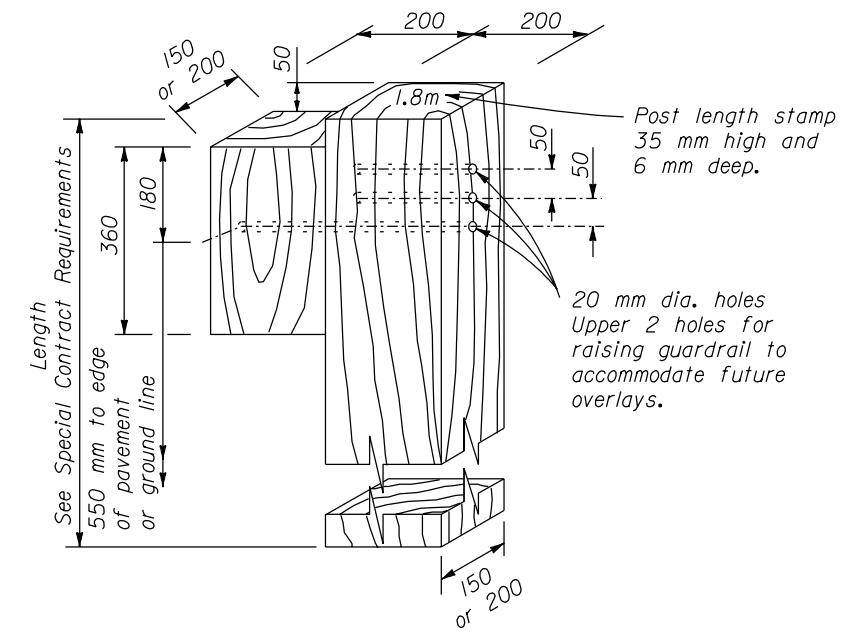
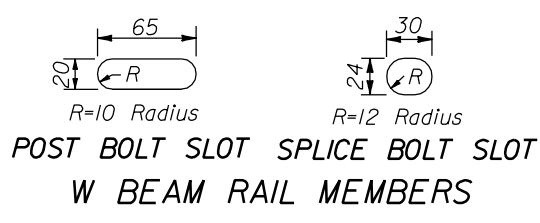


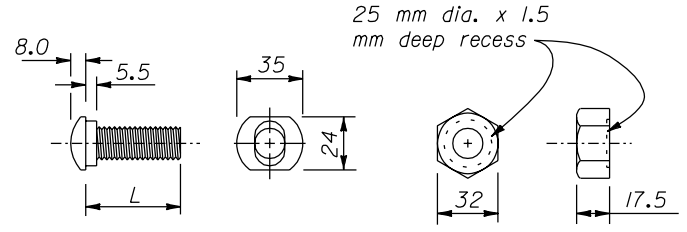
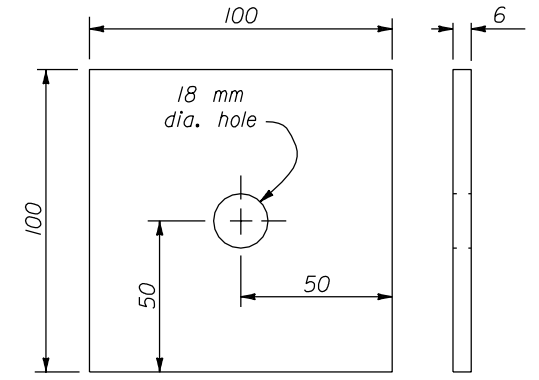
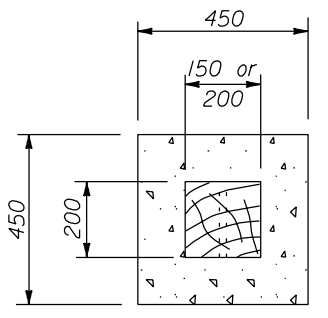
- NOTE:**
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 - Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.



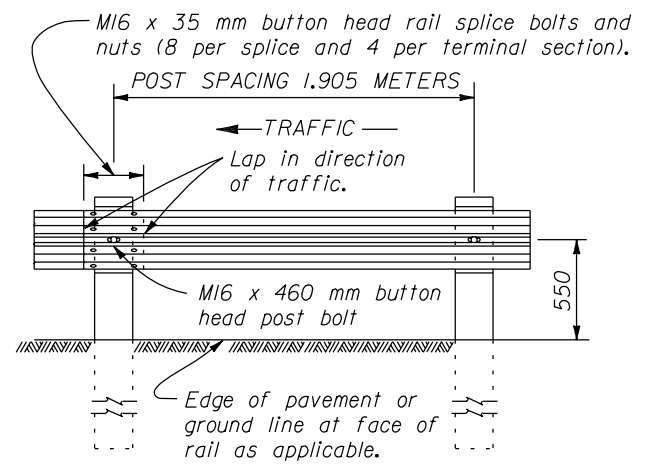
RAIL ELEMENT ELEVATION



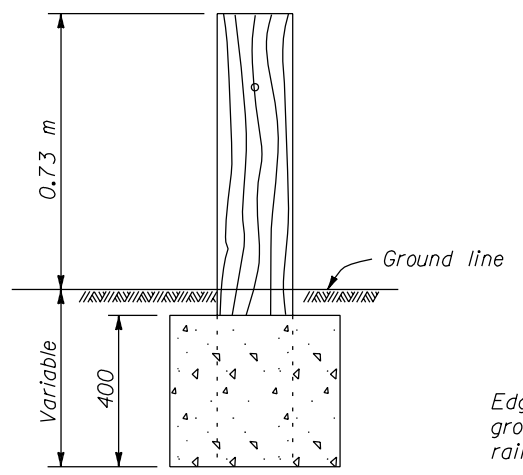
L	Threaded Length
35	Full length
50	30 minimum
255	45 minimum
460	100 minimum
640	100 minimum



**M16 BUTTON HEAD BOLT M16 RECESS NUT
BUTTON HEAD BOLT AND RECESS NUT**



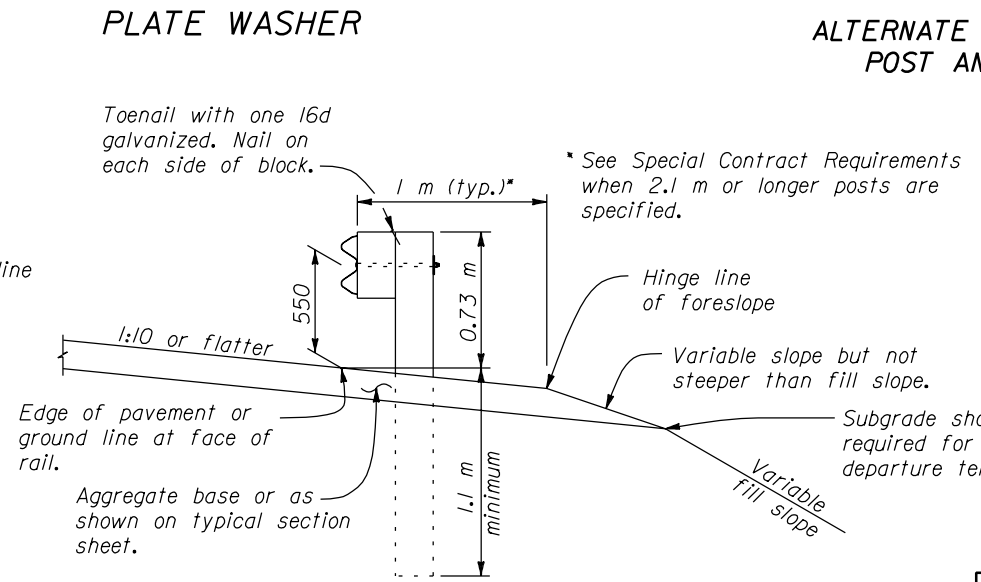
**POST SPACING
STANDARD POST SECTION**



Use 500 mm diameter round anchor or 450 mm square anchor. Reduced size acceptable in solid rock.

Wrap post with 13 mm styrofoam where it contacts the concrete anchor.

**CONCRETE ANCHOR FOR
SHORT GUARDRAIL POST**



TYPICAL GUARDRAIL CROSS SECTION

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

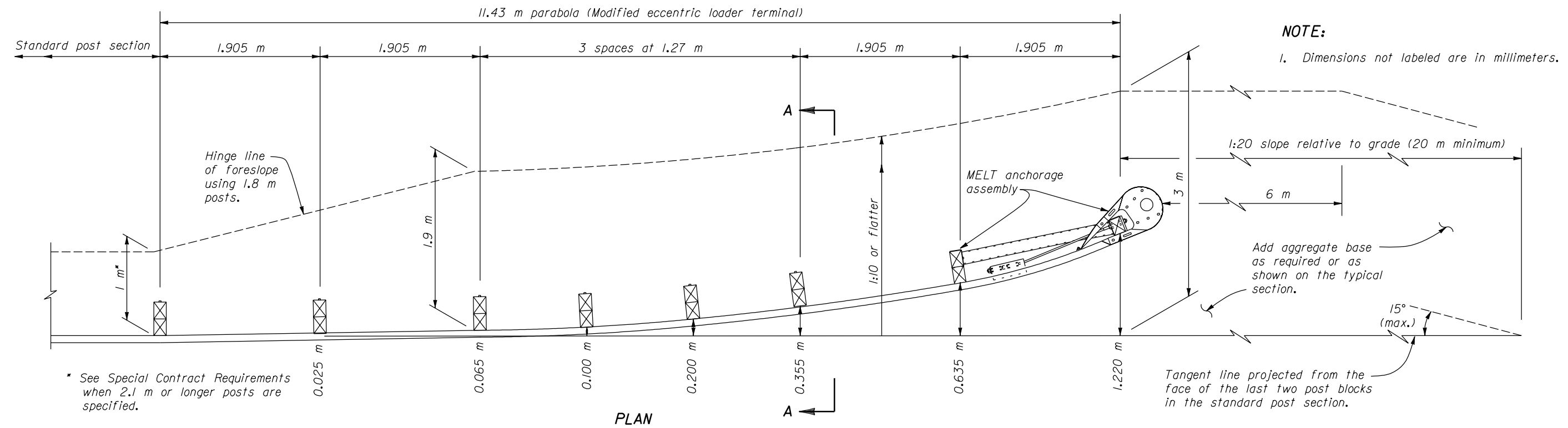
METRIC STANDARD

**G4 W BEAM GUARDRAIL
WOOD POSTS**

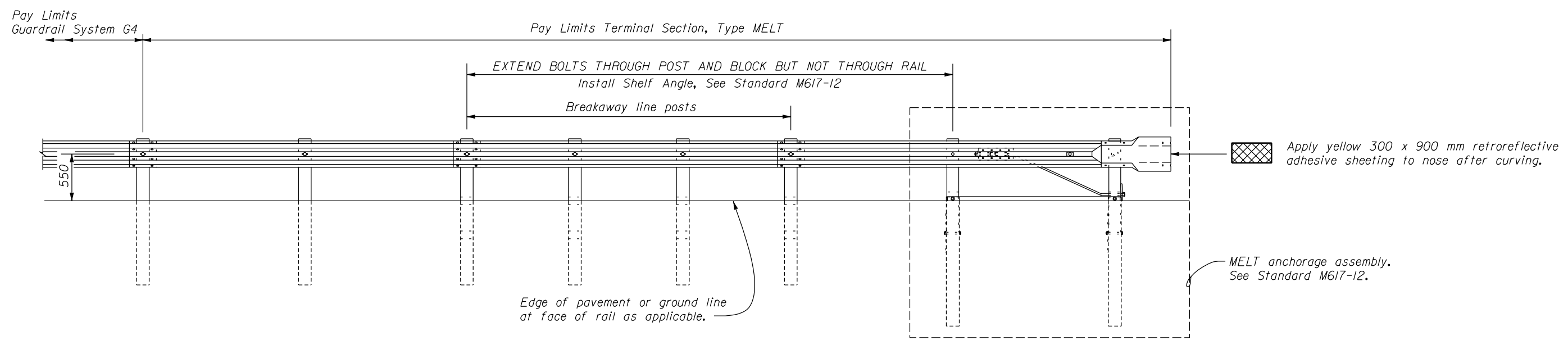
STANDARD APPROVED FOR USE 3/1996
REVISED: 8/1997

STANDARD
M617-10

22 NOV 2000 f:\standrow\metric\m61710.dgn

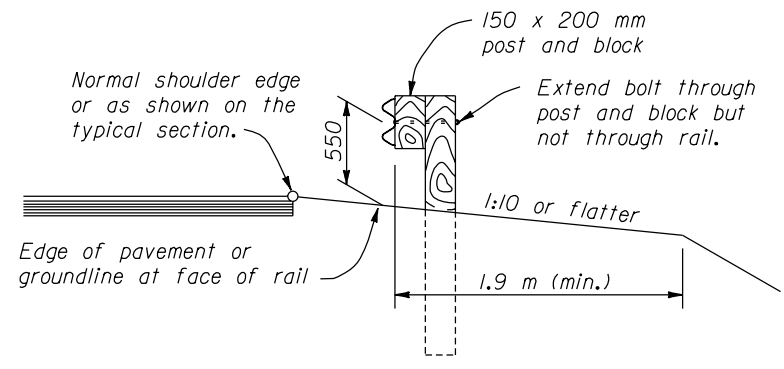
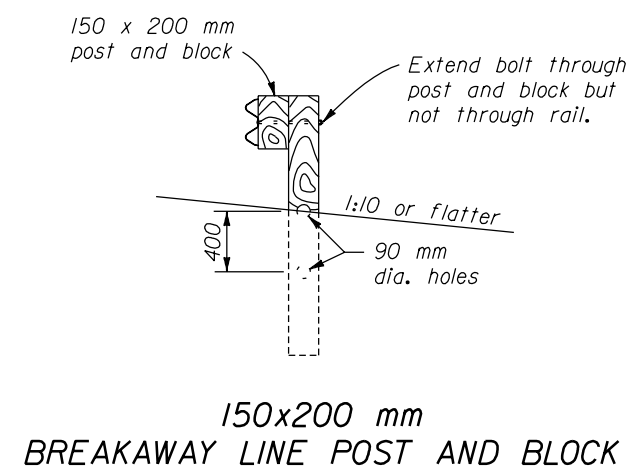


PLAN



ELEVATION

APPROACH & DEPARTURE FLARE WITH MODIFIED ECCENTRIC LOADER TERMINAL



SECTION A-A

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

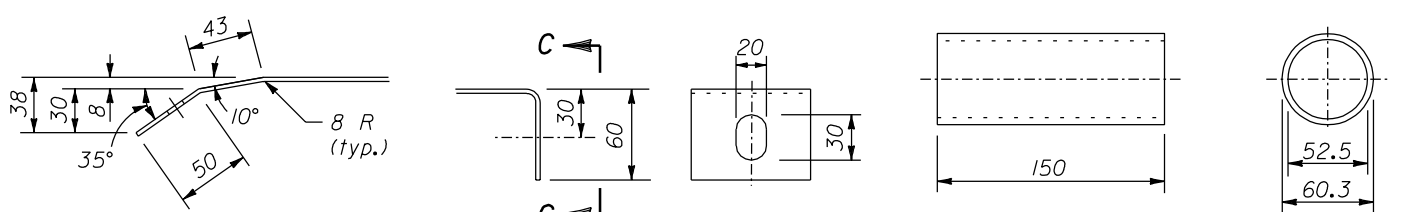
METRIC STANDARD
G4 W BEAM GUARDRAIL
MODIFIED ECCENTRIC
LOADER TERMINAL
TERMINAL SECTION, TYPE MELT

STANDARD APPROVED FOR USE 3/1996

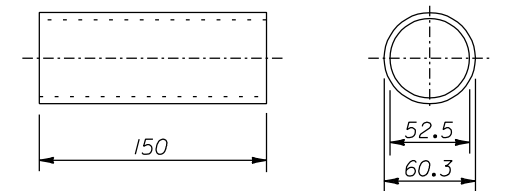
REVISOR: 12/1998

STANDARD
M617-11

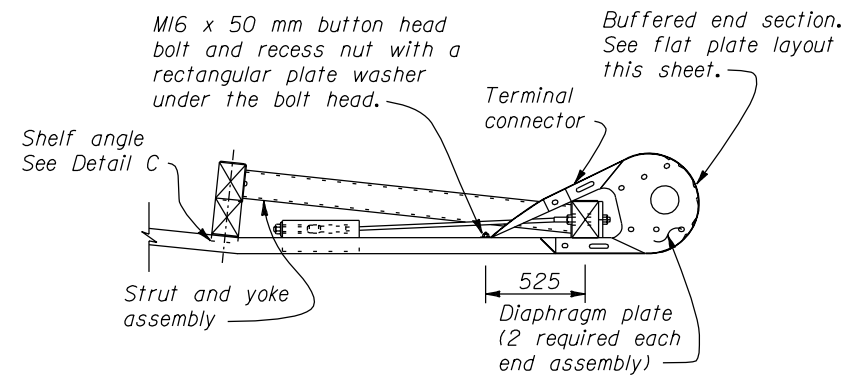
22 NOV 2000 f:\standard\metric\m617\l\dgn



VIEW A-A SECTION B-B VIEW C-C
DIAPHRAGM PLATE DETAILS

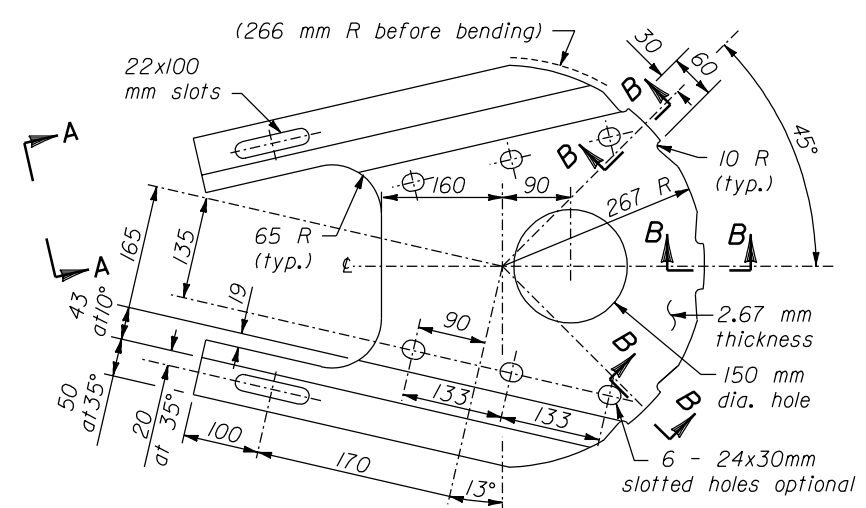


GALVANIZED STANDARD PIPE POST SLEEVE

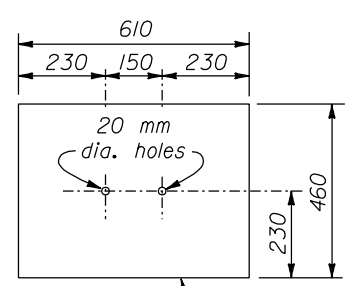


PLAN

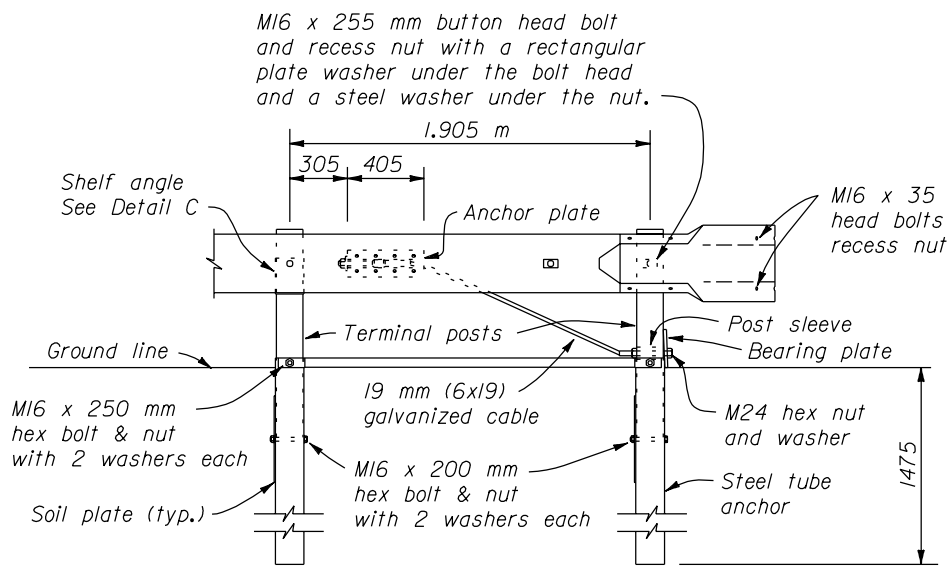
- NOTE:**
1. Dimension not labeled are in millimeters.
 2. Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance, and accepted manufacturing practices.
 3. Furnish hardware in metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.



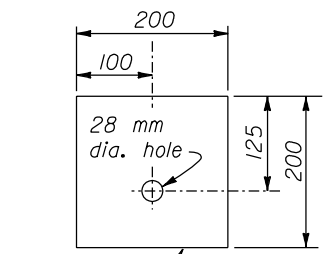
DIAPHRAGM PLATE
(2 required each terminal)



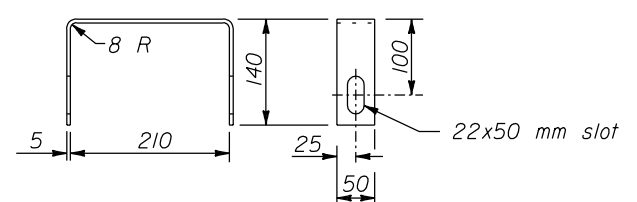
SOIL PLATE
(2 reqd.)



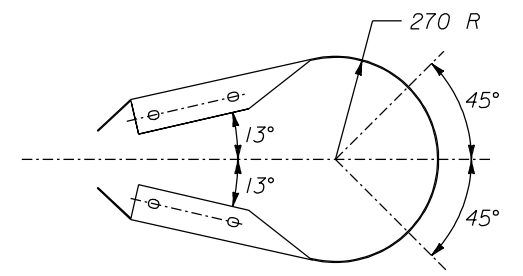
ELEVATION
ANCHORAGE ASSEMBLY



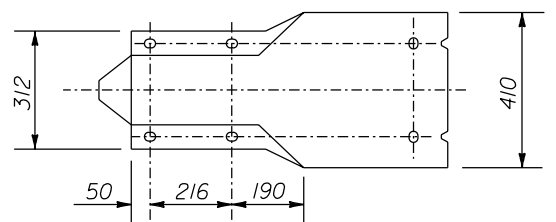
BEARING PLATE



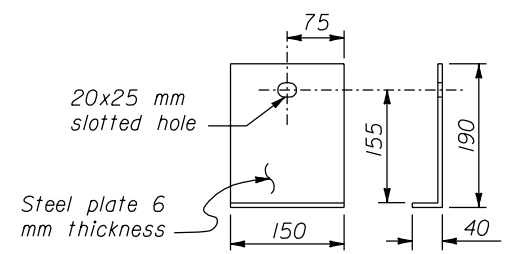
YOKE DETAILS



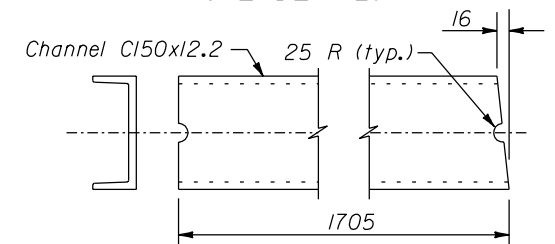
PLAN



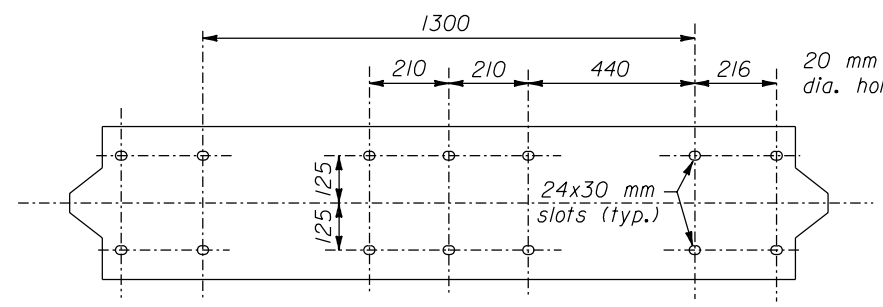
ELEVATION



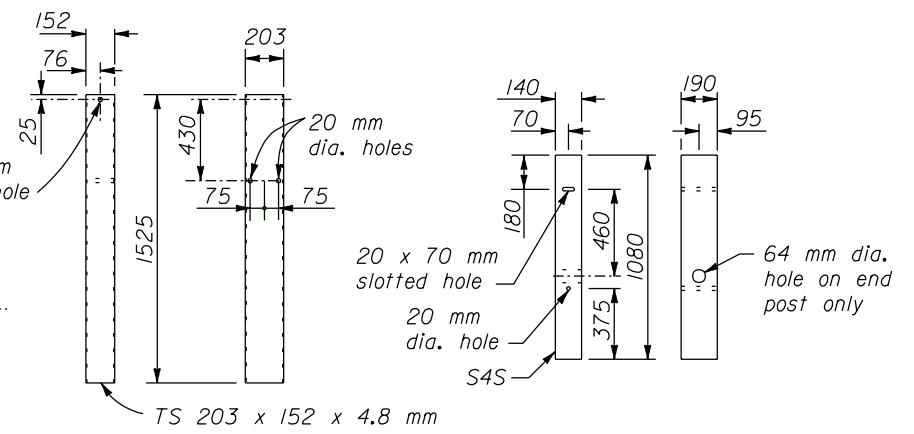
DETAIL C
SHELF ANGLE



STRUT DETAILS



BUFFERED END SECTION
FLAT PLATE LAYOUT



STEEL TUBE ANCHOR

TERMINAL POST

NO SCALE

Shown, legs down,
For opposite hand, install legs up.
STRUT AND YOKE ASSEMBLY

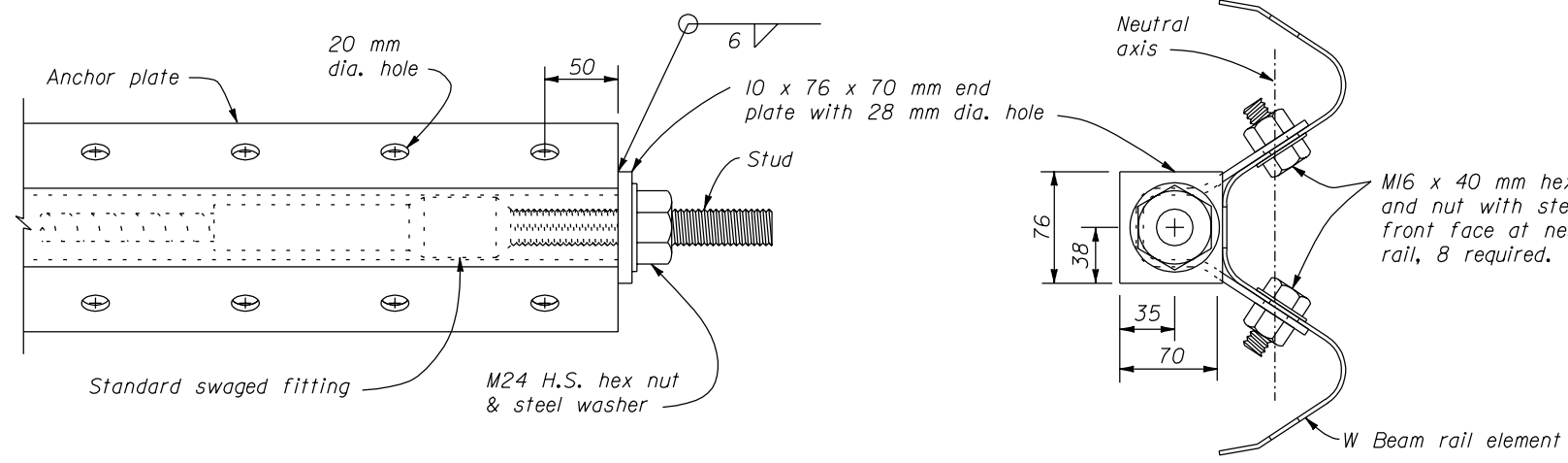
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

METRIC STANDARD
G4 W BEAM GUARDRAIL
MODIFIED ECCENTRIC
LOADER TERMINAL
MELT ANCHORAGE ASSEMBLY

STANDARD APPROVED FOR USE 3/1996
REVISED: 8/1997

STANDARD
M617-12

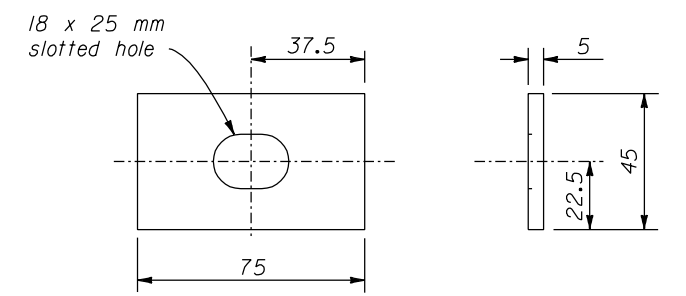
22 NOV 2000
f:\standrow\metric\m61712.dgn



NOTE:

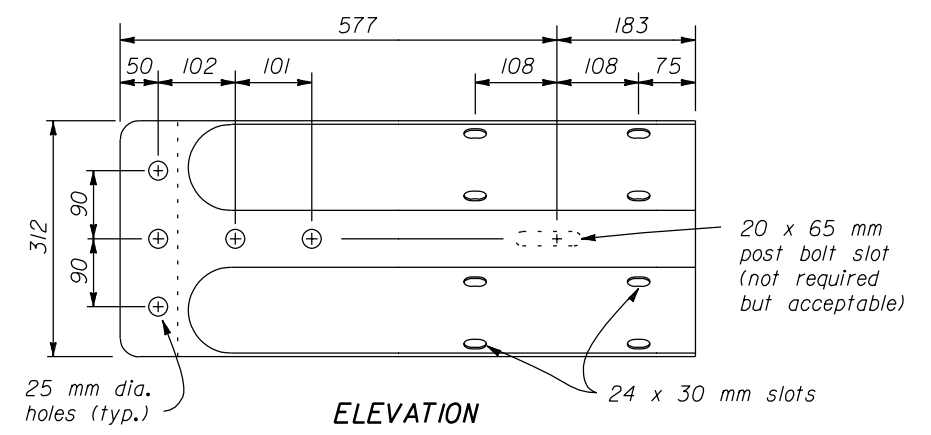
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2. Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance, and accepted manufacturing practices.
3. Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.

ANCHOR PLATE DETAILS FOR MELT ANCHORAGE ASSEMBLY

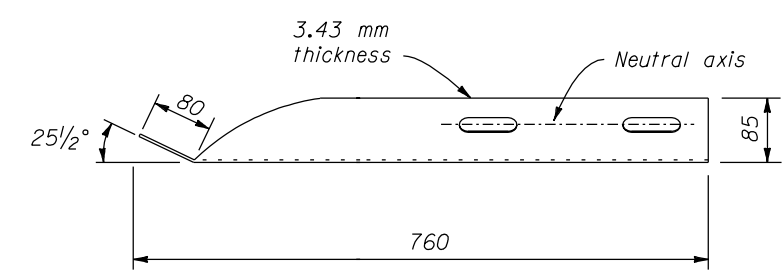


(Use to attach the end section to the end post of anchorage assembly)

RECTANGULAR PLATE WASHER

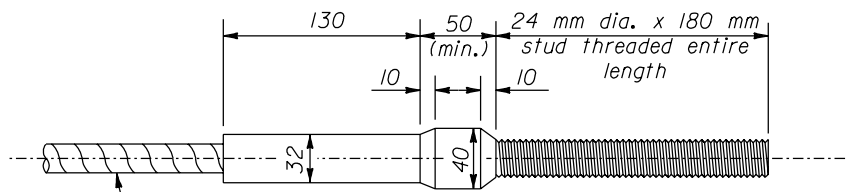


ELEVATION

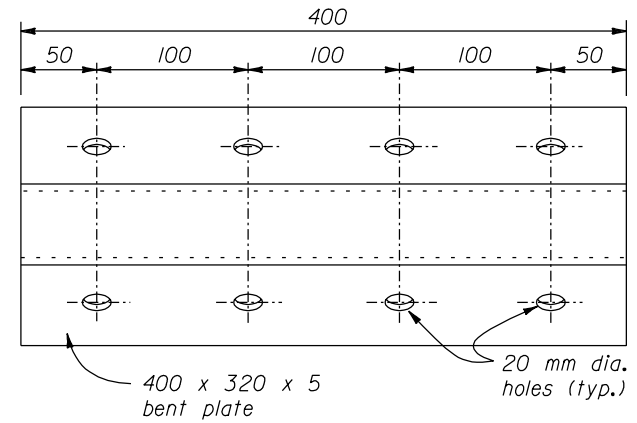


PLAN

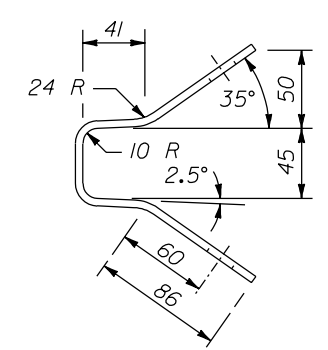
TERMINAL CONNECTOR



CABLE ASSEMBLY
(Standard swaged fitting and stud)

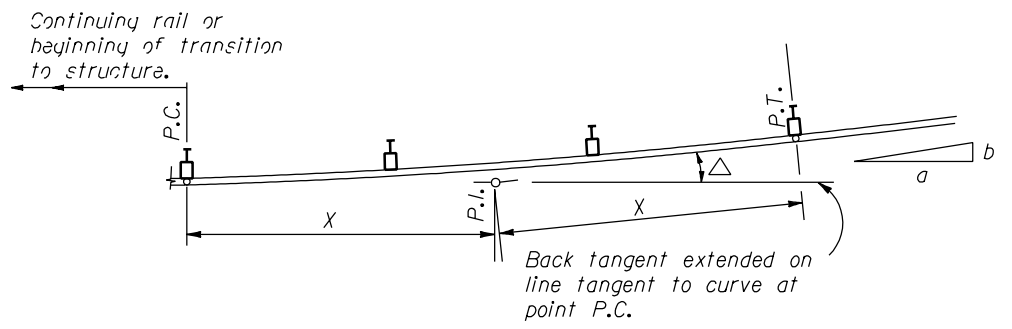


ANCHOR PLATE



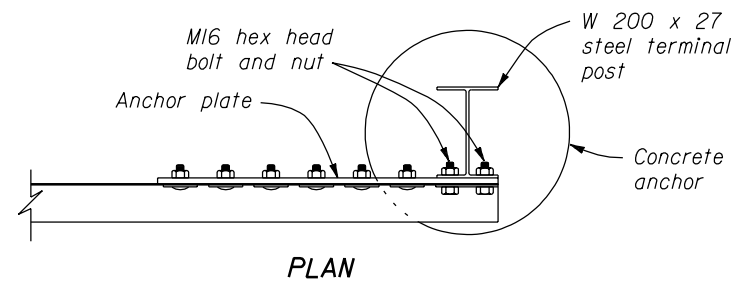
U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION FEDERAL LANDS HIGHWAY	
METRIC STANDARD	
G4 W BEAM GUARDRAIL MELT ANCHORAGE ASSEMBLY DETAILS	
STANDARD APPROVED FOR USE 3/1996	STANDARD
REVISED: 12/1998	M617-13

NO SCALE

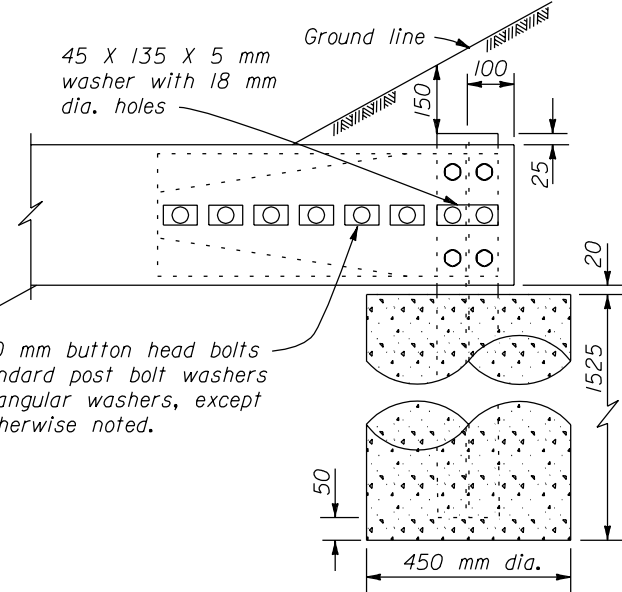


DETAIL A

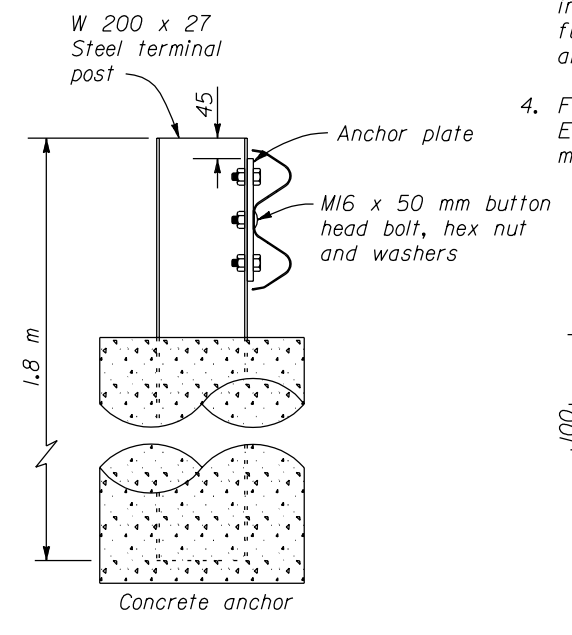
DESIGN SPEED km/h	a:b	Δ	Radius meters	X meters
110	15:1	3°48'51"	85.850	2.858
100	13:1	4°23'55"	74.442	2.859
90	12:1	4°45'49"	68.739	2.859
80	11:1	5°11'40"	63.037	2.859
70	10:1	5°42'38"	57.340	2.860
60	9:1	6°20'25"	51.645	2.860
50 or less	7:1	8°07'48"	40.276	2.862



PLAN

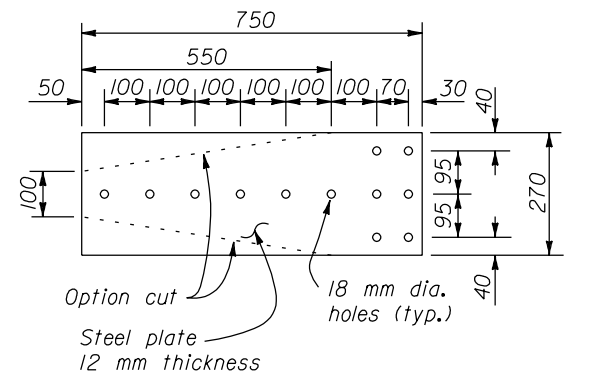


ELEVATION



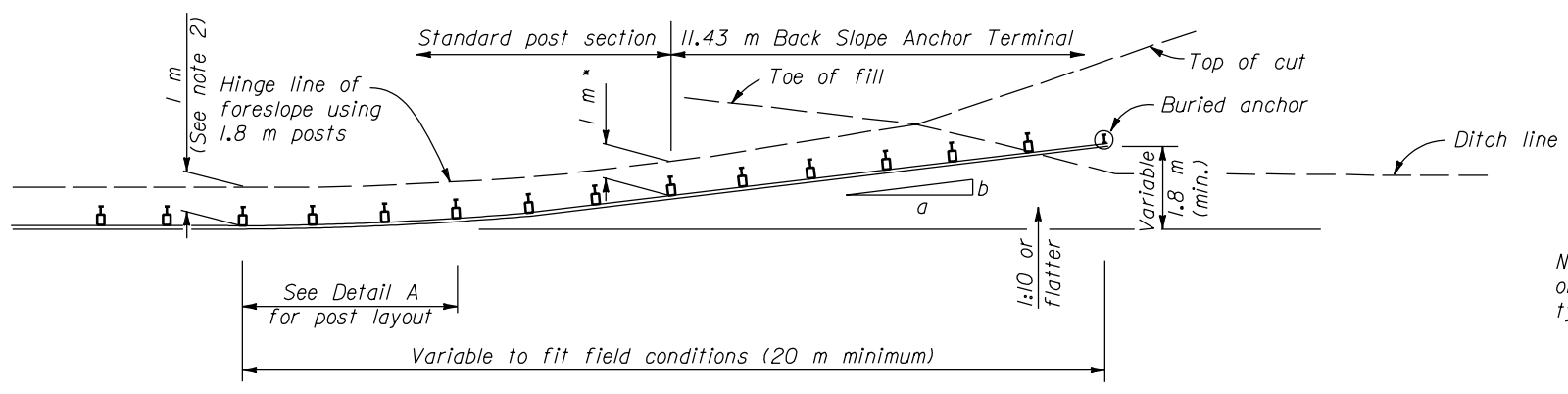
SIDE

- NOTE:**
- All dimensions not labeled are in millimeters.
 - See special contract requirements when 2.1 m or longer posts are specified.
 - Dimensional tolerance not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance, and accepted manufacturing practices.
 - Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.

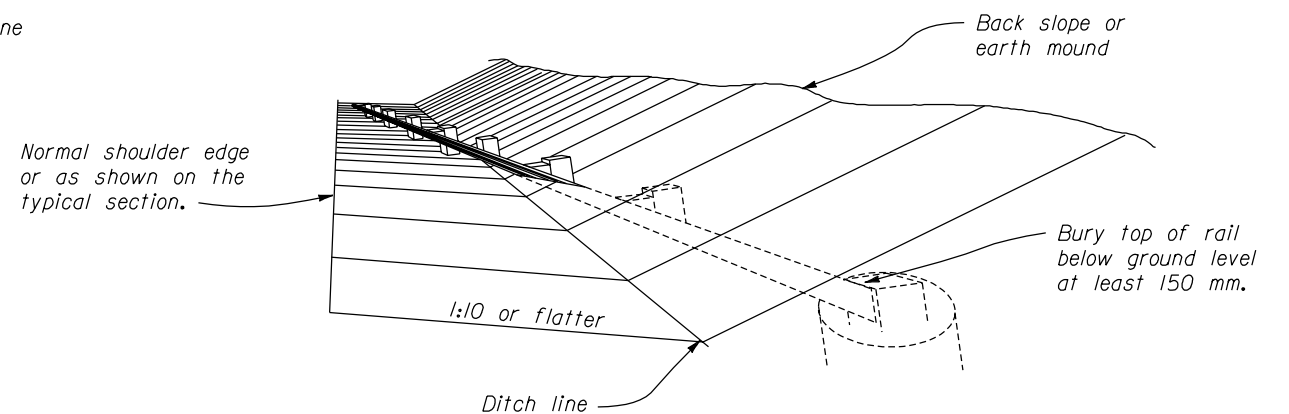


ANCHOR PLATE

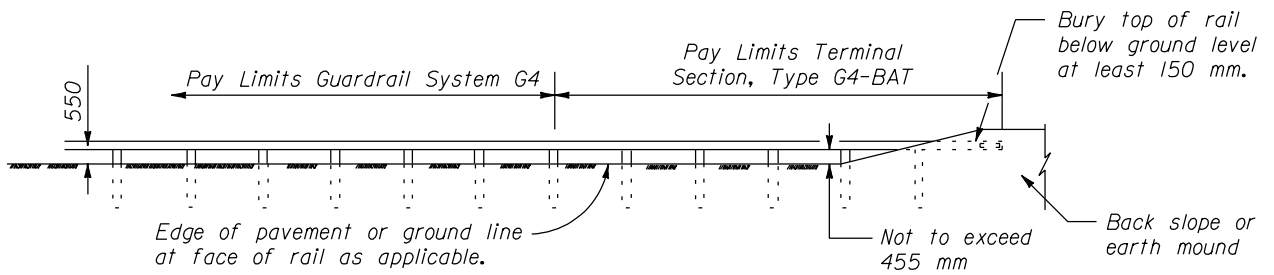
BACK SLOPE ANCHOR ASSEMBLY



PLAN

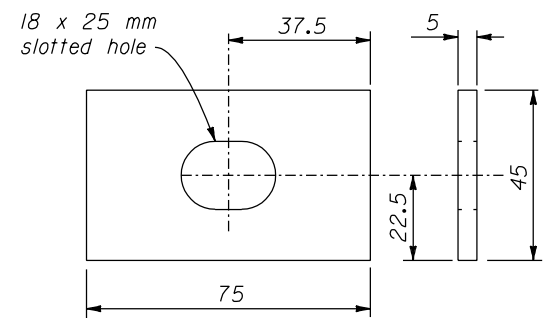


PERSPECTIVE VIEW



ELEVATION

APPROACH & DEPARTURE FLARE WITH BACK SLOPE ANCHOR TERMINAL



RECTANGULAR PLATE WASHER

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

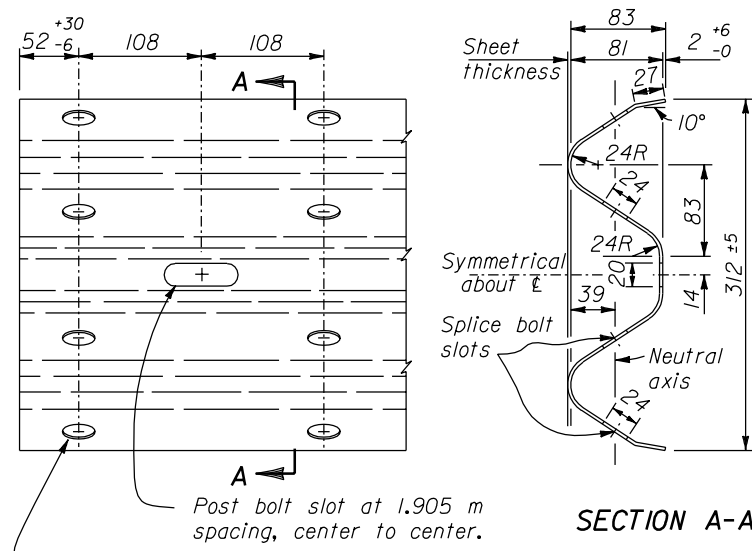
METRIC STANDARD
G4 W BEAM GUARDRAIL
BACK SLOPE ANCHOR TERMINAL
WOOD OR STEEL POSTS
TERMINAL SECTION, TYPE G4-BAT

STANDARD APPROVED FOR USE 3/1996
REVISED: 6/1997

STANDARD
M617-17

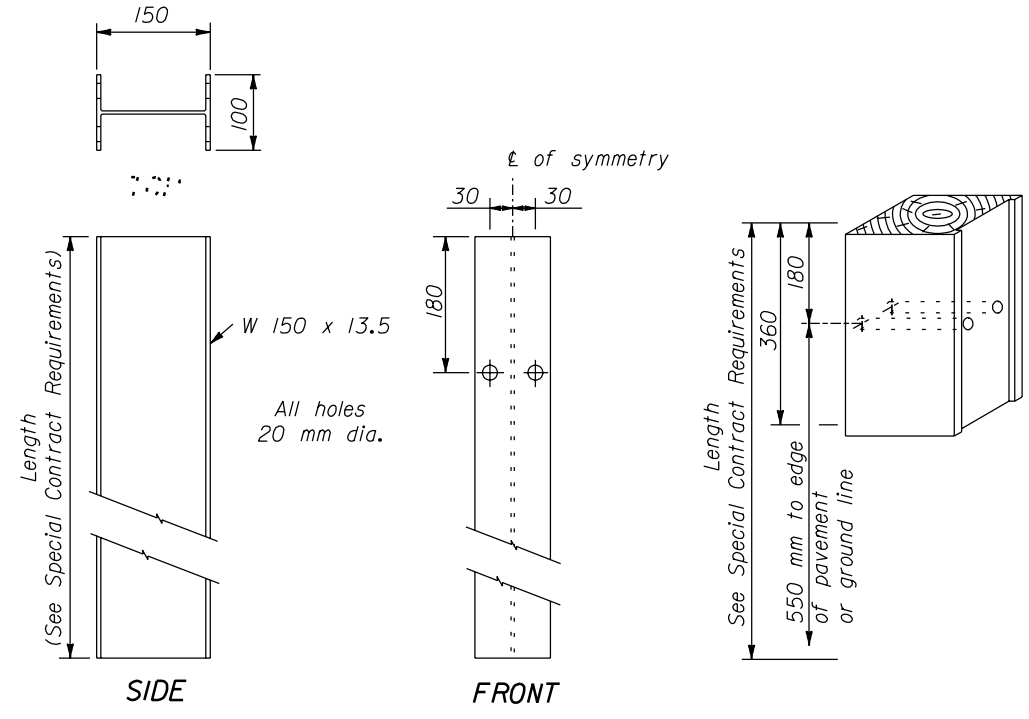
NO SCALE

22 NOV 2000 f:\standrow\metric\ms161717.dgn



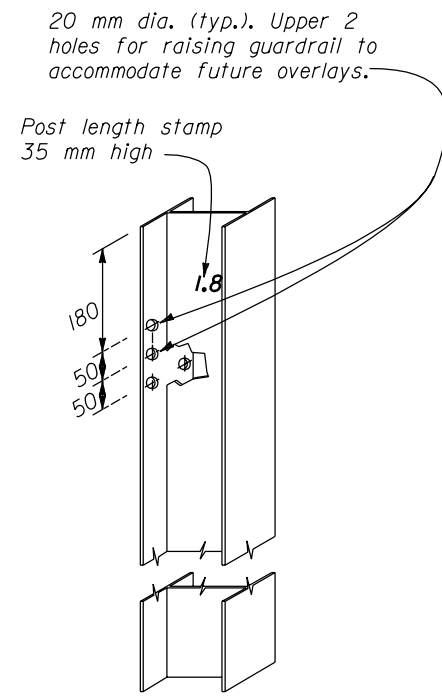
RAIL ELEMENT ELEVATION

SECTION A-A

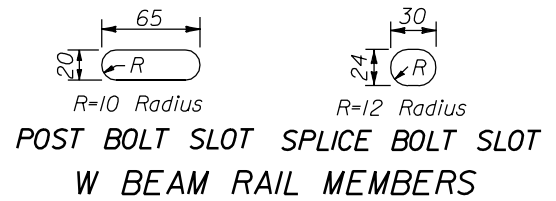


STRUCTURAL SHAPE POST

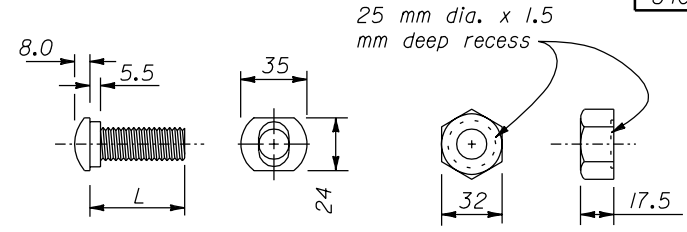
ALTERNATE HOLE ARRANGEMENT POST AND BLOCK DETAIL



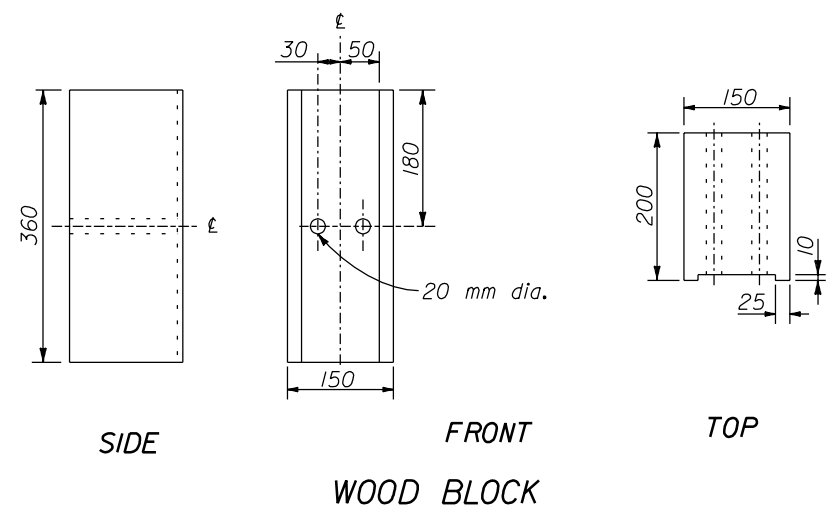
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 3. Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.



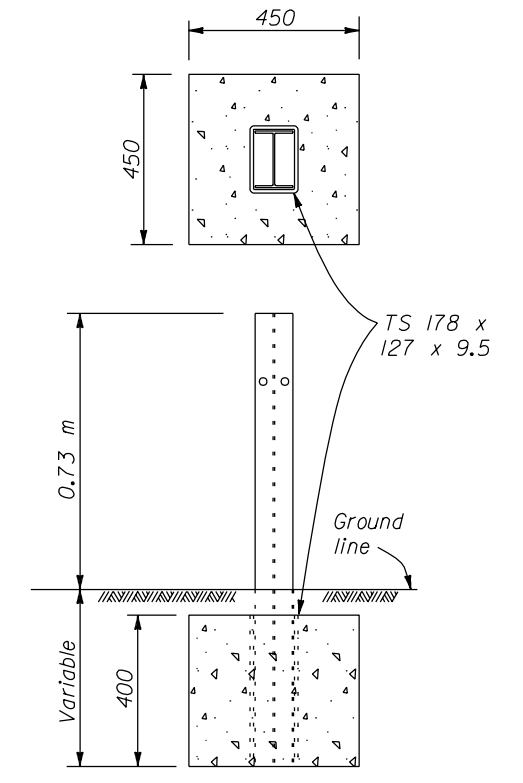
L	Threaded Length
35	Full length
50	30 minimum
255	45 minimum
460	100 minimum
640	100 minimum



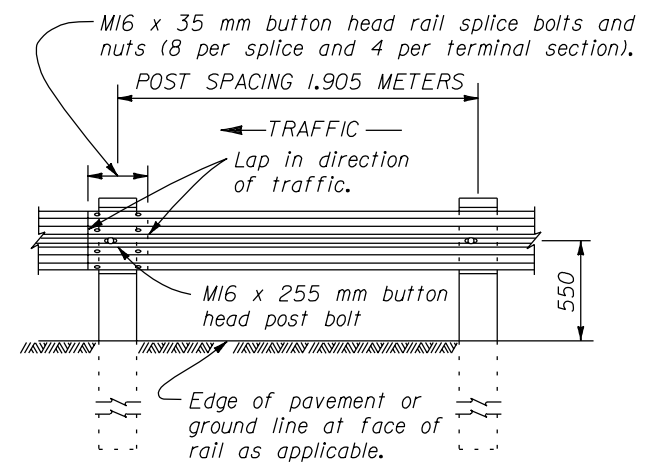
MI6 BUTTON HEAD BOLT MI6 RECESS NUT
BUTTON HEAD BOLT AND RECESS NUT



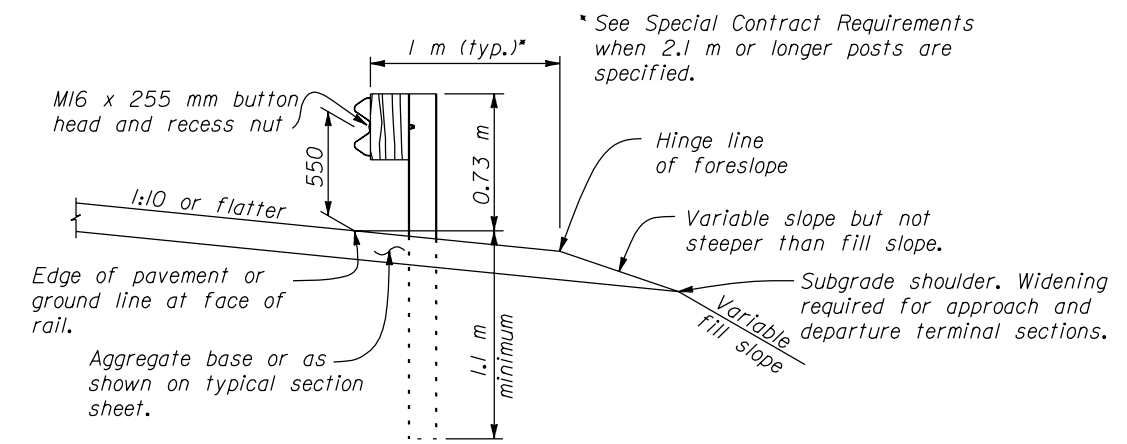
WOOD BLOCK



CONCRETE ANCHOR FOR SHORT GUARDRAIL POST



POST SPACING STANDARD POST SECTION



TYPICAL GUARDRAIL CROSS SECTION

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

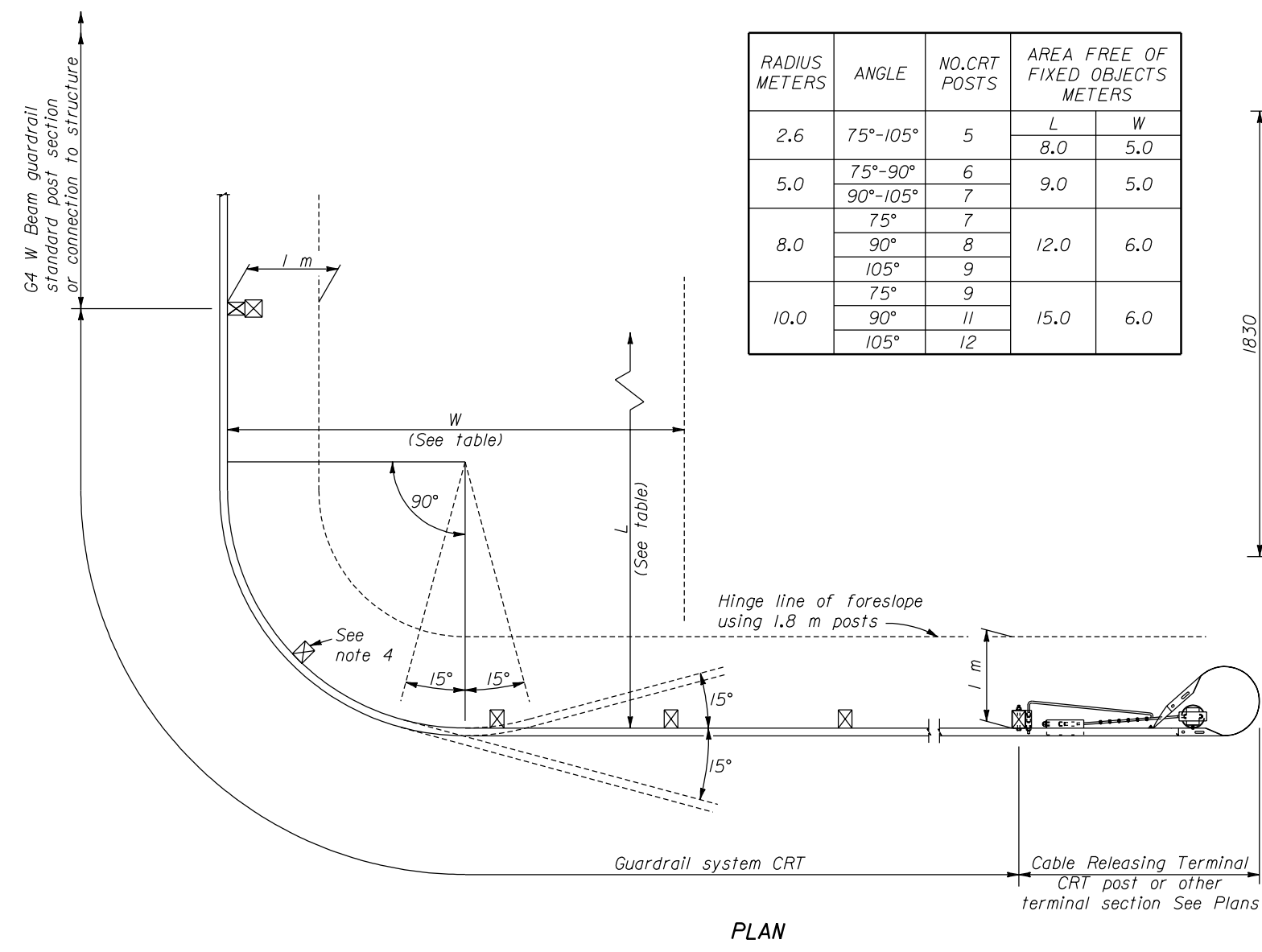
METRIC STANDARD

G4 W BEAM GUARDRAIL STEEL POSTS

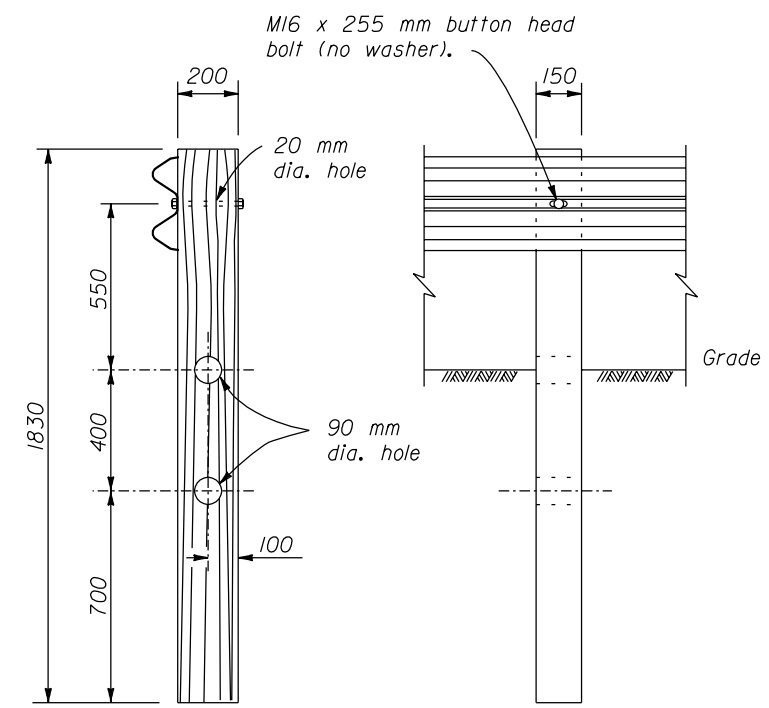
STANDARD APPROVED FOR USE 3/1996
REVISED: 12/1998

STANDARD
M617-18

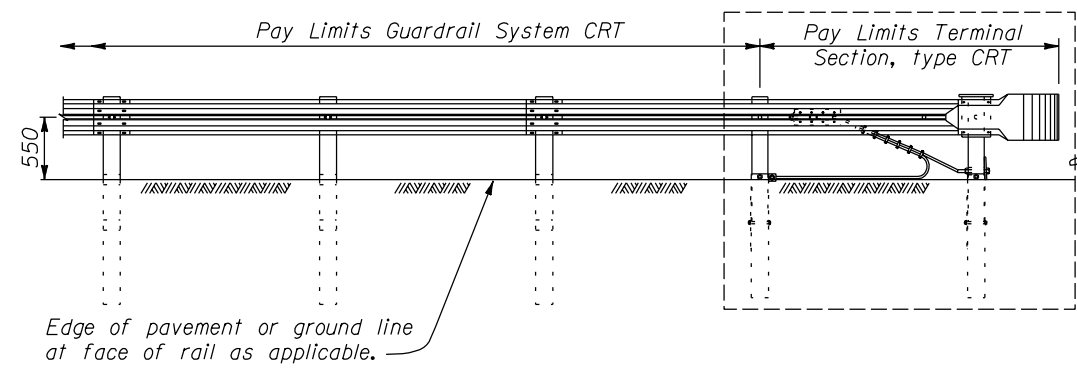
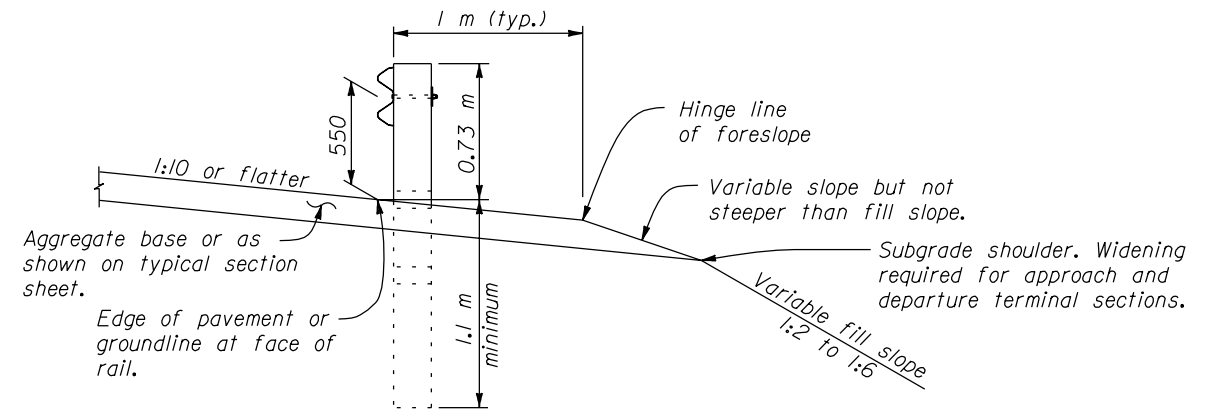
22 NOV 2000 f:\standrow\metric\mst61718.dgn



RADIUS METERS	ANGLE	NO. CRT POSTS	AREA FREE OF FIXED OBJECTS METERS	
			L	W
2.6	75°-105°	5	8.0	5.0
			5.0	5.0
5.0	75°-90°	6	9.0	5.0
	90°-105°	7		
8.0	75°	7	12.0	6.0
	90°	8		
	105°	9		
10.0	75°	9	15.0	6.0
	90°	11		
	105°	12		



- NOTE:**
1. Dimensions not labeled are in millimeters.
 2. Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance, and accepted manufacturing practices.
 3. The use of terminal section, Type CRT, is limited to driveways, road approaches and low speed minor road connections. Do not use on mainline roadways.
 4. Do not bolt post to W beam for 2.6 m radius only.
 5. Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.



ELEVATION

GUARDRAIL SYSTEM CRT WITH CABLE RELEASING TERMINAL CRT POSTS

U.S. DEPARTMENT OF TRANSPORTATION
 FEDERAL HIGHWAY ADMINISTRATION
 FEDERAL LANDS HIGHWAY

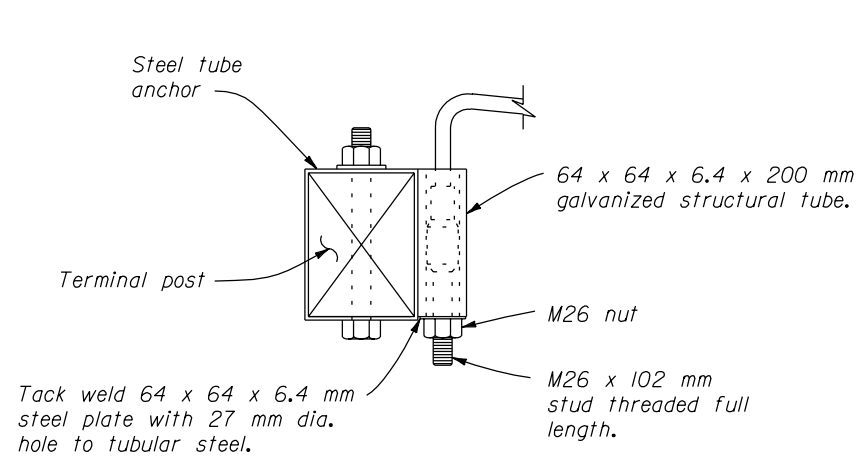
METRIC STANDARD
CRT W BEAM GUARDRAIL
CABLE RELEASING TERMINAL
CRT POSTS
TERMINAL SECTION, TYPE CRT

STANDARD APPROVED FOR USE 3/1996
 REVISED: 12/1998

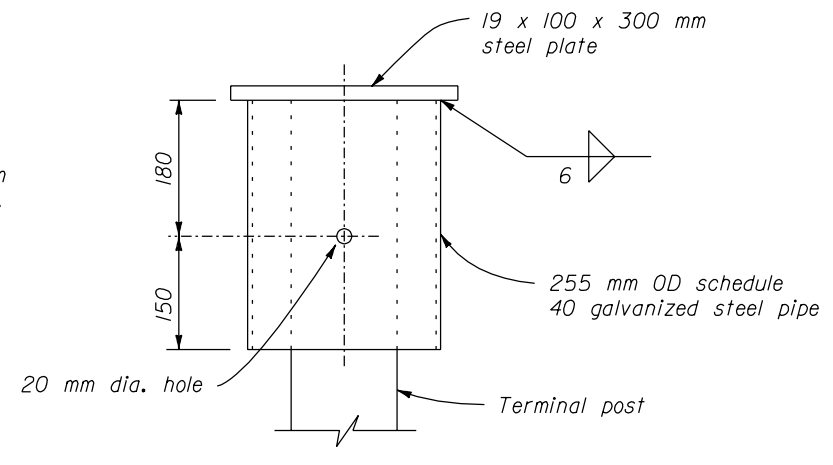
STANDARD
M617-21

NO SCALE

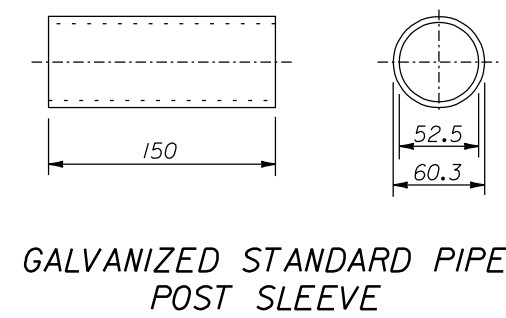
22 NOV 2000 f:\standrow\metric\mst61721.dgn



DETAIL A

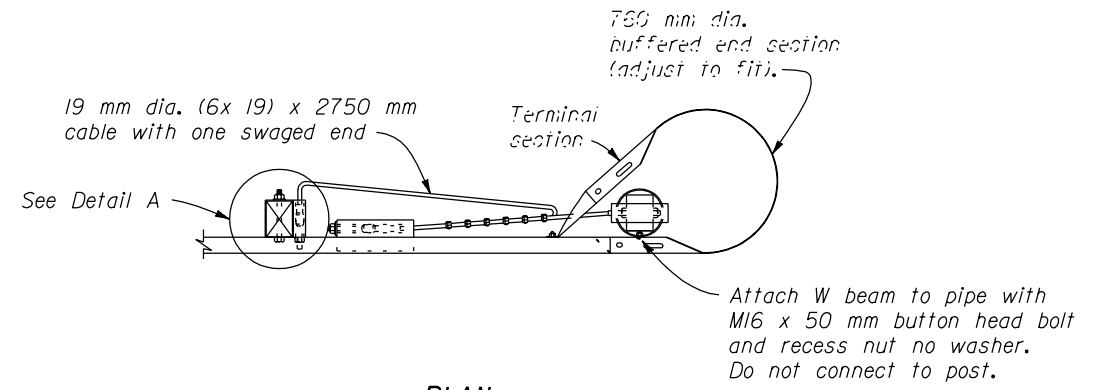


DETAIL B

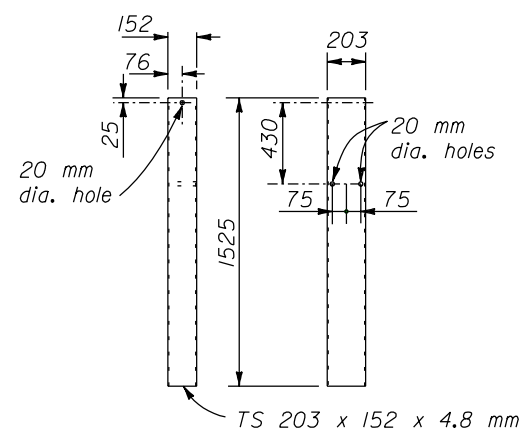


GALVANIZED STANDARD PIPE POST SLEEVE

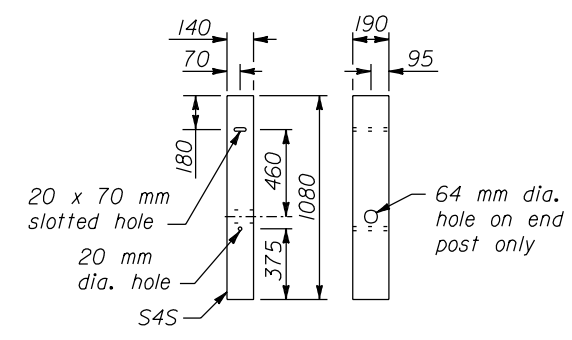
- NOTE:**
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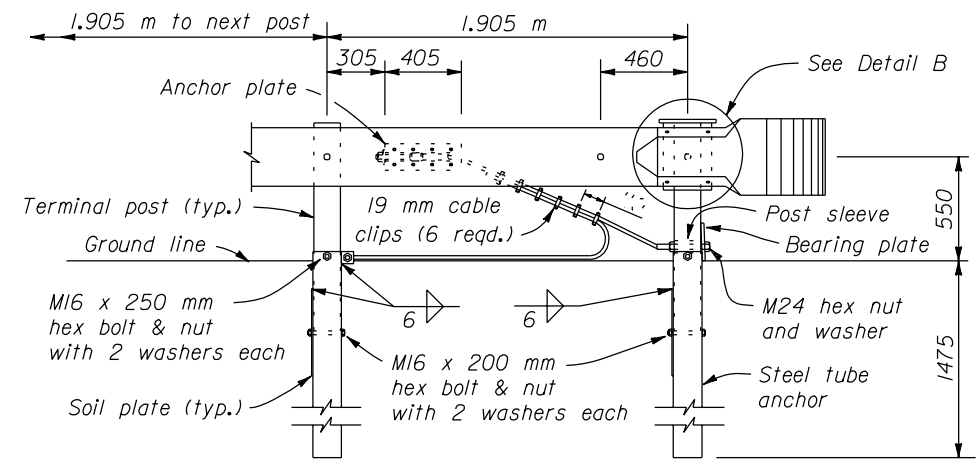
PLAN



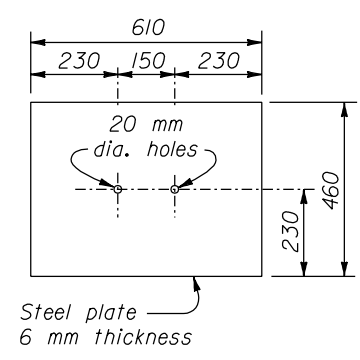
STEEL TUBE ANCHOR



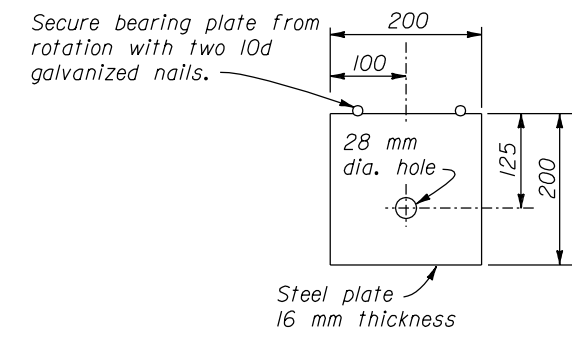
TERMINAL POST



ELEVATION ANCHORAGE ASSEMBLY



SOIL PLATE (2 reqd.)



BEARING PLATE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

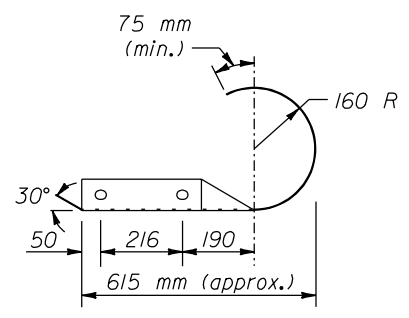
METRIC STANDARD
CRT W BEAM GUARDRAIL
STEEL TUBE ANCHOR
CRT ANCHORAGE ASSEMBLY
CRT POSTS

STANDARD APPROVED FOR USE 3/1996
REVISED:

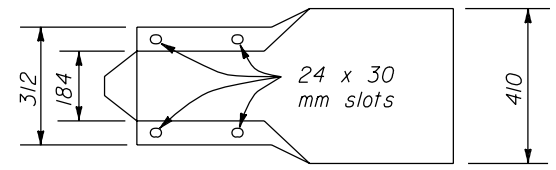
STANDARD
M617-22

NO SCALE

22 NOV 2000 f:\standrow\metric\m61722.dgn

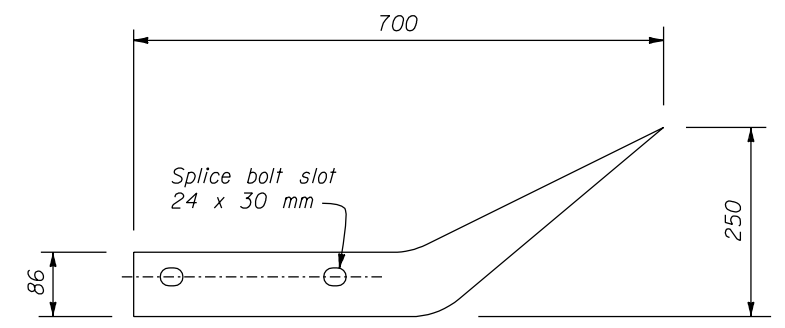


PLAN

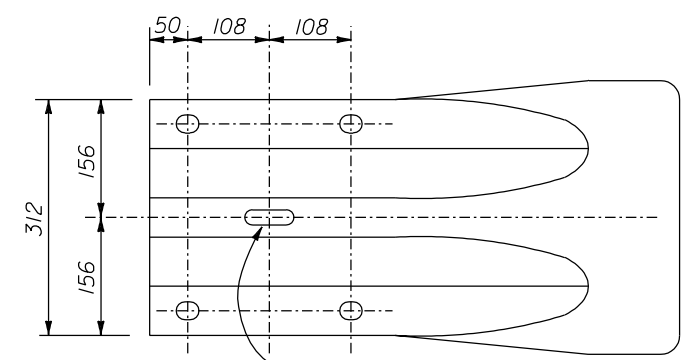


ELEVATION

ROUND END SECTION ASSEMBLY

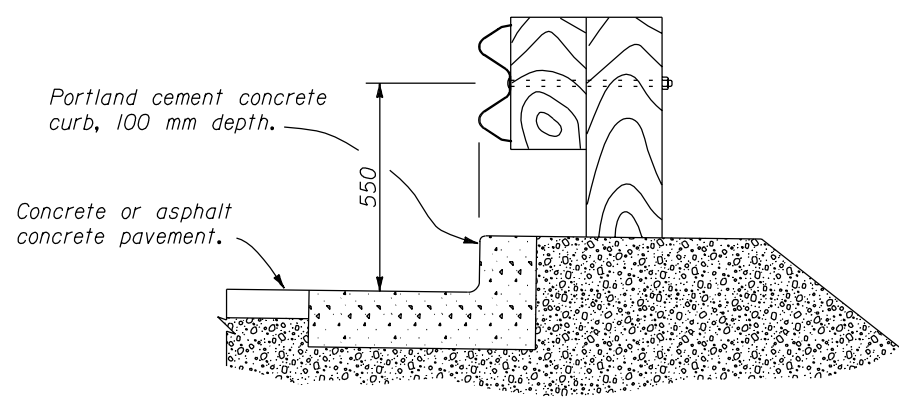


PLAN

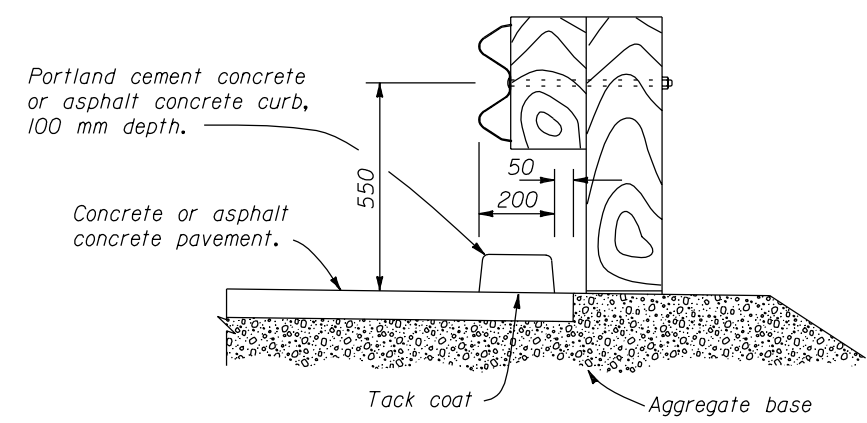


ELEVATION

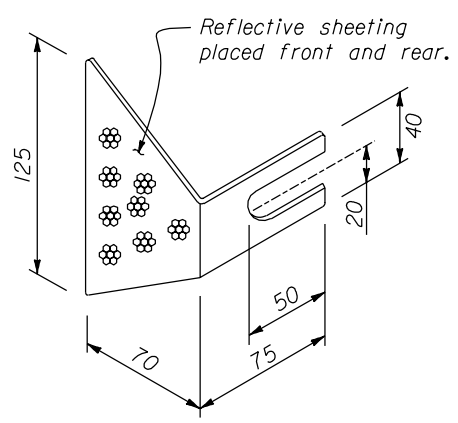
FLARED END SECTION



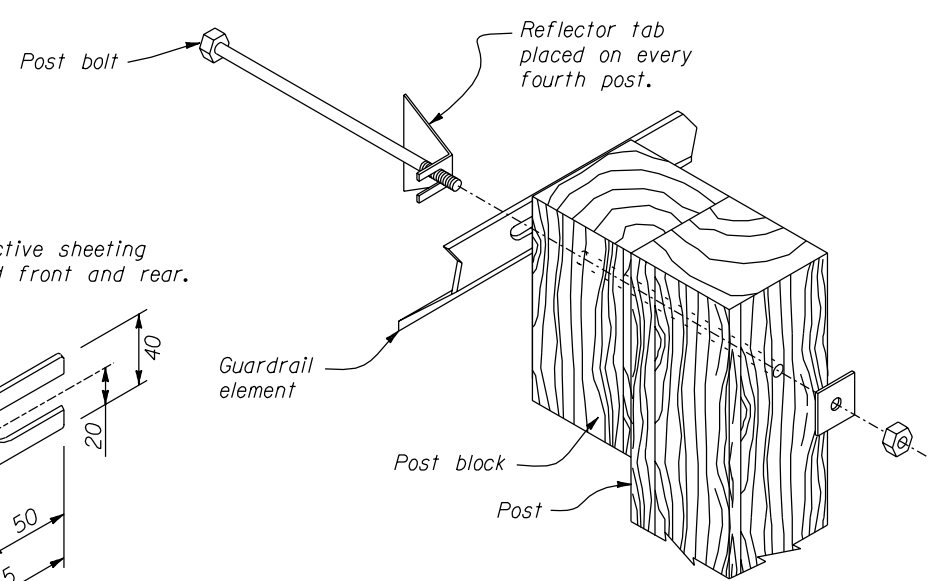
PLACEMENT OF GUARDRAIL AT CURB AND GUTTER LOCATIONS



PLACEMENT OF GUARDRAIL AT CURB LOCATIONS



REFLECTOR TAB



ASSEMBLY DETAIL

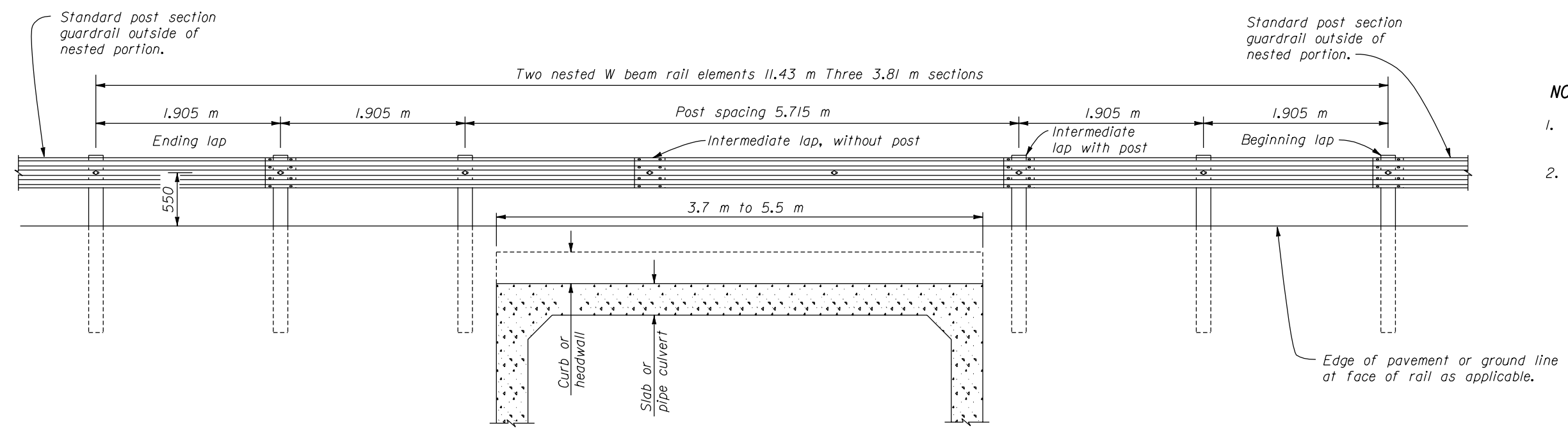
NOTE:

1. Dimensions not labeled are in millimeters.
2. Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance, and accepted manufacturing practices.
3. Rounded or flared end sections are acceptable alternates to buffered end sections and type I end sections on terminal sections at the trailing ends of guardrail runs on the right side of multilane roadways and where shown on the plans on the left side of multilane roadways.
4. The curb, and curb and gutter shapes shown are for illustration only. Actual curb, and curb and gutter shapes and dimensions will show on the plans.
5. Alternate reflector tab shapes are acceptable.
6. Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION FEDERAL LANDS HIGHWAY	
METRIC STANDARD	
G4 W BEAM GUARDRAIL SUPPLEMENTARY INSTALLATION DETAILS	
STANDARD APPROVED FOR USE 3/1996	STANDARD
REVISED:	M617-23

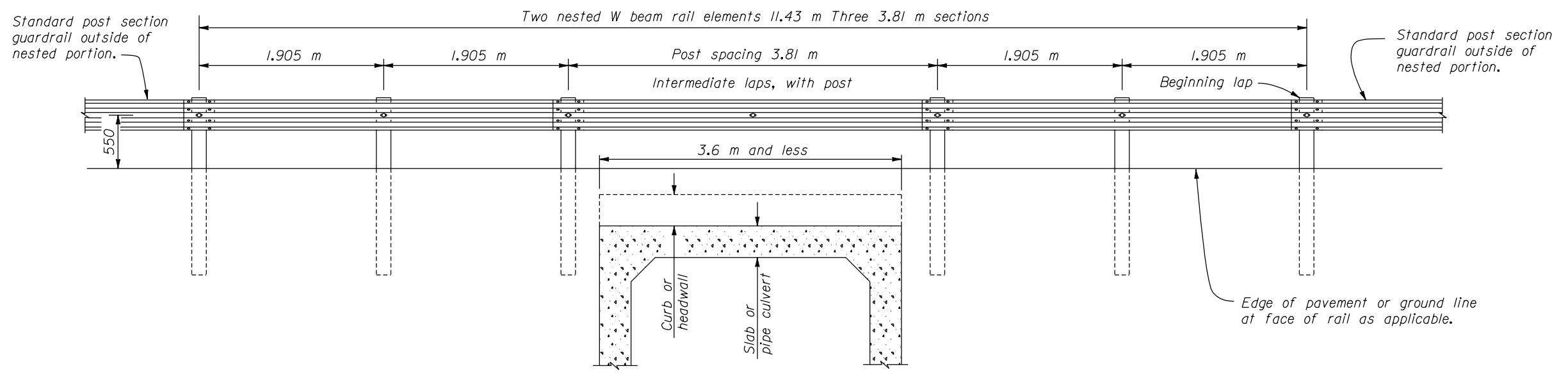
NO SCALE

22 NOV 2000 f:\standrow\metric\m61723.dgn

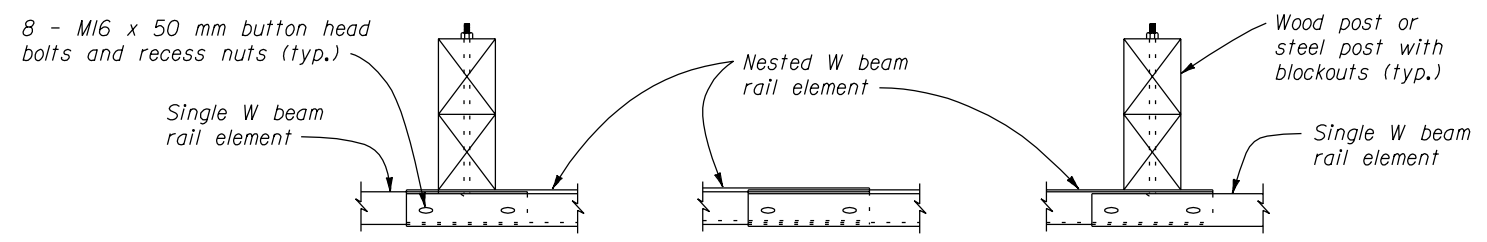


ELEVATION

- NOTE:**
1. Dimensions not labeled are in millimeters.
 2. 7.62 m rail lengths may be used to eliminate the intermediate lap without a post.



ELEVATION



ENDING LAP INTERMEDIATE LAP WITHOUT POST BEGINNING LAP

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION
 FEDERAL HIGHWAY ADMINISTRATION
 FEDERAL LANDS HIGHWAY

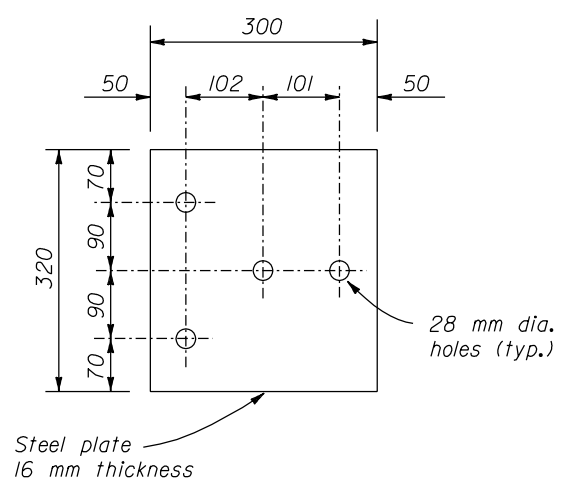
METRIC STANDARD

**G4 W BEAM GUARDRAIL
 PLACEMENT AT MINOR
 STRUCTURES AND CULVERTS**

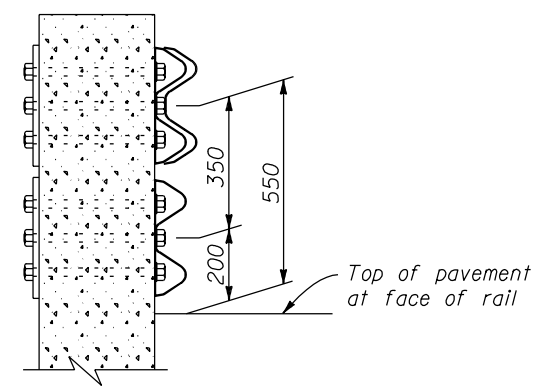
STANDARD APPROVED FOR USE 3/1996
 REVISED: 8/1997

STANDARD
M617-24

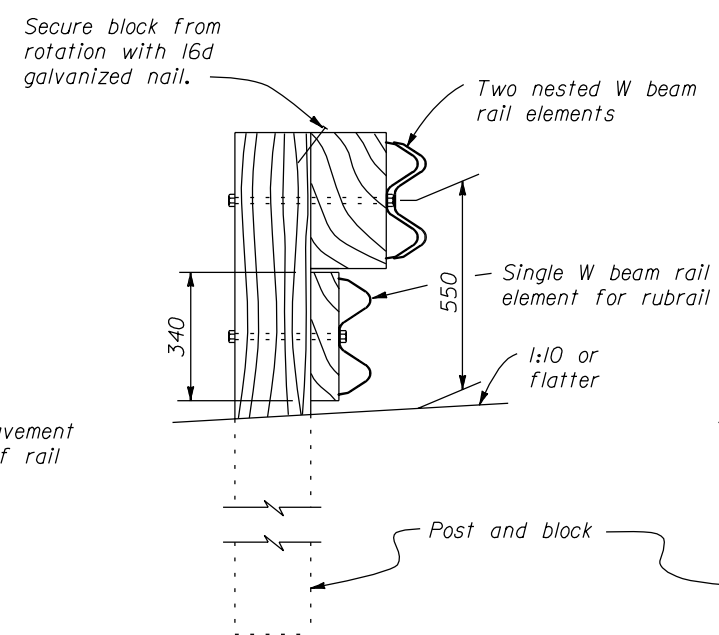
f:\standrow\metric\mst61724.dgn 22 NOV 2000



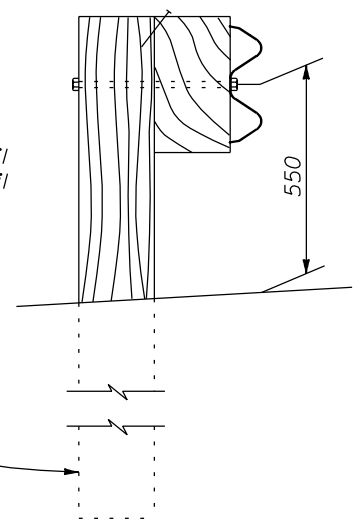
BEARING PLATE



SECTION A-A

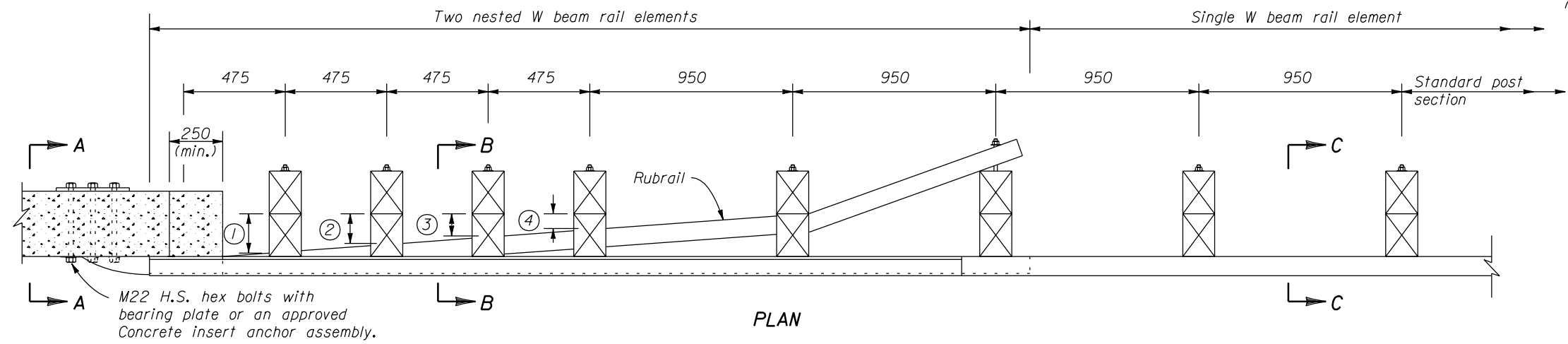


SECTION B-B



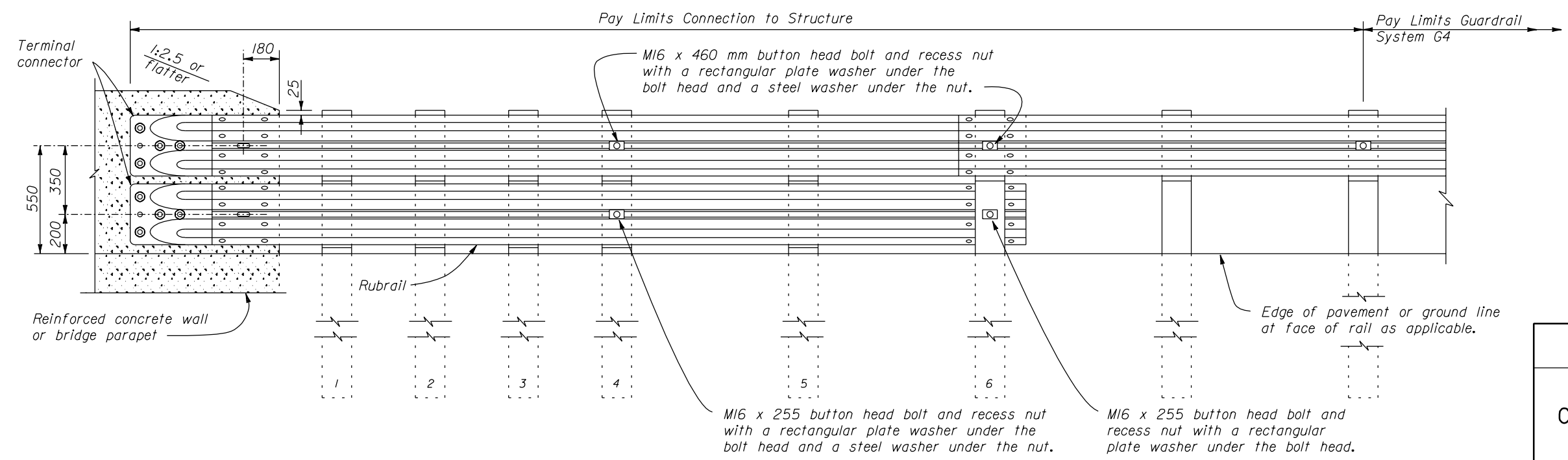
SECTION C-C

- NOTE:**
- Dimensions not labeled are in millimeters
 - The rubrail may be shop bent in the last 950 mm to facilitate installation.
 - Center drill wood blocks for rubrail located on posts 1 through 4. Secure blocks to post 1 through 3 with M16 carriage bolts.
 - Posts 1, 2, 3, 4 and 6 require an additional hole to attach wood blocks for rubrail and/or the rubrail.
 - Do not bolt nested W beam or rubrail W beam to posts and blocks on posts 1, 2, 3 and 5. Bolt blocks directly to posts.
 - Reinforced concrete wall or bridge parapet must be capable of developing a 265 kN pull out strength.
 - Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.



PLAN

WOOD BLOCKS FOR RUBRAIL	
POST	THICKNESS
①	125
②	100
③	75
④	50



ELEVATION

NO SCALE

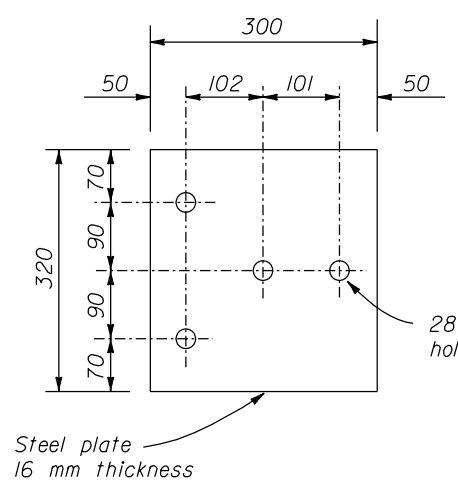
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

**METRIC STANDARD
G4 BEAM GUARDRAIL
CONNECTION TO STRUCTURE
VERTICAL FACE
WOOD POSTS**

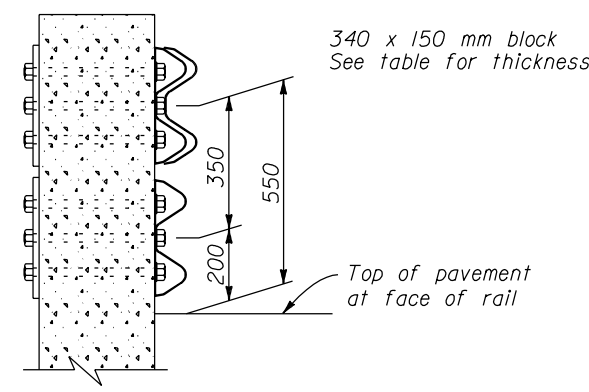
STANDARD APPROVED FOR USE 3/1996

REVISOR: STANDARD
M617-25

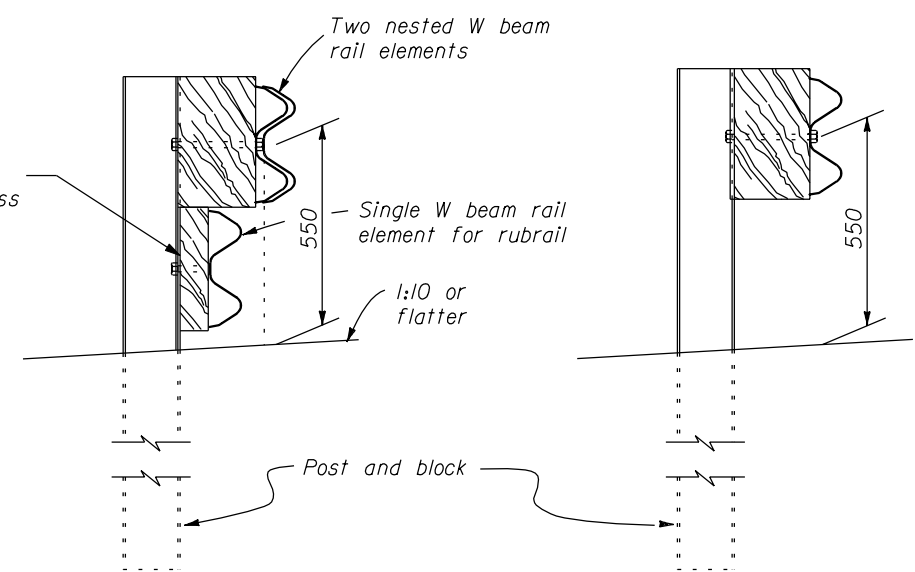
22 NOV 2000 f:\standrow\metric\m61725.dgn



BEARING PLATE



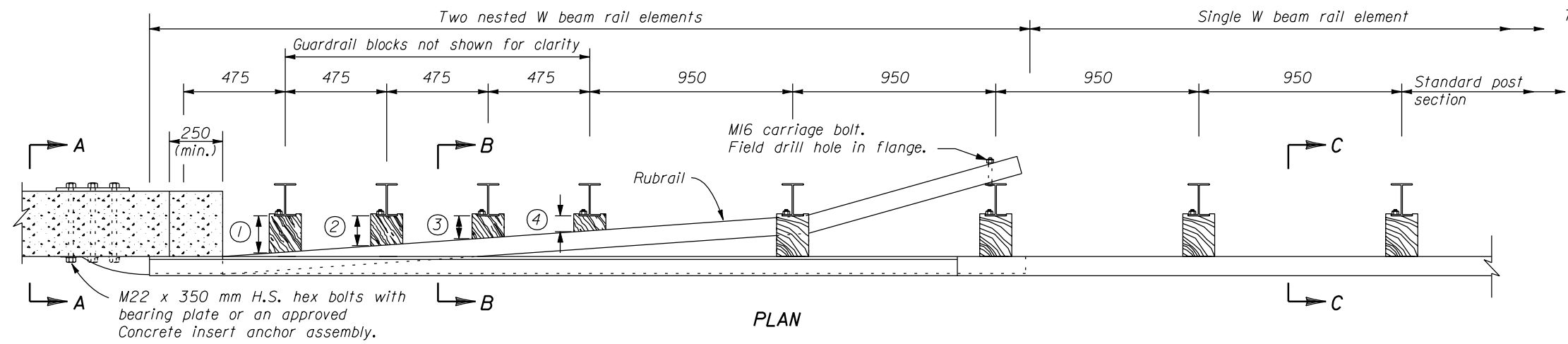
SECTION A-A



SECTION B-B

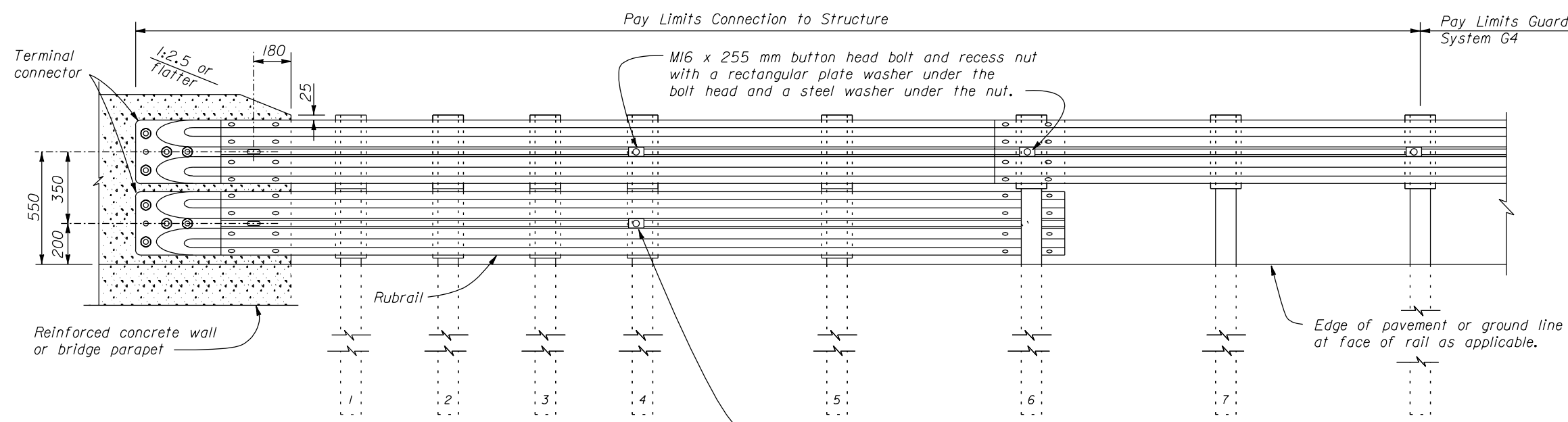
SECTION C-C

- NOTE:**
- Dimensions not labeled are in millimeters
 - The rubrail may be shop bent in the last 950 mm to facilitate installation.
 - Offset drill wood blocks for rubrail to sit squarely on the post flange posts 1 through 4. Secure blocks to post 1 through 3 with M16 carriage bolts.
 - Posts 1, 2, 3, 4 and 6 require an additional hole to attach wood blocks for rubrail and/or the rubrail.
 - Do not bolt nested W beam or rubrail W beam to posts and blocks on posts 1, 2, 3 and 5. Bolt blocks directly to posts.
 - Reinforced concrete wall or bridge parapet must be capable of developing a 265 kN pull out strength.
 - Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.

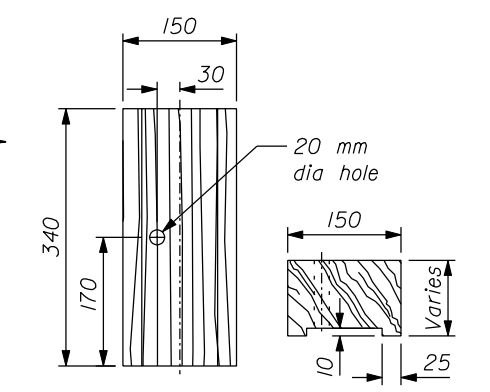


PLAN

WOOD BLOCKS FOR RUBRAIL	
POST	THICKNESS
①	175
②	140
③	110
④	80



ELEVATION



**FRONT TOP
WOOD BLOCKOUT FOR
RUBRAIL ON STEEL POSTS**

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

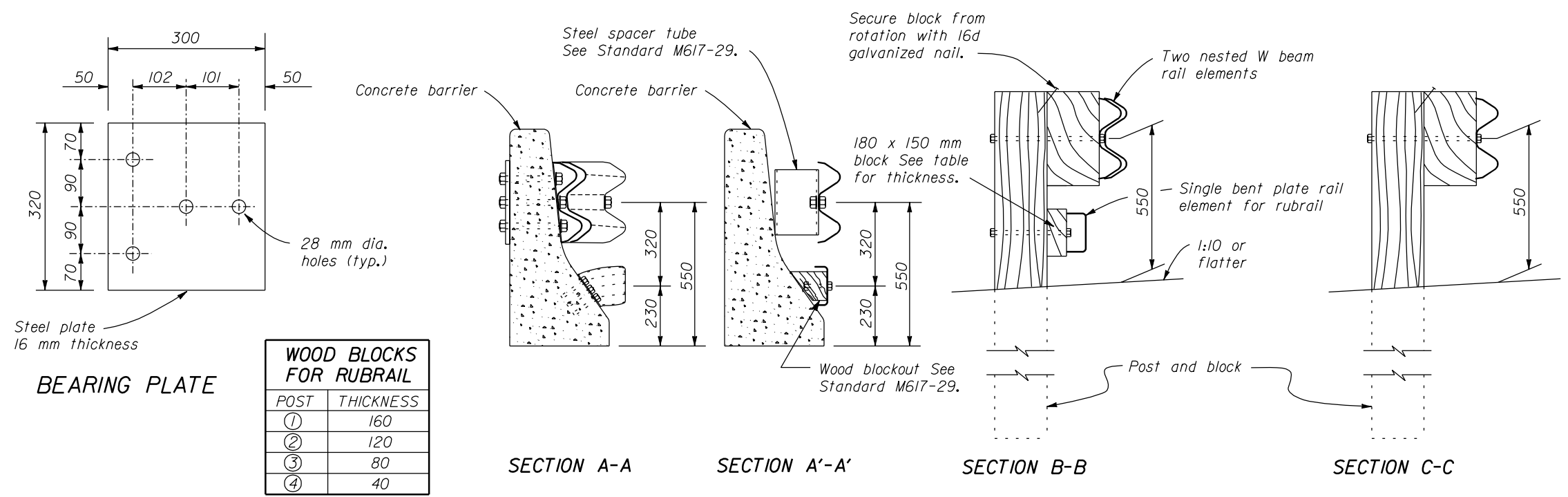
**METRIC STANDARD
G4 BEAM GUARDRAIL
CONNECTION TO STRUCTURE
VERTICAL FACE
STEEL POSTS**

STANDARD APPROVED FOR USE 3/1996
REVISED: 1/1998

STANDARD
M617-26

NO SCALE

22 NOV 2000 f:\standrow\metric\m61726.dgn



- NOTE:**
- Dimensions not labeled are in millimeters.
 - Center drill wood blocks for rubrail, located on posts 1 through 4. Secure blocks 2 and 4 with M16 carriage bolts.
 - Center drill an additional hole on posts 1 through 5 to attach wood blocks to rubrail and/or the rubrail.
 - Do not bolt W beam to posts and blocks at posts 2, 3, 4, 6 and 8. Bolt blocks directly to posts.
 - Reinforced concrete wall or bridge parapet must be capable of developing a 265 kN pull out strength.
 - Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.

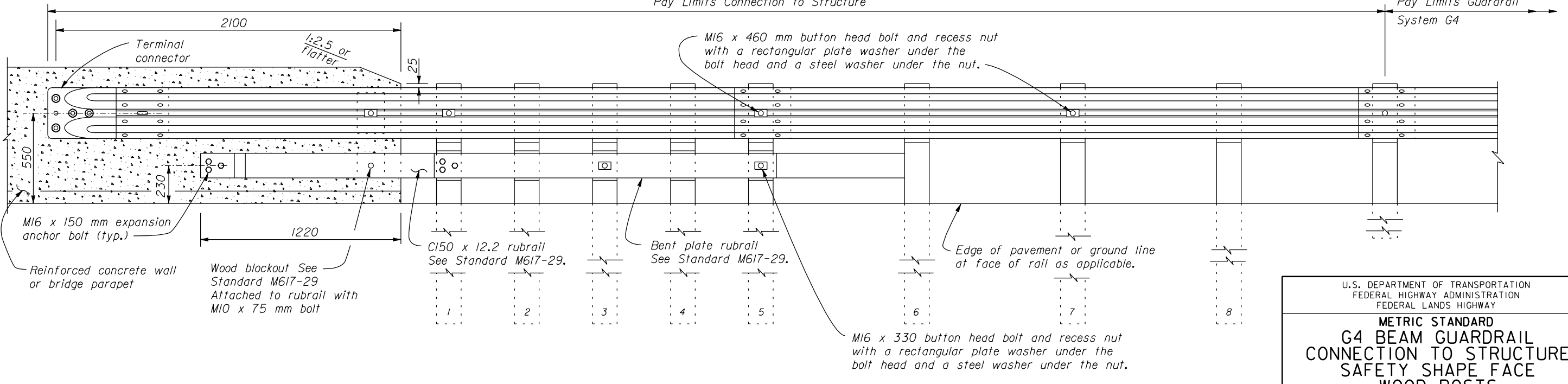
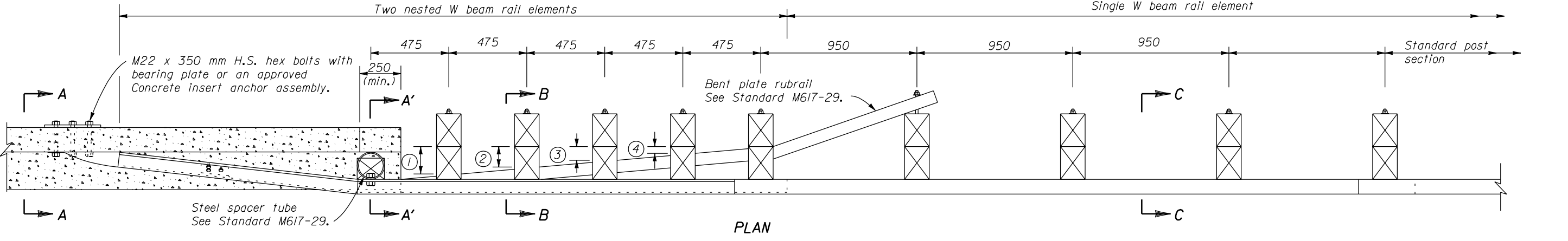
Steel plate 16 mm thickness

BEARING PLATE

POST	THICKNESS
①	160
②	120
③	80
④	40

WOOD BLOCKS FOR RUBRAIL

28 mm dia. holes (typ.)



ELEVATION

NO SCALE

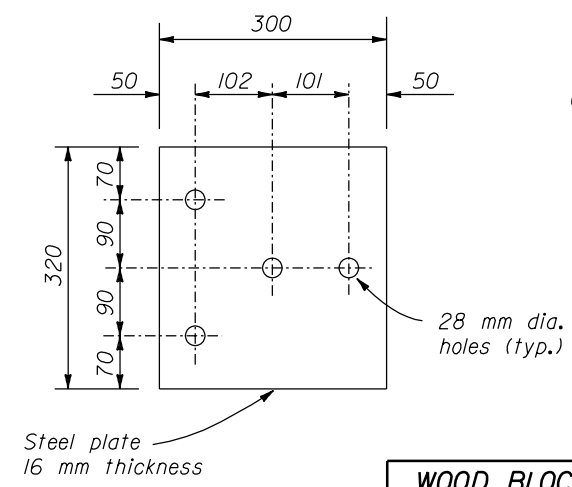
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

METRIC STANDARD
G4 BEAM GUARDRAIL
CONNECTION TO STRUCTURE
SAFETY SHAPE FACE
WOOD POSTS

STANDARD APPROVED FOR USE 3/1996
REVISED: 1/1998

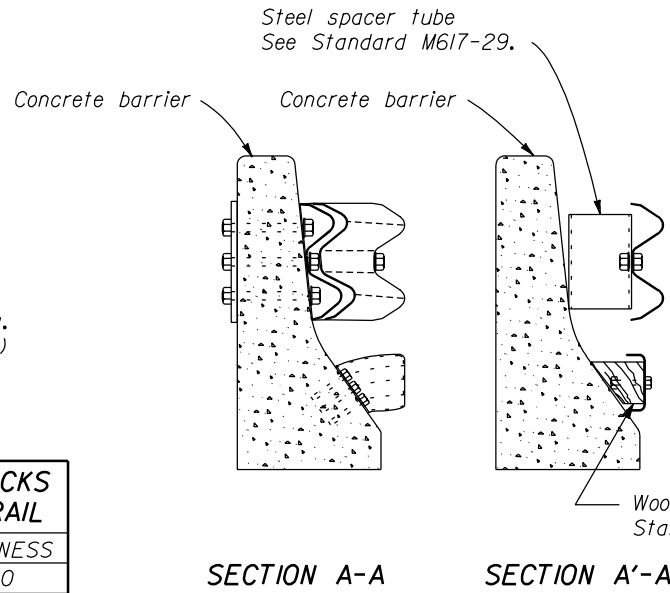
STANDARD
M617-27

22 NOV 2000 f:\standrow\metric\m61727.dgn

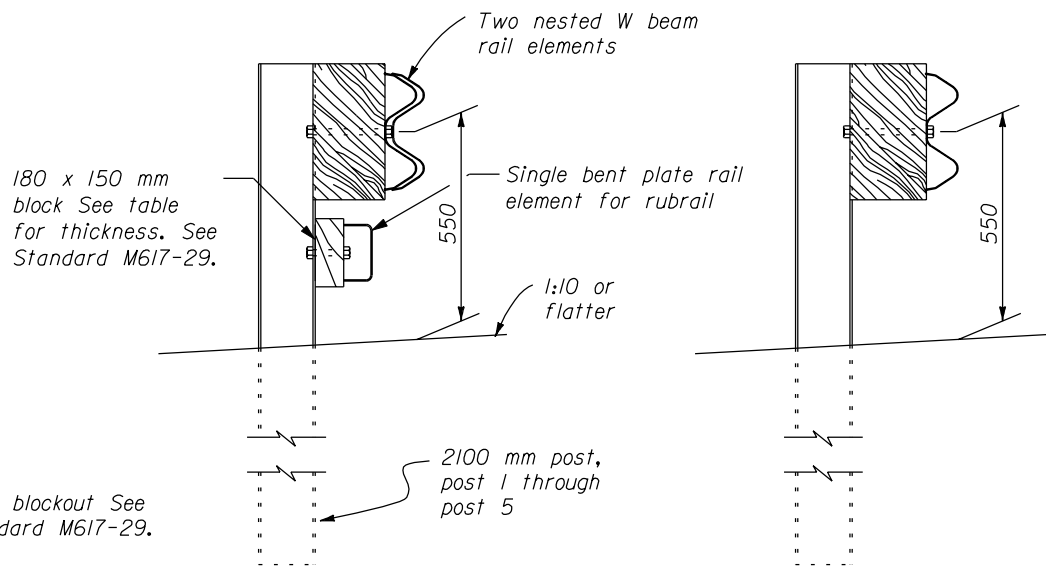


BEARING PLATE

WOOD BLOCKS FOR RUBRAIL	
POST	THICKNESS
①	170
②	130
③	90
④	50

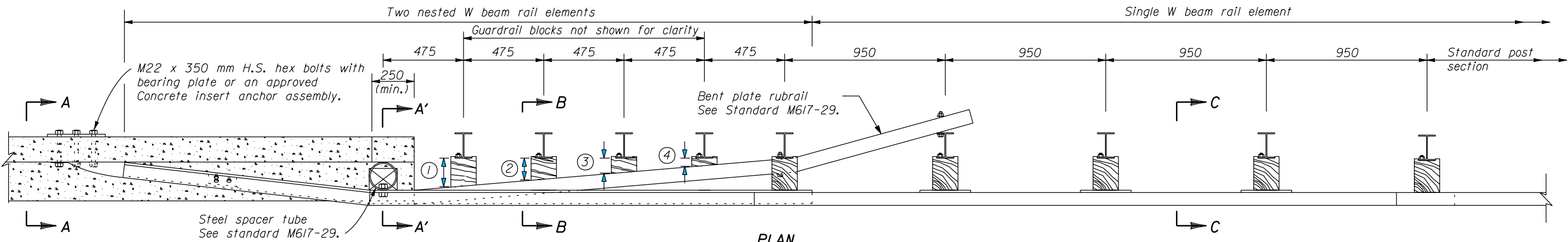


SECTION A-A SECTION A'-A'

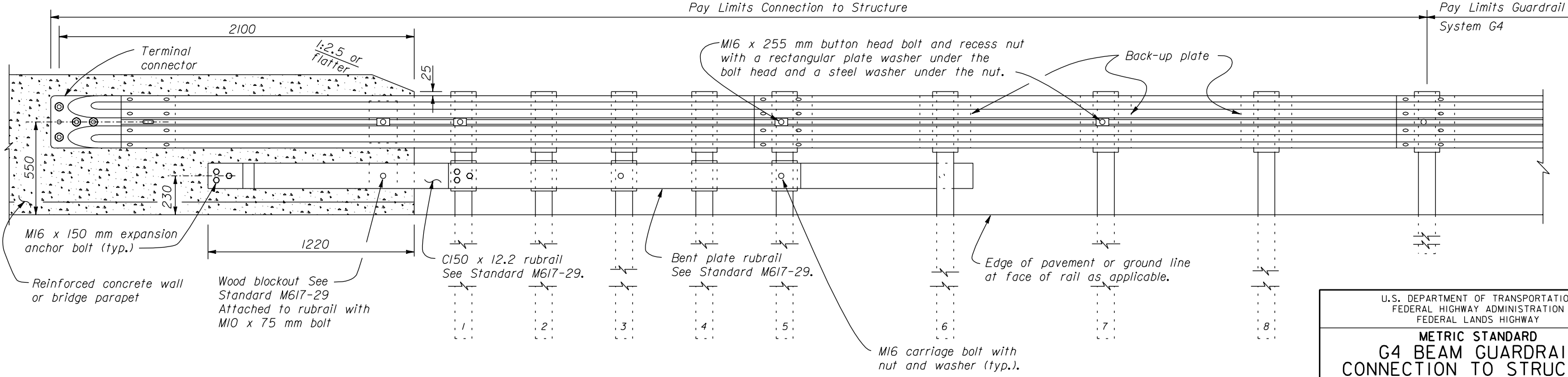


SECTION B-B SECTION C-C

- NOTE:**
- Dimensions not labeled are in millimeters.
 - Offset drill an additional hole on posts 1 through 6 to attach wood blocks for rubrail and/or the rubrail.
 - Offset drill wood blocks for rubrail to sit squarely on the post flange on posts 1 through 4. Secure blocks to posts 2 and 4. Secure rubrail and blocks to post flange on posts 1,3, and 5 use M16 carriage bolts.
 - Do not bolt W beam to posts and blocks at posts 2 through 4.
 - Reinforced concrete wall or bridge parapet must be capable of developing a 265 kN pull out strength.
 - Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.



PLAN



ELEVATION

NO SCALE

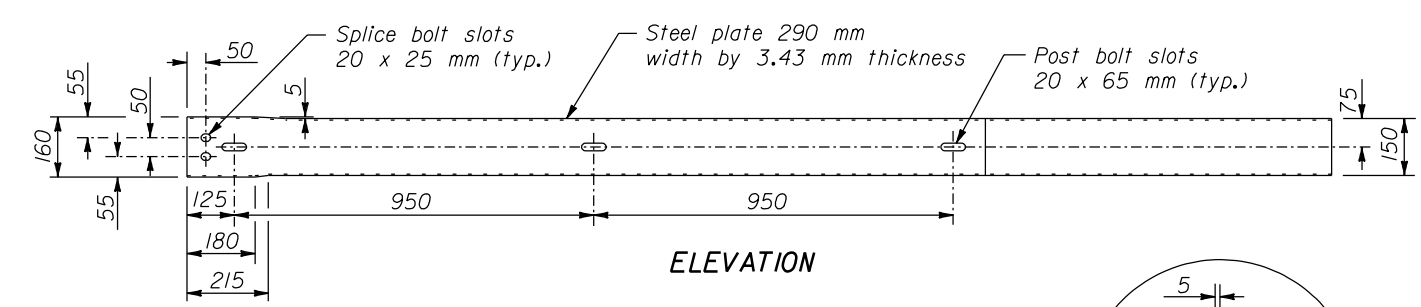
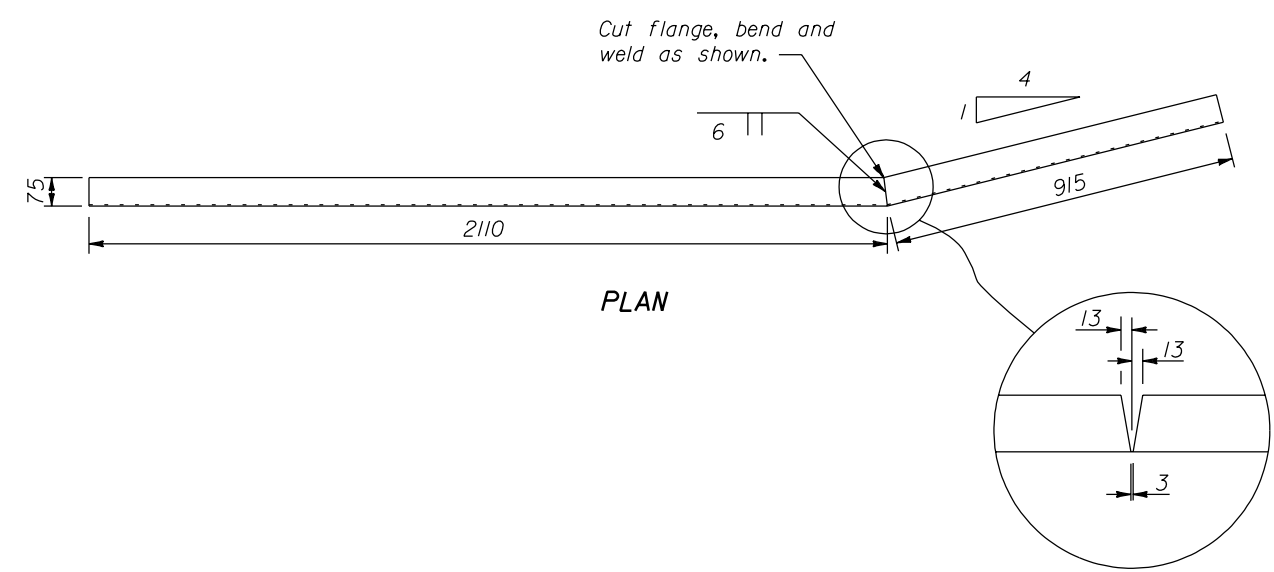
U.S. DEPARTMENT OF TRANSPORTATION
 FEDERAL HIGHWAY ADMINISTRATION
 FEDERAL LANDS HIGHWAY

**METRIC STANDARD
 G4 BEAM GUARDRAIL
 CONNECTION TO STRUCTURE
 SAFETY SHAPE FACE
 STEEL POSTS**

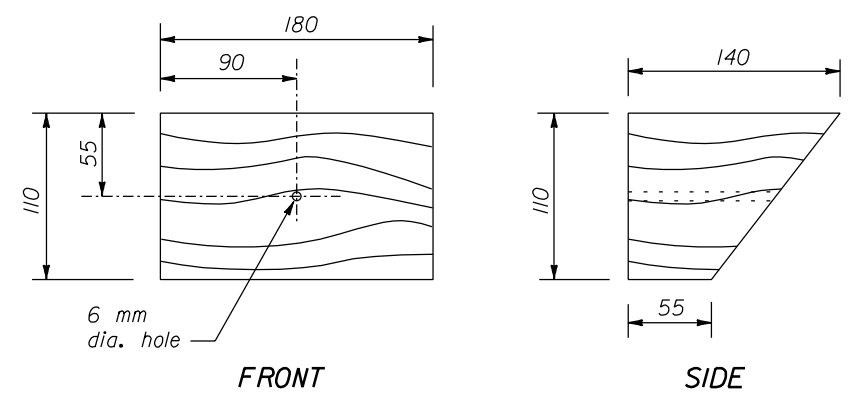
STANDARD APPROVED FOR USE 3/1996
 REVISED: 1/1998

STANDARD
M617-28

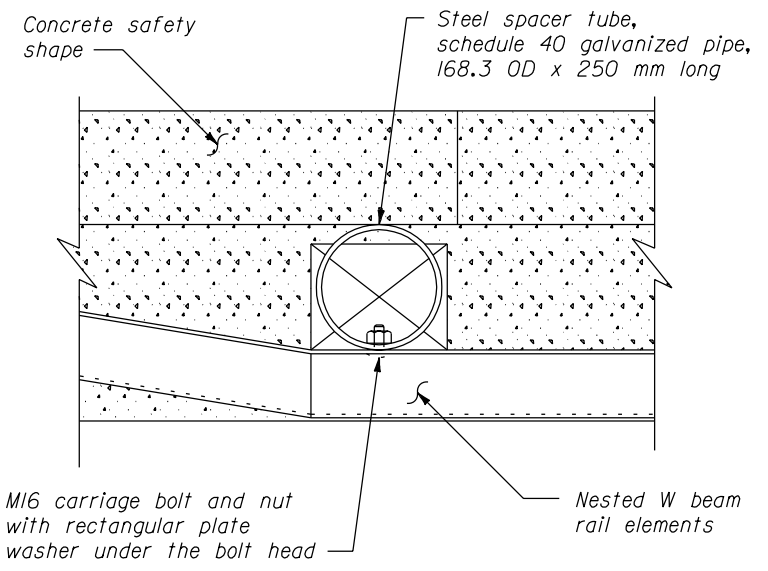
22 NOV 2000 f:\standrow\metric\m61728.dgn



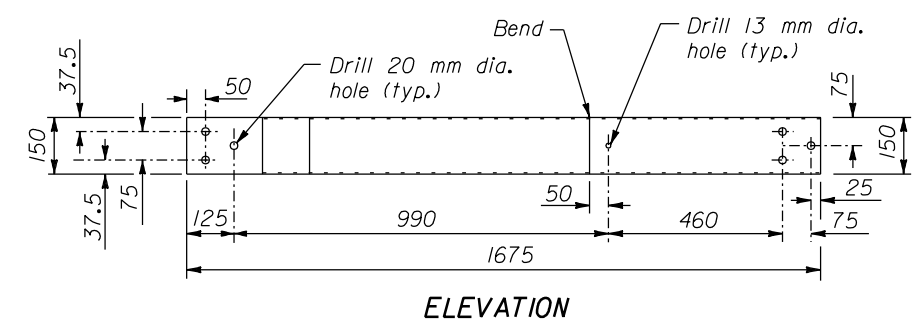
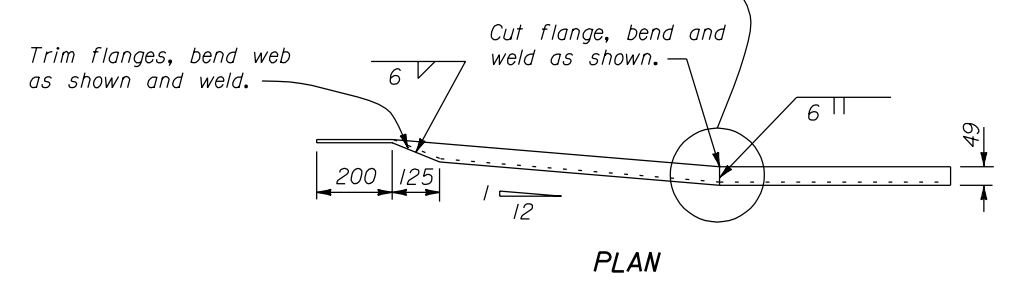
BENT PLATE RUBRAIL



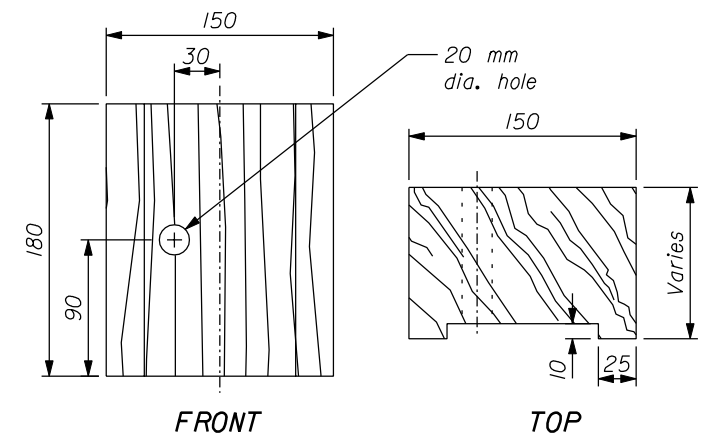
WOOD BLOCKOUT FOR RUBRAIL ON CONCRETE SAFETY SHAPE



STEEL SPACER BLOCK



C150 X 12.2 RUBRAIL



WOOD BLOCKOUT FOR RUBRAIL ON STEEL POSTS

NOTE:

1. Dimensions not labeled are in millimeters.
2. Attach rubrail end flush with sloped toe of safety shape. Shop fabricate the C150 x 12.2 rubrail end to be consistent with the slope of safety shape. Both clockwise and counterclockwise fabrications may be required.
3. Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance, and accepted manufacturing practices.

NO SCALE

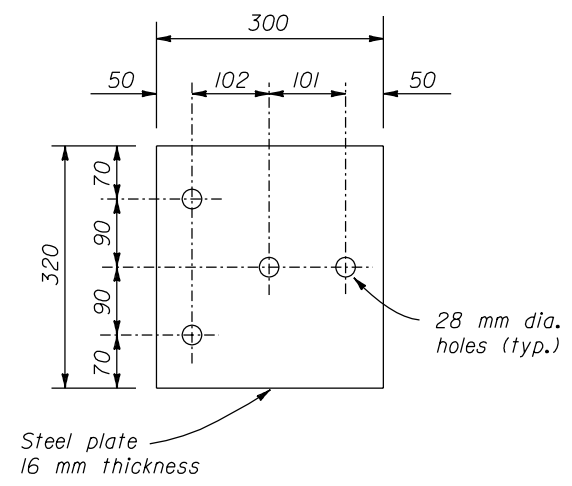
U.S. DEPARTMENT OF TRANSPORTATION
 FEDERAL HIGHWAY ADMINISTRATION
 FEDERAL LANDS HIGHWAY

METRIC STANDARD
**G4 W BEAM GUARDRAIL
 CONNECTION TO STRUCTURE
 SAFETY SHAPE FACE
 RUBRAIL**

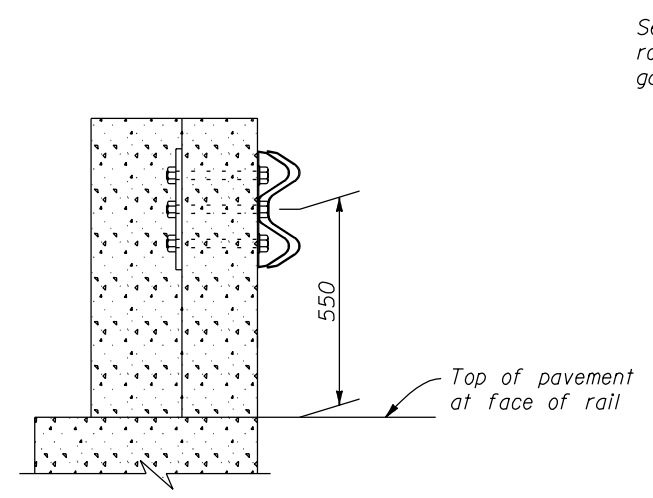
STANDARD APPROVED FOR USE 3/1996
 REVISED: 1/1998

STANDARD
M617-29

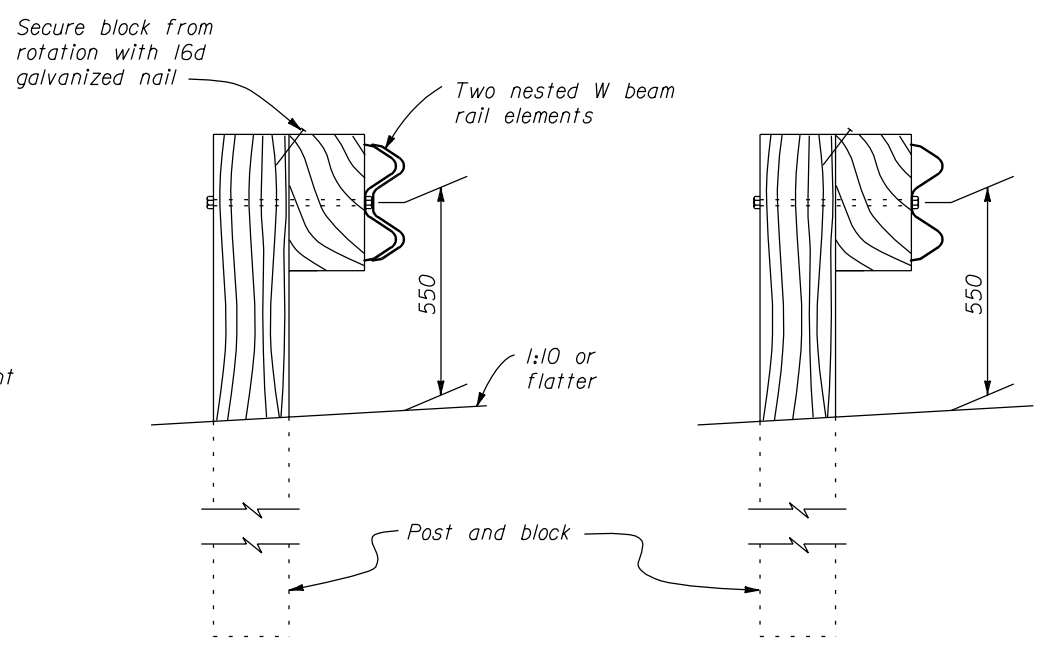
22 NOV 2000 f:\standrow\metric\c150x12.2rubrail.dgn



BEARING PLATE



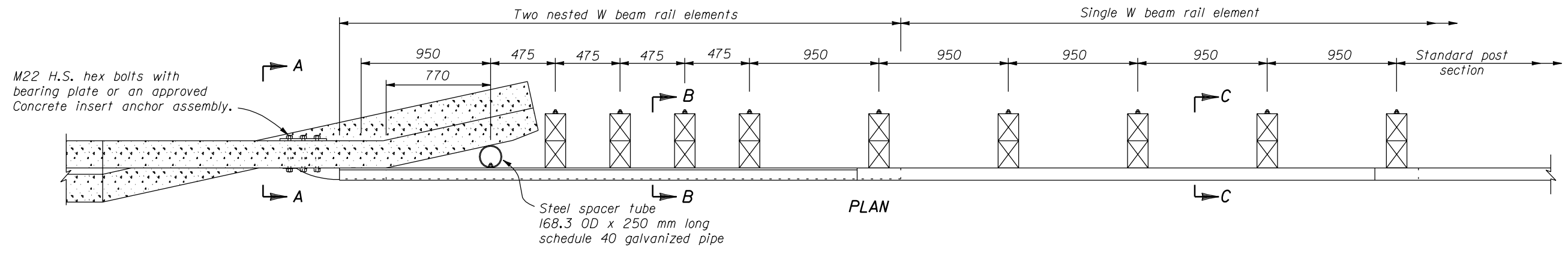
SECTION A-A



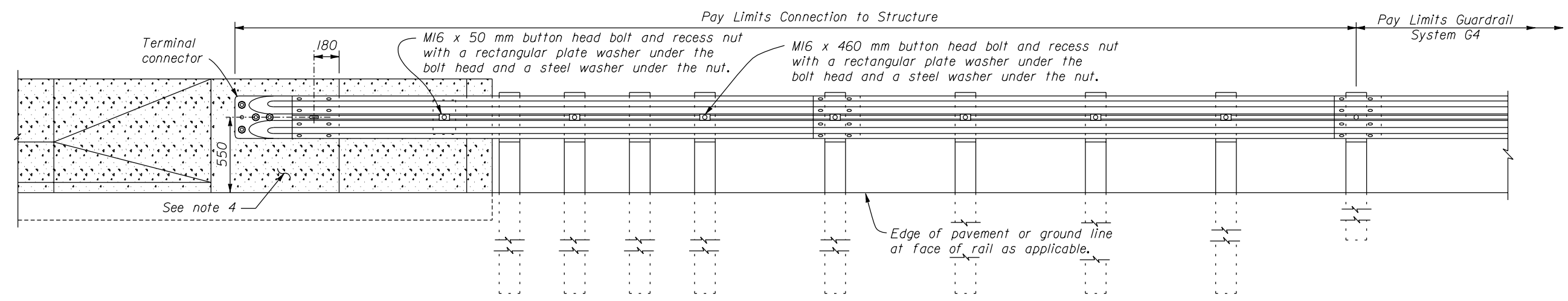
SECTION B-B

SECTION C-C

- NOTE:**
1. Dimensions not labeled are in millimeters.
 2. Reinforced concrete wall or bridge parapet must be capable of developing a 265 kN pull out strength.
 3. Connect steel spacer tube to rail element only.
 4. Where reinforced concrete flare back transition section is required, See Standard M617-32 or plan sheets, as appropriate, for details.



PLAN



ELEVATION

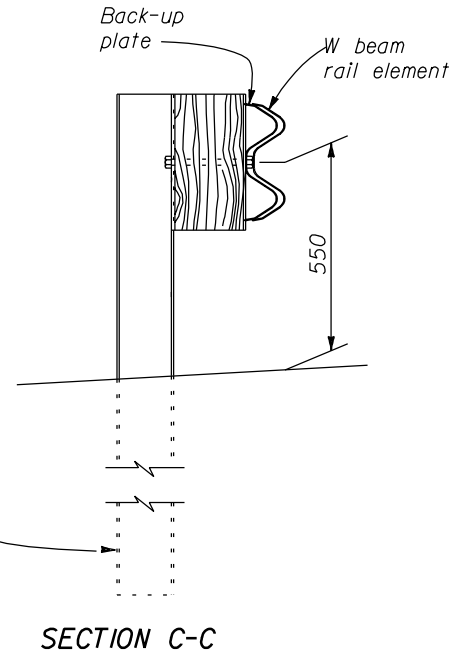
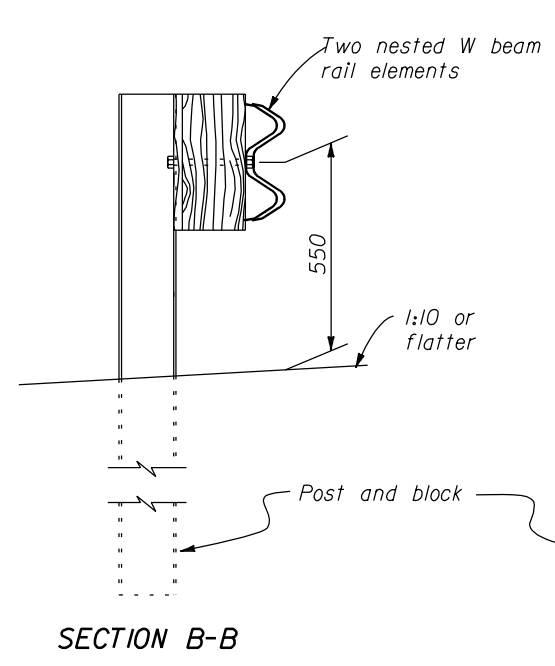
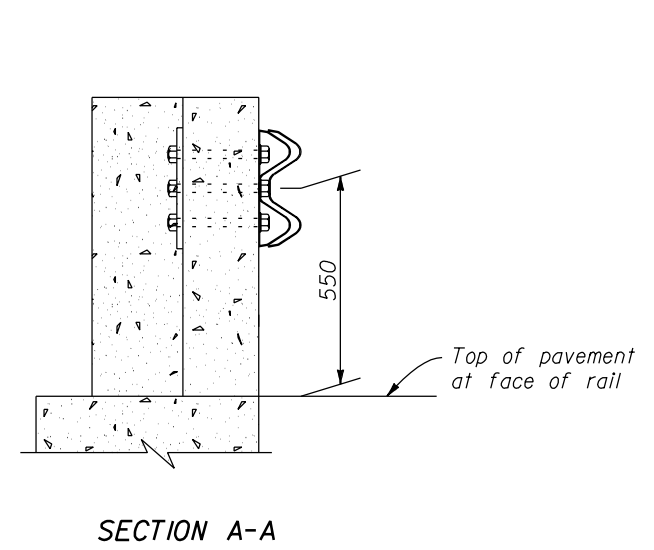
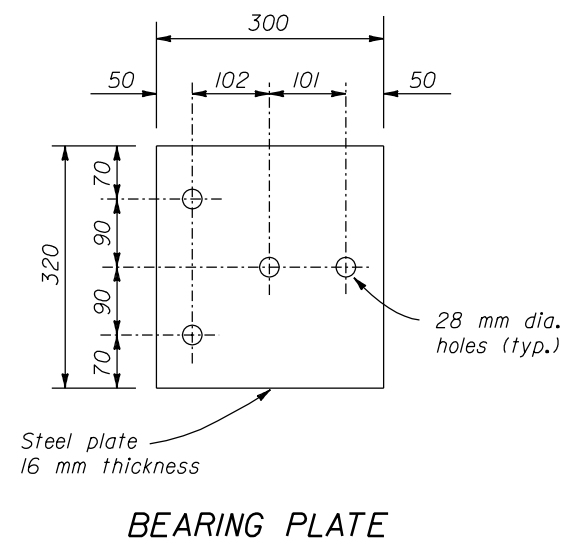
U.S. DEPARTMENT OF TRANSPORTATION
 FEDERAL HIGHWAY ADMINISTRATION
 FEDERAL LANDS HIGHWAY

METRIC STANDARD
G4 W BEAM GUARDRAIL
CONNECTION TO STRUCTURE
VERTICAL FLARED BACK
WOOD POSTS

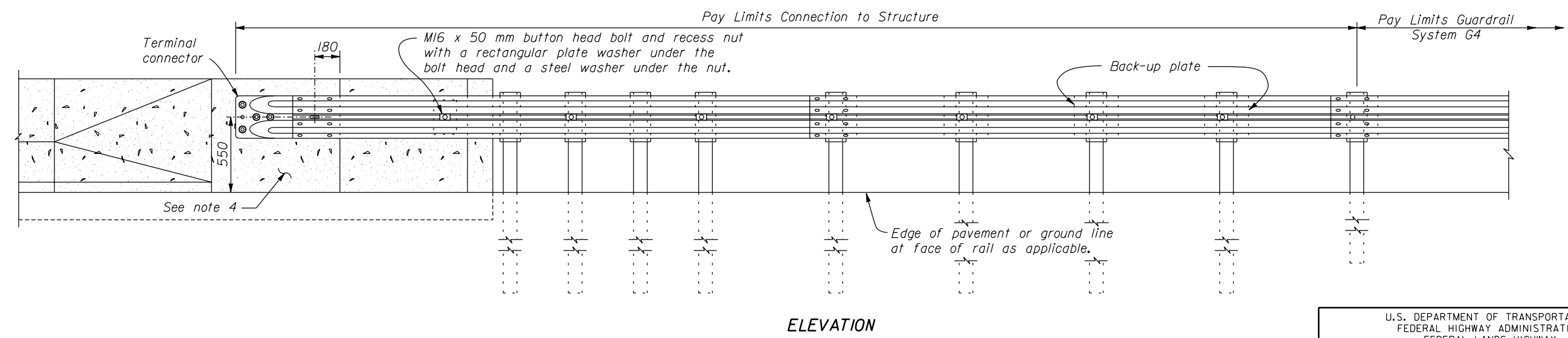
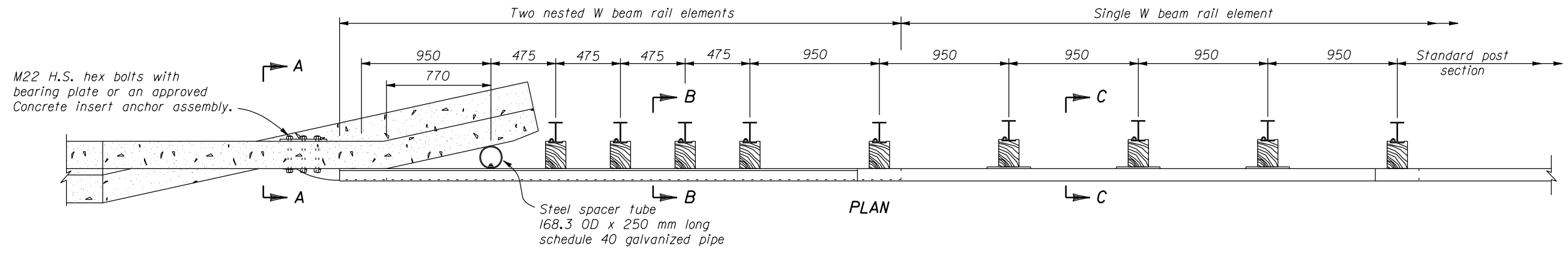
STANDARD APPROVED FOR USE 3/1996
 STANDARD
 M617-30

NO SCALE

22 NOV 2000 f:\standrow\metric\mst61730.dgn



- NOTE:**
1. Dimensions not labeled are in millimeters.
 2. Reinforced concrete wall or bridge parapet must be capable of developing a 265 kN pull out strength.
 3. Connect steel spacer tube to rail element only.
 4. Where reinforced concrete flare back transition section is required, See Standard M617-32 or plan sheets, as appropriate, for details.



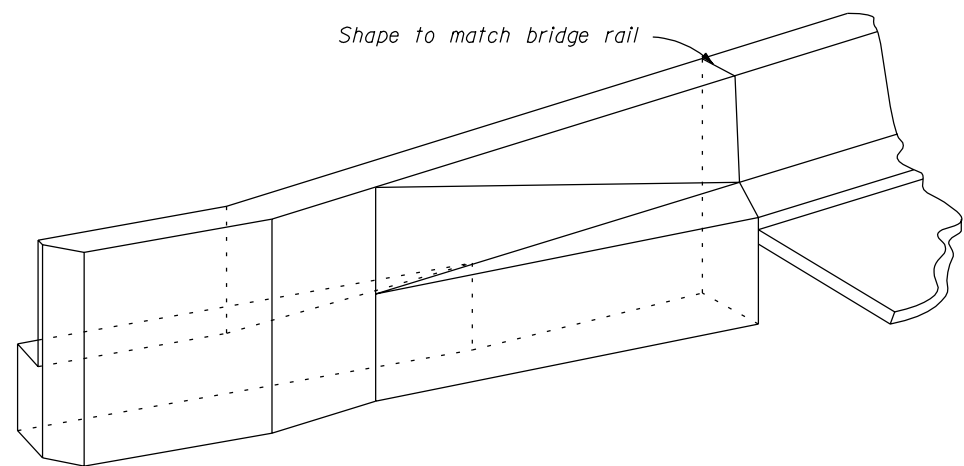
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

METRIC STANDARD
G4 W BEAM GUARDRAIL
CONNECTION TO STRUCTURE
VERTICAL FLARED BACK
STEEL POSTS

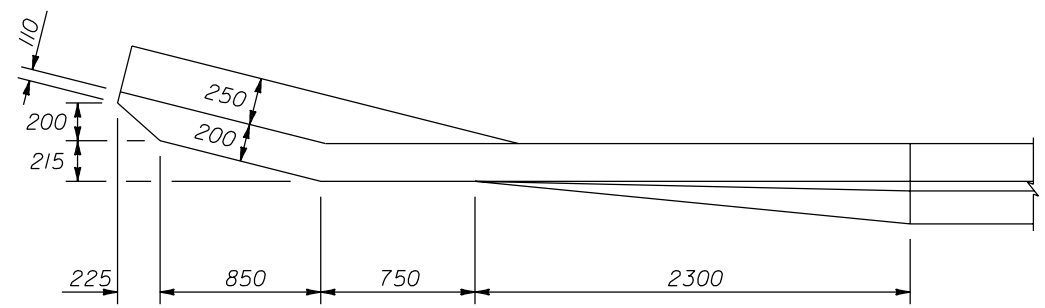
STANDARD APPROVED FOR USE 3/1996
REVISED: 12/1997

STANDARD
M617-31

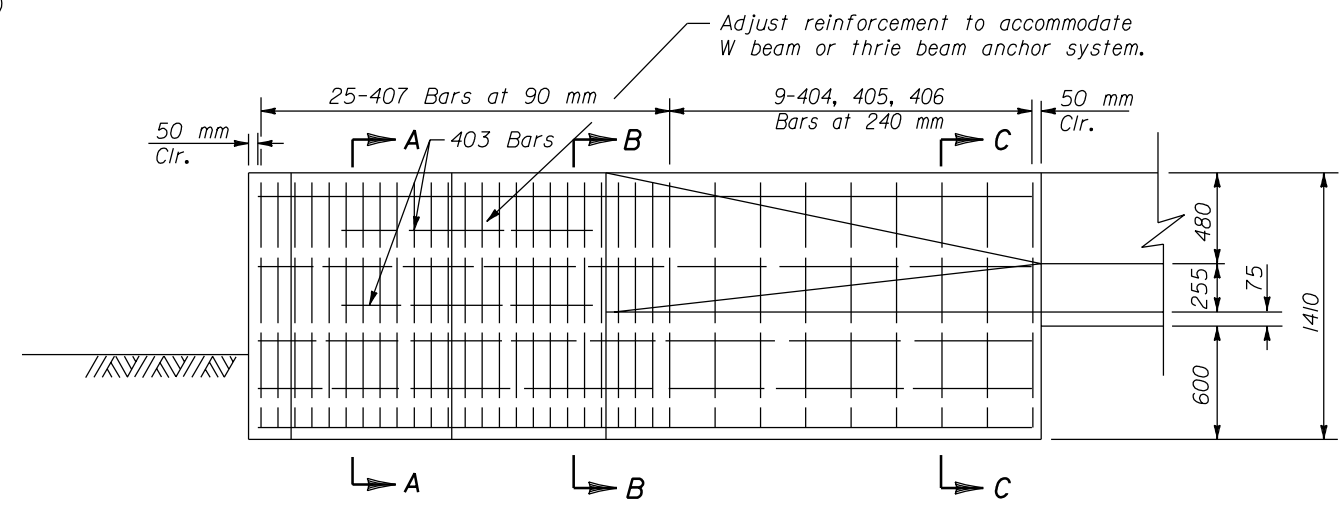
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WINGWALL ISOMETRIC



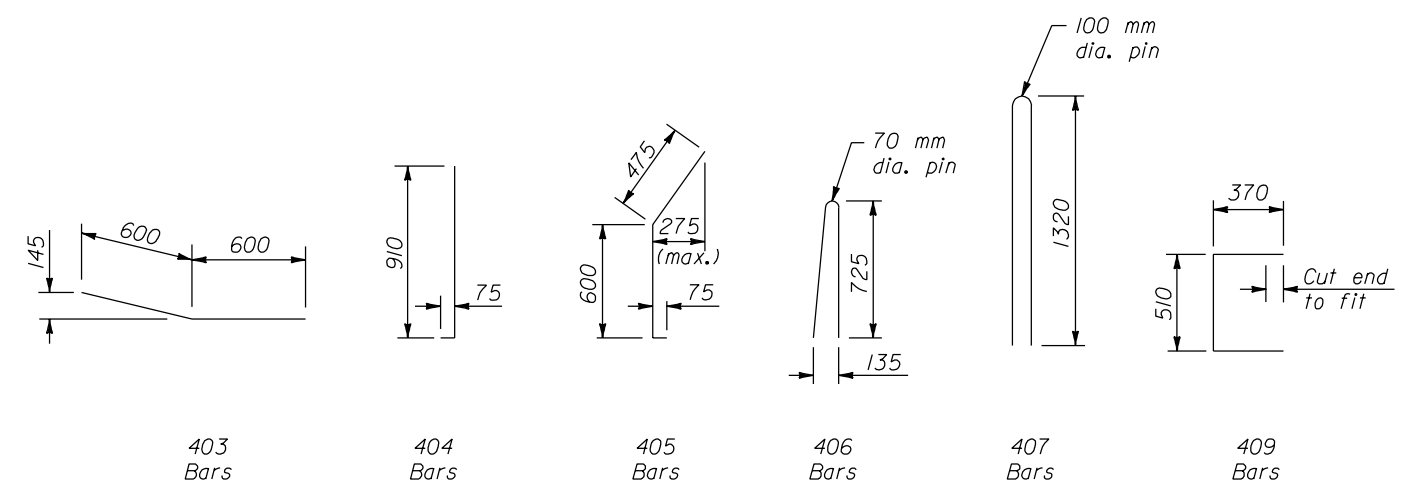
PLAN



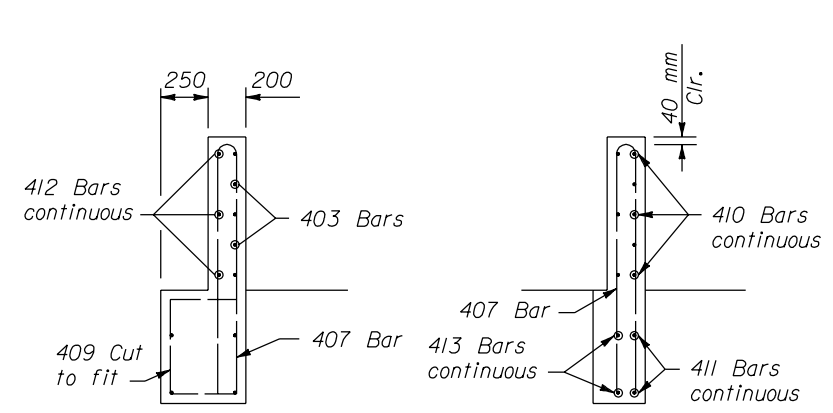
ELEVATION

NOTE:

1. Dimensions not labeled are in millimeters.
2. CONCRETE: Structural concrete Class A(AE), with a specified minimum 28-day compressive strength $F'c=30$ MPa. Vibrate all concrete. Chamfer exposed edges 20 mm unless otherwise shown. Do not use calcium chloride additives in the concrete.
3. The minimum concrete covering to the face of any bar is 40 mm unless otherwise shown. All bars are #13.
4. FINISHING CONCRETE: Give all concrete surfaces a Class I finish except as specified in the Special Contract Requirements.

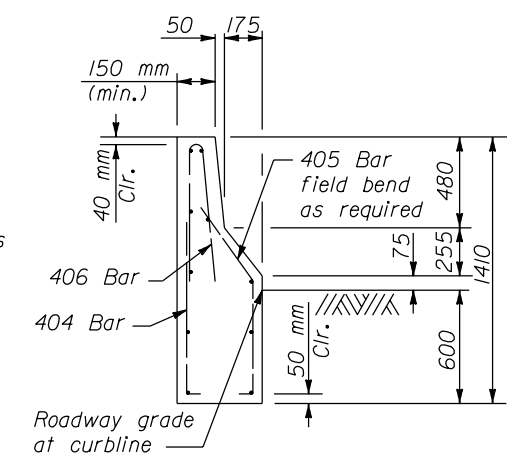


REINFORCING BAR DETAILS

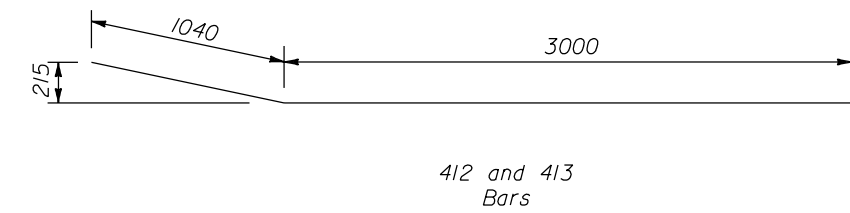
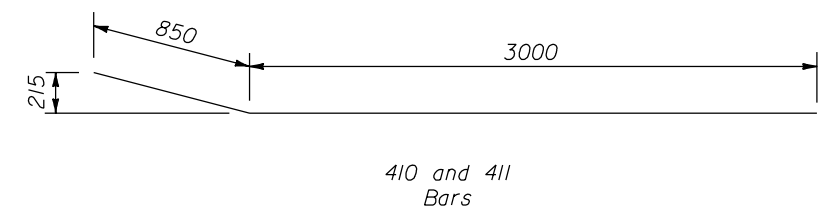


SECTION A-A

SECTION B-B



SECTION C-C



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

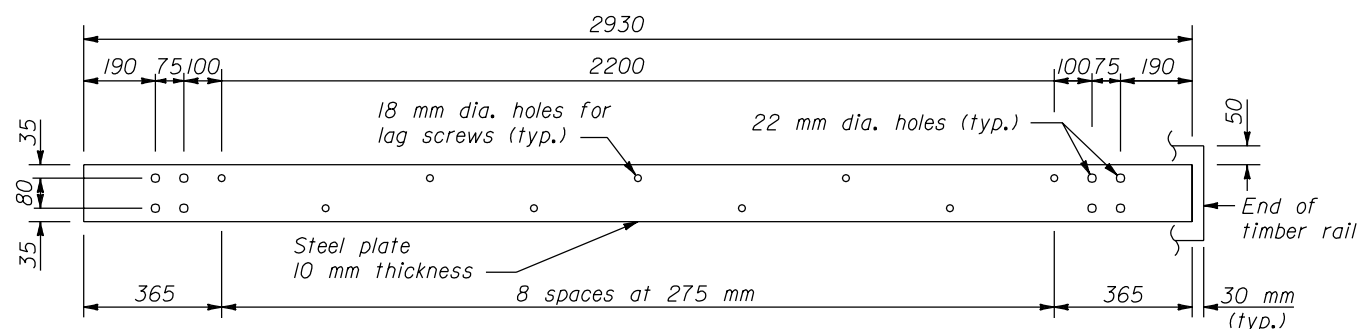
METRIC STANDARD
**G4 W BEAM GUARDRAIL
FLARED BACK
PARAPET WALL AND
SAFETY SHAPE TRANSITION**

STANDARD APPROVED FOR USE 3/1996
REVISED: 5/1997

STANDARD
M617-32

NO SCALE

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STEEL RAIL

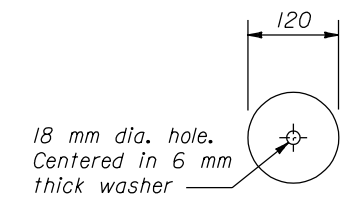
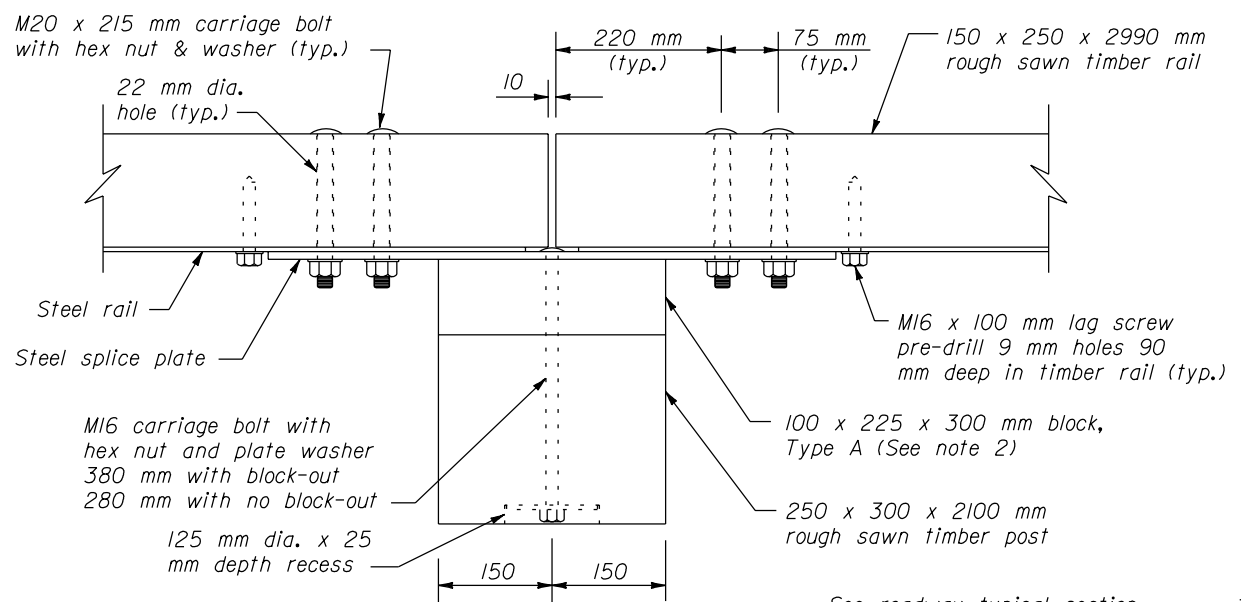
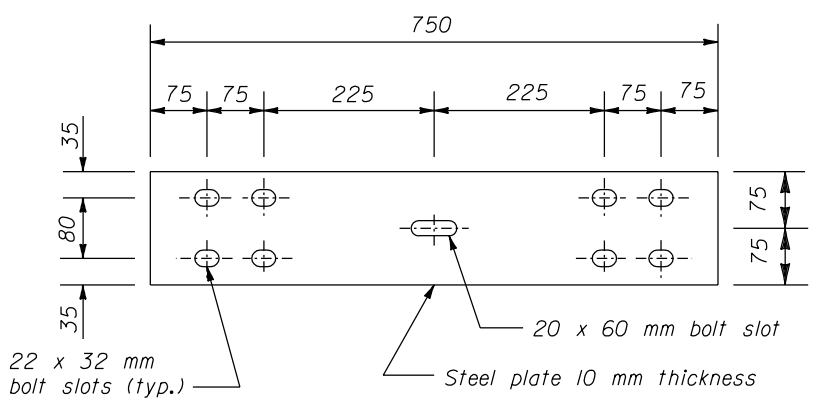


PLATE WASHER

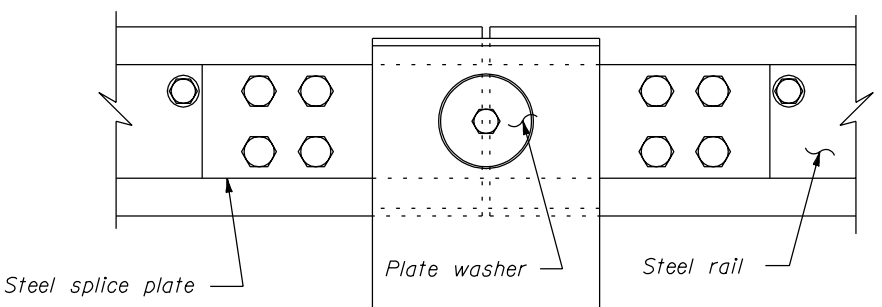
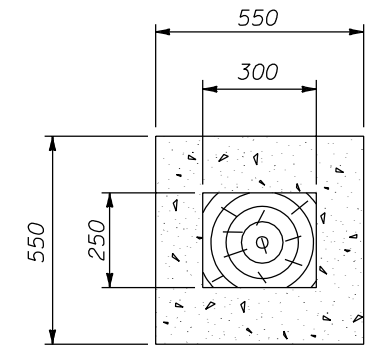
- NOTE:**
1. Dimensions not labeled are in millimeters.
 2. Use the Type A, blocked-out, system or the Type B, non-blocked-out, system as specified.
 3. Use weathering steel for all structural steel and fastener hardware as specified.
 4. Place a terminal section (See Standards M617-61 and M617-62) on both approach and trailing ends of barrier installations.
 5. Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.



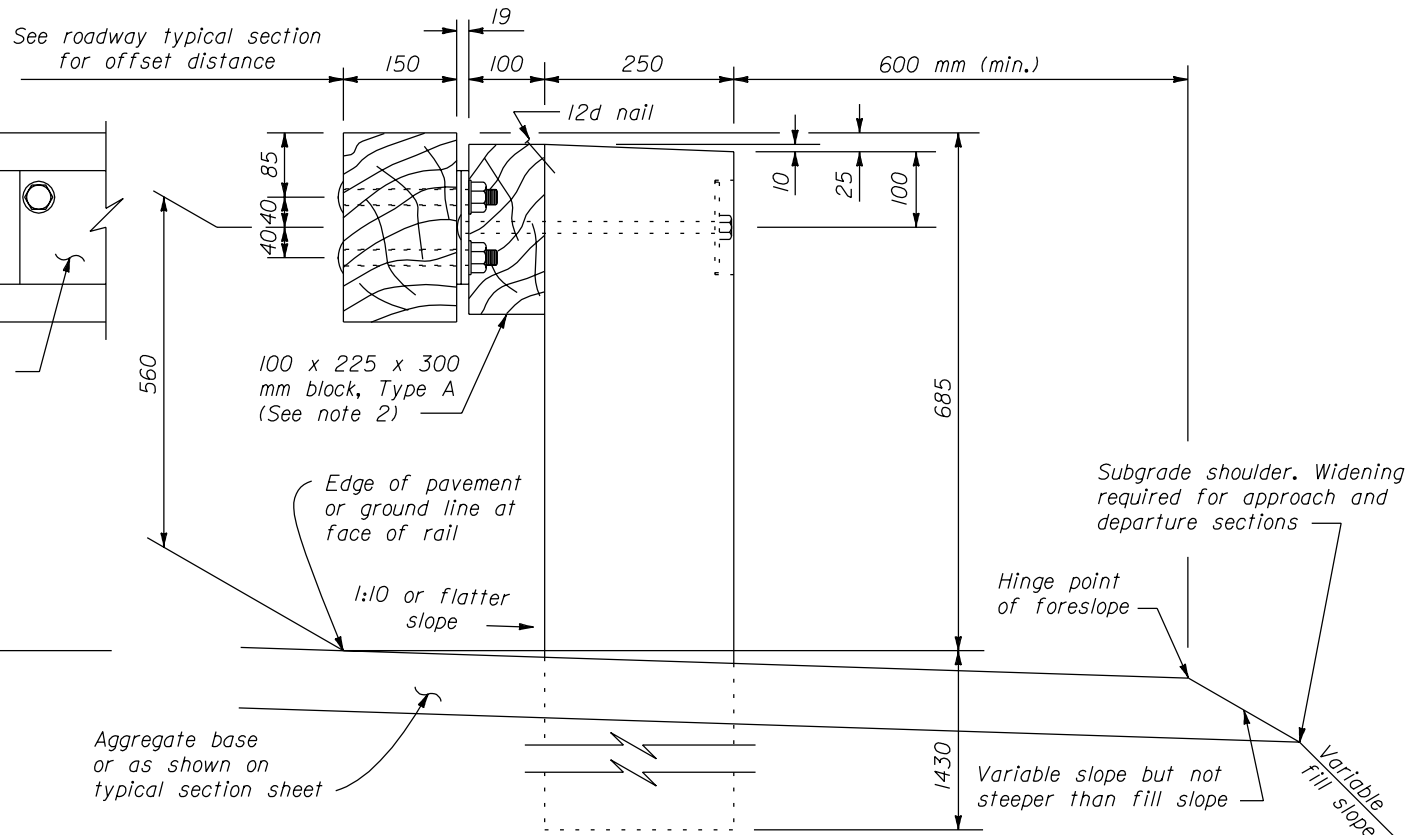
PLAN



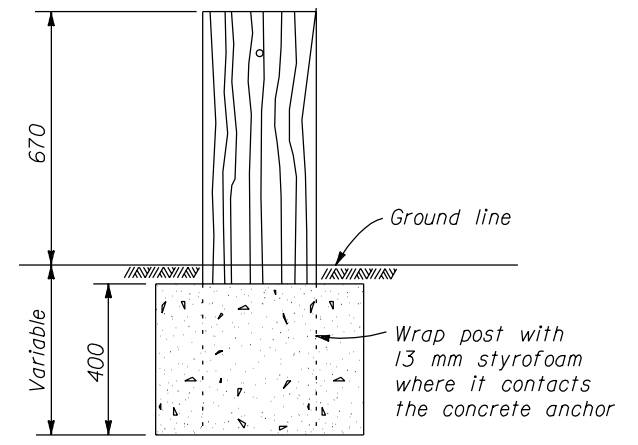
STEEL SPLICE PLATE



**ELEVATION
POST CONNECTION**



TYPICAL GUARDRAIL CROSS SECTION



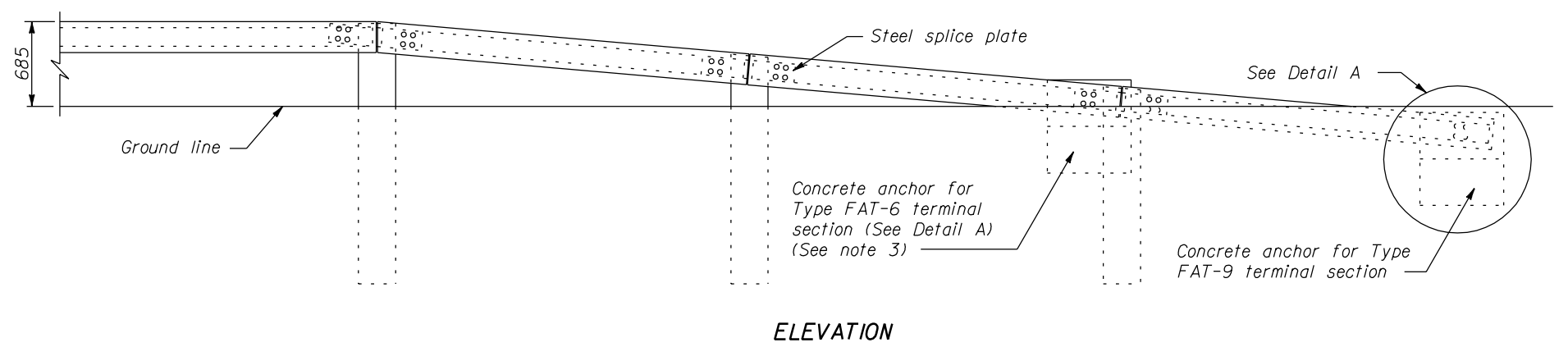
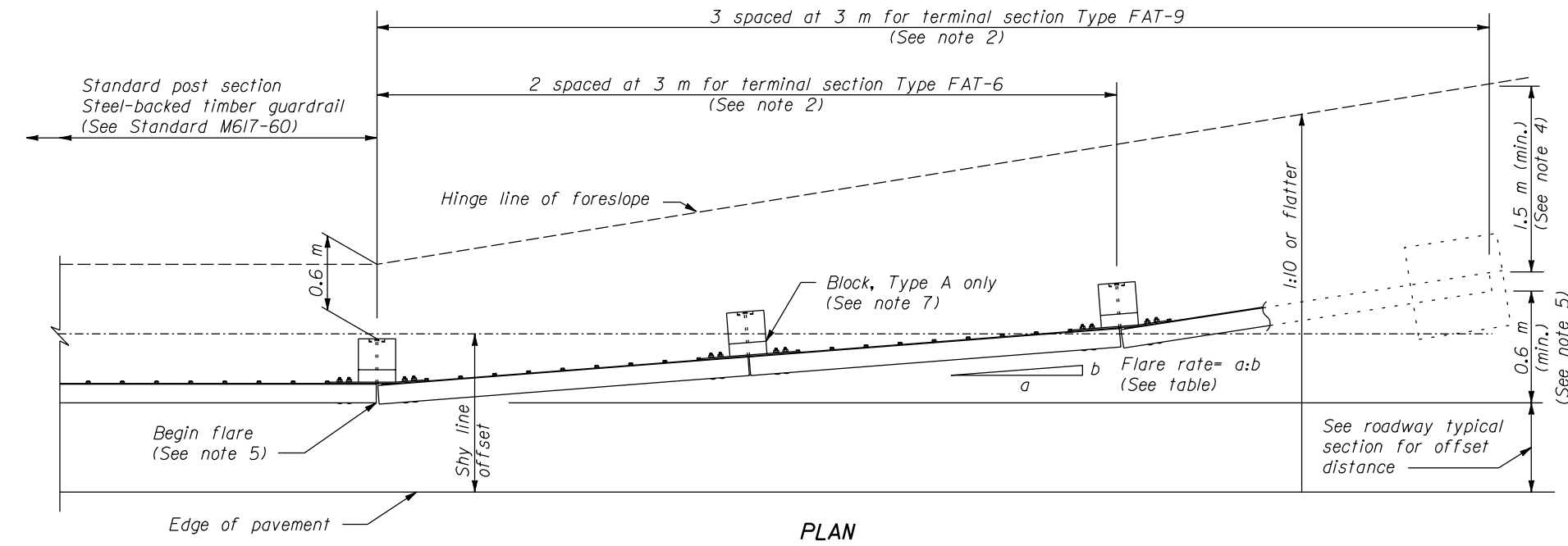
Use 600 mm diameter round anchor. Reduced size acceptable in solid rock.

**CONCRETE ANCHOR FOR
SHORT GUARDRAIL POST**

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION FEDERAL LANDS HIGHWAY	
METRIC STANDARD	
STEEL-BACKED TIMBER GUARDRAIL, TYPE A & TYPE B	
STANDARD APPROVED FOR USE 3/1996 REVISED: 6/1997	STANDARD M617-60

NO SCALE

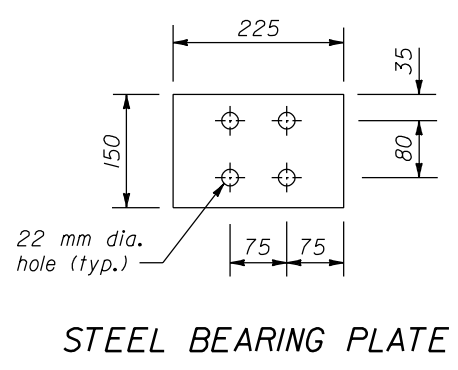
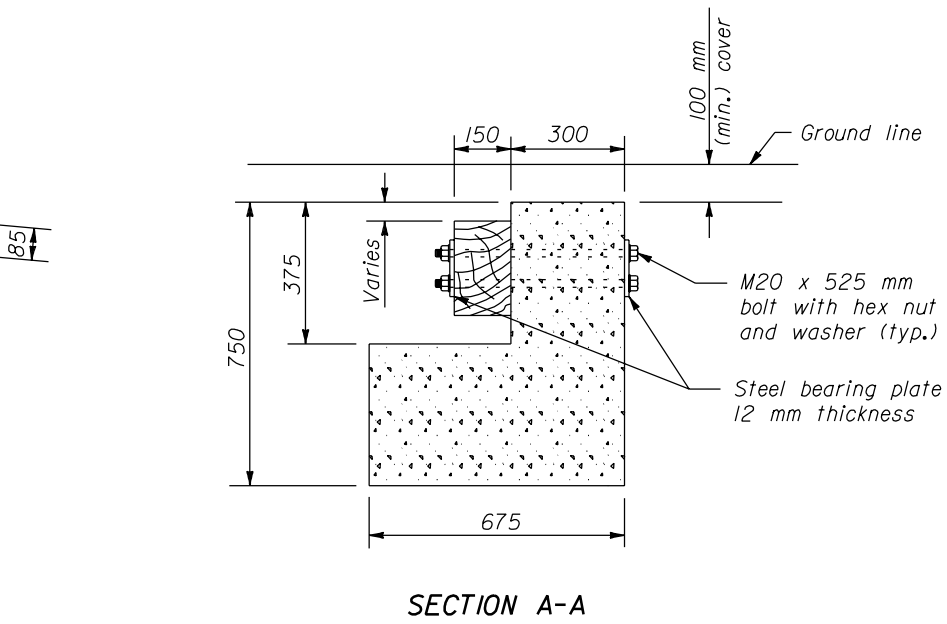
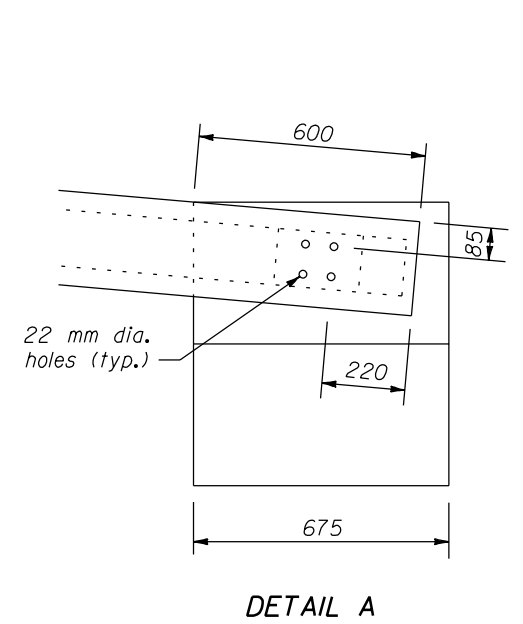
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APPROACH & DEPARTURE FLARE WITH FLARED ANCHOR TERMINAL (FAT)

- NOTE:**
- Dimensions not labeled are in millimeters.
 - Use 9 m long Type FAT-9 (Flared Anchor Terminal) terminal section or the 6 m long Type FAT-6 (Flared Anchor Terminal) terminal section as specified.
 - For the Type FAT-6 terminal section, the third rail on the Type FAT-9 terminal section is deleted and the concrete anchor is relocated to the end of the second rail. See Standard M204-1, Earth berm for Roadside Barrier Terminal Sections, for construction of the earth berm.
 - For the Type FAT-9 terminal section, extend the fill widening a minimum of 1.5 m behind the guardrail, unless otherwise directed by the CO.
 - The guardrail flare shown in the plan view is the minimum length and rate required. As directed by the CO, flare the guardrail so that the terminal section is outside the clear zone. If the terminal section cannot be located outside the clear zone, it should be flared as far as practical from the road at the maximum rate indicated on the Guardrail Flare Rates table.
 - See Standard M617-60, Steel-Backed Timber Guardrail, Type SBTA and SBTB, for timber, structural steel, and hardware details.
 - On the Type A, blocked-out guardrail, include the blocks in terminal section, except on the concrete anchor. For the Type B, non-blocked-out guardrail, no blocks are included.
 - Finish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.

Design Speed (km/h)	Shy line offset (m)	Flare rate inside shy line (a:b)	Flare rate outside shy line (a:b)
100	2.5	26:1	13:1
80	2.0	21:1	11:1
60	1.5	17:1	9:1
50 or less	1.0	13:1	7:1



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

METRIC STANDARD

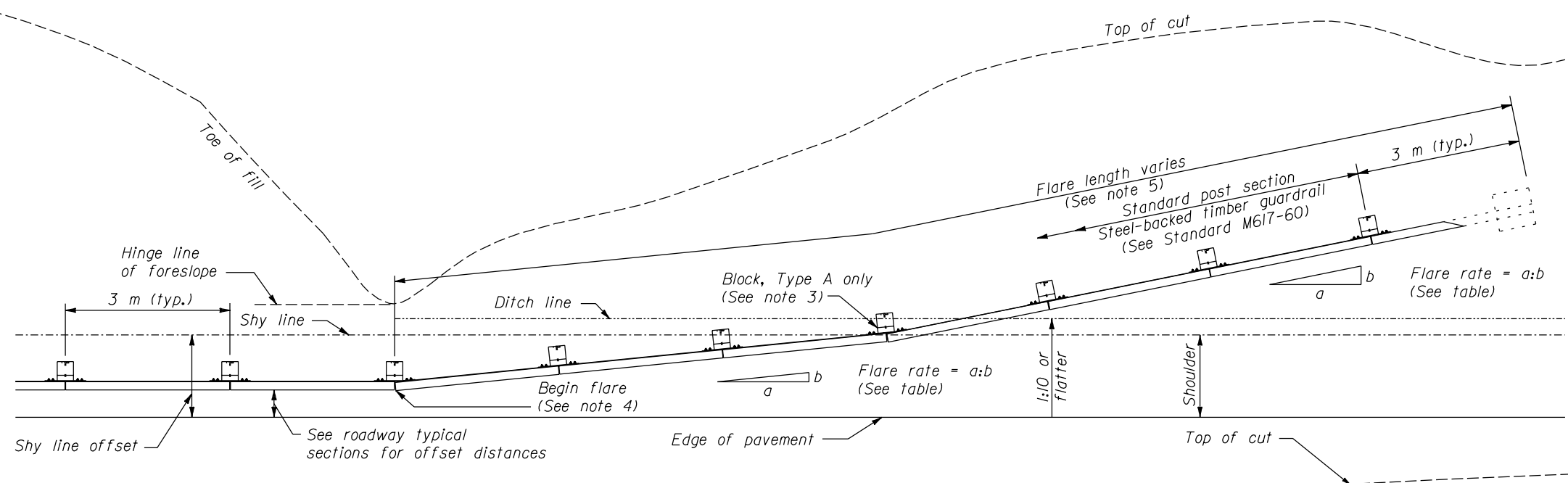
**STEEL-BACKED TIMBER GUARDRAIL
TERMINAL SECTION
TYPE FAT-9 AND TYPE FAT-6**

STANDARD APPROVED FOR USE 3/1996

REVISOR: STANDARD
M617-61

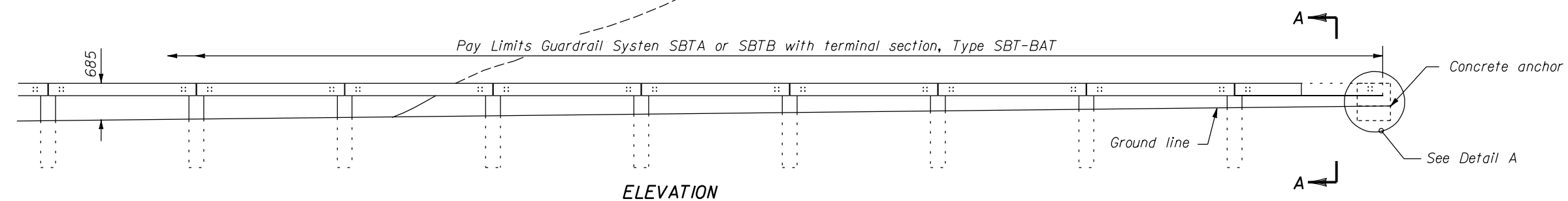
NO SCALE

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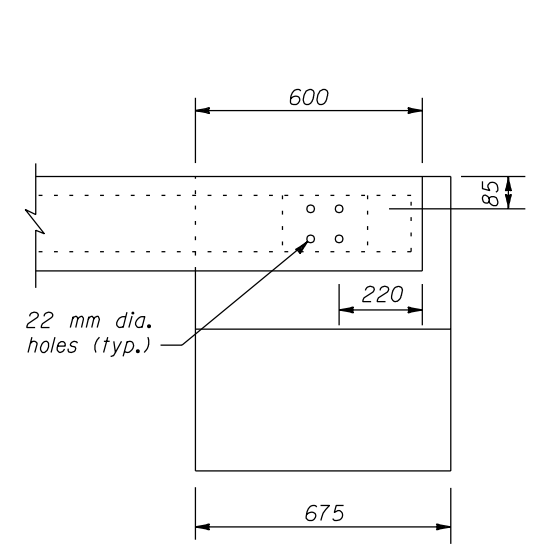
PLAN

- NOTE:**
1. Dimensions not labeled are in millimeters.
 2. See Standard M617-60, SBTA and SBTB for timber, structural steel, and hardware details.
 3. On the Type A, blocked-out guardrail, include the blocks in the terminal section, except on the concrete anchor. For the Type B, non-blocked-out guardrail, no blocks are included.
 4. Begin the cut flares at the nearest post to a transition point between fill and cut as directed by the CO.
 5. Extend the flare into the cut until a minimum 300 mm cover is obtained over the guardrail end.
 6. Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.



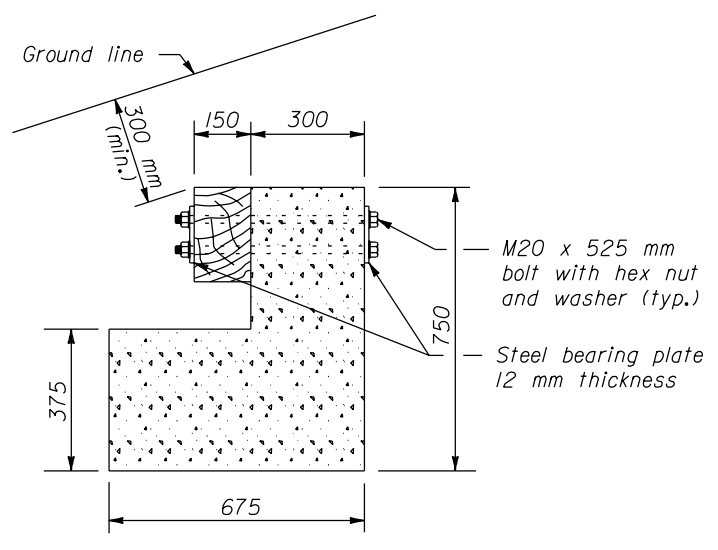
ELEVATION

APPROACH & DEPARTURE FLARE WITH BACK SLOPE ANCHOR TERMINAL (BAT)

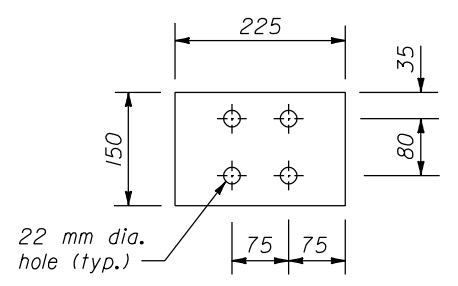


DETAIL A

CONCRETE ANCHOR



SECTION A-A



STEEL BEARING PLATE

Design Speed (km/h)	Shy line offset (m)	Flare rate inside shy line (a:b)	Flare rate outside shy line (a:b)
100	2.5	26:1	13:1
80	2.0	21:1	11:1
60	1.5	17:1	9:1
50 or less	1.0	13:1	7:1

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

METRIC STANDARD

STEEL-BACKED TIMBER GUARDRAIL
TERMINAL SECTION
TYPE SBT-BAT

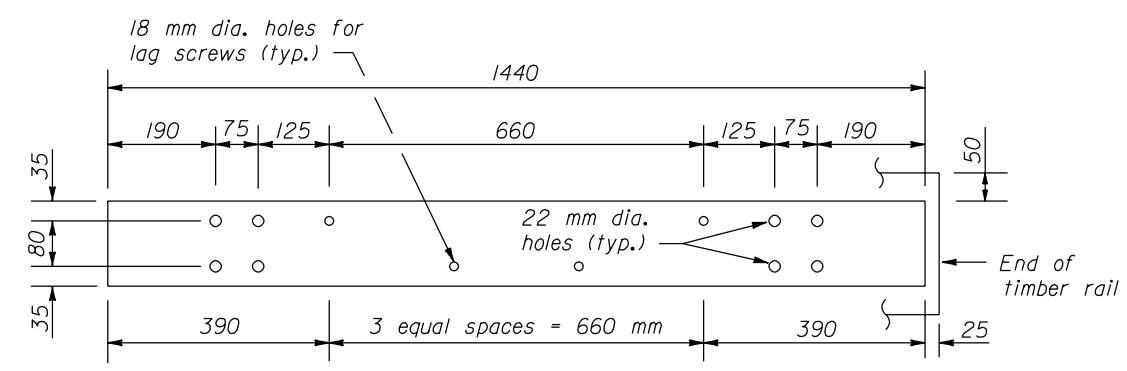
STANDARD APPROVED FOR USE 3/1996

REVISOR:

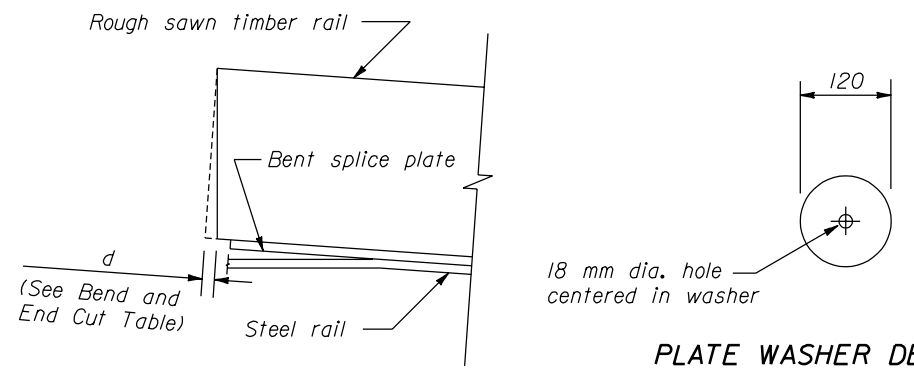
STANDARD
M617-62

NO SCALE

22 NOV 2000 f:\standrow\metric\ms161762.dgn



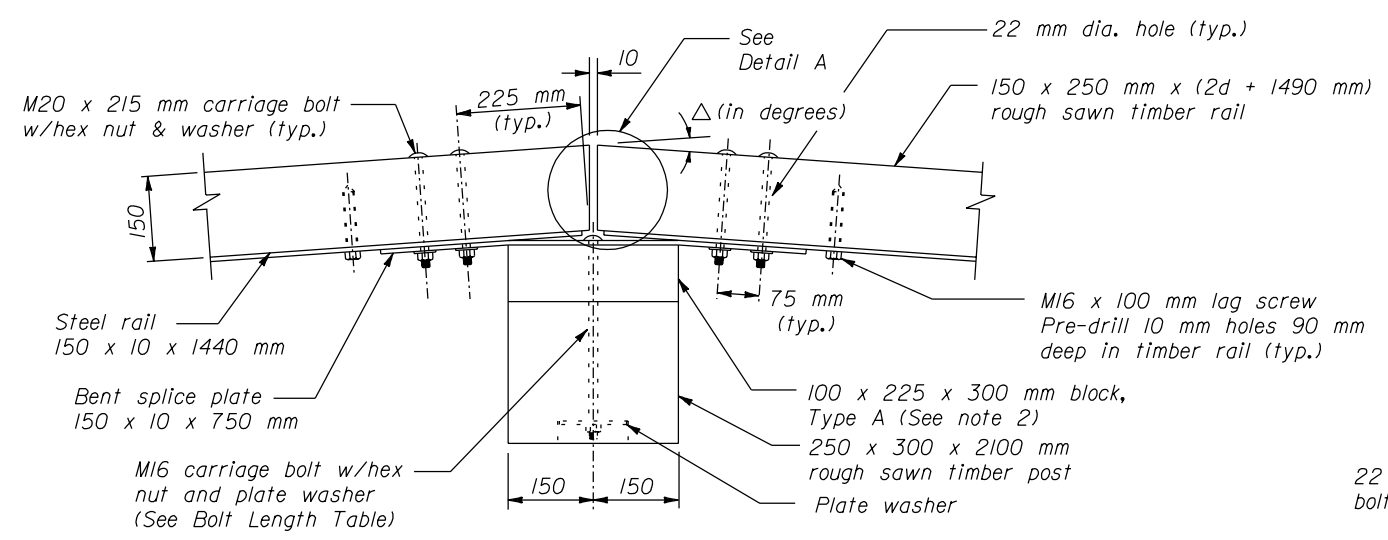
STEEL RAIL
150 x 10 x 1445 mm



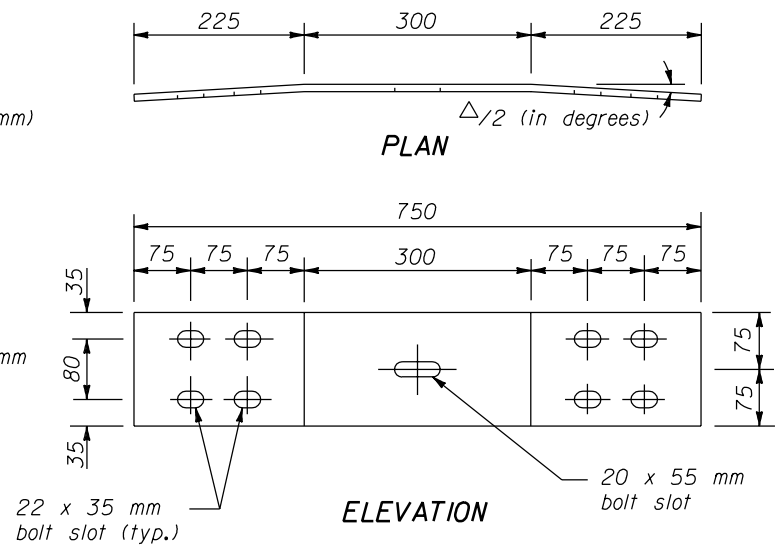
DETAIL A

PLATE WASHER DETAIL
120 mm DIA. X 6 mm

- NOTE:**
1. Dimensions not labeled are in millimeters.
 2. Use the Type A, blocked-out, system or the Type B, non-blocked-out, system as specified.
 3. Use weathering steel for all structural steel and fastener hardware.
 4. Furnish shop bent splice plates. Use the minimum bend angle shown in the table below.
 5. Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.
 6. See Standard M617-64 for Plan View Layout.

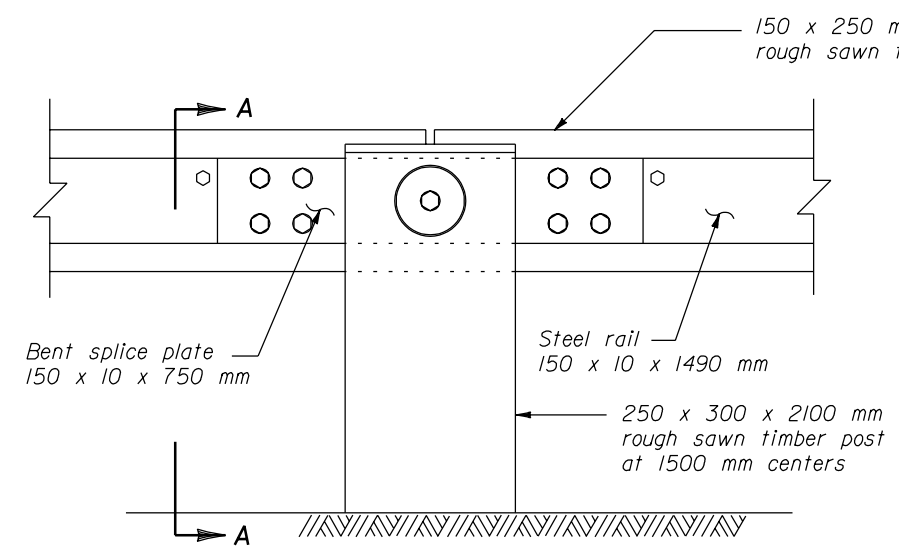


PLAN



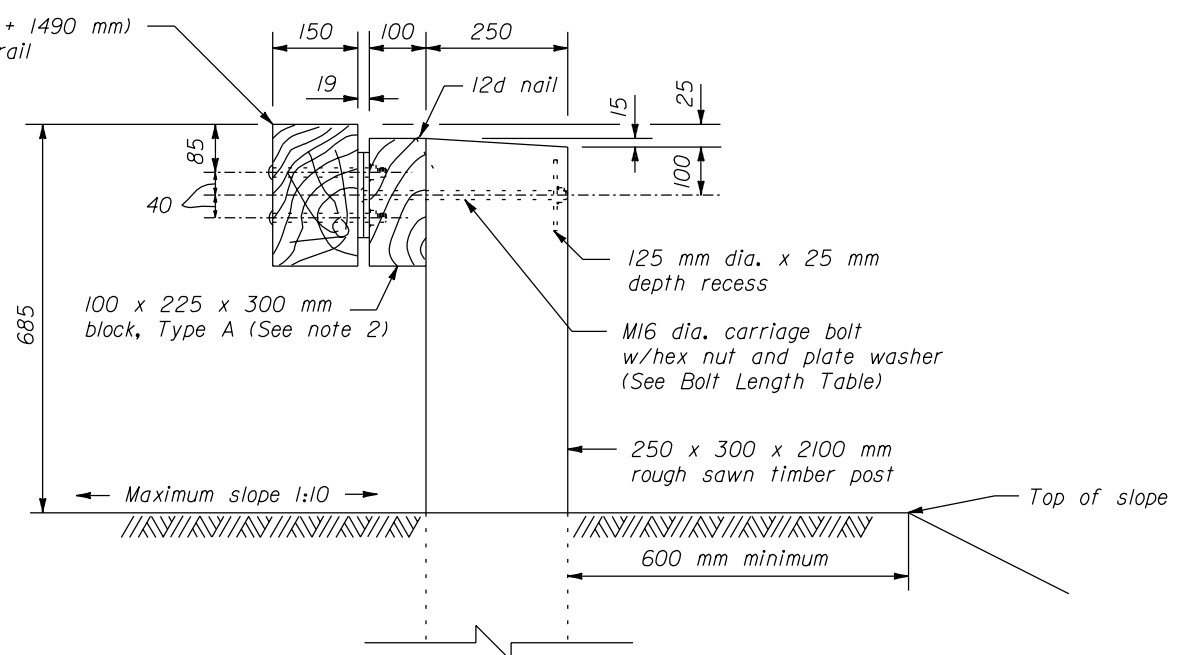
BENT SPLICE PLATE
150 X 10 X 750 mm

Radius R meters	Δ/2 (degrees)	d mm
5	8.63	23
8	5.38	14
10	4.3	11
12	3.58	9
14	3.07	8
16	2.69	7
18	2.39	6
20	2.15	5
22	1.95	5
over 22	flat	0



ELEVATION

POST CONNECTION



SECTION A-A

Type A (Block-out)	Type B (No Block-out)
375	275

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

METRIC STANDARD

**STEEL-BACKED TIMBER GUARDRAIL
AROUND CIRCULAR CURVES
22 m RADIUS AND BELOW**

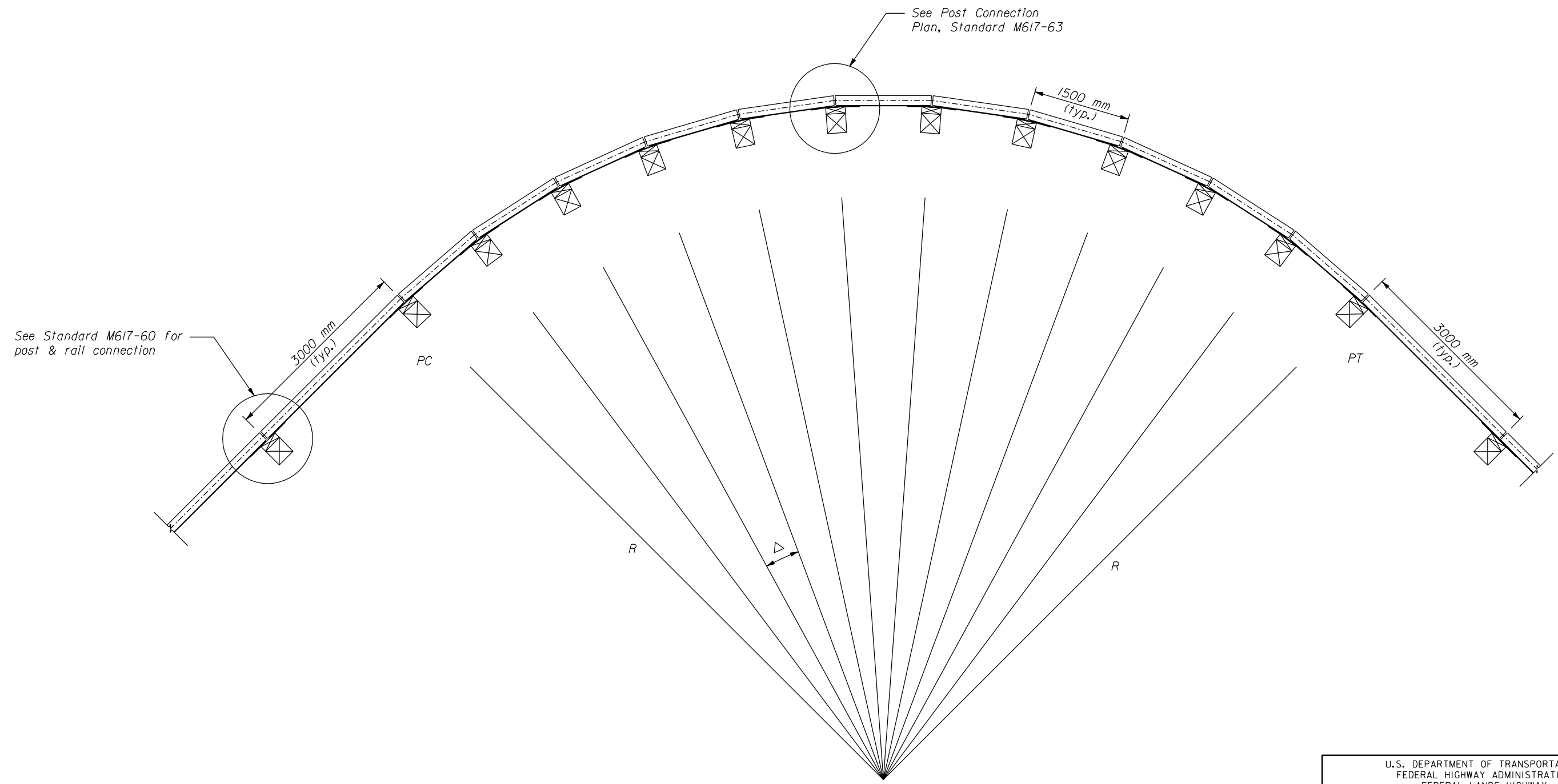
STANDARD APPROVED FOR USE 3/1996
REVISED:

STANDARD
M617-63

NO SCALE

NOTE:

1. Dimensions not labeled are in millimeters.
2. Δ is the central angle which subtends a 1500 mm chord.
3. R is measured from the center of the circle to the back surface of the rough sawn timber rail.



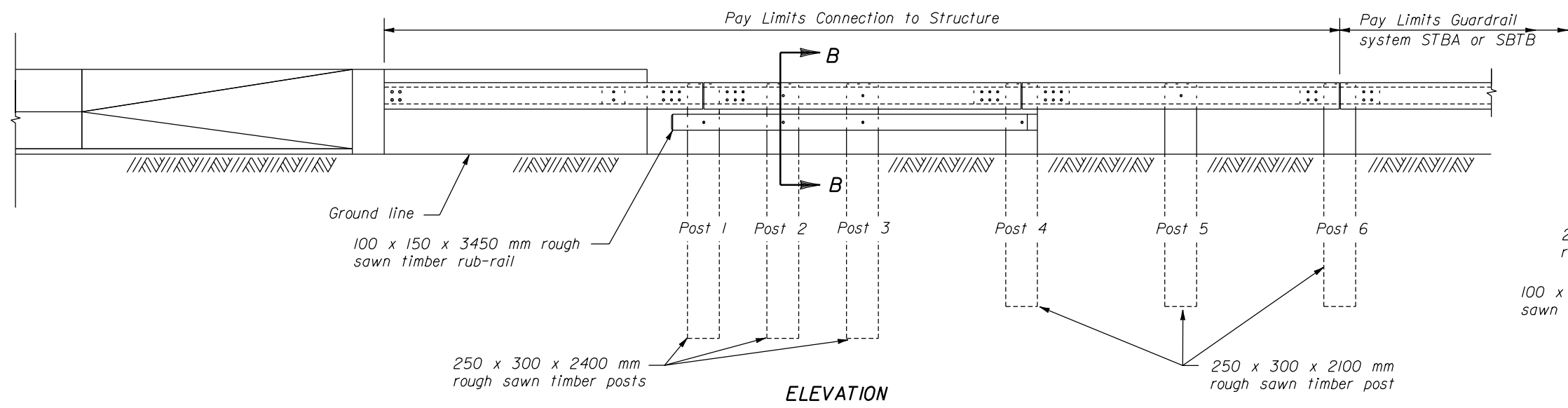
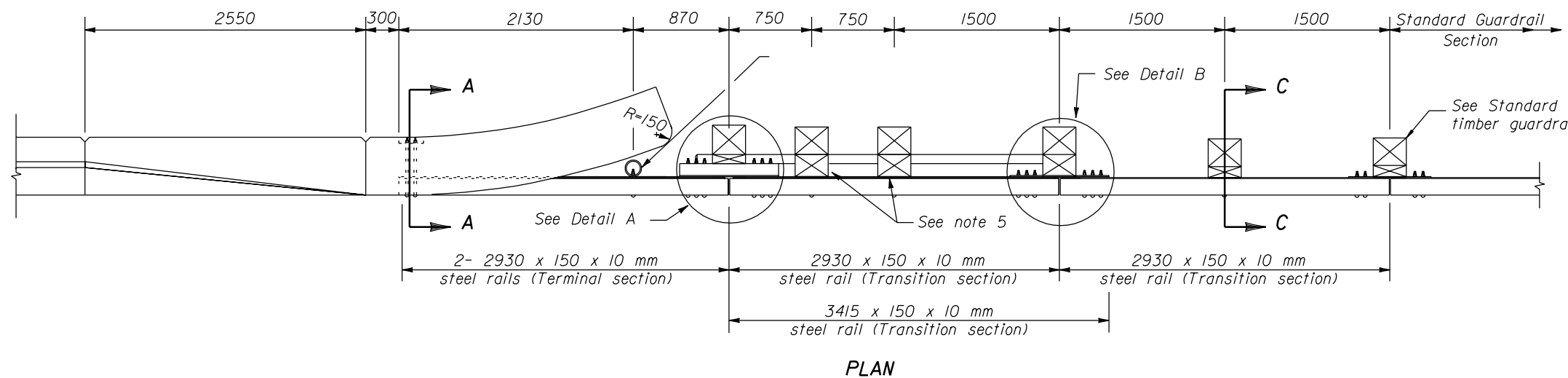
PLAN VIEW LAYOUT

NO SCALE

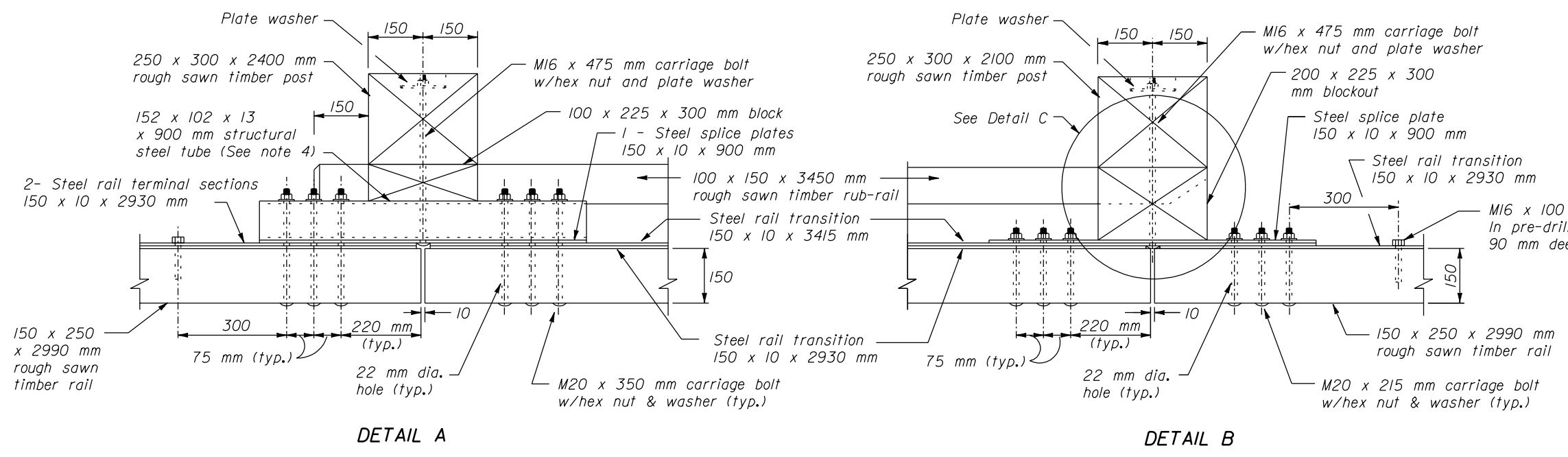
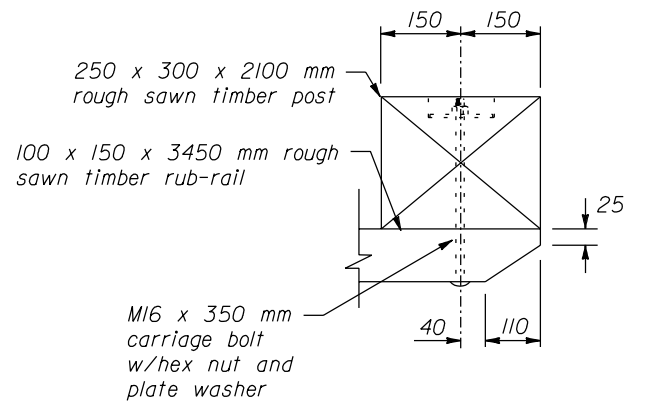
U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION FEDERAL LANDS HIGHWAY	
METRIC STANDARD	
STEEL-BACKED TIMBER GUARDRAIL AROUND CIRCULAR CURVES 22 m RADIUS AND BELOW	
STANDARD APPROVED FOR USE 3/1996	STANDARD
REVISED:	M617-64

22 NOV 2000

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- NOTE:**
- Dimensions not labeled are in millimeters.
 - See Standard M617-66 for Sections A-A through C-C, steel rail layouts, and other details.
 - Use weathering steel for all structural steel and fastener hardware.
 - Drill the bolt pattern for structural steel tube to match the pattern for the splice plate shown on Standard M617-66.
 - For posts 2 and 3, use a 200 x 225 x 300 mm block for the blackout, and an M16 x 650 mm carriage bolt with hex nut and plate washer.
 - Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.



POST CONNECTION

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

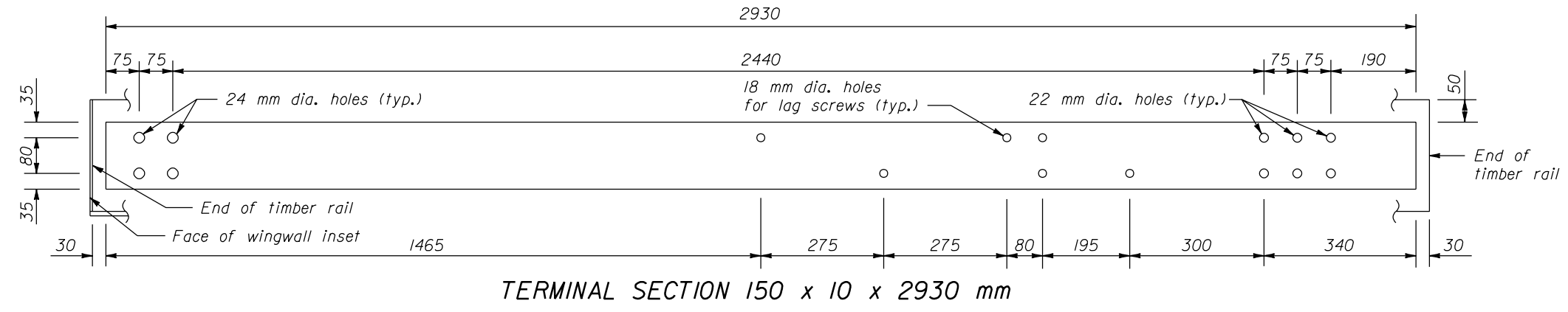
METRIC STANDARD

**STEEL-BACKED
TIMBER GUARDRAIL
CONNECTION TO STRUCTURE**

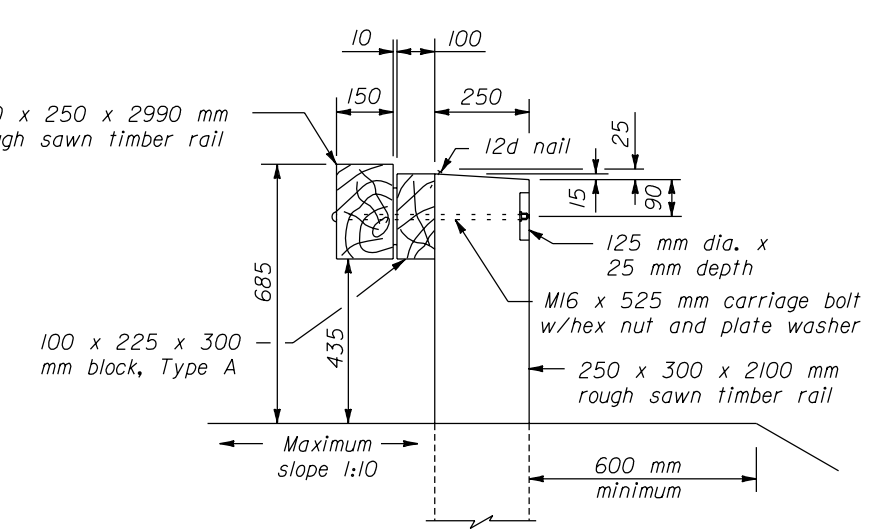
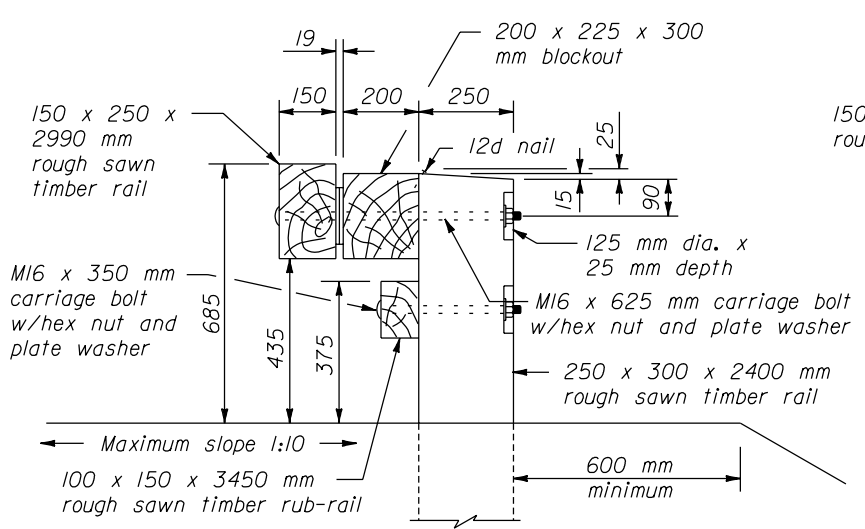
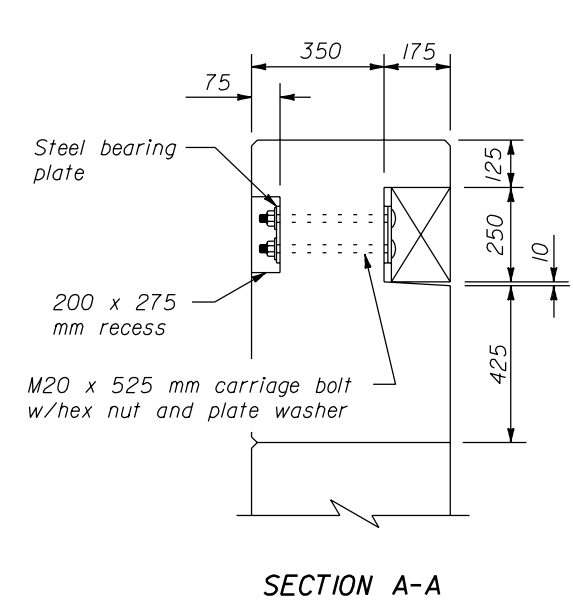
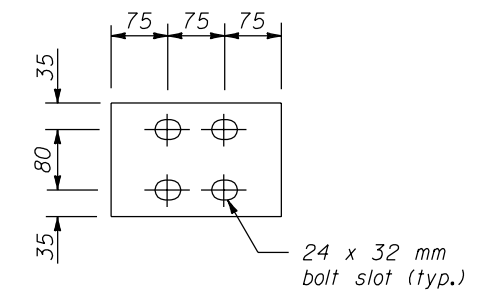
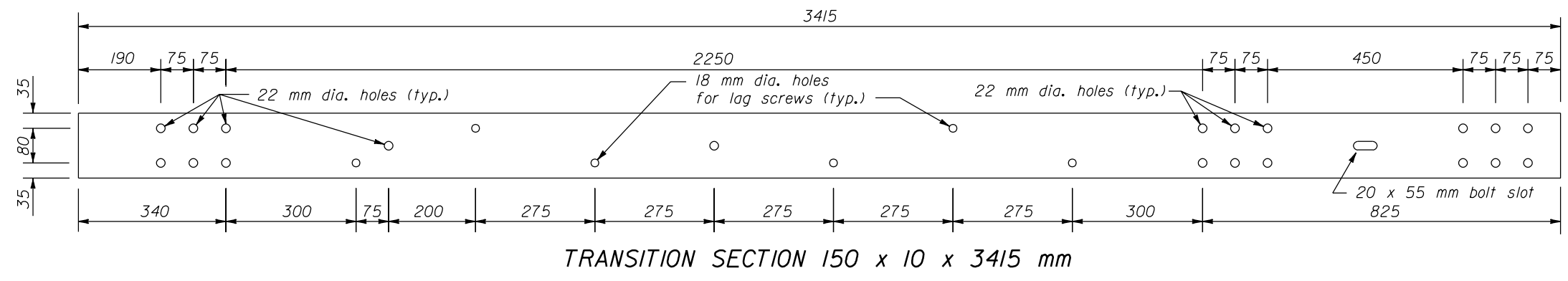
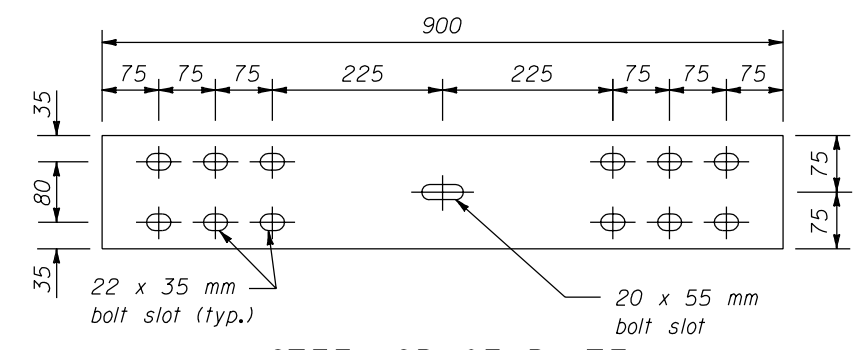
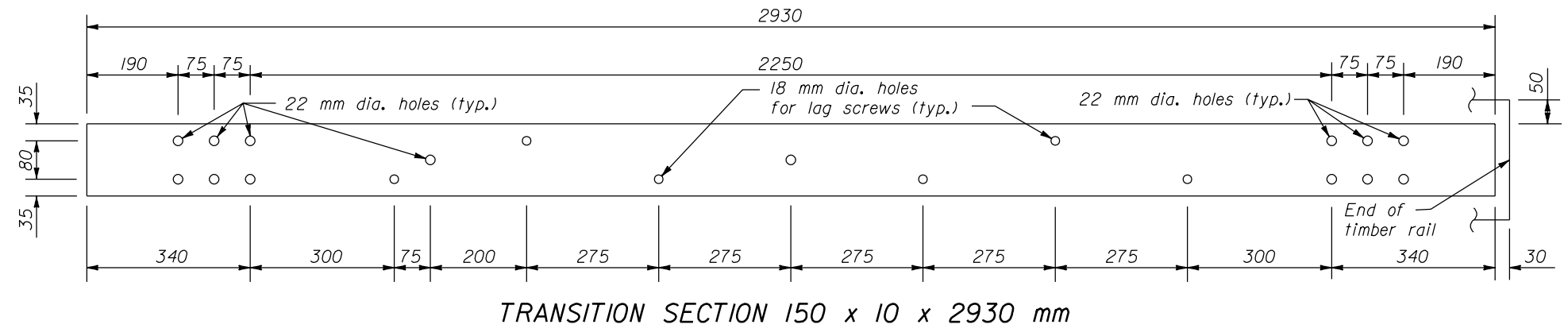
STANDARD APPROVED FOR USE 3/1996

REVISIONS: STANDARD M617-65

22 NOV 2000 f:\standrow\metric\m61765.dgn



- NOTE:**
- Dimensions not labeled are in millimeters.
 - Pre-drill 18 mm holes in blocks outs and posts.
 - Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.



NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

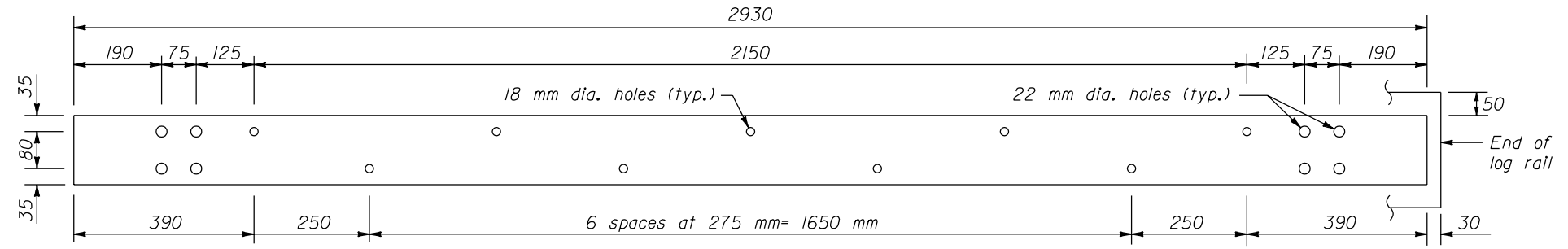
METRIC STANDARD

**STEEL-BACKED
TIMBER GUARDRAIL
BRIDGE CONNECTION**

STANDARD APPROVED FOR USE 3/1996

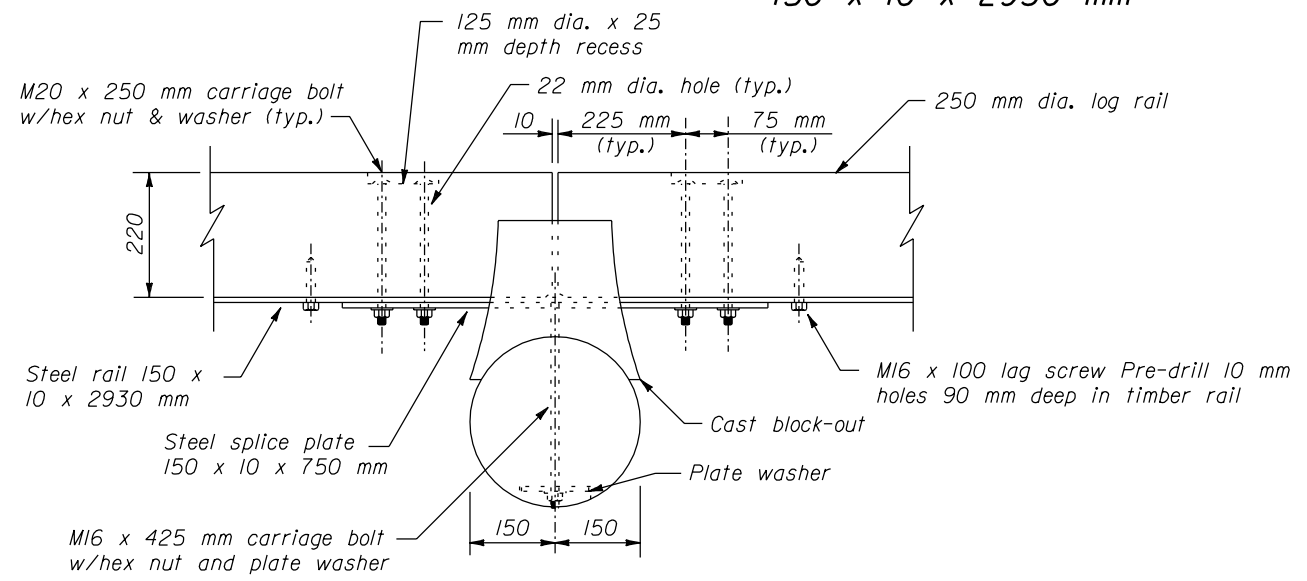
REVISOR: STANDARD
M617-66

22 NOV 2000 f:\standrow\metric\mstr61766.dgn

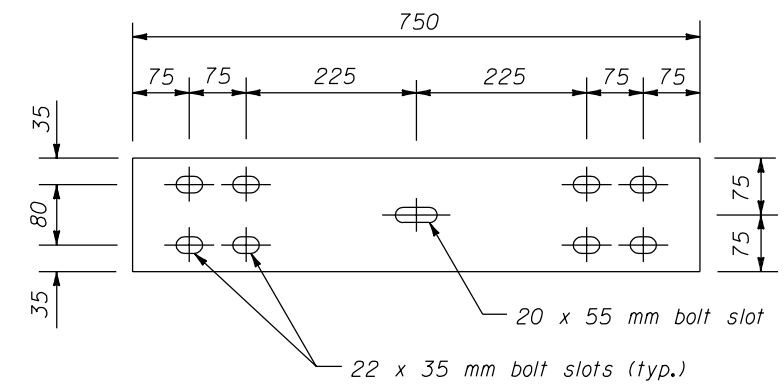


STEEL RAIL
150 x 10 x 2930 mm

- NOTE:**
1. Dimensions not labeled are in millimeters.
 2. For details of the cast block-out and general notes for Steel-Backed Log Guardrail See Standard M617-81.
 3. Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.



PLAN



STEEL SPLICE PLATE
150 x 10 x 750 mm

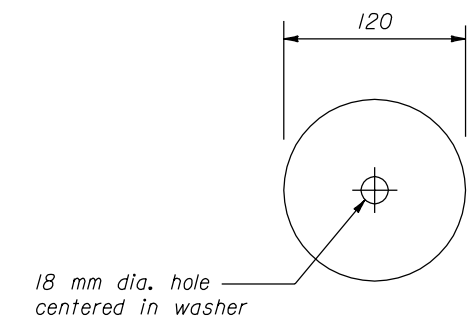
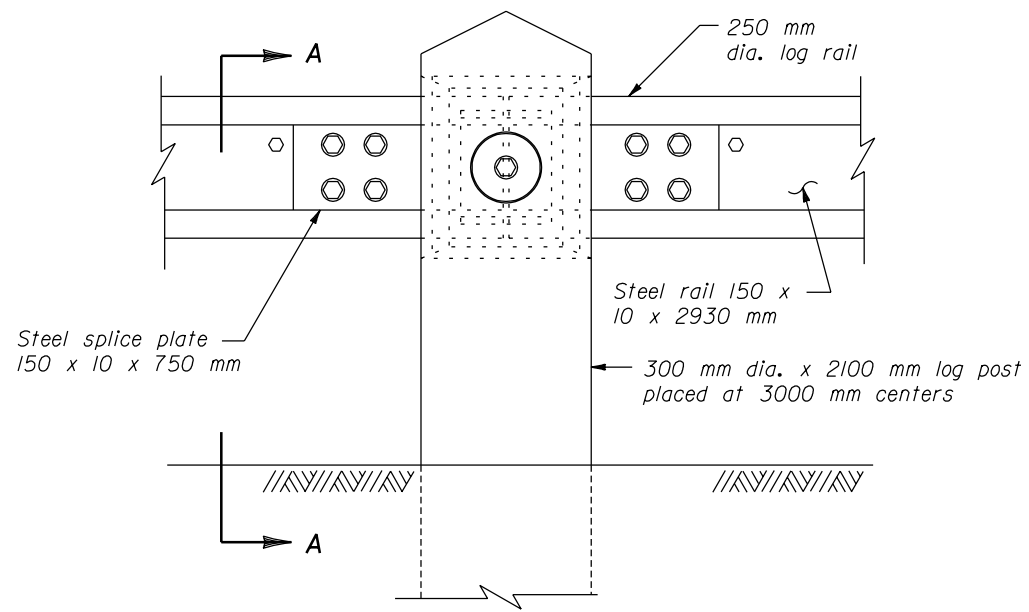
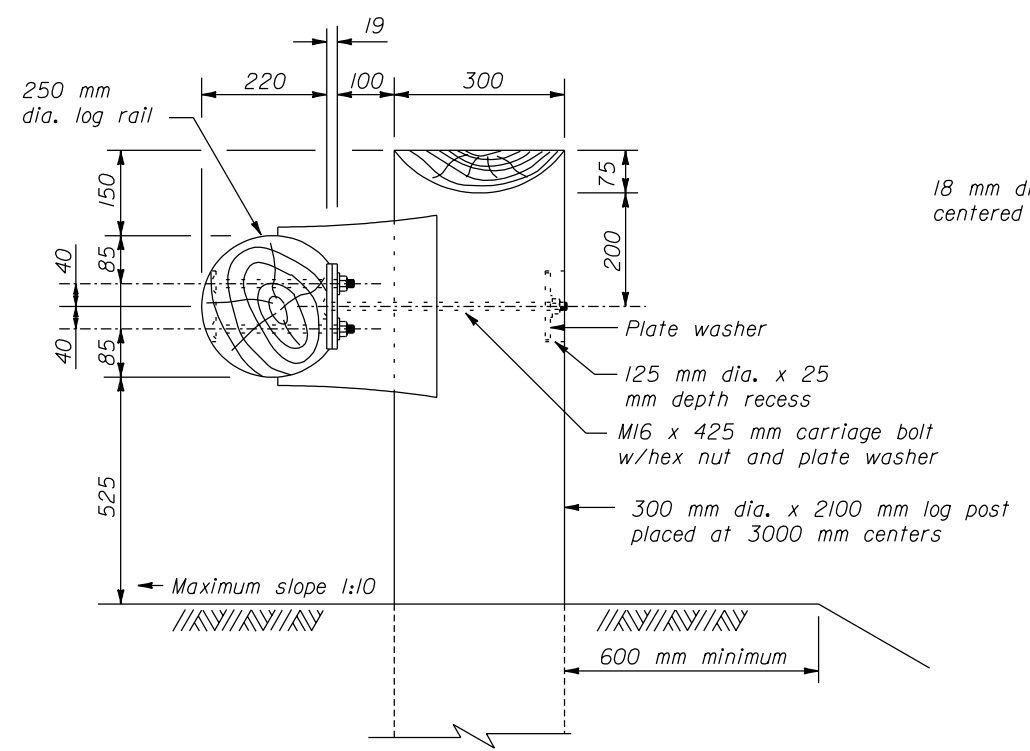


PLATE WASHER
120 mm Dia. 6 mm



ELEVATION



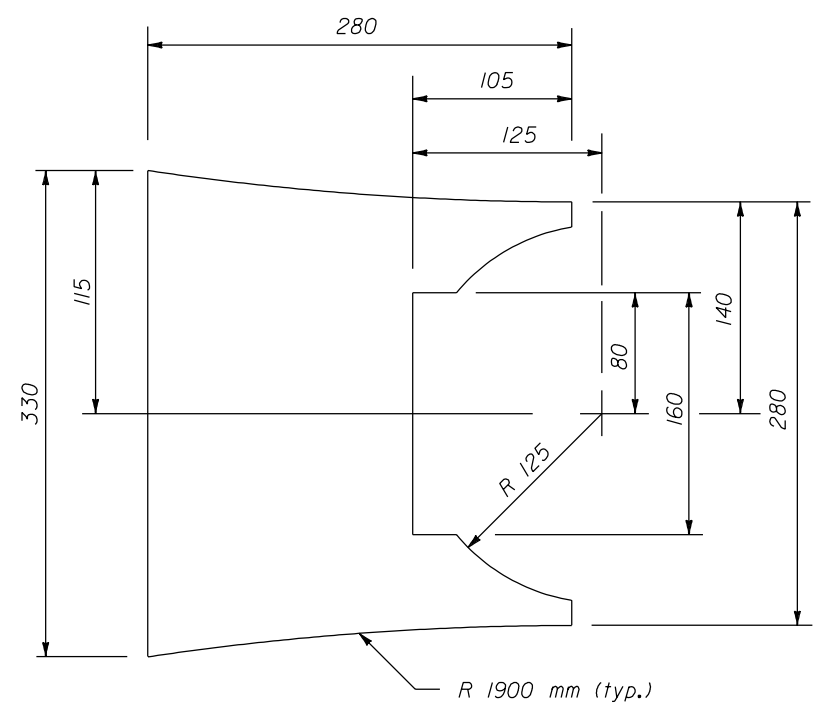
SECTION A-A

POST CONNECTION

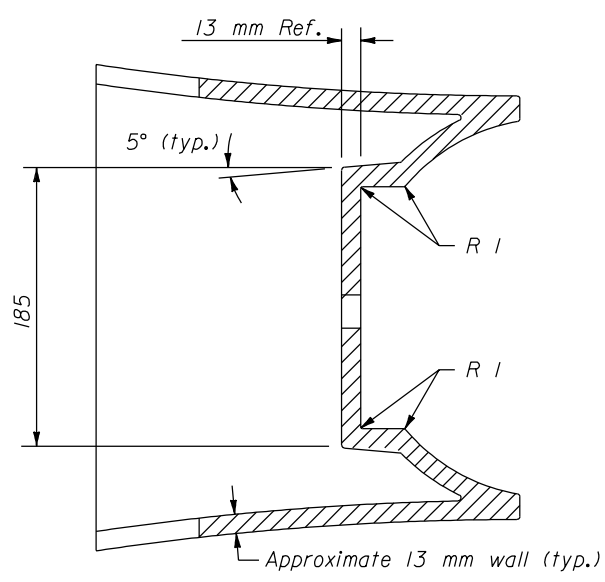
NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION FEDERAL LANDS HIGHWAY	
METRIC STANDARD	
STEEL-BACKED LOG RAIL	
STANDARD APPROVED FOR USE 3/1996	STANDARD
REVISED:	M617-80

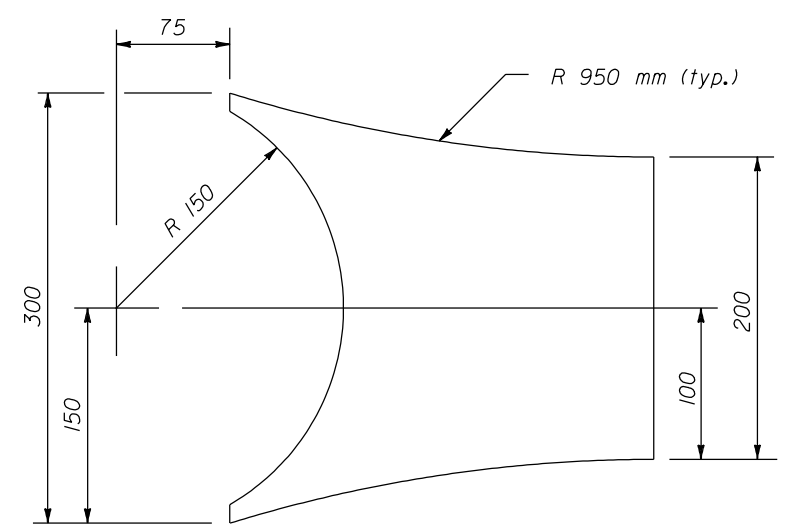
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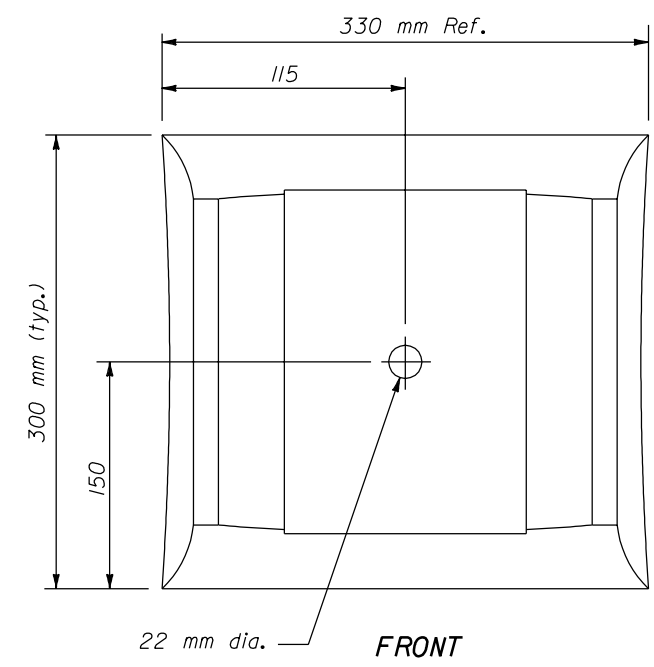
SIDE



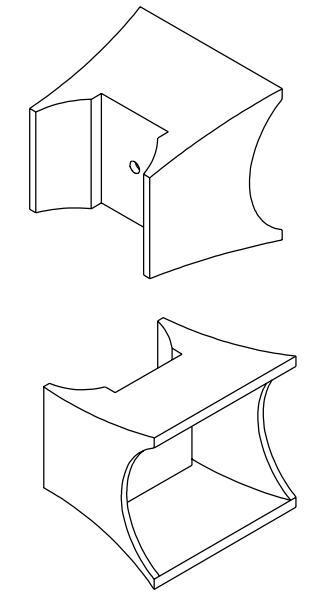
SECTION



TOP



FRONT



NOTE:

1. Dimensions not labeled are in millimeters.
2. Furnish post and rail elements of peeled, round Coastal Douglas-fir, Western hemlock, Western larch, Western pine, Jack pine or Lodgepole pine.
3. Treat post and rail elements with water-borne preservative CCA according to AWP Standard C14.
4. Install logs for rails butt to butt and tip to tip. A 50 mm maximum taper between the butt and tip ends of individual logs is permitted.
5. 6 meter logs are acceptable for rails provided the 50 mm maximum taper requirement is met and roadway curvature permits.
6. Make splices in rail elements at posts only.
7. Field cut log ends and dress as necessary to obtain tight fitting butt joints in full contact with each other at the log ends. Trim traffic exposed faces of log ends at the joints and elsewhere and dress as necessary to obtain a smooth surface with no protrusions.
8. Dress back face of log rail members to provide a flat surface wide enough to accommodate a 150 mm steel rail.
9. Apply an approved tinted brown color stain to all exposed surfaces of logs. Apply stain either as a part of or subsequent to preservative treatment.
10. Treat all field cuts and drill holes with two applications of the same preservative and stain as the rails and posts.
11. Furnish structural steel conforming to AASHTO M222 (ASTM A588).
12. Furnish corrosion resistant fastener hardware manufactured from steel conforming to AASHTO M164, Type 3 (ASTM A325, Type 3).
13. The nominal bolt length is 400 mm. Bolt lengths will vary according to log size. Extra long threaded bolts may be used, provided they are field cut so that none of the shank protrudes beyond the back of the post.
14. Cast block-out fits 300 mm diameter posts and 250 mm diameter rails with steel backing.
15. All cast steel, including hardware, conforms to AASHTO M222 or ASTM A588 (Grade C).
16. Apply a good sand cast finish to all exposed exterior surfaces. Lightly sandblast all exterior surfaces.
17. Unless otherwise specified, all exterior radii are 1 mm.
18. Unless otherwise specified all inside radii are 2 mm.

CAST BLOCK-OUT FOR 300 mm LOG POST TO 250 mm LOG RAIL (CONCAVE OUTSIDE WALLS)

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION FEDERAL LANDS HIGHWAY	
METRIC STANDARD	
STEEL-BACKED LOG RAIL BLOCKOUT	
STANDARD APPROVED FOR USE 3/1996	STANDARD
REVISED:	M617-81