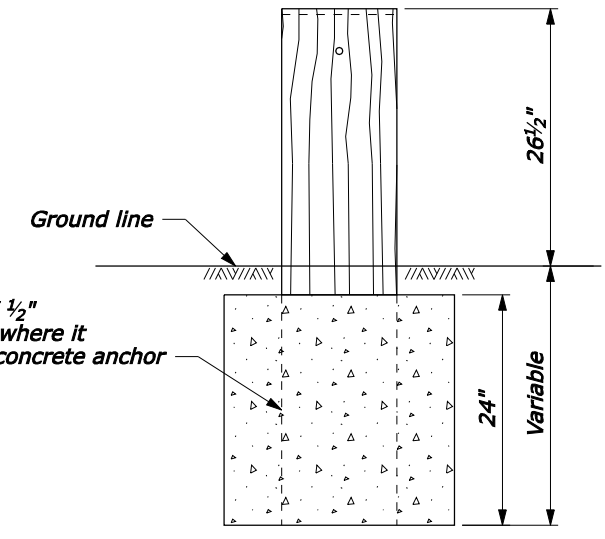
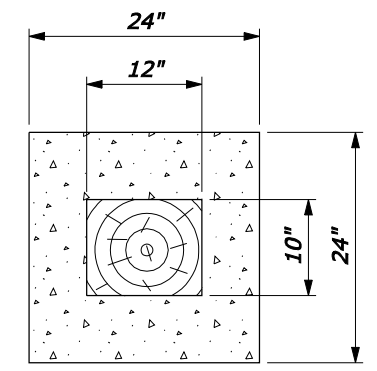
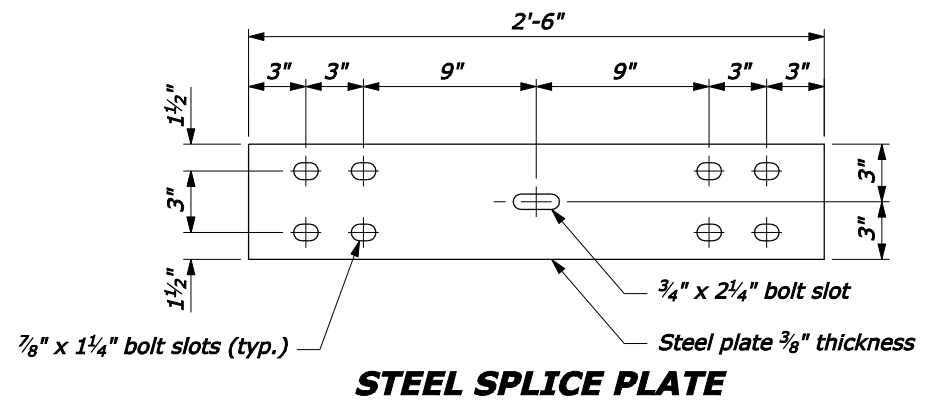
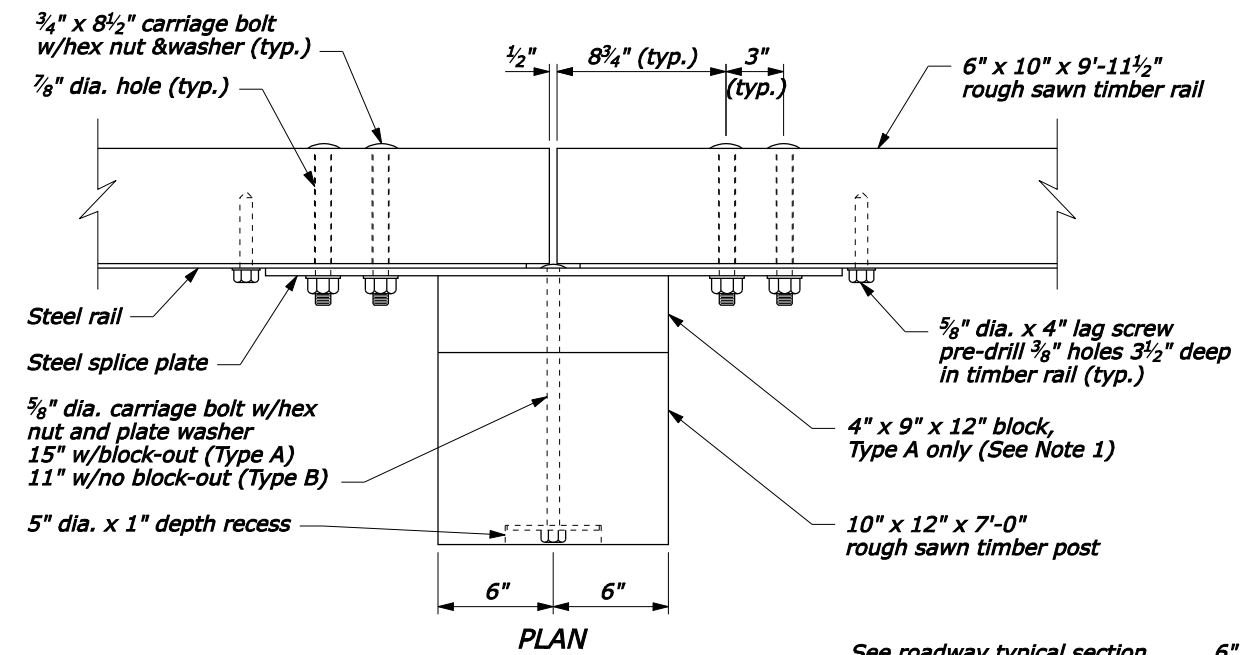
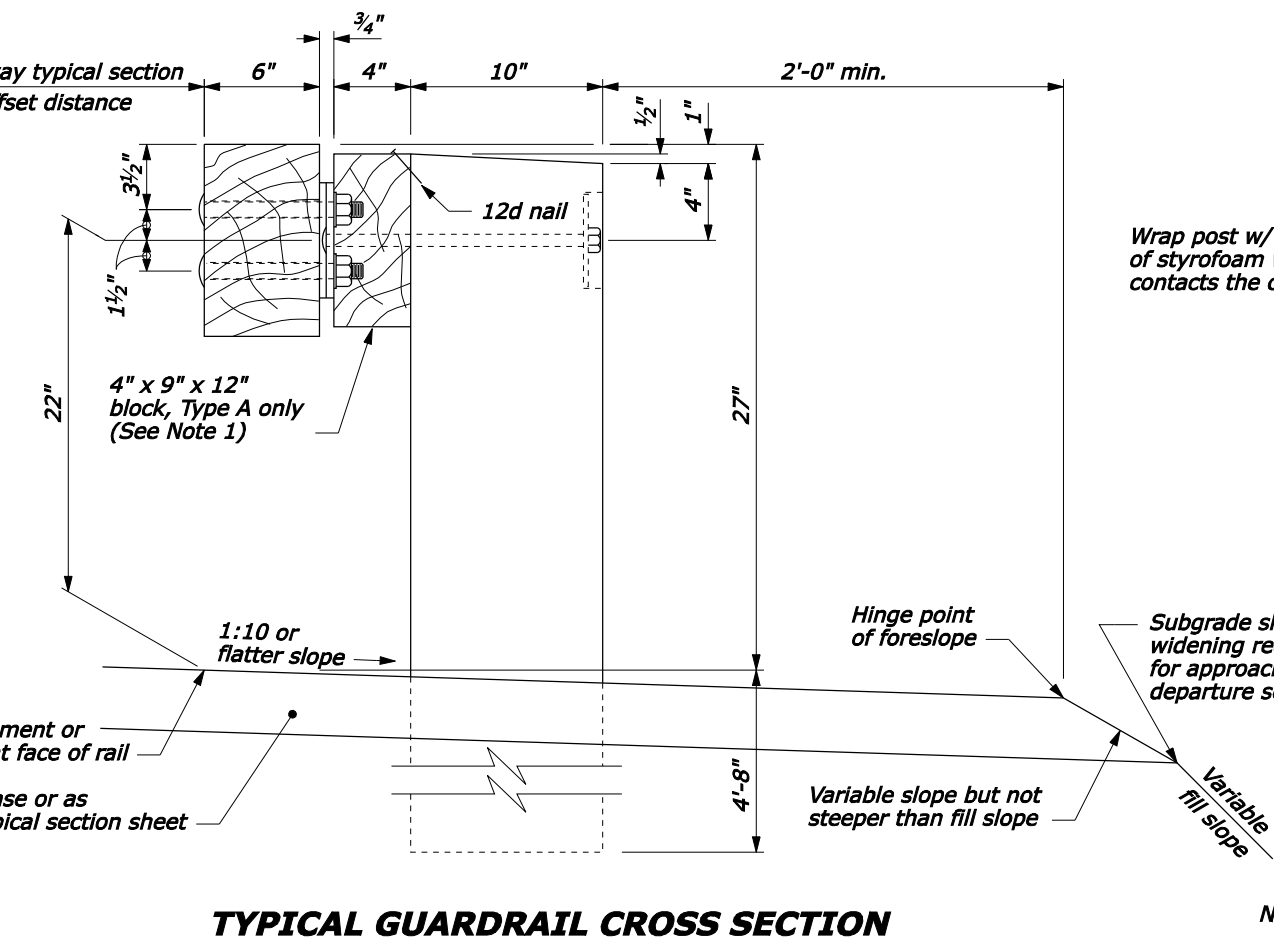
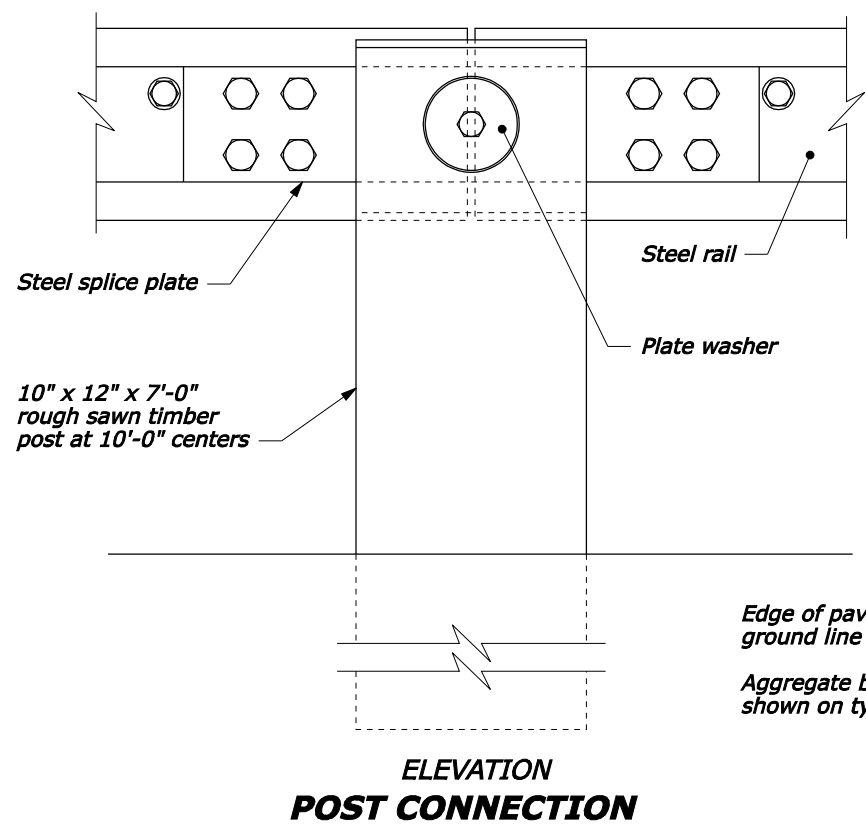


- NOTE:**
1. Use the Type A, blocked-out, system or the Type B, non-blocked-out, system as specified in the plans.
 2. Use weathering steel for all structural steel and fastener hardware as specified.
 3. Place a terminal section (See Standards 617-61 and 617-62) on both approach and trailing ends of barrier installations.



24" dia. round anchor is an acceptable alternative. Reduced size acceptable in solid rock.

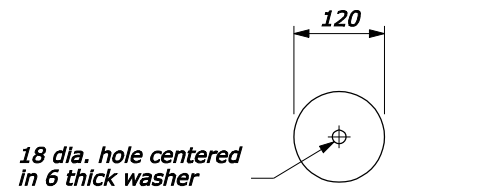
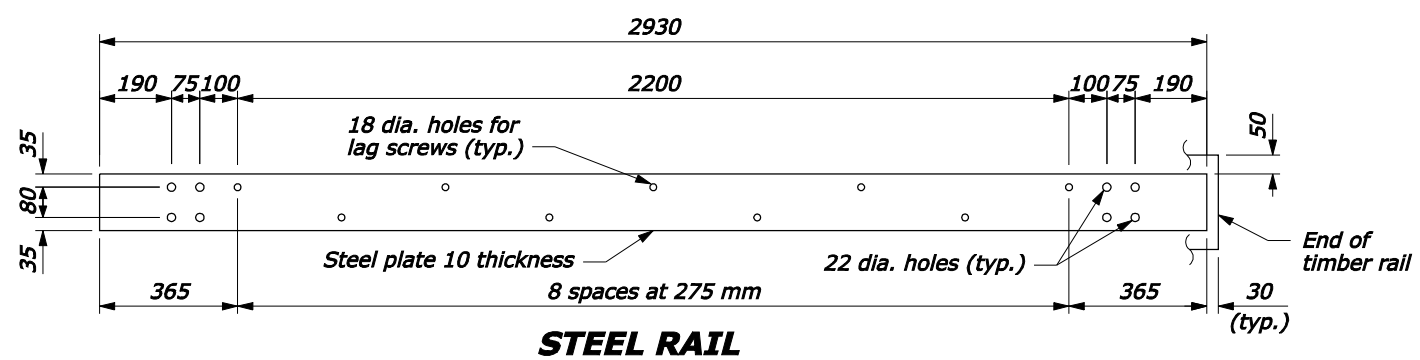
CONCRETE ANCHOR FOR SHORT GUARDRAIL POST



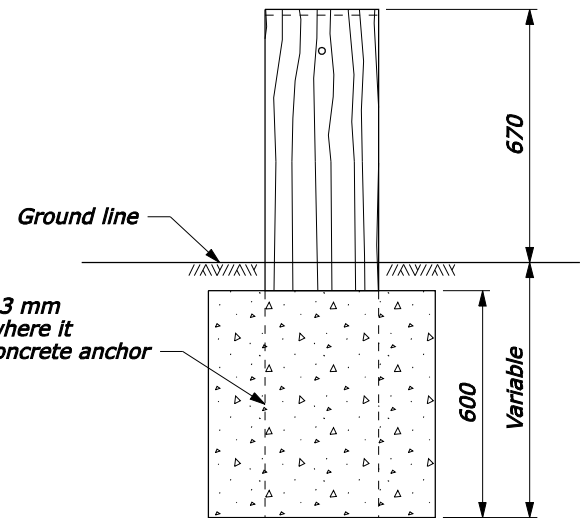
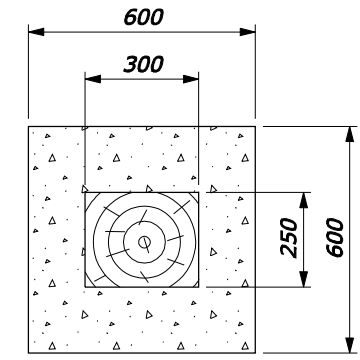
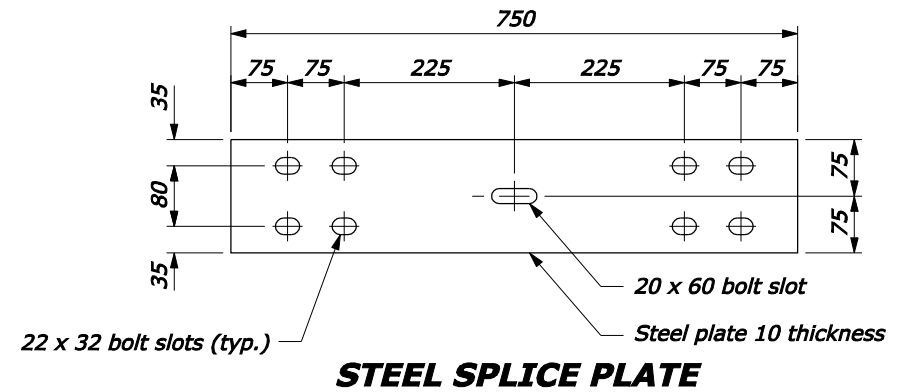
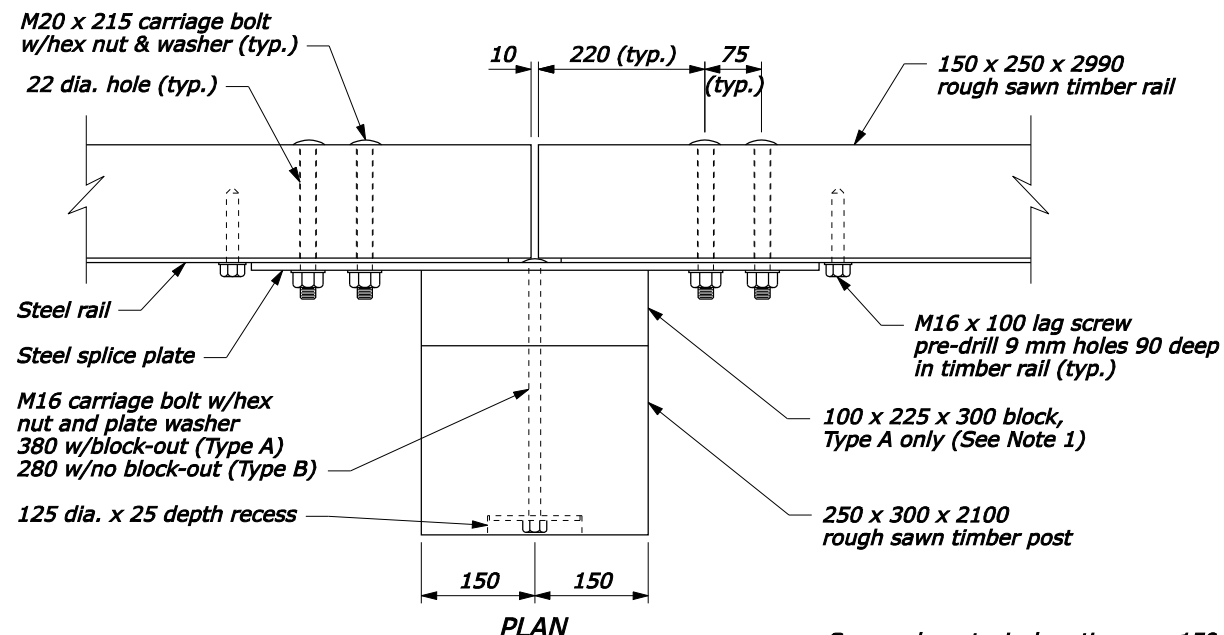
NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION FEDERAL LANDS HIGHWAY	
U.S. CUSTOMARY STANDARD	
STEEL-BACKED TIMBER GUARDRAIL TYPE A & TYPE B	
STANDARD APPROVED FOR USE 3/1990 REVISED: 4/1994 6/2005	STANDARD 617-60

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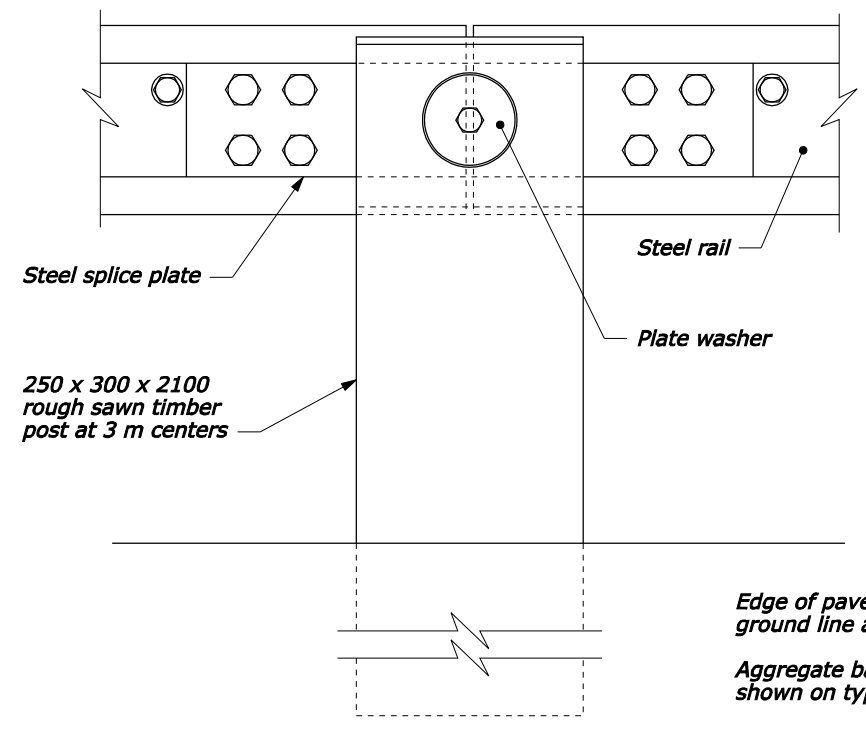


- NOTE:**
1. Use the Type A, blocked-out, system or the Type B, non-blocked-out, system as specified in the plans.
 2. Use weathering steel for all structural steel and fastener hardware as specified.
 3. Place a terminal section (See Standards M617-61 and M617-62) on both approach and trailing ends of barrier installations.
 4. Furnish hardware in the metric sizes shown. Equivalent imperial sizes may be used when metric sizes are not available.
 5. Dimensions without units are millimeters.

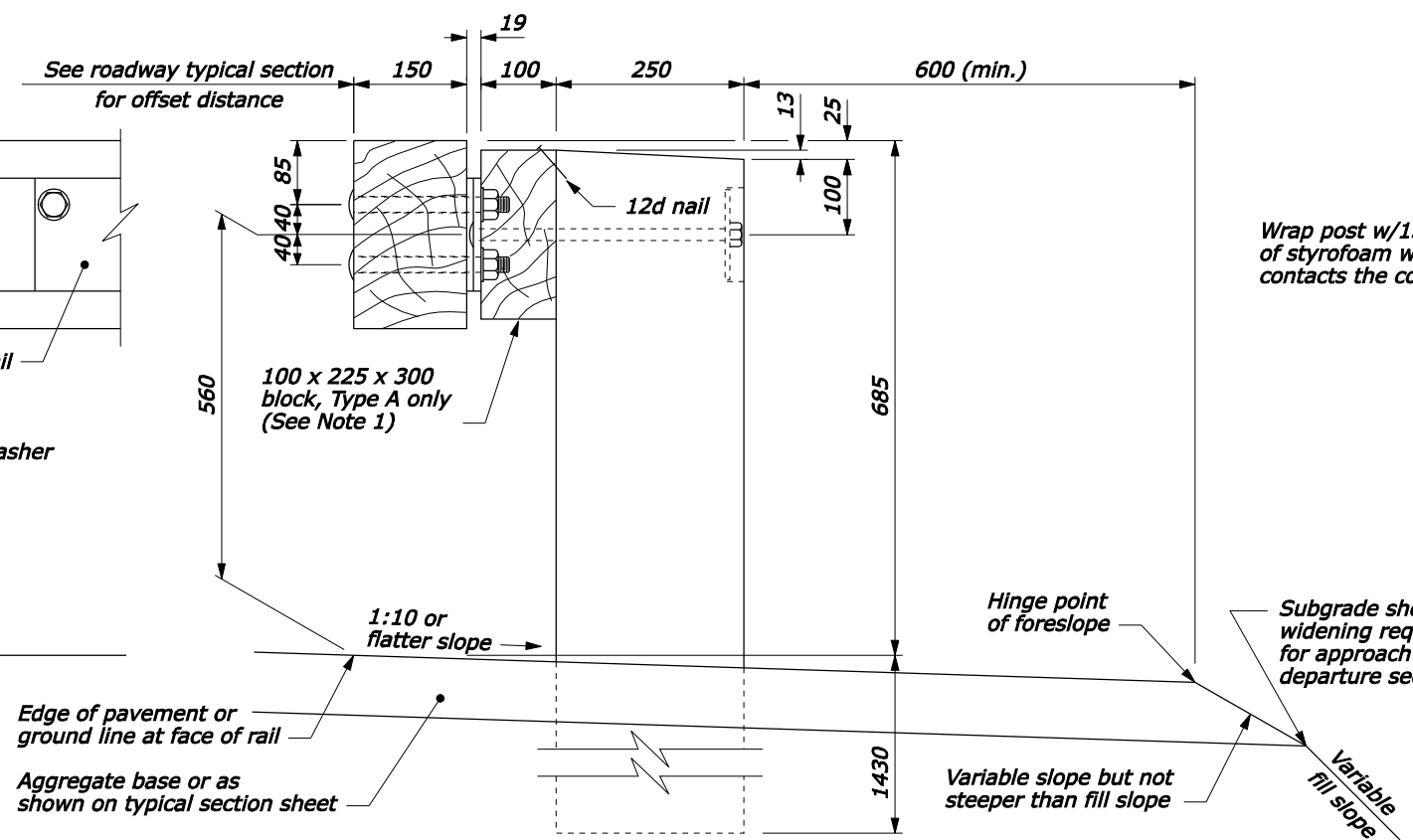


600 dia. round anchor is an acceptable alternative. Reduced size acceptable in solid rock.

CONCRETE ANCHOR FOR SHORT GUARDRAIL POST



ELEVATION POST CONNECTION

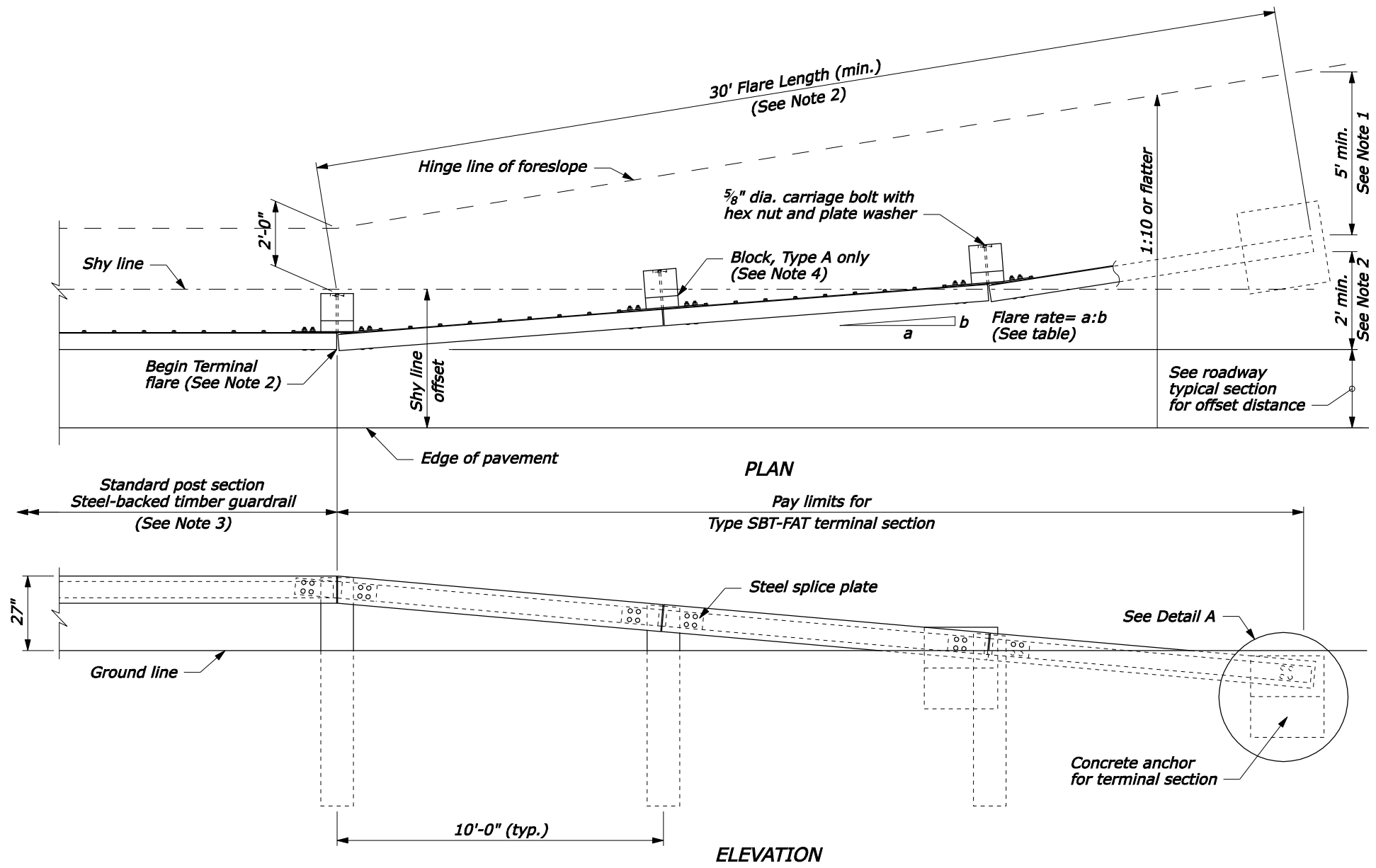


TYPICAL GUARDRAIL CROSS SECTION

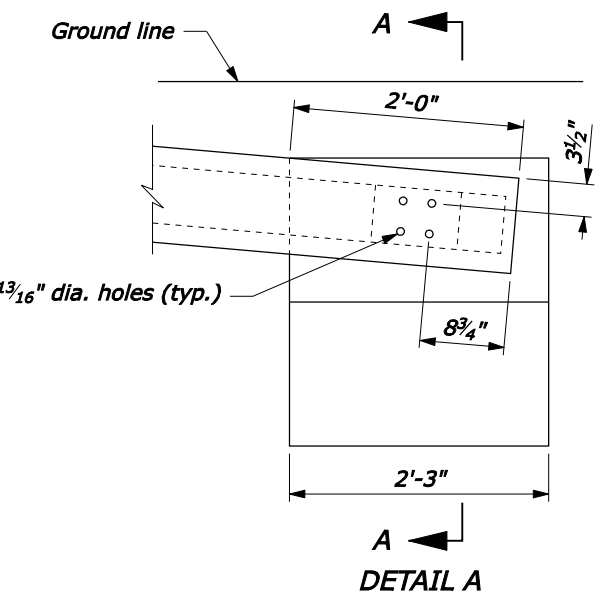
NO SCALE

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	STANDARD
REVISED: 5/1997 6/2005	M617-60

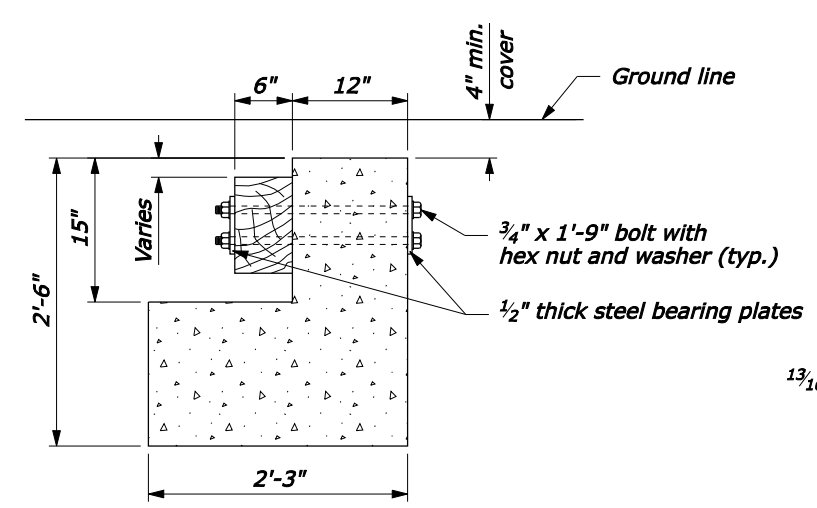
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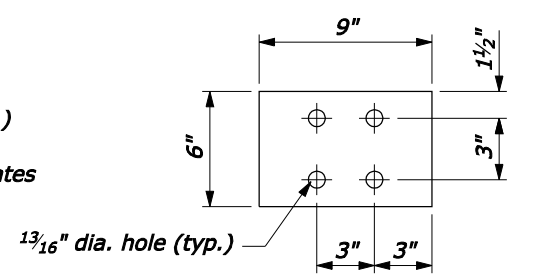
APPROACH & DEPARTURE FLARE WITH FLARED ANCHOR TERMINAL (FAT)



CONCRETE ANCHOR



SECTION A-A



STEEL BEARING PLATE

Design Speed (mph)	Shy line offset (ft)	Flare rate inside shy line (a:b)	Flare rate outside shy line (a:b)
60	8.0	26:1	14:1
50	6.5	21:1	11:1
40	5.0	16:1	8:1
30 and less	3.5	13:1	7:1

NOTE:

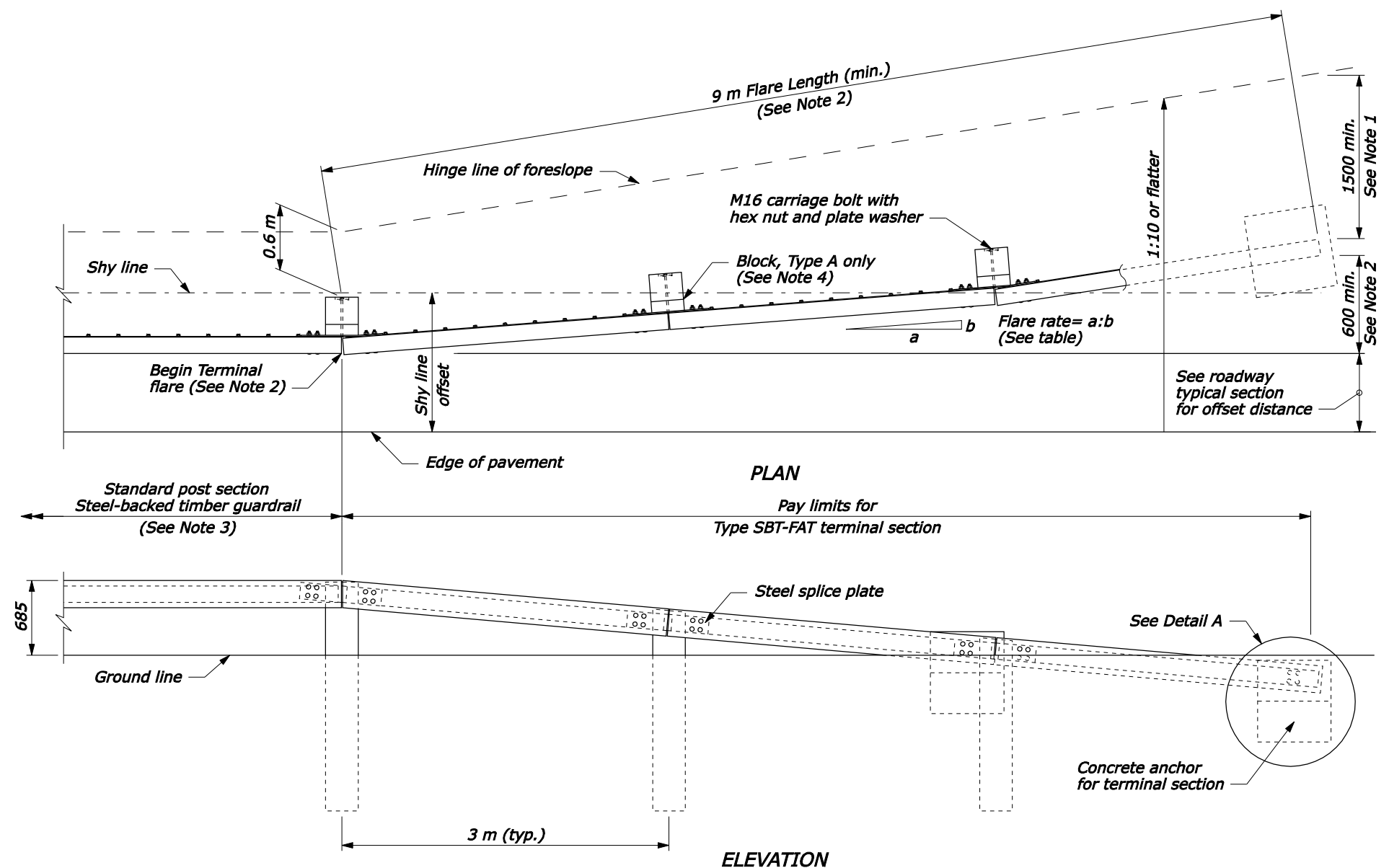
1. Extend the fill widening a minimum of 5 feet behind the guardrail, unless otherwise directed by the CO.
2. The guardrail flare shown in the plan view is the minimum length and rate required. As directed by the CO, flare the guardrail so that the terminal section is outside the clear zone. If the terminal 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.
3. See Standard 617-60, Steel-Backed Timber Guardrail, Type SBTA and SBTB, for timber, structural steel, and hardware details.
4. 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.

NO SCALE

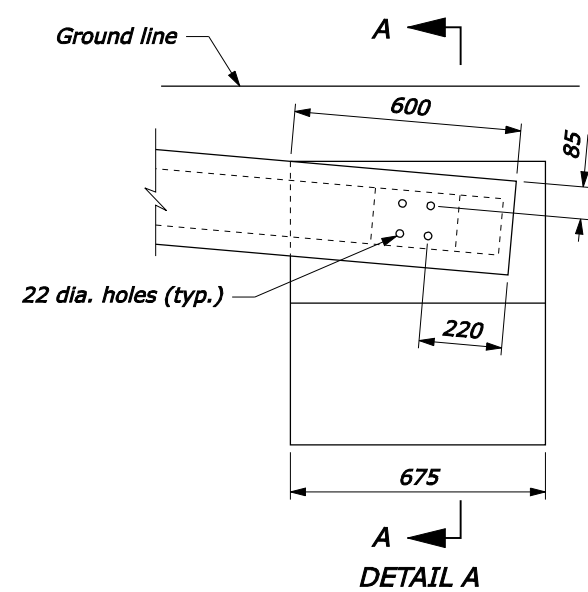
U.S. DEPARTMENT OF TRANSPORTATION
 FEDERAL HIGHWAY ADMINISTRATION
 FEDERAL LANDS HIGHWAY

U.S. CUSTOMARY STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
 TERMINAL SECTION
 TYPE SBT-FAT**

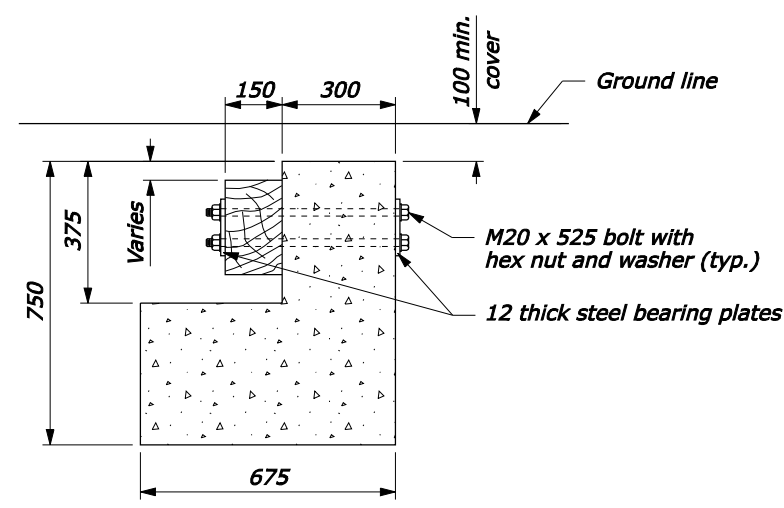
STANDARD APPROVED FOR USE 1/1990	STANDARD
REVISED: 4/1994 6/2005	617-61
DRAFT: 9/2007	



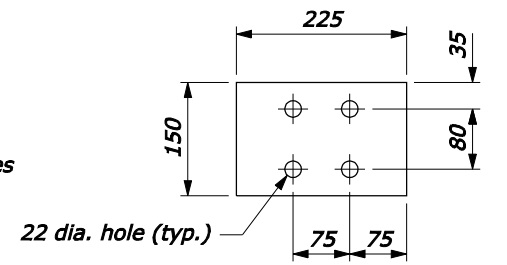
APPROACH & DEPARTURE FLARE WITH FLARED ANCHOR TERMINAL (FAT)



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	14:1
80	2.0	21:1	11:1
60	1.5	16:1	8:1
50 or less	1.0	13:1	7:1

NOTE:

1. Extend the fill widening a minimum of 1.5 m behind the guardrail, unless otherwise directed by the CO.
2. 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.
3. See Standard M617-60, Steel-Backed Timber Guardrail, Type SBT-A and SBT-B, for timber, structural steel, and hardware details.
4. 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.
5. Furnish hardware in the metric sizes shown. Equivalent US Customary sizes may be used when metric sizes are not available.
6. Dimensions without units are millimeters.

NO SCALE

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

METRIC STANDARD

**STEEL-BACKED TIMBER GUARDRAIL
 TERMINAL SECTION
 TYPE SBT-FAT**

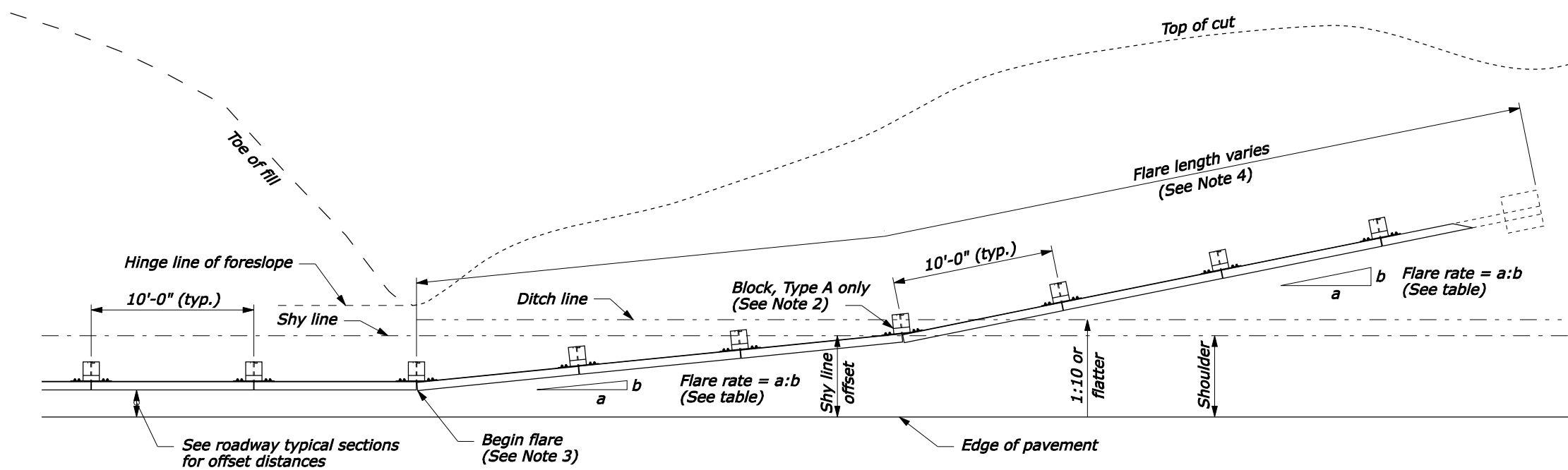
STANDARD APPROVED FOR USE 3/1996

REVISD: 6/2005
 DRAFT: 9/2007

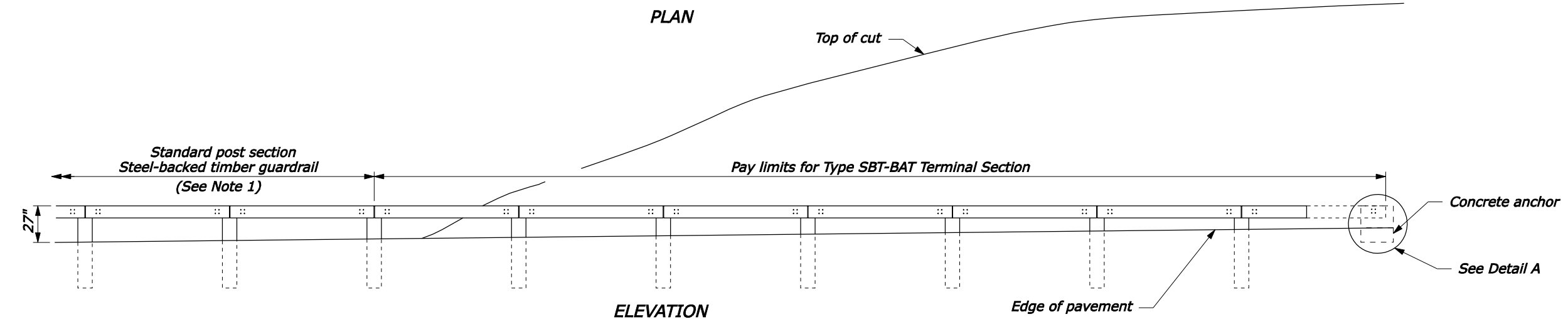
STANDARD
M617-61

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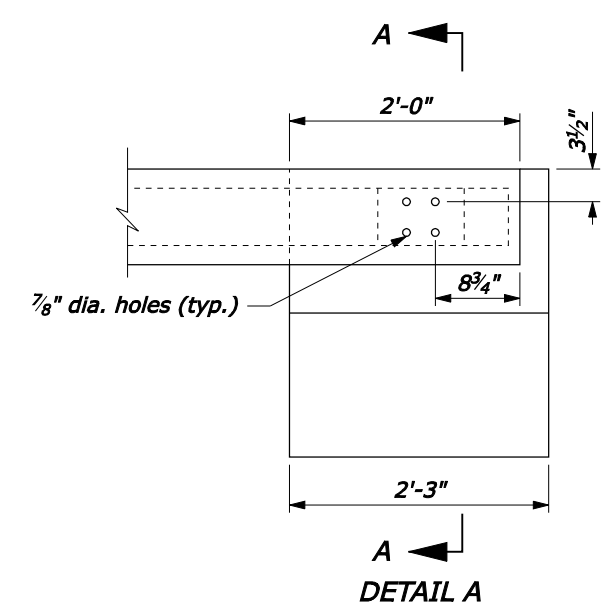


- NOTE:**
1. See Standard 617-60, SBTA and SBTB for timber, structural steel, and hardware details.
 2. On the Type A, blocked-out guardrail, include the blocks in the terminal section, except on the concrete anchor. For the Type B, non-blocked-out guardrail, no blocks are included.
 3. Begin the cut flares at the nearest post to a transition point between fill and cut as directed by the CO.
 4. Extend the flare into the cut until a minimum 1-foot cover is obtained over the guardrail end.

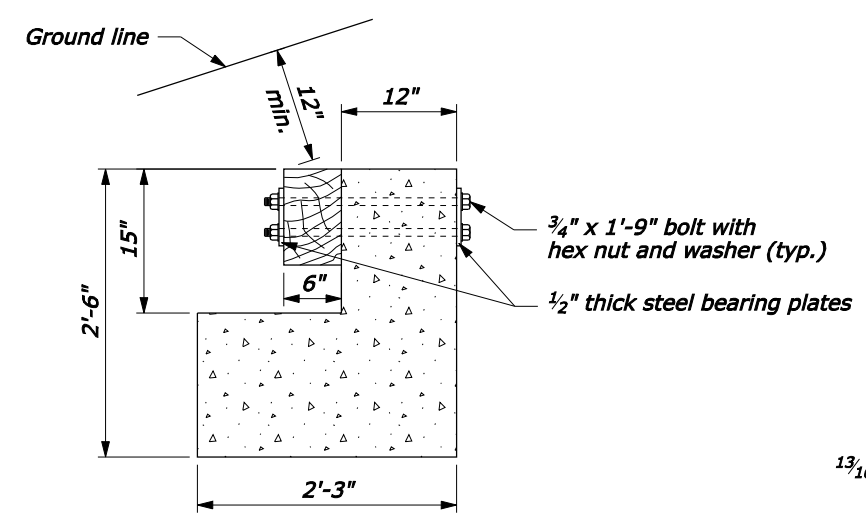


APPROACH & DEPARTURE FLARE WITH BACK SLOPE ANCHOR TERMINAL (BAT)

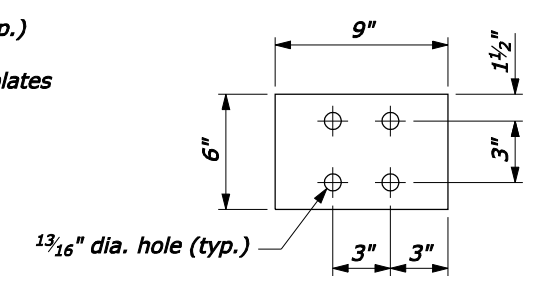
Design Speed (mph)	Shy line offset (ft)	Flare rate inside shy line (a:b)	Flare rate outside shy line (a:b)
60	8.0	26:1	14:1
50	6.5	21:1	11:1
40	5.0	16:1	8:1
30 and less	3.5	13:1	7:1



CONCRETE ANCHOR



SECTION A-A



STEEL BEARING PLATE

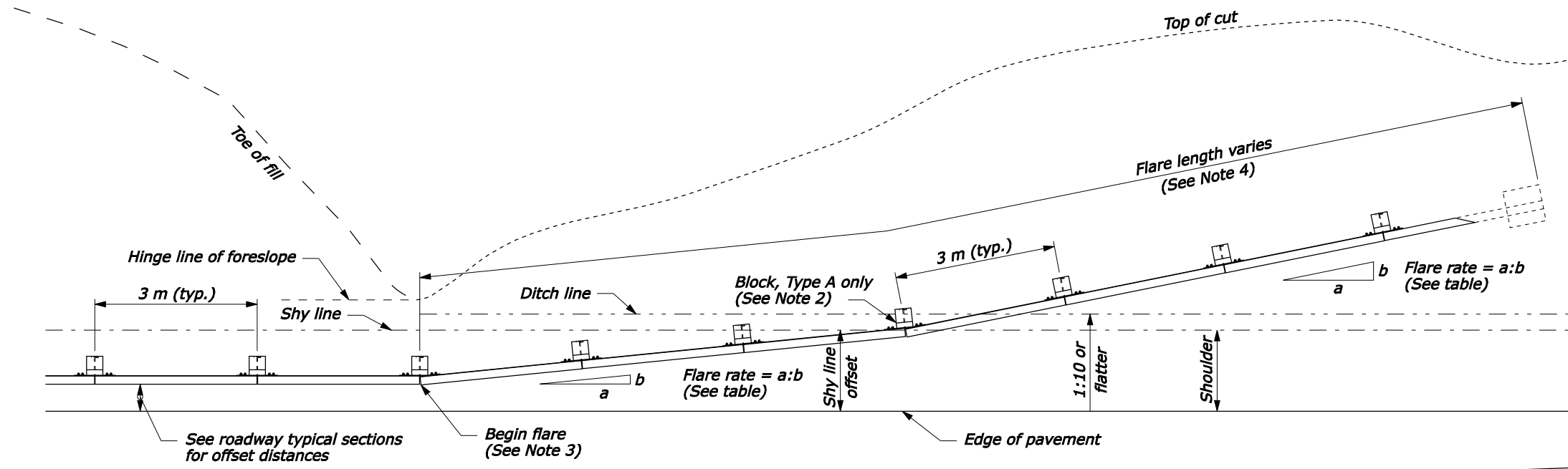
NO SCALE

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

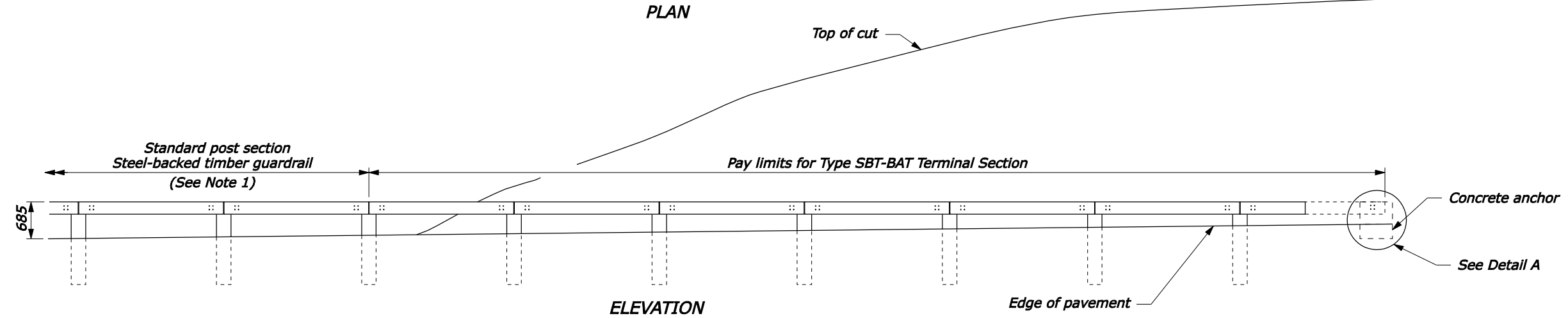
**U.S. CUSTOMARY STANDARD
 STEEL-BACKED TIMBER GUARDRAIL
 TERMINAL SECTION
 TYPE SBT-BAT**

STANDARD APPROVED FOR USE 3/1990	STANDARD
REVISED: 4/1994 6/2005	617-62

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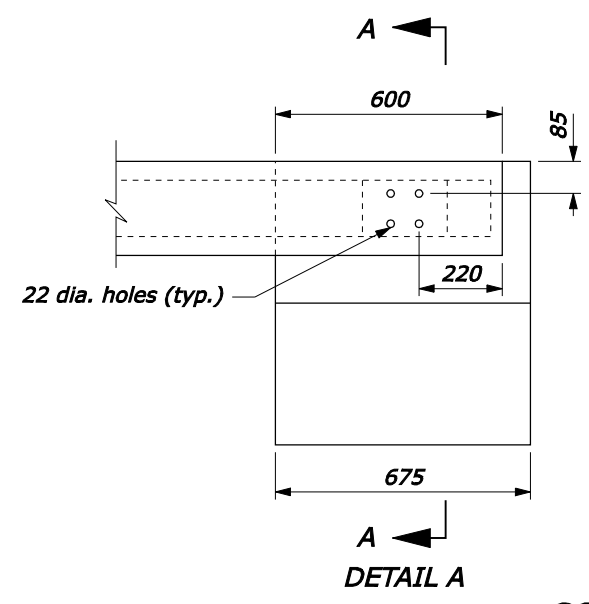


- NOTE:**
1. See Standard M617-60, SBTA and SBTB for timber, structural steel, and hardware details.
 2. On the Type A, blocked-out guardrail, include the blocks in the terminal section, except on the concrete anchor. For the Type B, non-blocked-out guardrail, no blocks are included.
 3. Begin the cut flares at the nearest post to a transition point between fill and cut as directed by the CO.
 4. Extend the flare into the cut until a minimum 300 mm cover is obtained over the guardrail end.
 5. Furnish hardware in the metric sizes shown. Equivalent US Customary sizes may be used when metric sizes are not available.
 6. Dimensions without units are millimeters.

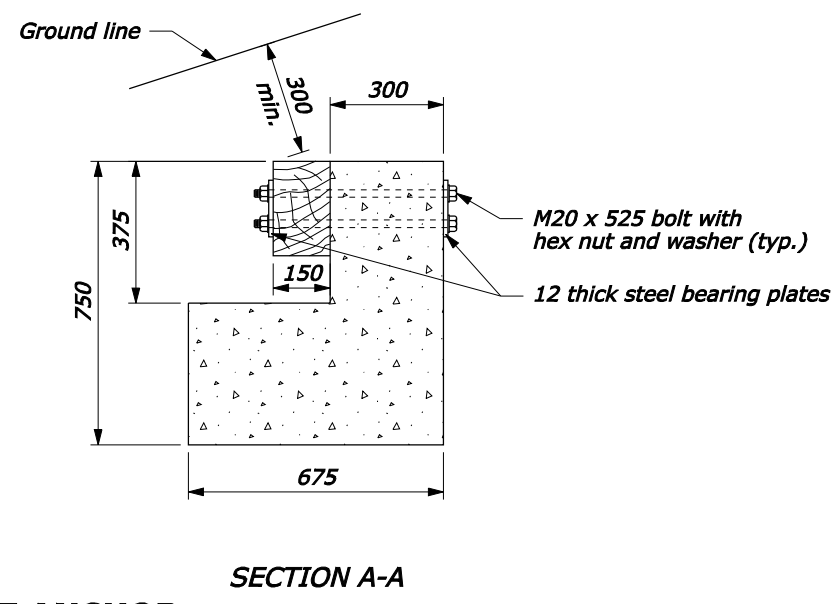


APPROACH & DEPARTURE FLARE WITH BACK SLOPE ANCHOR TERMINAL (BAT)

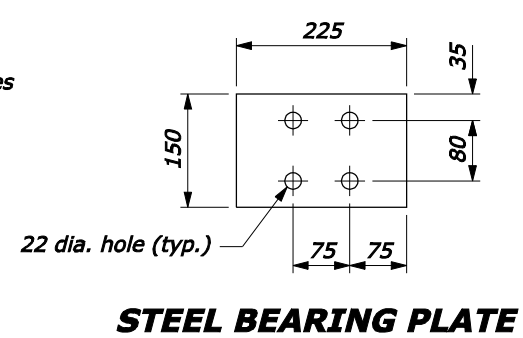
Design Speed (km/h)	Shy line offset (m)	Flare rate inside shy line (a:b)	Flare rate outside shy line (a:b)
100	2.5	26:1	14:1
80	2.0	21:1	11:1
60	1.5	16:1	8:1
50 or less	1.0	13:1	7:1



CONCRETE ANCHOR



SECTION A-A



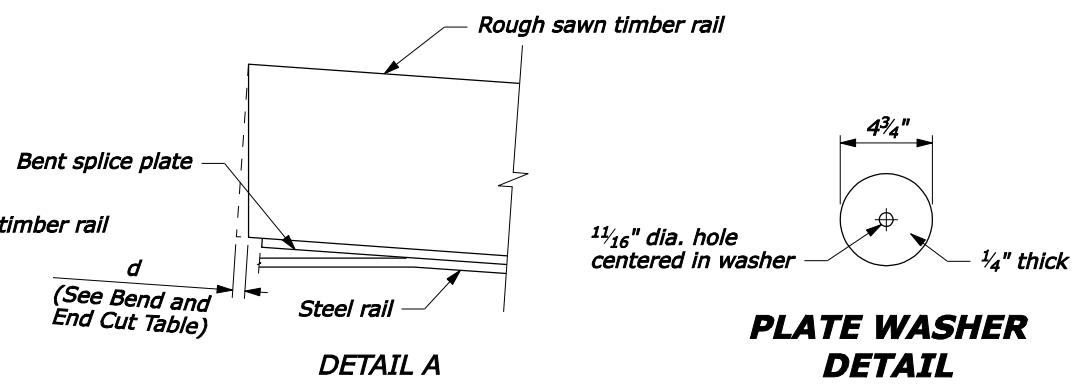
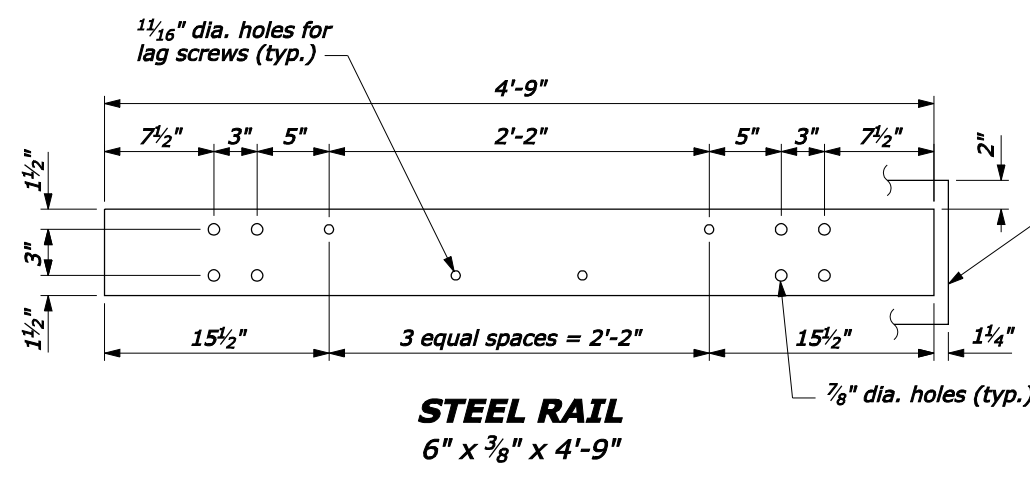
STEEL BEARING PLATE

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
 REVISED: 6/2005

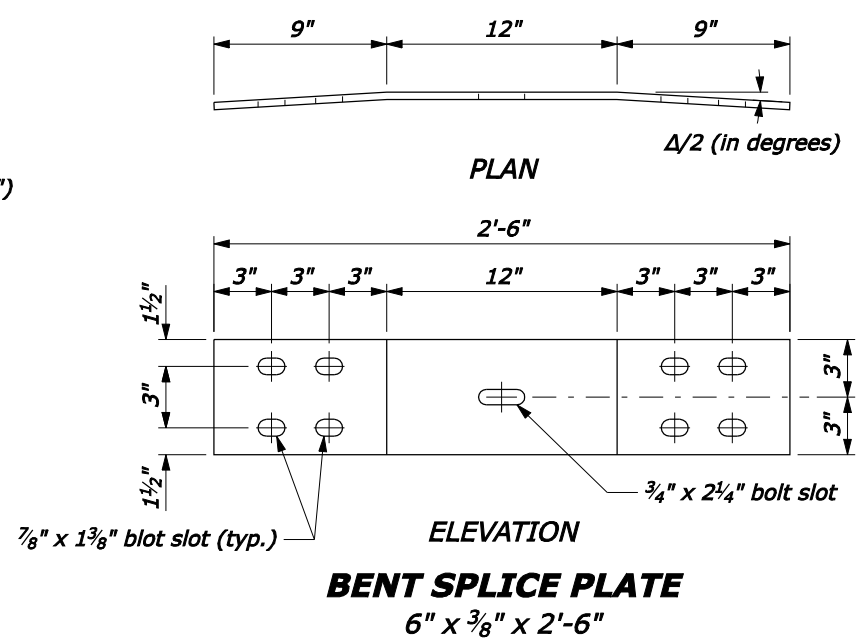
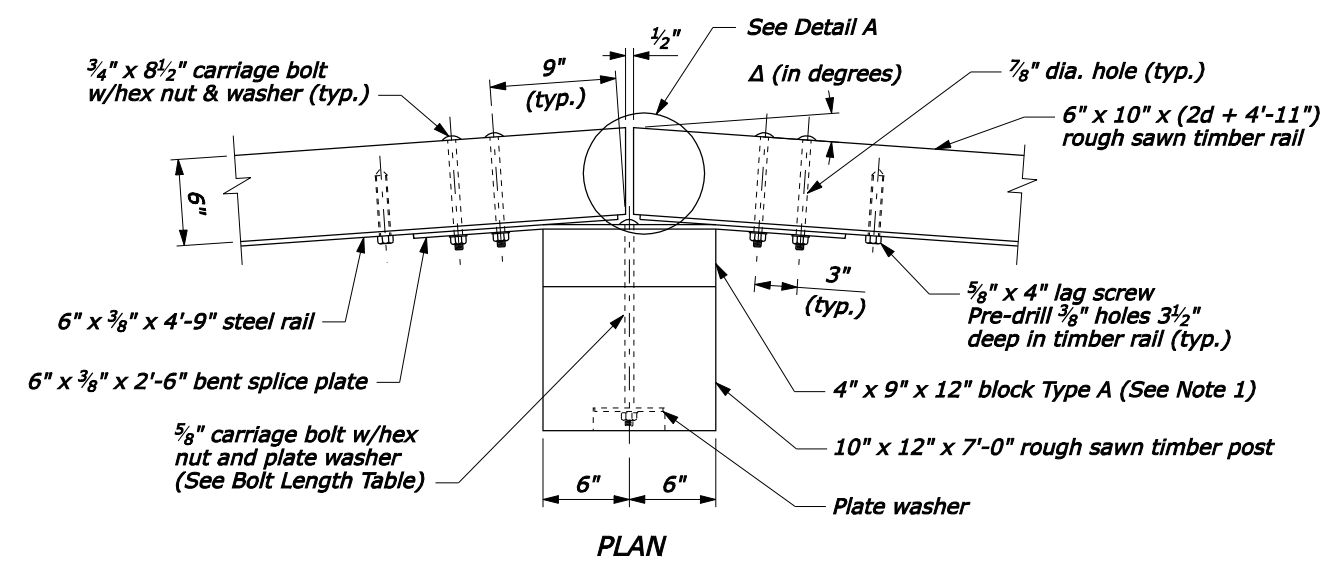
STANDARD
M617-62

NO SCALE

24-Sep-2007 06:32 AM F:\StandDraw\std61762.dgn [Metric]



- NOTE:**
1. Use the Type A, blocked-out, system or the Type B, non-blocked-out, system as specified.
 2. Use the weathering steel for all structural steel and fastener hardware.
 3. Furnish shop bent splice plates. Use the minimum bend angle shown in the table below.
 4. See Sheet 2 of 2 for Plan View Layout.

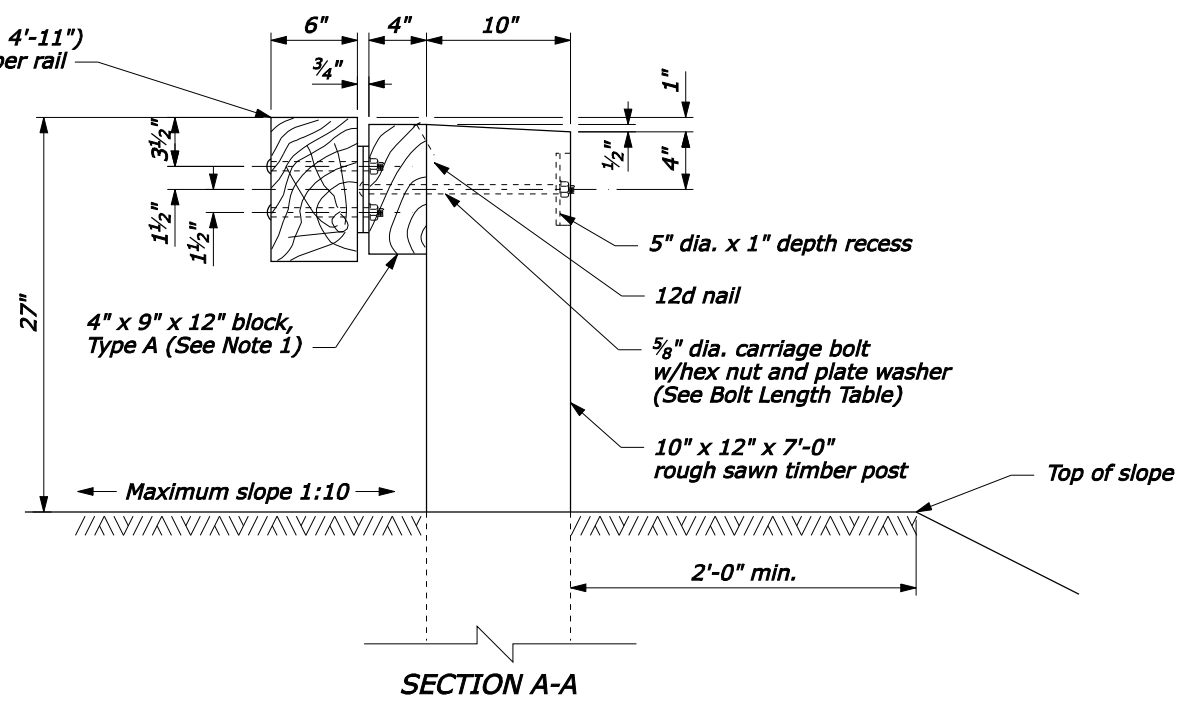
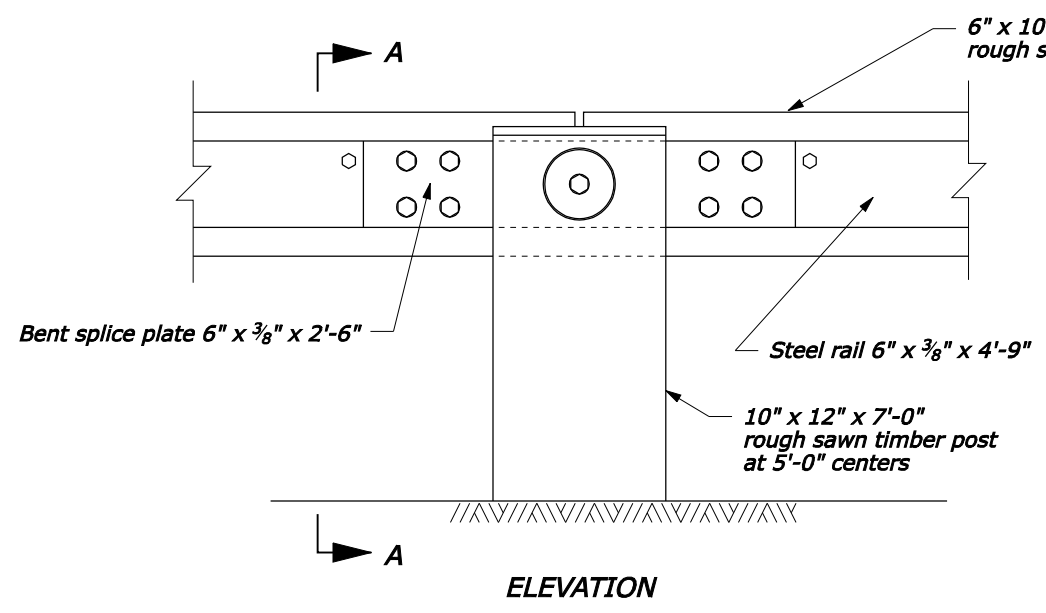


BEND AND END CUT TABLE

Radius R ft	Δ/2 degrees	d in
20	7.18	3/4
25	5.74	5/8
30	4.78	1/2
35	4.10	7/16
40	3.58	3/8
45	3.18	1/3
50	2.87	5/16
55	2.61	1/4
60	2.39	1/4
65	2.20	1/4
70	2.05	1/4
over 70	flat	0

BOLT LENGTH TABLE

Type A (Block-out)	Type B (No Block-out)
15"	11"

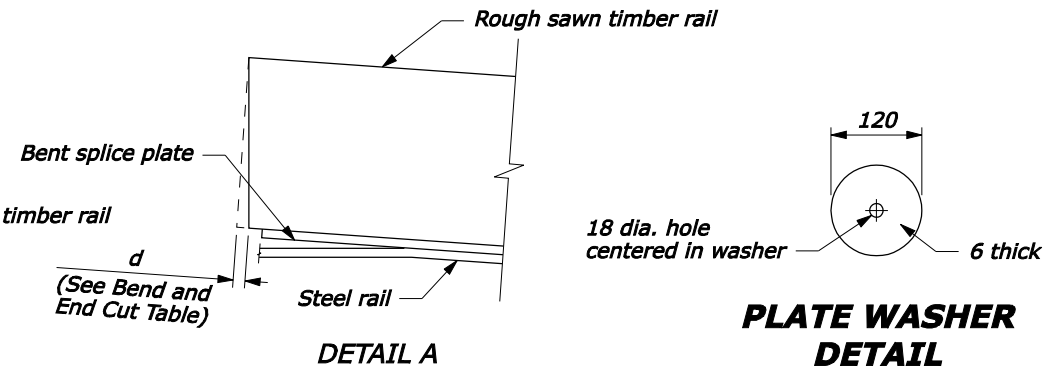
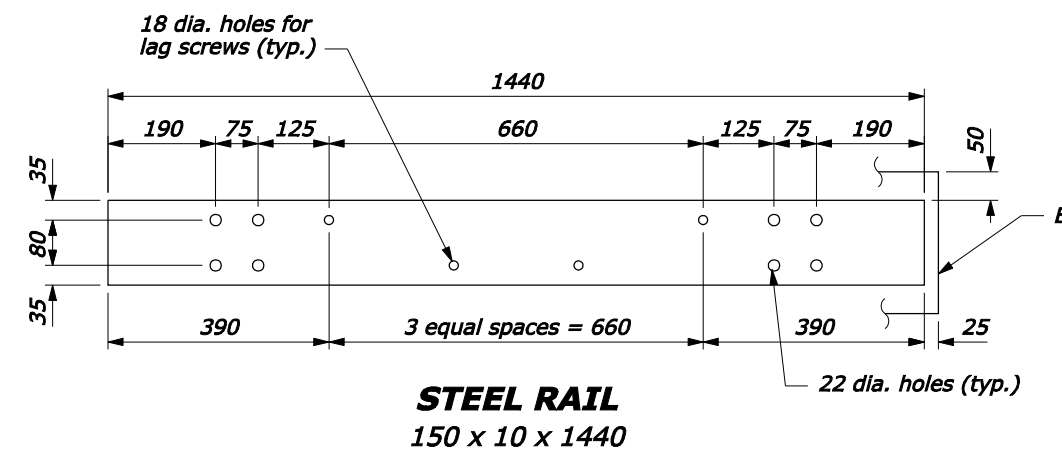


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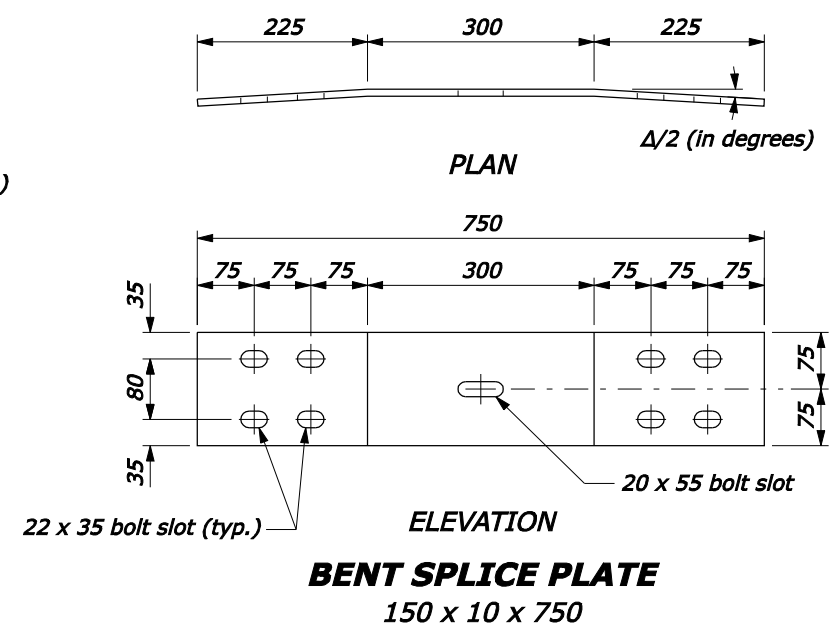
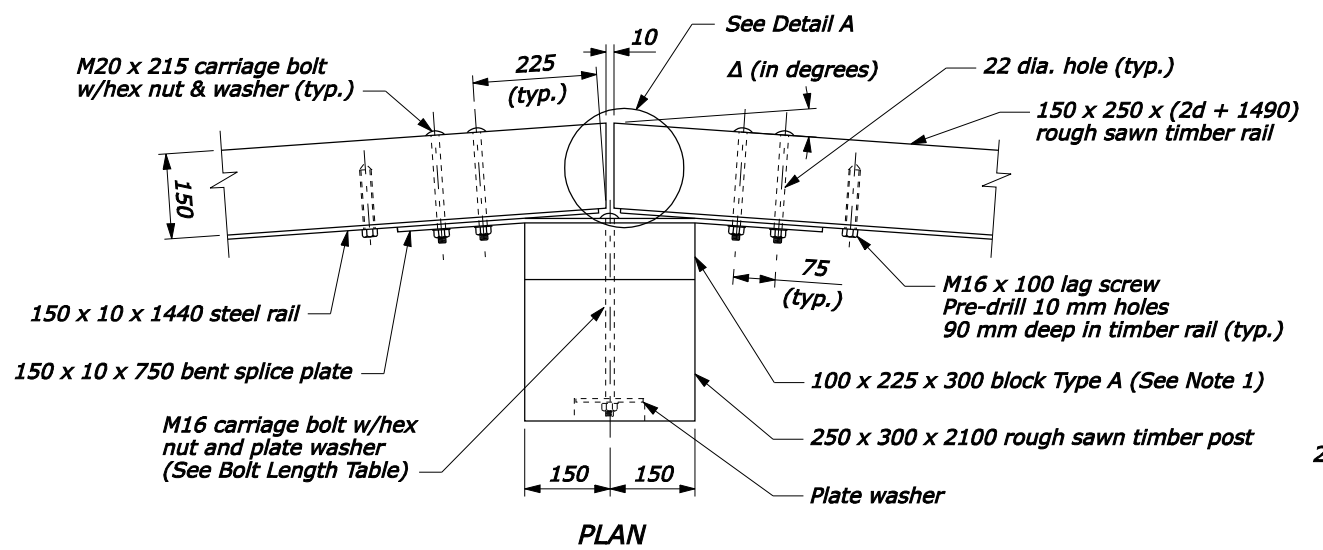
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

U.S. CUSTOMARY STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
AROUND CIRCULAR CURVES
70 FOOT RADIUS AND BELOW**
Sheet 1 of 2

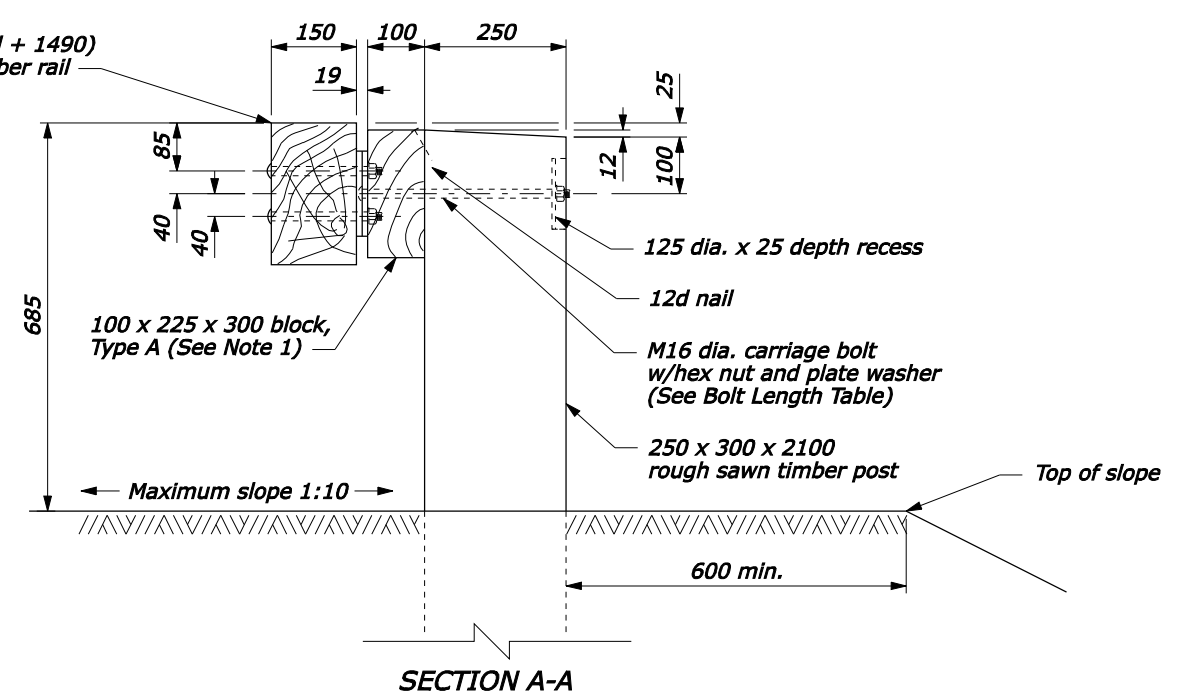
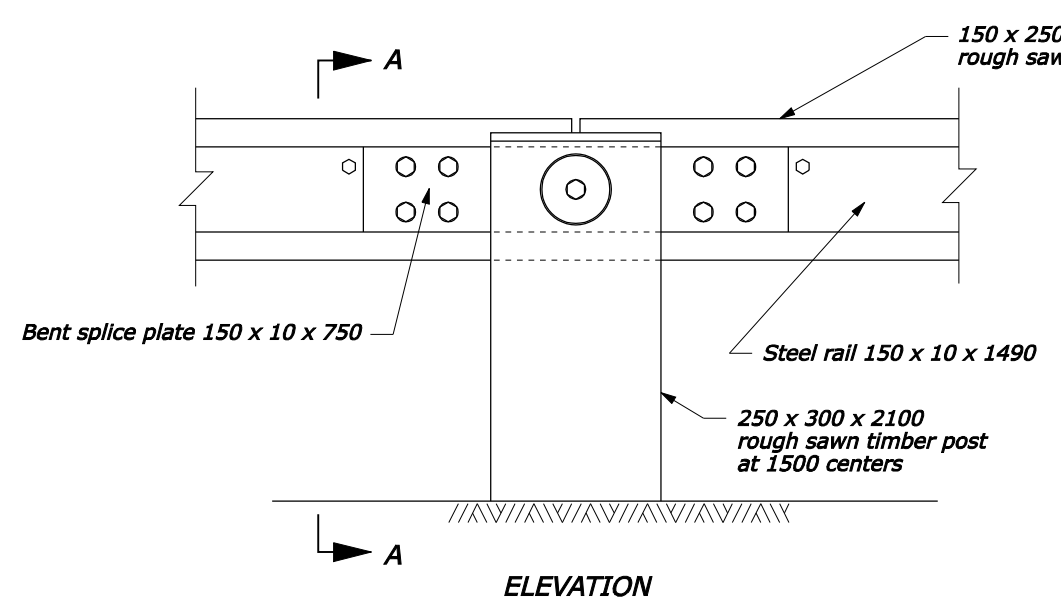
STANDARD APPROVED FOR USE 6/2005	STANDARD
REVISED:	617-63



- NOTE:**
1. Use the Type A, blocked-out, system or the Type B, non-blocked-out, system as specified.
 2. Use the weathering steel for all structural steel and fastener hardware.
 3. Furnish shop bent splice plates. Use the minimum bend angle shown in the table below.
 4. See Sheet 2 of 2 for Plan View Layout.
 5. Furnish hardware in the metric sizes shown. Equivalent US Customary sizes may be used when metric sizes are not available.
 6. Dimensions without units are millimeters.



Radius R meters	Δ/2 degrees	d mm
5	8.63	23
6	7.18	19
8	5.38	14
10	4.30	11
12	3.58	9
14	3.07	8
16	2.69	7
18	2.39	6
20	2.15	6
22	1.95	5
over 22	flat	0



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

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

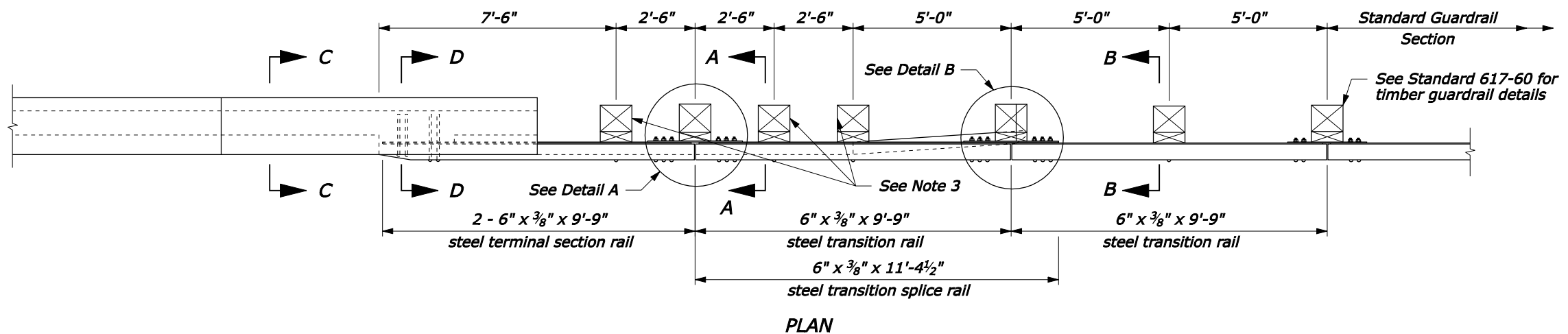
METRIC STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
AROUND CIRCULAR CURVES
22 m RADIUS AND BELOW**
Sheet 1 of 2

STANDARD APPROVED FOR USE 3/1996
REVISED: 6/2005

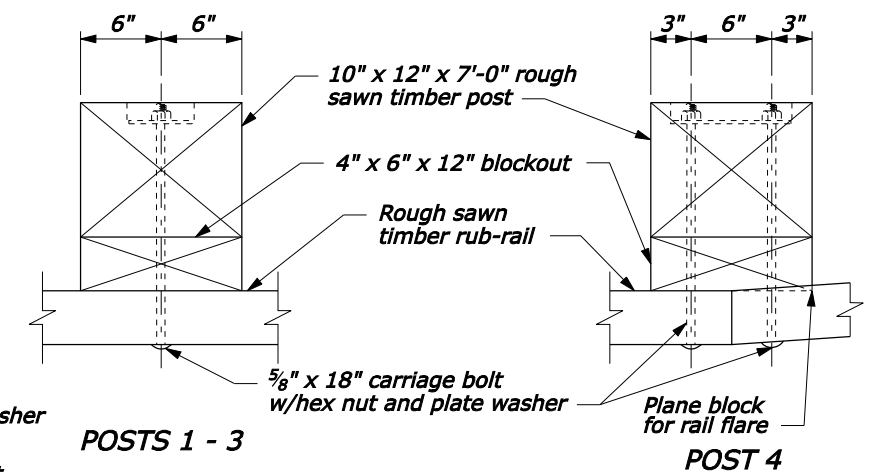
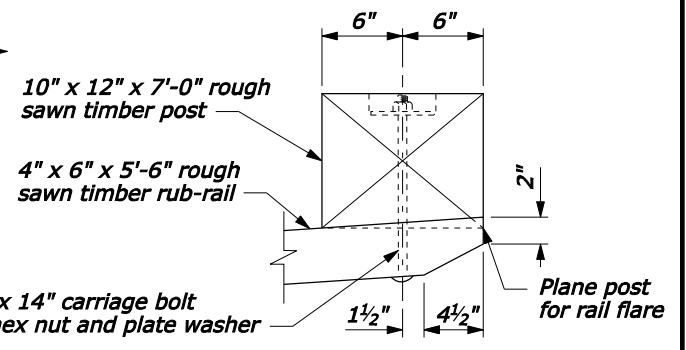
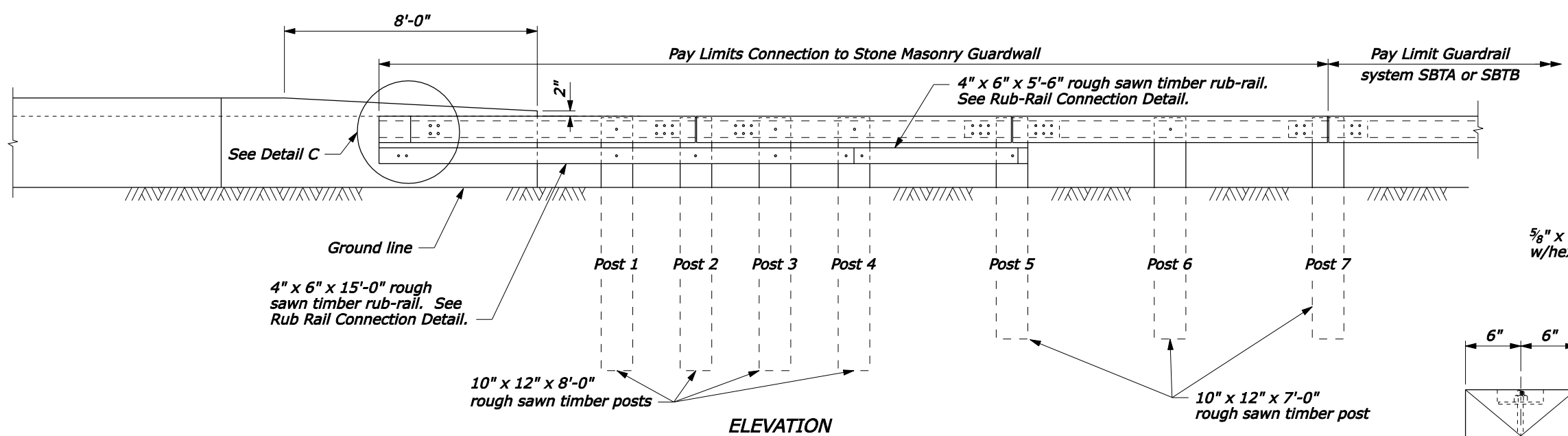
STANDARD
M617-63

NO SCALE

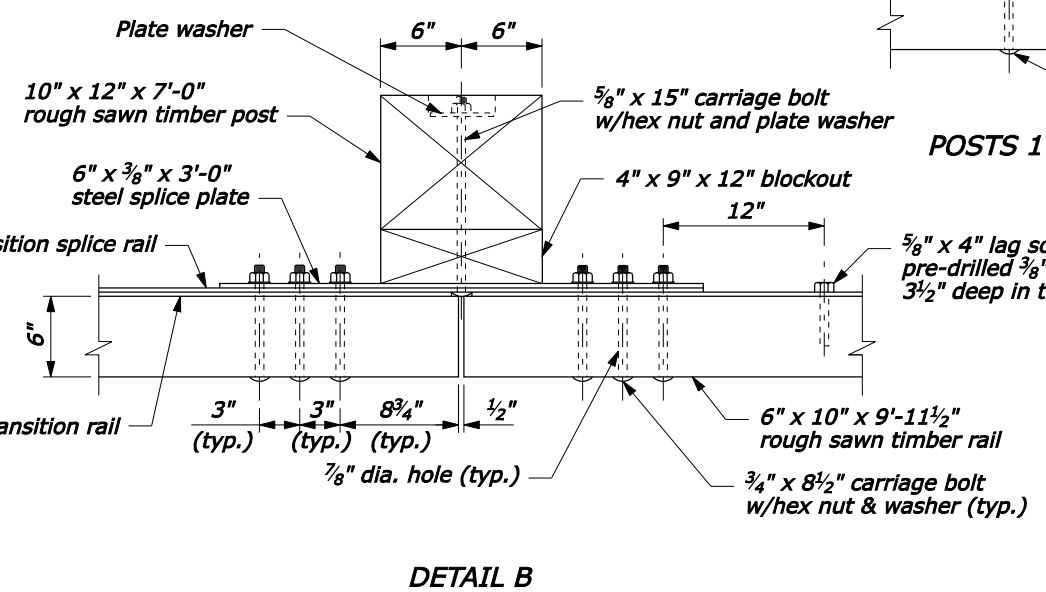
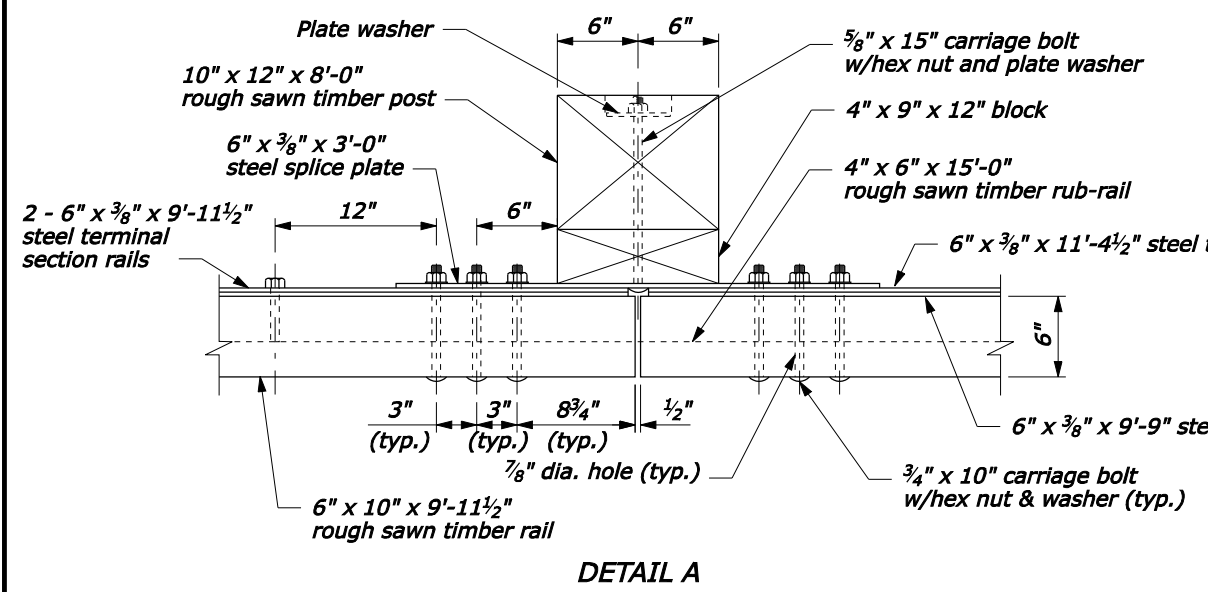
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- NOTE:**
1. See the following sheets for Sections A-A through C-C, steel rail layouts, and other details.
 2. Use weathering steel for all structural steel and fastener hardware.
 3. For posts 1, 3, and 4, use an 8" x 9" x 12" block for the blockout, and a 5/8" x 2'-1 1/2" carriage bolt with hex nut and plate washer.



RUB-RAIL CONNECTION



POST CONNECTION

NO SCALE

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

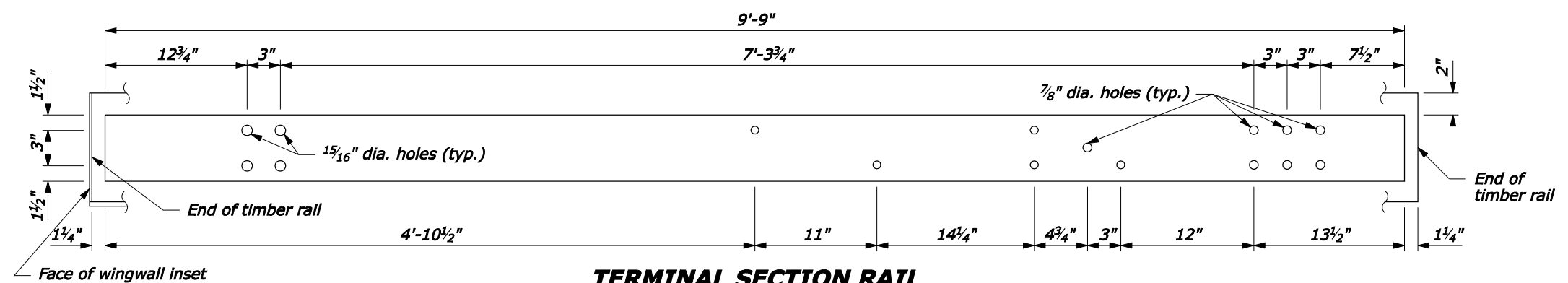
U.S. CUSTOMARY STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
TL-2 CONNECTION TO
STONE MASONRY GUARDWALL**
Sheet 1 of 3

STANDARD APPROVED FOR USE --/----

REVISID:
DRAFT: 1/2008

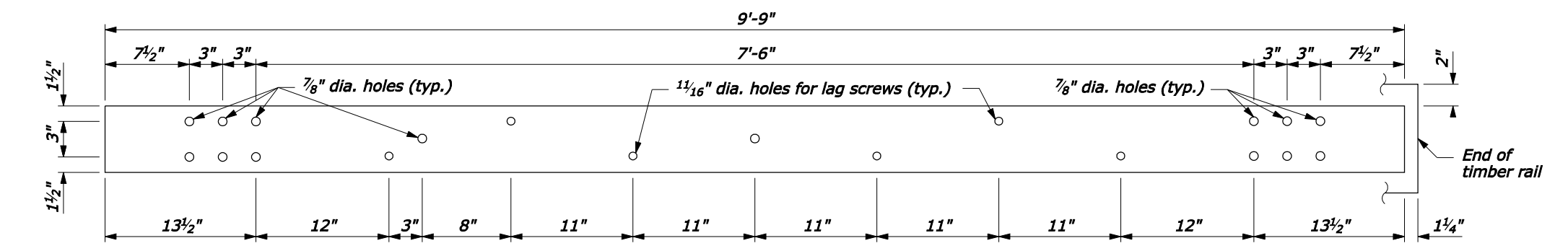
STANDARD
617-64

14-Jan-2008 04:06 PM P:\198.145.186.2\std.pln\std61764.dgn [US Customary]

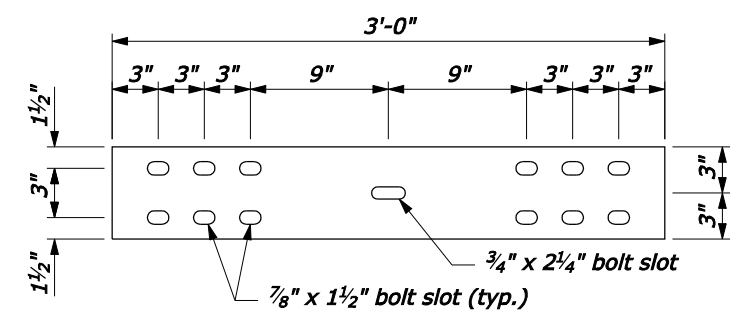


TERMINAL SECTION RAIL
6" x 3/8" x 9'-9"

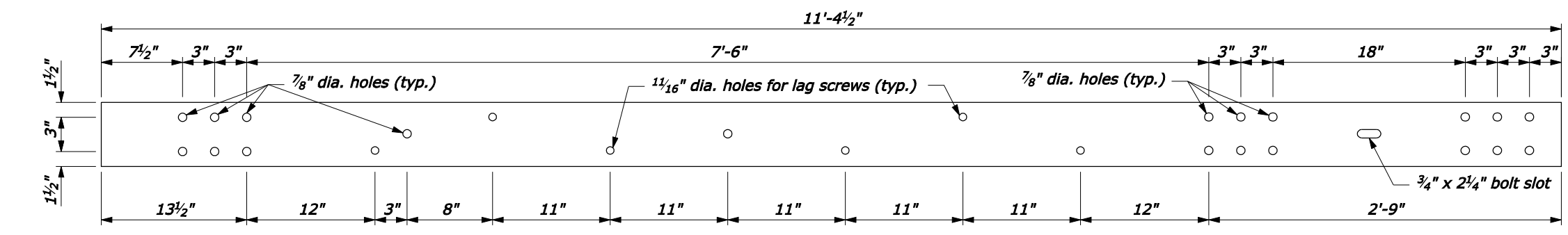
NOTE:
1. Pre-drill 3/4" holes in blocks outs and posts.



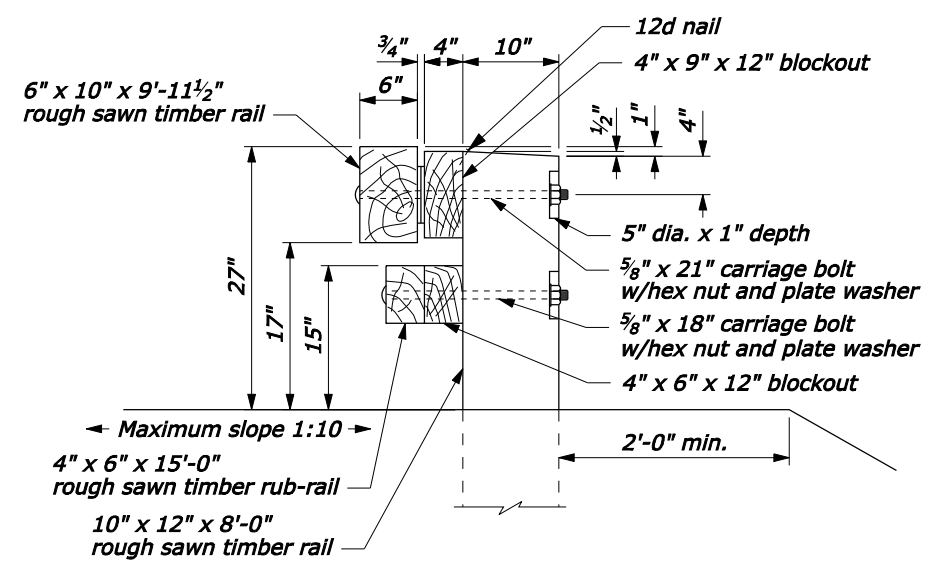
TRANSITION RAIL
6" x 3/8" x 9'-9"



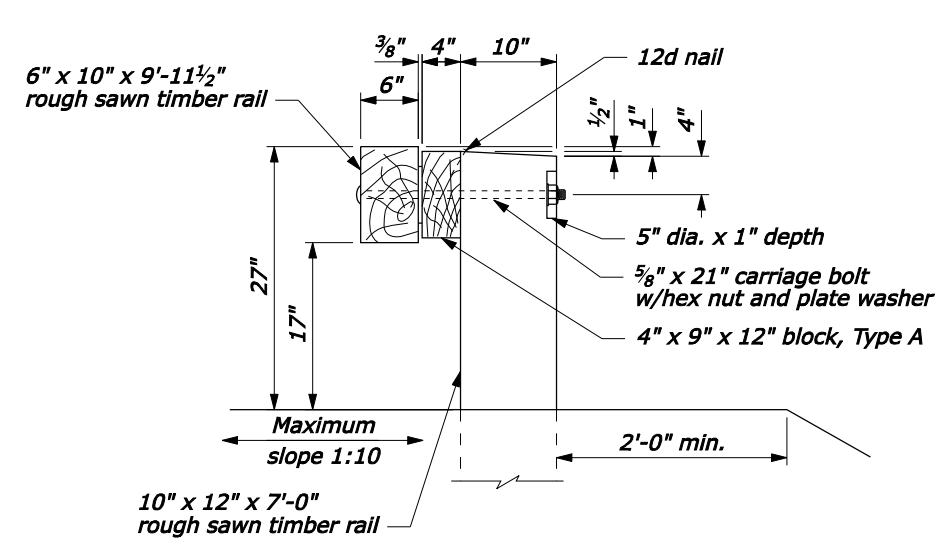
SPLICE PLATE
6" x 3/8" x 3'-0"



TRANSITION SPLICE RAIL
6" x 3/8" x 11'-4 1/2"



SECTION A-A



SECTION B-B

NO SCALE

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

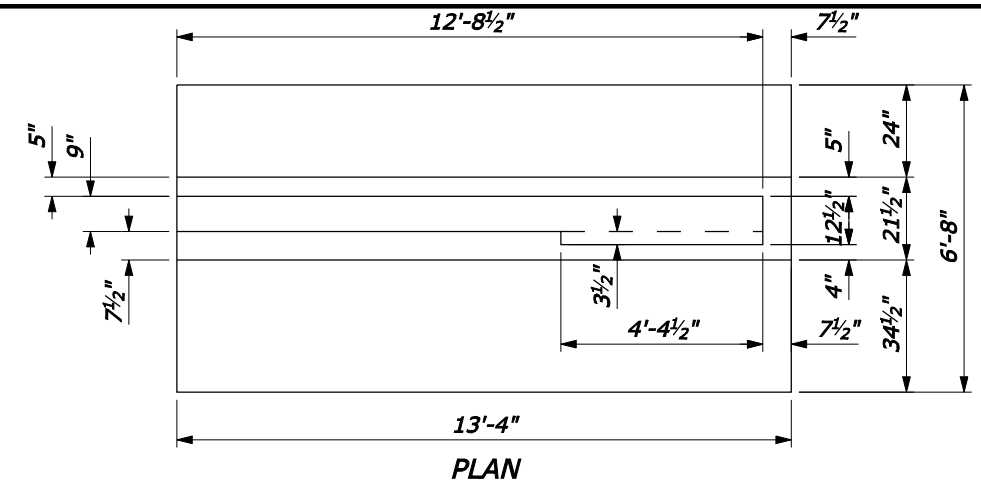
U.S. CUSTOMARY STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
TL-2 CONNECTION TO
STONE MASONRY GUARDWALL**
Sheet 2 of 3

STANDARD APPROVED FOR USE --/----

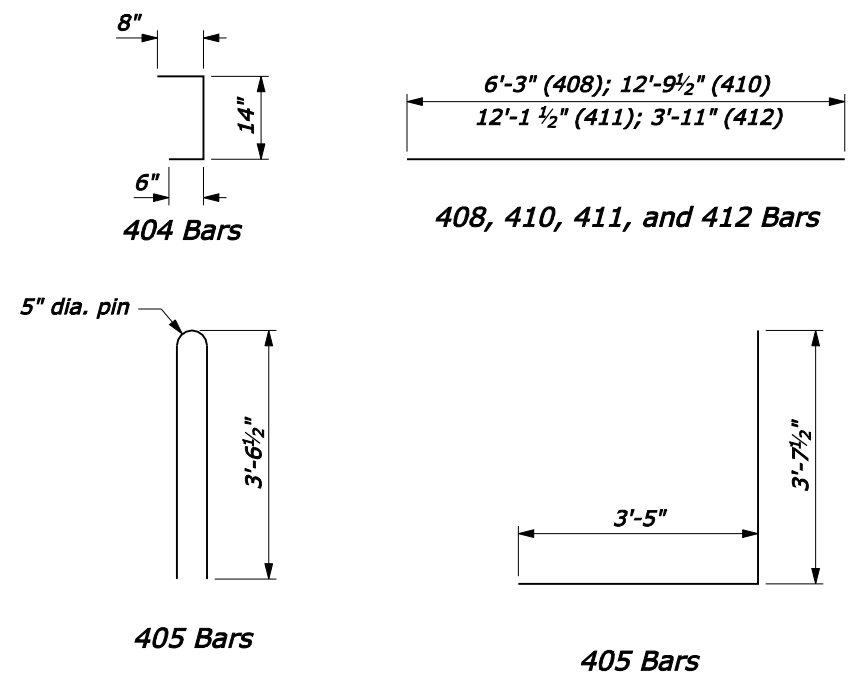
REVISID: DRAFT: 1/2008

STANDARD
617-64

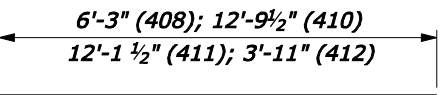
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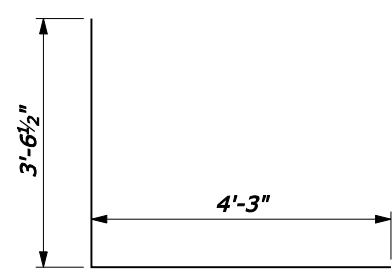
PLAN



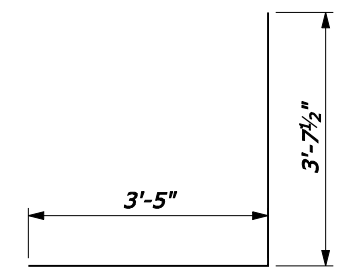
404 Bars



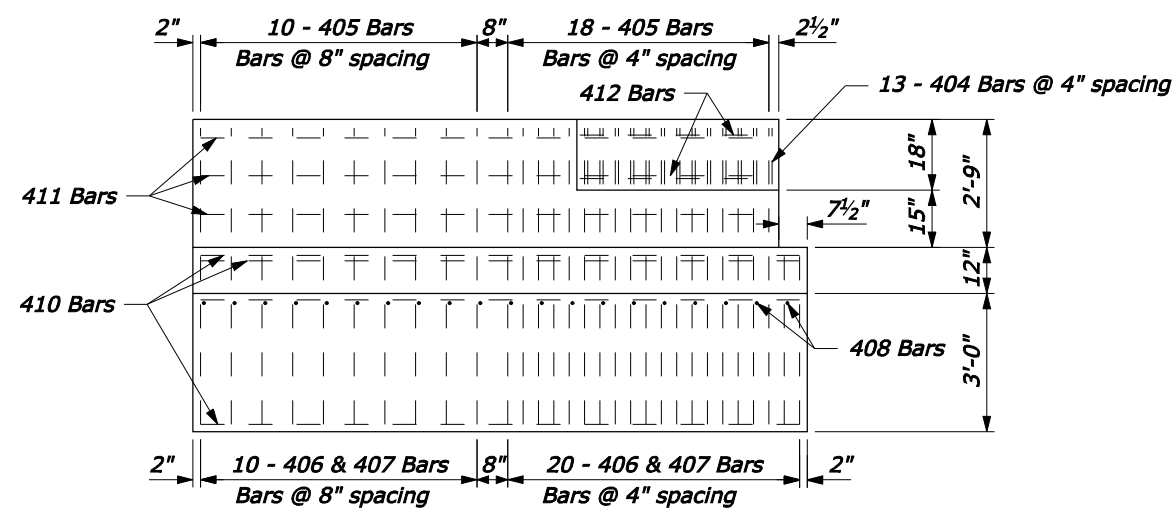
408, 410, 411, and 412 Bars



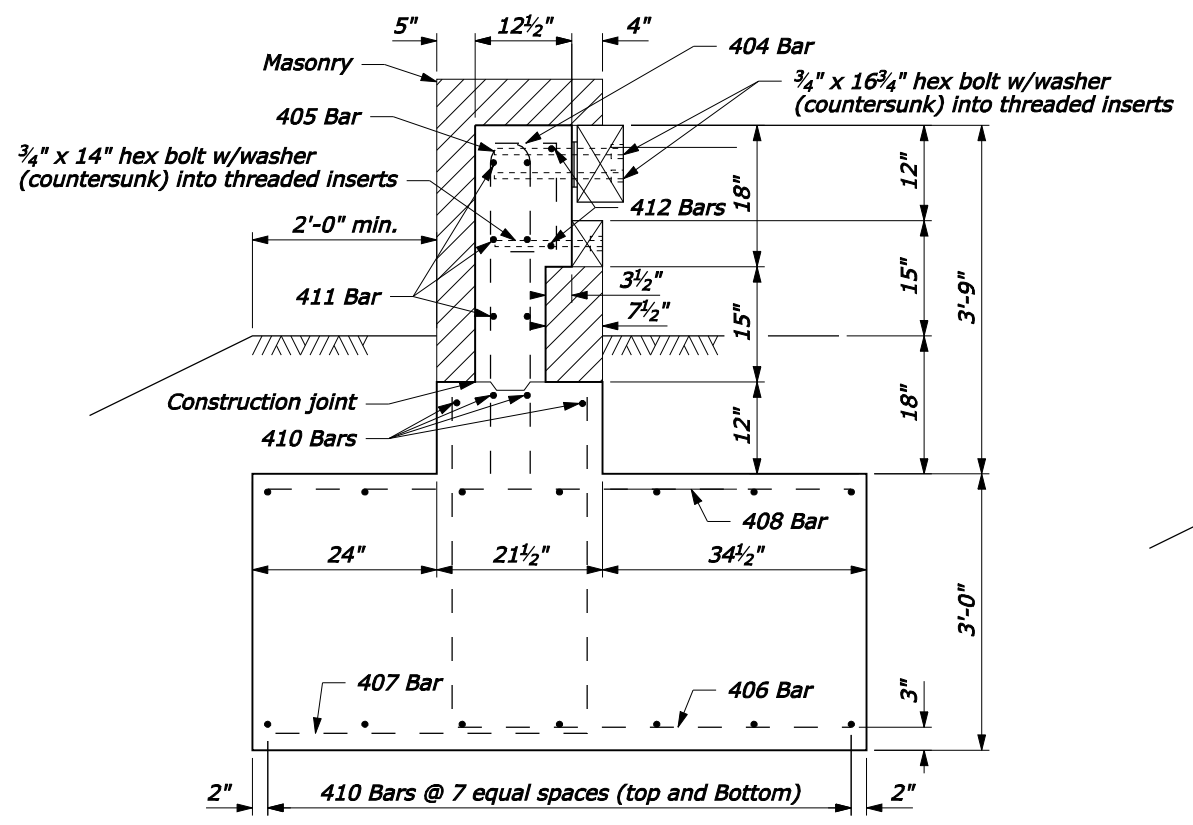
405 Bars



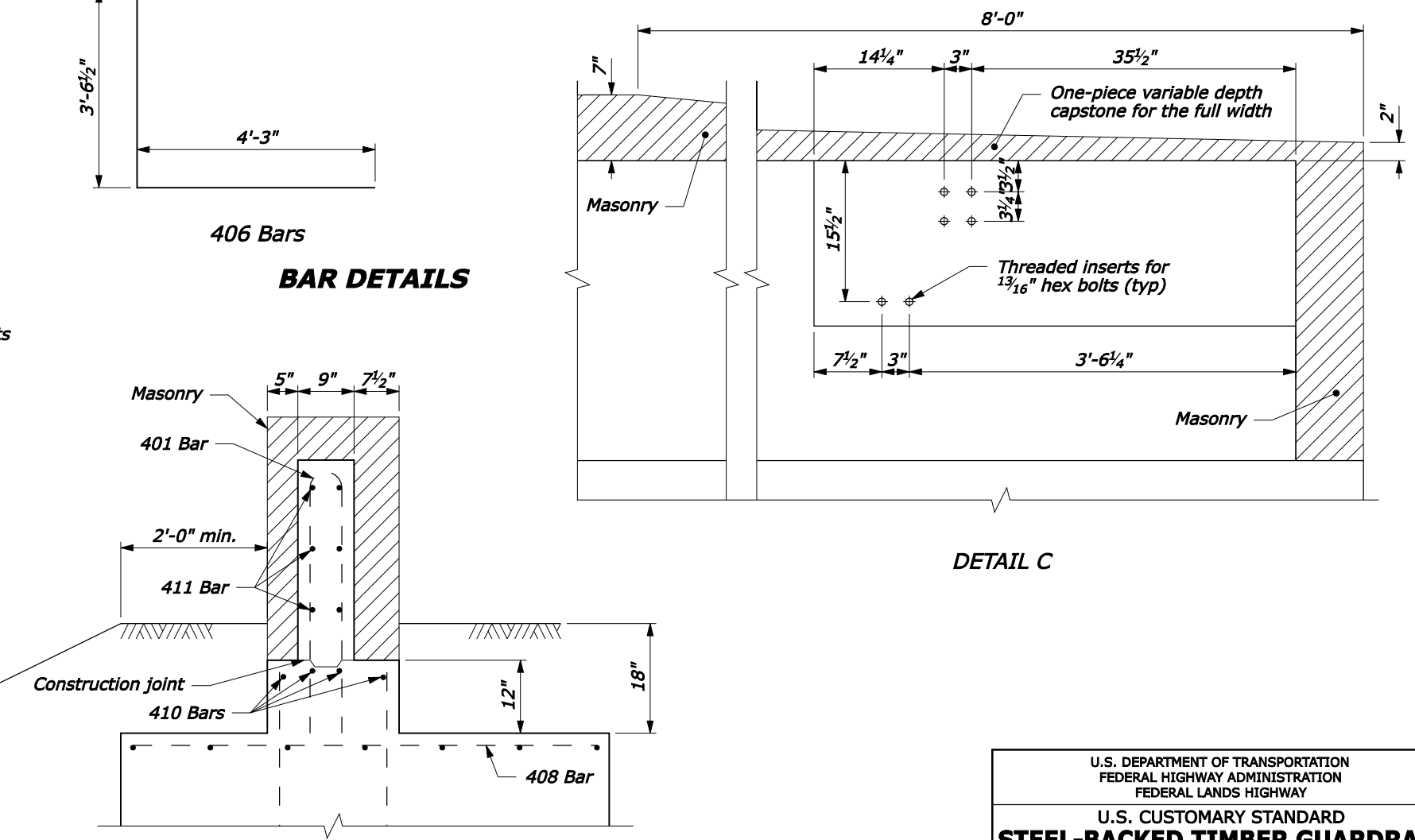
406 Bars



ELEVATION



SECTION D-D
PARAPET END BLOCK



SECTION C-C

DETAIL C

NOTE:

1. CONCRETE: Structural concrete Class A(AE), with a specified minimum 28-day compressive strength $F'_c=4350$ psi. Vibrate all concrete. Chamfer exposed edges $3/4$ " unless otherwise shown. Do not use calcium chloride additives in the concrete.
2. REINFORCING STEEL: Reinforcing steel Grade 420 (ASTM A615M-96a, Grade 420) deformed billet steel bars conforming to AASHTO M31M. The minimum concrete covering to the face of any bar is 2" unless otherwise shown. All bars are US Customary size #5.
3. Construct footing against undisturbed material or backfill with well compacted granular material.

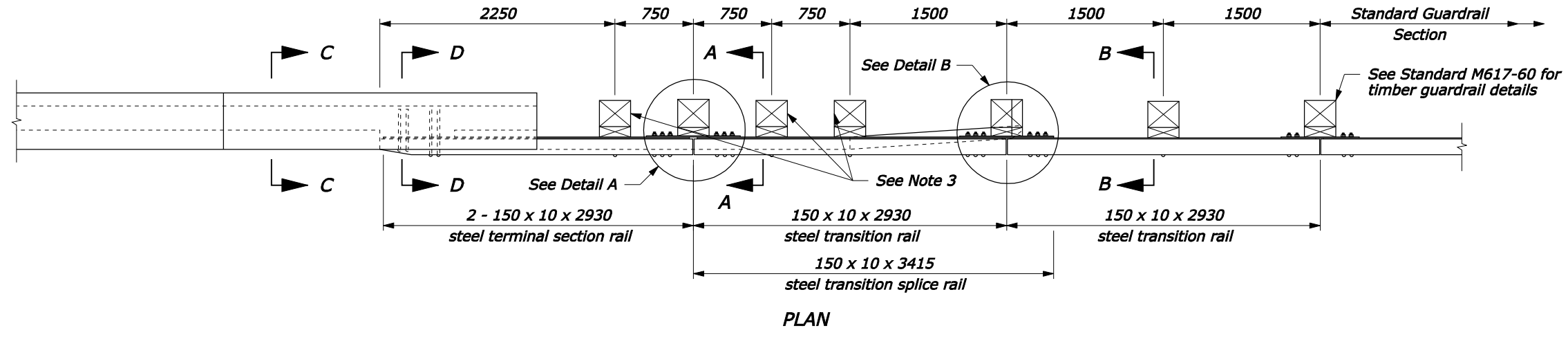
NO SCALE

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

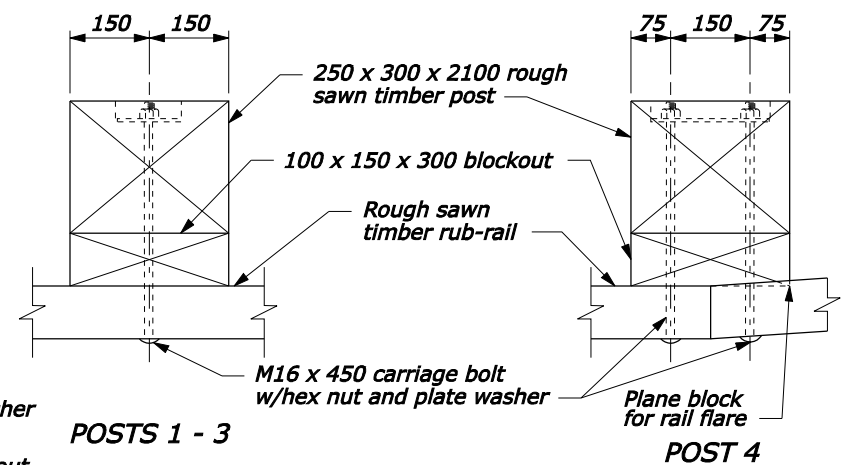
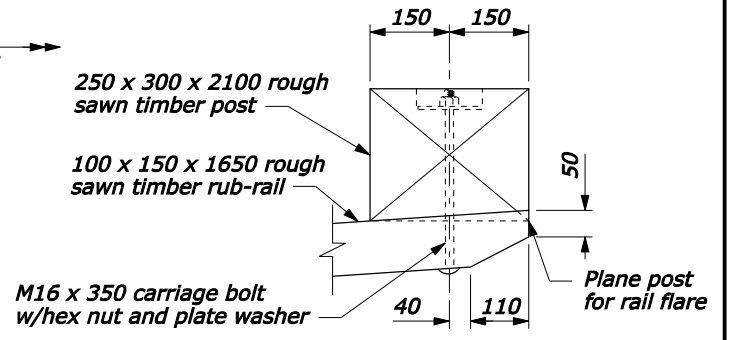
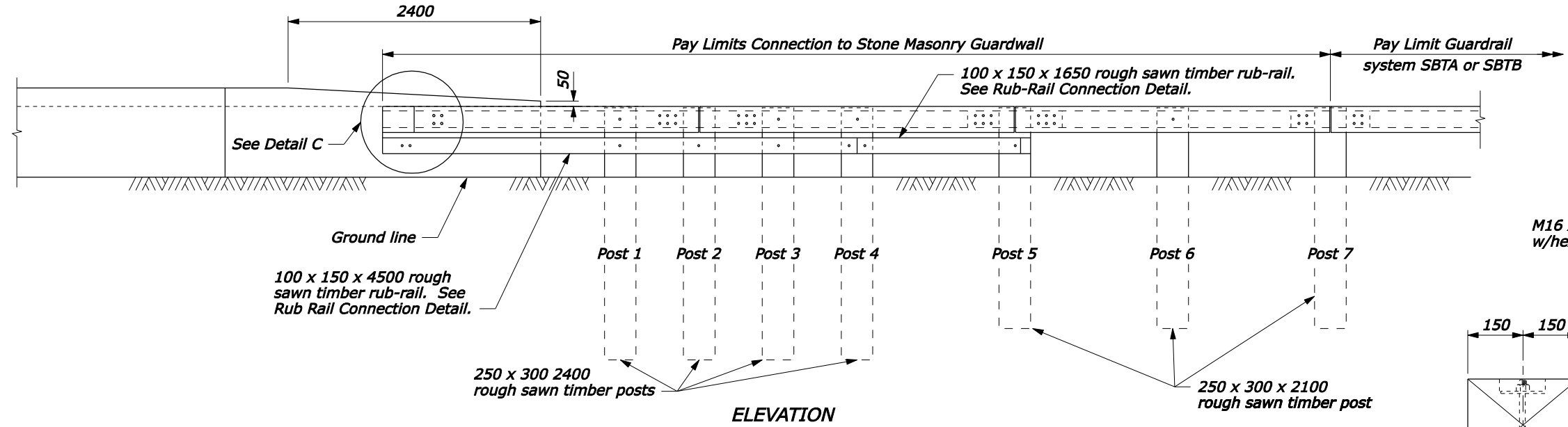
U.S. CUSTOMARY STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
TL-2 CONNECTION TO
STONE MASONRY GUARDWALL**
Sheet 3 of 3

STANDARD APPROVED FOR USE --/----	STANDARD
REVISED:	617-64
DRAFT: 1/2008	

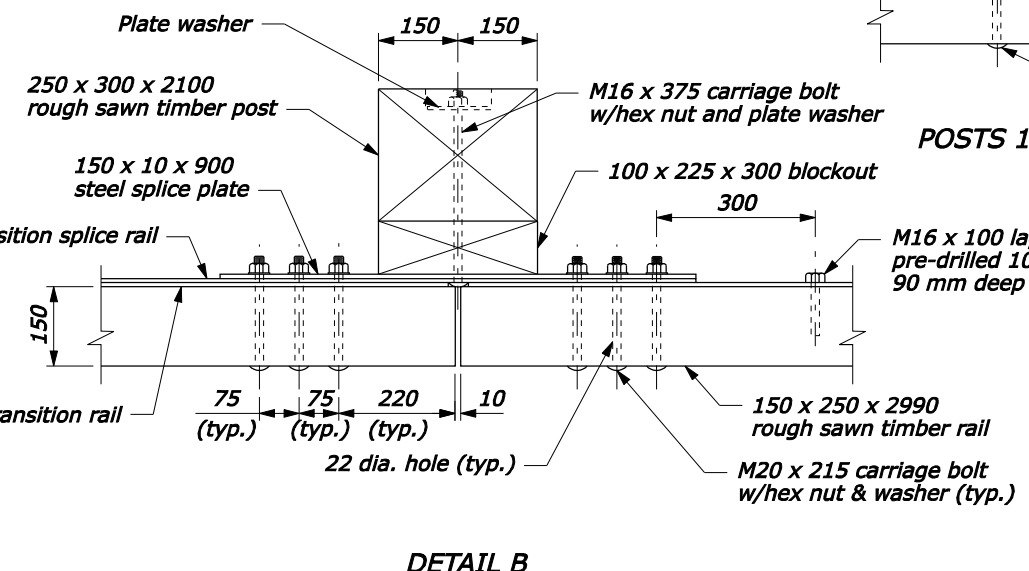
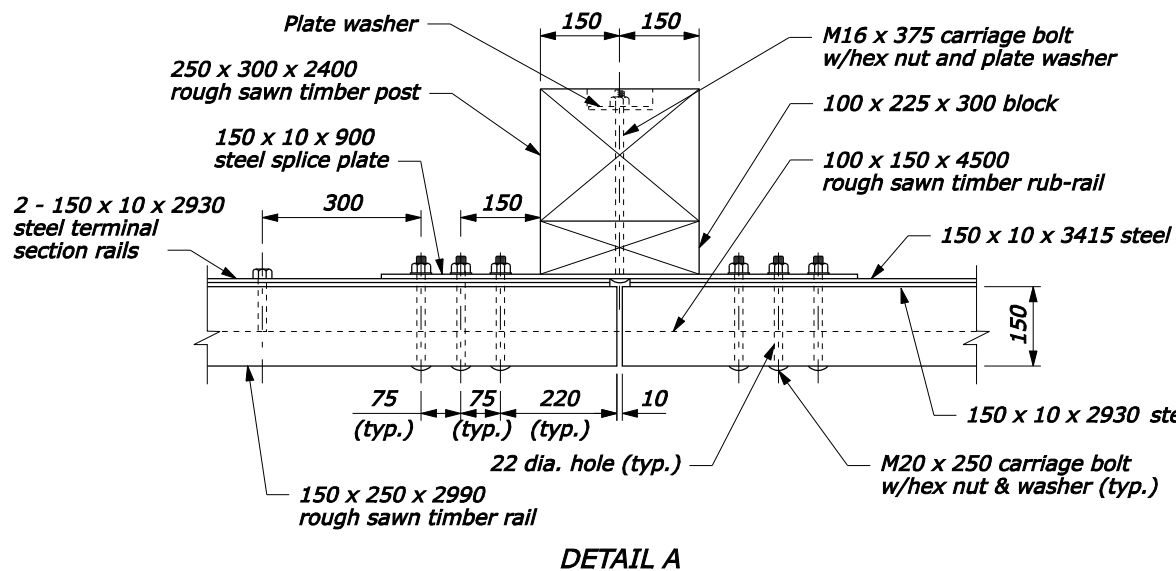
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- NOTE:**
1. See the following sheets for Sections A-A through C-C, steel rail layouts, and other details.
 2. Use weathering steel for all structural steel land fastener hardware.
 3. For posts 1, 3, and 4, use a 200 x 225 x 300 mm block for the blockout, and an M16 x 650 mm carriage bolt with hex nut and plate washer.
 4. Furnish hardware in the metric sizes shown. Equivalent US Customary sizes may be used when metric sizes are not available.
 5. Dimensions without units are millimeters.



RUB-RAIL CONNECTION



POST CONNECTION

NO SCALE

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

METRIC STANDARD

**STEEL-BACKED TIMBER GUARDRAIL
TL-2 CONNECTION TO
STONE MASONRY GUARDWALL**

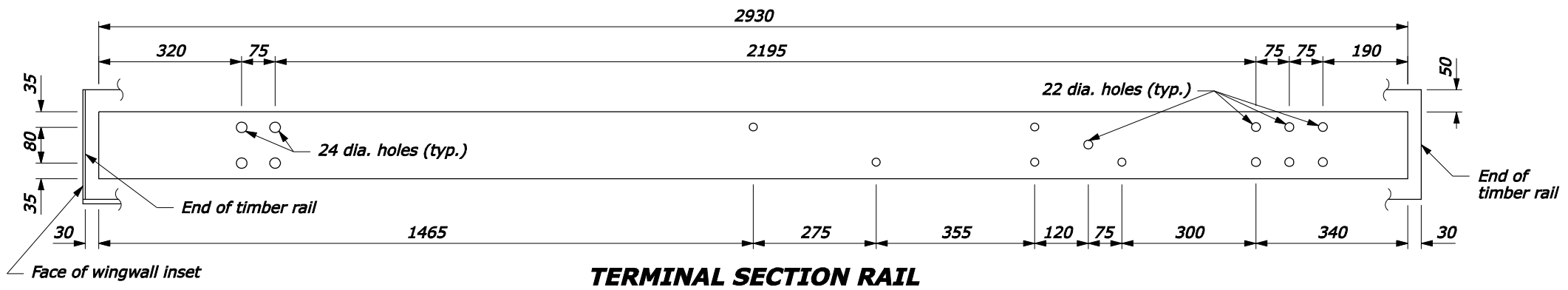
Sheet 1 of 3

STANDARD APPROVED FOR USE --/----

REVISD:
DRAFT: 1/2008

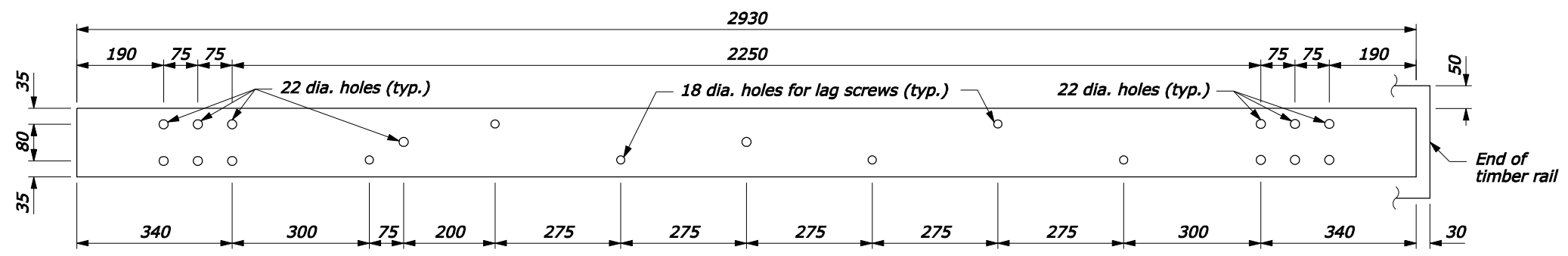
STANDARD
M617-64

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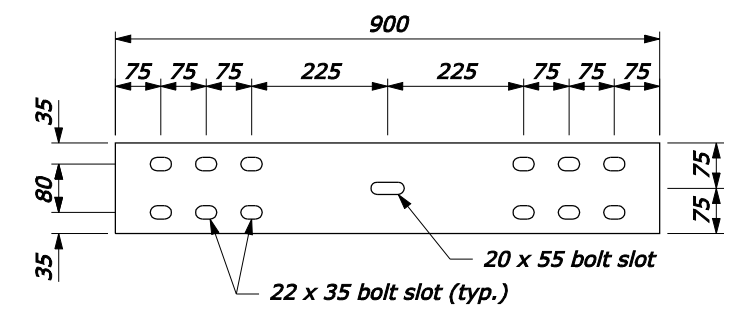


TERMINAL SECTION RAIL
150 x 10 x 2930

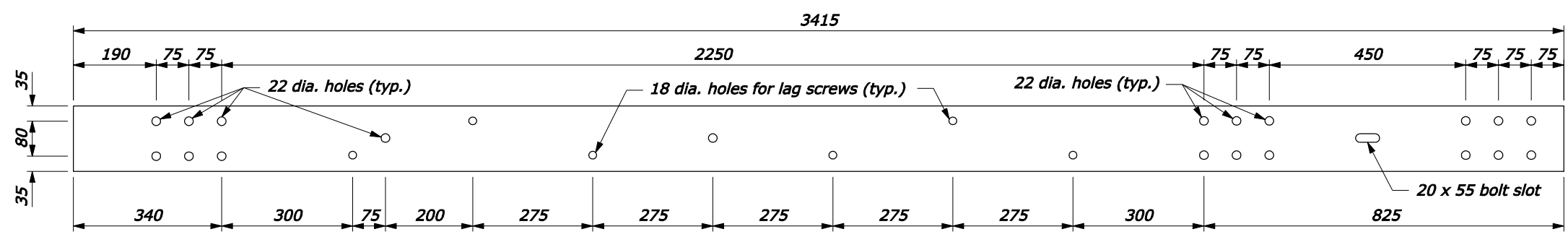
- NOTE:**
1. Pre-drill 18 mm holes in blocks outs and posts.
 2. Furnish hardware in the metric sizes shown. Equivalent US Customary sizes may be used when metric sizes are not available.
 3. Dimensions without units are millimeters.



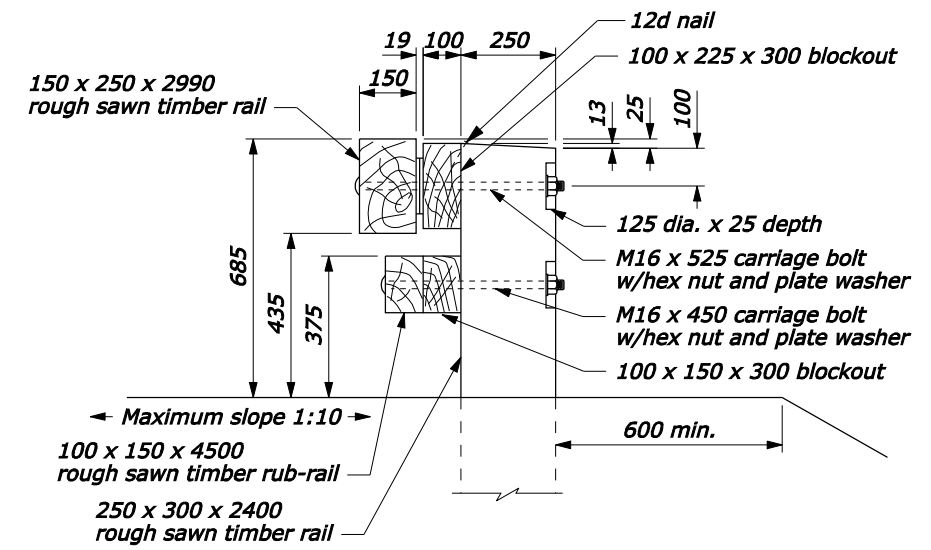
TRANSITION RAIL
150 x 10 x 2930



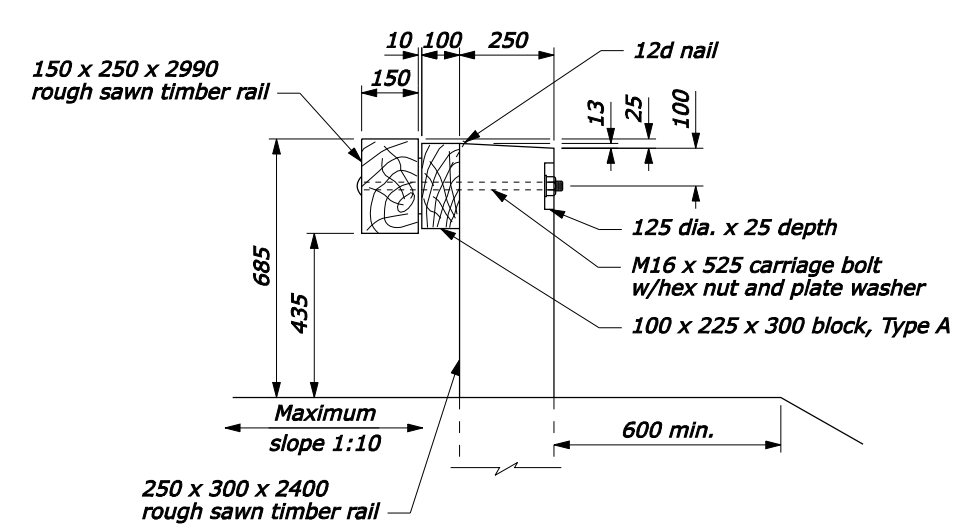
SPLICE PLATE
150 x 10 x 900



TRANSITION SPLICE RAIL
150 x 10 x 3415



SECTION A-A



SECTION B-B

NO SCALE

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

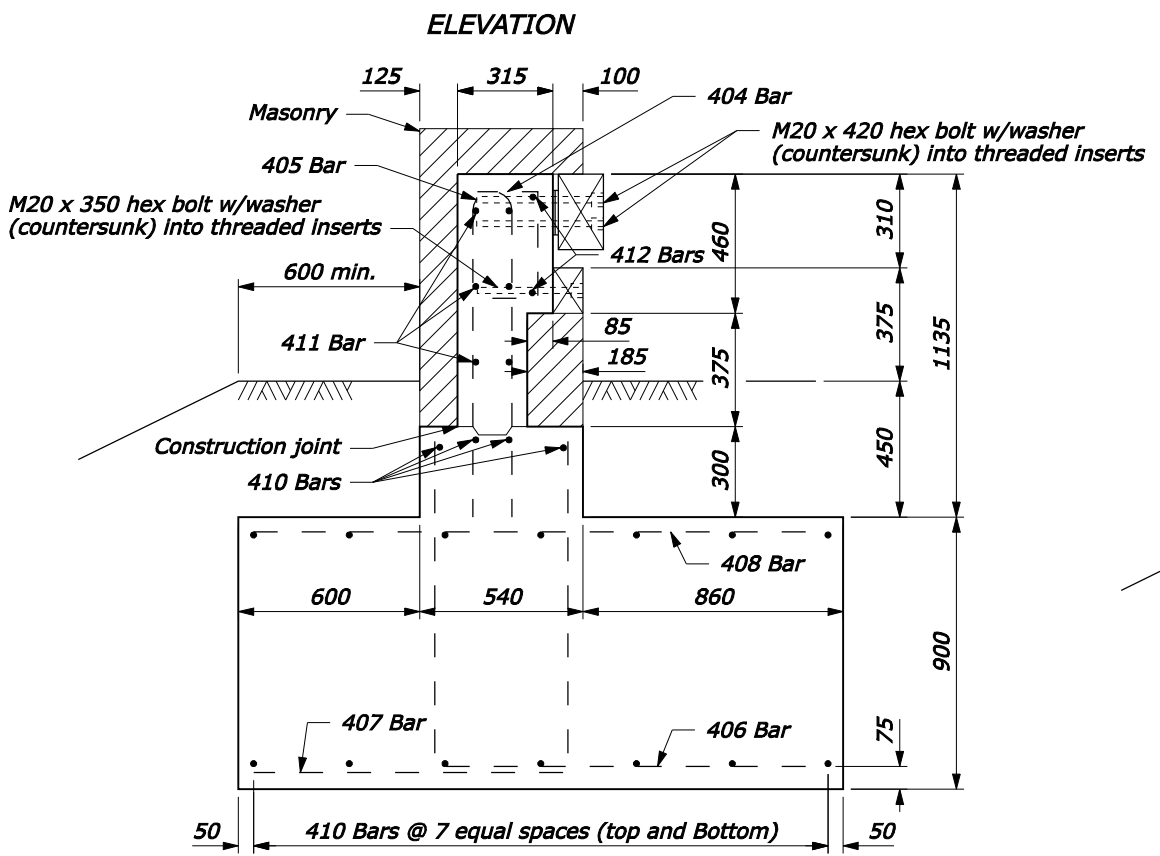
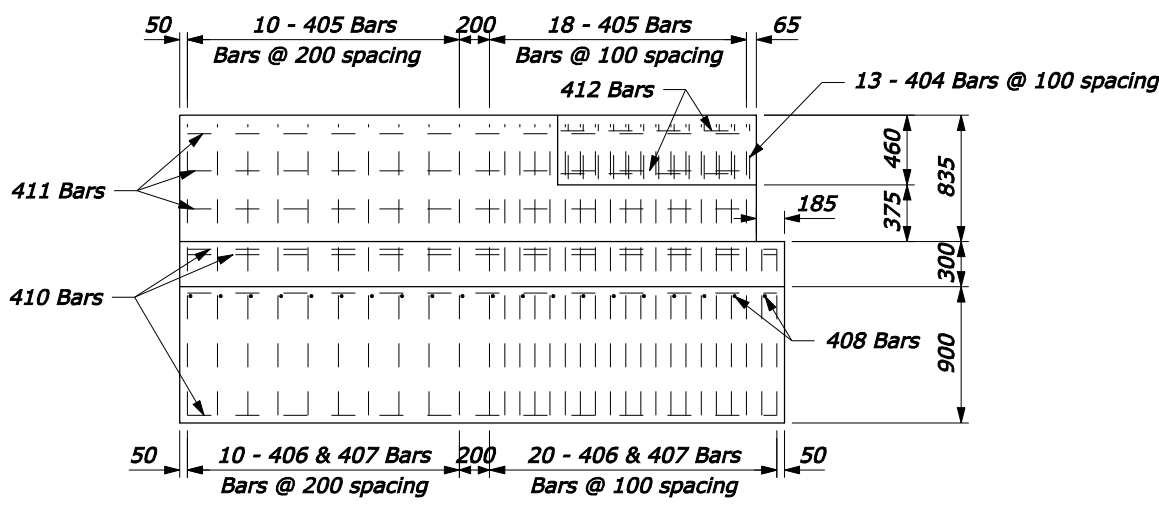
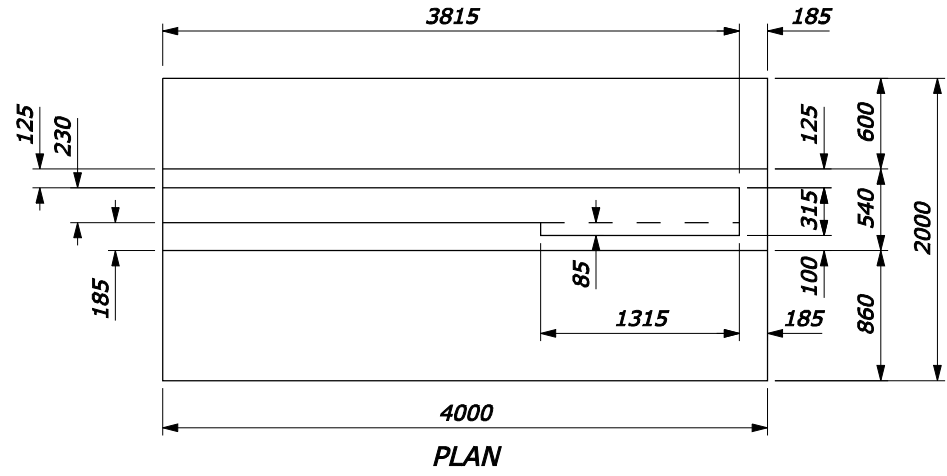
METRIC STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
TL-2 CONNECTION TO
STONE MASONRY GUARDWALL**
Sheet 2 of 3

STANDARD APPROVED FOR USE --/----

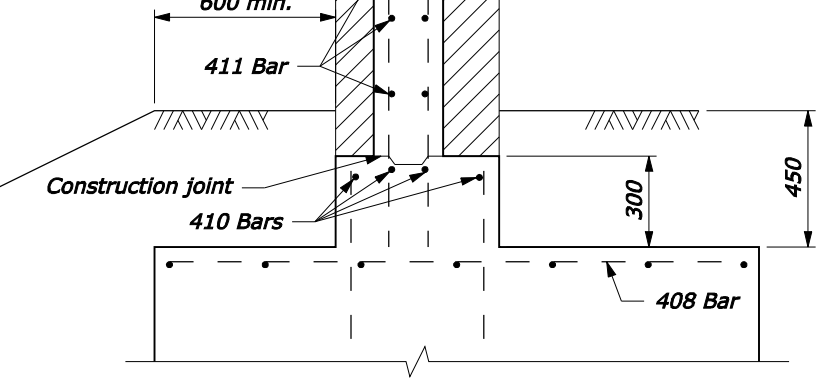
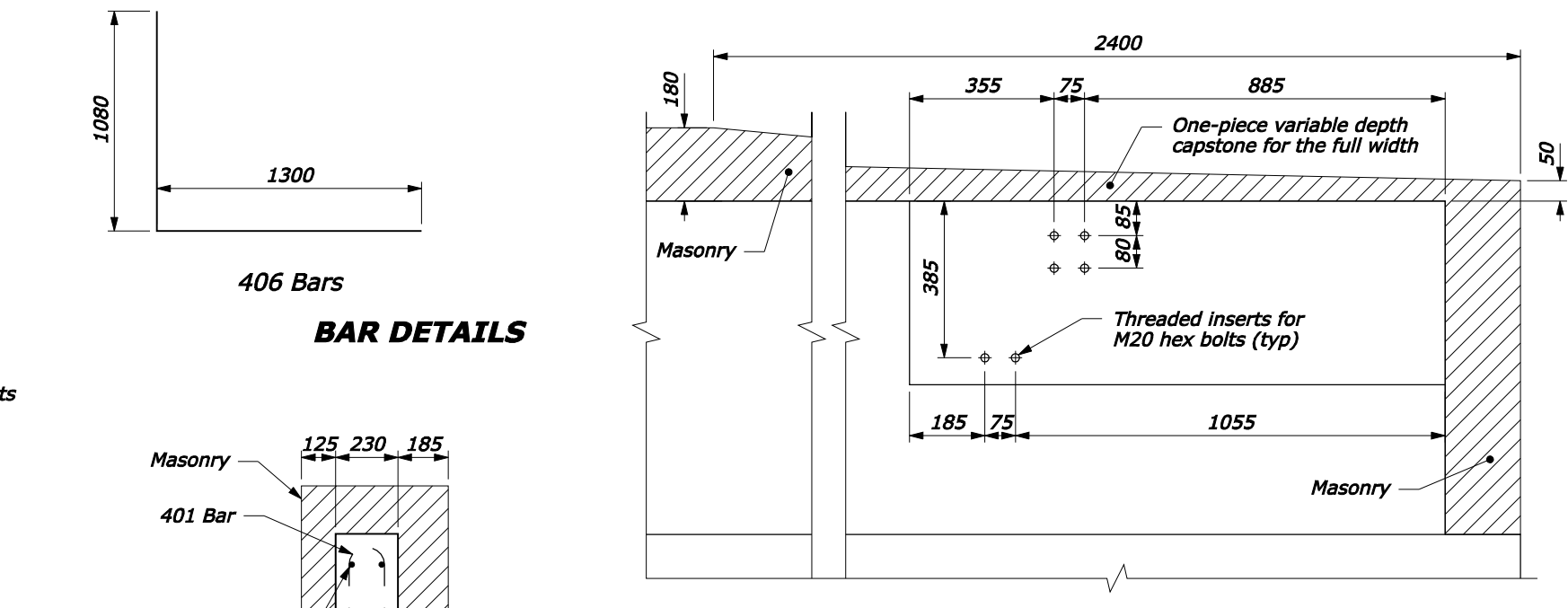
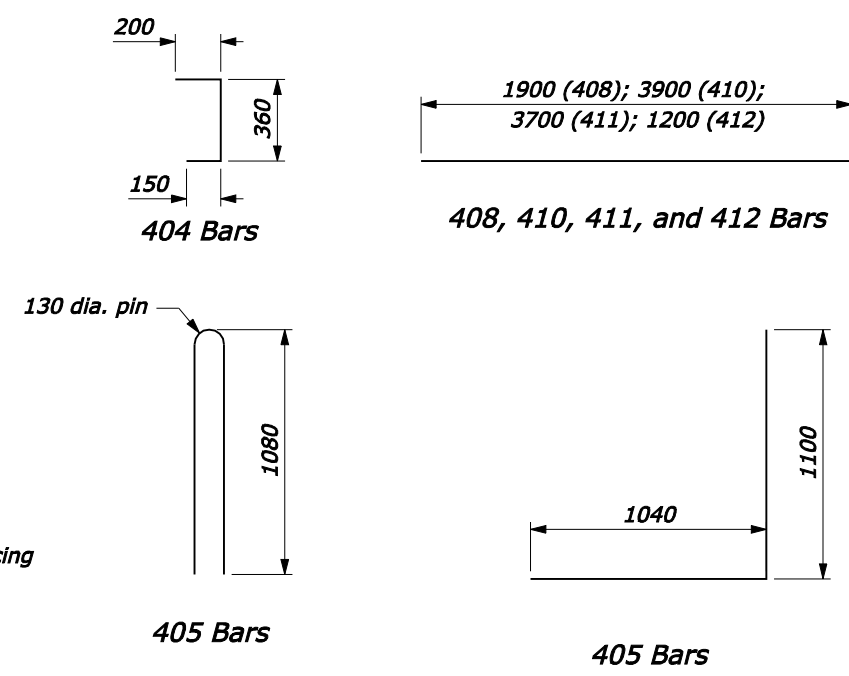
REVISED: 1/2008
DRAFT: 1/2008

STANDARD
M617-64

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**SECTION D-D
PARAPET END BLOCK**



SECTION C-C

NOTE:

- 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.
- REINFORCING STEEL:** Reinforcing steel Grade 420 (ASTM A615M-96a, Grade 420) deformed billet steel bars conforming to AASHTO M31M. The minimum concrete covering to the face of any bar is 50 mm unless otherwise shown. All bars are Metric size #16.
- Construct footing against undisturbed material or backfill with well compacted granular material.
- Dimensions without units are millimeters.

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

METRIC STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
TL-2 CONNECTION TO
STONE MASONRY GUARDWALL**
Sheet 3 of 3

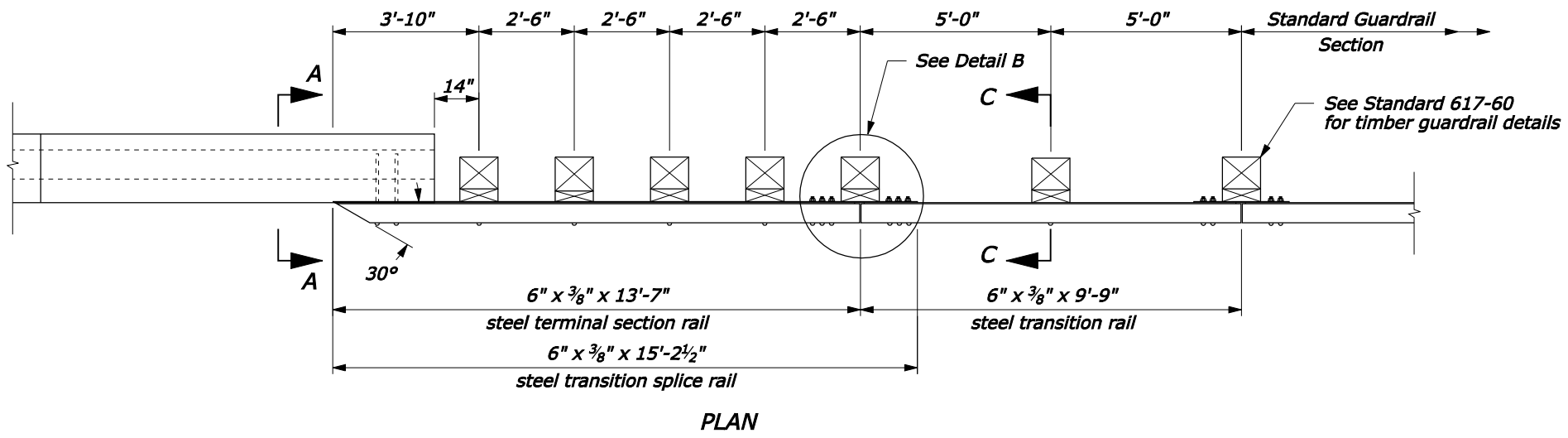
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REVISID:
DRAFT: 1/2008

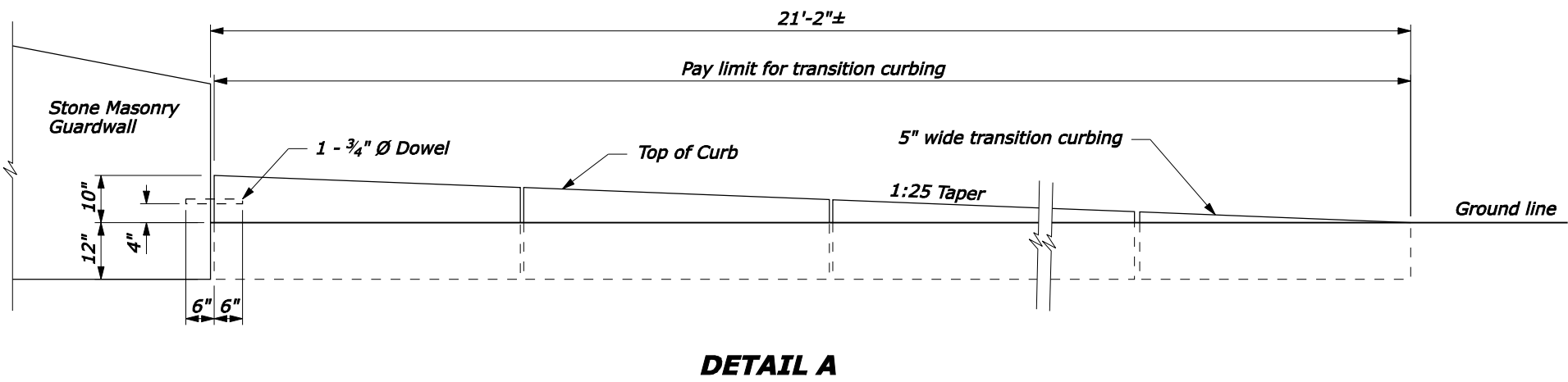
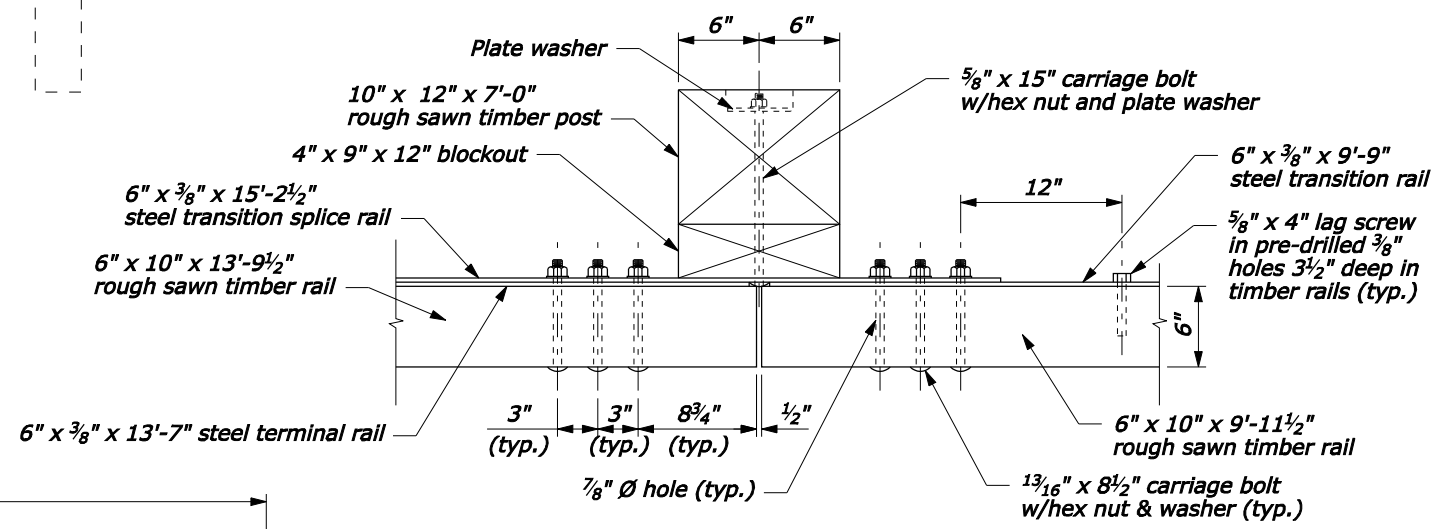
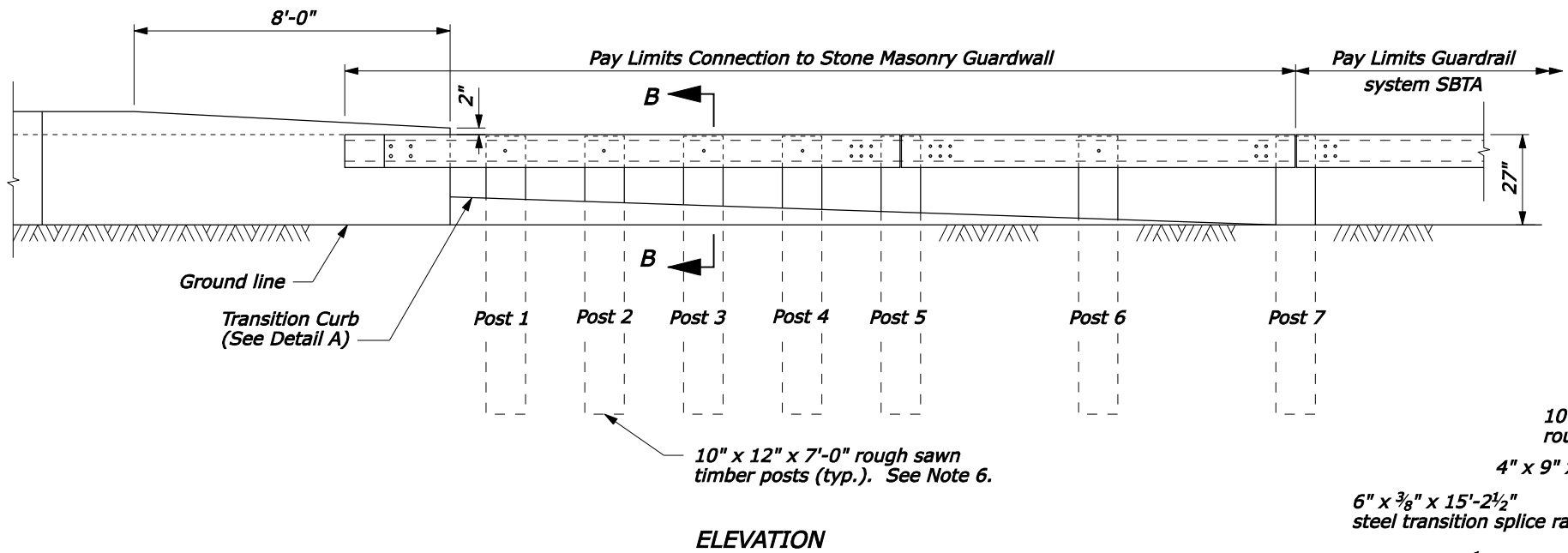
STANDARD
M617-64

NO SCALE

23-Jan-2008 11:35 AM
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- NOTE:**
1. See Sheet 2 of 2 for Sections A-A through C-C, steel rail layouts, and other details.
 2. Use weathering steel for all structural steel and fastener hardware.
 3. Transition curbing (including dowel) will be paid for at the contract unit price for transition curbing.
 4. Install transition curbing of material type specified in plans.
 5. Curb may be continuous or slabs at least 4'-11" in length. Install faces of slabs evenly and with maximum 1/8" separation.
 6. If contract requires steel post, substitute wood post with 6" x 9" x 6'-6" long steel post.



NO SCALE

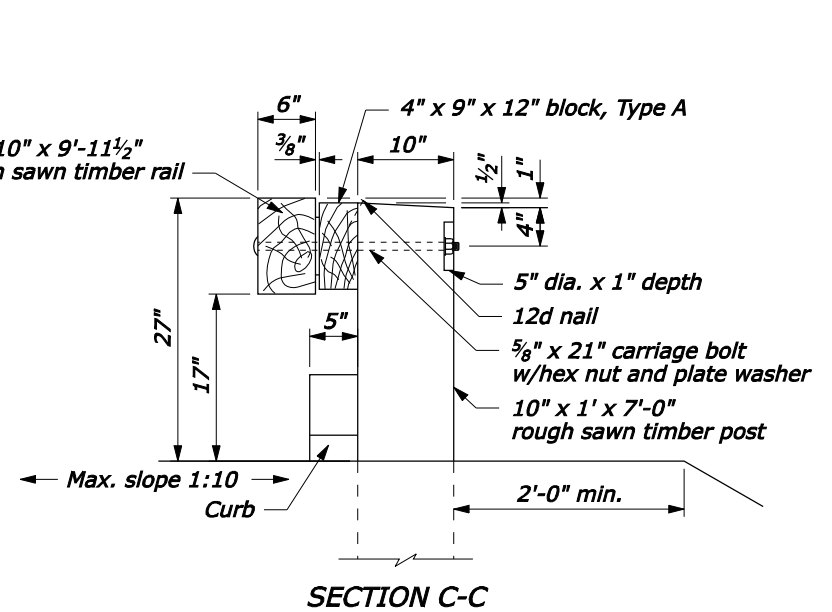
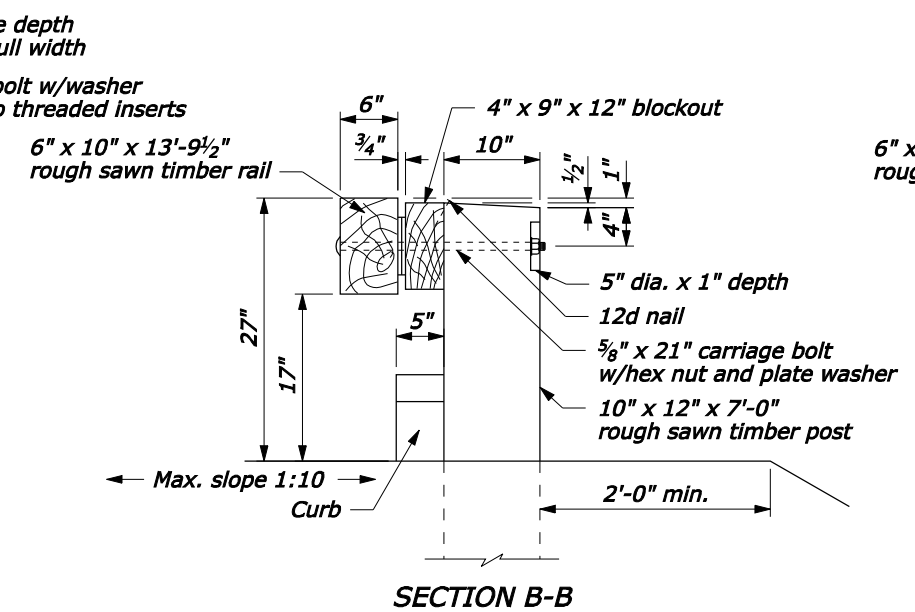
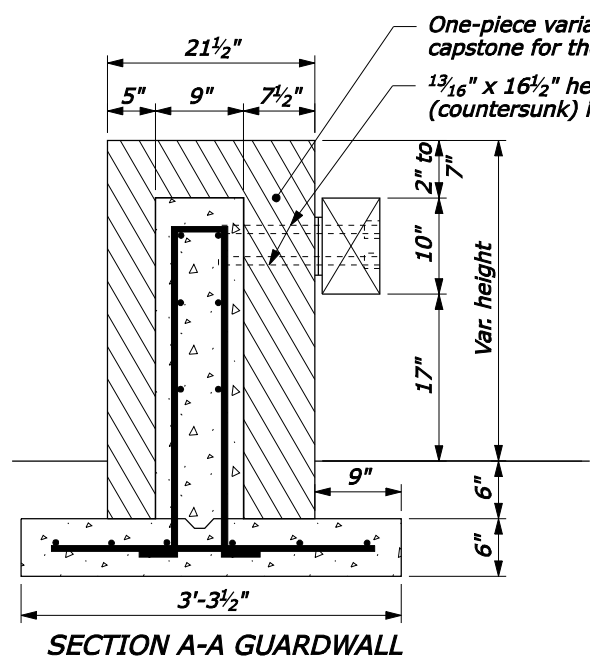
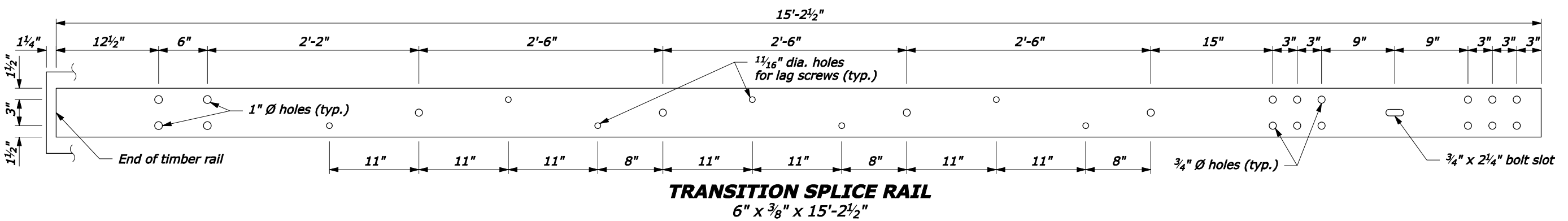
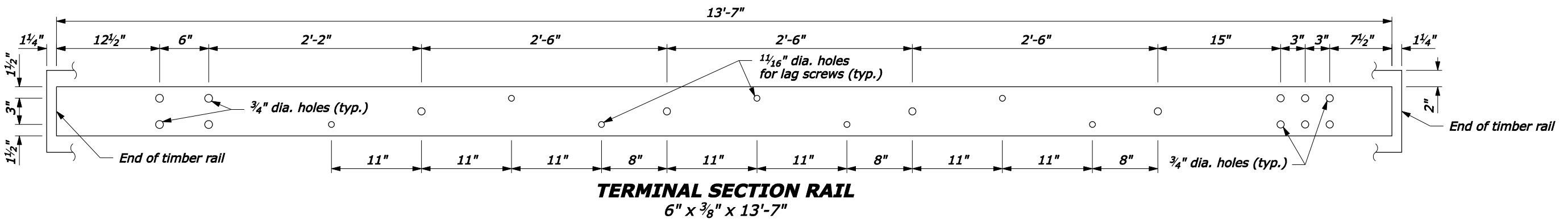
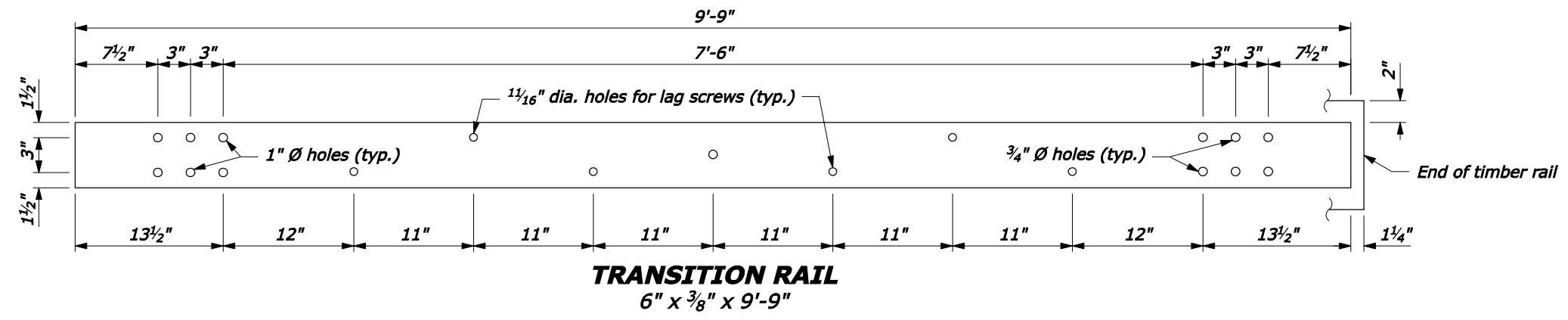
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

U.S. CUSTOMARY STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
TL-3 CONNECTION TO
STONE MASONRY GUARDWALL**
Sheet 1 of 2

STANDARD APPROVED FOR USE --/----	STANDARD 617-65
REVISED: DRAFT: 1/2008	

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NOTE:
1. Pre-drill $1\frac{1}{16}$ " holes in blocks outs and posts.



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

**U.S. CUSTOMARY STANDARD
STEEL-BACKED TIMBER GUARDRAIL
TL-3 CONNECTION TO
STONE MASONRY GUARDWALL**
Sheet 2 of 2

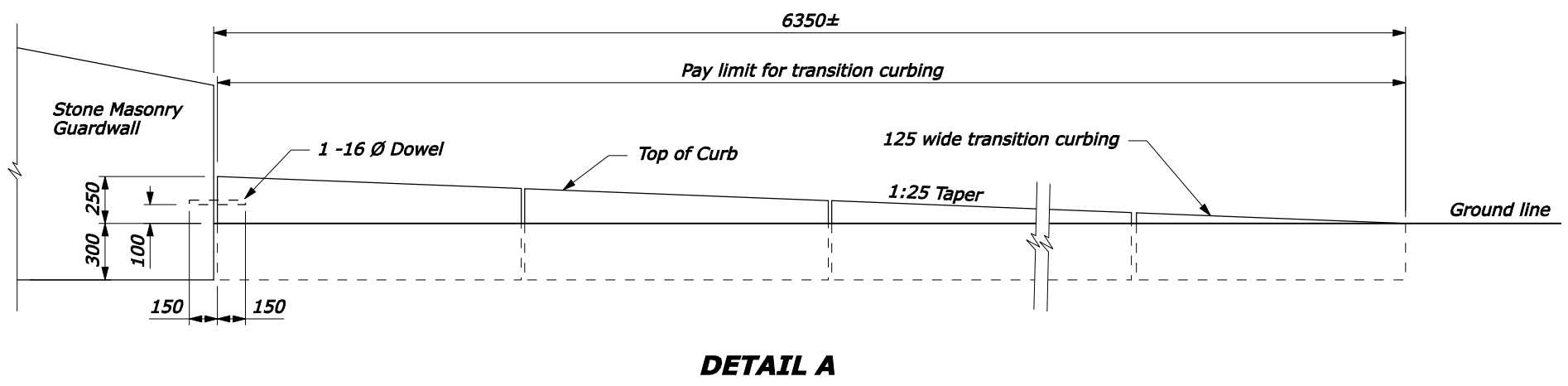
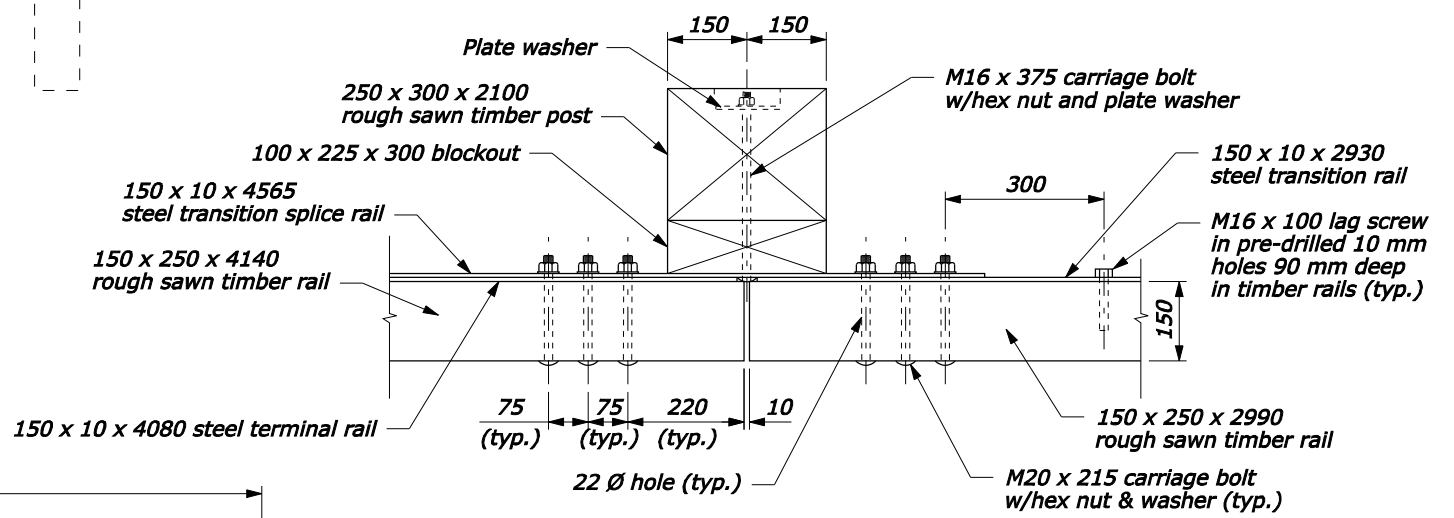
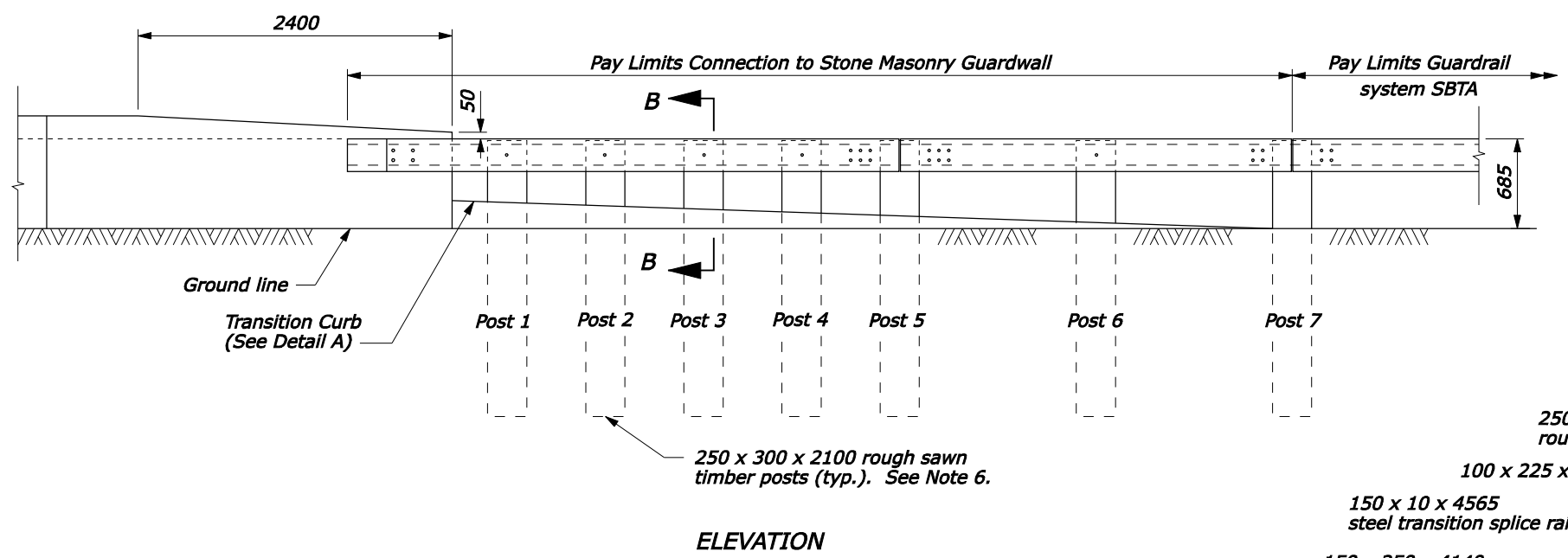
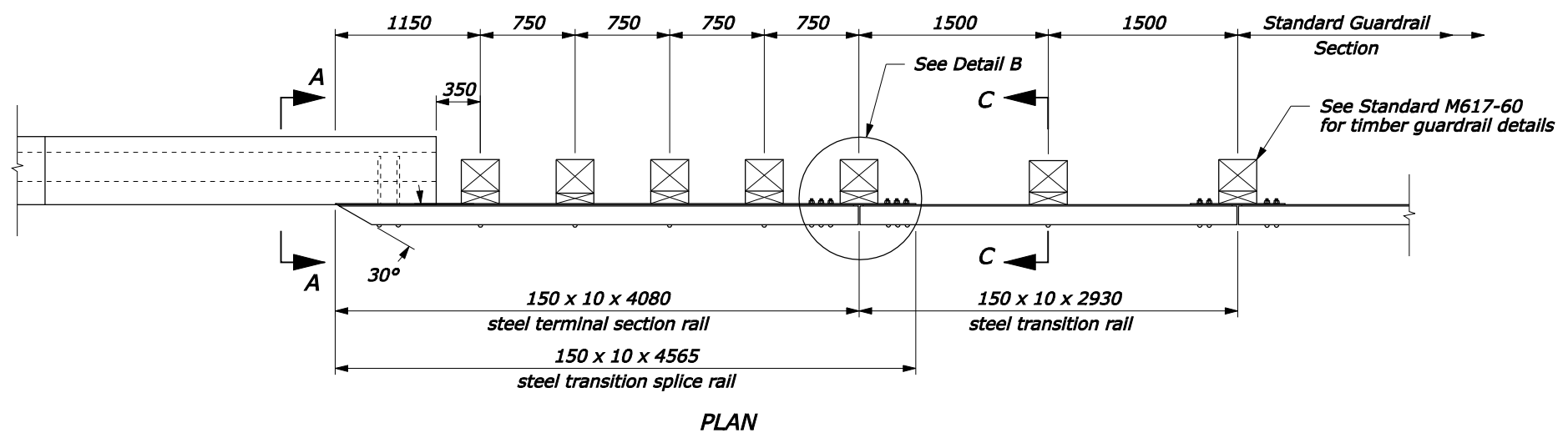
STANDARD APPROVED FOR USE --/----

REVISED: DRAFT: 1/2008

STANDARD
617-65

NO SCALE

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NOTE:

1. See Sheet 2 of 2 for Sections A-A through C-C, steel rail layouts, and other details.
2. Use weathering steel for all structural steel and fastener hardware.
3. Transition curbing (including dowel) will be paid for at the contract unit price for transition curbing.
4. Install transition curbing of material type specified in plans.
5. Curb may be continuous or slabs at least 1.5 m in length. Install faces of slabs evenly and with maximum 2.5 mm separation.
6. If contract requires steel post, substitute wood post with $W150 \times 225 \times 2.0$ m long.
7. Furnish hardware in the metric sizes shown. Equivalent US Customary sizes may be used when metric sizes are not available.
8. Dimensions without units are millimeters.

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

METRIC STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
 TL-3 CONNECTION TO
 STONE MASONRY GUARDWALL**
 Sheet 1 of 2

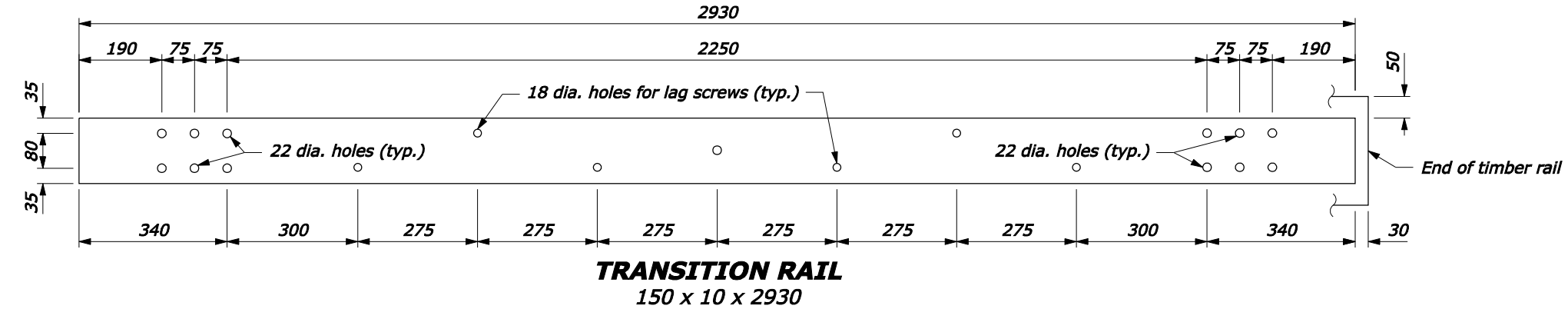
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REVISED: DRAFT: 1/2008

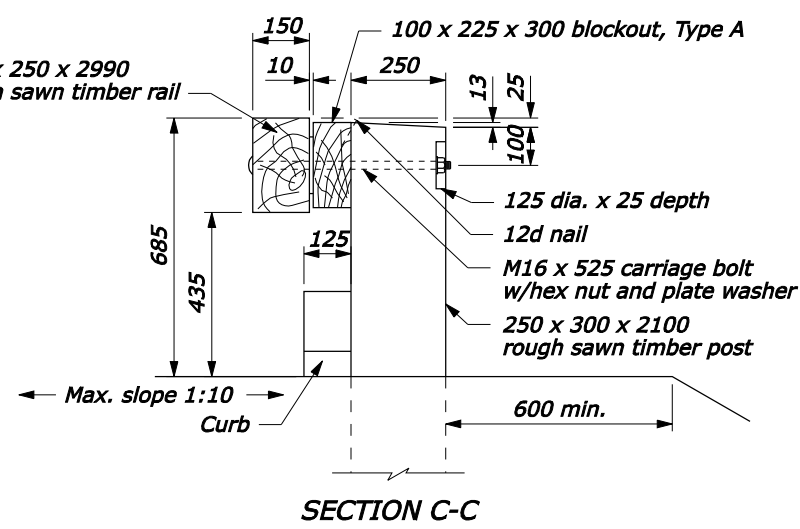
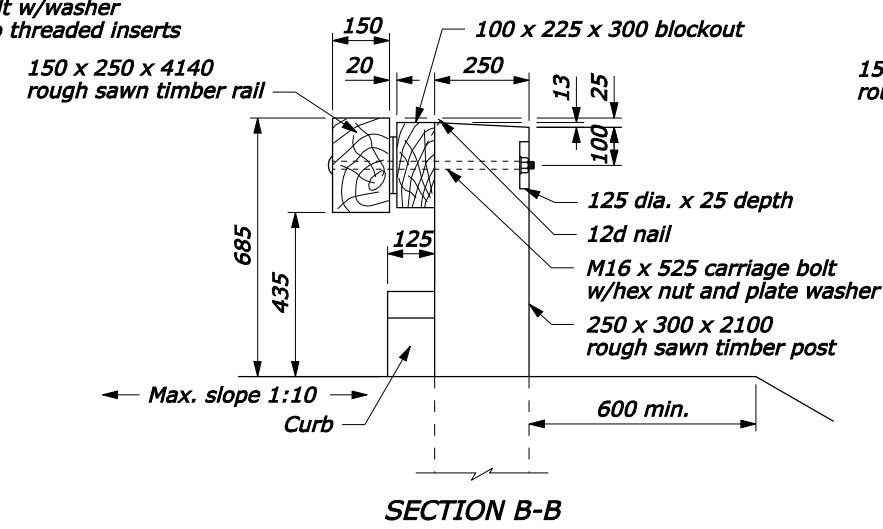
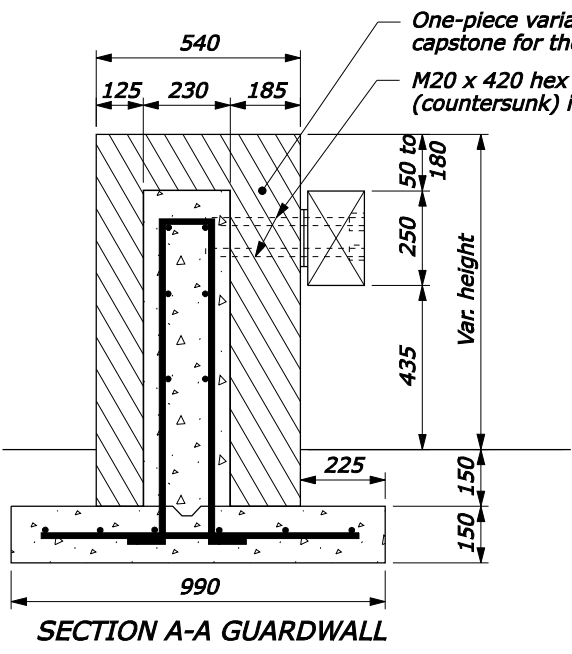
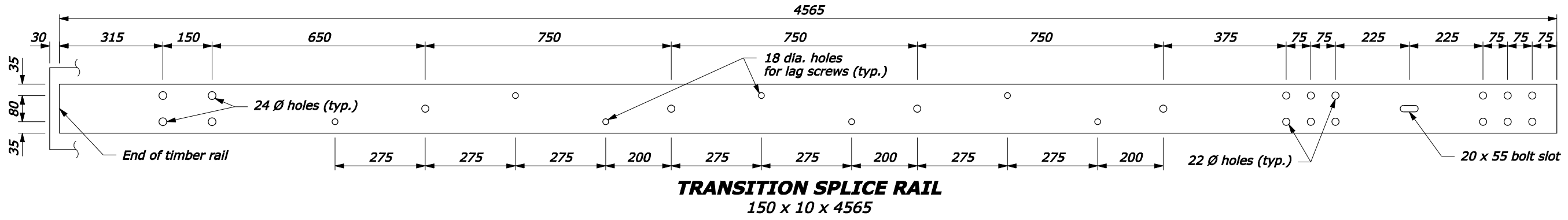
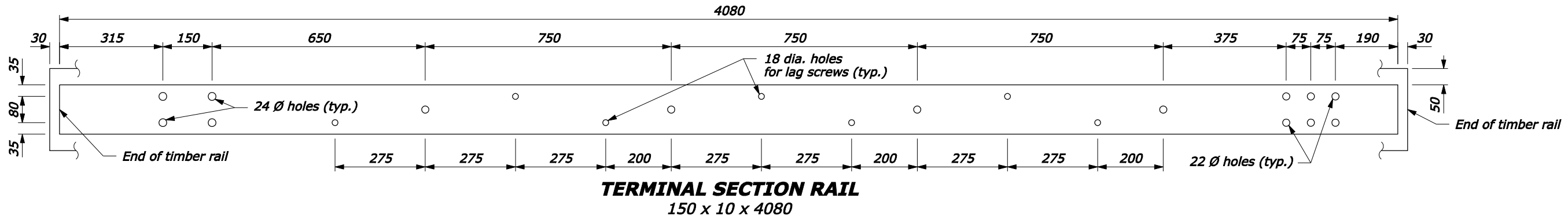
STANDARD
M617-65

NO SCALE

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- NOTE:**
1. Pre-drill 18 mm holes in blocks outs and posts.
 2. Furnish hardware in the metric sizes shown. Equivalent US Customary sizes may be used when metric sizes are not available.
 3. Dimensions without units are millimeters.



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

METRIC STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
TL-3 CONNECTION TO
STONE MASONRY GUARDWALL**
Sheet 2 of 2

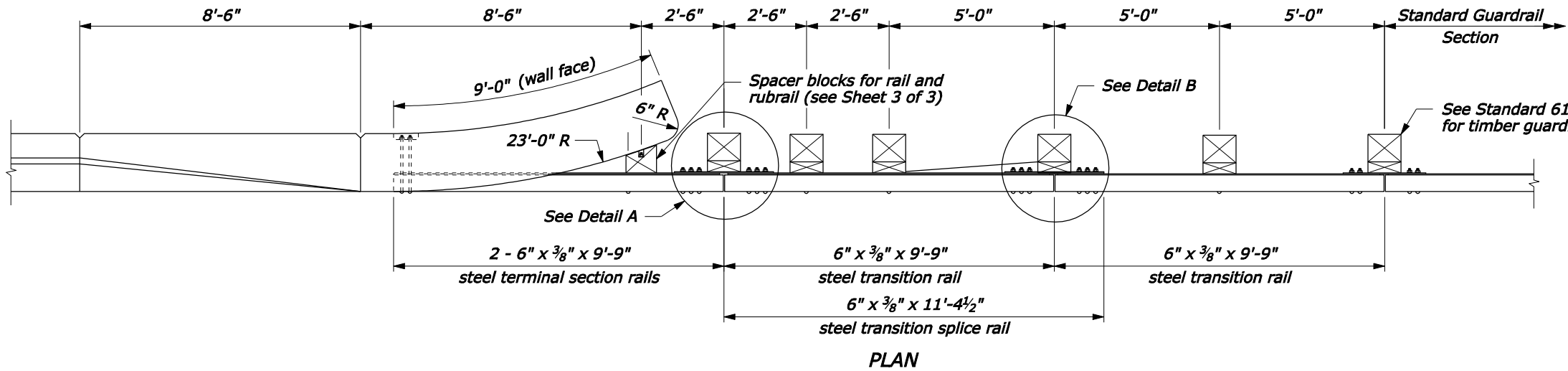
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REVISED: 1/2008
DRAFT: 1/2008

STANDARD
M617-65

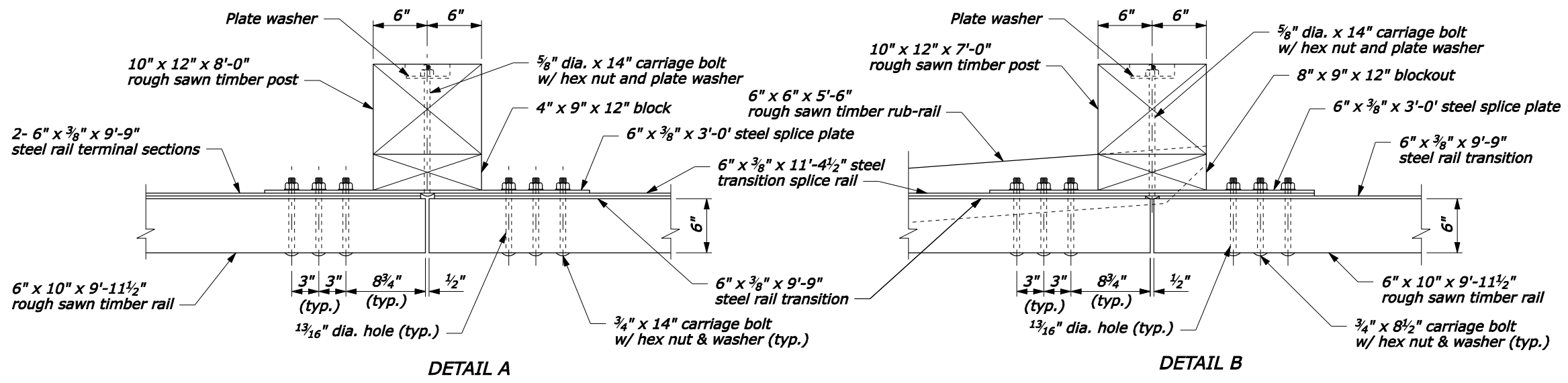
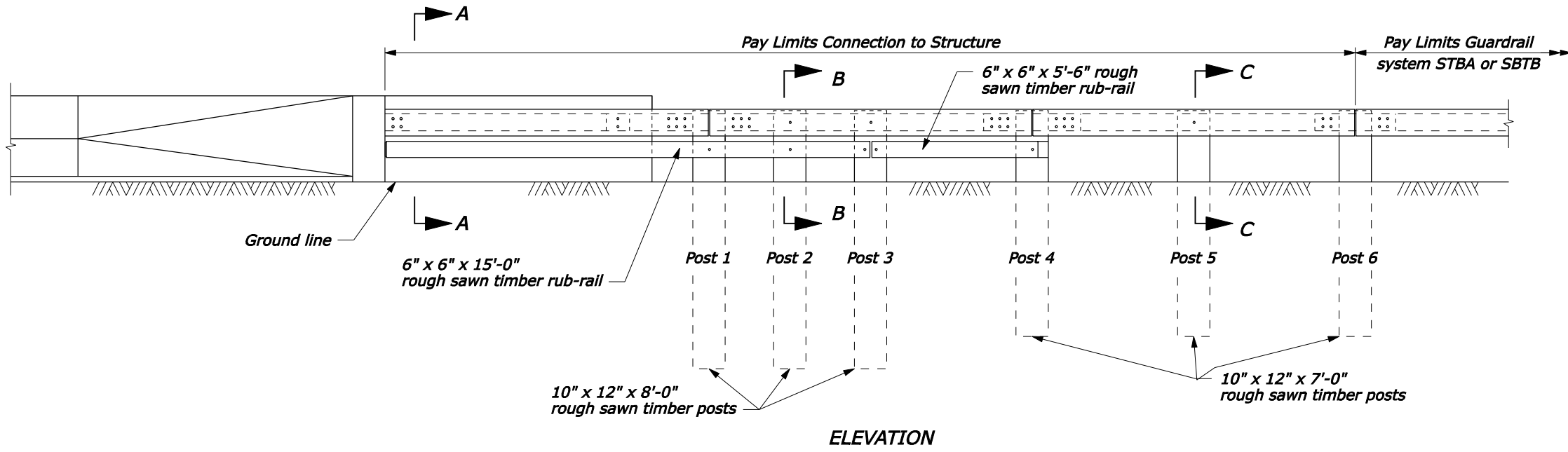
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NOTE:

1. See the following sheets for Sections A-A through C-C, steel rail layouts, and other details.
2. Use weathering steel for all structural steel and fastener hardware.



POST CONNECTION

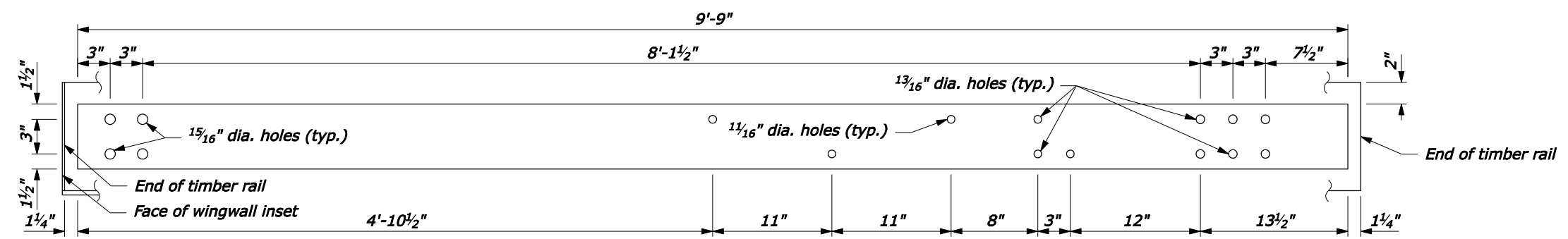
NO SCALE

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

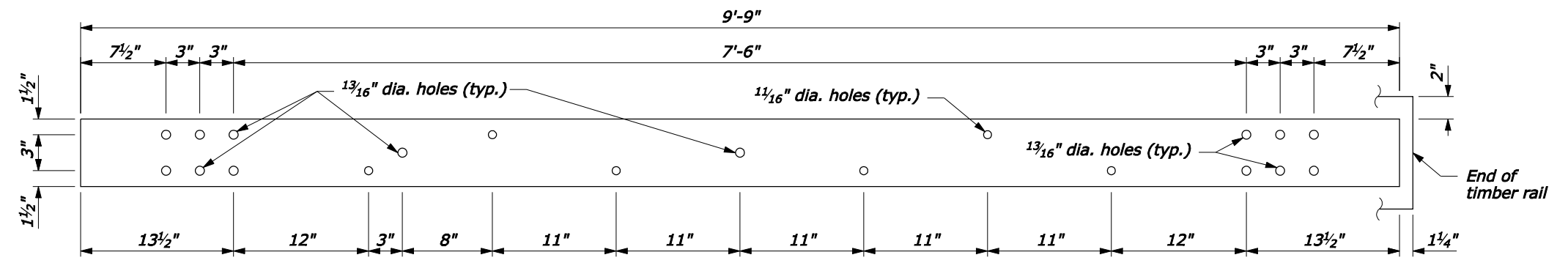
**U.S. CUSTOMARY STANDARD
 STEEL-BACKED TIMBER GUARDRAIL
 CONNECTION TO
 CURVED BACK STRUCTURE**
 Sheet 1 of 3

STANDARD APPROVED FOR USE 1/1994	STANDARD
REVISED: 4/1994	617-66
DRAFT: 1/2008	

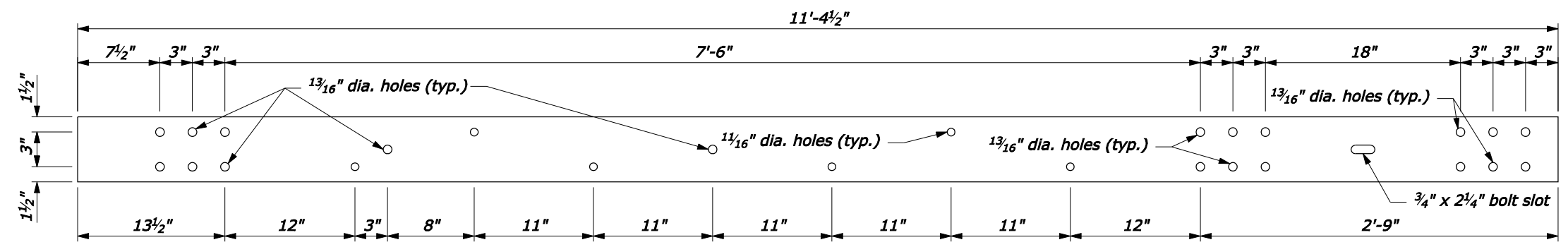
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TERMINAL SECTION RAIL
6" x 3/8" x 9'-9"

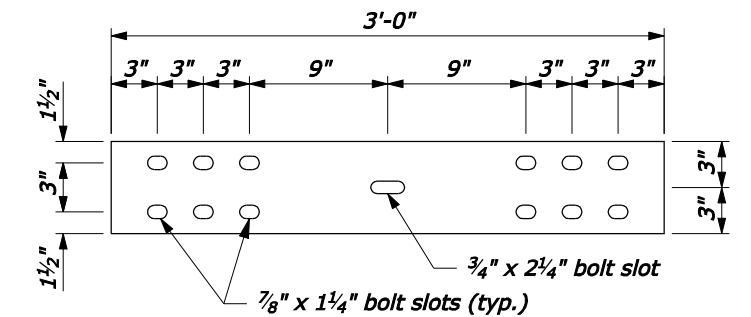


TRANSITION RAIL
6" x 3/8" x 9'-9"

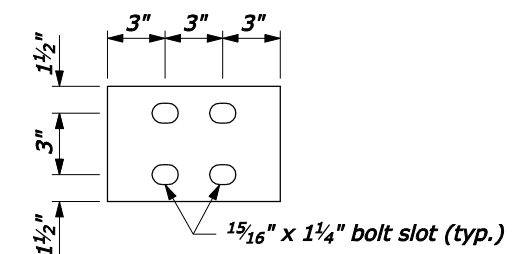


TRANSITION SPLICE RAIL
6" x 3/8" x 11'-4 1/2"

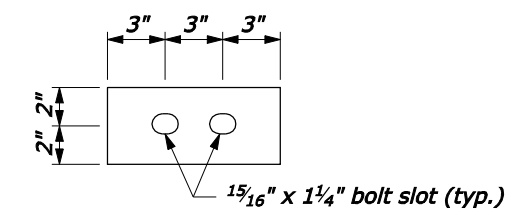
NOTE:
1. Pre-drill 5/8-inch holes in timber rail and 3/8-inch holes in the wood spacer block for the 5/8-inch lag screws.



SPLICE PLATE
6" x 3/8" x 3'-0"

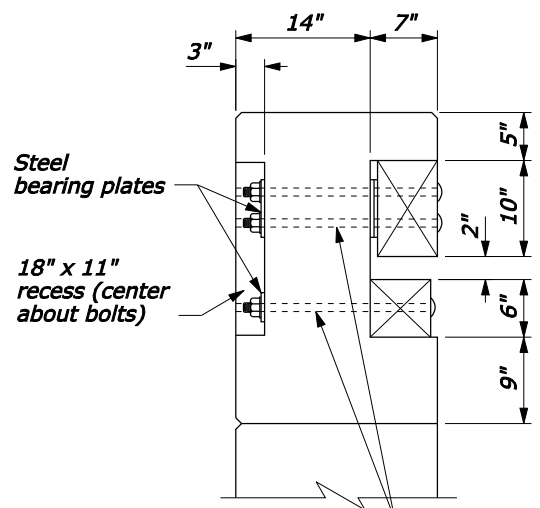


6" x 3/8" x 9"

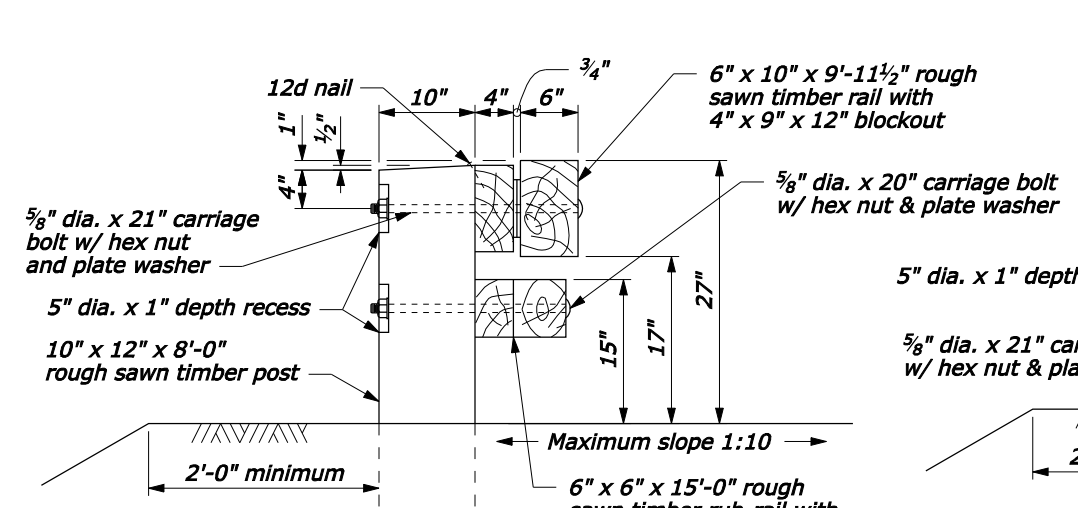


4" x 3/8" x 9"

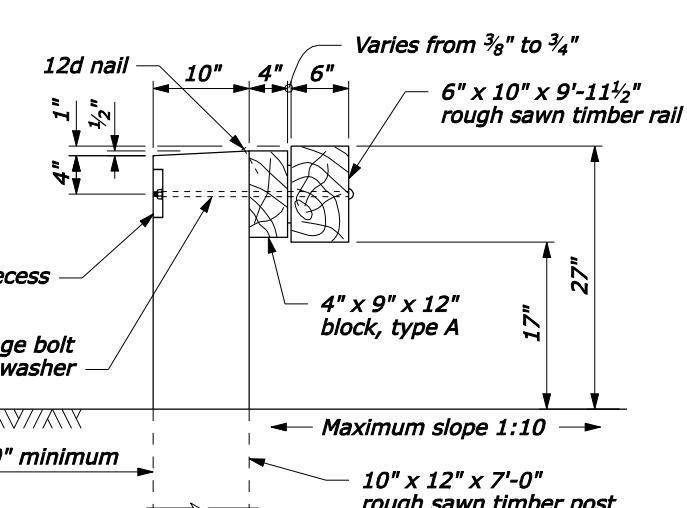
BEARING PLATE DETAILS



SECTION A-A



SECTION B-B



SECTION C-C

NO SCALE

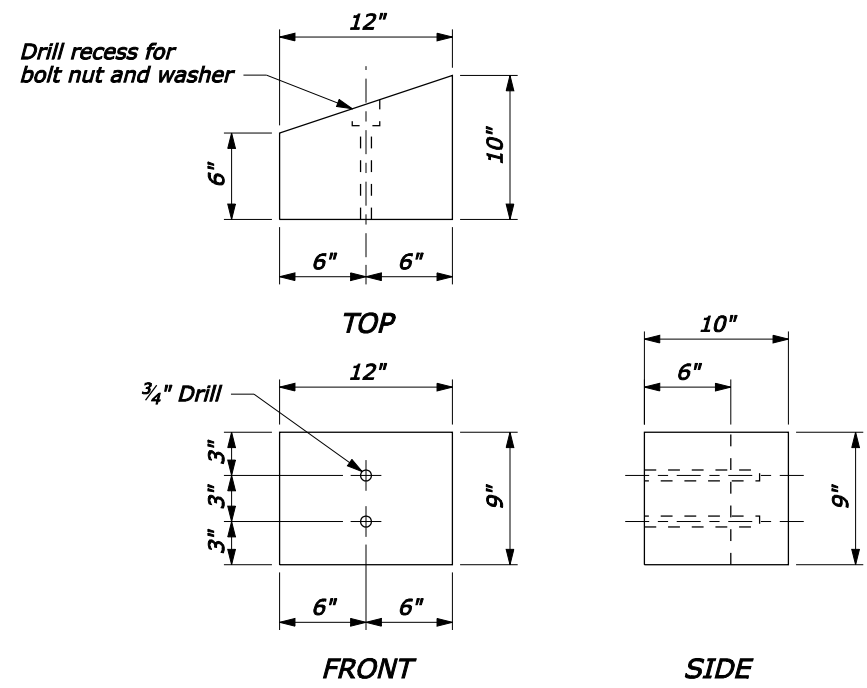
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

U.S. CUSTOMARY STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
CONNECTION TO
CURVED BACK STRUCTURE**
Sheet 2 of 3

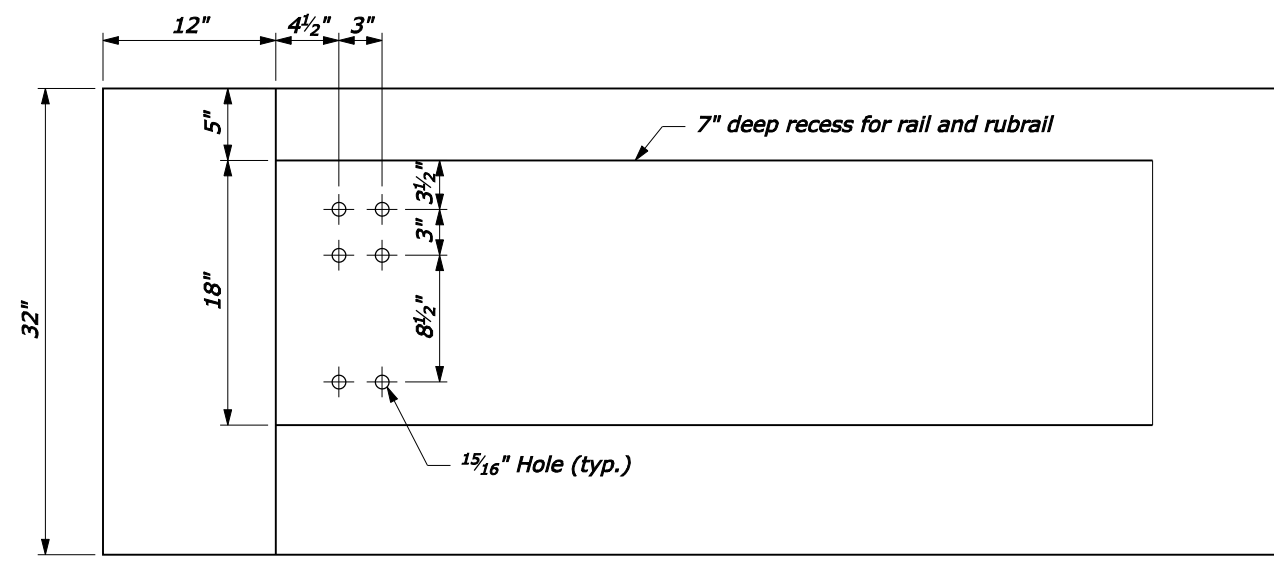
STANDARD APPROVED FOR USE 1/1994
REVISED: 4/1994
DRAFT: 1/2008

STANDARD
617-66

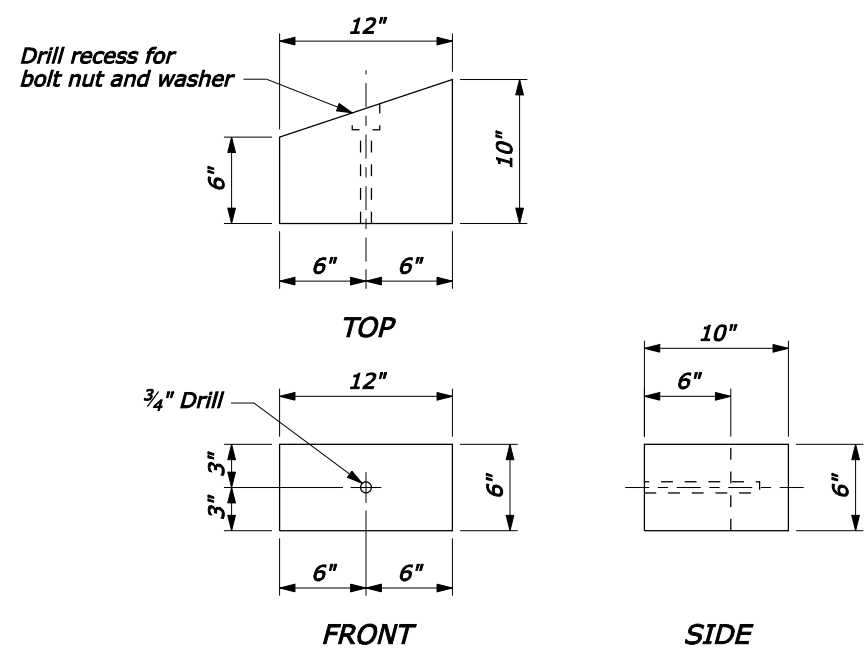
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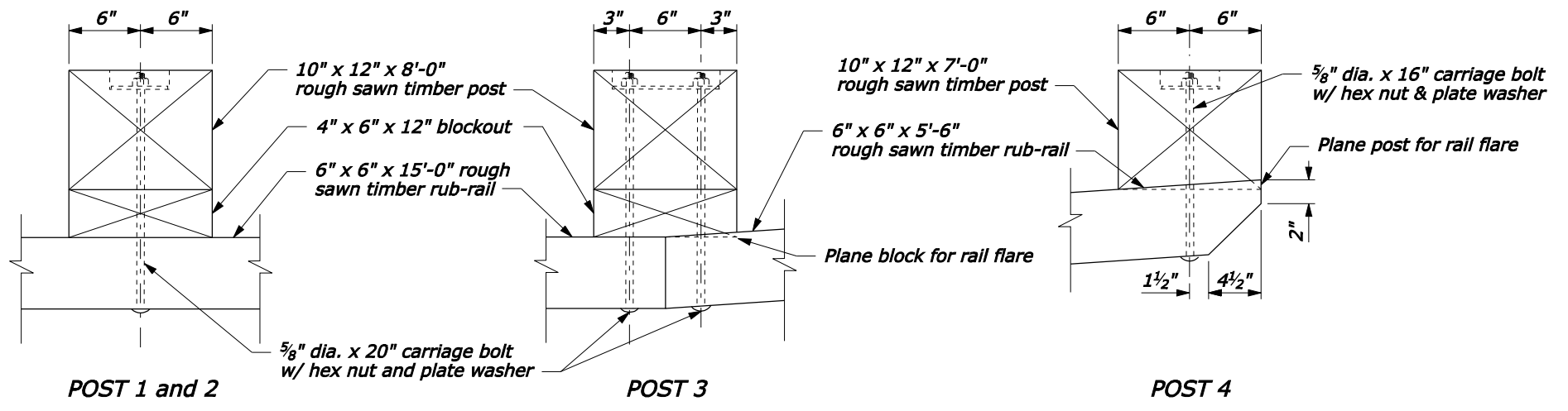
SPACER BLOCK FOR RAIL



PARAPET ATTACHMENT DETAIL



SPACER BLOCK FOR RUB-RAIL

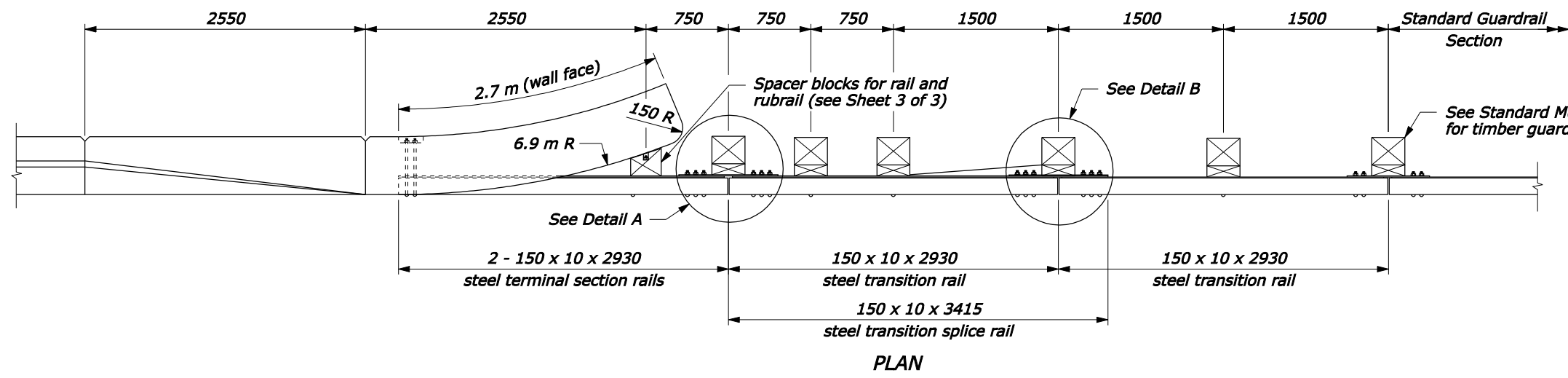


RUB-RAIL CONNECTIONS

NO SCALE

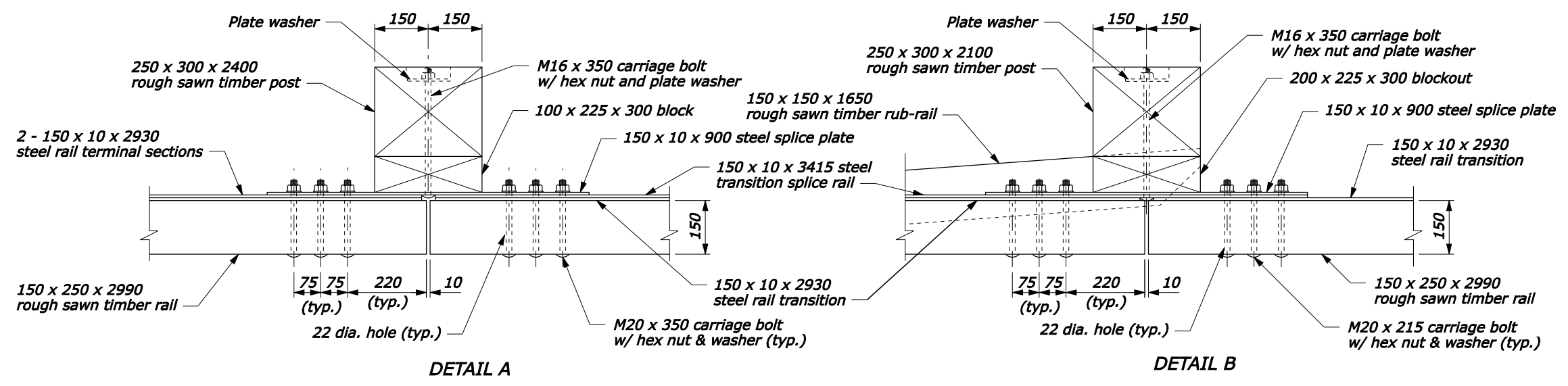
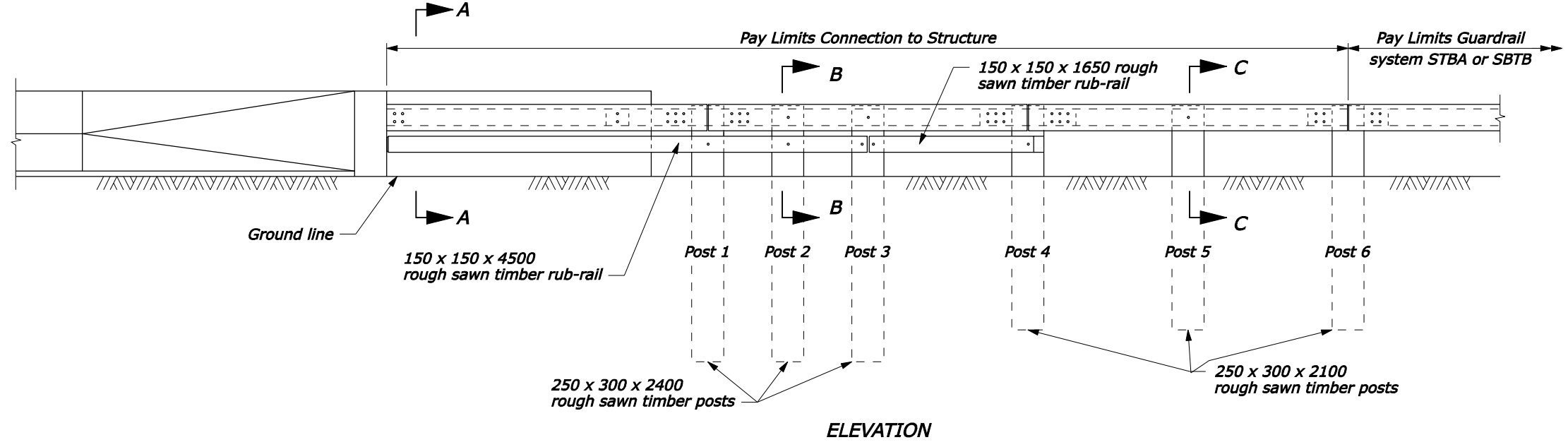
U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION FEDERAL LANDS HIGHWAY	
U.S. CUSTOMARY STANDARD STEEL-BACKED TIMBER GUARDRAIL CONNECTION TO CURVED BACK STRUCTURE Sheet 3 of 3	
STANDARD APPROVED FOR USE 1/1994	STANDARD
REVISED: 4/1994 DRAFT: 1/2008	617-66

P:\198.145.186.2\std_plan\std61766.dgn [US Customary] 23-Jan-2008 04:09 PM



NOTE:

1. See the following sheets for Sections A-A through C-C, steel rail layouts, and other details.
2. Use weathering steel for all structural steel and fastener hardware.
3. Furnish hardware in the metric sizes shown. Equivalent US Customary sizes may be used when metric sizes are not available.
4. Dimensions without units are millimeters.



POST CONNECTION

NO SCALE

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

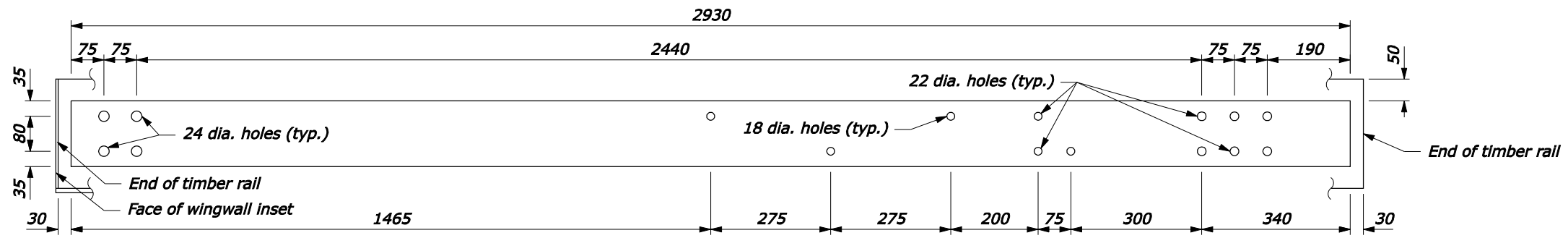
METRIC STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
 CONNECTION TO
 CURVED BACK STRUCTURE**
 Sheet 1 of 3

STANDARD APPROVED FOR USE 3/1996

REVISOR: 1/2008
 DRAFT: 1/2008

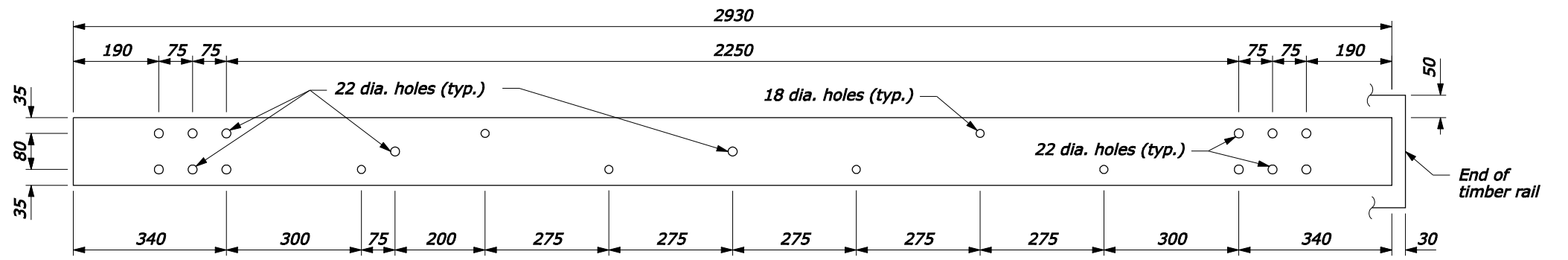
STANDARD
M617-66

23-Jan-2008 04:10 PM
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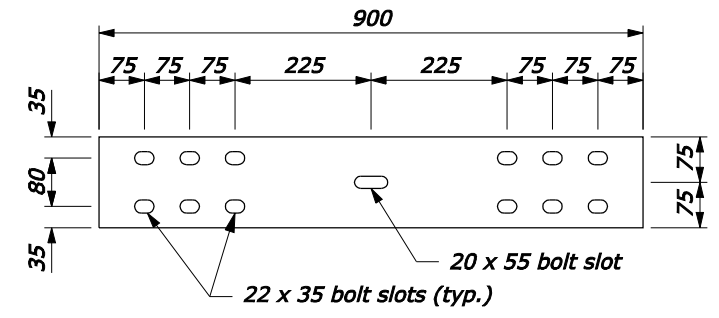


TERMINAL SECTION RAIL
150 x 10 x 2930

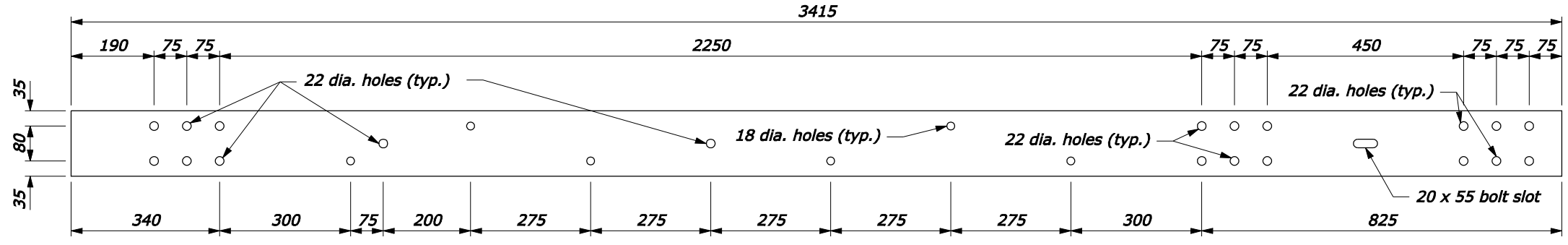
- NOTE:**
1. Pre-drill 16 mm holes in timber rail and 10 mm holes in the wood spacer block for the 16 mm lag screws.
 2. Furnish hardware in the metric sizes shown. Equivalent US Customary sizes may be used when metric sizes are not available.
 3. Dimensions without units are millimeters.



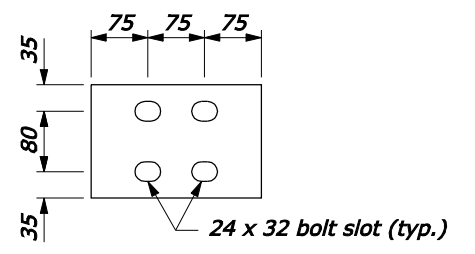
TRANSITION RAIL
150 x 10 x 2930



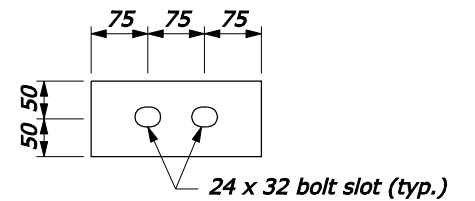
SPLICE PLATE
150 x 10 x 900



TRANSITION SPLICE RAIL
150 x 10 x 3415

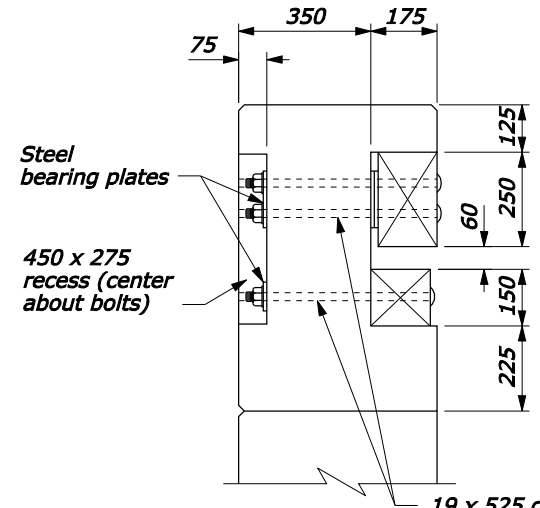


150 x 10 x 225

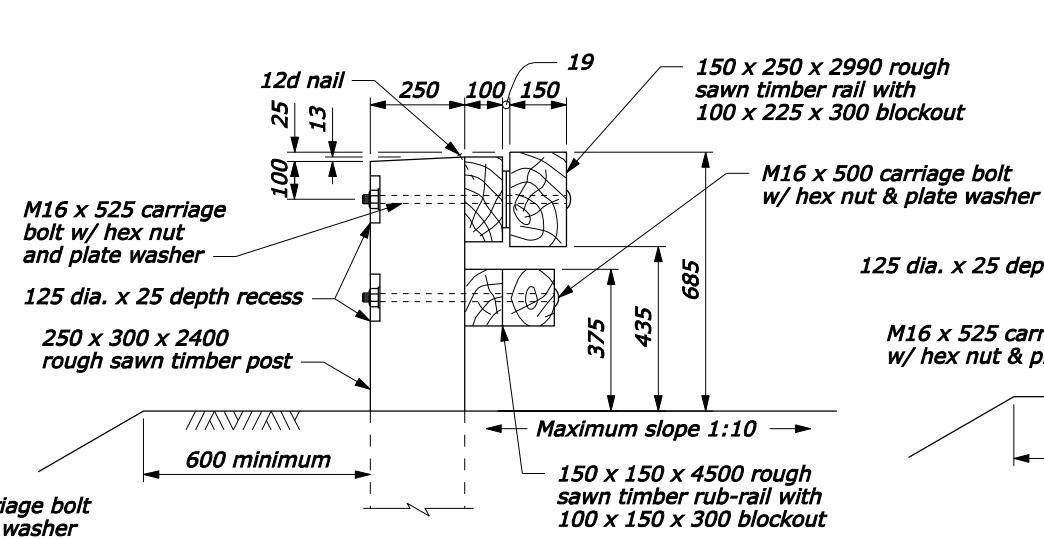


100 x 10 x 225

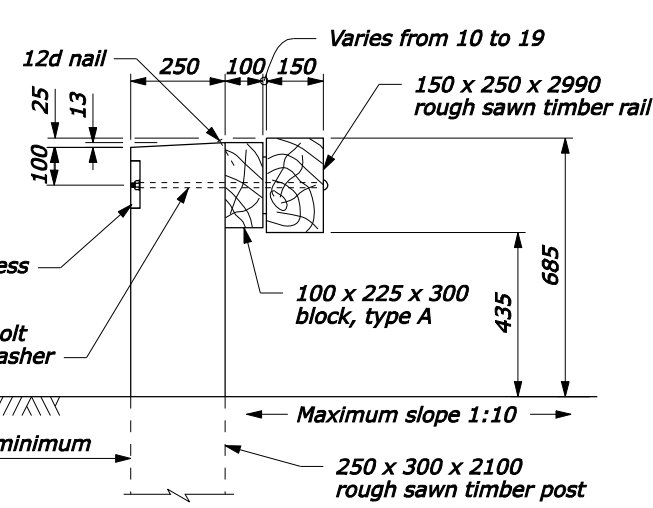
BEARING PLATE DETAILS



SECTION A-A



SECTION B-B



SECTION C-C

NO SCALE

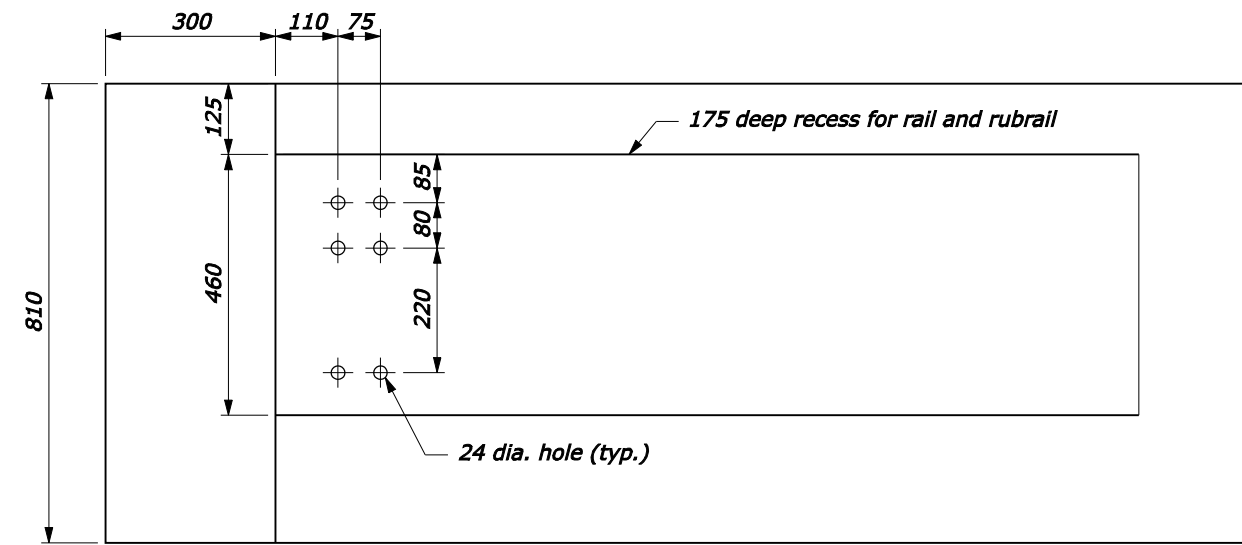
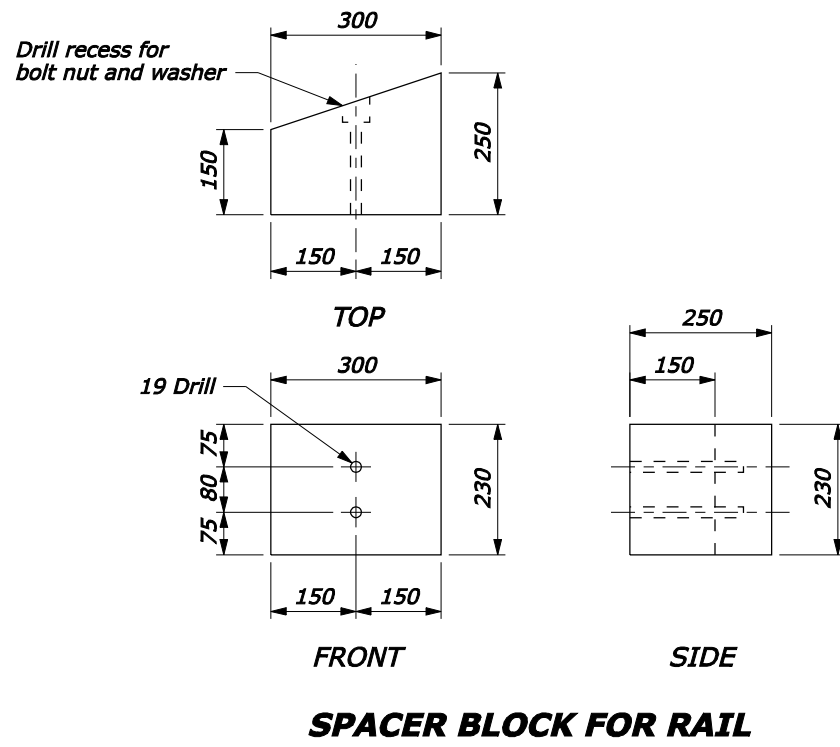
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

METRIC STANDARD
STEEL-BACKED TIMBER GUARDRAIL CONNECTION TO CURVED BACK STRUCTURE
Sheet 2 of 3

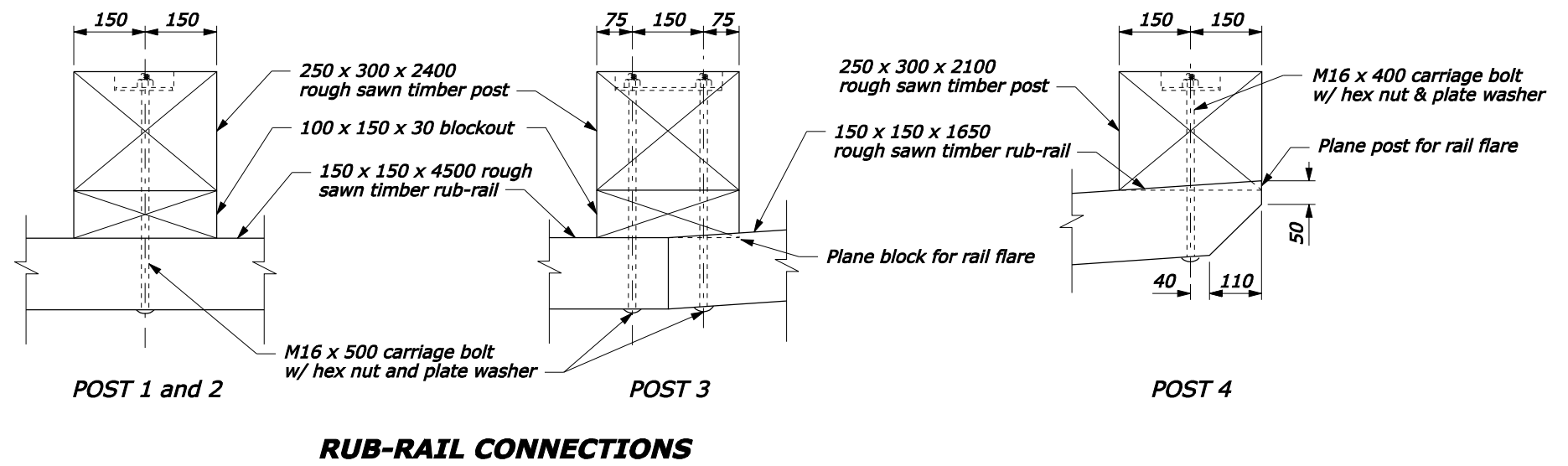
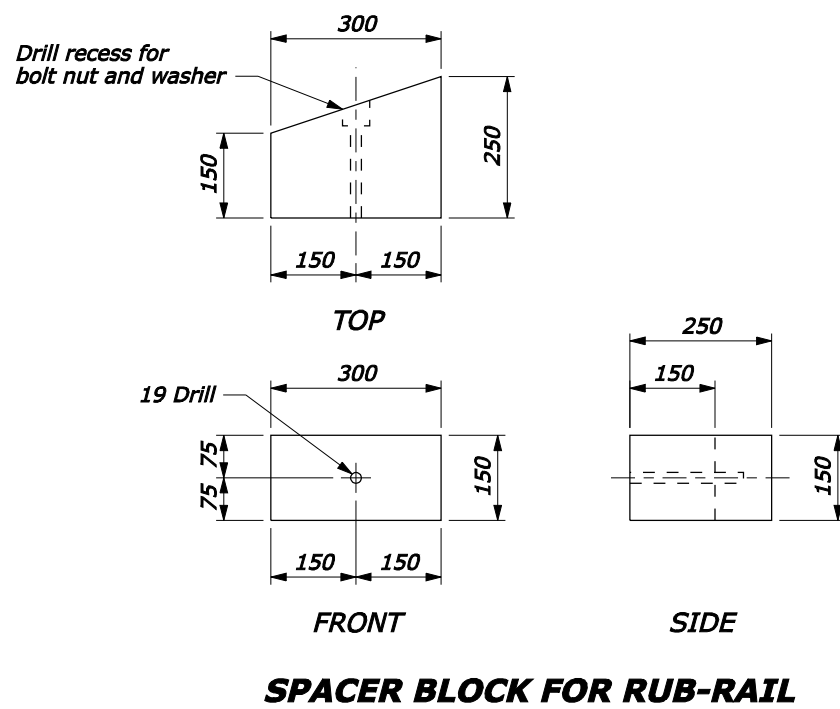
STANDARD APPROVED FOR USE 3/1996
REVISOR: 1/2008
DRAFT: 1/2008

STANDARD
M617-66

23-Jan-2008 04:10 PM
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PARAPET ATTACHMENT DETAIL

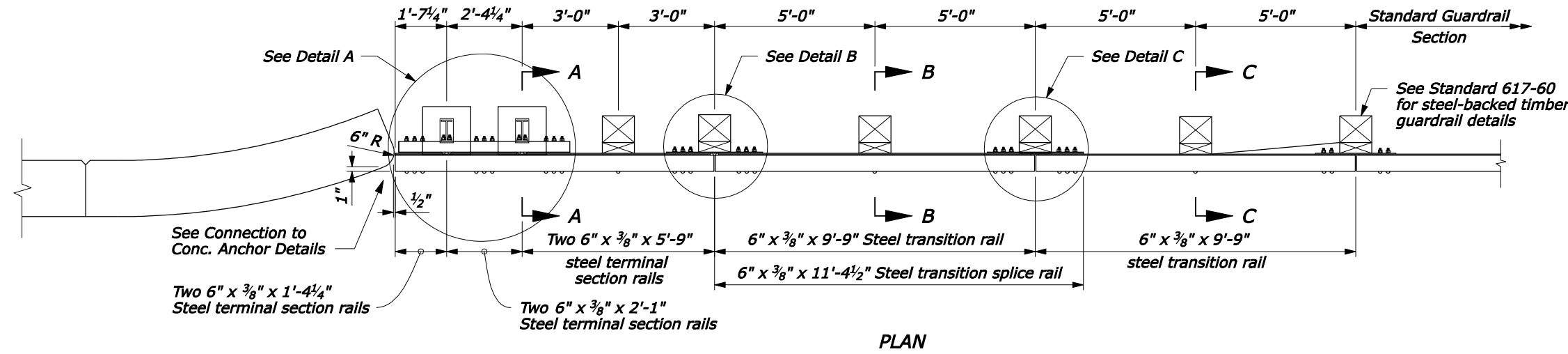


RUB-RAIL CONNECTIONS

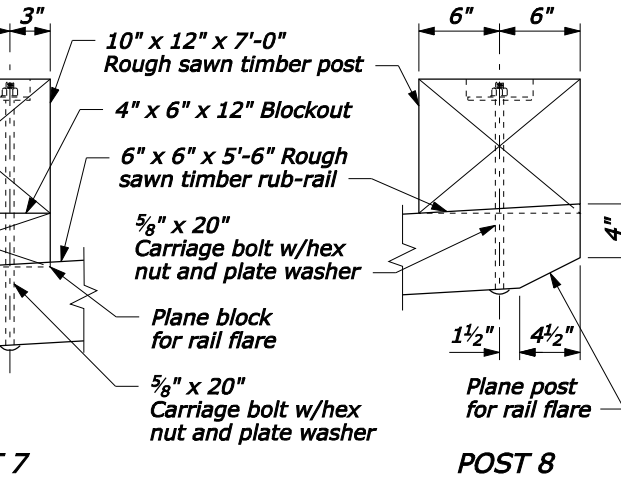
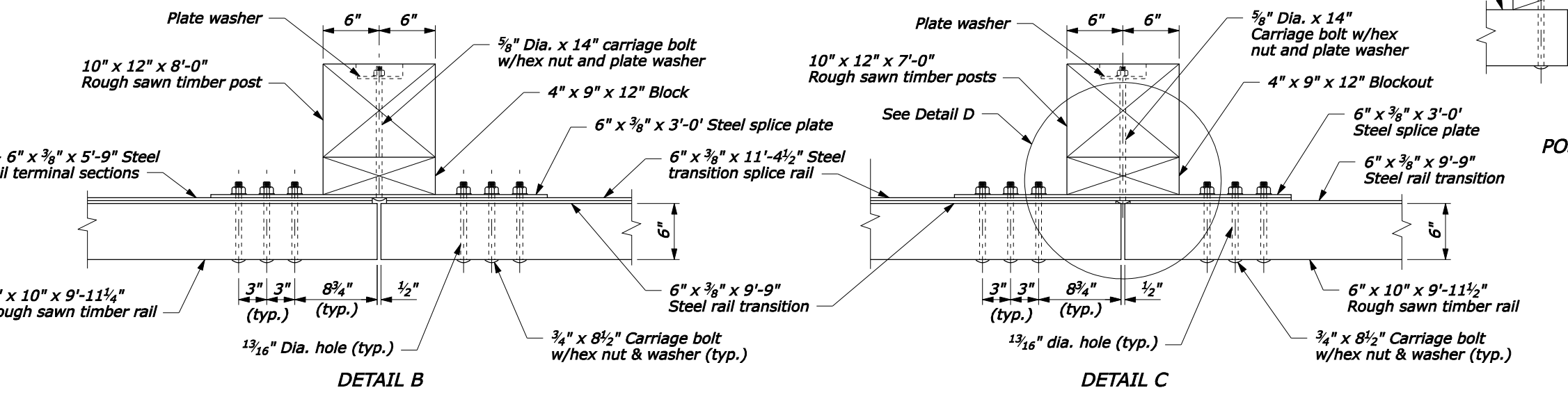
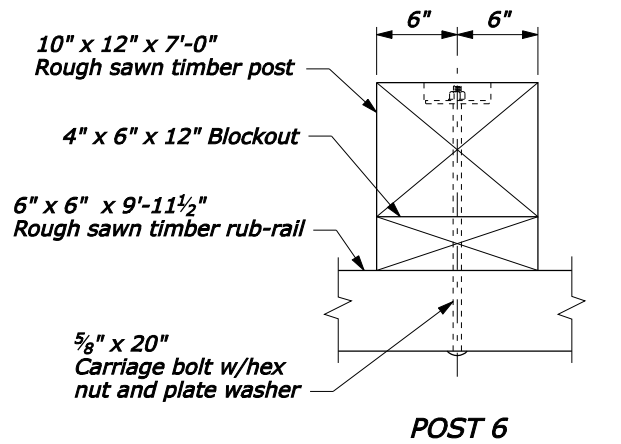
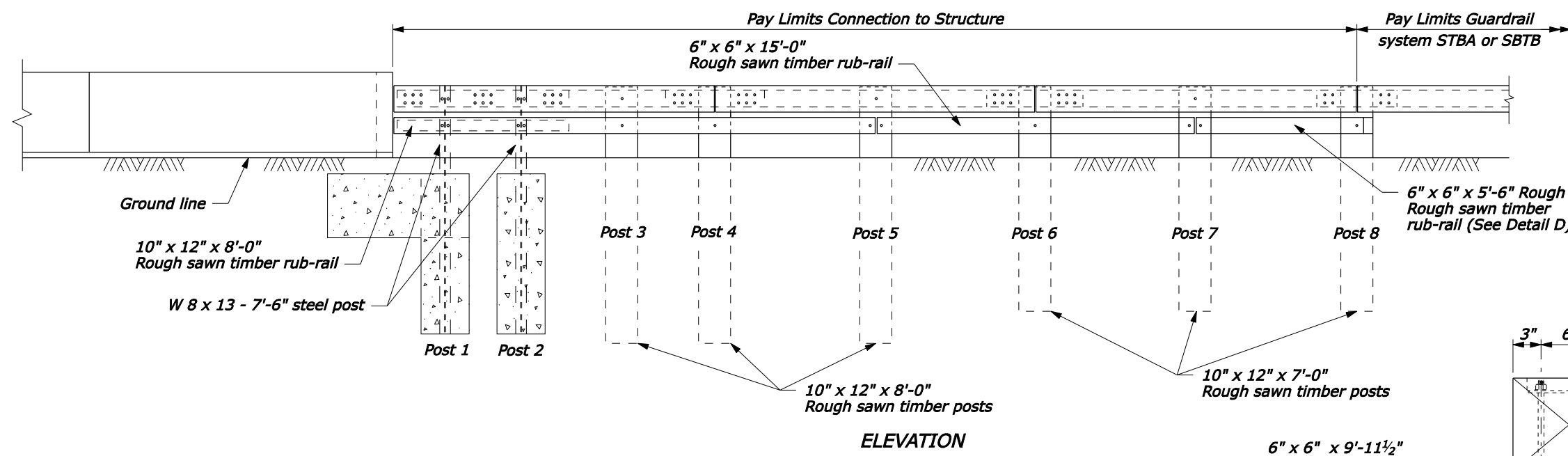
NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION FEDERAL LANDS HIGHWAY	
METRIC STANDARD STEEL-BACKED TIMBER GUARDRAIL CONNECTION TO CURVED BACK STRUCTURE Sheet 3 of 3	
STANDARD APPROVED FOR USE 3/1996	STANDARD M617-66
REVISED: DRAFT: 1/2008	

23-Jan-2008 04:11 PM
 ftp://196.145.188.2/sxd_plan/s61766.dgn [Metric]



- NOTE:**
1. See the following sheets for Sections A-A through C-C, steel rail layouts, and other details.
 2. Use weathering steel for all structural steel and fastener hardware.
 3. Transition shown for curved end structure. For transition to a straight parapet end, install the timber rail so that the face of the timber rail is offset 1 inch towards the roadway.



RUBRAIL CONNECTION PLAN

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

U.S. CUSTOMARY STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
TL-2 TRANSITION TO STRAIGHT
OR CURVED-END STRUCTURE**
Sheet 1 of 3

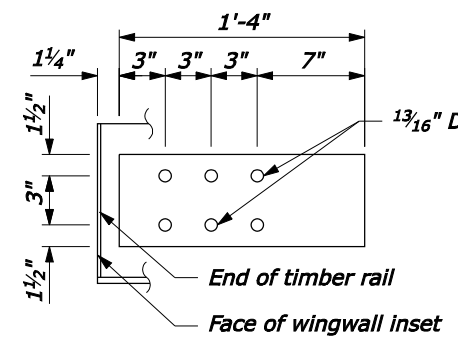
STANDARD APPROVED FOR USE --/----

REVISD:
DRAFT: 3/2008

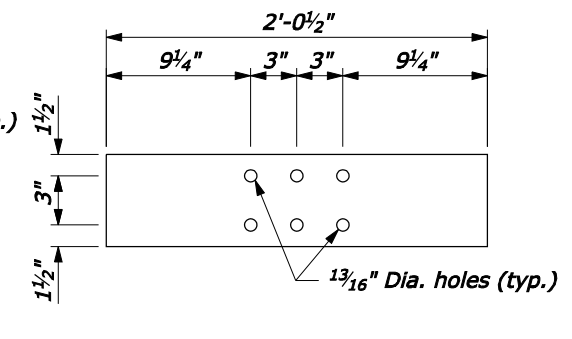
STANDARD
617-67

NO SCALE

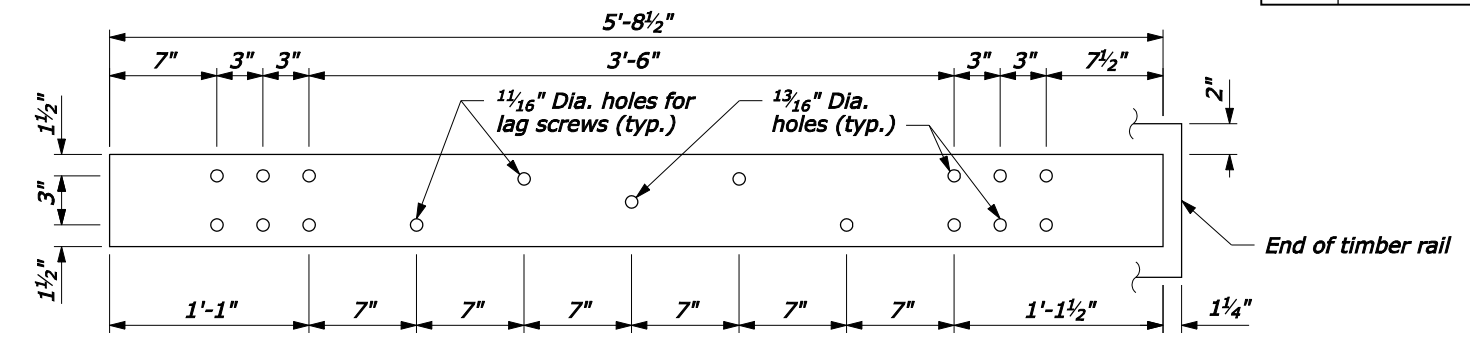
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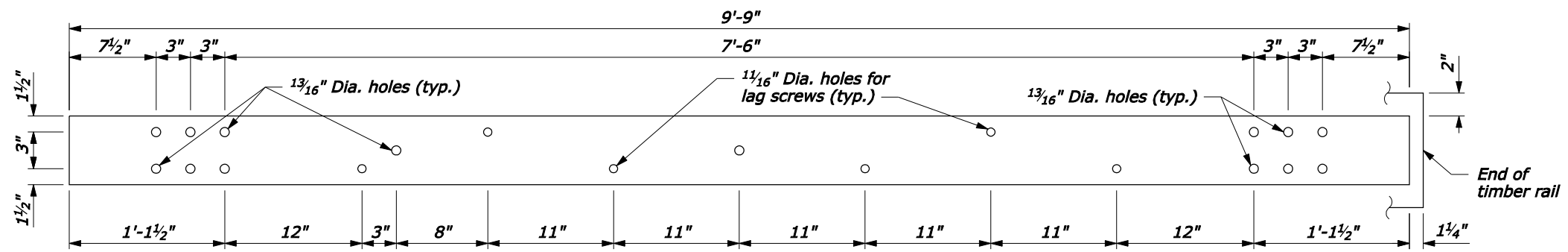
TERMINAL SECTION
6" x 3/8" x 1'-4"



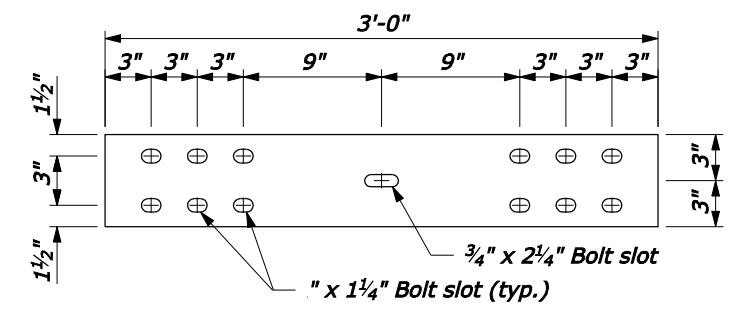
TERMINAL SECTION
6" x 3/8" x 2'-0 1/2"



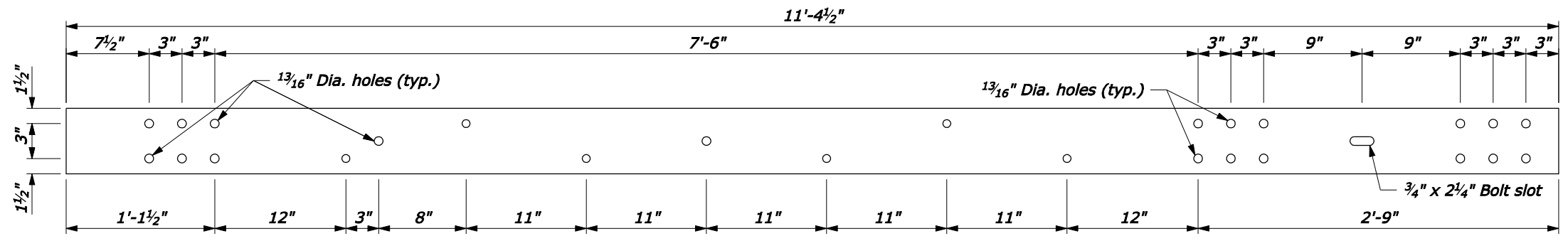
TERMINAL SECTION
6" x 3/8" x 5'-8 1/2"



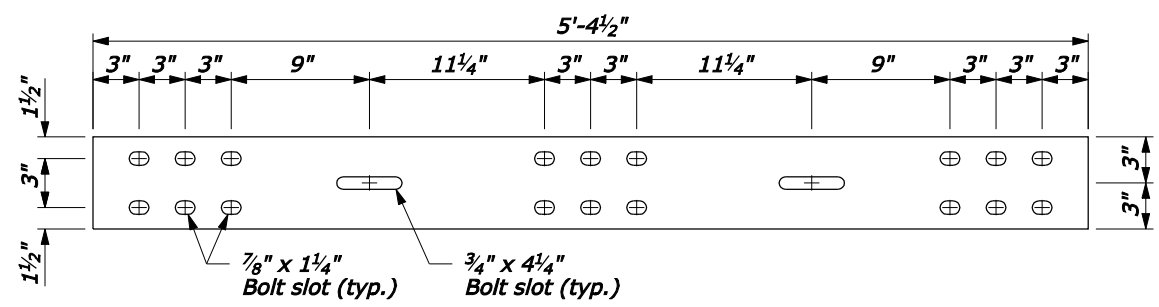
TRANSITION SECTION
6" x 3/8" x 9'-9"



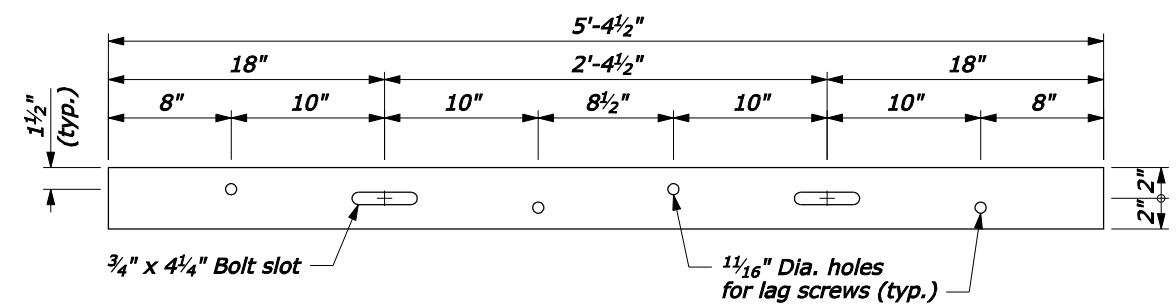
STEEL SPLICE PLATE
6" x 3/8" x 3'-0"



TRANSITION SECTION
6" x 3/8" x 11'-4 1/2"



STEEL SPLICE PLATE
6" x 3/8" x 5'-4 1/2"



RUB-RAIL TRANSITION SECTION
4" x 3/8" x 5'-4 1/2"

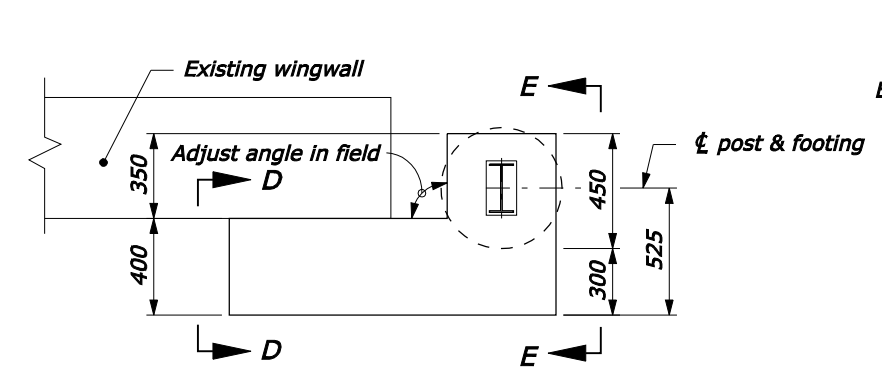
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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY

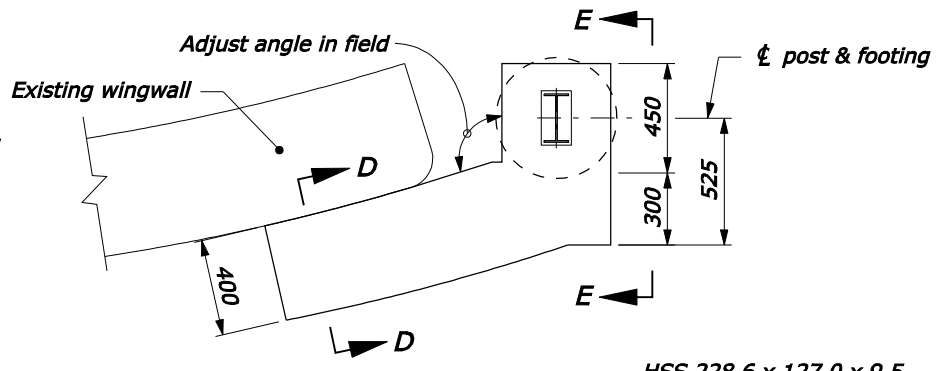
U.S. CUSTOMARY STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
TL-2 TRANSITION TO STRAIGHT
OR CURVED-END STRUCTURE**
Sheet 3 of 3

STANDARD APPROVED FOR USE --/----	STANDARD
REVISED: DRAFT: 3/2008	617-67

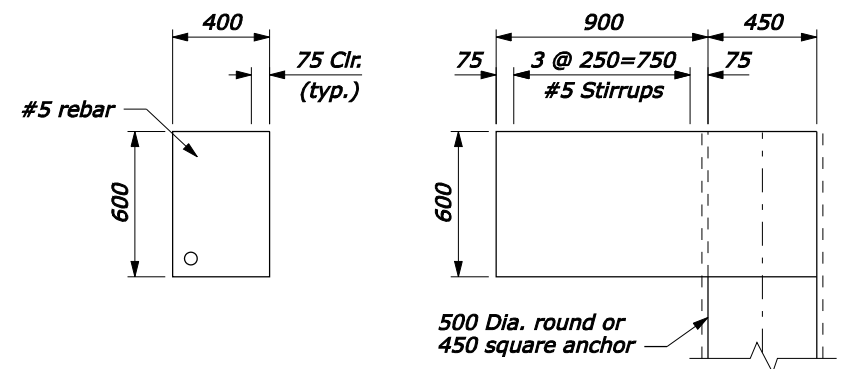
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NON-FLARED WINGWALL

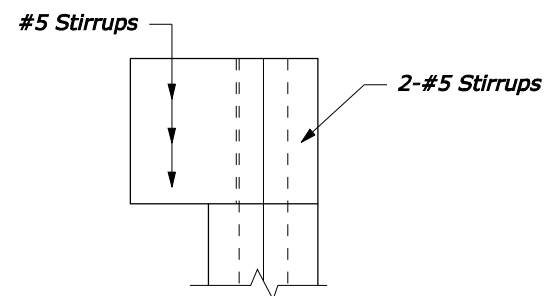


FLARED WINGWALL



SECTION D-D

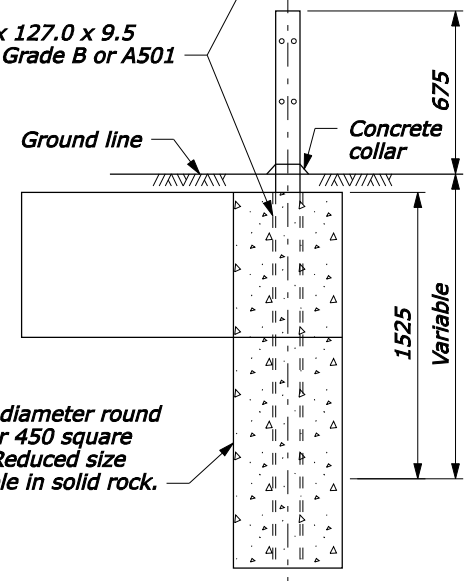
ELEVATION



SECTION E-E

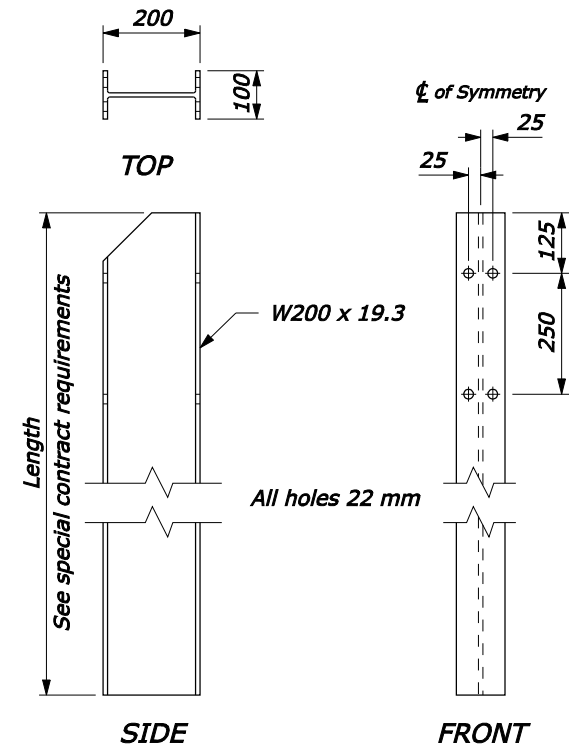
CONNECTION TO CONCRETE ANCHOR

HSS 228.6 x 127.0 x 9.5
ASTM A500 Grade B or A501

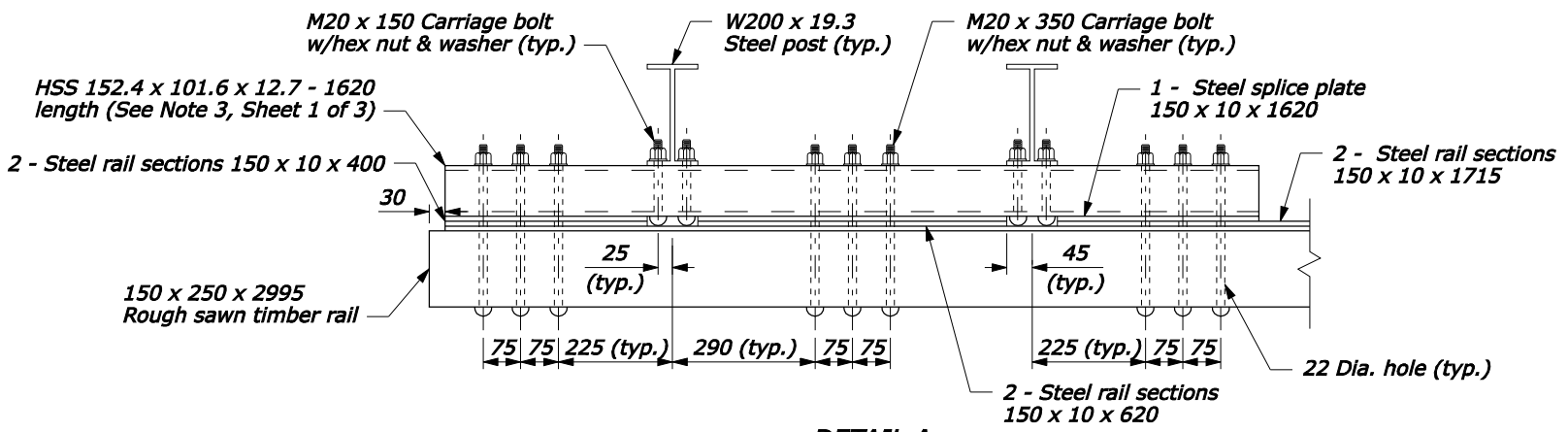


CONCRETE ANCHOR FOR GUARDRAIL POST

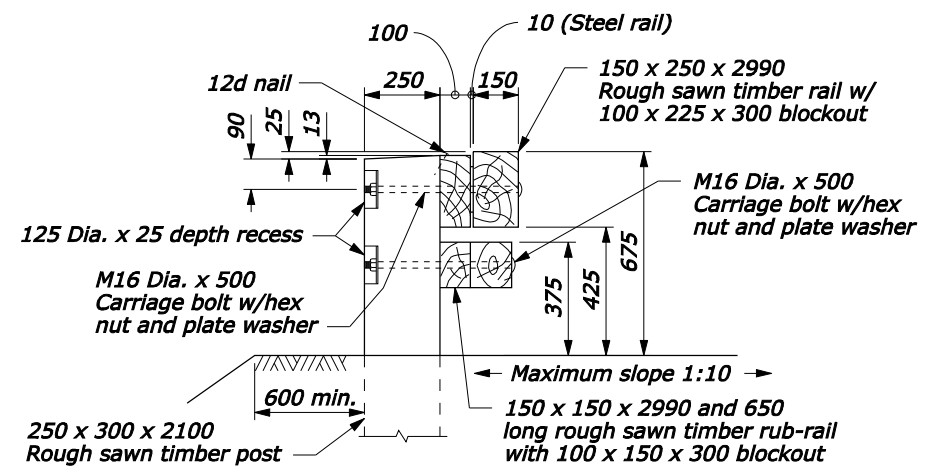
Use 500 diameter round anchor or 450 square anchor. Reduced size acceptable in solid rock.



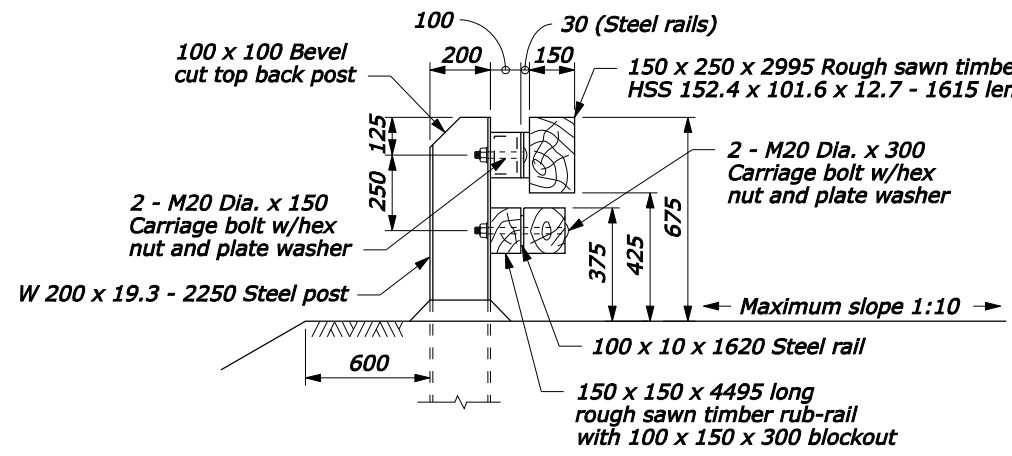
STEEL POST



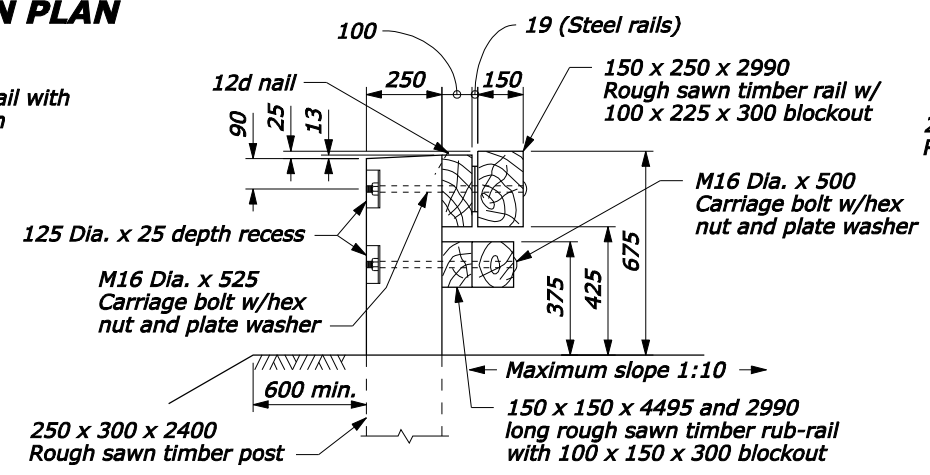
POST CONNECTION PLAN



SECTION C-C



SECTION A-A



SECTION B-B

NO SCALE

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

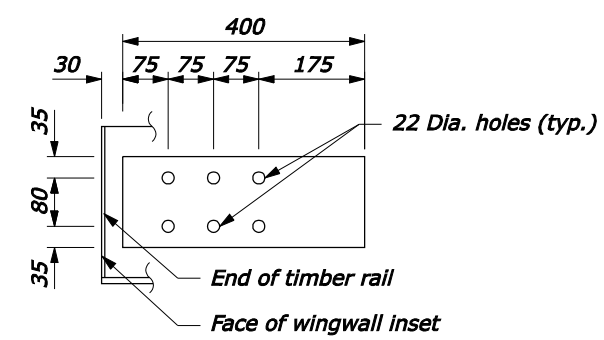
METRIC STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
TL-2 TRANSITION TO STRAIGHT
OR CURVED-END STRUCTURE**
Sheet 2 of 3

STANDARD APPROVED FOR USE --/----

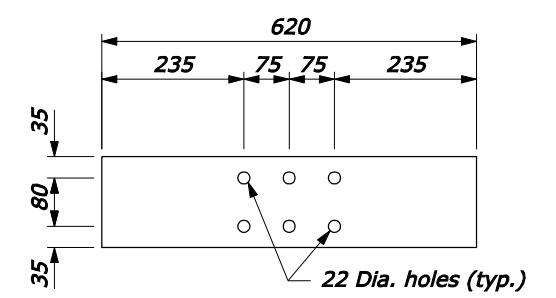
REVISID: 3/2008
DRAFT: 3/2008

STANDARD
M617-67

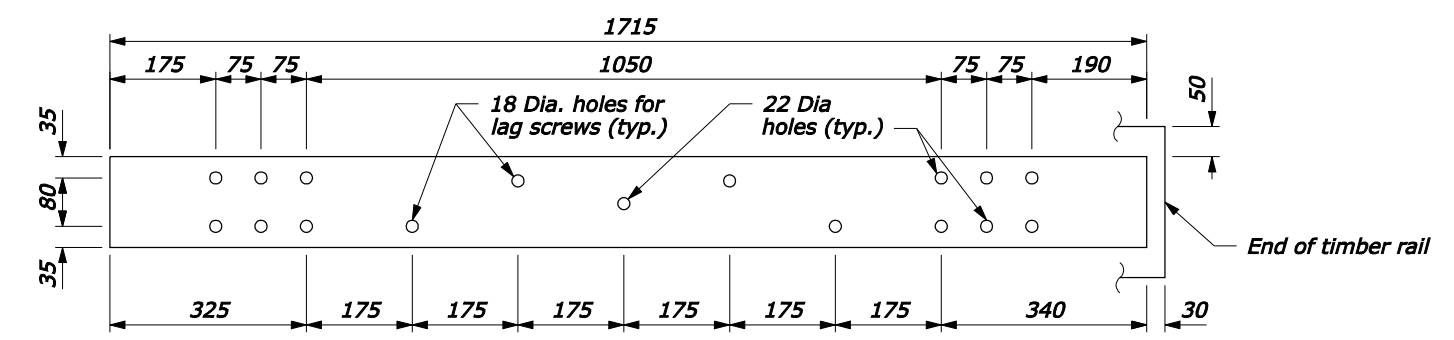
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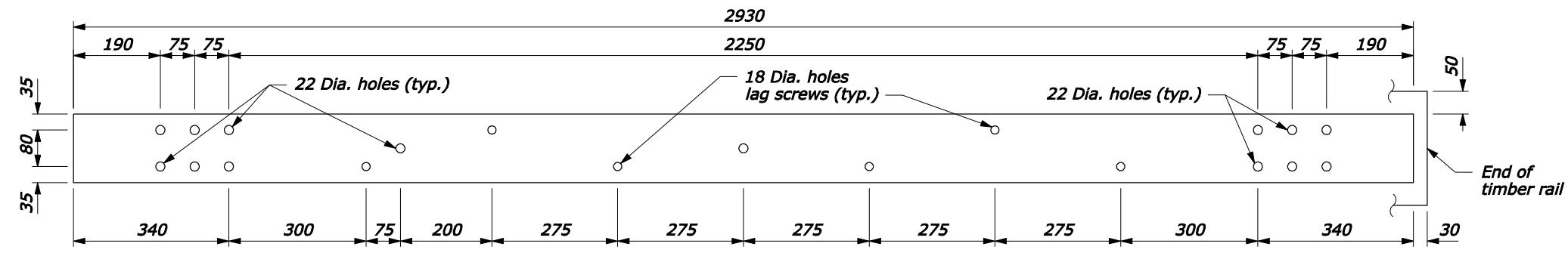
TERMINAL SECTION
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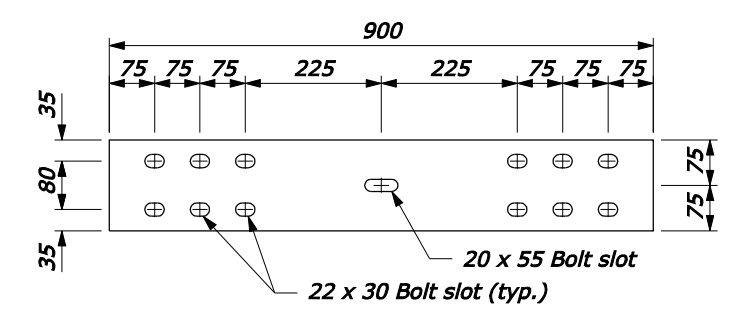
TERMINAL SECTION
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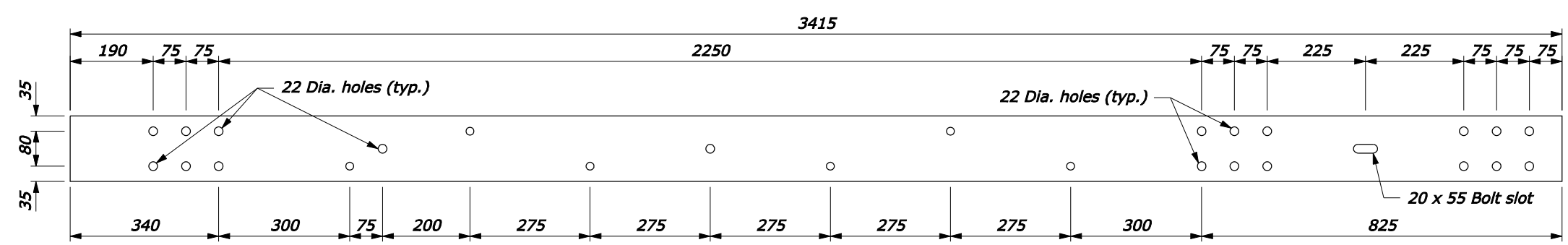
TERMINAL SECTION
150 x 10 x 1715



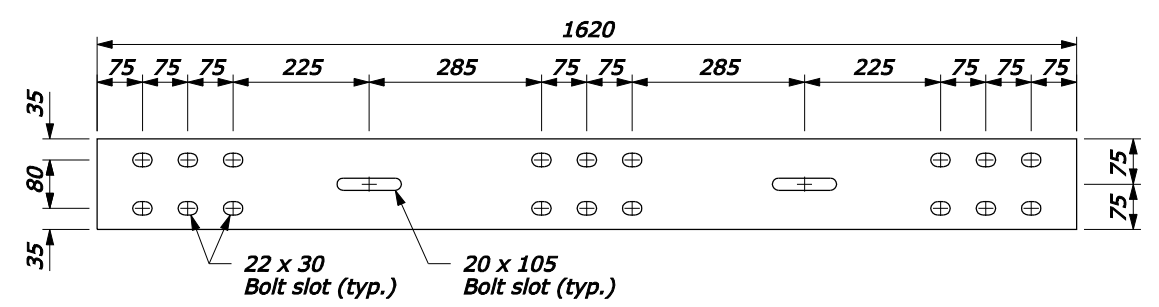
TRANSITION SECTION
150 x 10 x 2930



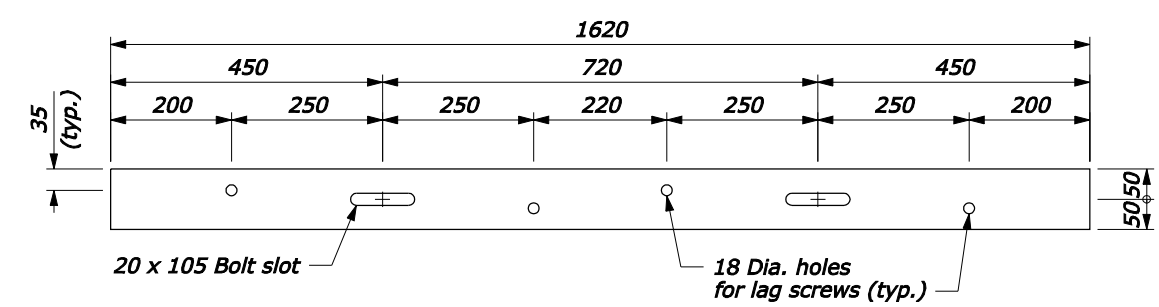
STEEL SPLICE PLATE
150 x 10 x 900



TRANSITION SECTION
150 x 10 x 3415



STEEL SPLICE PLATE
150 x 10 x 1620



RUB-RAIL TRANSITION SECTION
100 x 10 x 1620

NO SCALE

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

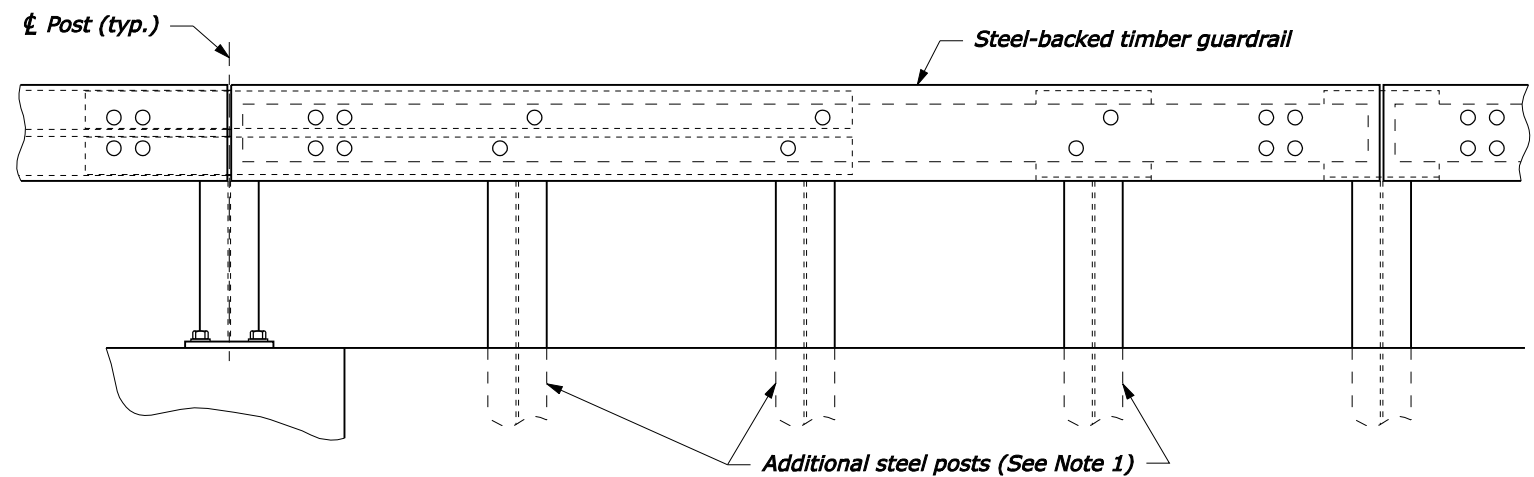
METRIC STANDARD
**STEEL-BACKED TIMBER GUARDRAIL
TL-2 TRANSITION TO STRAIGHT
OR CURVED-END STRUCTURE**
Sheet 3 of 3

STANDARD APPROVED FOR USE --/----

REVISOR: DRAFT: 3/2008

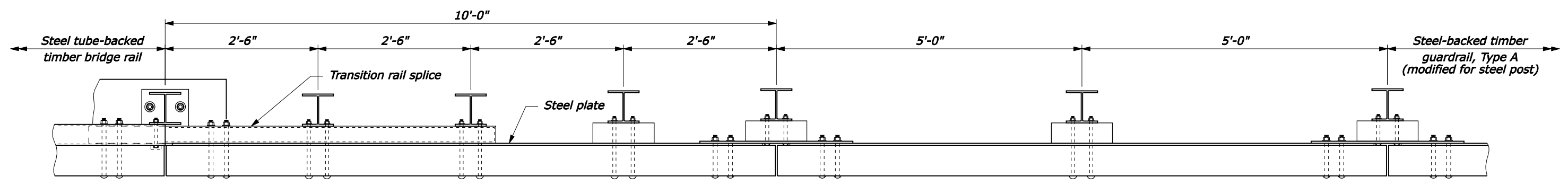
STANDARD
M617-67

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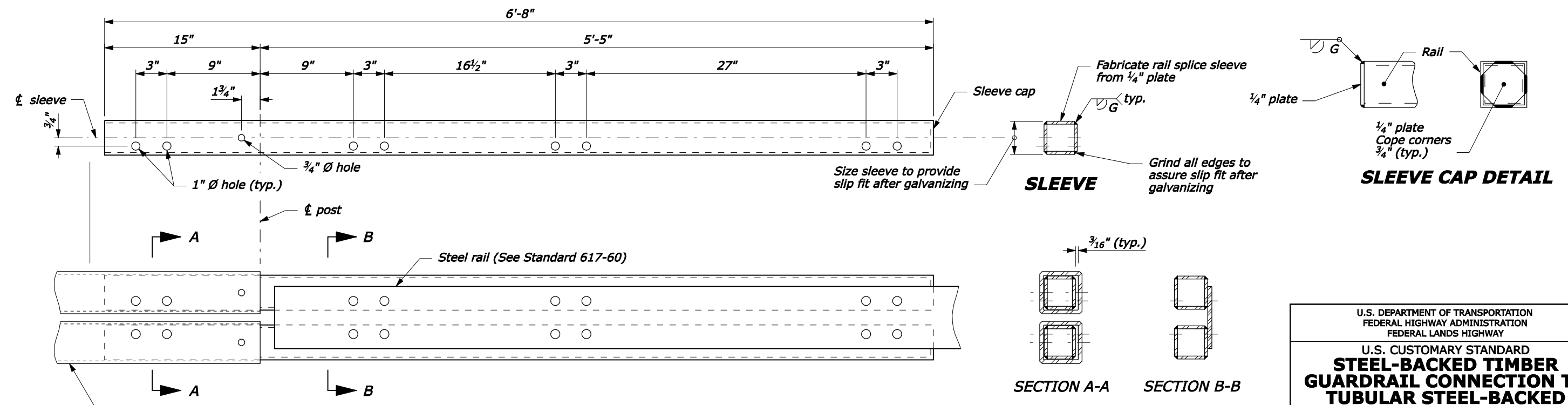


RAIL TRANSITION ELEVATION

NOTE:
 1. At each additional post provide 2 5/8" Ø round head square neck bolts with plate washer and hex nut, a 3/4" x 2 1/2" slot in steel plate, and 3/4" Ø holes in timber rail, steel post, and timber block. See Standard 617-60, Steel-backed timber guardrail, Type A (modified for steel post).



RAIL TRANSITION PLAN



TRANSITION RAIL SPLICE DETAIL

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

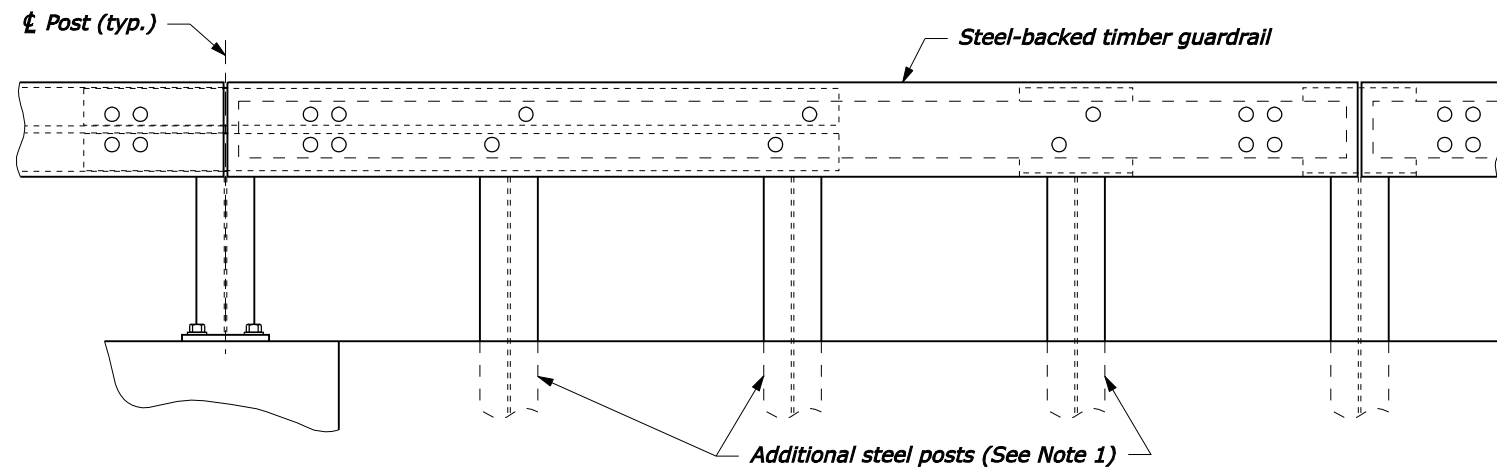
U.S. CUSTOMARY STANDARD
**STEEL-BACKED TIMBER
 GUARDRAIL CONNECTION TO
 TUBULAR STEEL-BACKED
 TIMBER BRIDGE RAIL**

STANDARD APPROVED FOR USE --/----

REVISOR: DRAFT: 12/2007

STANDARD
 617-68

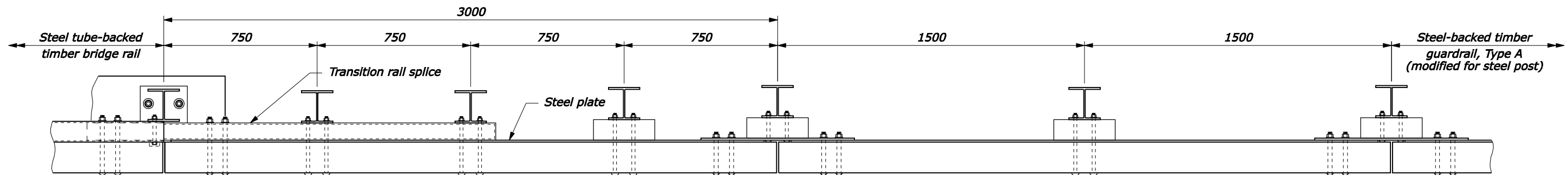
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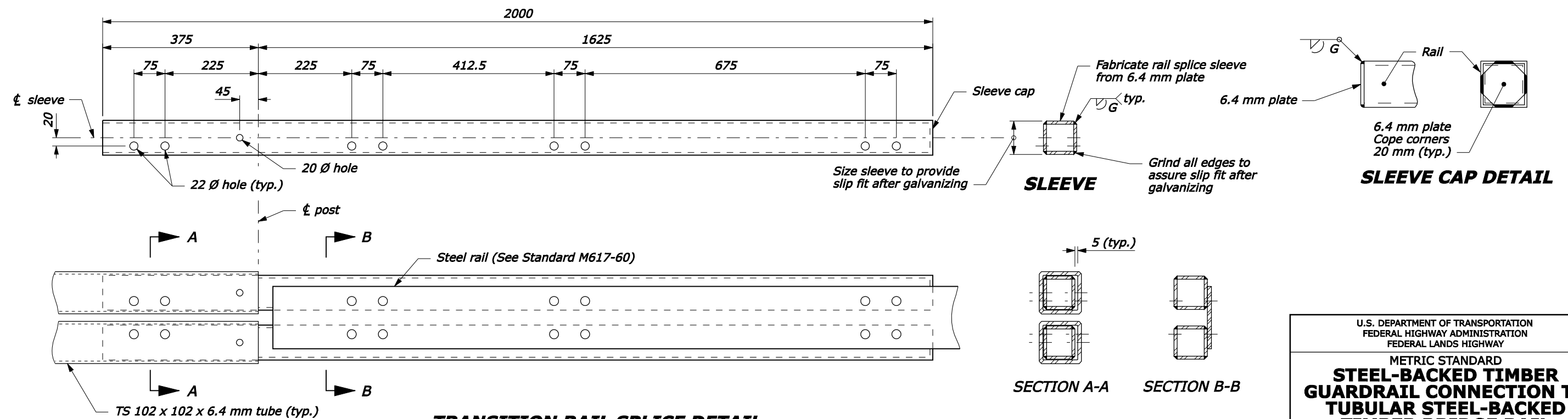
RAIL TRANSITION ELEVATION

NOTE:

1. At each additional post provide 2-M16 round head square neck bolts with plate washer and hex nut, a 20 x 60 slot in steel plate, and 18 mm Ø holes in timber rail, steel post, and timber block. See Standard M617-60, Steel-backed timber guardrail, Type A (modified for steel post).
2. Dimensions without units are millimeters.



RAIL TRANSITION PLAN



TRANSITION RAIL SPLICE DETAIL

SLEEVE

SLEEVE CAP DETAIL

SECTION A-A

SECTION B-B

NO SCALE

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

METRIC STANDARD
**STEEL-BACKED TIMBER
 GUARDRAIL CONNECTION TO
 TUBULAR STEEL-BACKED
 TIMBER BRIDGE RAIL**

STANDARD APPROVED FOR USE --/----

REVISED: DRAFT: 12/2007

STANDARD
M617-68