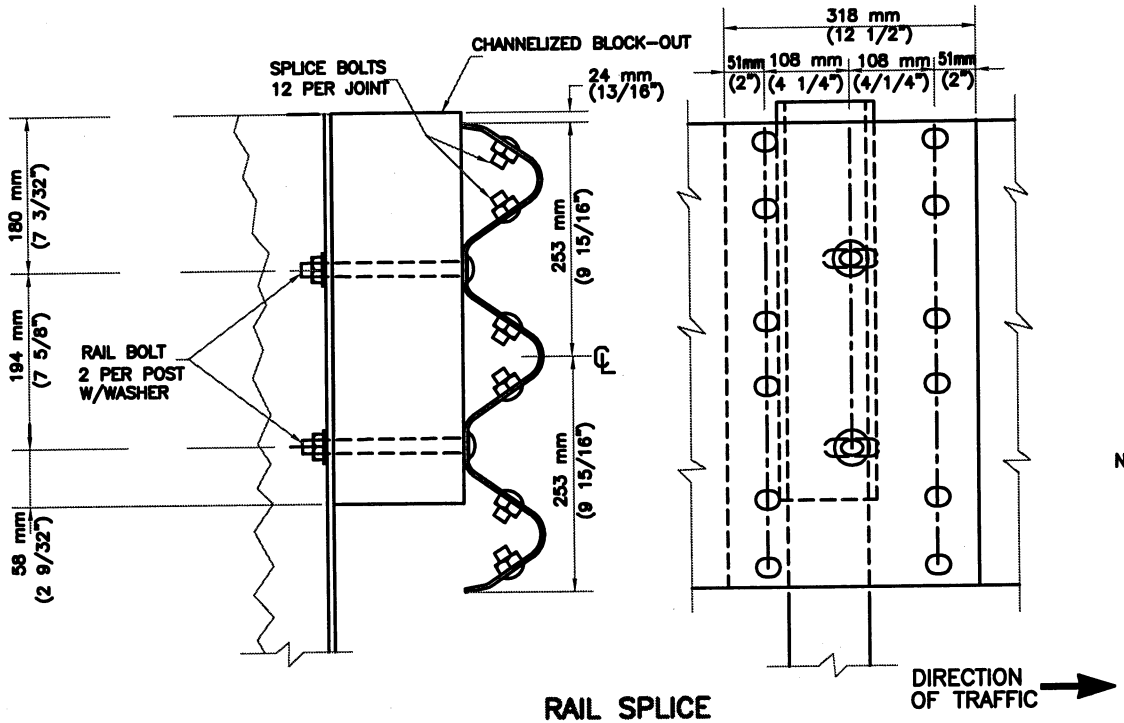
RAIL DETAILS

DRAWING NUMBER **M/E 401.5.0**

DATE OF ISSUE December 2001



SECTION THROUGH RAIL AT SPLICE



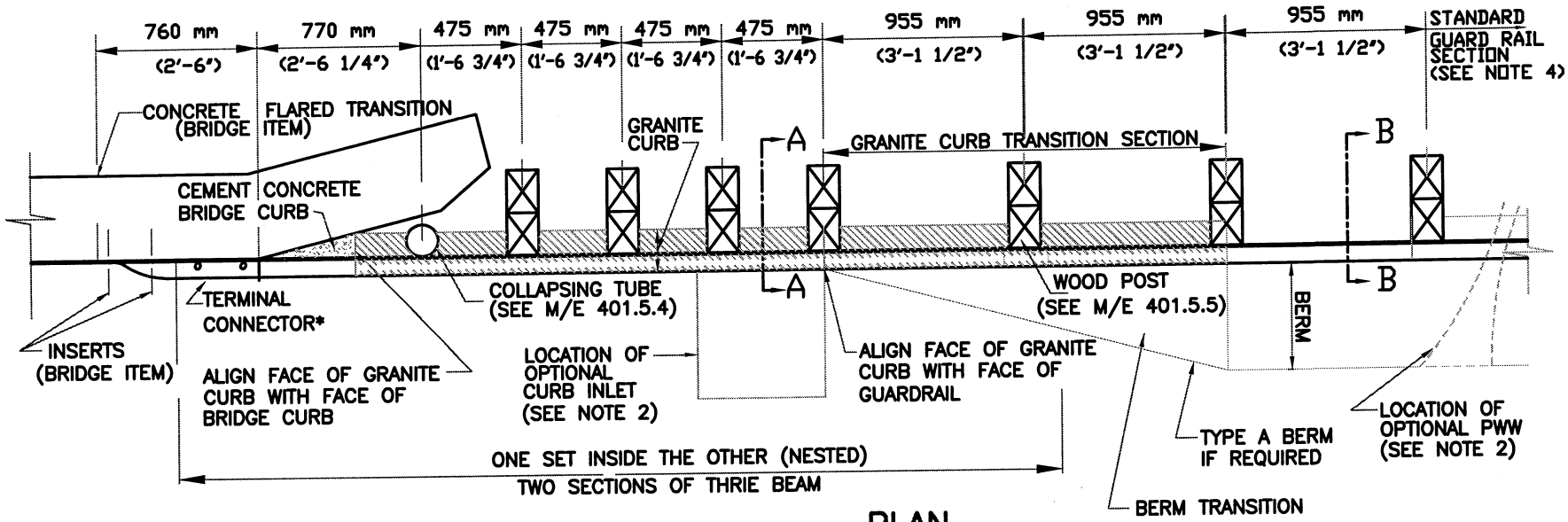
RAIL SPLICE

NOTES:

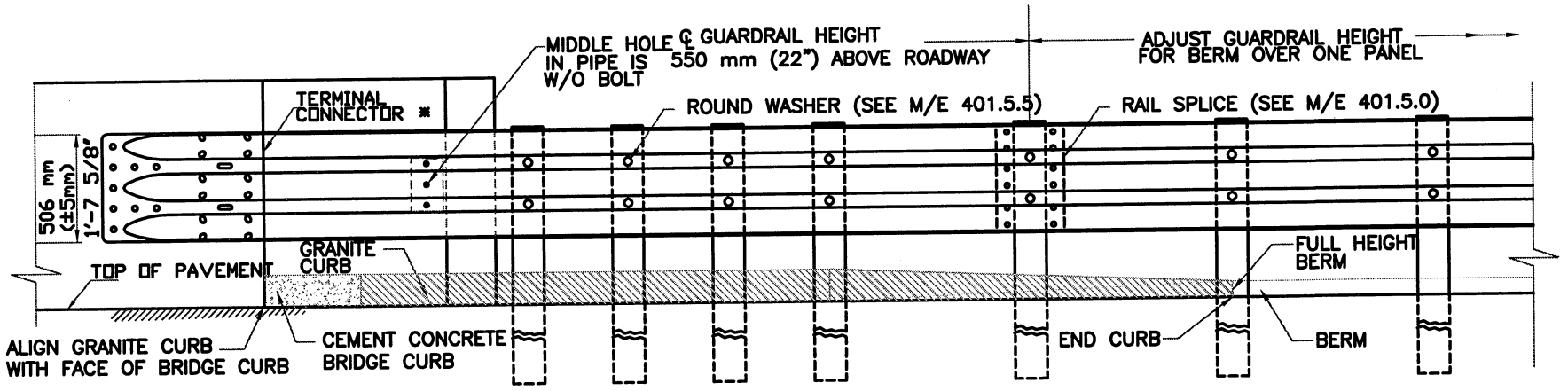
1. FOR POST & BLOCK-OUT DETAILS SEE M/E 401.6.0R AND M/E 401.21.0
2. FOR HARDWARE DETAILS SEE M/E 401.7.0R
3. LAP DOWN STREAM IN DIRECTION OF TRAFFIC

MASS HIGHWAY
CONSTRUCTION STANDARDS

BRIDGE END POST TO GUARDRAIL ATTACHMENT TRANSITION



PLAN



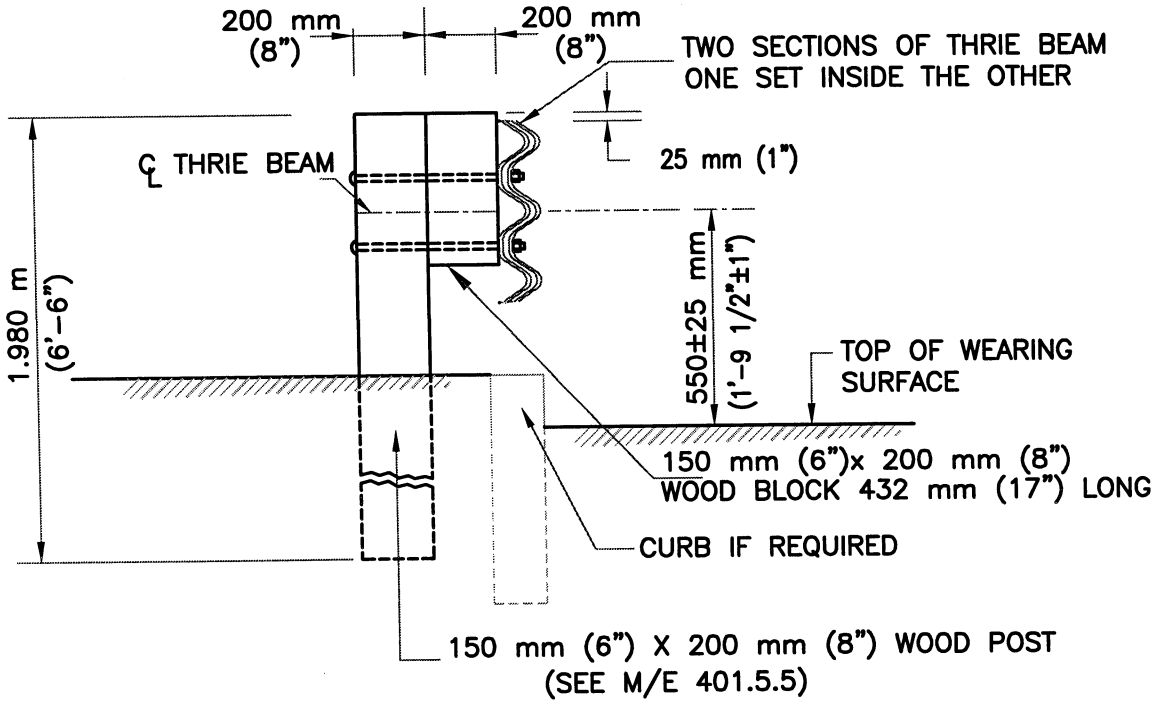
ELEVATION

NOTES:
1. CURB AND BERM OPTIONAL SEE GENERAL HIGHWAY PLANS AND/OR BRIDGE PLANS
2. CURB INLET OR PWW OPTIONAL BASED ON GENERAL PLAN REQUIREMENTS
3. FOR SECTIONS A–A AND B–B, SEE M/E 401.5.2
4. ONE PANEL THRIE BEAM BEFORE TRANSITION TO W BEAM
5. FOR POST SEE M/E 401.5.5

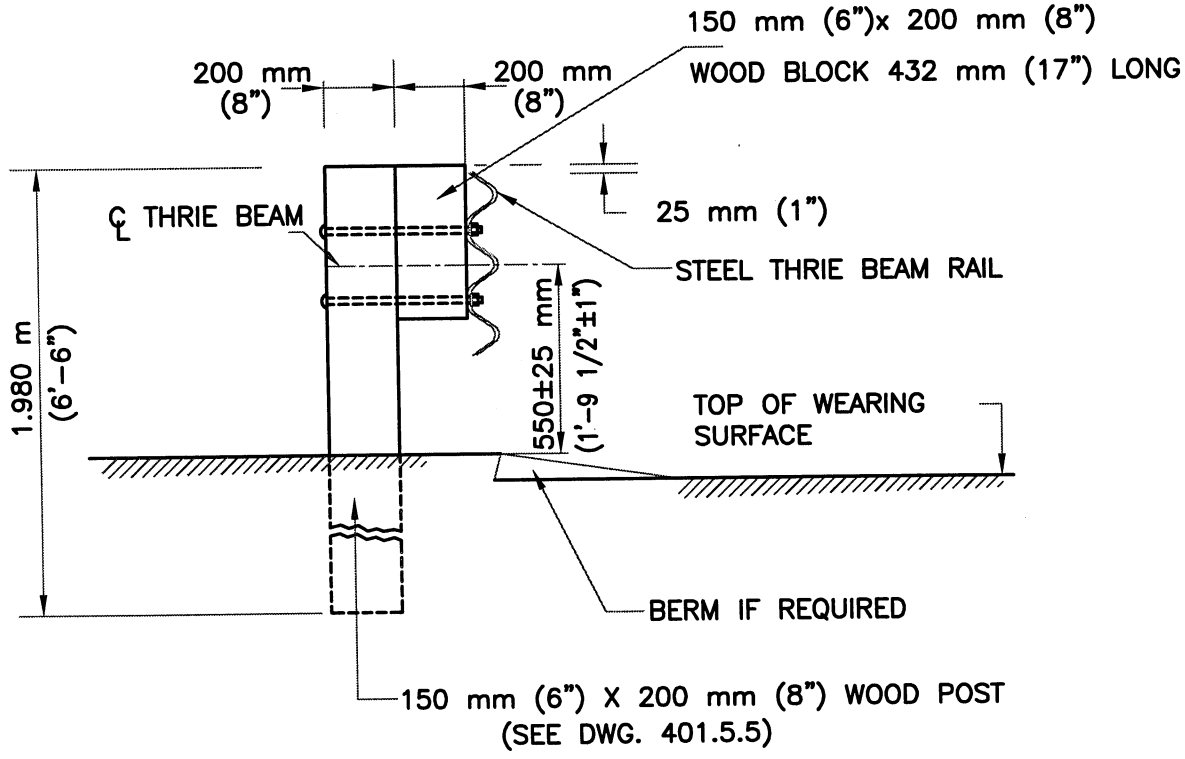
* SEE M/E 401.5.3 FOR TERMINAL CONNECTOR DIMENSIONS AND DETAILS

DATE OF ISSUE December 2001

DRAWING NUMBER **M/E 401.5.1**



SECTION A–A
(SEE M/E 401.5.1)



SECTION B–B
(SEE M/E 401.5.1)

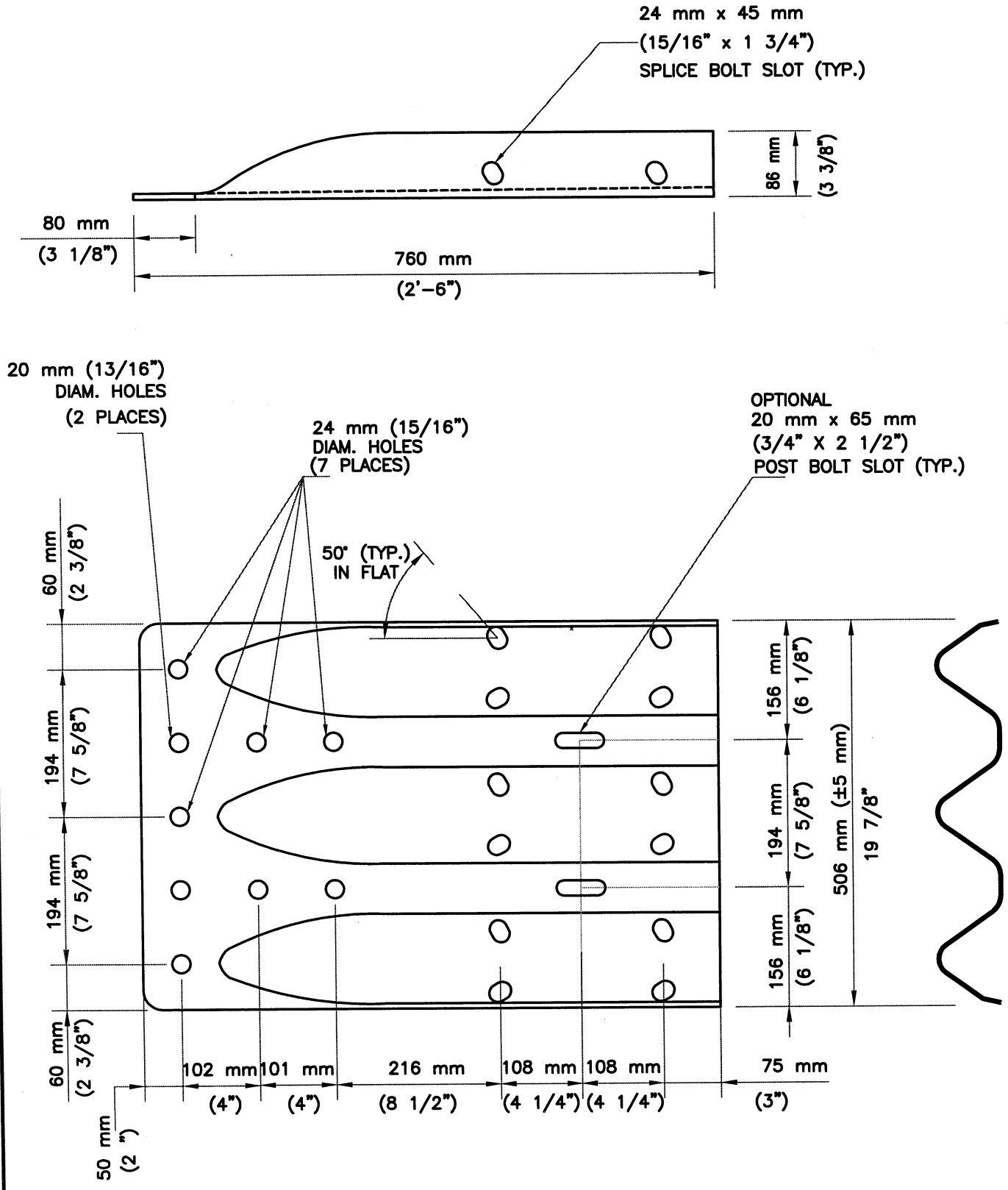
–FOR BLOCK DIMENSIONS SEE DRAWING M/E 401.5.0

MASS HIGHWAY CONSTRUCTION STANDARDS

BRIDGE END POST TO GUARDRAIL ATTACHMENT TRANSITION SECTIONS

DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 401.5.2



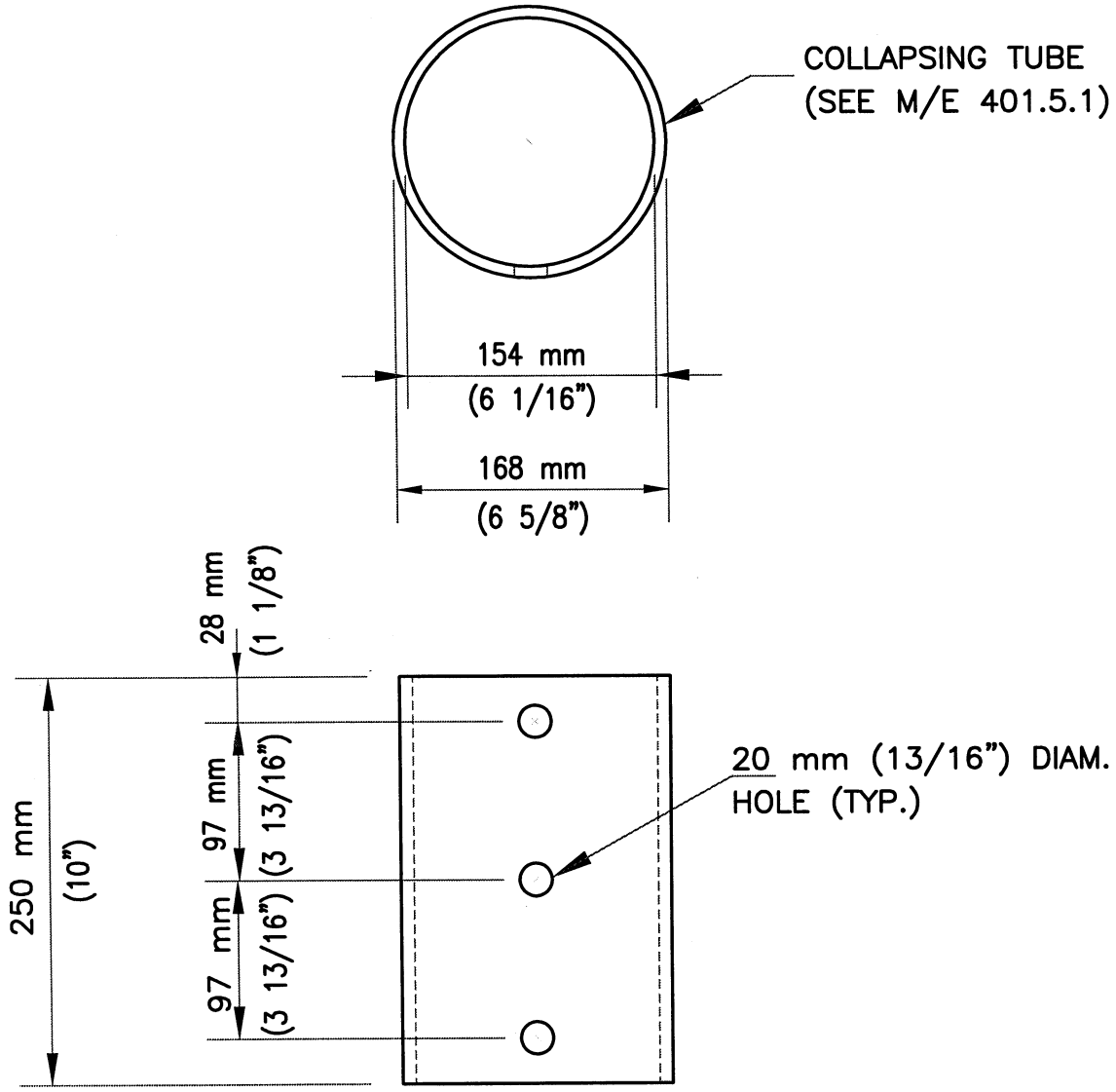
NOTES: 1. BASE METAL THICKNESS = 3.43 mm (1/8") (10 GAGE)
2. SEE M/E 401.4.1

MASS HIGHWAY
CONSTRUCTION STANDARDS

STEEL THRIE BEAM HIGHWAY GUARDRAIL TERMINAL CONNECTOR ATTACHMENT END

DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 401.5.3



NOTES: 1. BASE METAL THICKNESS = 7 mm (1/4") (SCHEDULE 40 STEEL PIPE)
2. SEE M/E 401.5.1

MASS HIGHWAY
CONSTRUCTION STANDARDS

COLLAPSING TUBE

DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 401.5.4

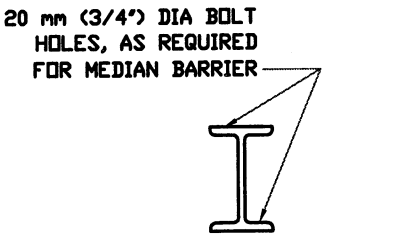
MASS HIGHWAY
CONSTRUCTION STANDARDS

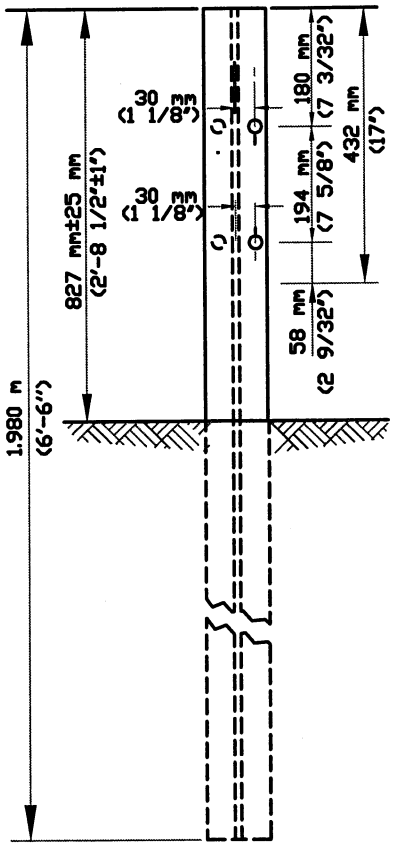
STEEL THRIE BEAM HIGHWAY GUARD ON STEEL POSTS

POST AND TERMINAL SECTION DETAILS

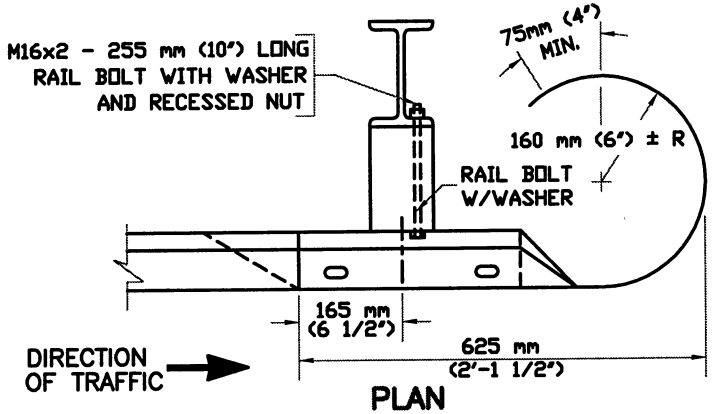
DRAWING NUMBER
M/E 401.6.0R

DATE OF ISSUE
April 2002



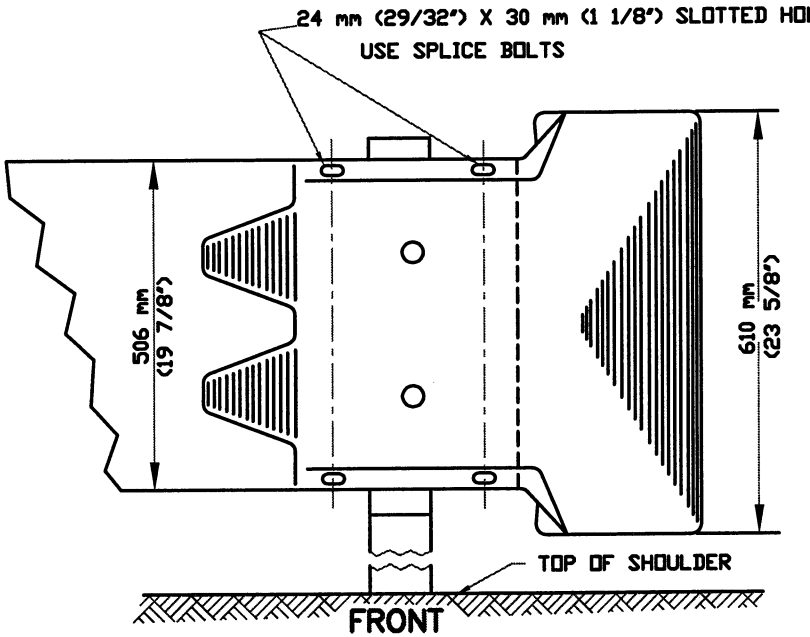


POST



PLAN

TERMINAL SECTION



FRONT

TERMINAL SECTION
DOWN STREAM OF TRAFFIC

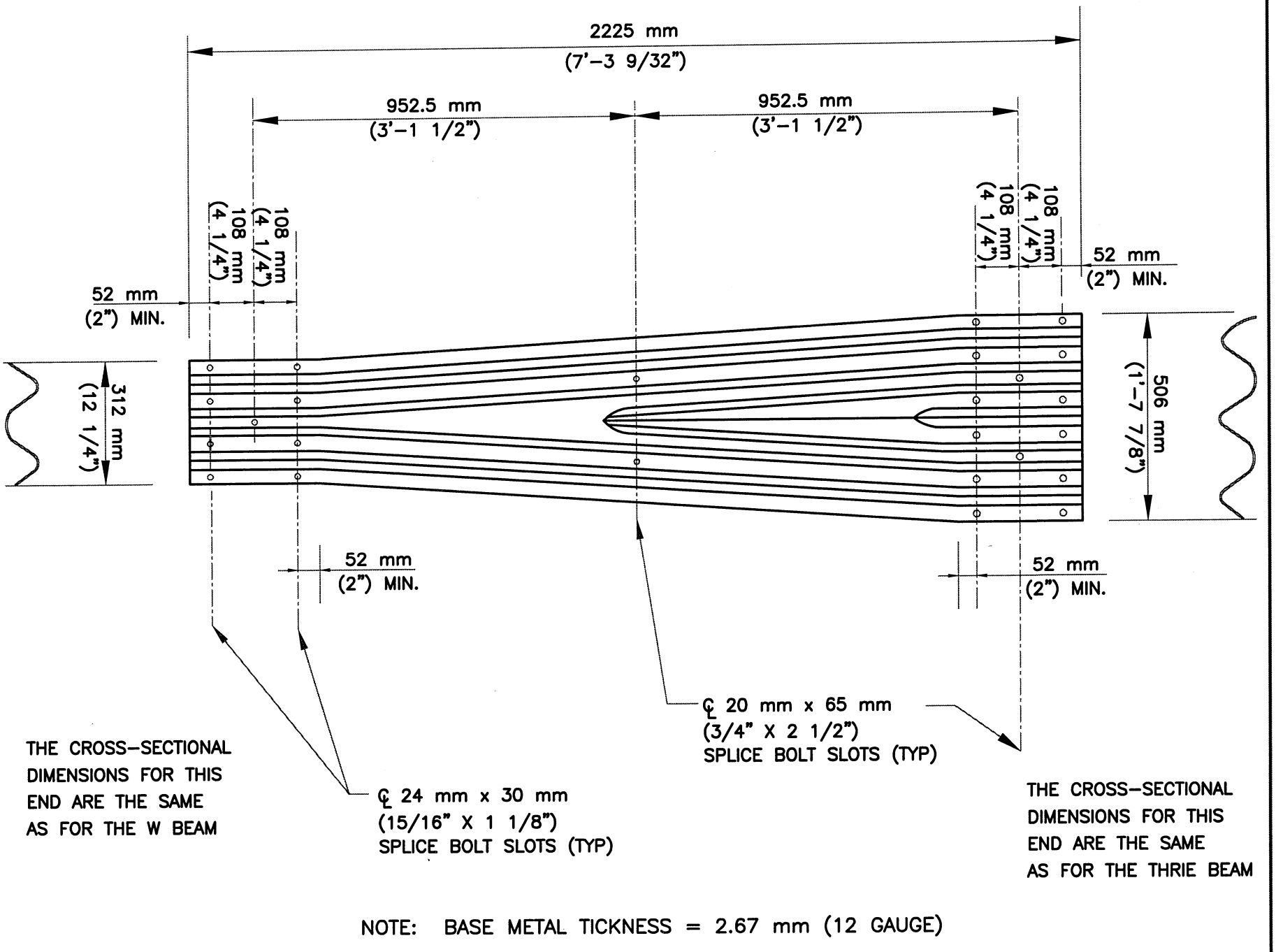
DIRECTION OF TRAFFIC

NOTES:

1. POST TO BE FABRICATED FROM W150 X 13.5 (W6'X9") STEEL SECTIONS AS SHOWN.
2. POST TO BE 20 mm DIA. (3/4"). (STD GALV WASHERS TO BE USED AT THESE CONNECTIONS).
3. FOR BLOCK-OUT DETAILS SEE M/E 401.21.0.

MASS HIGHWAY
CONSTRUCTION STANDARDS

W BEAM TO THRIE BEAM TRANSITION SECTION



NOTE: BASE METAL TICKNESS = 2.67 mm (12 GAUGE)

DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 401.6.1

MASSHIGHWAY
CONSTRUCTION STANDARDS

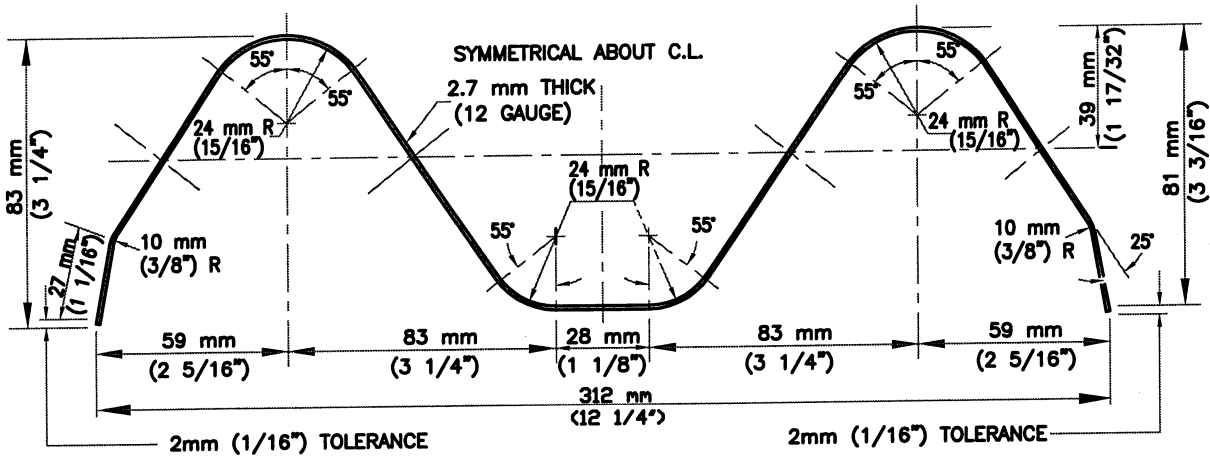
STEEL W BEAM HIGHWAY GUARD ON STEEL POSTS

RAIL DETAILS

DRAWING NUMBER
M/E 401.7.0

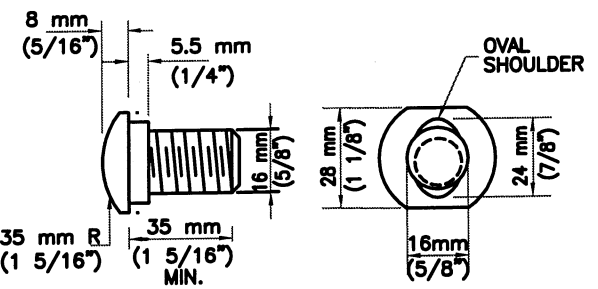
DATE OF ISSUE
December 2001

SECTION THROUGH RAIL

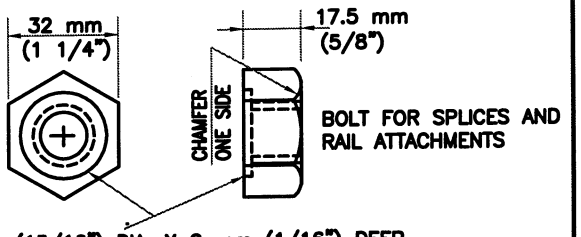


SPLICE BOLT

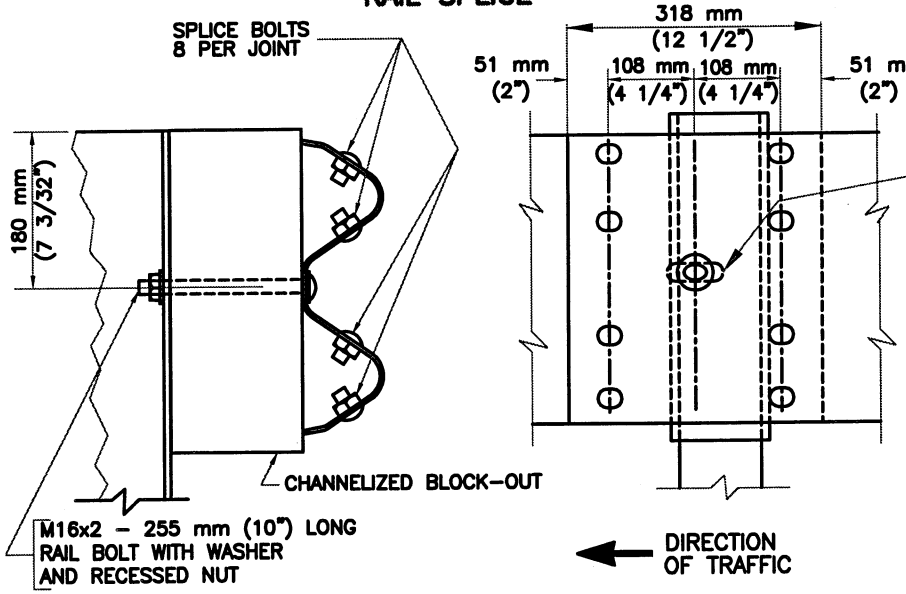
M16x2 – 35 mm (1 5/16") LONG



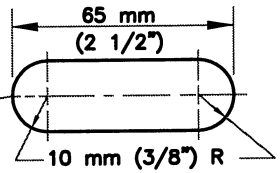
ALL BOLTS AND NUTS TO BE GALV.



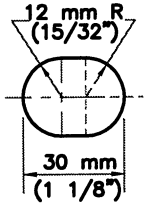
RAIL SPLICE



RAIL BOLT SLOT

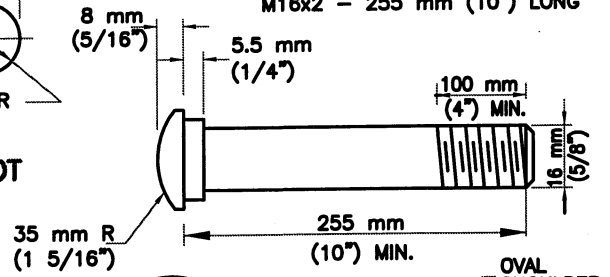


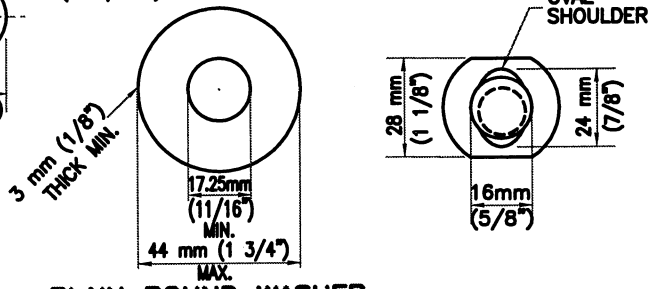
SPLICE BOLT SLOT



RAIL BOLT

M16x2 – 255 mm (10") LONG





PLAIN ROUND WASHER

NOTES:
1. FOR POST AND BLOCK–OUT DETAILS SEE M/E 401.8.0 AND M/E 401.20.0
2. LAP DOWNSTREAM IN DIRECTION OF TRAFFIC.

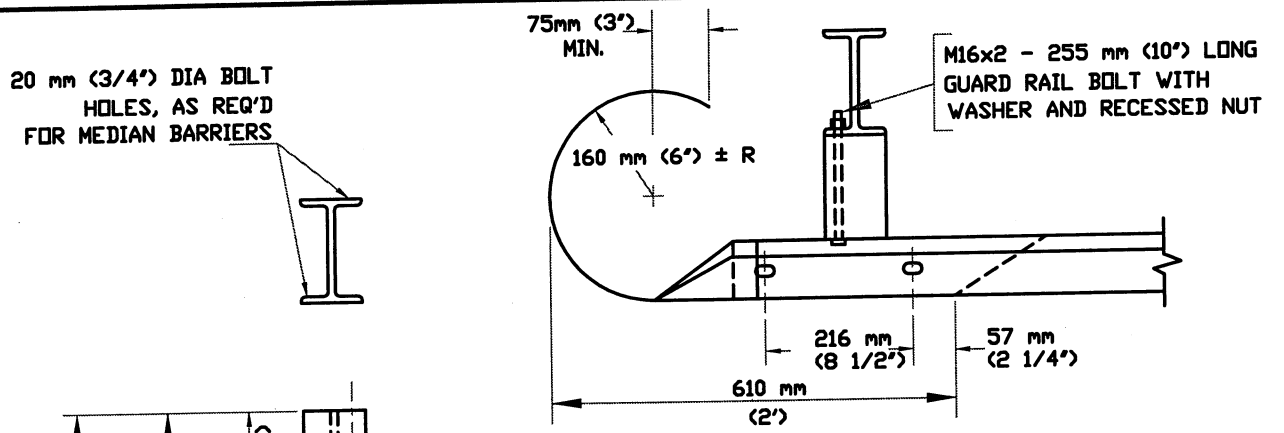
MASS HIGHWAY
CONSTRUCTION STANDARDS

STEEL W BEAM HIGHWAY GUARD ON STEEL POSTS

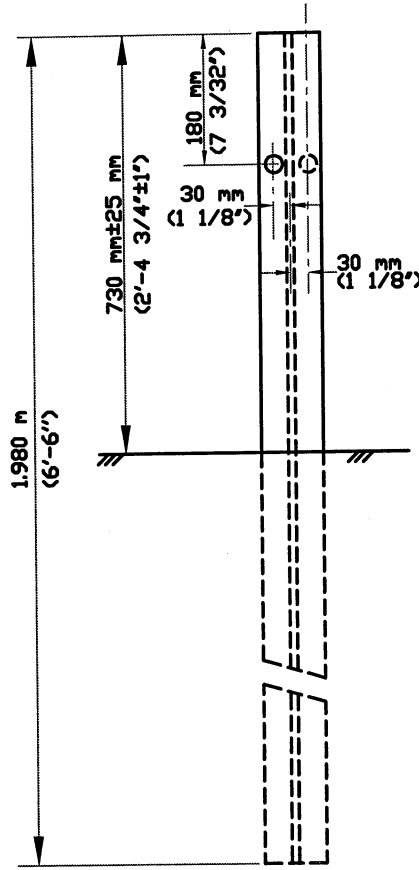
POSTS AND TERMINAL SECTION DETAILS

DRAWING NUMBER **M/E401.8.0R**

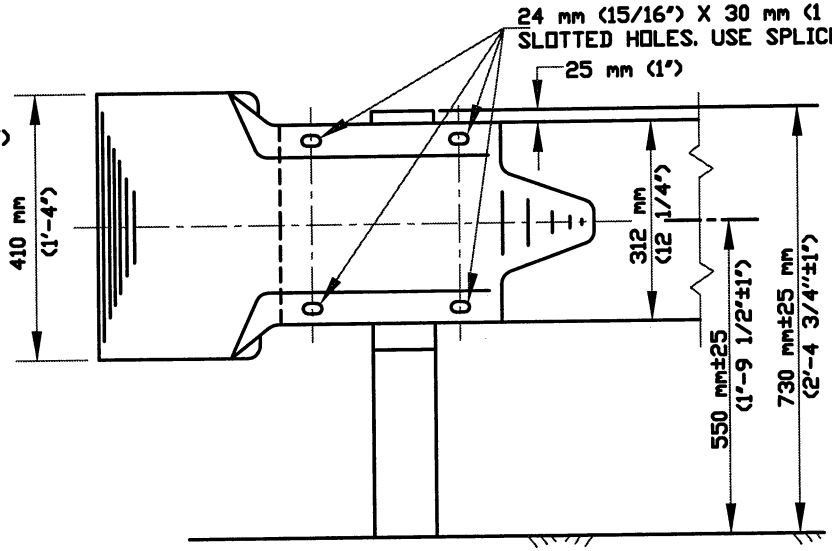
DATE OF ISSUE April 2002



PLAN
TERMINAL SECTION



POST

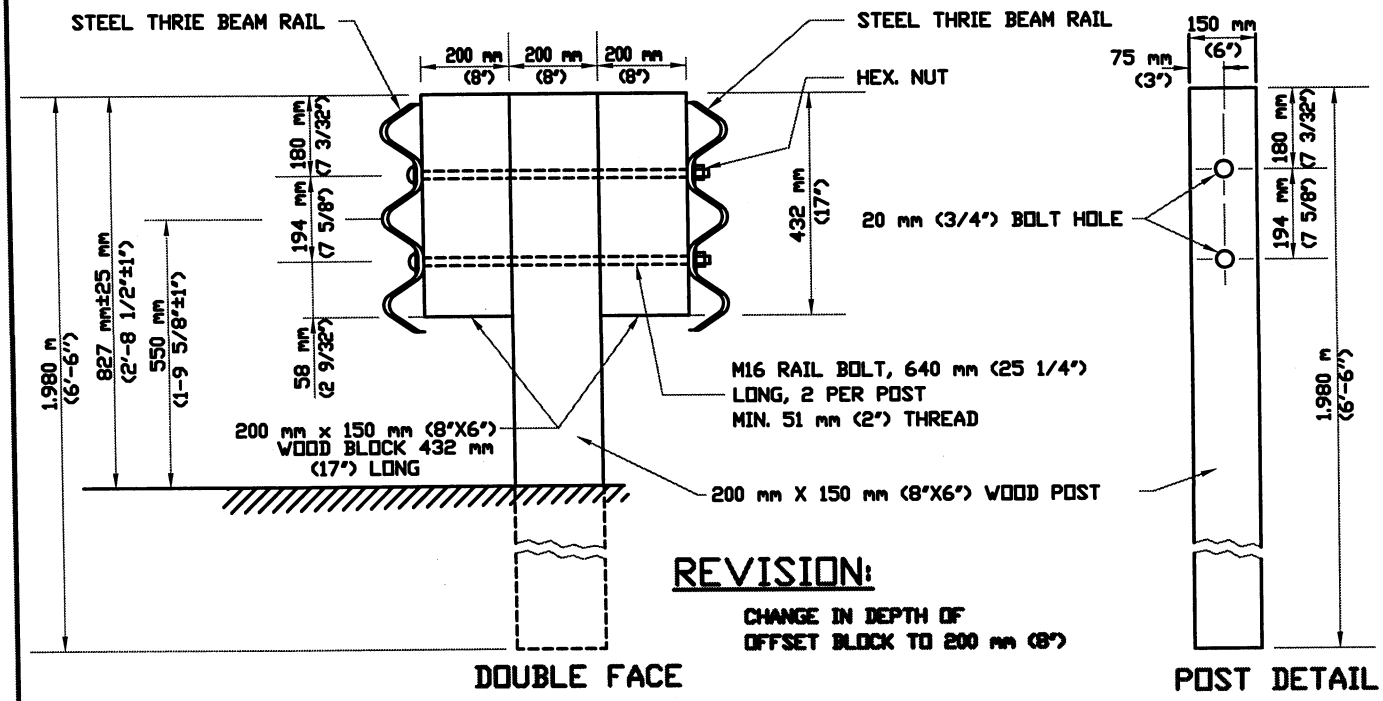


FRONT
TERMINAL SECTION

DIRECTION OF TRAFFIC

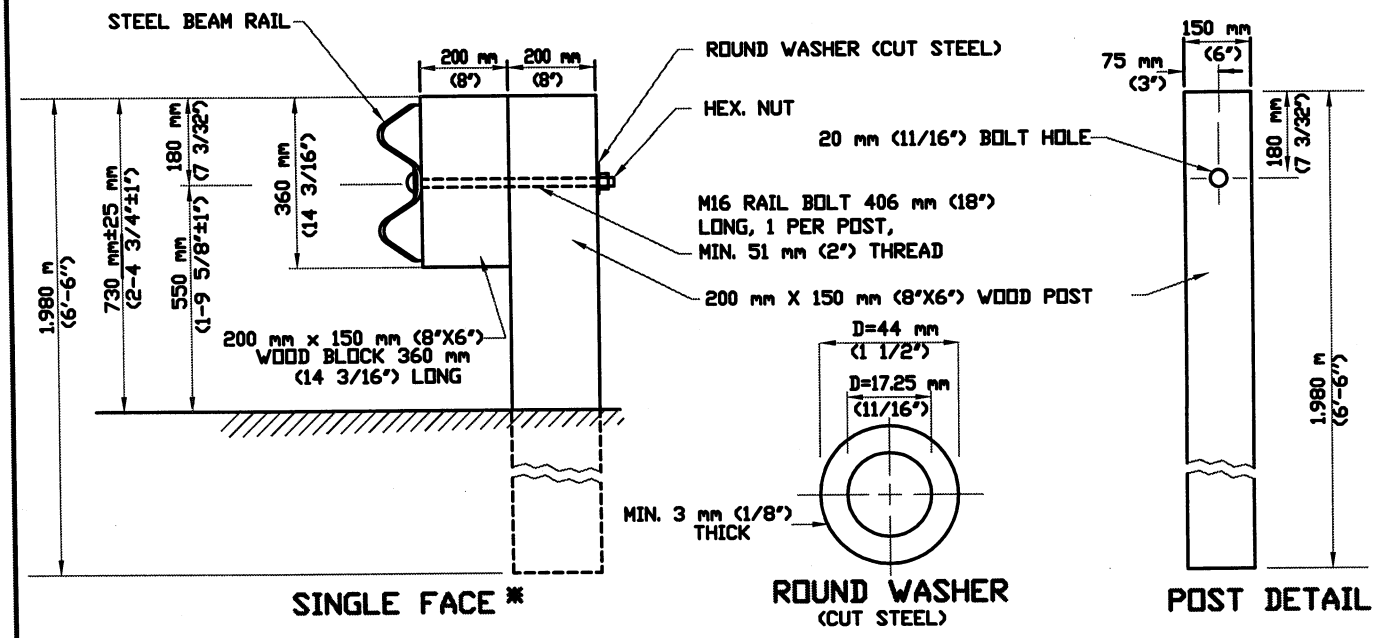
NOTES:

1. POST TO BE FABRICATED FROM W150 X 13.5 (W6"X9") STEEL SECTIONS AS SHOWN.
2. POST TO BE 20 mm DIA. (3/4"). (STD GALV WASHERS TO BE USED AT THESE CONNECTIONS).
3. FOR RAIL BOLT SLOT DETAILS SEE M/E 401.7.0.
4. FOR BLOCK-OUT DETAILS SEE M/E 401.20.0.



REVISION:

CHANGE IN DEPTH OF OFFSET BLOCK TO 200 mm (8")



* WHEN PLACED IN MEDIAN CHANGE TO THRIE BEAM, AND CHANGE HEIGHT TO 827 mm±25 mm (2'-8 1/2"±1").

NOTES:

1. POST SPACING, APPROACH END & TRAILING ENDS ARE THE SAME AS THOSE SHOWN FOR STEEL "H" POSTS.
2. ALL NUTS, BOLTS & WASHERS ARE TO BE GALVANIZED.
3. ALL MATERIALS & DIMENSIONS OF FITTINGS NOT SHOWN ABOVE ARE TO BE SIMILAR TO THE CORRESPONDING ELEMENTS SHOWN FOR STEEL "H" POSTS.
4. TERMINAL SECTIONS FOR DOUBLE FACE & SINGLE FACE GUARD RAIL ARE SHOWN ON DRAWINGS 401.6.0, 401.8.0
5. ALL SPLICES ARE TO BE MADE AT POSTS.
6. FOR THE TYPE OF WOOD & WOOD TREATMENT, OTHER MATERIALS & METHODS OF CONST., SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS.
7. STEEL POSTS ARE TO BE SUBSTITUTED AT THE SAME BID PRICE, FOR CERTAIN WOOD POSTS IN A WOOD POST RUN WHEN CEMENT CONCRETE EMBEDMENT IS REQUIRED.

MASS HIGHWAY
CONSTRUCTION STANDARDS

STEEL BEAM GUARDRAIL WITH WOOD POST

DATE OF ISSUE
April 2002

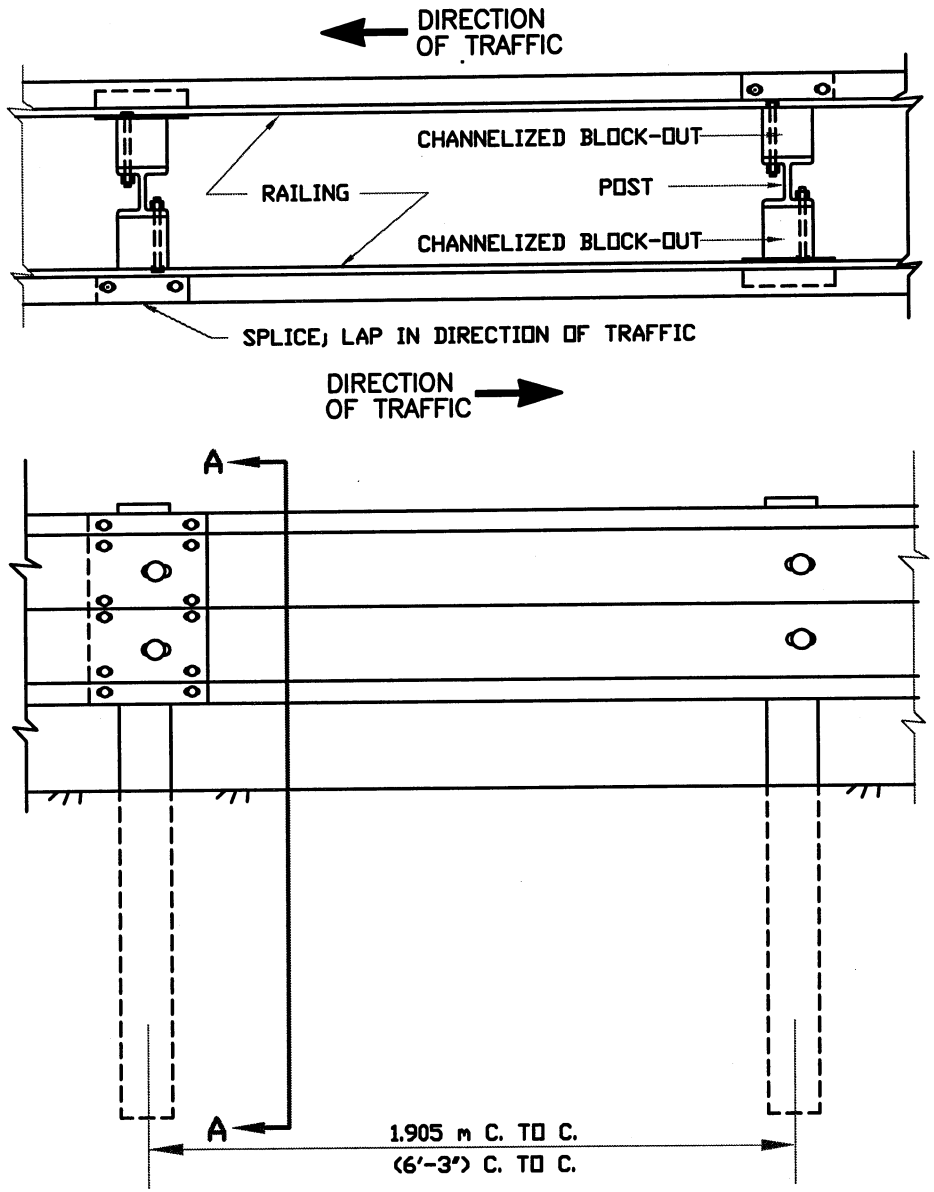
DRAWING NUMBER
M/E 401.10.0R

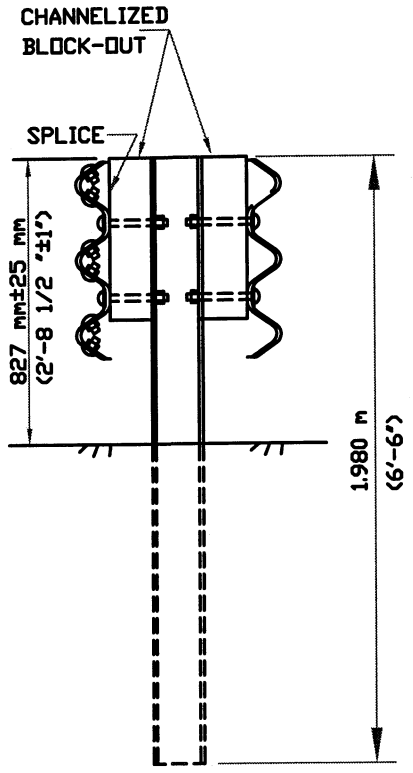
MASS HIGHWAY
CONSTRUCTION STANDARDS

STEEL THRIE BEAM HIGHWAY GUARD ON STEEL POSTS MEDIAN–BARRIER

DATE OF ISSUE
April 2002

DRAWING NUMBER
M/E 401.16.0R

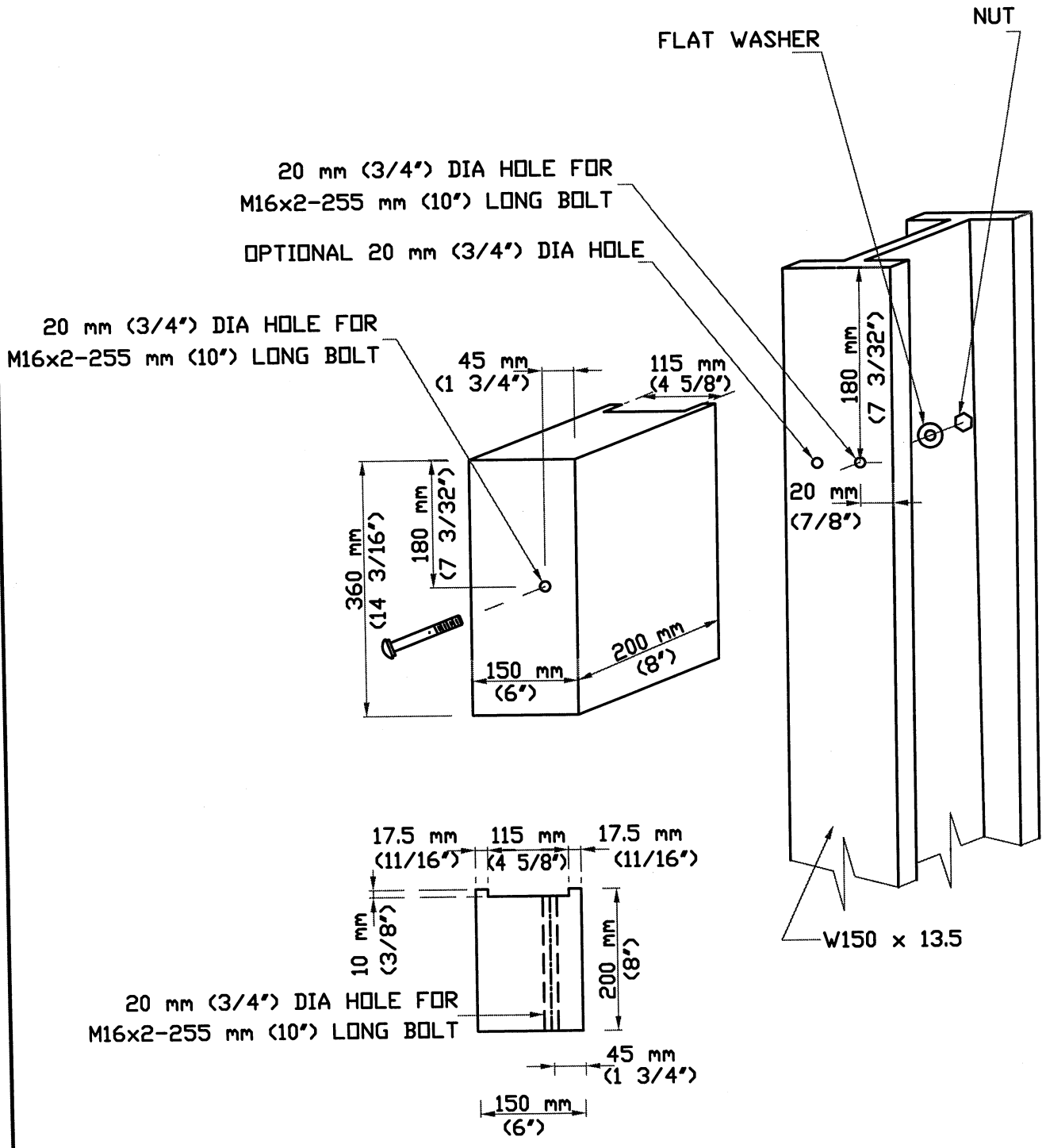




SECTION A–A

NOTES:

1. ALL POSTS TO BE SPACED 1.905 m (6'-3") C. TO C.
2. FOR DESCRIPTION, MATERIALS AND CONSTRUCTION METHODS SEE STANDARD SPECIFICATIONS.
3. FOR DETAILS OF BARRIER COMPONENTS SEE M/E 401.5.0 AND 401.6.0.
4. RAIL SPLICES ON DOUBLE FACED HIGHWAY GUARD ARE TO BE STAGGERED. i.e, SPLICES ARE NOT TO BE MADE ON BOTH SIDES OF THE SAME POST.

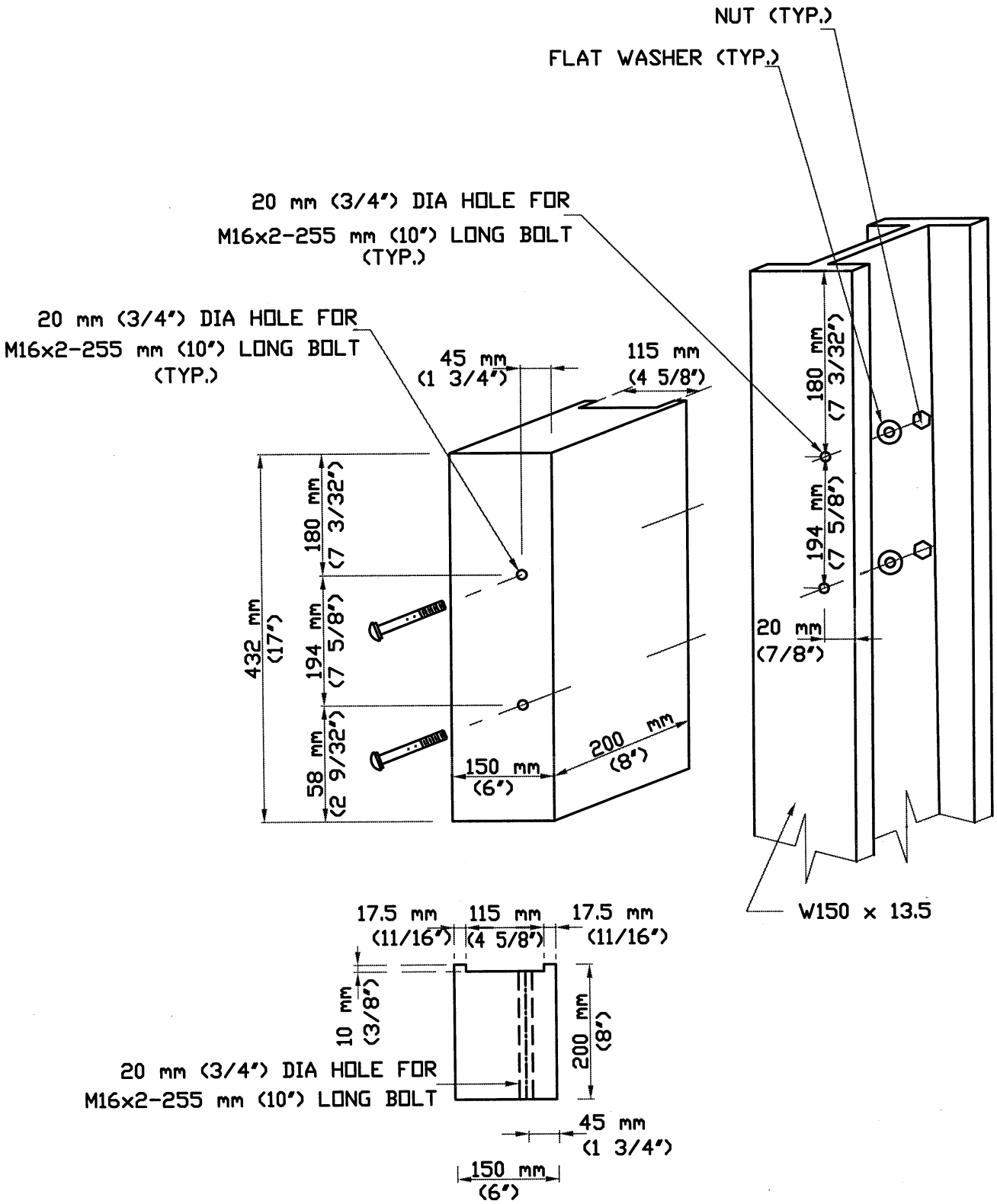


MASS HIGHWAY
CONSTRUCTION STANDARDS

CHANNELIZED BLOCK-OUTS FOR STEEL W BEAM GUARDRAIL ON STEEL POSTS

DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 401.20.0

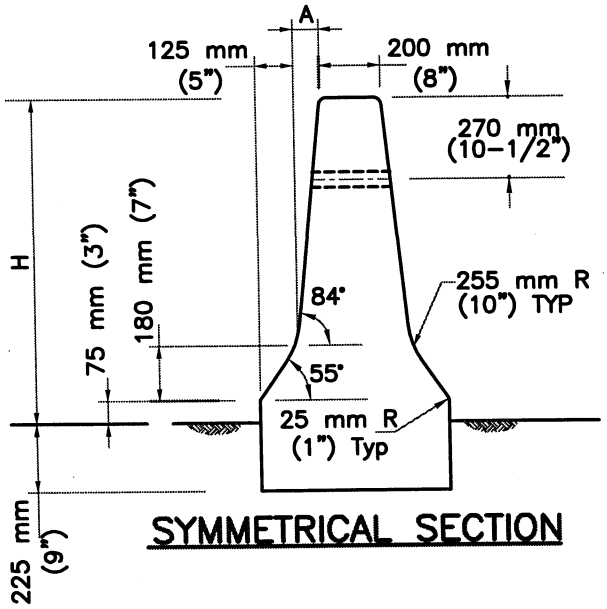


MASS HIGHWAY
CONSTRUCTION STANDARDS

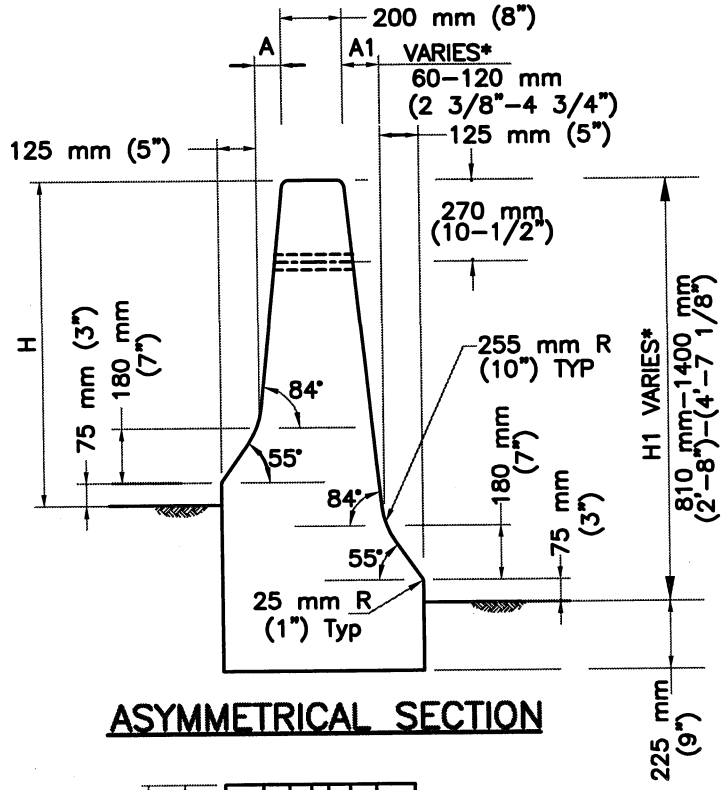
CHANNELIZED BLOCK-OUTS FOR STEEL THRIE BEAM GUARDRAIL ON STEEL POSTS

DATE OF ISSUE
December 2001

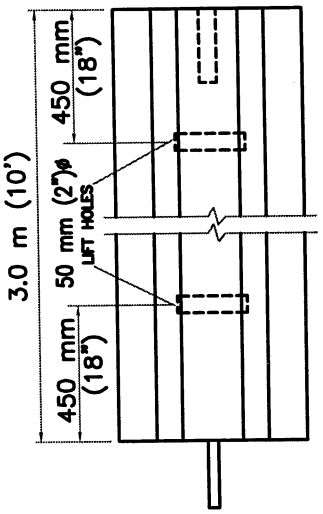
DRAWING NUMBER
M/E 401.21.0



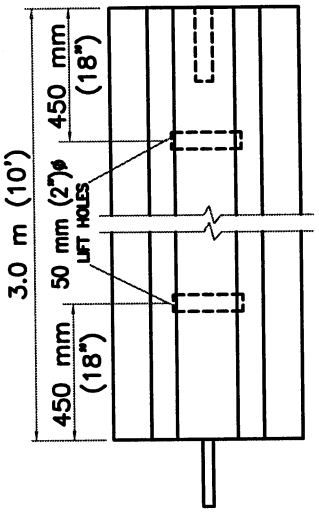
SYMMETRICAL SECTION



ASYMMETRICAL SECTION



PLAN



PLAN

SYSTEM	A	H
NORMAL	60 mm (2 3/8")	810 mm (2'-8")
TALL	85 mm (3 11/32")	1070 mm (3'-6 1/8")

NOTES:

1. ALL EDGES SHALL BE ROUNDED WITH A 25 mm RADIUS EXCEPT AS SHOWN
2. FOR DOWEL CONNECTION DETAILS SEE M/E 402.13.0.
3. FOR REINFORCING SEE M/E 402.11.0 FOR SYMMETRICAL SHAPE AND M/E 401.12.0 FOR ASYMMETRICAL SHAPE.
4. ALL CONCRETE IS TO BE FIELD COATED AFTER FINAL INSTALLATION WITH A CONCRETE PENETRANT/SEALER. CAST IN PLACE CONCRETE SHALL CURE NOT LESS THAN 28 DAYS PRIOR TO COATING.
5. LIFT HOLES USED ONLY ON PRECAST BARRIERS 4 m (13') AND LESS.

* VARY "A1" RELATIVE TO "H1" WHILE MAINTAINING 55° AND 84° BARRIER ANGLES. A1=120 mm (4-3/4") MAX., H1=1400 mm (4'-7 1/8") MAX.

MASS HIGHWAY CONSTRUCTION STANDARDS

F SHAPE MEDIAN BARRIER

DATE OF ISSUE
December 2001

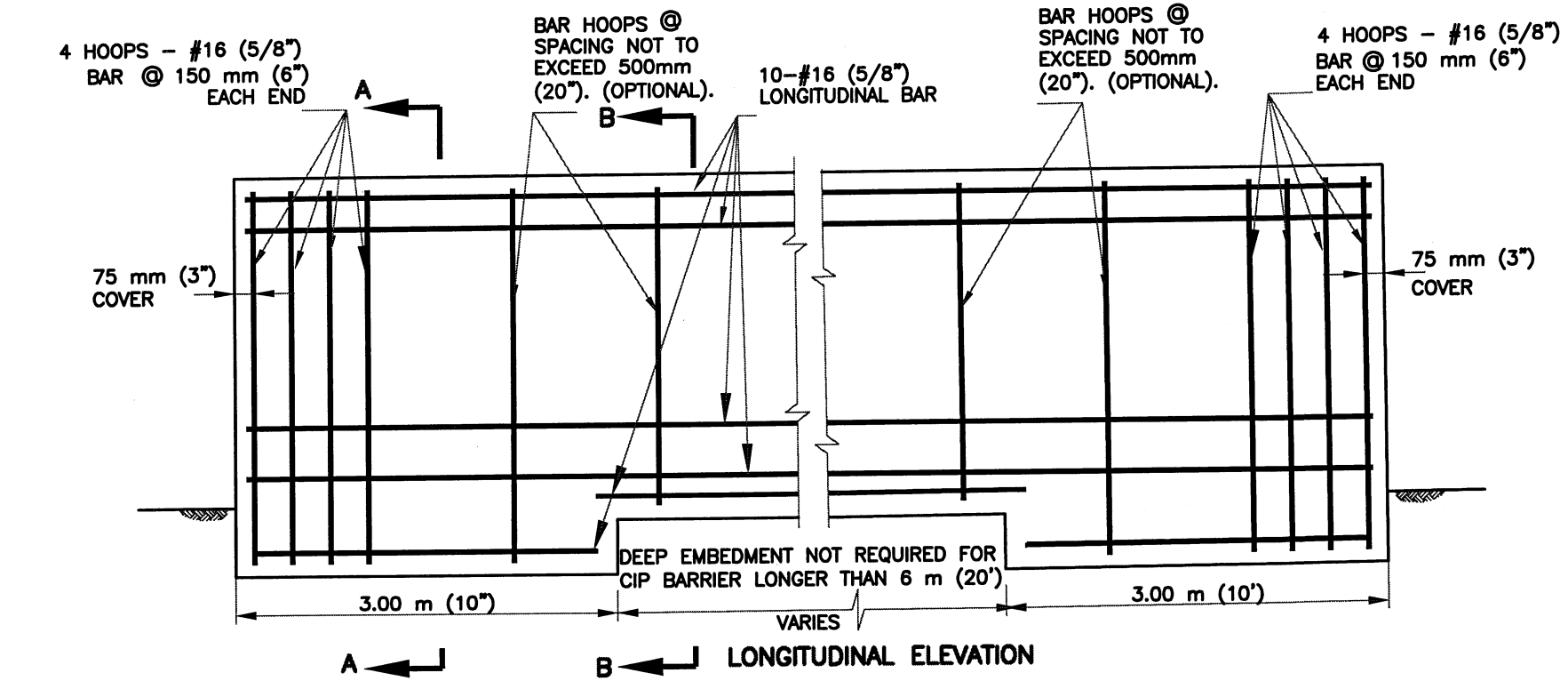
DRAWING NUMBER
M/E 402.10.0

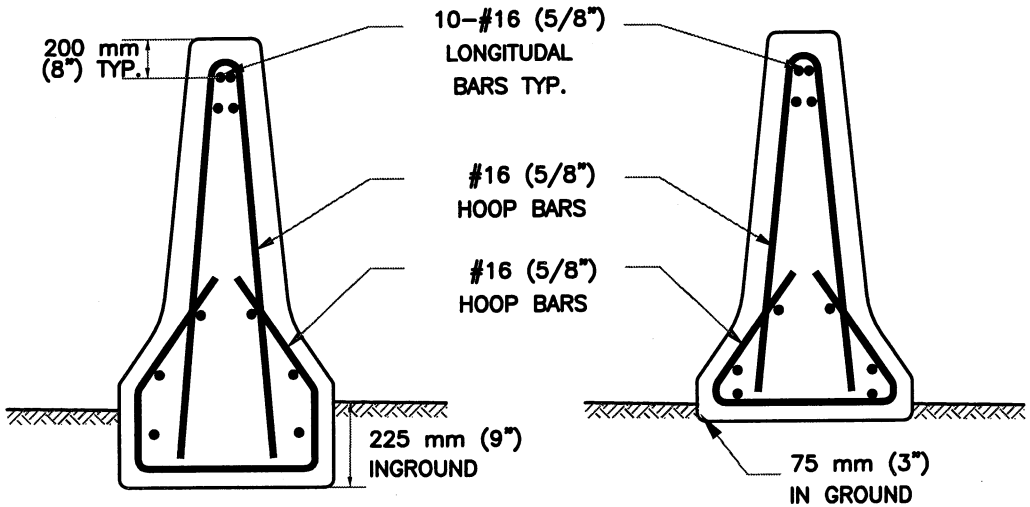
MASS HIGHWAY
CONSTRUCTION STANDARDS

F SHAPE MEDIAN BARRIER
SYMMETRICAL SECTION
REINFORCING DETAILS

DRAWING NUMBER
M/E 402.11.0

DATE OF ISSUE
December 2001





NOTES:

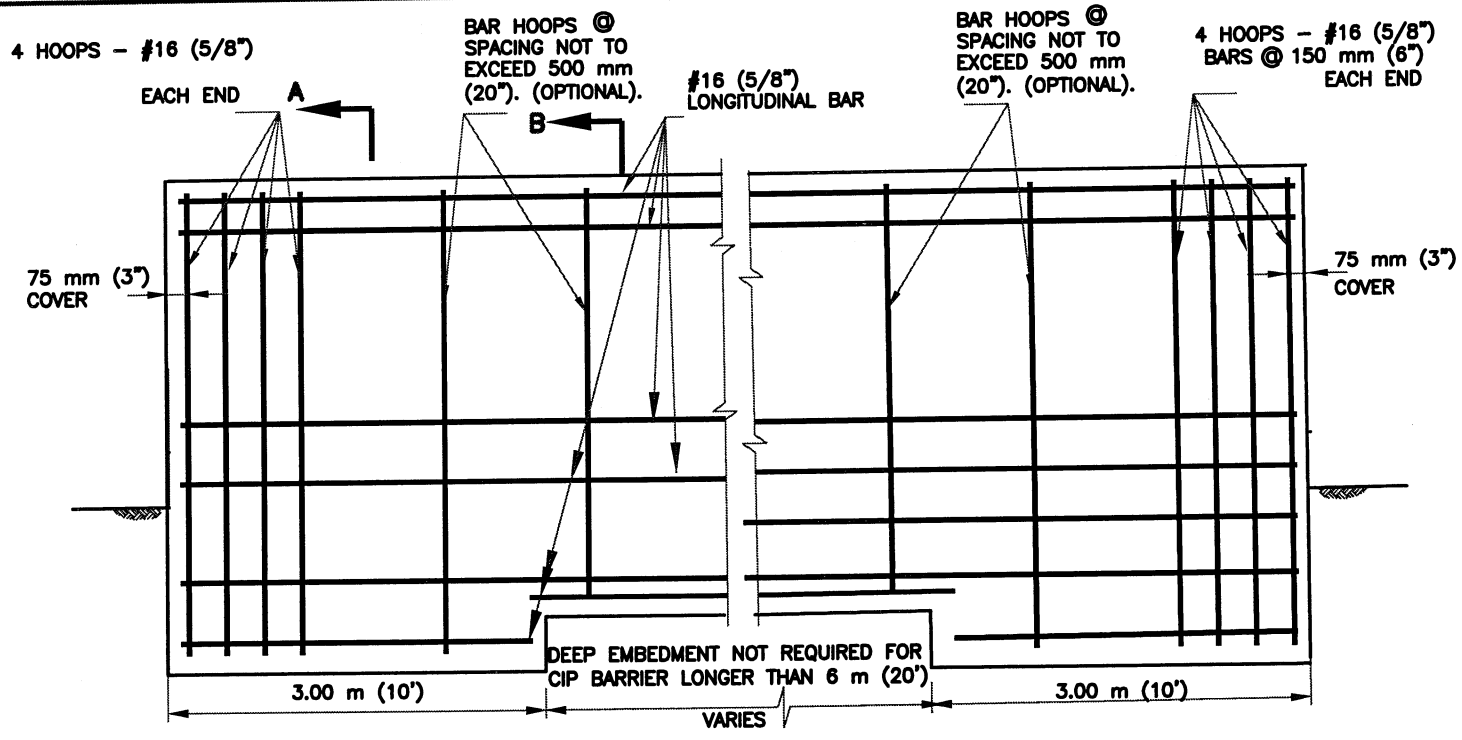
1. CAST IN PLACE NOT TO EXCEED 60 m (200') BETWEEN EXPANSION JOINTS.
2. CONSTRUCTION JOINTS REQUIRED AT 12 m (40') INTERVALS (13 mm (1/2 ") PREMOULDED JOINT FILLER REQUIRED FOR PRECAST BARRIERS).
3. USE MINIMUM COVER OF 40 mm (1 1/2"), UNLESS OTHERWISE INDICATED.
4. MATERIAL IS 30 MPa, 20 mm, 390 kg/m3 4000 psi–3/4"–610 lb/Cu.Yd.) CONCRETE.
5. ALL STEEL REINFORCING TO BE GALVANIZED OR EPOXY COATED, AASHTO–M31, GRADE 60.
6. ALL LONGITUDINAL BARS ARE TO BE CONTINUOUS FOR BOTH PRECAST AND CAST IN PLACE BARRIERS.
7. FOR DIMENSIONS SEE M/E 402.10.0

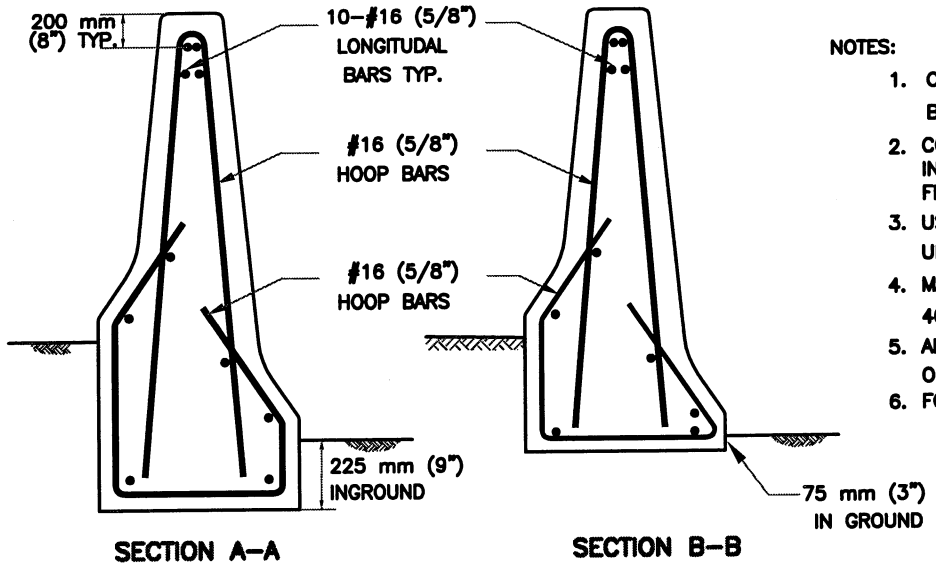
MASSHIGHWAY
CONSTRUCTION STANDARDS

F SHAPE MEDIAN BARRIER
ASYMMETRICAL SECTION
REINFORCING DETAILS

DRAWING NUMBER
M/E 402.12.0

DATE OF ISSUE
December 2001





NOTES:

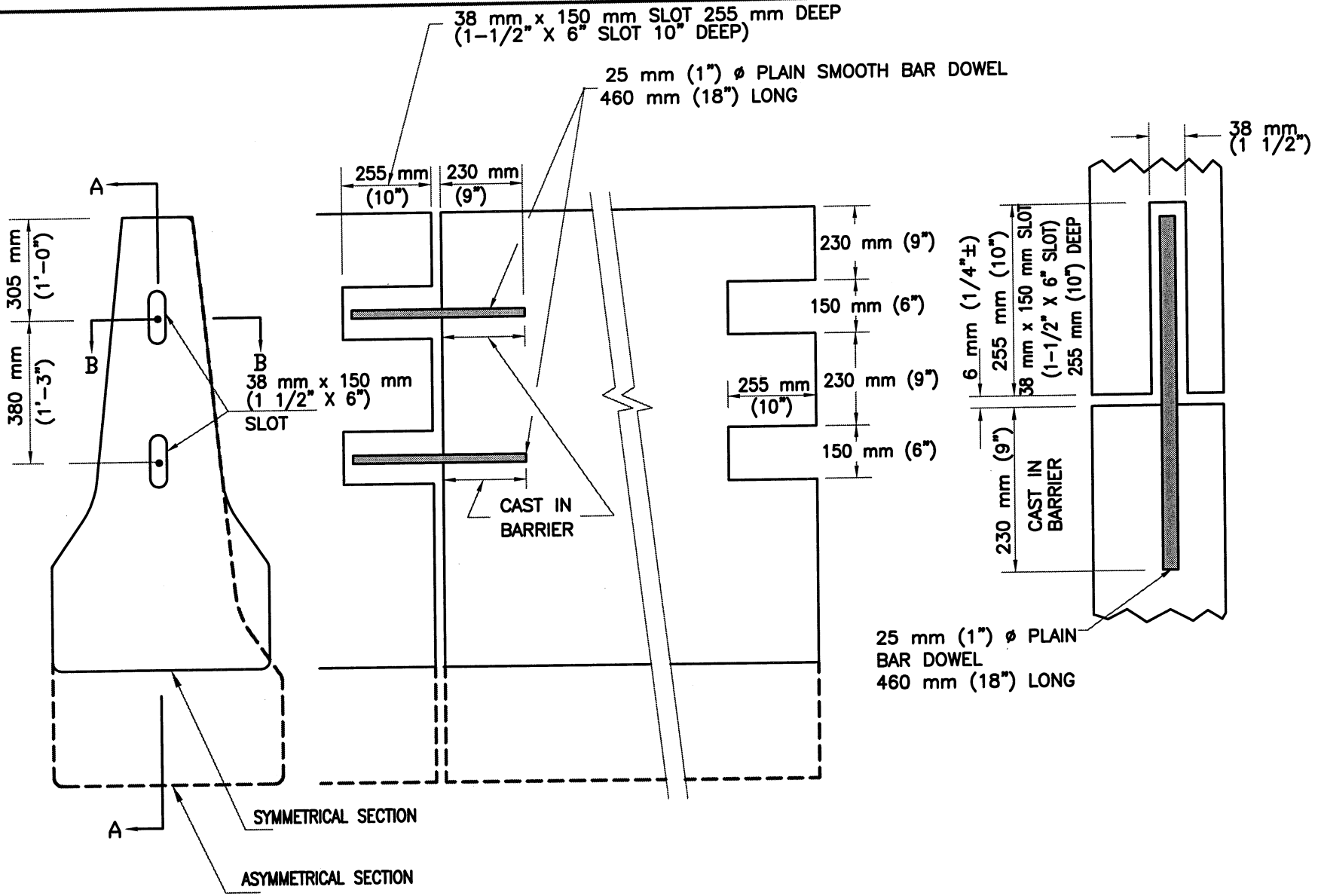
1. CAST IN PLACE NOT TO EXCEED 60 m (200') BETWEEN EXPANSION JOINTS.
2. CONSTRUCTION JOINTS REQUIRED AT 12 m (40') INTERVALS (13 mm (1/2 ") PREMOULDED JOINT FILLER REQUIRED FOR PRECAST BARRIERS).
3. USE MINIMUM COVER OF 40 mm (1 1/2"), UNLESS OTHERWISE INDICATED.
4. MATERIAL IS 30 MPa, 20 mm, 390 kg/m3 4000 psi–3/4"–610 lb/Cu.Yd.) CONCRETE.
5. ALL STEEL REINFORCING TO BE GALVANIZED OR EPOXY COATED, AASHTO–M31, GRADE 60.
6. FOR DIMENSIONS SEE M/E 402.10.0

MASS HIGHWAY
CONSTRUCTION STANDARDS

F SHAPE MEDIAN BARRIER DOWEL DETAILS

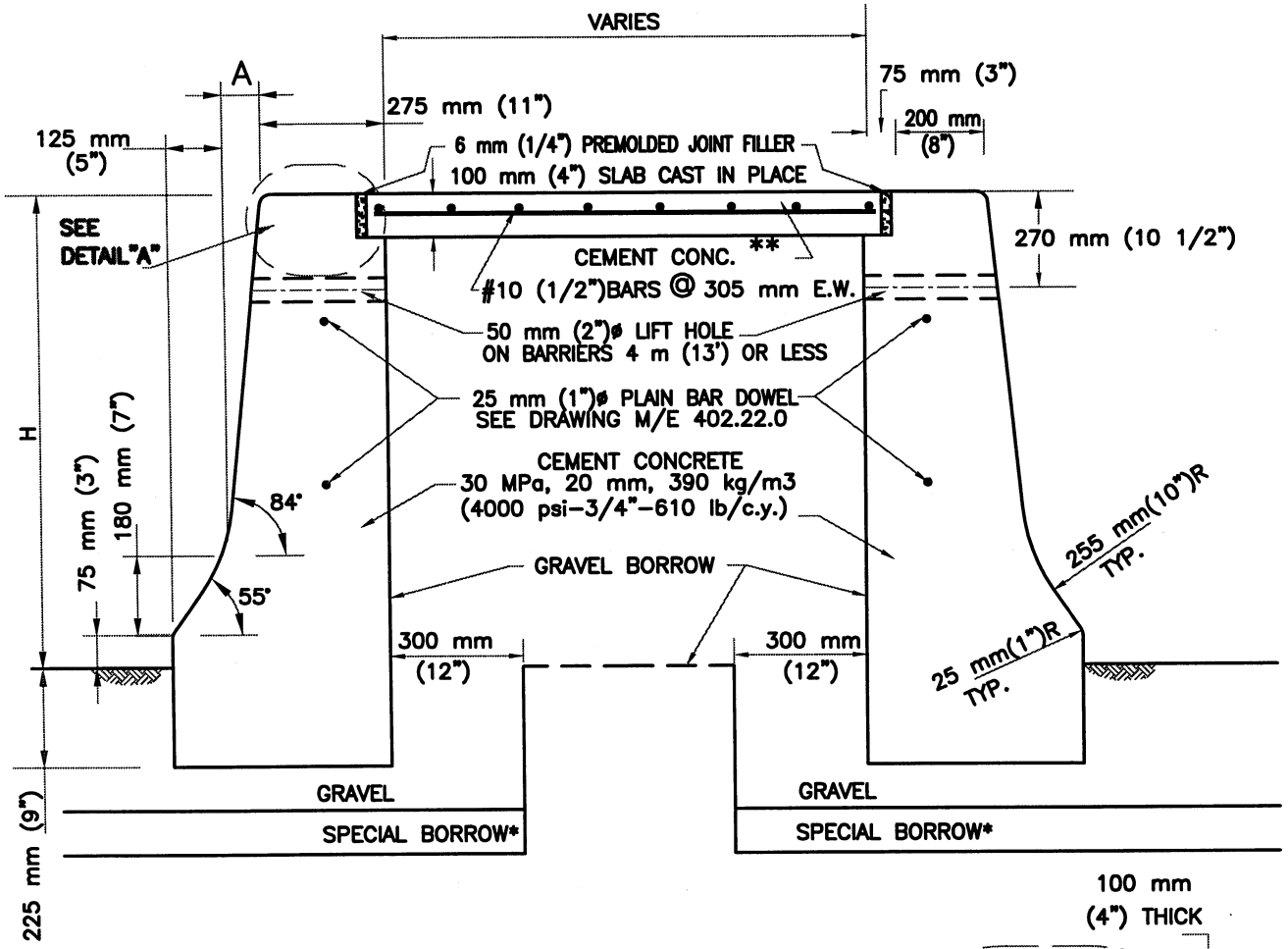
DRAWING NUMBER
M/E 402.13.0

DATE OF ISSUE
December 2001

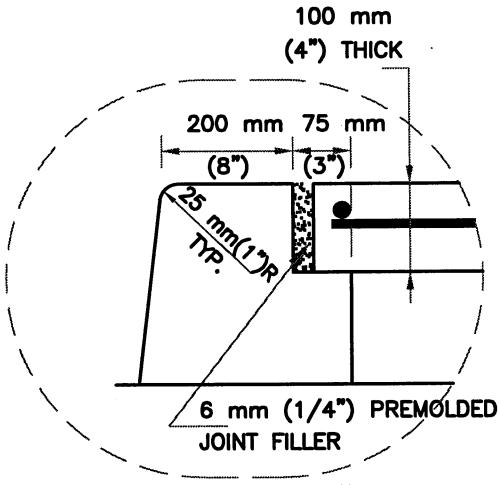


NOTES:

1. DOWELS TO BE GALVANIZED, AASHTO–M31, GRADE 60.
2. FOR ADDITIONAL DETAILS SEE M/E 402.10.0



SYSTEM	A	H
NORMAL	60 mm (2-3/8")	810 mm (2'-8")
TALL	85 mm (3-11/32")	1070 mm (3'-6 1/8")



DETAIL "A"

* SAME DEPTH AS UNDER ROADWAY.

** BARRIER CAP BUILT USING 30 MPa, 20 mm, 390 kg/m3 (4000 psi-3/4"-610 lb/c.y.) CEMENT CONCRETE.

NOTES:

1. ALL LONGITUDINAL BARS TO BE CONTINUOUS FOR BOTH PRECAST BARRIERS AND CAST IN PLACE BARRIERS.
2. USE MINIMUM COVER OF 40 mm (1 1/2"), UNLESS OTHERWISE INDICATED.
3. ALL CONCRETE IS TO BE FIELD COATED AFTER FINAL INSTALLATION WITH A CONCRETE PENETRANT/SEALER. CONCRETE SHALL CURE NOT LESS THAN 28 DAYS PRIOR TO COATING.
4. FOR REINFORCING DETAILS SEE M/E 402.21.0
5. FOR DOWEL DETAILS SEE M/E 402.22.0
6. TAR PAPER TO BE PLACED INSIDE LIFT HOLES AND BARRIER JOINTS.

MASS HIGHWAY CONSTRUCTION STANDARDS

F SHAPE MEDIAN BARRIER WITH CONCRETE SEPARATOR

DATE OF ISSUE
December 2001

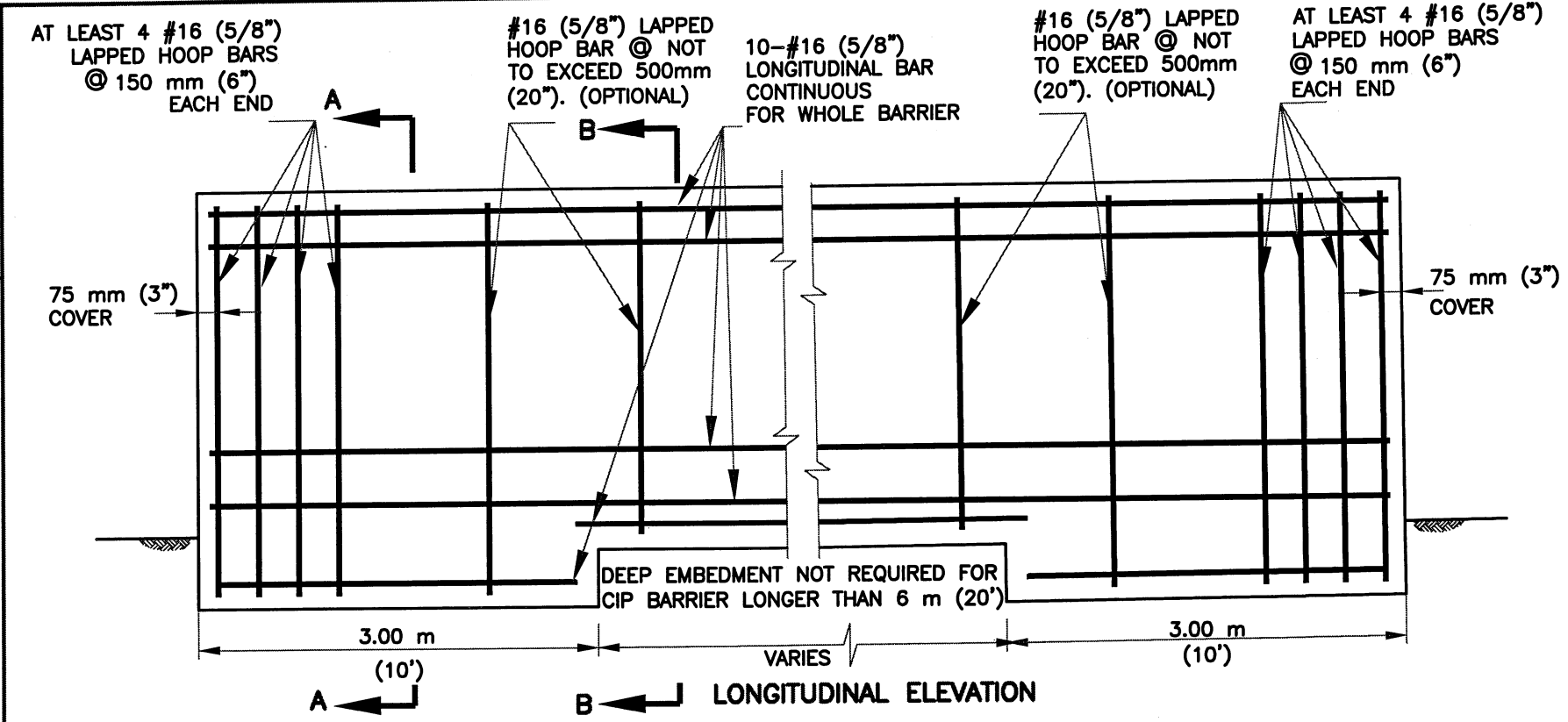
DRAWING NUMBER
M/E 402.20.0

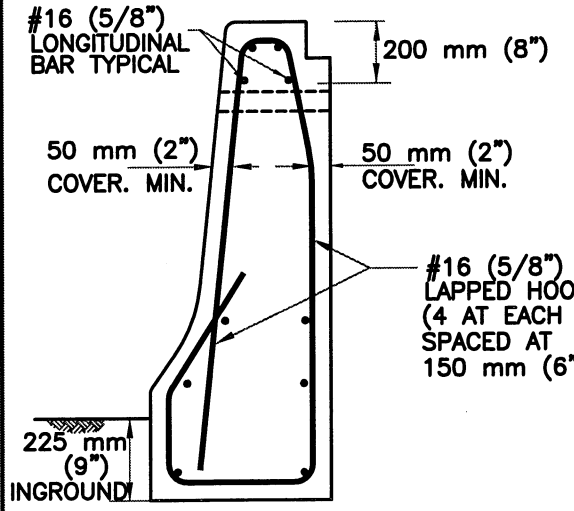
MASS HIGHWAY
CONSTRUCTION STANDARDS

F SHAPE MEDIAN BARRIER WITH CONCRETE SEPARATOR REINFORCING DETAILS

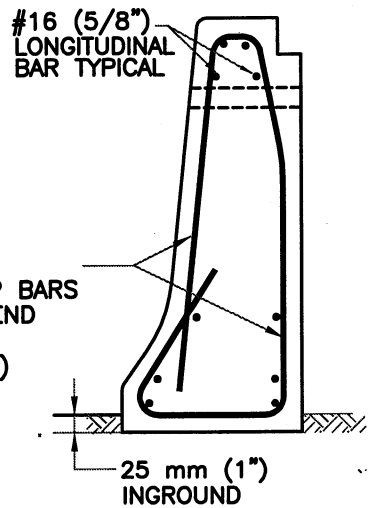
DRAWING NUMBER
M/E402.21.0

DATE OF ISSUE
December 2001





SECTION A–A



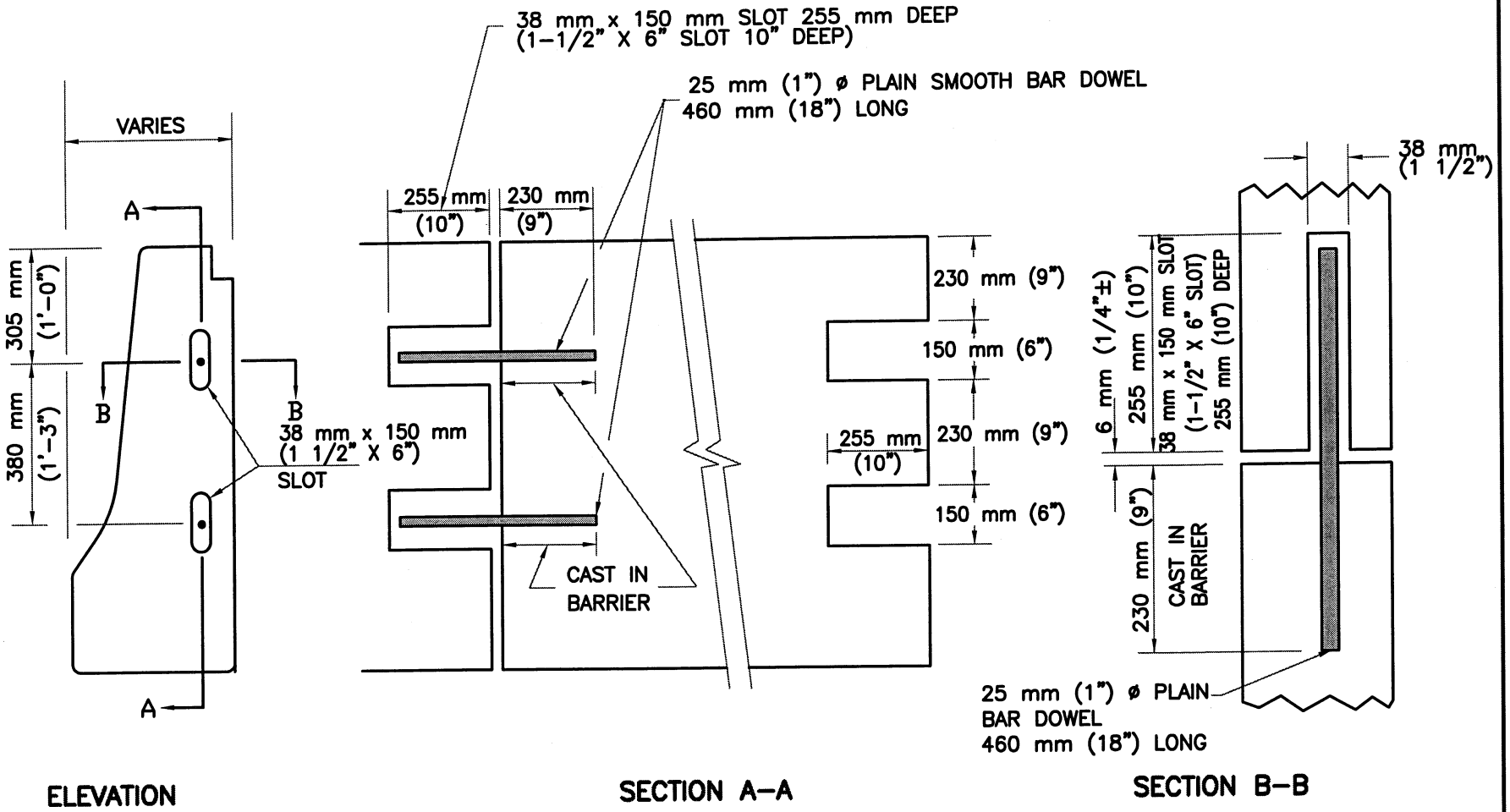
SECTION B–B

NOTES:

1. ALL LONGITUDINAL BARS ARE TO BE CONTINUOUS FOR BOTH PRECAST BARRIERS AND CAST IN PLACE BARRIERS.
2. USE MINIMUM COVER OF 40 mm (1 1/2"), UNLESS OTHERWISE INDICATED.
3. CAST IN PLACE (CIP) NOT TO EXCEED 60 m (200 FT) BETWEEN EXPANSION JOINTS.
4. CONTRACTION JOINTS REQUIRED AT 12 m (40') INTERVALS (13 mm (1/2 ") PREMOULDED JOINT FILLER REQUIRED FOR PRECAST BARRIERS).
5. ALL STEEL REINFORCING TO BE GALVANIZED OR EPOXY COATED, AASHTO–M31, GRADE 60.
6. FOR DIMENSIONS SEE M/E 401.20.0

MASS HIGHWAY
CONSTRUCTION STANDARDS

F SHAPE MEDIAN BARRIER WITH CONCRETE SEPARATOR DOWEL DETAILS



ELEVATION

SECTION A–A

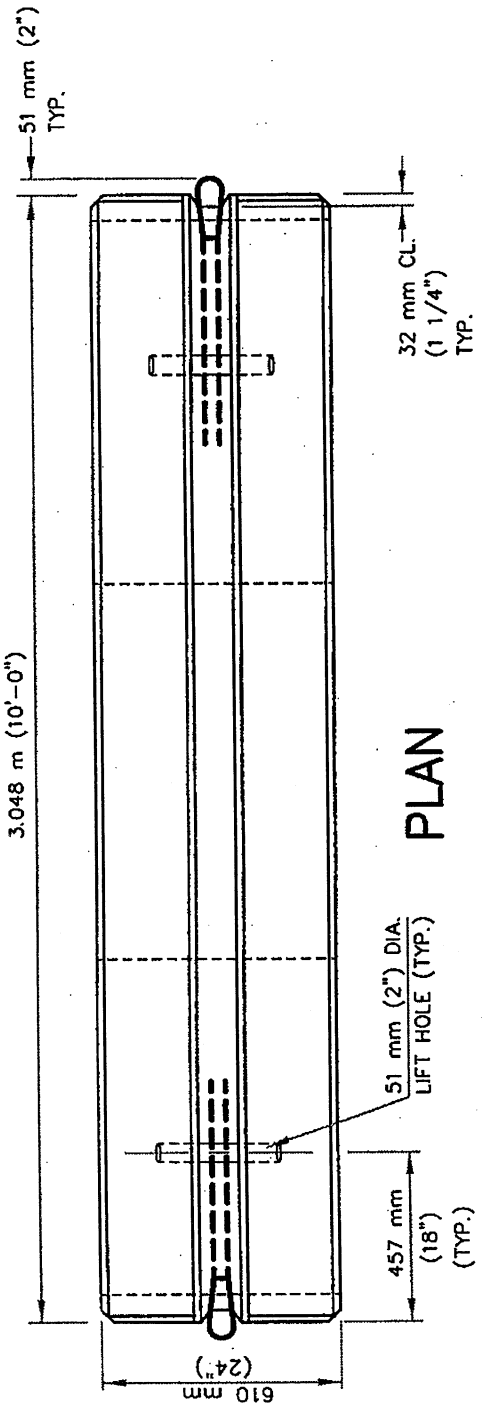
SECTION B–B

NOTES:

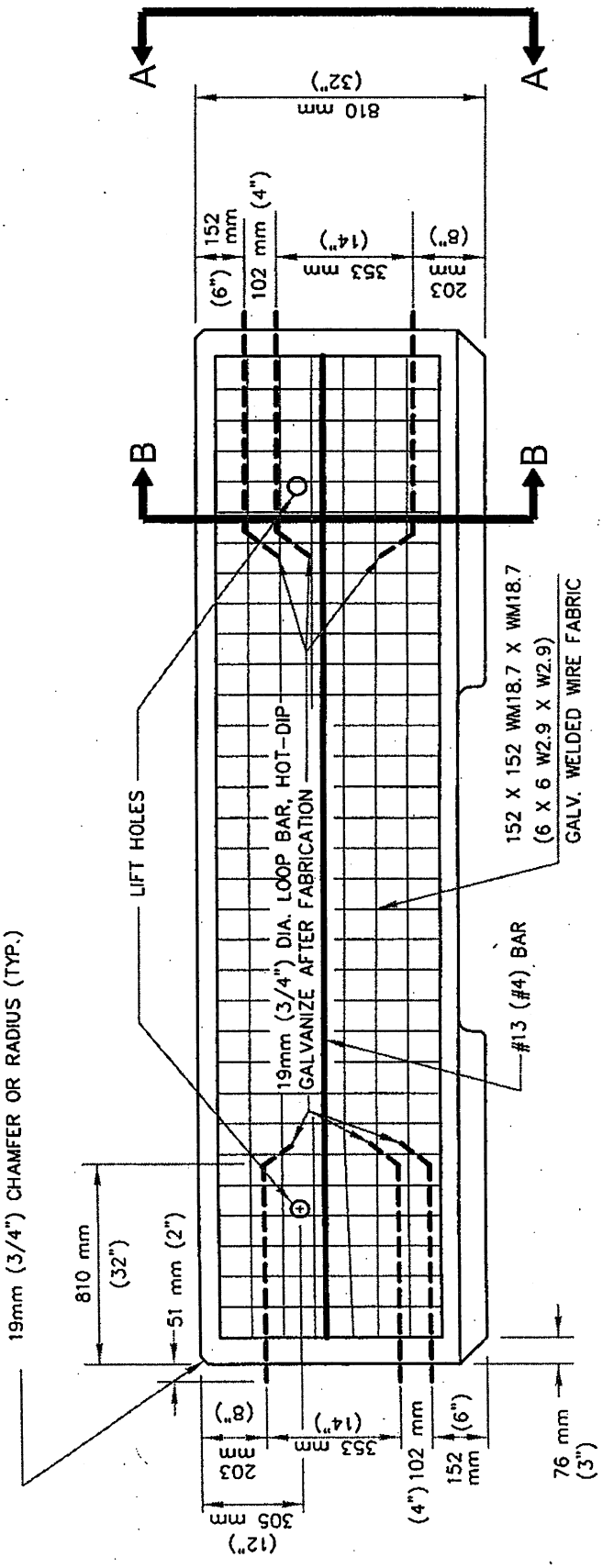
1. DOWELS TO BE GALVANIZED, AASHTO M–31, GRADE 60.
2. FOR ADDITIONAL DETAILS SEE M/E 402.20.0

DATE OF ISSUE December 2001

DRAWING NUMBER **M/E 402.22.0**



PLAN



ELEVATION

MASS HIGHWAY CONSTRUCTION STANDARDS	PRECAST PORTABLE CONCRETE BARRIER 1/3	DATE OF ISSUE OCTOBER 2002
		DRAWING NUMBER M/E 403.1

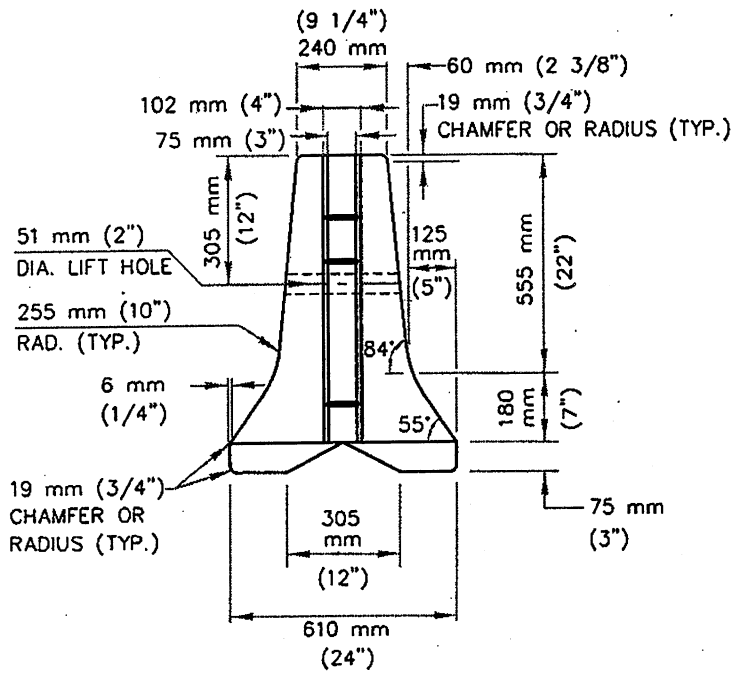
MASSHIGHWAY
CONSTRUCTION STANDARDS

PRECAST PORTABLE CONCRETE BARRIER

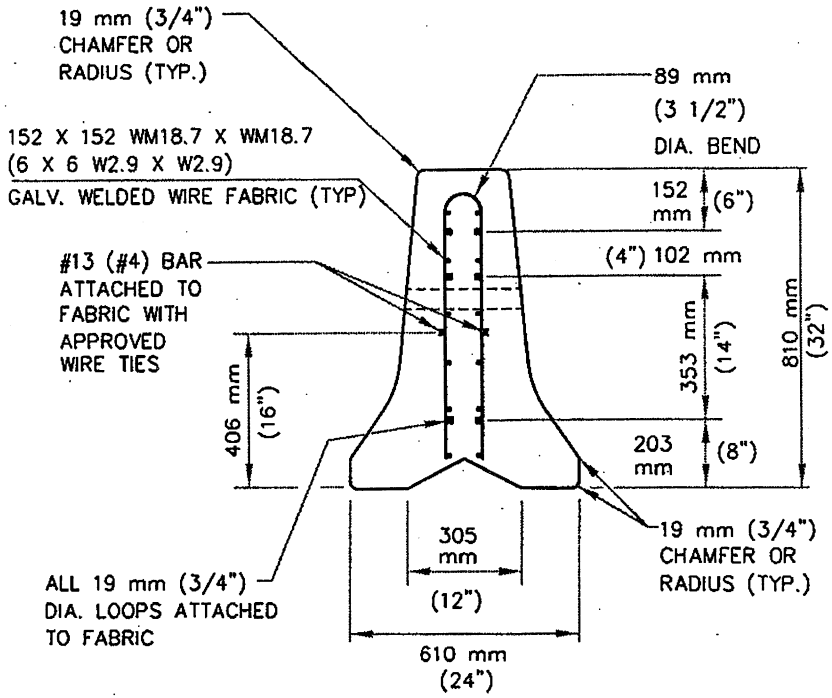
2/3

DRAWING NUMBER M/E 403.2

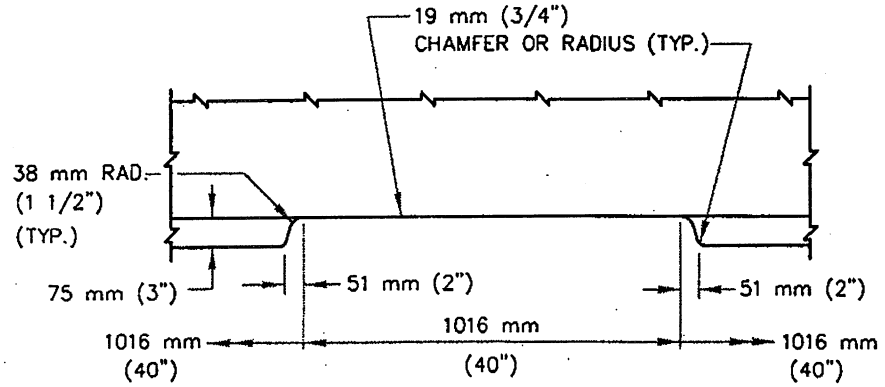
DATE OF ISSUE OCTOBER 2002



END VIEW A–A



SECTION B–B



ELEVATION DETAIL OF DRAINAGE SLOT

GENERAL NOTES

1. ALL WELDED WIRE FABRIC, BARS, HOOP BARS AND PIN ASSEMBLIES ARE TO BE HOT–DIP GALVANIZED AFTER FABRICATION.

2. HOT–DIP GALVANIZED TREATMENTS ARE TO CONFORM TO MASSACHUSETTS HIGHWAY STANDARD SPECIFICATIONS M7.10.0 AND AASHTO M111.

3. CEMENT CONCRETE IS TO CONFORM TO MASSACHUSETTS HIGHWAY STANDARD SPECIFICATIONS M4.02.00.
CEMENT CONCRETE IS TO BE 35 MPa, 19mm (5000 PSI, 3/4") CONCRETE.

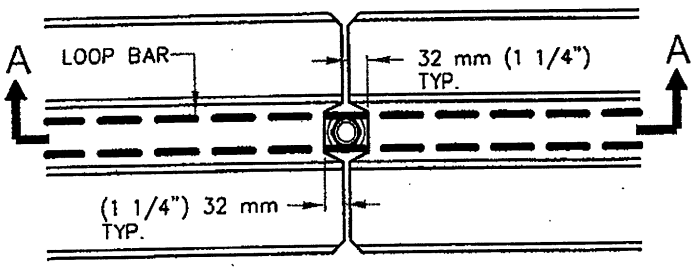
MASSHIGHWAY
CONSTRUCTION STANDARDS

PRECAST PORTABLE CONCRETE BARRIER

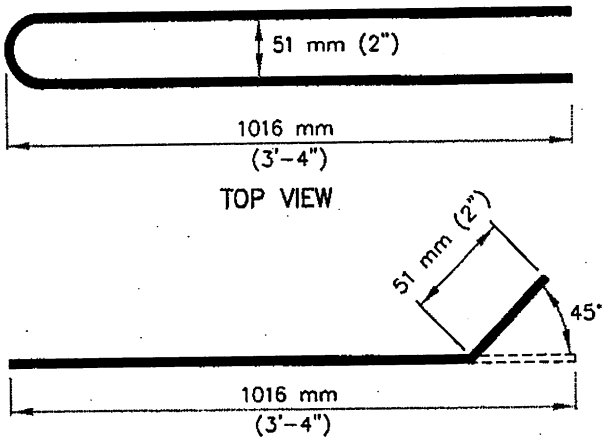
3/3

DRAWING NUMBER M/E 403.3

DATE OF ISSUE OCTOBER 2002

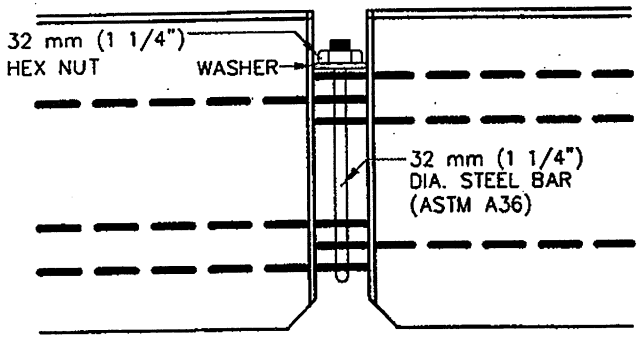


PLAN OF CONNECTION

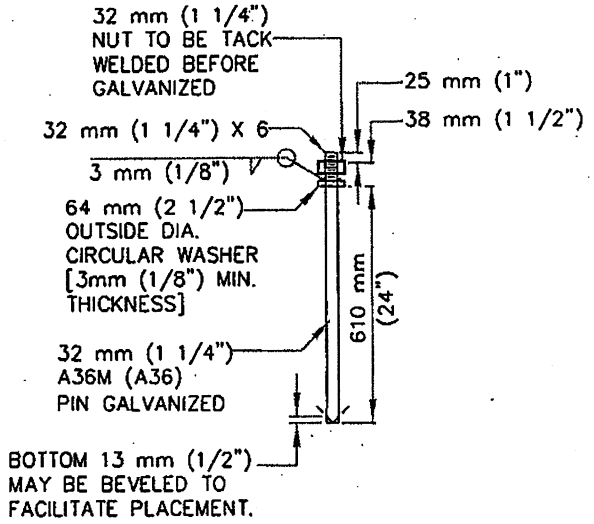


SIDE VIEW
LOOP BAR
19 mm (3/4") DIA. A36M (A36)

REINFORCEMENT DETAIL



SECTION A–A



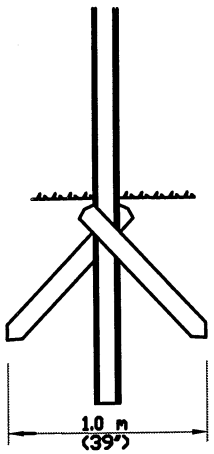
CONNECTOR PIN ASSEMBLY

MASSHIGHWAY
CONSTRUCTION STANDARDS

CHAIN LINK FENCE WITH SPRING TENSION WIRE

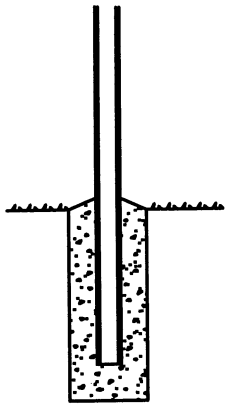
DATE OF ISSUE
December 2001

DRAWING NUMBER
M/E 404.1.0

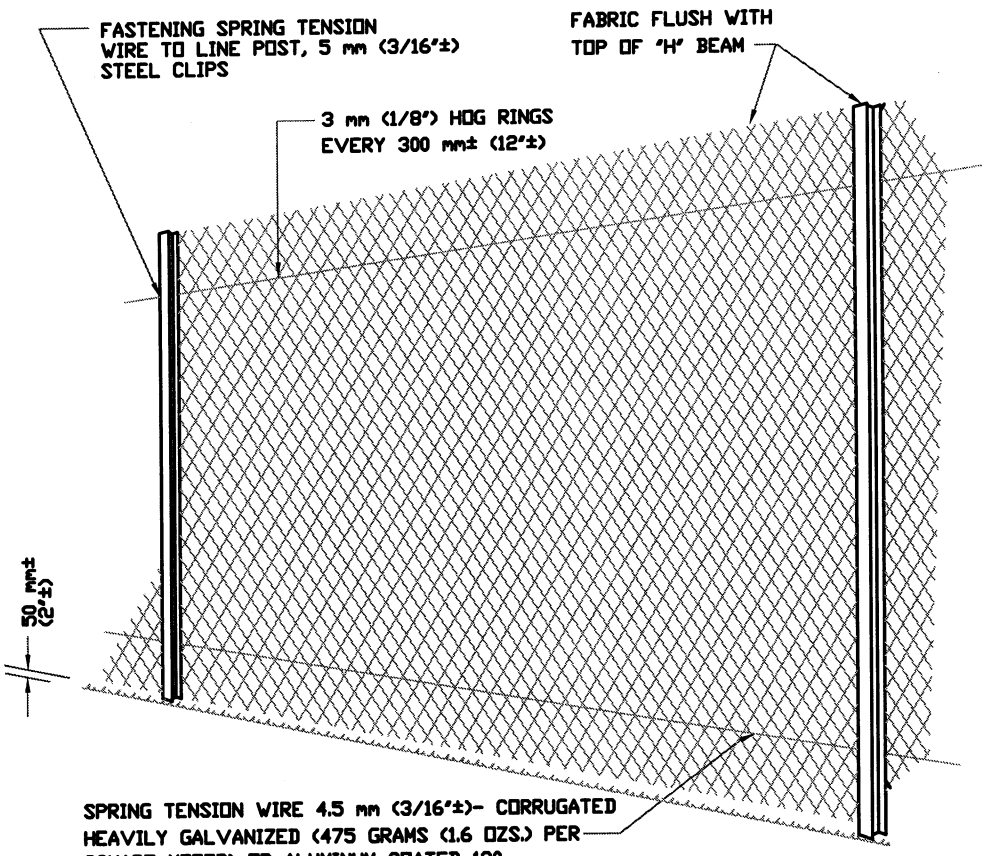


FABRIC PLACED PERPENDICULAR TO THE ANCHOR

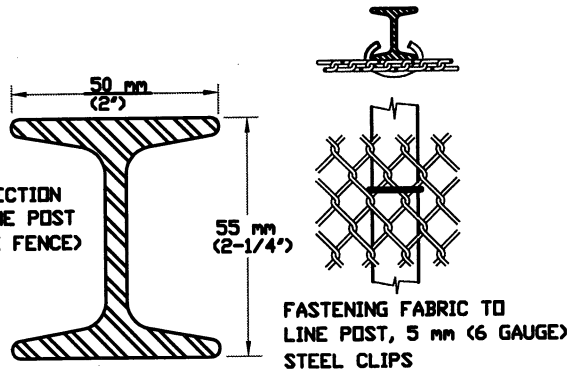
DETAIL SHOWING LINE POST SET WITH DRIVE ANCHORS



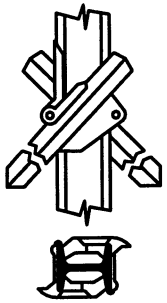
DETAIL SHOWING LINE POST SET IN CONCRETE FOOTING



CHAIN LINK FENCE WITH SPRING TENSION WIRE
(ALUMINUM COATED FENCE)



STEEL OR ALUMINUM "H" BEAM LINE POST



DETAIL OF AN ANCHOR CLAMP SHOWING POSITION OF THE ANCHOR

TABLE 1

LOADING CONDITION

$$R = \frac{\text{WALL THICKNESS}}{\text{WALL HEIGHT}} = \frac{D}{H}$$

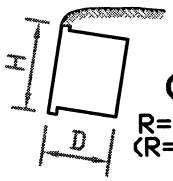
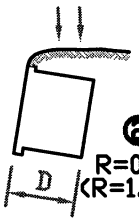
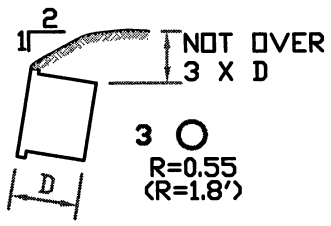
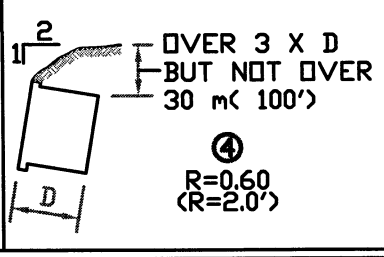
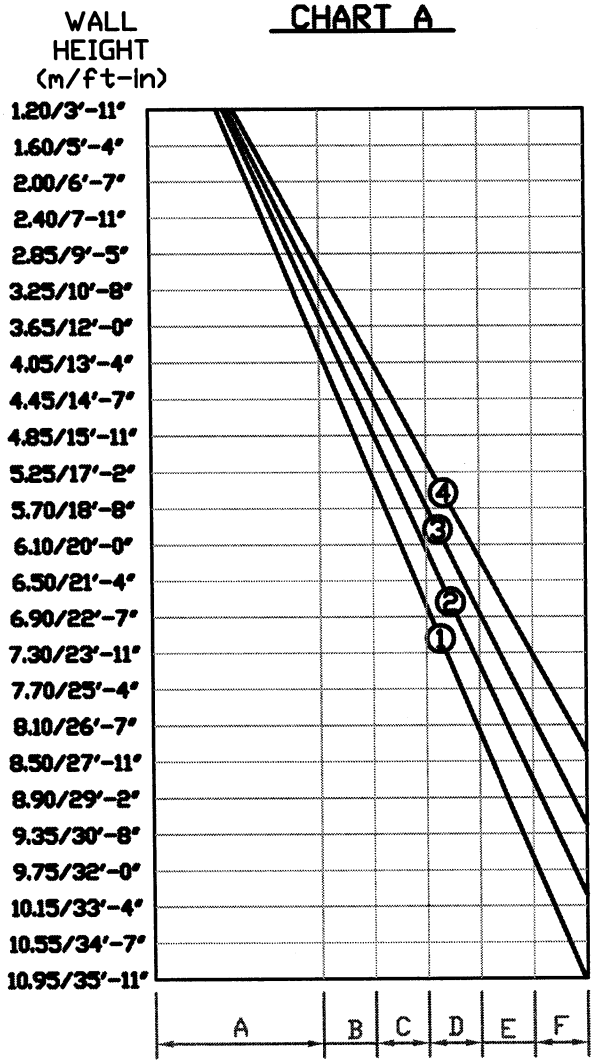
BATTER	LEVEL	SLIGHT WITH SUPERIMPOSED LOAD	SLOPING TO 3 X D	SLOPING ABOVE 3 X D
WALL ON 6V : 1H (1:6) BATTER	 ① R=0.45 (R=1.5')	 ② R=0.50 (R=1.64')	 3 R=0.55 (R=1.8')	 ④ R=0.60 (R=2.0')

CHART A



WALL DESIGN

FOR REPAIR TO EXISTING WALLS ONLY

MASS HIGHWAY CONSTRUCTION STANDARDS

METAL BIN-TYPE RETAINING WALL DESIGN CHART

DATE OF ISSUE December 2001

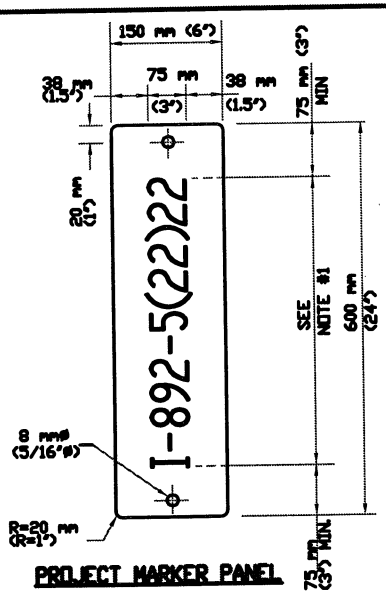
DRAWING NUMBER M/E 503.1.6

MASS HIGHWAY
CONSTRUCTION STANDARDS

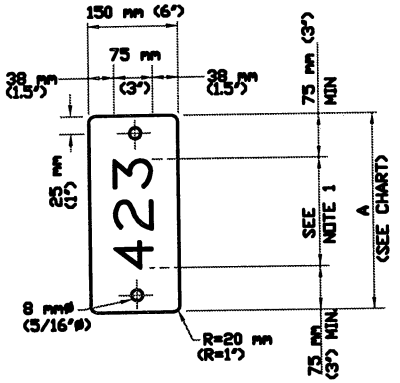
DEMOUNTABLE STATION MARKER AND PROJECT MARKER

DRAWING NUMBER
M/E 505.1.0

DATE OF ISSUE
December 2001

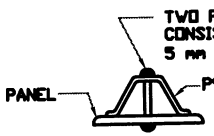


PROJECT MARKER PANEL

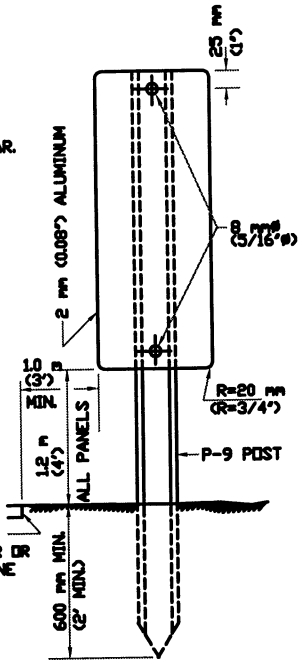


STATION MARKER PANEL

# OF DIGITS	A mm (inches)
1	200 (8)
2	275 (11)
3	325 (13)



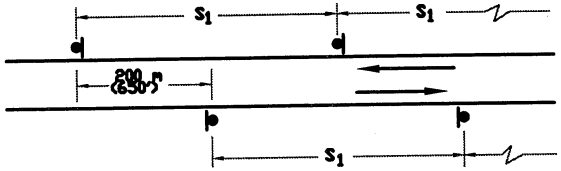
METHOD OF ATTACHING PANEL TO P-9 POST



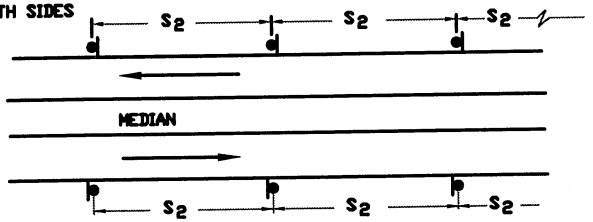
TYPICAL MARKER INSTALLATION

SPACING OF STATION NUMBERS

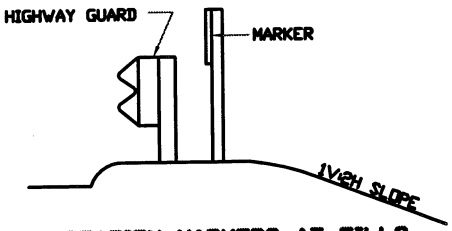
S_1 - 400 m (1300'), BOTH SIDES, STAGGER
S_2 - 200 m (650'), BOTH SIDES



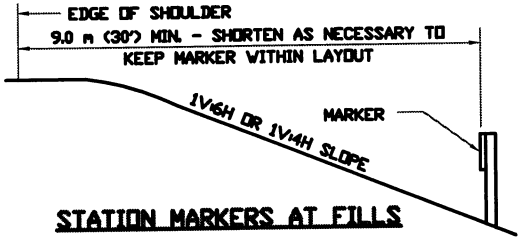
SINGLE ROADWAY



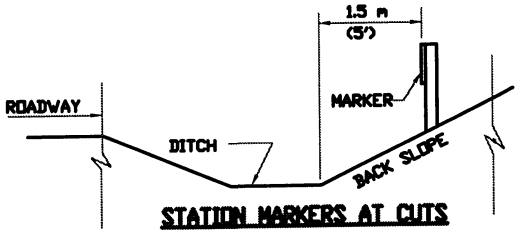
DIVIDED ROADWAY
OMIT MARKERS FROM INTERCHANGE



STATION MARKERS AT FILLS



STATION MARKERS AT FILLS



STATION MARKERS AT CUTS

NOTES:
1. THE LEGEND IS TO BE CENTERED AND THE SPACING OF THE CHARACTERS IS TO CONFORM TO THE FEDERAL HIGHWAY ADMINISTRATION RECOMMENDATION FOR SERIES "C" TYPE LETTERING.
2. THE STATION DESIGNATIONS ARE TO BE EVEN STATIONS i.e. NO PLUS STATIONS.
3. THE PANELS FOR THE LEGEND ARE TO BE 2 mm (0.08") SHEET ALUMINUM. FABRICATED AND FINISHED ACCORDING TO THE STANDARD SPECIFICATIONS.
4. THE LETTERS AND NUMERALS AND METHOD OF APPLICATIONS ARE DESCRIBED IN THE STANDARD SPECIFICATIONS.
5. ALL PANELS ARE TO BE MOUNTED ON NEW P-9 POST IN THE MANNER DESCRIBED IN THE STANDARD SPECIFICATIONS.
6. ONE MARKER IS TO BE PROVIDED AT CULVERT END, WHERE NO GUARD RAIL IS INSTALLED IT IS TO BE LOCATED AT THE NEAR BACK CORNER OF THE END IN THE DIRECTION OF TRAFFIC.
7. MARKERS ARE TO BE PLACED AT 200 m (650') INTERVALS; ON UNDIVIDED ROADWAY STAGGER ON EACH SIDE, ON DIVIDED ROADWAY PLACE MARKERS OPPOSITE EACH OTHER.
8. SEE DRAWING TR.2.3 FOR P-9 POST DIMENSIONS.