

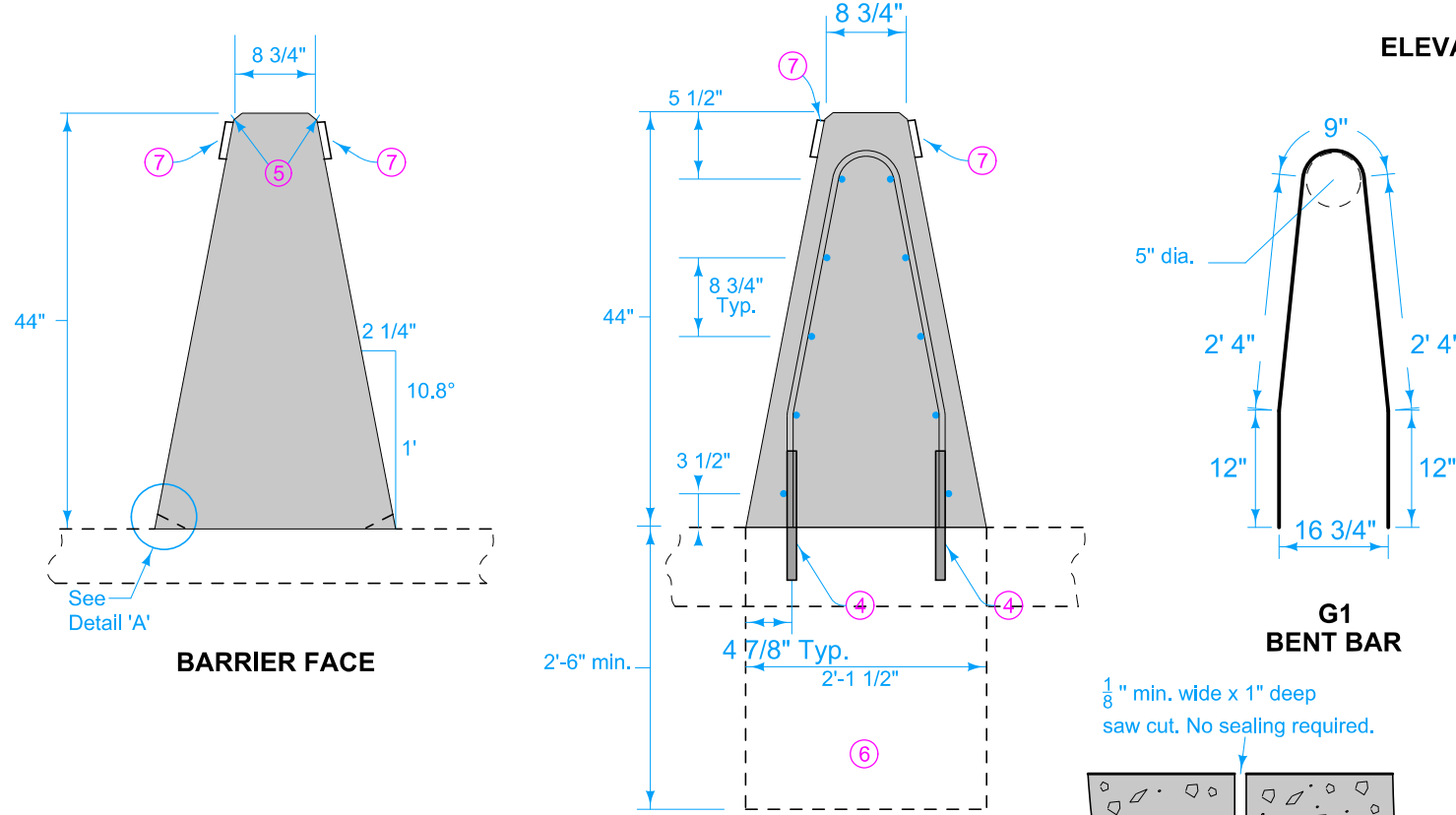
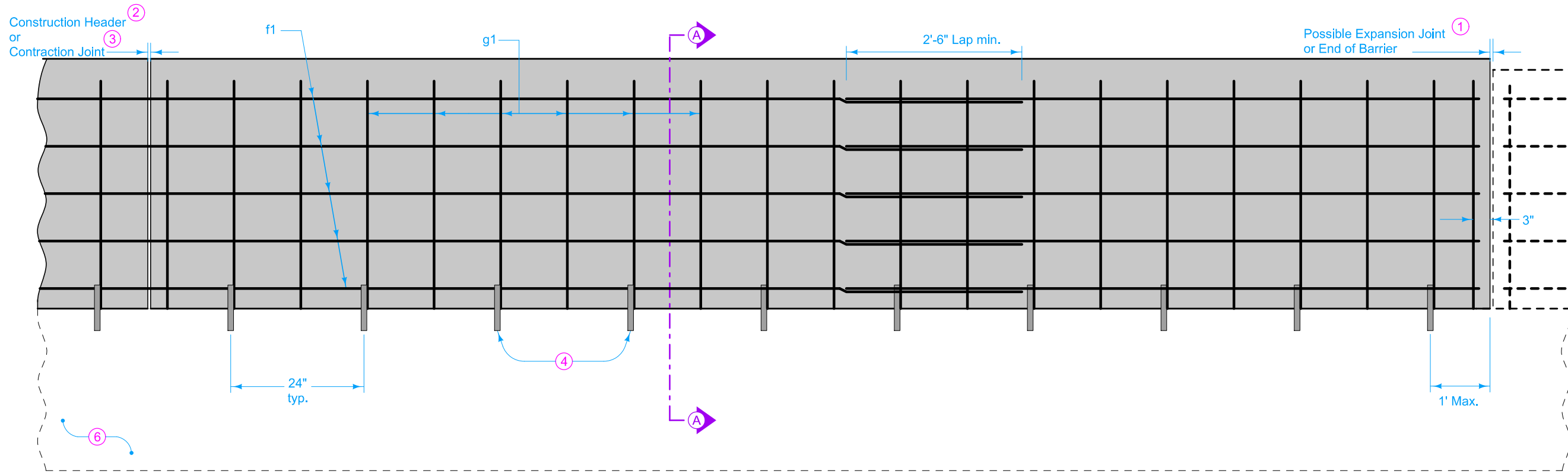
Barriers

Barriers

NO.	DATE	TITLE
Concrete Barriers		
BA-100	10-18-22	44" Concrete Median Barrier (Full Section)
BA-101	10-18-22	44" Concrete Median Barrier Width Transition
BA-102	10-18-22	44" Concrete Barrier (Half Section)
BA-103	10-18-22	34" Concrete Barrier (Half Section)
BA-104	10-18-22	34" Concrete Barrier for use with Reinforced Paved Shoulder
BA-105	10-18-22	34" to 44" Concrete Barrier Transition Section
BA-106	10-17-23	Reinforced Paved Shoulder for Concrete Barrier
BA-107	10-18-22	Concrete Barrier End Section
BA-108	10-18-22	Concrete Barrier Tapered End Section
BA-110	10-18-22	Concrete Barrier 34" Single Slope to 34" F-Shape (Half Section)
BA-111	04-18-23	Concrete Barrier 44" Single Slope to 44" F-Shape (Full Section)
BA-112	10-15-24	Concrete Barrier 44" Single Slope to 44" F-Shape (Half Section)
BA-150	10-18-22	Side Obstacle Protection with Concrete Barrier and Guardrail
Steel Beam Guardrail		
BA-200	04-20-21	Steel Beam Guardrail Components
BA-201	10-18-22	Steel Beam Guardrail Barrier Transition Section (MASH TL-3)
BA-202	10-24-24	Steel Beam Guardrail Bolted End Anchor
BA-203	10-15-19	Steel Beam Guardrail W-Beam End Anchor
BA-204	10-18-22	Steel Beam Guardrail Thrie-Beam End Anchor
BA-205	10-17-23	Steel Beam Guardrail Tangent End Terminal (MASH TL-3)
BA-206	10-19-21	Steel Beam Guardrail Flared End Terminal For Cable Connection
BA-209	10-15-24	Steel Beam Guardrail Barrier Transition Section (MASH TL-3, 34" mounting height)
BA-210	10-19-21	Guardrail Post Adaptor Unit
BA-211	10-15-24	Steel Beam Guardrail Long - Span System for Post Conflicts
BA-221	10-18-22	Steel Beam Guardrail Barrier Transition Section (MASH TL-2)
BA-225	10-17-23	Steel Beam Guardrail Tangent End Terminal (MASH TL-2)
BA-250	04-20-21	Steel Beam Guardrail Installation at Concrete Barrier or Bridge End Post (MASH TL-3)

Barriers

NO.	DATE	TITLE
BA-251	04-20-21	Steel Beam Guardrail Installation at Side Object (Two-Way Protection)
BA-252	04-20-21	Steel Beam Guardrail Installation at Side Object (One-Way Protection)
BA-253	10-18-22	Steel Beam Guardrail Installation at Railroad Signal
BA-260	04-20-21	Steel Beam Guardrail Installation at Concrete Barrier or Bridge End Post (MASH TL-2)
		Cable Guardrail
BA-351	10-19-21	High Tension Cable Guardrail
		Temporary Barrier Rails
BA-401	04-20-21	Temporary Barrier Rail (Precast Concrete)
		Crash Cushions
BA-500	04-20-21	Temporary Crash Cushions Sand Barrel



REINFORCING BAR LIST					
Per Section (Approx. 20 feet)					
Mark	Size	Number of Bars	Length	WT. (lbs.)	Max. Spacing
g1	5	20	7'-5"	155	12"
f1	5	10	19'-6"	204	—
Lap	5	10	2'-6"	3	—

- Use epoxy-coated Grade 60 reinforcing bars. Provide 2 inches minimum cover. Anchor barrier reinforcement to prevent movement. Secure each section at the front, back, and at 3 foot 6 inch minimum intervals using a method approved by the Engineer.
- Expansion joints are necessary only where specifically required by project plans. Conform expansion material to the shape of the barrier. No sealer is required.
 - Saw contraction joints as indicated. Where abutting sections are placed as separate pours, a butt joint may be used. Extend longitudinal reinforcement into the abutting section a minimum of 3 feet.
 - For barrier dowelled to pavement, match pavement joints. For free-standing barrier with integral footings, use 17 foot maximum, 15 foot minimum joint spacing.
 - Use 1 inch diameter deformed dowel bars of sufficient length to ensure 6 inch minimum embedment in barrier and supporting surface. Install dowels either in supporting surface when placed, or in drilled holes using polymer grout complying with Materials I.M. 491.11 or hydraulic cement grout complying with Materials I.M. 491.13.

- Fillet all exposed corners with a 3/4 inch dressed and beveled strip.
- Construct concrete footing when barrier is not placed on concrete slab. Apply Article 2403.03 of the Standard Specifications, but the use of forms is optional. If forms are used, place backfill around the completed footing.
- Place barrier markers at 100 foot increments in areas with non-continuous lighting, or 250 foot increments in areas with continuous lighting. Marker color to be the same as adjacent edge line.

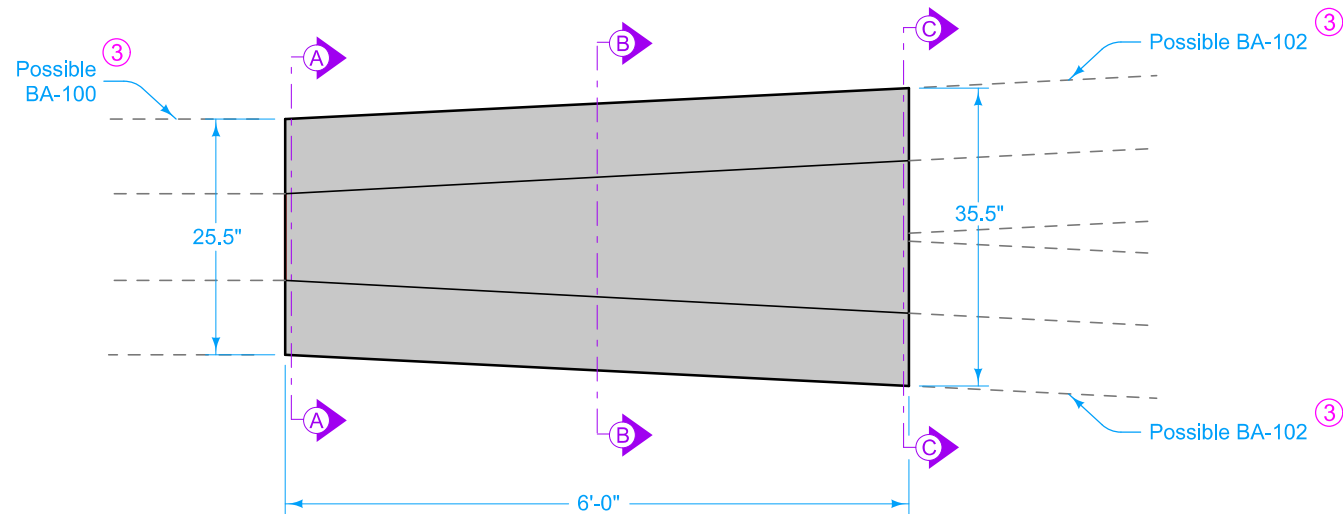
Possible Contract Item:
Concrete Barrier, BA-100 or
Concrete Barrier, BA-100 and Footing

Possible Tabulation:
108-18

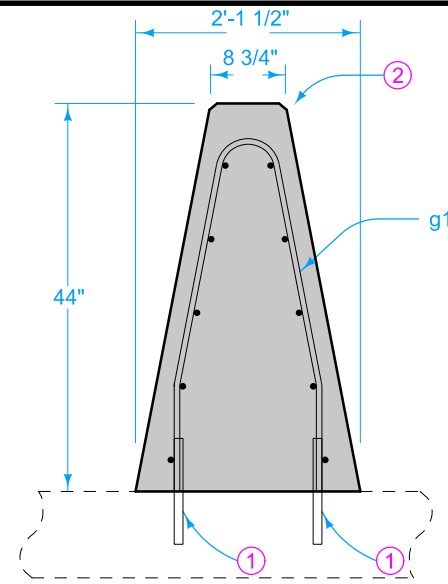
CONCRETE QUANTITIES
Per Foot
0.19 cy

	REVISION	
	4	10-18-22
STANDARD ROAD PLAN		BA-100
SHEET 1 of 1		
REVISIONS: Changed from F-shape to Texas single slope, Change reinforcing.		
 APPROVED BY DESIGN METHODS ENGINEER		
44" CONCRETE MEDIAN BARRIER (FULL SECTION)		

DETAIL 'A'
Special Shaping for Barrier over Intake



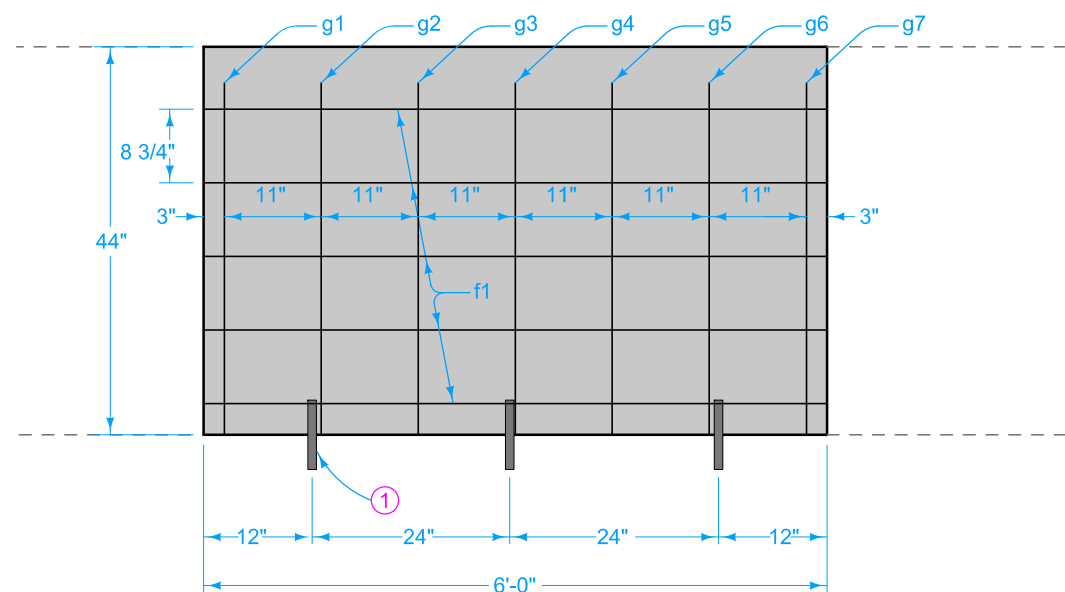
PLAN



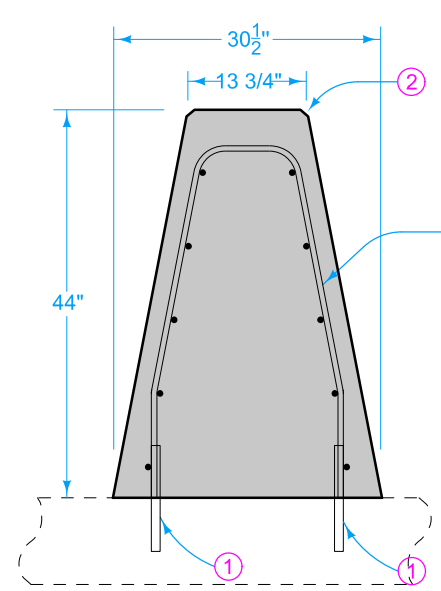
SECTION A-A

Use epoxy-coated grade 60 reinforcing bars. Provide 2 inches minimum cover. Anchor barrier reinforcement to prevent movement. Secure each section at the front, back, and at 3'-6" minimum intervals using a method approved by the Engineer.

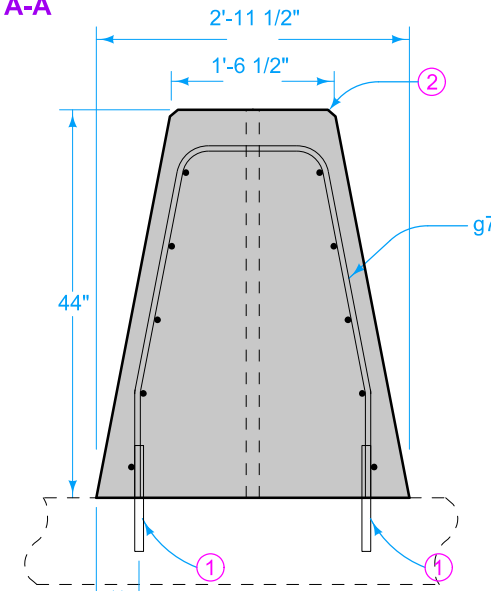
- ① Use 1 inch diameter deformed dowel bars of sufficient length to ensure 6 inch minimum embedment in barrier and supporting surface. Install bars either in supporting surface when placed or in drilled holes using polymer grout complying with Materials I.M. 491.11 or hydraulic cement grout complying with Materials I.M. 491.13.
- ② Fillet all exposed corners with a 3/4 inch dressed and beveled strip.
- ③ Provide 3 feet overlap of reinforcing steel between sections.



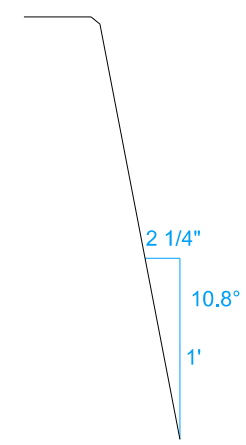
ELEVATION



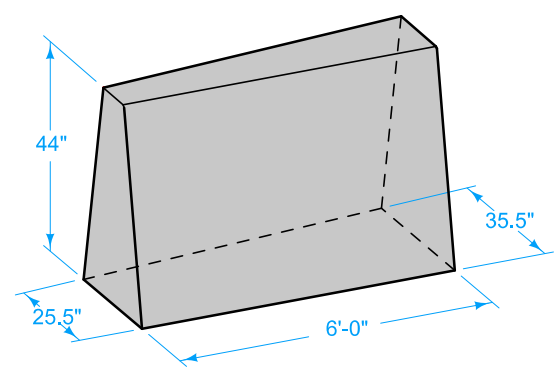
SECTION B-B



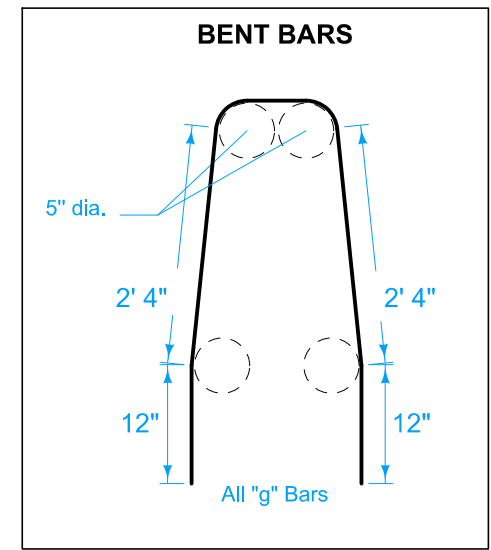
SECTION C-C



BARRIER FACE



ISOMETRIC



BENT BARS

REINFORCING BAR LIST Per Section (6'-0")				
Mark	Size	Number of Bars	Length	Weight (lbs.)
f1	5	10	5'-9"	60
g1	5	1	7'-5"	8
g2	5	1	7'-7"	8
g3	5	1	7'-8"	8
g4	5	1	7'-10"	9
g5	5	1	7'-11"	9
g6	5	1	8'-1"	9
g7	5	1	8'-3"	9

CONCRETE QUANTITIES
Per Section
1.5 cy

Possible Contract Item:
Concrete Barrier, BA-101

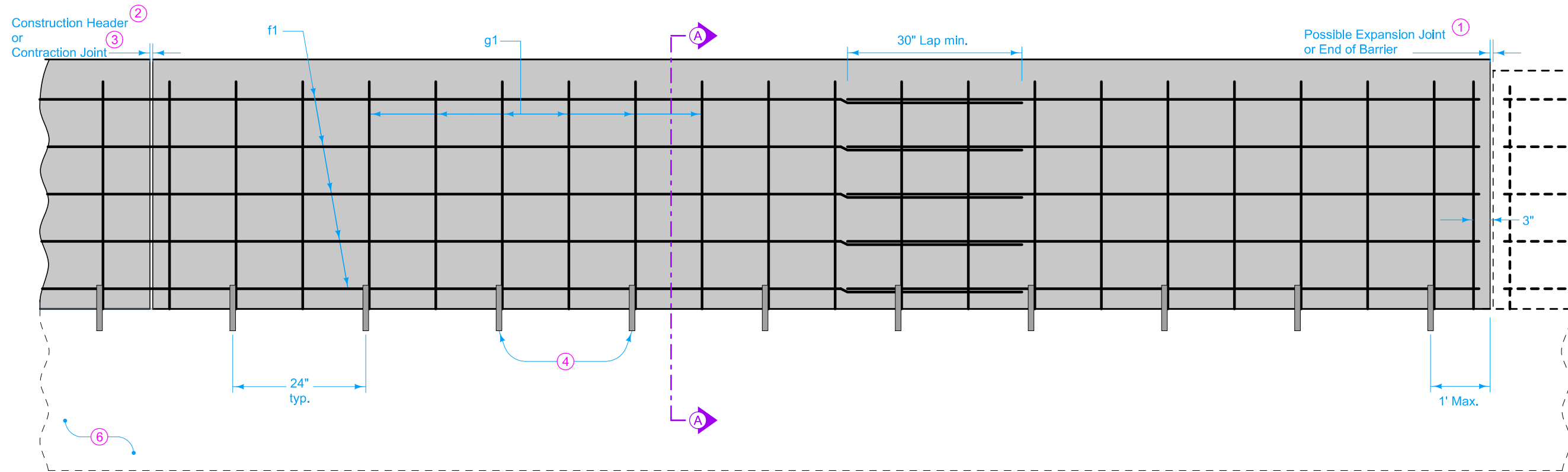
Possible Tabulation:
108-18

	REVISION	
	2	10-18-22
STANDARD ROAD PLAN		BA-101
		SHEET 1 of 1

REVISIONS: Changed from F-shape to Texas single slope, Change reinforcing.

APPROVED BY DESIGN METHODS ENGINEER

**44" CONCRETE MEDIAN BARRIER
WIDTH TRANSITION**



ELEVATION

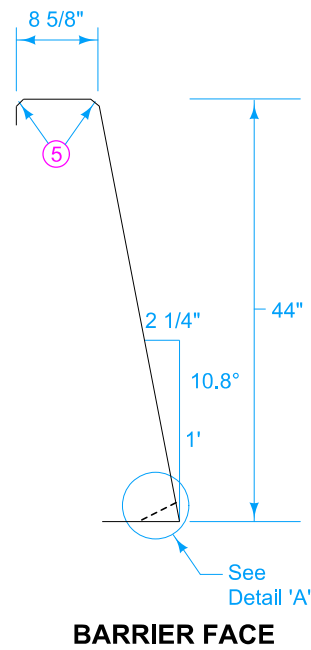
Use Grade 60 epoxy-coated reinforcing bars. Provide 2 inches minimum cover. Anchor all reinforcement to prevent movement. Secure each section at the front, back, and at 3 foot 6 inch intervals using a method approved by the Engineer.

- ① Expansion joints are necessary only where specifically required by project plans. Conform expansion material to the shape of the barrier. No sealer is required.
- ② Where abutting sections are placed as separate pours, a butt joint may be used. Extend longitudinal reinforcement into the abutting section a minimum of 3 feet.
- ③ For barrier dowelled to pavement, match pavement joints. For free-standing barrier with integral footings, use 17 foot maximum, 15 foot minimum joint spacing.
- ④ Use 1 inch diameter deformed dowel bars of sufficient length to ensure 6 inch minimum embedment in barrier and supporting surface. Install dowels either in supporting surface when placed, or in drilled holes using polymer grout complying with Materials I.M. 491.11 or hydraulic cement grout complying with Materials I.M. 491.13.

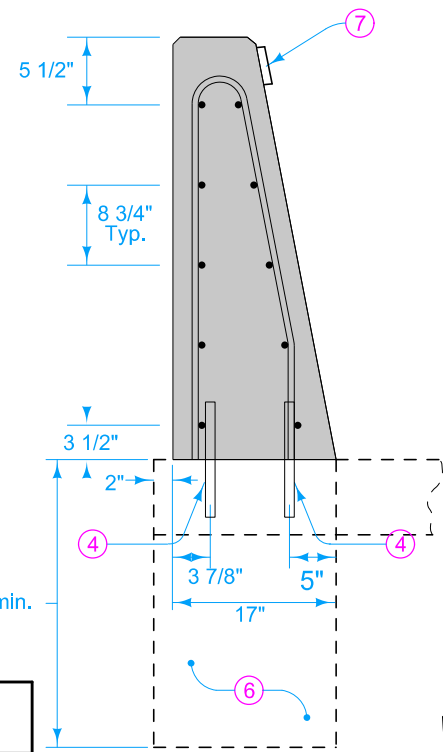
- ⑤ Fillet all exposed corners with a $\frac{3}{4}$ inch dressed and beveled strip.
- ⑥ Construct concrete footing when barrier is not placed on concrete slab. Apply Section 2403.03, but the use of forms is optional. If forms are used, place backfill around the completed footing.
- ⑦ Place barrier markers at 100 foot increments in areas with non-continuous lighting, or 250 foot increments in areas with continuous lighting. Marker color to be the same as adjacent edge line.

Possible Contract Item:
Concrete Barrier, BA-102 or
Concrete Barrier, BA-102 and Footing

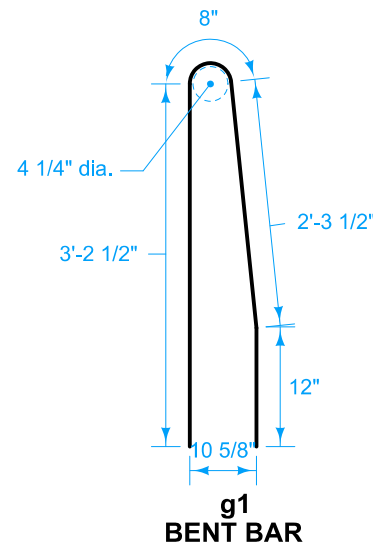
Possible Tabulation:
108-18



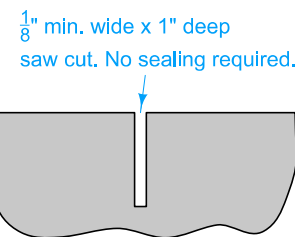
BARRIER FACE



SECTION A-A

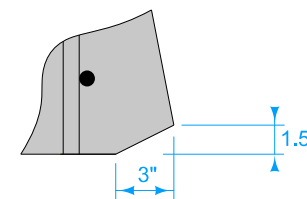


g1 BENT BAR



SAWED CONTRACTION JOINT

Saw cut top and front face. Saw cut back if exposed.



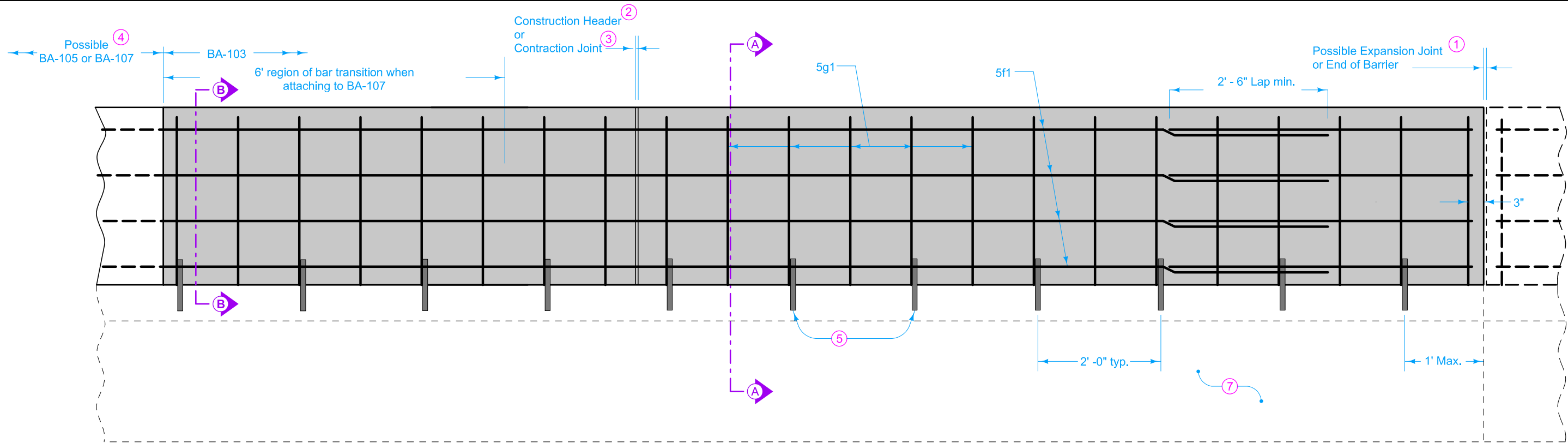
DETAIL 'A'

Special Shaping for Barrier over Intake

CONCRETE QUANTITIES
Per foot
0.14 cy

REINFORCING BAR LIST					
Per Section (Approx. 20 feet)					
Bar	Size	Number of Bars	Length	Weight (lbs.)	Spacing
g1	5	20	7' 2"	150	12"
f1	5	10	19'-6"	204	—
Lap	5	10	2'-6"	3	—

	REVISION	
	5	10-18-22
STANDARD ROAD PLAN		BA-102
		SHEET 1 of 1
REVISIONS: Changed from F-shape to Texas single slope, Change reinforcing.		
 APPROVED BY DESIGN METHODS ENGINEER		
44" CONCRETE BARRIER (HALF SECTION)		



ELEVATION

Use Grade 60 epoxy-coated reinforcing bars. Provide 2 inches minimum cover. Anchor all reinforcement to prevent movement. Secure each section at the front, back, and at 3 foot 6 inch intervals using a method approved by the Engineer.

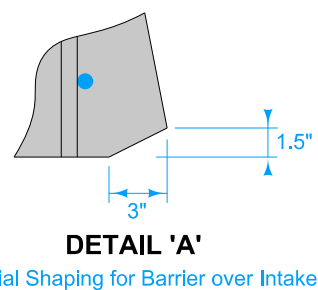
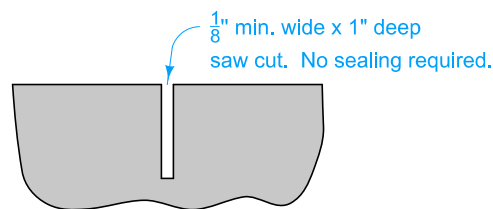
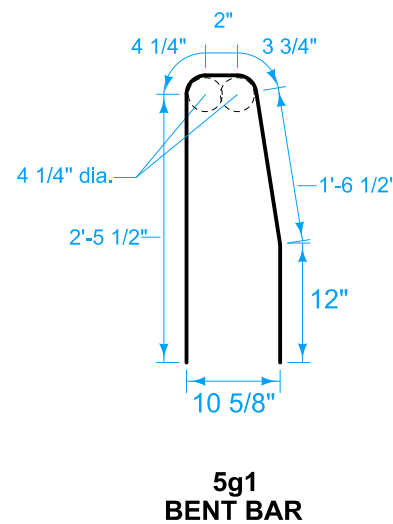
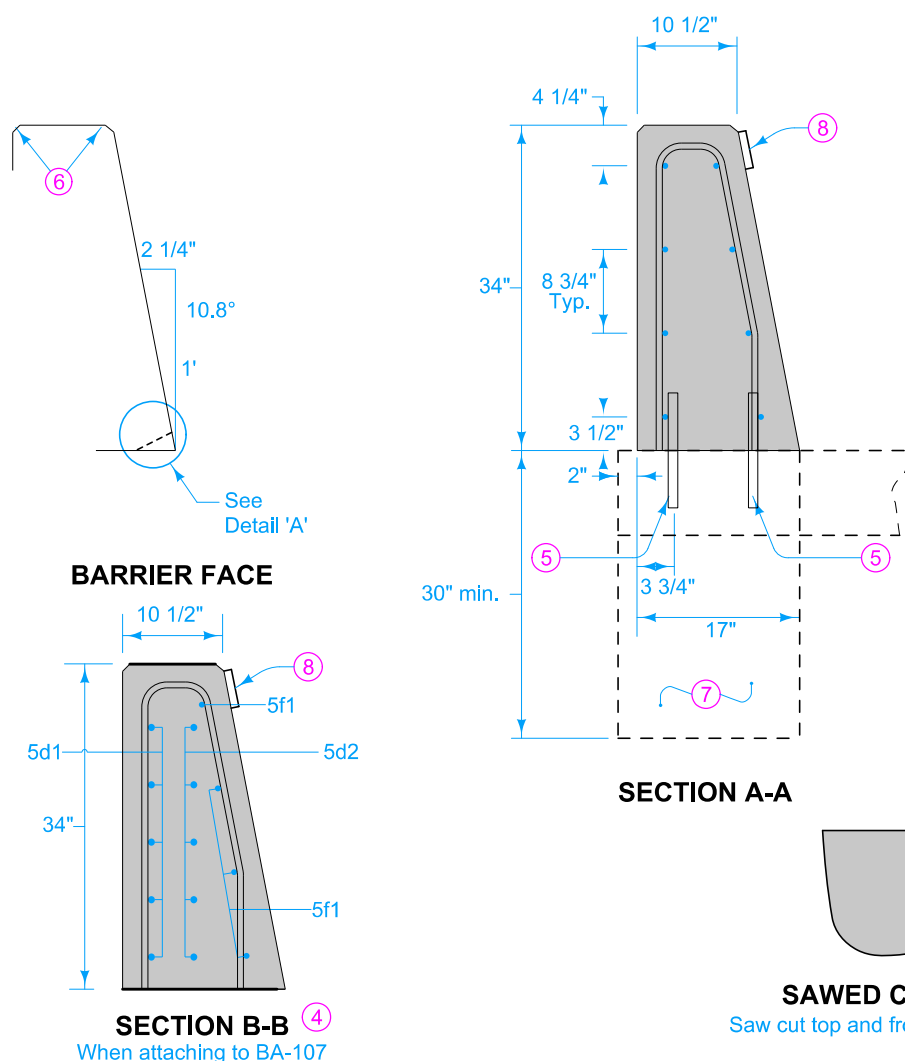
- ① Expansion joints are necessary only where specifically required by project plans. Conform expansion material to the shape of the barrier. No sealer is required.
- ② Where abutting sections are placed as separate pours, a butt joint may be used. Extend longitudinal reinforcement into the abutting section a minimum of 3 feet.
- ③ For barrier dowelled to pavement, match pavement joints. For free-standing barrier with integral footings, use 17 foot maximum, 15 foot minimum joint spacing.
- ④ When connecting to BA-107, include 6 additional #5 bars embedded a minimum of 3 feet into the BA-103 barrier.
- ⑤ Use 1 inch diameter deformed dowel bars of sufficient length to ensure 6 inch minimum embedment in barrier and supporting surface. Install dowels either in supporting surface when placed, or in drilled holes using polymer grout complying with Materials I.M. 491.11 or hydraulic cement grout complying with Materials I.M. 491.13.

- ⑥ Fillet all exposed corners with a $\frac{3}{4}$ inch dressed and beveled strip.
- ⑦ Construct concrete footing when barrier is not placed on concrete slab. Apply Article 2403.03 of the Standard Specifications, but the use of forms is optional. If forms are used, place backfill around the completed footing.
- ⑧ Place barrier markers at 100 foot increments in areas with non-continuous lighting, or 250 foot increments in areas with continuous lighting. Marker color to be the same as adjacent edge line.

CONCRETE QUANTITIES	
Per foot	
0.12 cy	

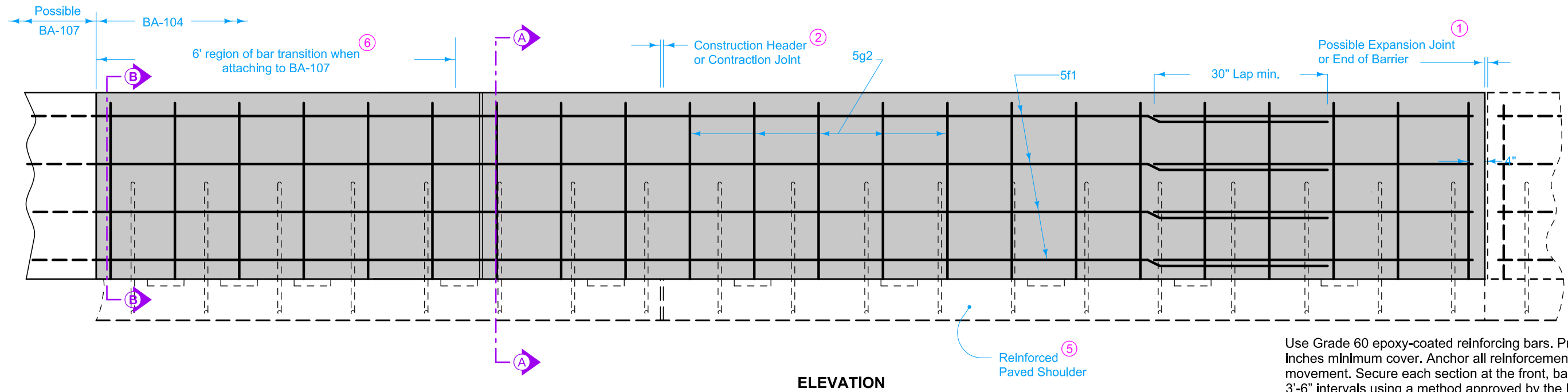
Possible Contract Item:
Concrete Barrier, BA-103 or
Concrete Barrier, BA-103 and Footing

Possible Tabulation:
108-18B



REINFORCING BAR LIST						
Per Section (Approx. 20 feet)						
Bar	Size	Number of Bars	Length	Weight (lbs.)	Spacing	
5g1	5	20	5'-10"	122	12"	
5f1	5	8	20'-0"	204	—	
Lap	5	8	2'-6"	3	—	

	REVISION	
	4	10-18-22
	BA-103	
SHEET 1 of 1		
REVISIONS: Changed from F-shape to Texas single slope, Change reinforcing.		
 APPROVED BY DESIGN METHODS ENGINEER		
34" CONCRETE BARRIER (HALF SECTION)		



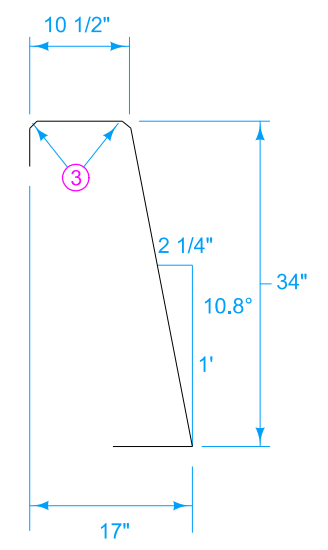
ELEVATION

Use Grade 60 epoxy-coated reinforcing bars. Provide 2 inches minimum cover. Anchor all reinforcement to prevent movement. Secure each section at the front, back, and at 3'-6" intervals using a method approved by the Engineer.

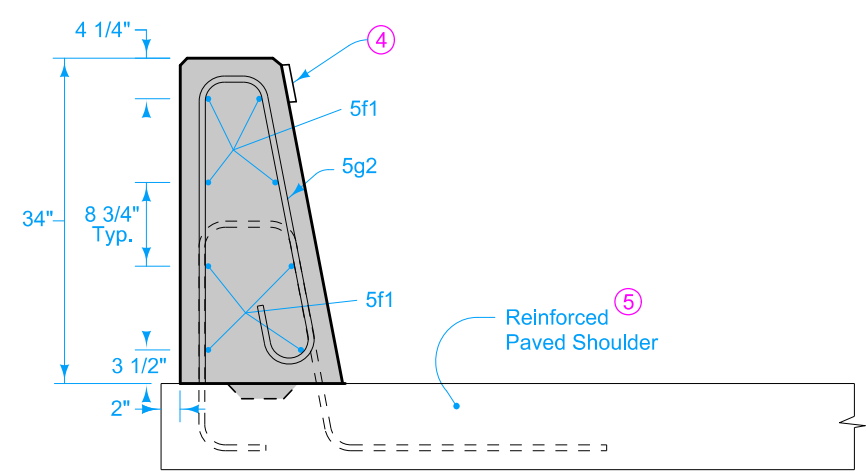
- ① Expansion joints are necessary only where specifically required by project plans. Conform expansion material to the shape of the barrier. No sealer is required.
- ② Where abutting sections are placed as separate pours, a butt joint may be used. Extend longitudinal reinforcement into the abutting section a minimum of 3 feet. Contraction joint locations shall match pavement joint locations.
- ③ Fillet all exposed corners with a $\frac{3}{4}$ inch dressed and beveled strip.
- ④ Place barrier markers at 100 foot increments in areas with non-continuous lighting, or 250 foot increments in areas with continuous lighting. Marker color to be the same as adjacent edge line.
- ⑤ Refer to **BA-106** for details of 5g2 bars, 5g3 bars, and reinforced paved shoulder.
- ⑥ When connecting to BA-107, include 6 additional #5 bars embedded a minimum of 3 feet into the BA-104 barrier.

Possible Contract Item:
Concrete Barrier, BA-104

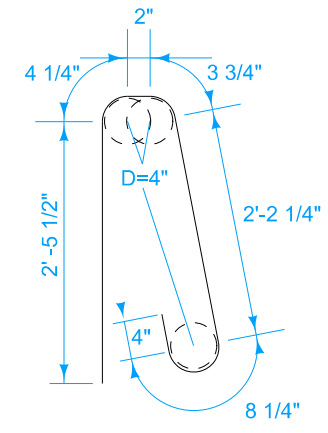
Possible Tabulation:
108-18B



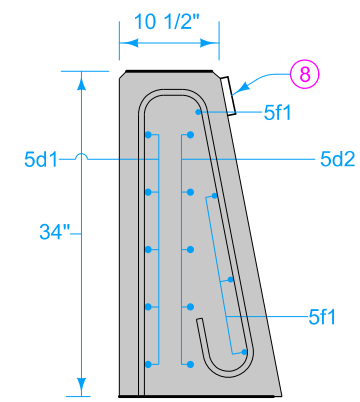
BARRIER FACE



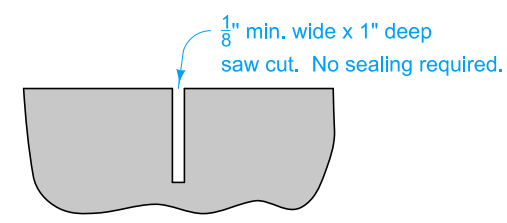
SECTION A-A



5g2 BENT BAR



SECTION B-B ⑥
When attaching to BA-107

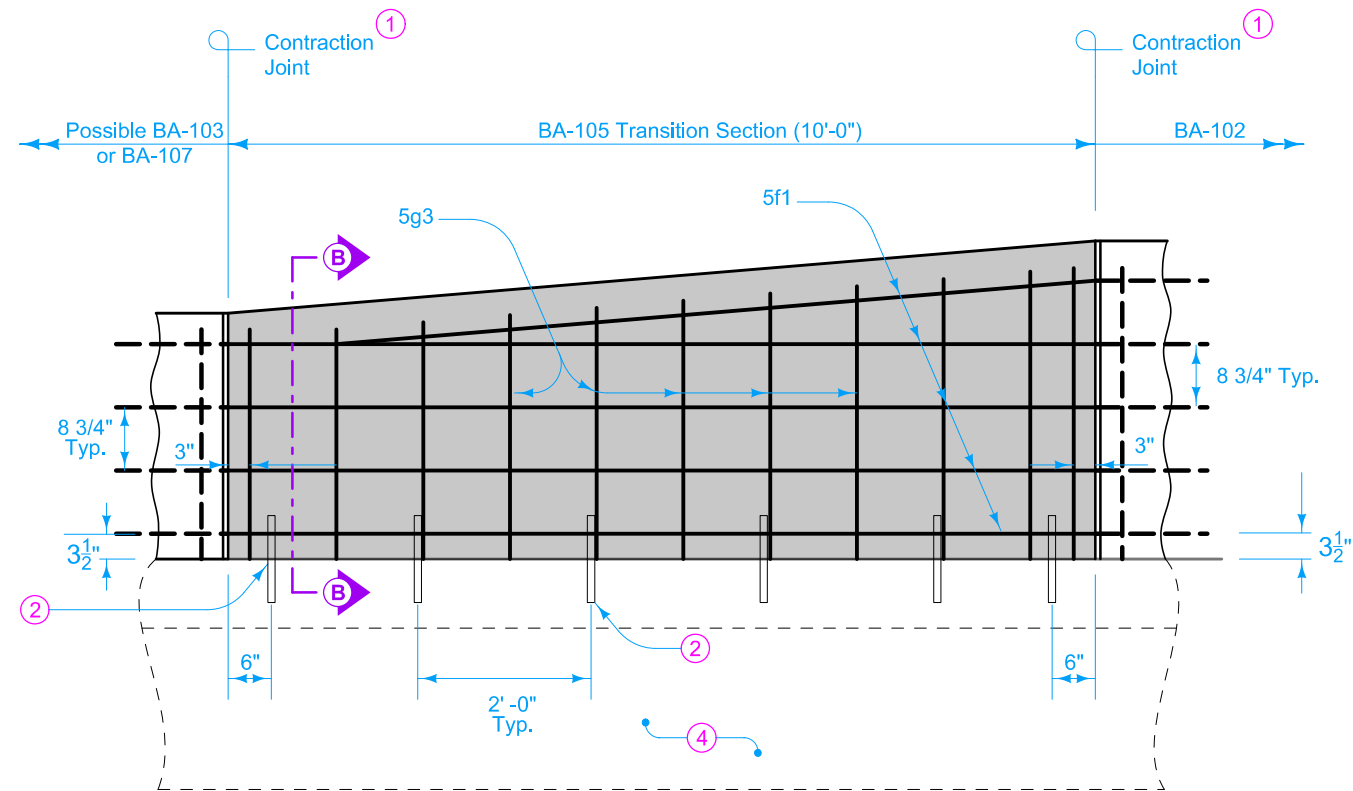


SAWED CONTRACTION JOINT
Saw cut top and front face. Saw cut back if exposed.

CONCRETE QUANTITIES
Per foot
0.12 cy

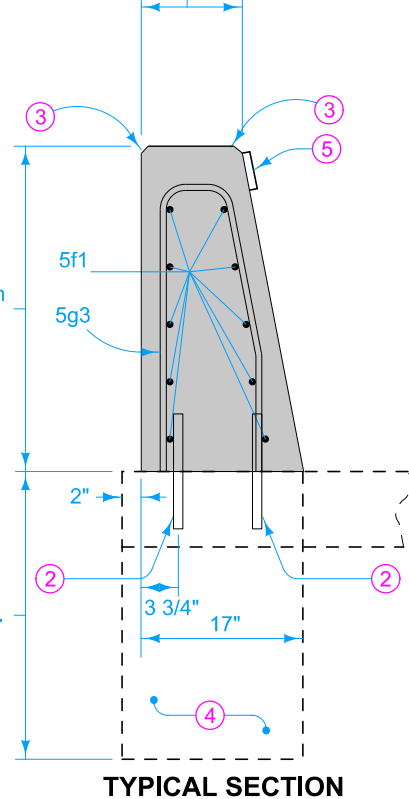
REINFORCING BAR LIST Per Section (Approx. 20 feet)					
Bar	Size	Number of Bars	Length	Weight (lbs.)	Spacing
5g2	5	20	6'-6"	122	12"
5f1	5	8	20'	204	—
Lap	5	8	2'-6"	3	—

	REVISION	
	2	10-18-22
STANDARD ROAD PLAN		BA-104
REVISIONS: Changed from F-shape to Texas single slope, Change reinforcing.		SHEET 1 of 1
 APPROVED BY DESIGN METHODS ENGINEER		
34" CONCRETE BARRIER FOR USE WITH REINFORCED PAVED SHOULDER		



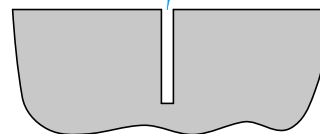
ELEVATION

Varies from 8 1/2" to 10 1/2"



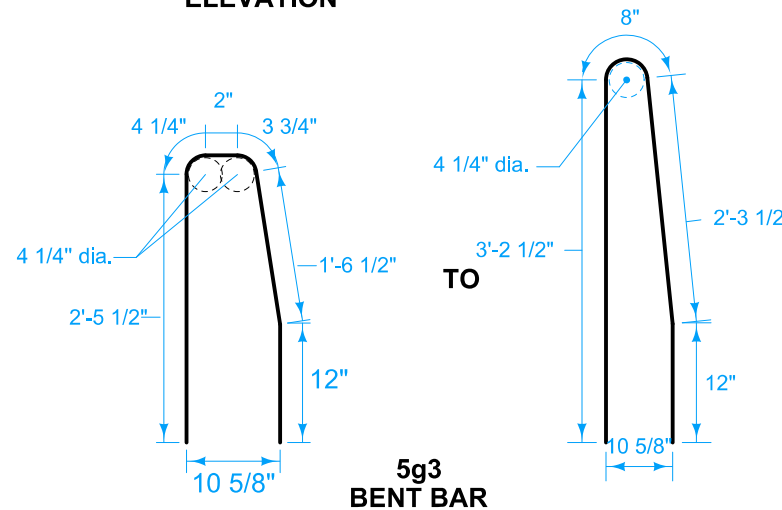
TYPICAL SECTION

1/8" min. wide x 1" deep saw cut. No sealing required.

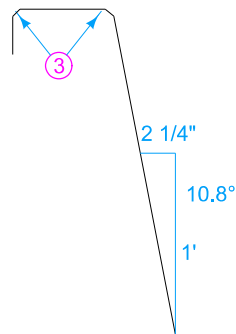
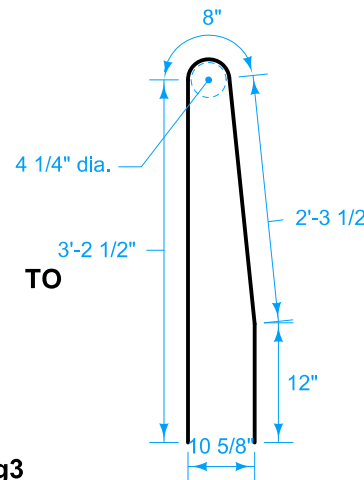


SAWED CONTRACTION JOINT

Saw cut top and front face. Saw cut back if exposed.



5g3 BENT BAR



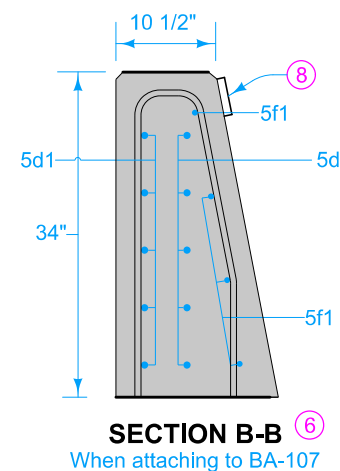
BARRIER FACE

CONCRETE QUANTITIES for one Transition Section
1.3 cy

REINFORCING BAR LIST for one Transition Section

Bar	Size	Number of Bars	Length	Weight (lbs.)	Spacing
5g3	5	11	*	122	12"
5f1	5	10	10'-0"	104	—

* Varies from 5'-10" to 7'-2"



SECTION B-B
When attaching to BA-107

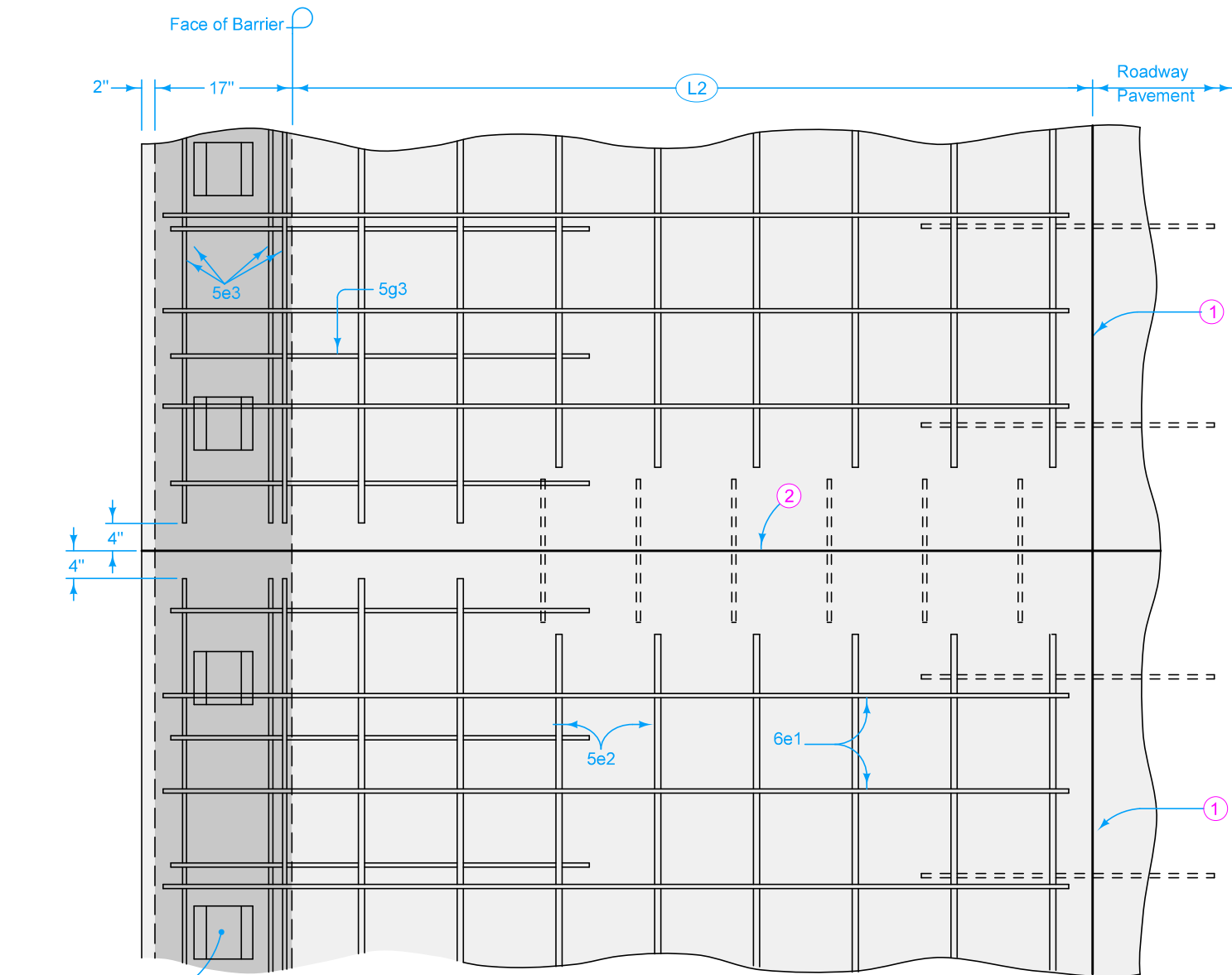
Use Grade 60 epoxy-coated reinforcing bars. Provide 2 inches minimum cover. Anchor all reinforcement to prevent movement. Secure each section at the front, back, and at 3'-6" intervals using a method approved by the Engineer.

- Where abutting sections are placed as separate pours, a butt joint may be used. Extend longitudinal reinforcement into the abutting section a minimum of 3 feet.
- Use 1 inch diameter deformed dowel bars of sufficient length to ensure 6 inch minimum embedment in barrier and supporting surface. Install dowels either in supporting surface when placed, or in drilled holes using polymer grout complying with Materials I.M. 491.11 or hydraulic cement grout complying with Materials I.M. 491.13.
- Fillet all exposed corners with a 3/4 inch dressed and beveled strip.
- Construct concrete footing when barrier is not placed on concrete slab. Apply Article 2403.03 of the Standard Specifications, but the use of forms is optional. If forms are used, place backfill around the completed footing.
- Place barrier markers at 100 foot increments in areas with non-continuous lighting, or 250 foot increments in areas with continuous lighting. Marker color to be the same as adjacent edge line.
- When connecting to BA-107, include 6 additional #5 bars embedded a minimum of 3 feet into the BA-105 barrier. Evenly transition rebar over length of transition section.

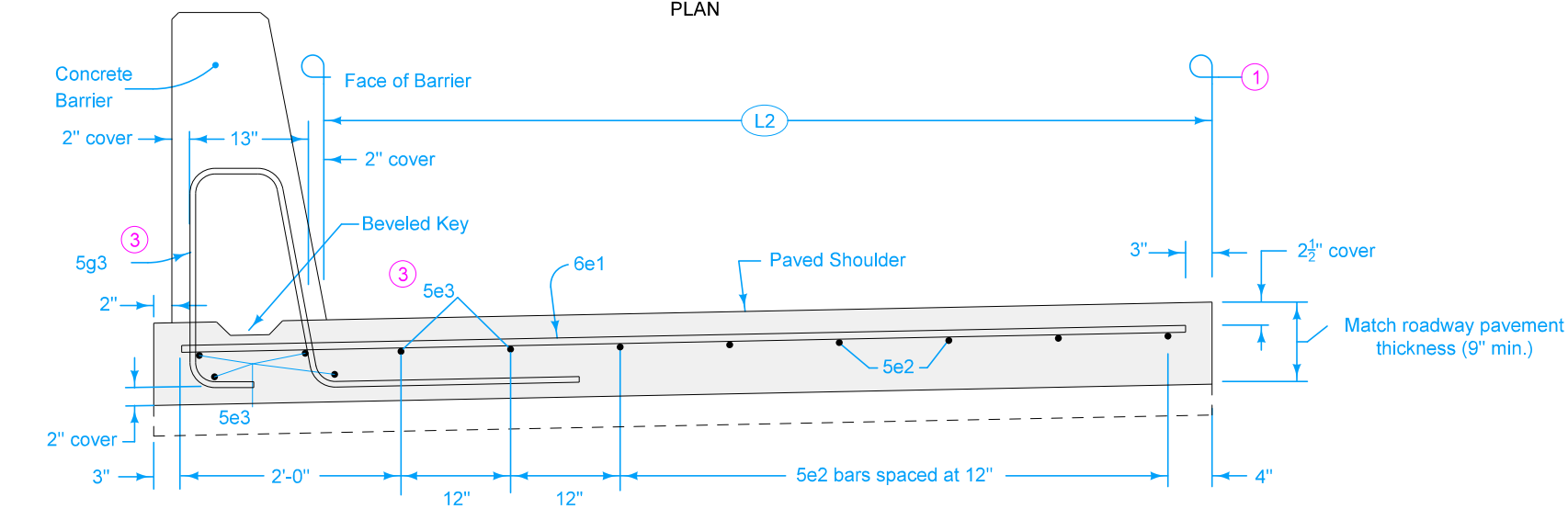
Possible Contract Item:
Concrete Barrier, BA-105 or
Concrete Barrier, BA-105 and Footing

Possible Tabulation:
108-18B

	REVISION	
	2	10-18-22
STANDARD ROAD PLAN		BA-105
		SHEET 1 of 1
REVISIONS: Changed from F-shape to Texas single slope, Change reinforcing.		
 APPROVED BY DESIGN METHODS ENGINEER		
34" TO 44" CONCRETE BARRIER TRANSITION SECTION		

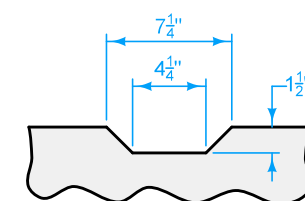
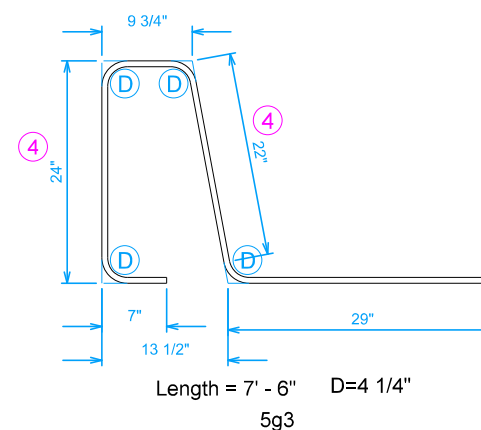


PLAN



TYPICAL SECTION

REINFORCING BAR LIST				
Per Shoulder Panel (Approximately 17 Linear Feet)				
(L2)	Bar	Number of Bars	Length	Spacing
4'	6e1	15	5'-1"	12"
	5e2	4	15'-0"	12"
6'	6e1	15	7'-1"	12"
	5e2	6	15'-0"	12"
8'	6e1	15	9'-1"	12"
	5e2	8	15'-0"	12"
10'	6e1	15	11'-1"	12"
	5e2	10	15'-0"	12"
12'	6e1	15	13'-1"	12"
	5e2	12	15'-0"	12"
Applies to all Shoulder Widths	5e3	4	16'-4"	See Drawing
	5g3	varies	varies	(5)



BEVELED KEY

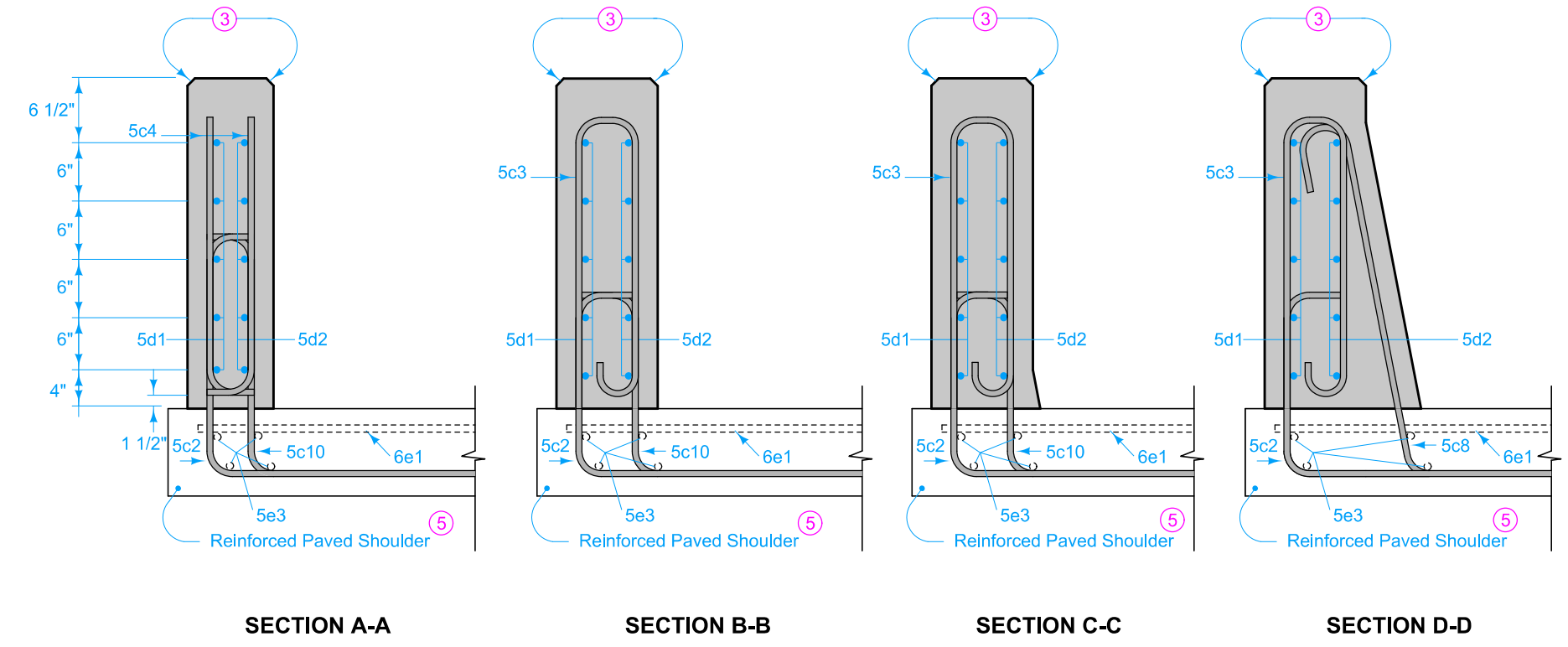
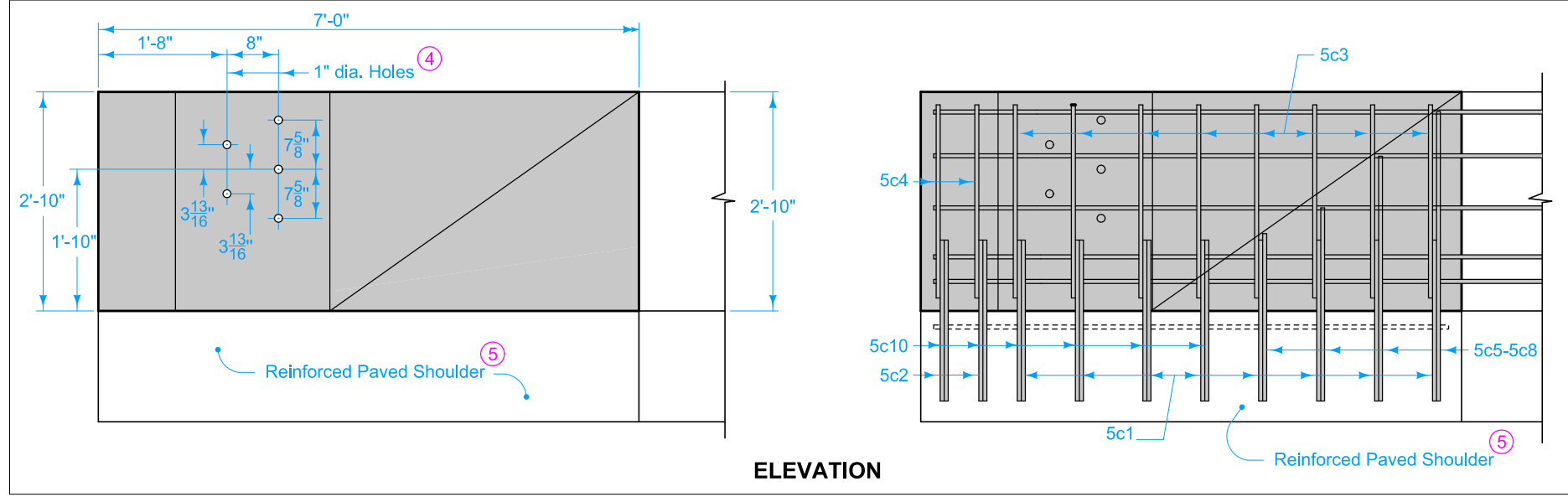
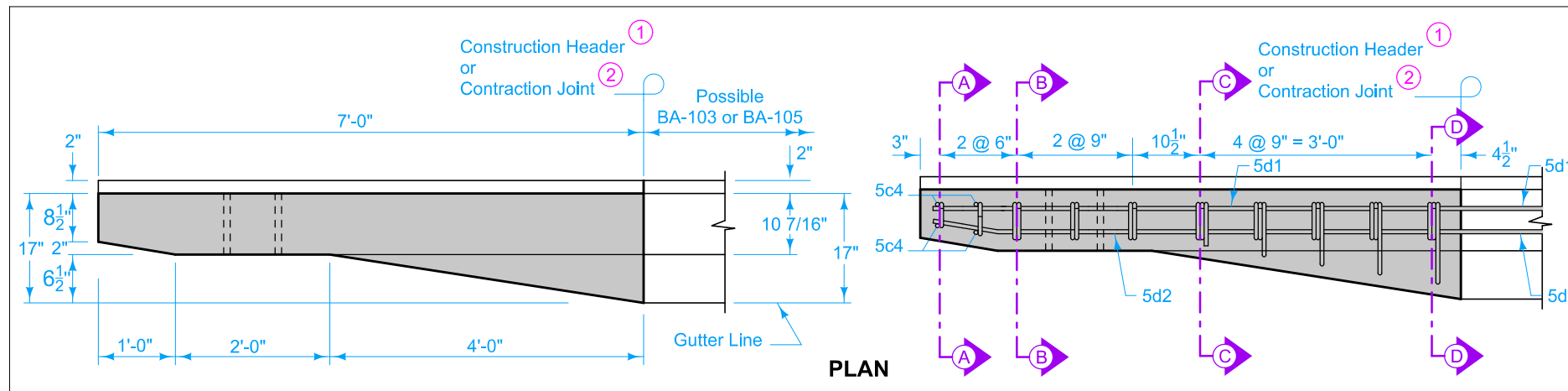
Use 2 x 8 lumber 8" long to make keys.
Place keys at 2'-8" centers.

- ① 'L-2' or 'KT-2' joint. When roadway pavement is existing, use 'BT-3' joint. See PV-101.
- ② 'CD' joint. Match roadway joint locations. See PV-101. No 'CD' joint baskets required within 4' of outside edge of shoulder.
- ③ When shoulder will be located under a concrete barrier end section, replace 5g3 bars with reinforcement as shown on BA-107.
- ④ Increase these dimensions by one inch for every inch of paved shoulder thickness greater than 9 inches.
- ⑤ Match spacing of vertical bars in concrete barrier.

Possible Contract Item:
Reinforced Paved Shoulder for Concrete Barrier

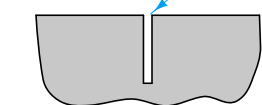
Possible Tabulation:
108-18B

	REVISION	
	6	10-17-23
STANDARD ROAD PLAN		
BA-106		
SHEET 1 of 1		
REVISIONS: Modified reinforcing to fit with 17' panels.		
APPROVED BY DESIGN METHODS ENGINEER		
REINFORCED PAVED SHOULDER FOR CONCRETE BARRIER		



BAR	"X"
5c5	19 1/8"
5c6	24 1/8"
5c7	31"
5c8	36 1/8"

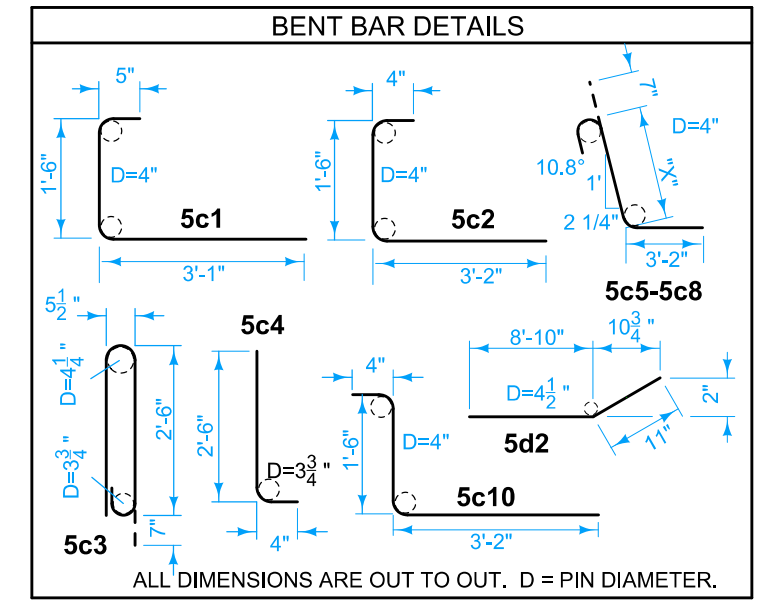
1/8" min. wide x 1" deep saw cut. No sealing required.



SAWED CONTRACTION JOINT

Saw cut top and front face. Saw cut back if exposed.

CONCRETE QUANTITIES	
Per End Section	
0.7 cy	



REINFORCING BAR LIST					
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
5c1	VERTICAL	└	8	5'-0"	42
5c2	VERTICAL	└	2	5'-0"	10
5c3	VERTICAL	┌	8	6'-1"	51
5c4	VERTICAL	└	4	2'-10"	12
5c5-5c8	VERTICAL	└	4	VARIES	17
5c10	VERTICAL	└	6	5'-0"	26
5d1	HORIZONTAL	—	5	10' 0"	35
5d2	HORIZONTAL	—	4	10' 0"	28
TOTAL WEIGHT (LBS.)					225

Use Grade 60 epoxy - coated reinforcing bars. Provide 2 inches minimum cover. Anchor all reinforcement to prevent movement. Secure each section at the front, back, and at 3'-6" intervals using a method approved by the Engineer.

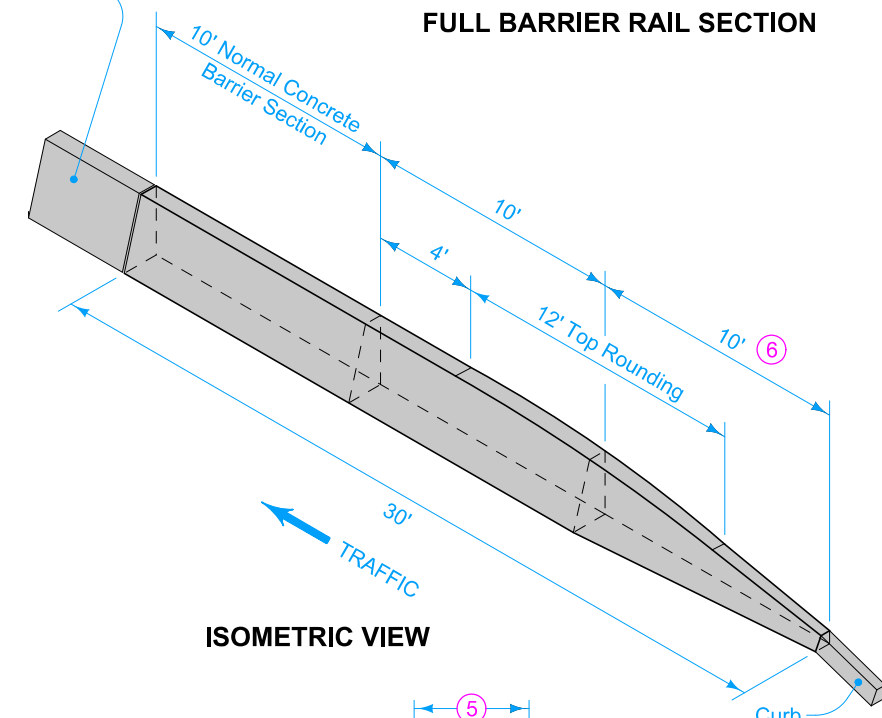
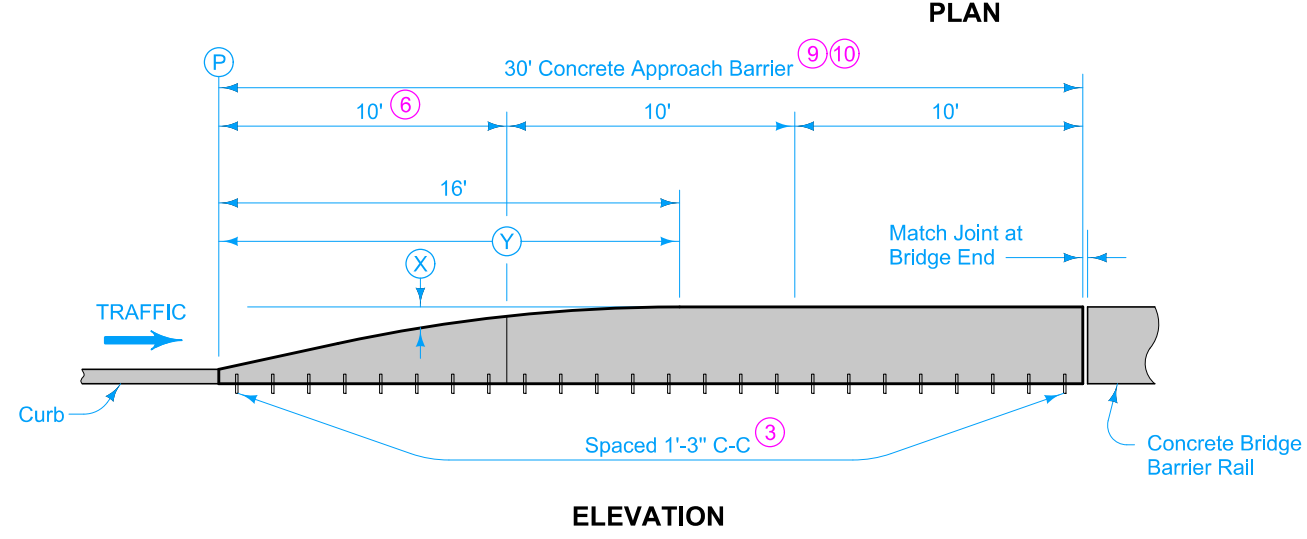
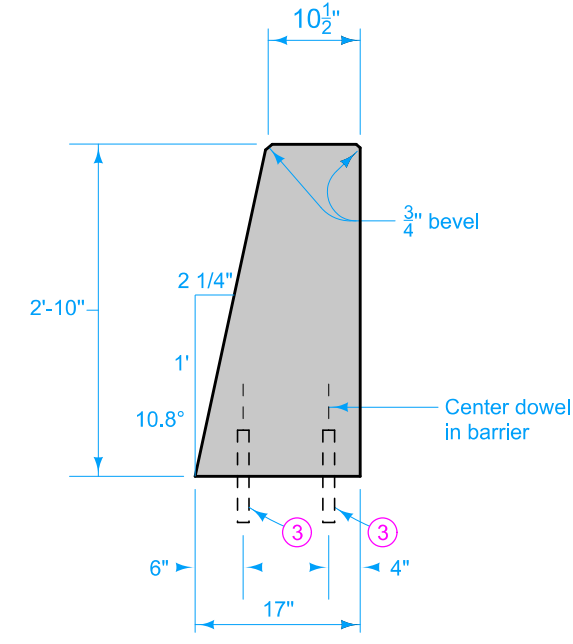
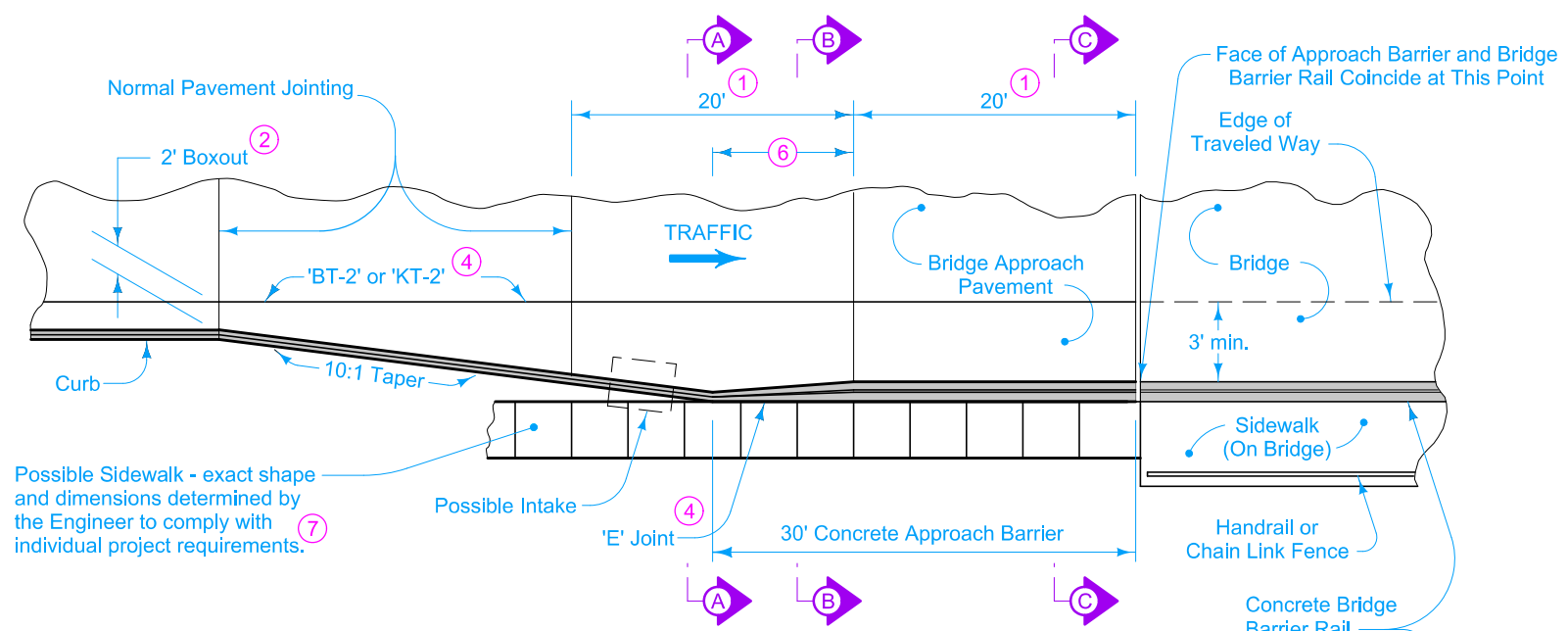
- ① Expansion joints are necessary only where specifically required by project plans. Conform expansion material to the shape of the barrier. No sealer is required.
- ② Where abutting sections are placed as separate pours, a butt joint may be used. Extend longitudinal reinforcement into the abutting section a minimum of 3 feet.
- ③ Fillet all exposed corners with a 3/4 inch dressed and beveled strip.
- ④ Form holes using 1 inch diameter plastic conduit.
- ⑤ See BA-106 for details of 5e3 bars, 6e1 bars, and reinforced paved shoulder.

Possible Contract Item:
Concrete Barrier Rail, BA-107

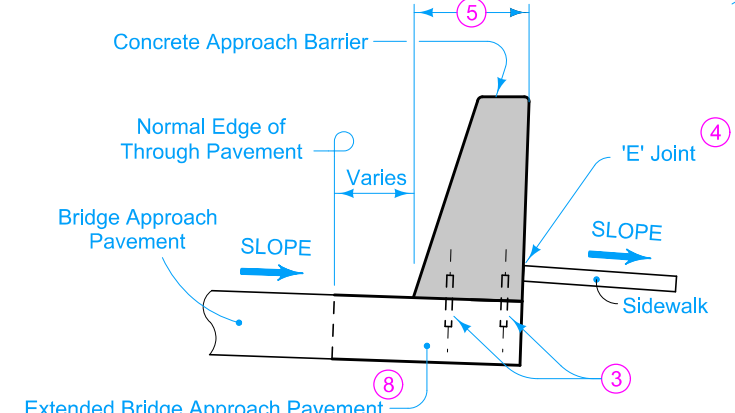
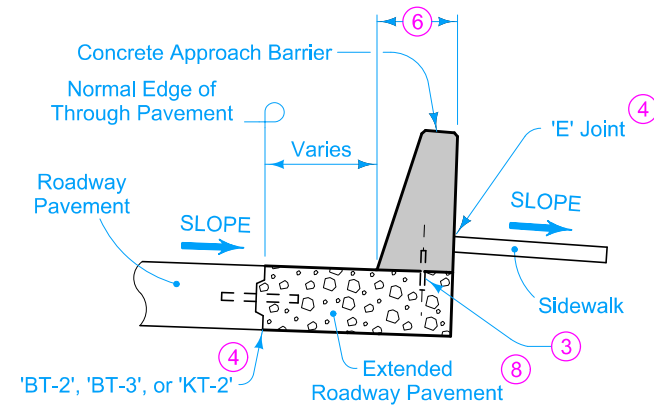
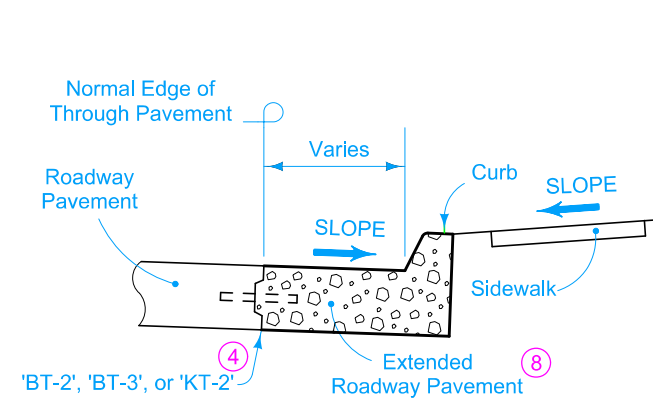
Possible Tabulation:
108-18B

IOWA DOT	REVISION	
	4	10-18-22
STANDARD ROAD PLAN		BA-107
REVISIONS: Changed from F-shape to Texas single slope. Change reinforcing.		SHEET 1 of 1
 APPROVED BY DESIGN METHODS ENGINEER		
CONCRETE BARRIER END SECTION		

DESIGNER INFORMATION



OFFSETS FOR ROUNDED BARRIER TOP																	
Y = Distance from (P)	ft.	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0
X = Offset to Rounded Top	ft.	2.13	1.91	1.70	1.48	1.26	1.06	0.87	0.70	0.54	0.42	0.30	0.20	0.12	0.06	0.02	0.00



SECTION A-A

SECTION B-B

SECTION C-C

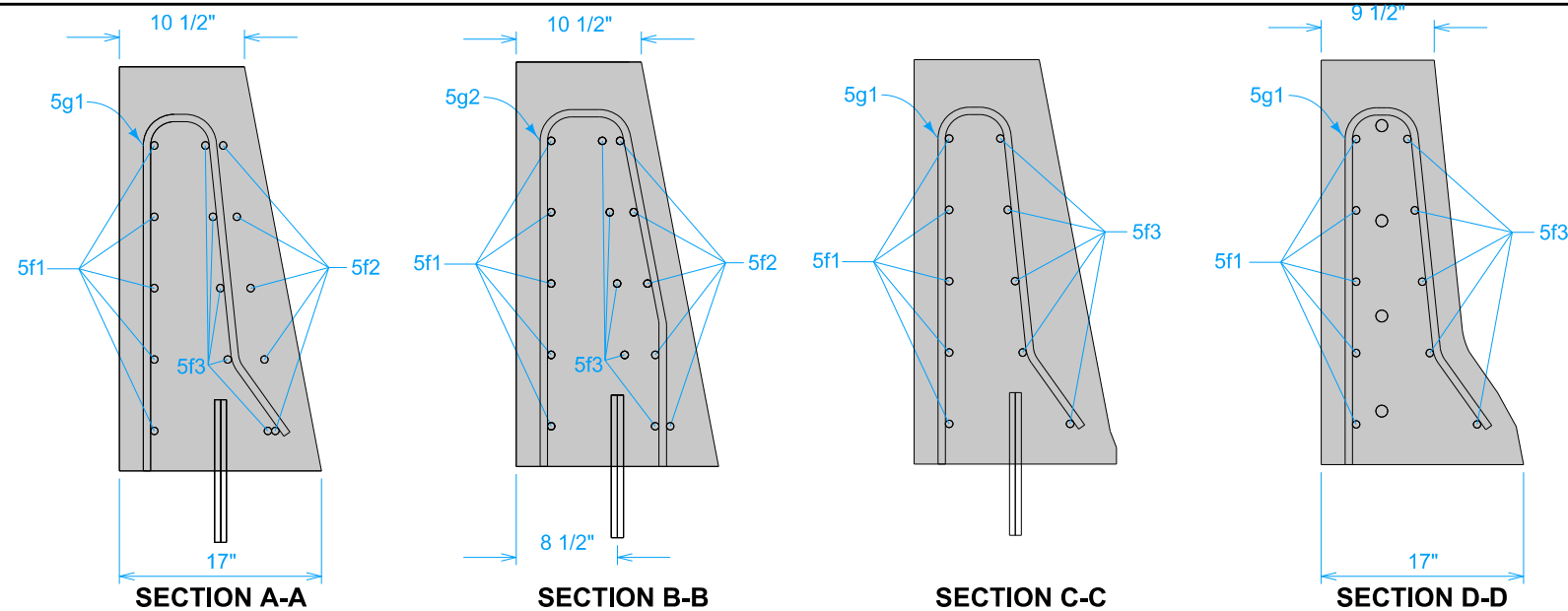
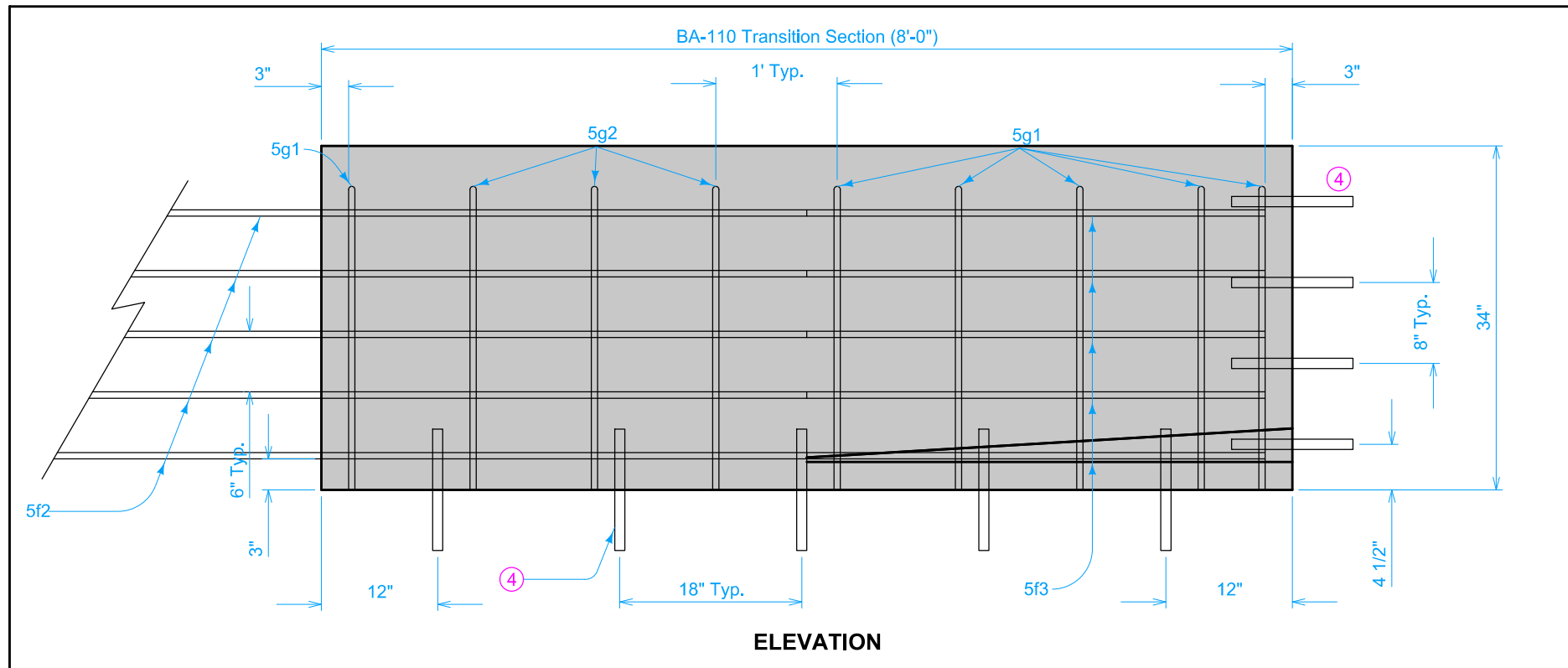
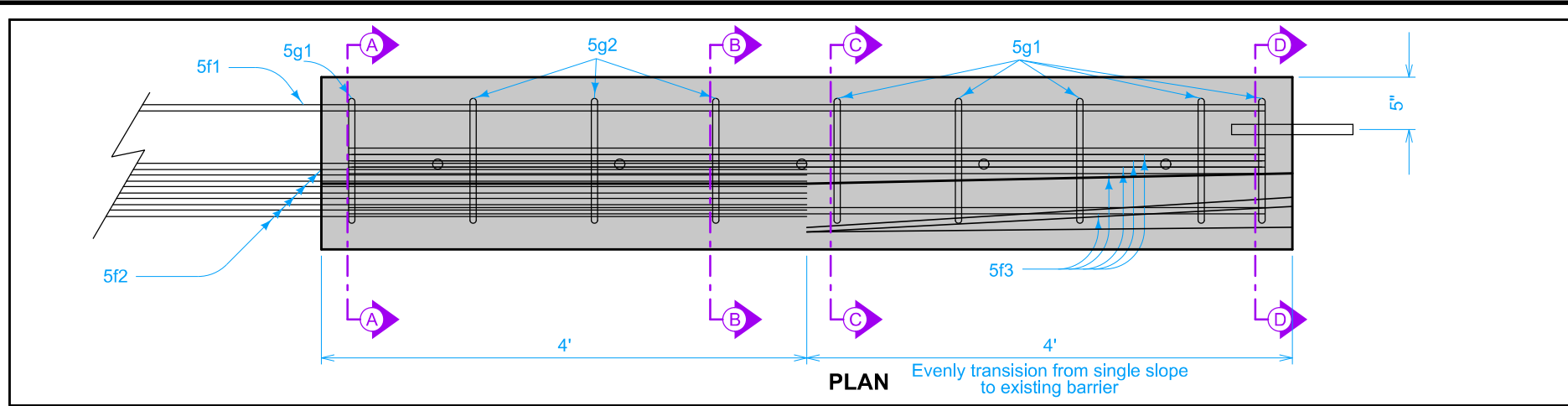
Install a 'C' joint in concrete approach barrier to match the location of each joint in both roadway and bridge approach pavement.

- ① Typical joint spacing and location. Follow specific project requirements as directed by the Engineer.
- ② Match boxout width to existing curb and gutter joint. Use 2 foot wide boxout where curb and gutter are not constructed.
- ③ #8 x 8 inch deformed bars or 1 inch diameter smooth.
- ④ For joint detail, see PV-101.
- ⑤ Bottom width of barrier is maintained at 17 inches.
- ⑥ Bottom width of barrier transitions from 8 to 17 inches.
- ⑦ Required sidewalk will be measured and paid for separately.
- ⑧ Additional concrete quantity required for extended roadway pavement will be included in roadway paving quantity.
- ⑨ Place no delineator or object marker in front of, or on, the barrier.
- ⑩ Approximately 3 cubic yards of concrete are required to construct barrier as shown. Amount may vary depending on individual site requirements.

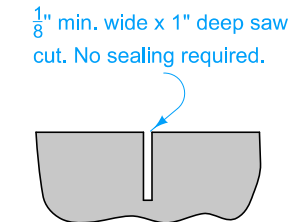
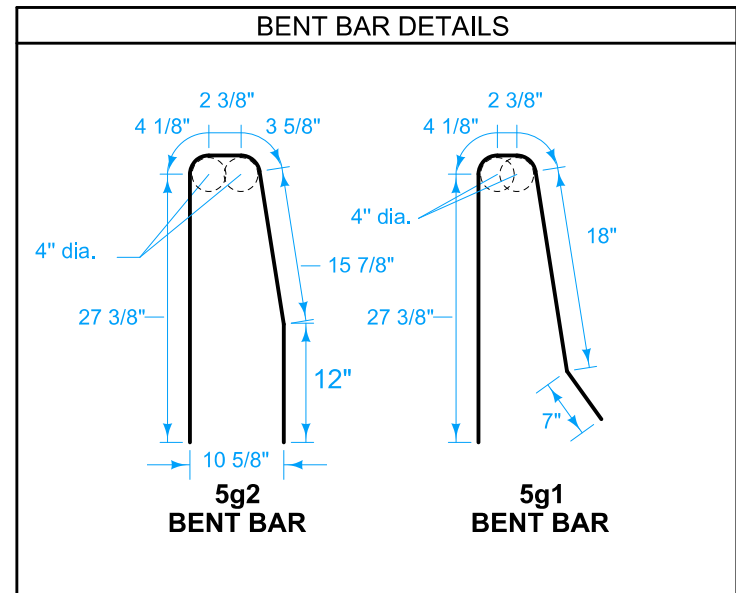
Possible Contract Item:
Concrete Barrier, Tapered End, BA-108

Possible Tabulation:
108-18B

	REVISION	
	3	10-18-22
<h2>STANDARD ROAD PLAN</h2>		<h1>BA-108</h1>
SHEET 1 of 1		
REVISIONS: Changed from F-shape to Texas single slope, Change dowel placement		
 APPROVED BY DESIGN METHODS ENGINEER		
<h3>CONCRETE BARRIER TAPERED END SECTION</h3>		



CONCRETE QUANTITIES
Per End Section
0.93 cy



SAWED CONTRACTION JOINT
Saw cut top and front face.
Saw cut back if exposed.

REINFORCING BAR LIST					
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
5g1	VERTICAL	U	6	5'-2"	32.3
5g2	VERTICAL	U	3	5'-5 3/4"	16.4
5f1	HORIZONTAL	—	5	11'-9" *	61.2
5f2	HORIZONTAL	—	5	7'-9" *	40.4
5f3	HORIZONTAL	—	5	7'-8"	40.0
TOTAL WEIGHT (LBS.)					130.3

* Minimum length

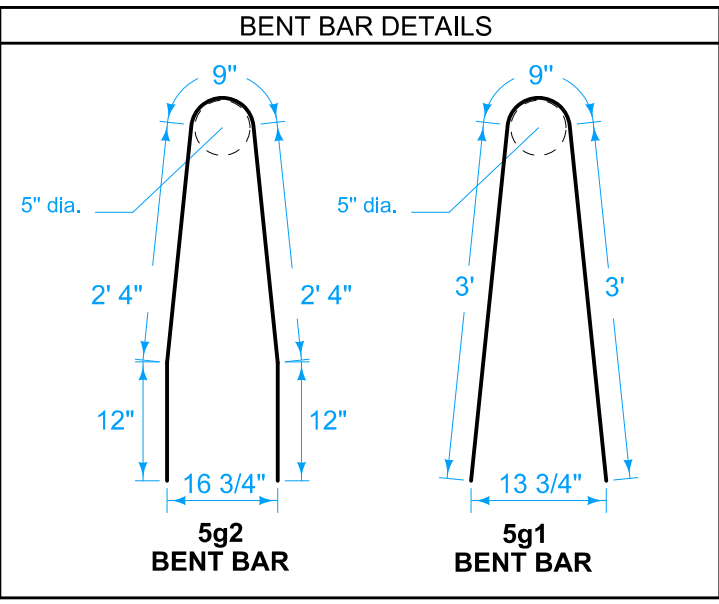
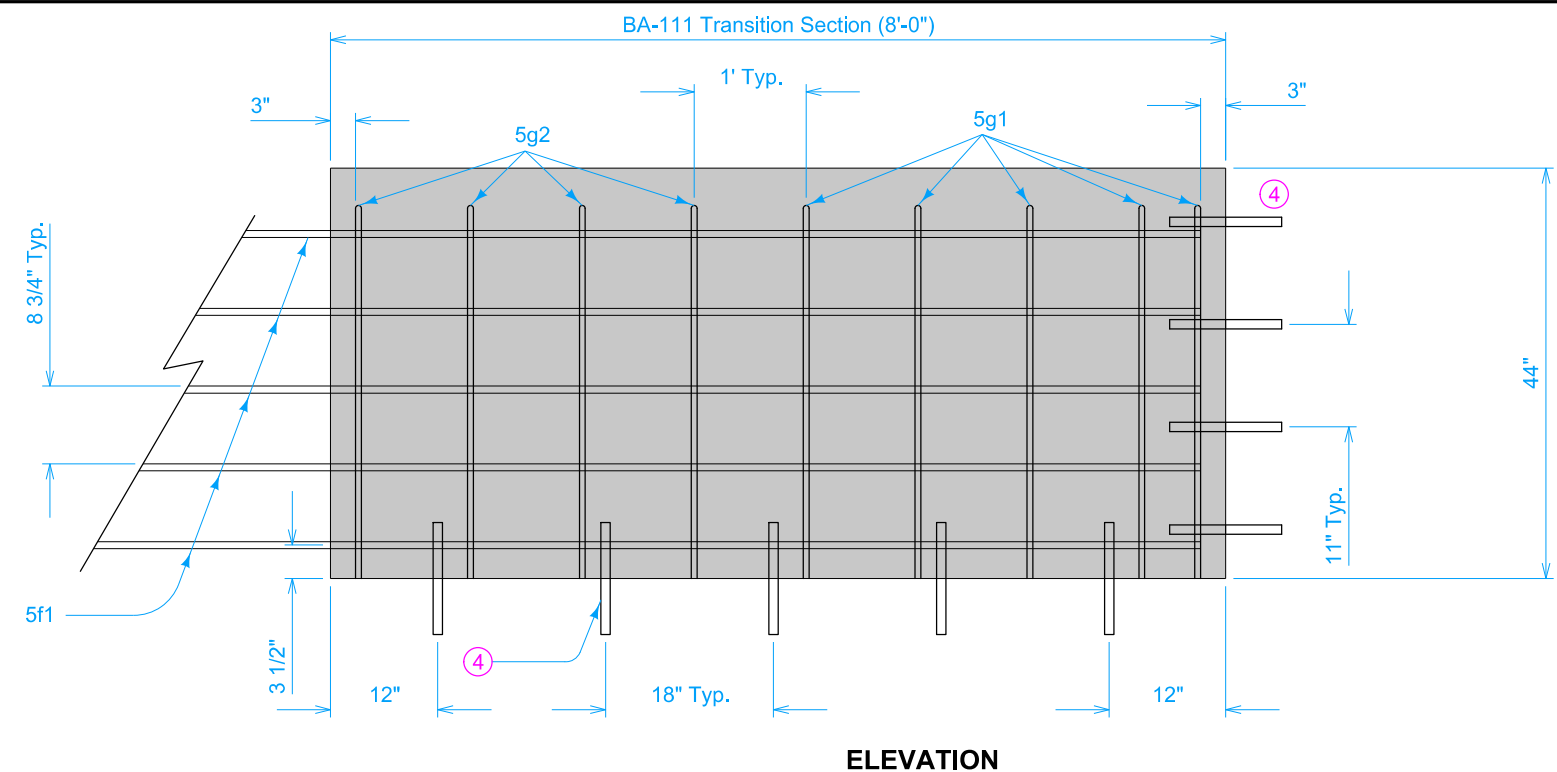
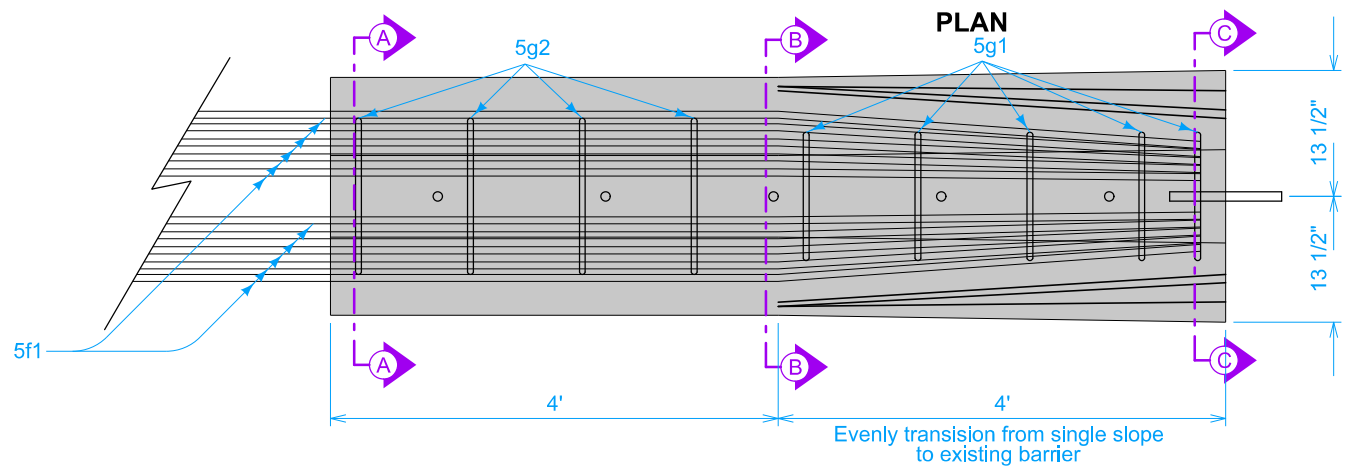
Use Grade 60 epoxy - coated reinforcing bars. Provide 2 inches minimum cover. Anchor all reinforcement to prevent movement. Secure each section at the front, back, and at 3'-6" intervals using a method approved by the Engineer.

- ① Expansion joints are necessary only where specifically required by project plans. Conform expansion material to the shape of the barrier. No sealer is required.
- ② Where abutting sections are placed as separate pours, a butt joint may be used. Extend longitudinal reinforcement into the abutting section a minimum of 3 feet.
- ③ Fillet all exposed corners with a 3/4 inch dressed and beveled strip.
- ④ Use 1 inch diameter deformed dowel bars of sufficient length to ensure 6 inch minimum embedment in barrier and supporting surface. Install dowels either in supporting surface when placed, or in drilled holes using polymer grout complying with Materials I.M. 491.11 or hydraulic cement grout complying with Materials I.M. 491.13.

Possible Contract Item:
Concrete Barrier, BA-110

Possible Tabulation:
108-18B

	REVISION	
	NEW	10-18-22
STANDARD ROAD PLAN		BA-110
REVISIONS: New		SHEET 1 of 1
<i>Steve Miller</i> APPROVED BY DESIGN METHODS ENGINEER		
CONCRETE BARRIER 34" SINGLE SLOPE TO 34" F-SHAPE (HALF SECTION)		

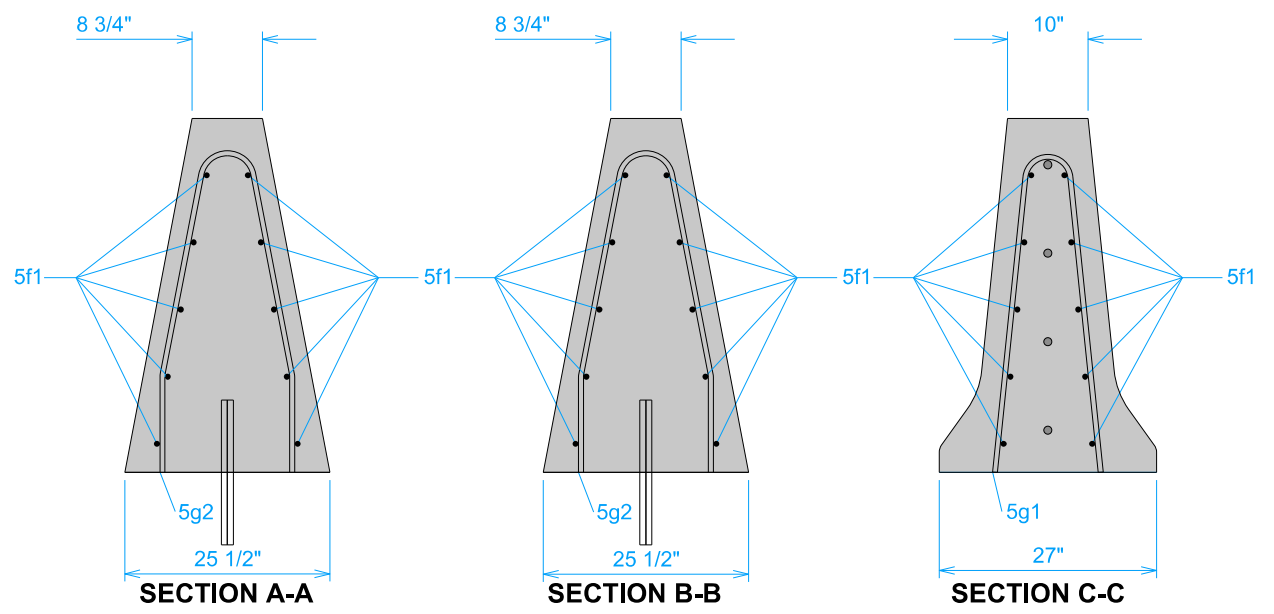


REINFORCING BAR LIST					
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
5g1	VERTICAL		5	7'-5"	39
5g2	VERTICAL		4	6'-9"	28
5f1	HORIZONTAL		10	10'-9" *	112
TOTAL WEIGHT (LBS.)					179

* Minimum length

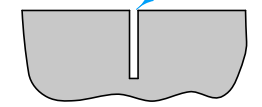
Use Grade 60 epoxy - coated reinforcing bars. Provide 2 inches minimum cover. Anchor all reinforcement to prevent movement. Secure each section at the front, back, and at 3'-6" intervals using a method approved by the Engineer.

- ① Expansion joints are necessary only where specifically required by project plans. Conform expansion material to the shape of the barrier. No sealer is required.
- ② Where abutting sections are placed as separate pours, a butt joint may be used. Extend longitudinal reinforcement into the abutting section a minimum of 3 feet.
- ③ Fillet all exposed corners with a 3/4 inch dressed and beveled strip.
- ④ Use 1 inch diameter deformed dowel bars of sufficient length to ensure 6 inch minimum embedment in barrier and supporting surface. Install dowels either in supporting surface when placed, or in drilled holes using polymer grout complying with Materials I.M. 491.11 or hydraulic cement grout complying with Materials I.M. 491.13.



CONCRETE QUANTITIES
Per End Section
1.52 cy

1/8" min. wide x 1" deep saw cut. No sealing required.



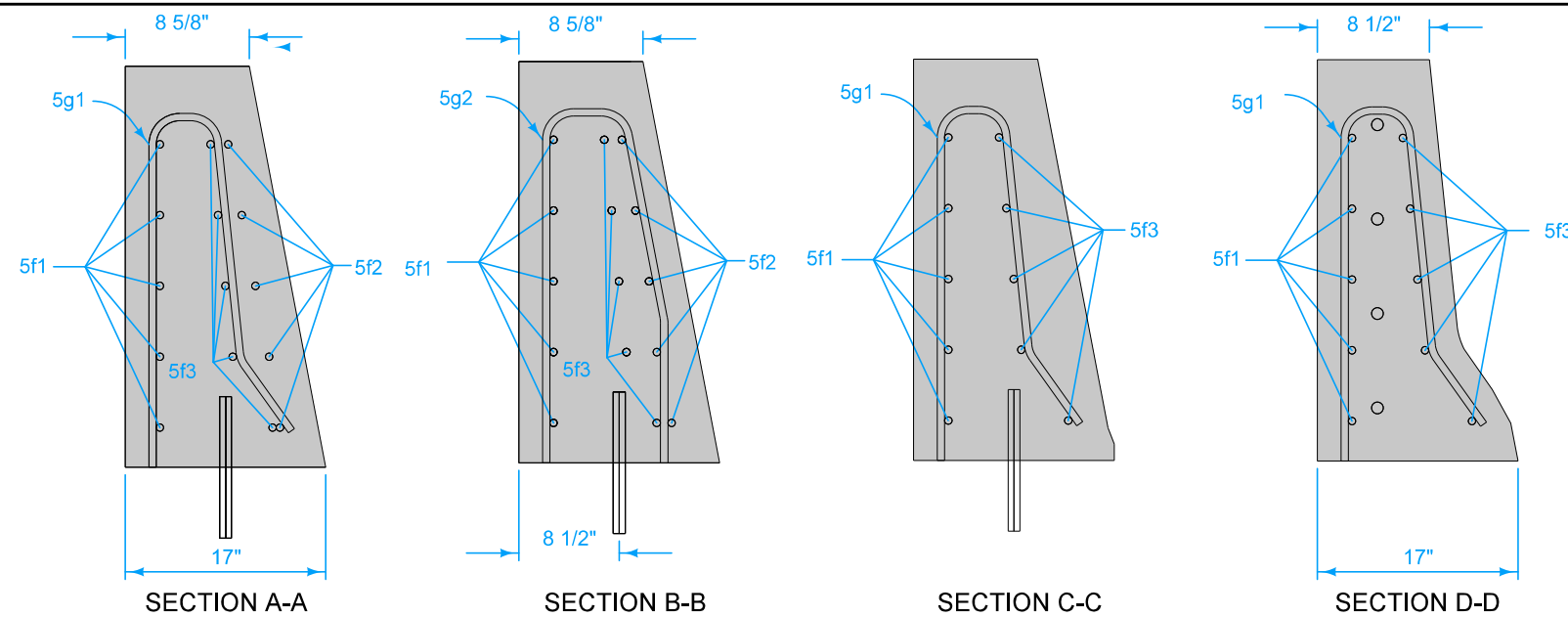
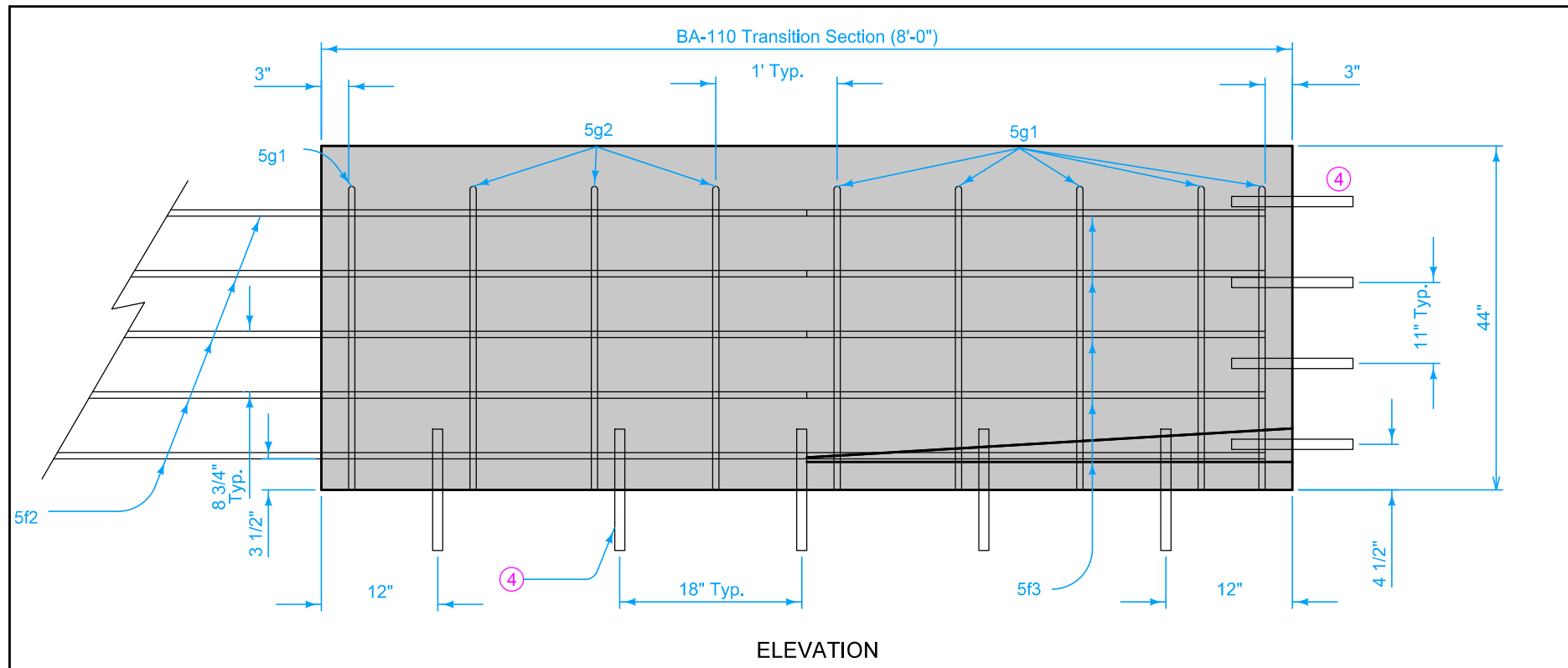
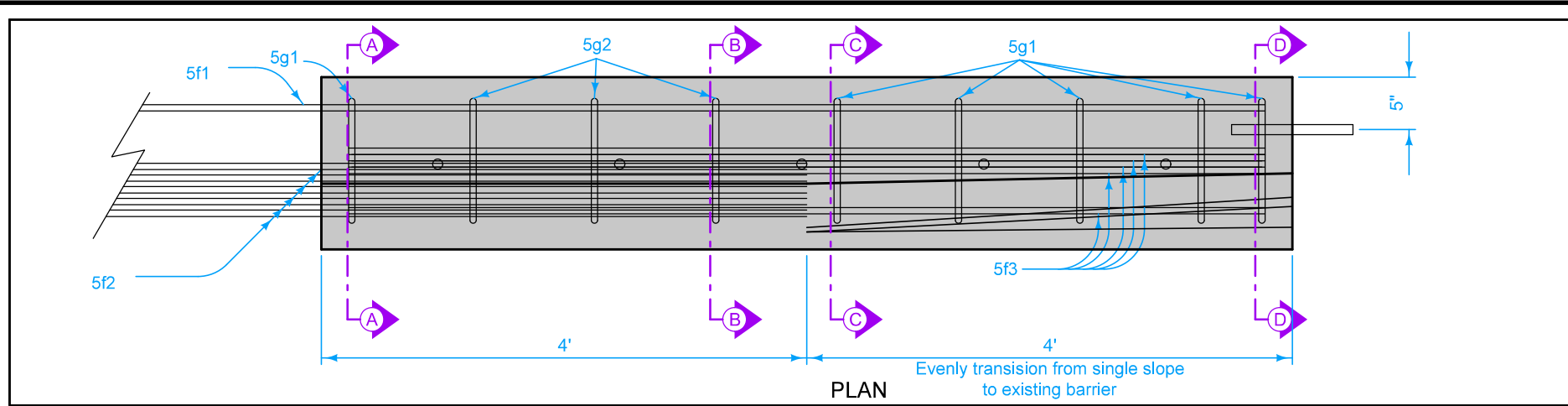
SAWED CONTRACTION JOINT

Saw cut top and front face.
Saw cut back if exposed.

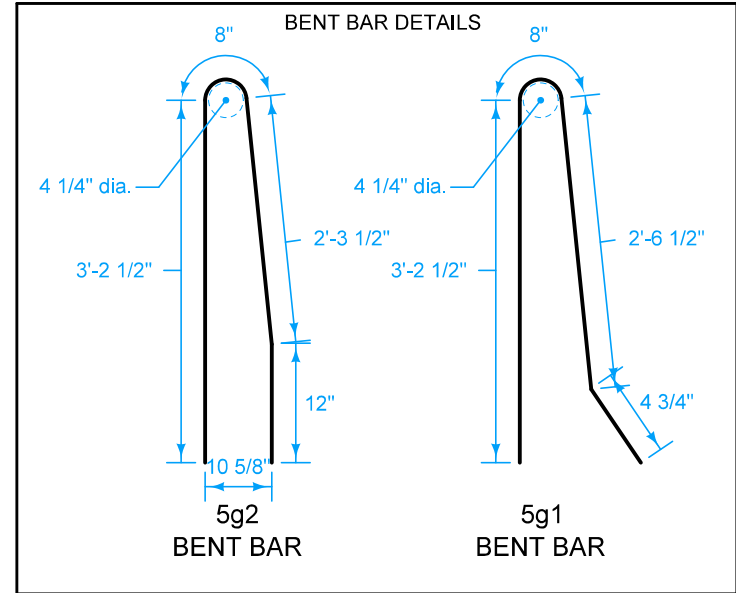
Possible Contract Item:
Concrete Barrier, BA-111

Possible Tabulation:
108-18B

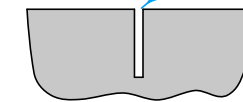
	REVISION	
	NEW	4-18-23
STANDARD ROAD PLAN		BA-111
REVISIONS: New		SHEET 1 of 1
 APPROVED BY DESIGN METHODS ENGINEER		
CONCRETE BARRIER 44" SINGLE SLOPE TO 44" F-SHAPE (FULL SECTION)		



CONCRETE QUANTITIES
Per Section
1.06 cy



1/8" min. wide x 1" deep saw cut. No sealing required.



SAWED CONTRACTION JOINT

Saw cut top and front face.
Saw cut back if exposed.

REINFORCING BAR LIST					
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
5g1	VERTICAL	∩	6	7' 3"	49.0
5g2	VERTICAL	∩	3	7'-2"	22.4
5f1	HORIZONTAL	—	5	11'-9" *	61.2
5f2	HORIZONTAL	—	5	7'-9" *	40.4
5f3	HORIZONTAL	—	5	7'-8"	40.0
TOTAL WEIGHT (LBS.)					213

* Minimum length

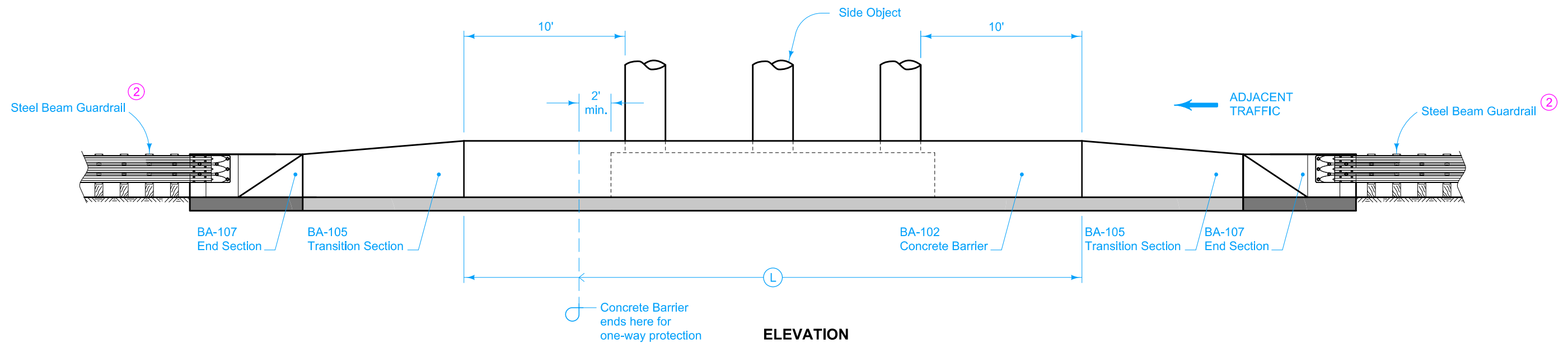
Use Grade 60 epoxy - coated reinforcing bars. Provide 2 inches minimum cover. Anchor all reinforcement to prevent movement. Secure each section at the front, back, and at 3"-6" intervals using a method approved by the Engineer.

- ① Expansion joints are necessary only where specifically required by project plans. Conform expansion material to the shape of the barrier. No sealer is required.
- ② Where abutting sections are placed as separate pours, a butt joint may be used. Extend longitudinal reinforcement into the abutting section a minimum of 3 feet.
- ③ Fillet all exposed corners with a 3/4 inch dressed and beveled strip.
- ④ Use 1 inch diameter deformed dowel bars of sufficient length to ensure 6 inch minimum embedment in barrier and supporting surface. Install dowels either in supporting surface when placed, or in drilled holes using polymer grout complying with Materials I.M. 491.11 or hydraulic cement grout complying with Materials I.M. 491.13.

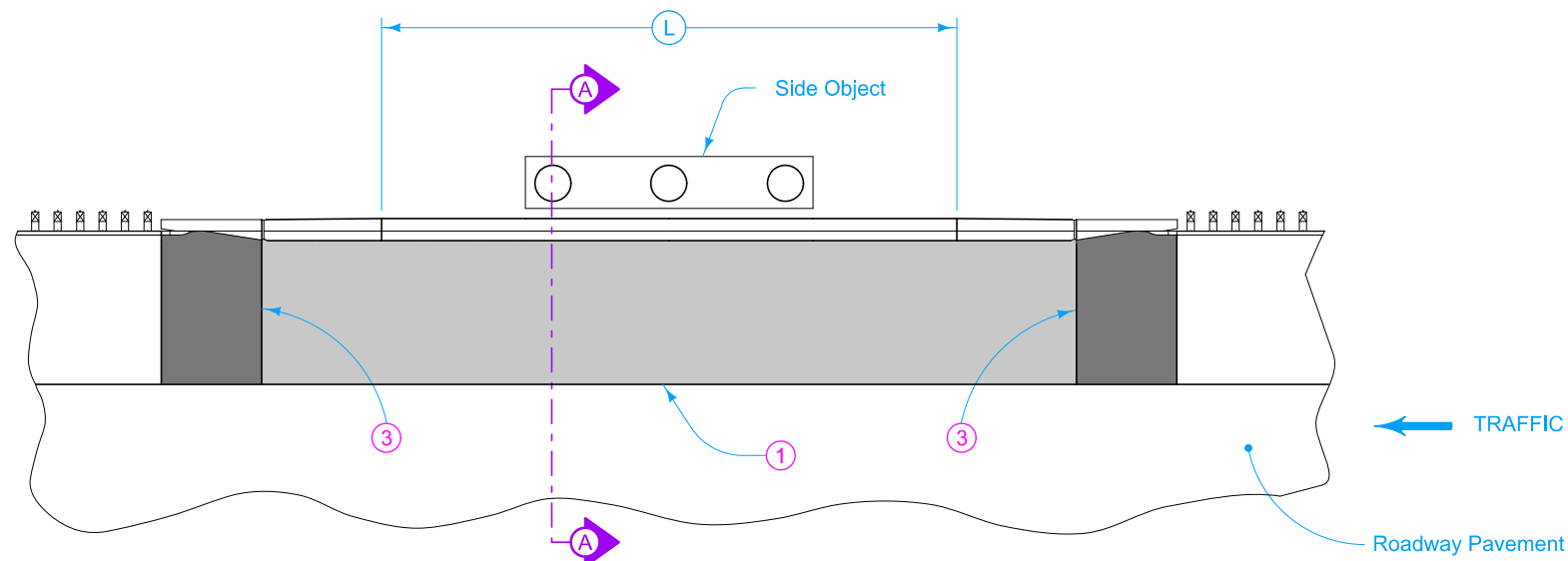
Possible Contract Item:
Concrete Barrier, BA-112

Possible Tabulation:
108-18B

 STANDARD ROAD PLAN	REVISION	
	NEW	10-15-24
BA-112		
SHEET 1 of 1		
REVISIONS: New		
 <small>APPROVED BY DESIGN METHODS ENGINEER</small>		
CONCRETE BARRIER 44" SINGLE SLOPE TO 44" F-SHAPE (HALF SECTION)		



ELEVATION



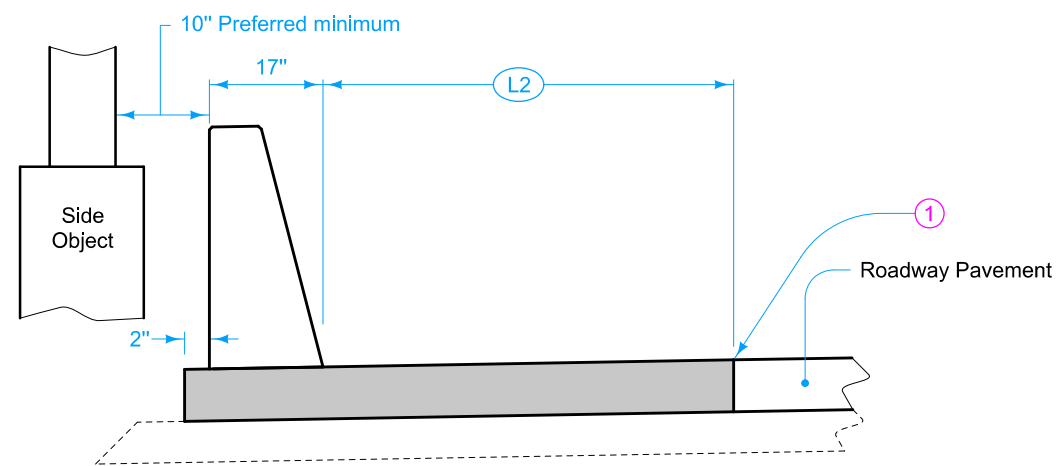
PLAN

- ① "L-2" or "KT-2" joint. When roadway pavement is existing, use "BT-3" joint. See PV-101.
- ② Refer to BA-250.
- ③ "C" Joint; match existing roadway joints when possible. See PV-101.
- ④ Refer to project typicals.
- ⑤ Refer to BA-106.

Possible Contract Items:
 Concrete Barrier items
 Steel Beam Guardrail items
 PCC Paved Shoulder
 Reinforced Paved Shoulder

Possible Tabulations:
 108-18B
 112-9

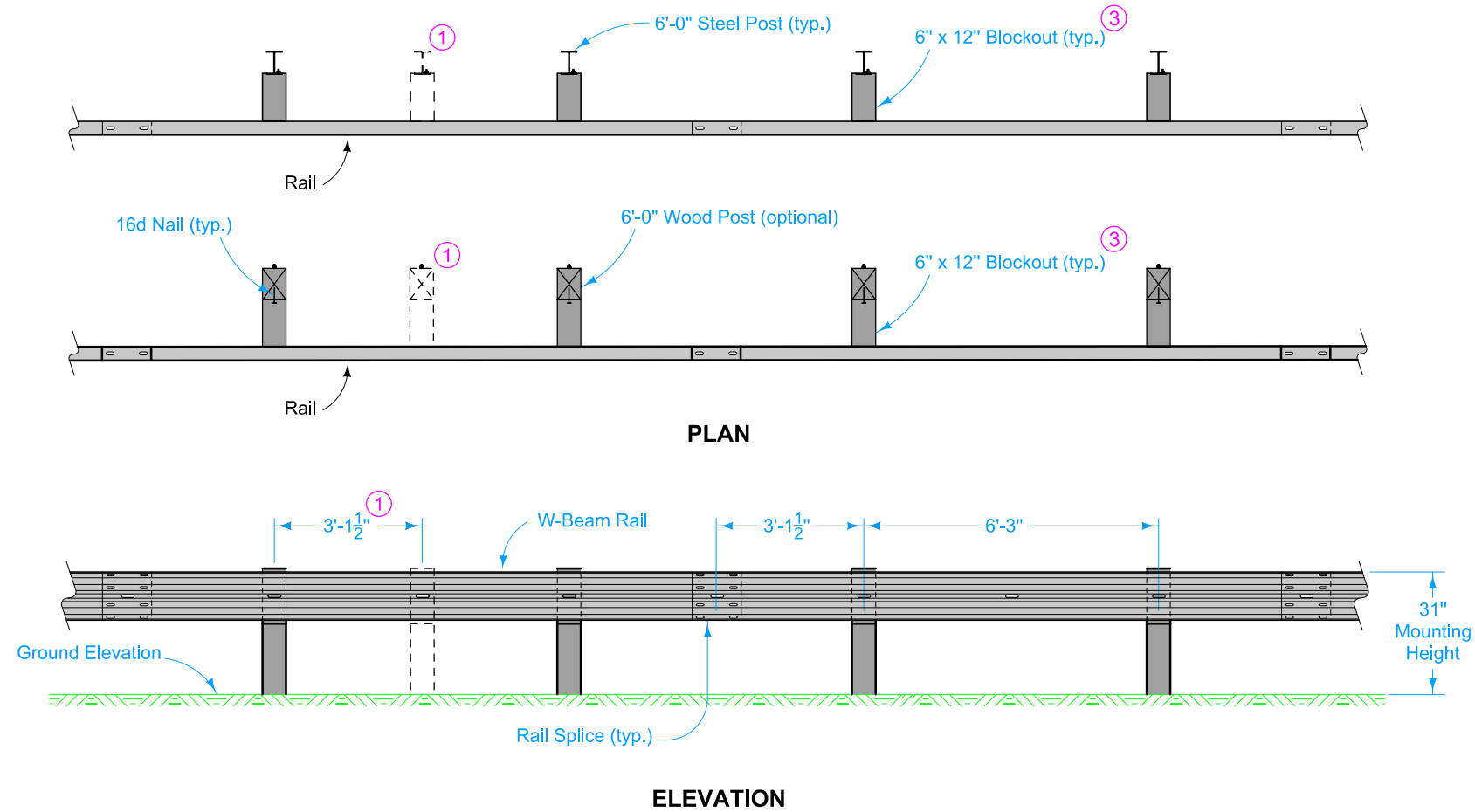
LEGEND	
	PCC Paved Shoulder ④
	Reinforced PCC Paved Shoulder ⑤



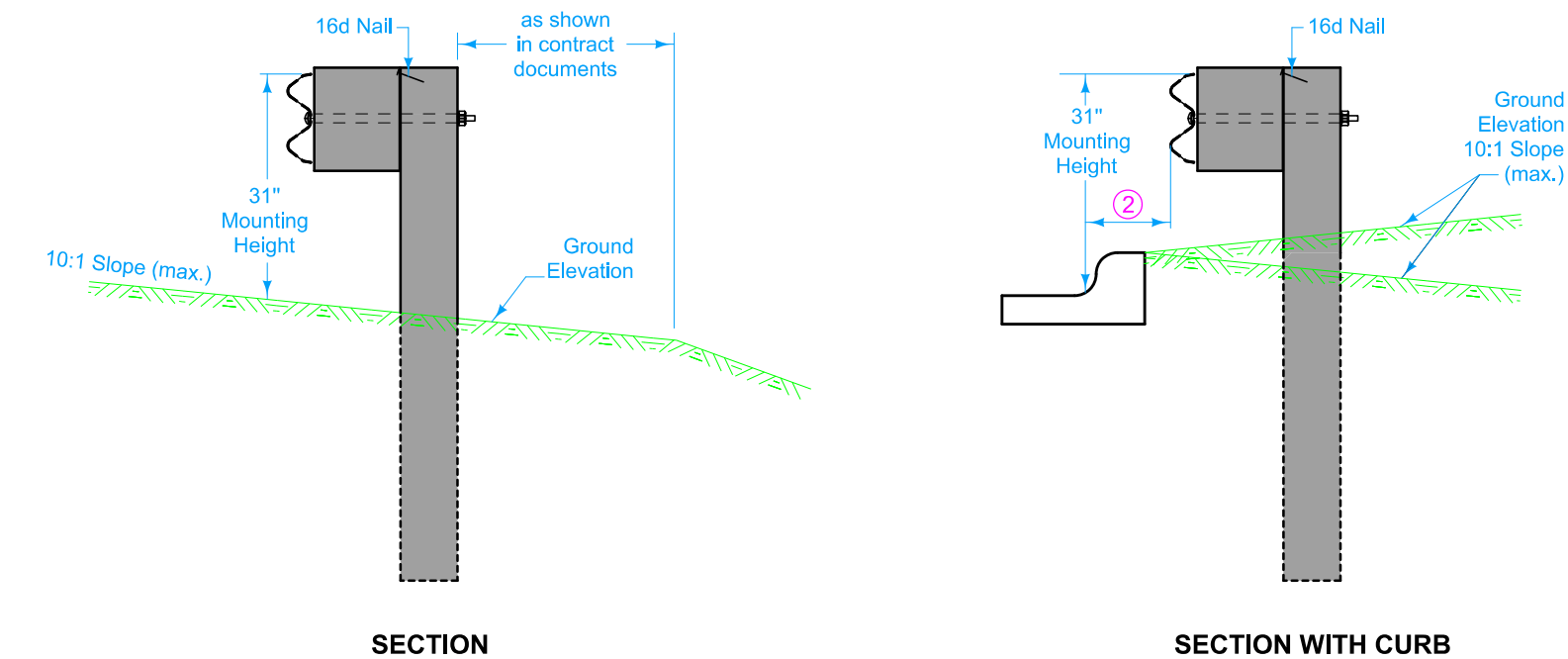
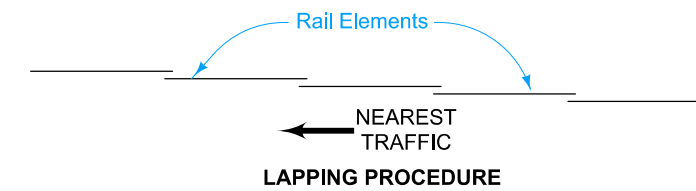
SECTION A-A

	REVISION	
	4	10-18-22
STANDARD ROAD PLAN		BA-150
		SHEET 1 of 1
REVISIONS: Changed from F-shape to Texas single slope.		
 APPROVED BY DESIGN METHODS ENGINEER		
SIDE OBJECT PROTECTION WITH CONCRETE BARRIER AND GUARDRAIL		

DESIGNER INFORMATION



- At Bridge End Drains, cut Scour Protection (Transition Mat and Turf Reinforcement Mat) or remove rock as required to place post(s) such that Bridge End Drains abut post(s).
- ① When specified by the contract documents, install posts at 3'-1½" spacing.
 - ② 6" maximum for 6" Standard or 6" Sloped curbs and for non-standard curbs.
 - ③ Wood or composite only. Steel blockouts will not be allowed.



W-BEAM INSTALLATION

Possible Contract Item:
Steel Beam Guardrail

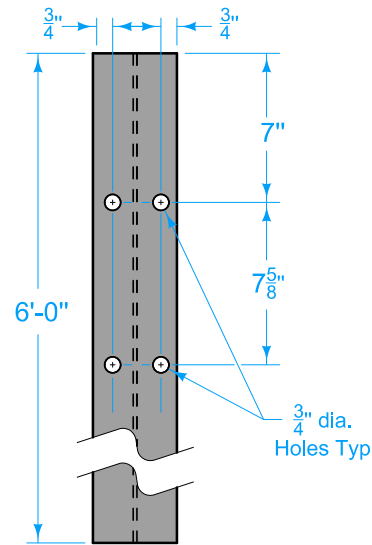
	REVISION	
	6	04-20-21
STANDARD ROAD PLAN		BA-200
		SHEET 1 of 4

REVISIONS: Added new circle note 4 and renumbered remaining notes.

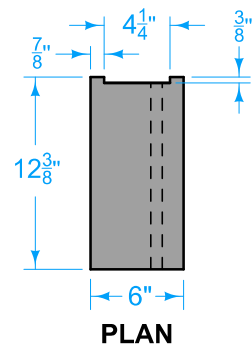
Shawn Miller
APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL COMPONENTS

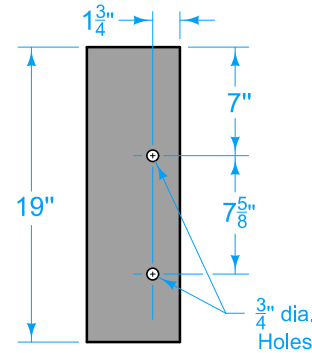
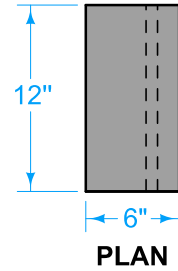
STEEL POST AND BLOCKOUT DETAILS



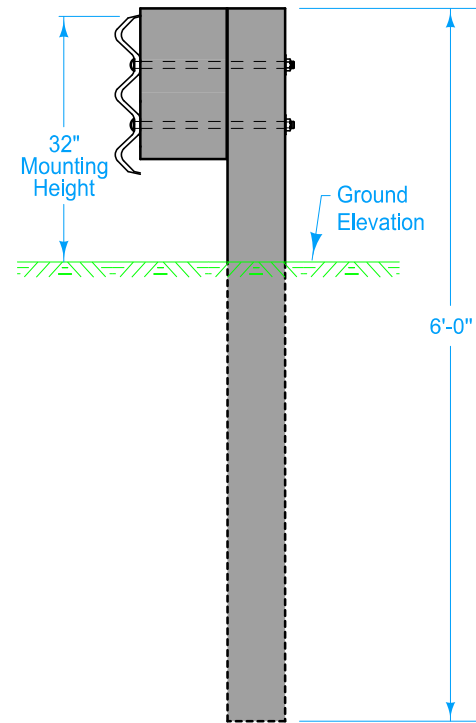
6'-0" STEEL POST
W6x9 or W6x8.5



PLAN
ELEVATION
W-BEAM BLOCKOUT ③



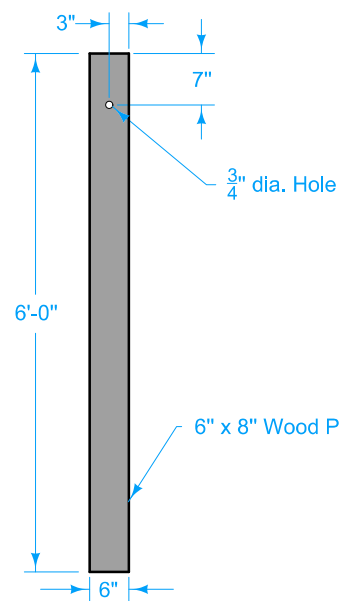
PLAN
ELEVATION
THRIE-BEAM BLOCKOUT ③



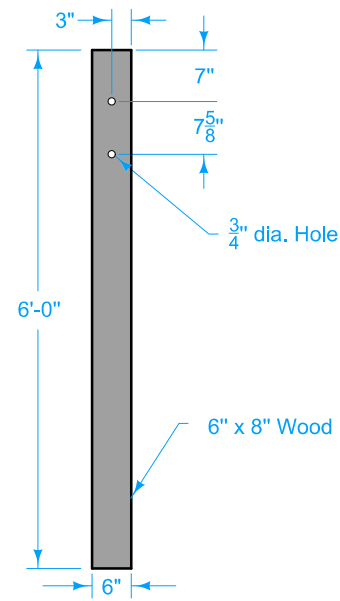
THRIE-BEAM INSTALLATION

- ③ Wood or composite only. Steel blockouts will not be allowed.
- ④ Thrie-beam post may be substituted for W-beam post.

WOOD POST AND BLOCKOUT DETAILS

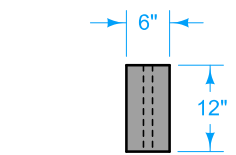


W-BEAM

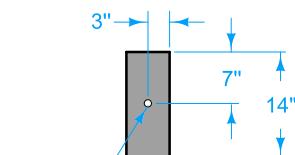


THRIE-BEAM

POSTS ④

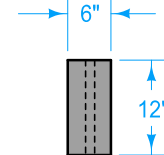


PLAN

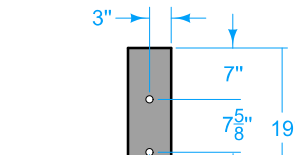


ELEVATION

W-BEAM BLOCKOUT ③



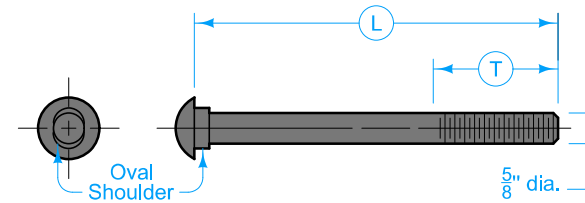
PLAN



ELEVATION

THRIE-BEAM BLOCKOUT ③

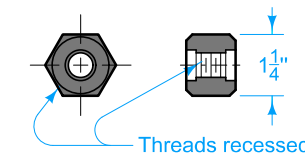
BOLT DETAILS



BOLT

APPLICATION	(T)	(L)
Splice Bolt	1-1/16"	1-1/4"
Bolt for Steel Post with 8" Blockout	2-1/2"	10"
Bolt for Steel Post with 12" Blockout	2-1/2"	14"
Bolt for Wood Post with 8" Blockout	2-1/2"	18"
Bolt for Wood Post with 12" Blockout	2-1/2"	22"

(T) = Min. Thread Length (L) = Bolt Length



NUT

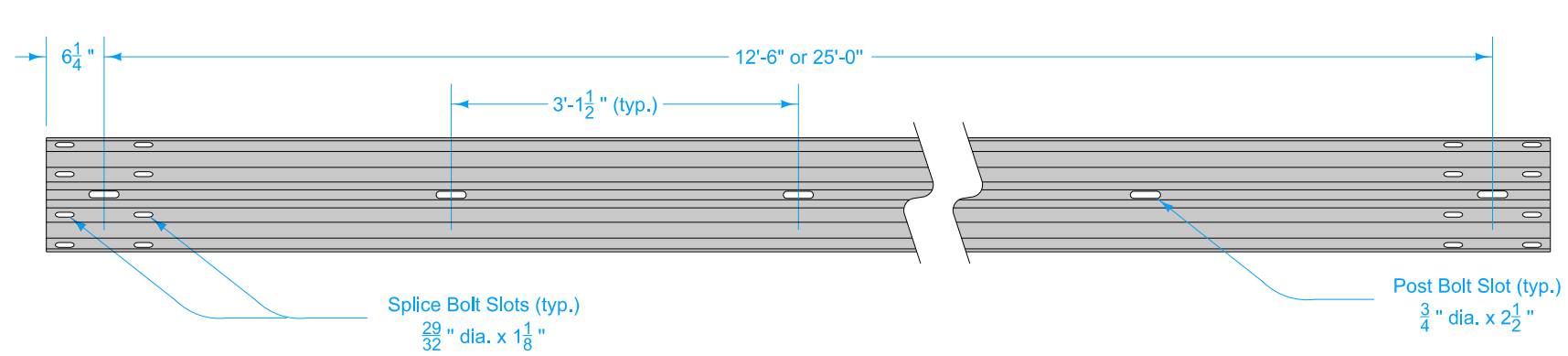
HARDWARE

<p>STANDARD ROAD PLAN</p>	REVISION	
	6	04-20-21
	BA-200	
SHEET 2 of 4		

REVISIONS: Added new circle note 4 and renumbered remaining notes.

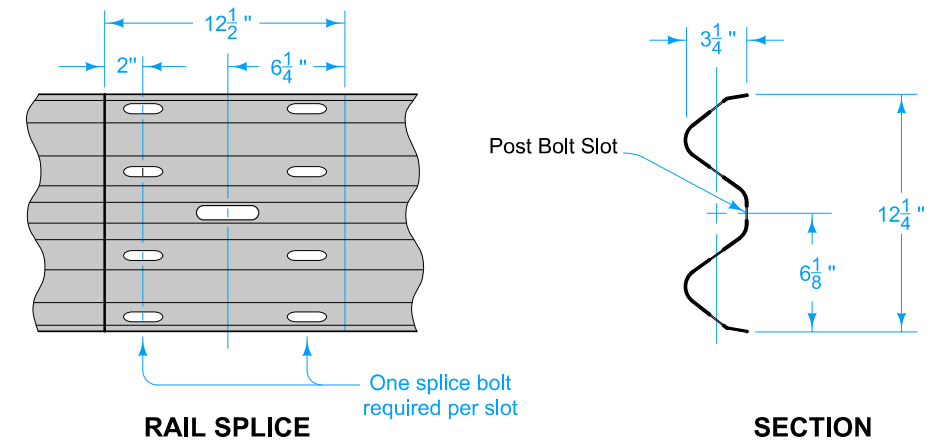
Shawn Miller
APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL COMPONENTS



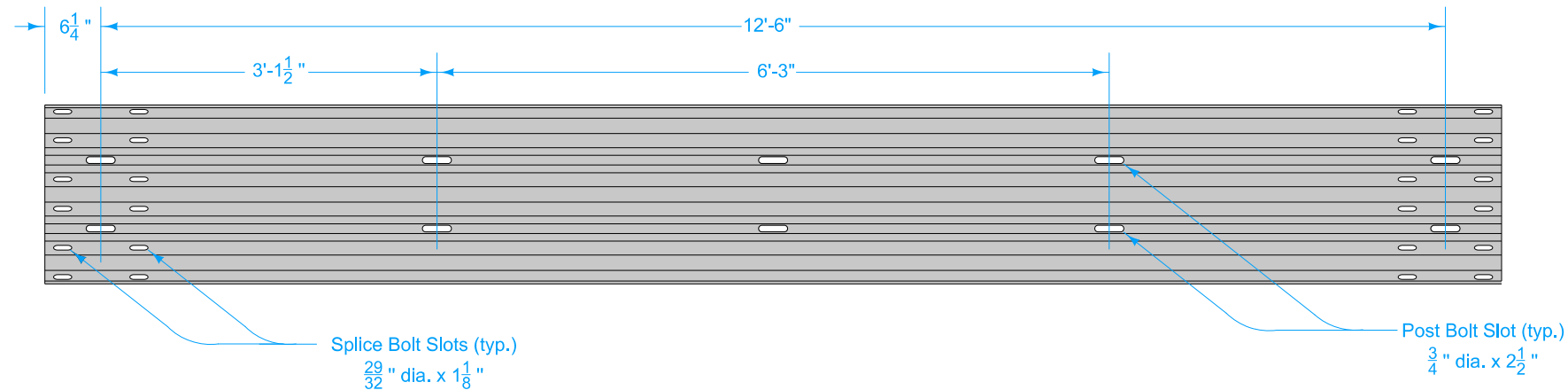
ELEVATION

W-BEAM RAIL



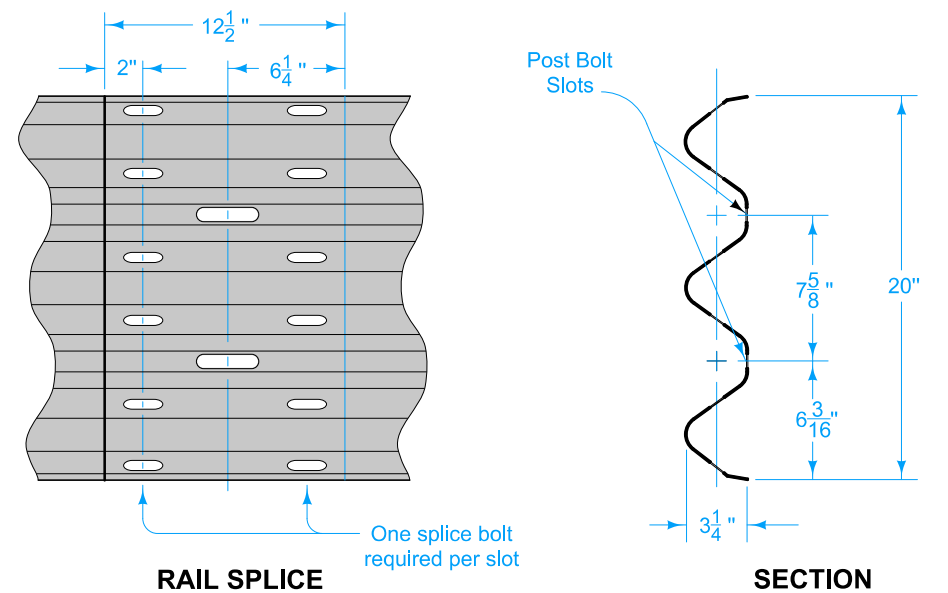
RAIL SPLICE

SECTION



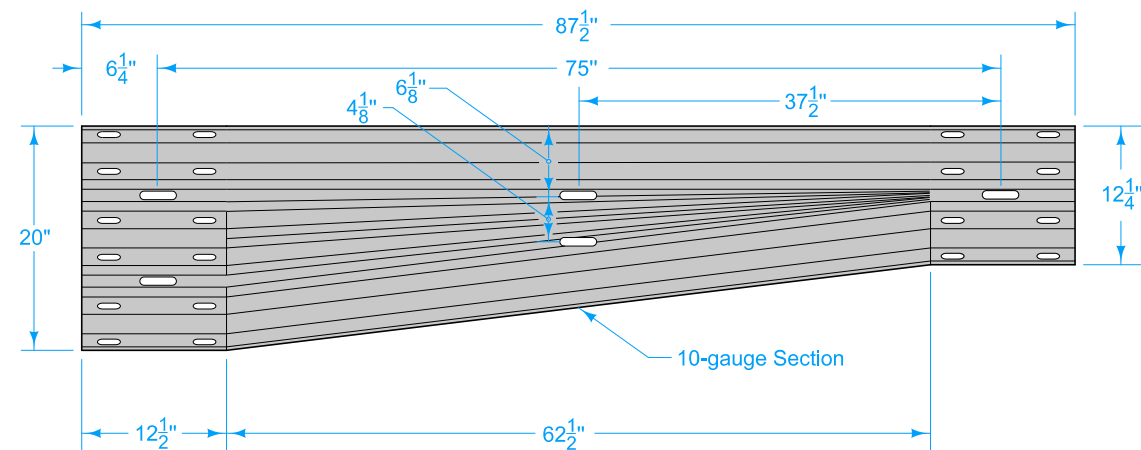
ELEVATION

THRIE-BEAM RAIL



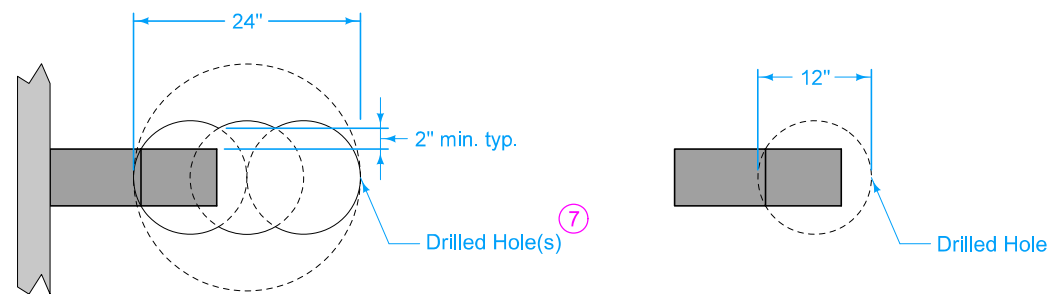
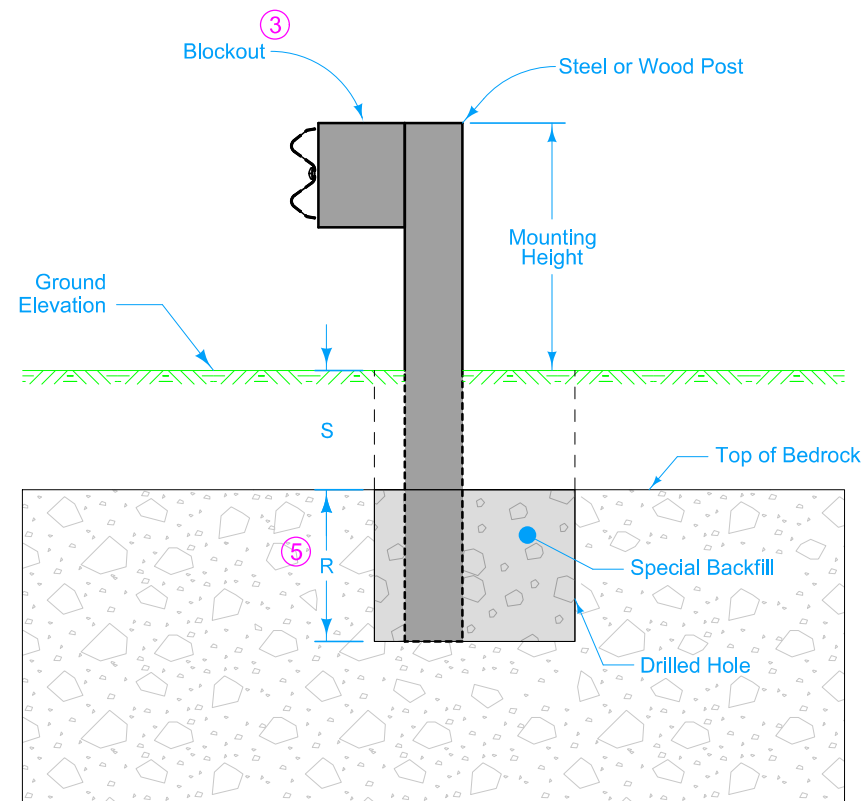
RAIL SPLICE

SECTION



ASYMMETRICAL TRANSITION SECTION

	REVISION
	6 | 04-20-21
STANDARD ROAD PLAN	BA-200
REVISIONS: Added new circle note 4 and renumbered remaining notes.	SHEET 3 of 4
 APPROVED BY DESIGN METHODS ENGINEER	
STEEL BEAM GUARDRAIL COMPONENTS	

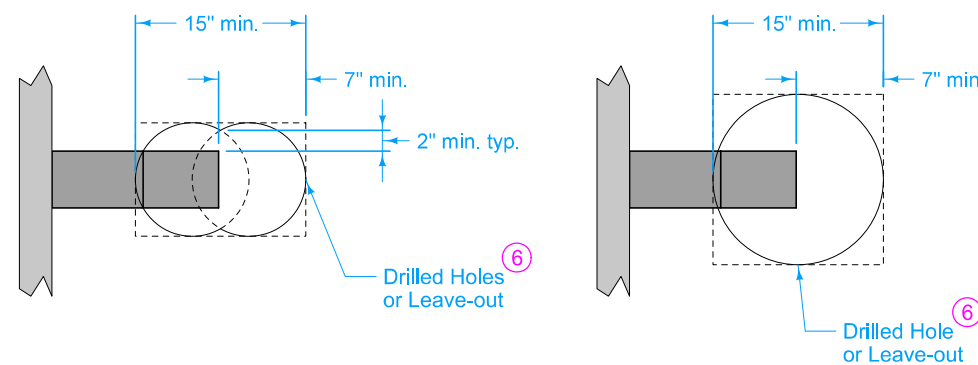
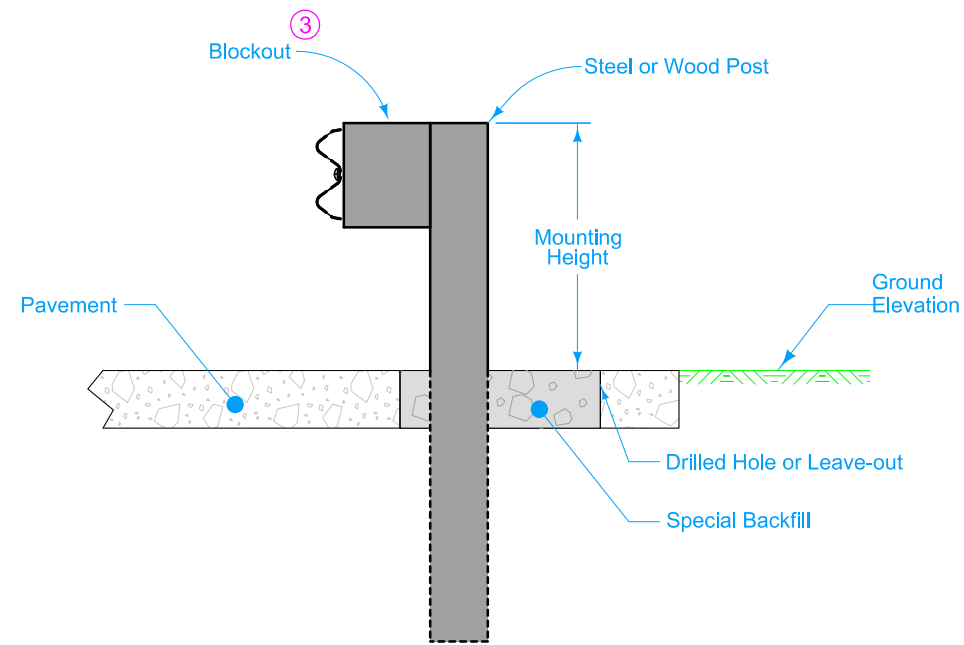


PLAN - CASE A

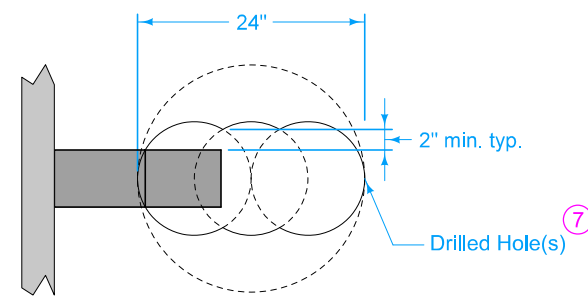
PLAN - CASE B

Post Embedment (5)		
Case	Depth to Bedrock	Minimum Depth to Drill into Bedrock
A	S = 0" to 16"	R = 24"
B	S = 16" to 52"	R = Post Length - Mounting Height - S

POST INSTALLED IN BEDROCK



PLAN - PAVEMENT THICKNESS <= 8"
Either approach is acceptable.



PLAN - PAVEMENT THICKNESS > 8"

POST INSTALLED IN PAVEMENT

Installation information applies to both wood and steel posts.

- (3) Wood or composite only. Steel blockouts will not be allowed.
- (5) Post extends to bottom of hole in all cases. Trim top of post as required and treat with preservative according to Section 4161 of the Standard Specifications.
- (6) Use a 12 inch bit with two drills or a 15 inch bit with one drill. If placing post before paving, provide required leave-out area. If placing post after paving, drill or cut required area. Leave-out may be round or square.
- (7) Use a 12 inch bit with three drills or a 24 inch bit with one drill.

	REVISION
	6 | 04-20-21
	BA-200
STANDARD ROAD PLAN	
SHEET 4 of 4	

REVISIONS: Added new circle note 4 and renumbered remaining notes.

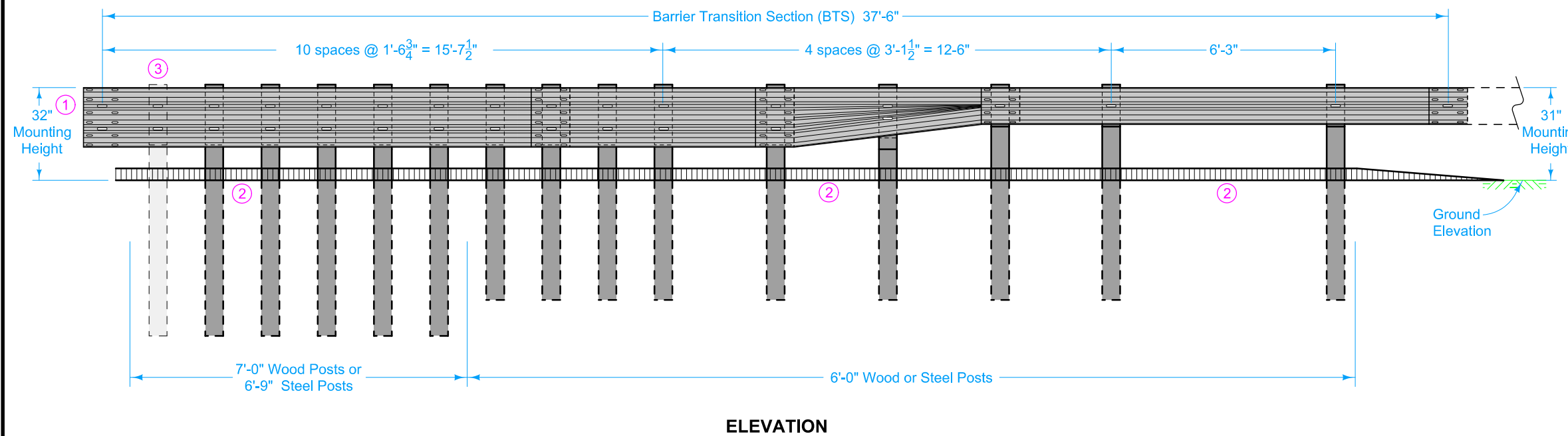
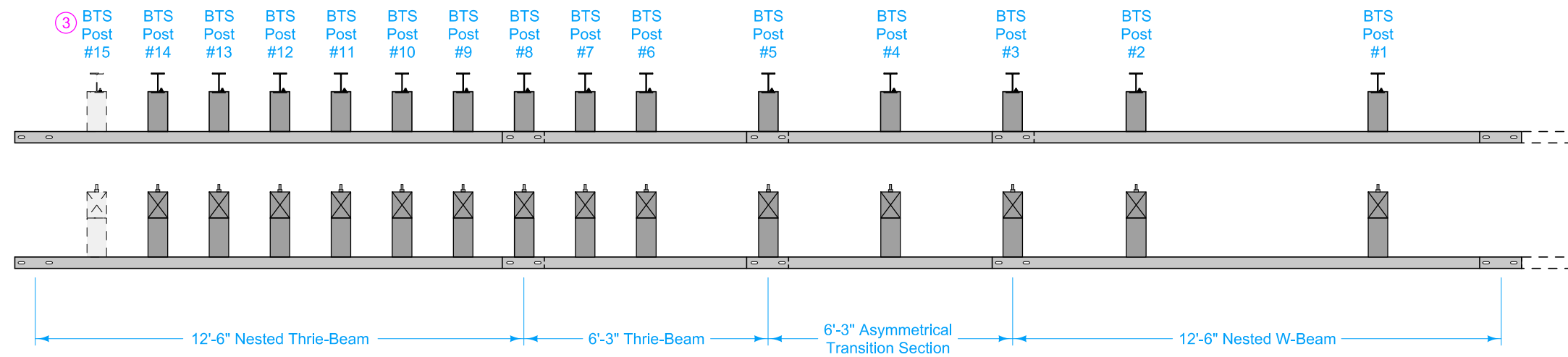
Steve Miller
APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL COMPONENTS

DESIGNER INFORMATION

At Bridge End Drains, cut Scour Protection (Transition Mat and Turf Reinforcement Mat) or remove rock as required to place post(s) such that Bridge End Drains abut post(s).

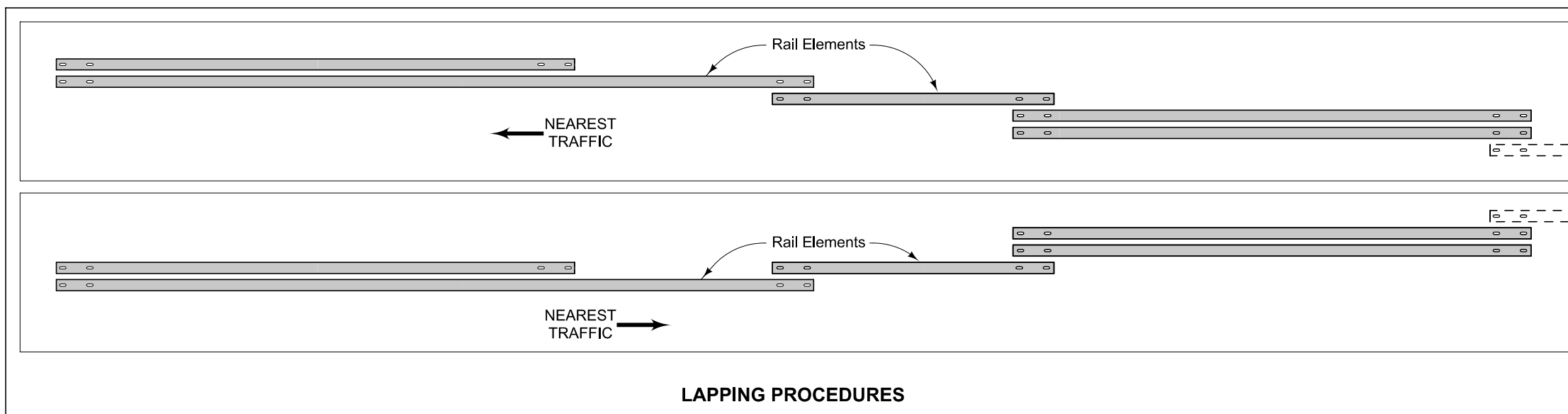
- ① Guardrail mounting height at barrier connection is 32 inches. Transition guardrail mounting height down to 31 inches at BTS Post #3.
- ② Possible 4 inch sloped curb. See project plans. Refer to PV-102 for curb and runout details.
- ③ Depending on end anchor type, BTS Post #15 may be eliminated or modified. See BA-202.



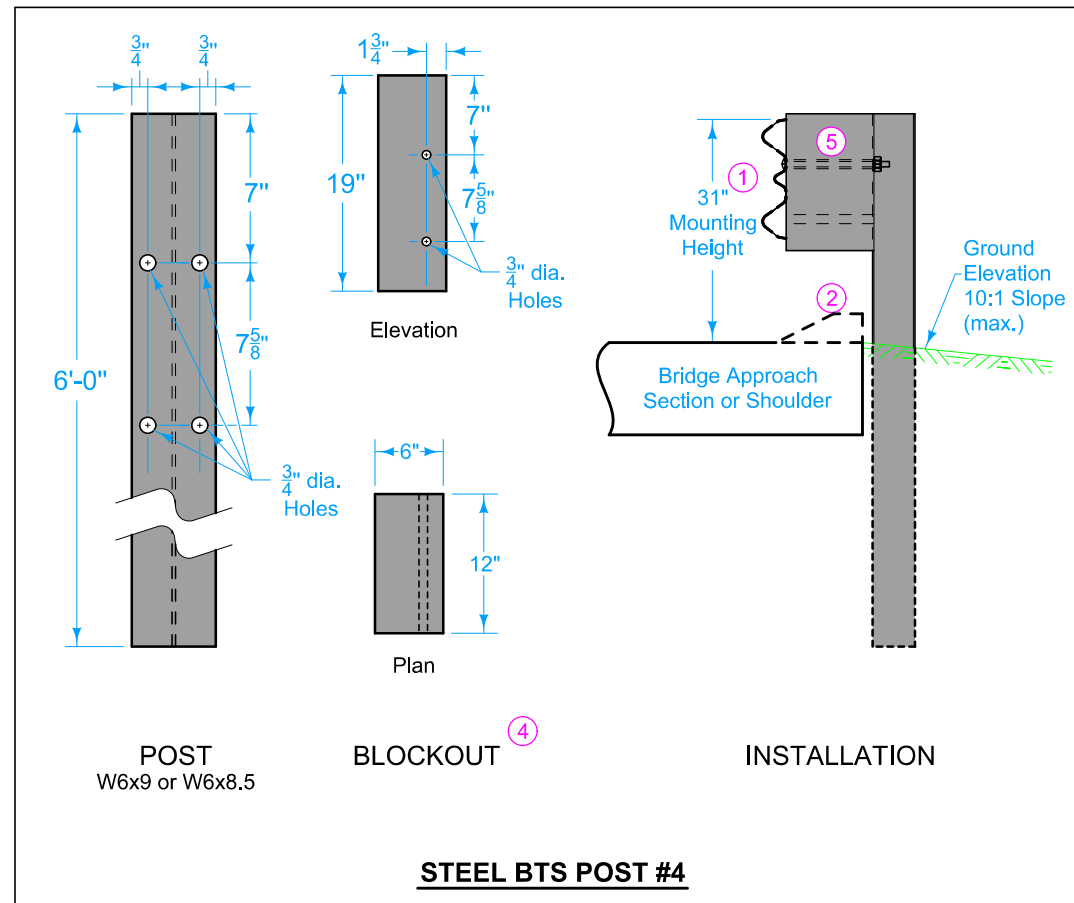
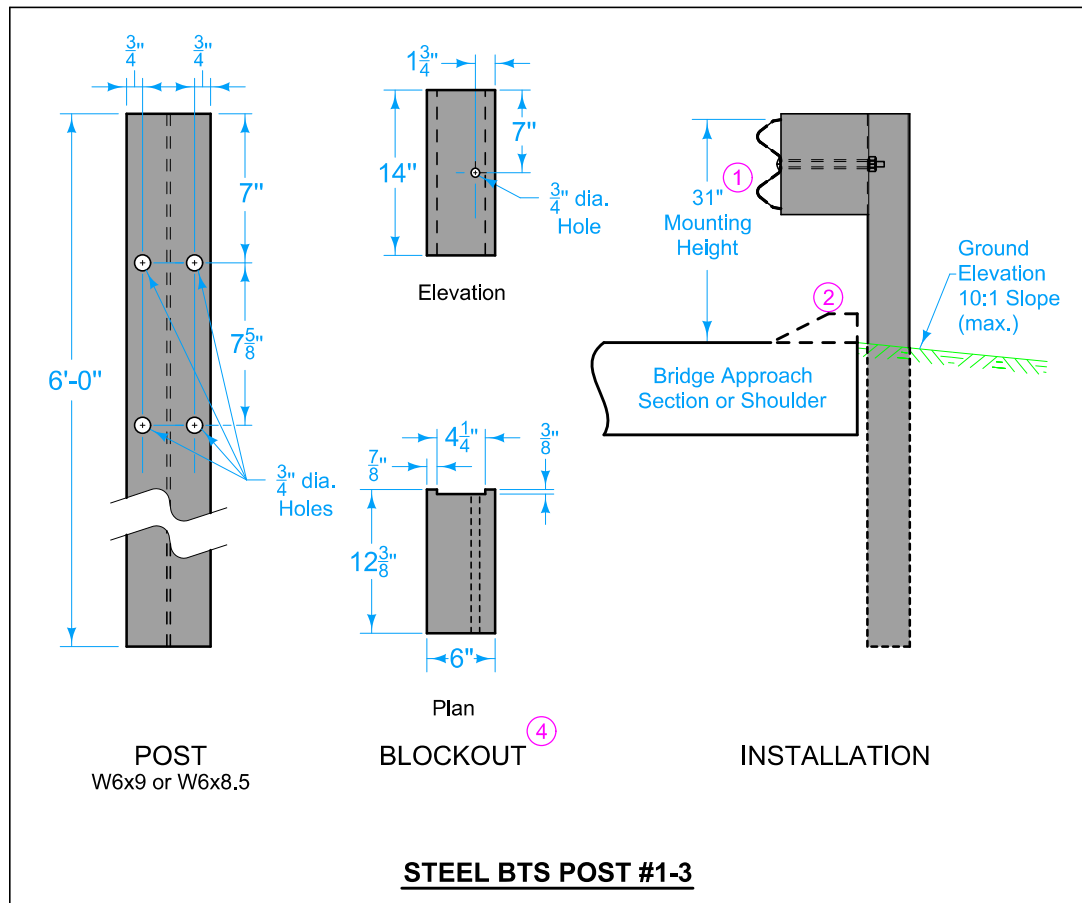
Possible Contract Item:
Steel Beam Guardrail Barrier Transition Section, BA-201

- Materials included in the Contract Item:
- Steel Post Option:
 - (9) W6x9 x 6'-0" posts
 - (6) 6" x 8" x 6'-9" posts
 - (12) 6" x 12" x 19" blockouts
 - (3) 6" x 12" x 14" blockouts
 - Wood Post Option:
 - (9) 6" x 8" x 6'-0" posts
 - (6) 6" x 8" x 7'-0" posts
 - (12) 6" x 12" x 19" blockouts
 - (3) 6" x 12" x 14" blockouts
 - (1) Asymmetrical Transition Section
 - (2) 12'-6" Thrie-Beam rail sections*
 - (1) 6'-3" Thrie-Beam rail section*
 - (2) 12'-6" W-Beam rail sections
- Approved bolts, nuts, and washers
Refer to BA-200 for guardrail components

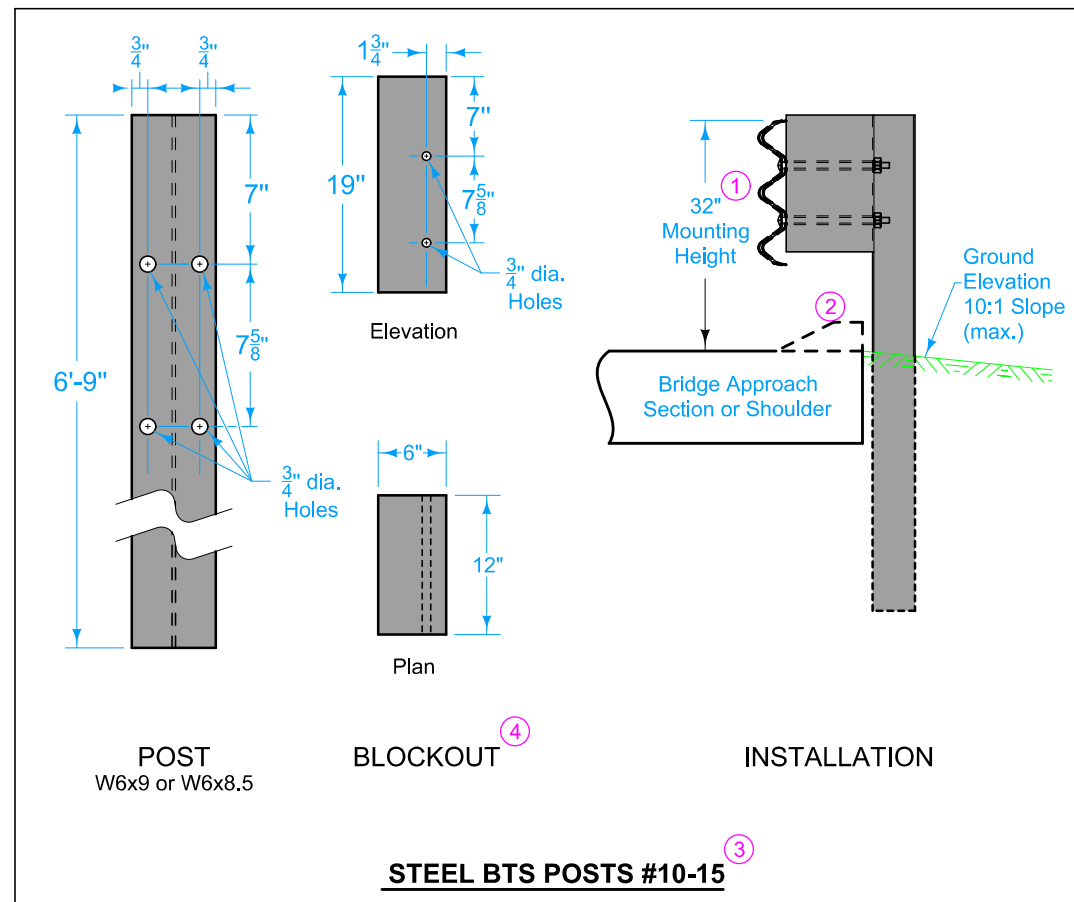
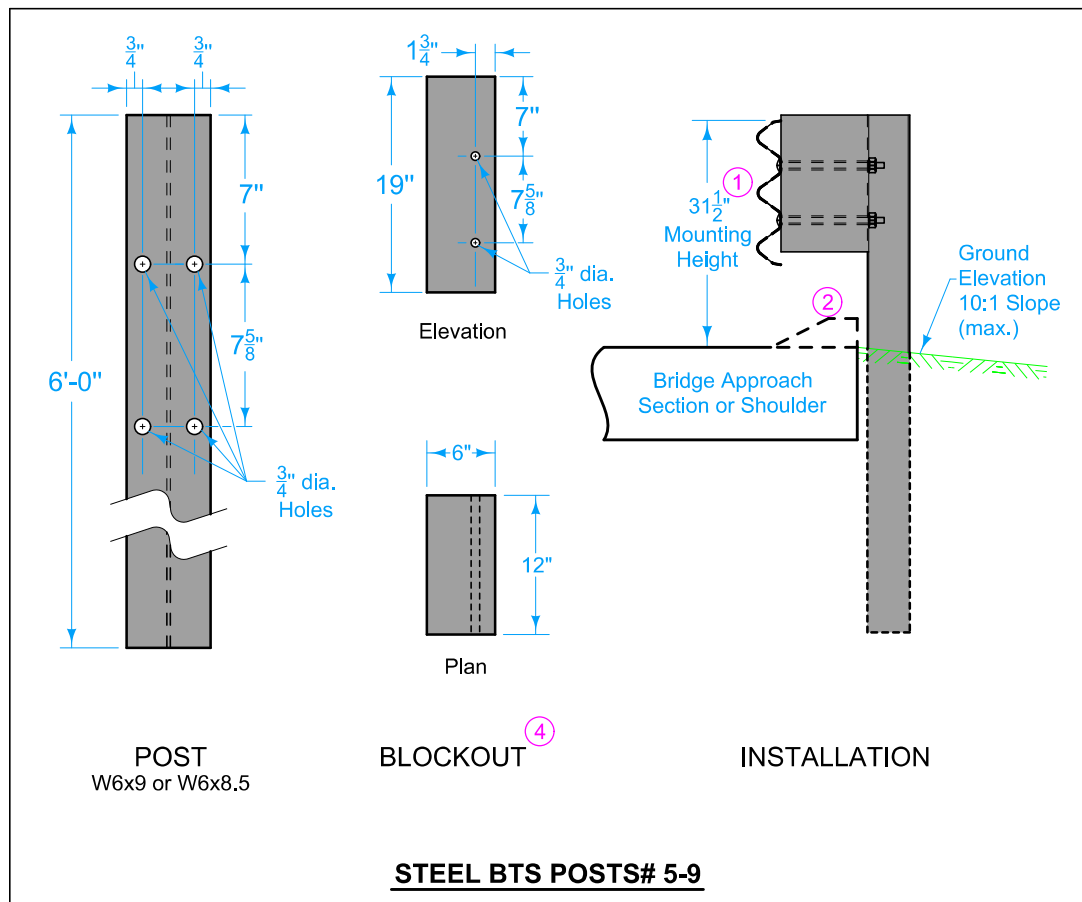
* One 18'-9" Thrie-Beam rail section may be substituted for one of the 12'-6" sections and the 6'-3" section as shown



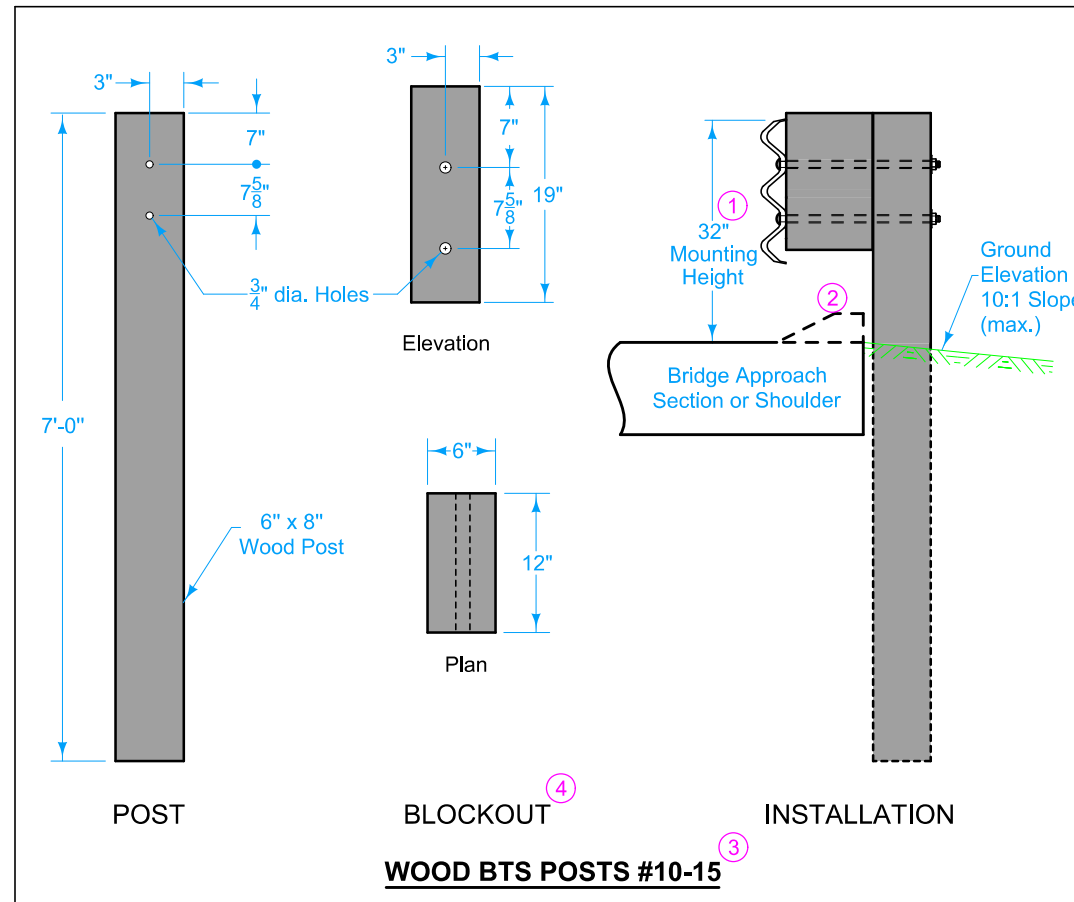
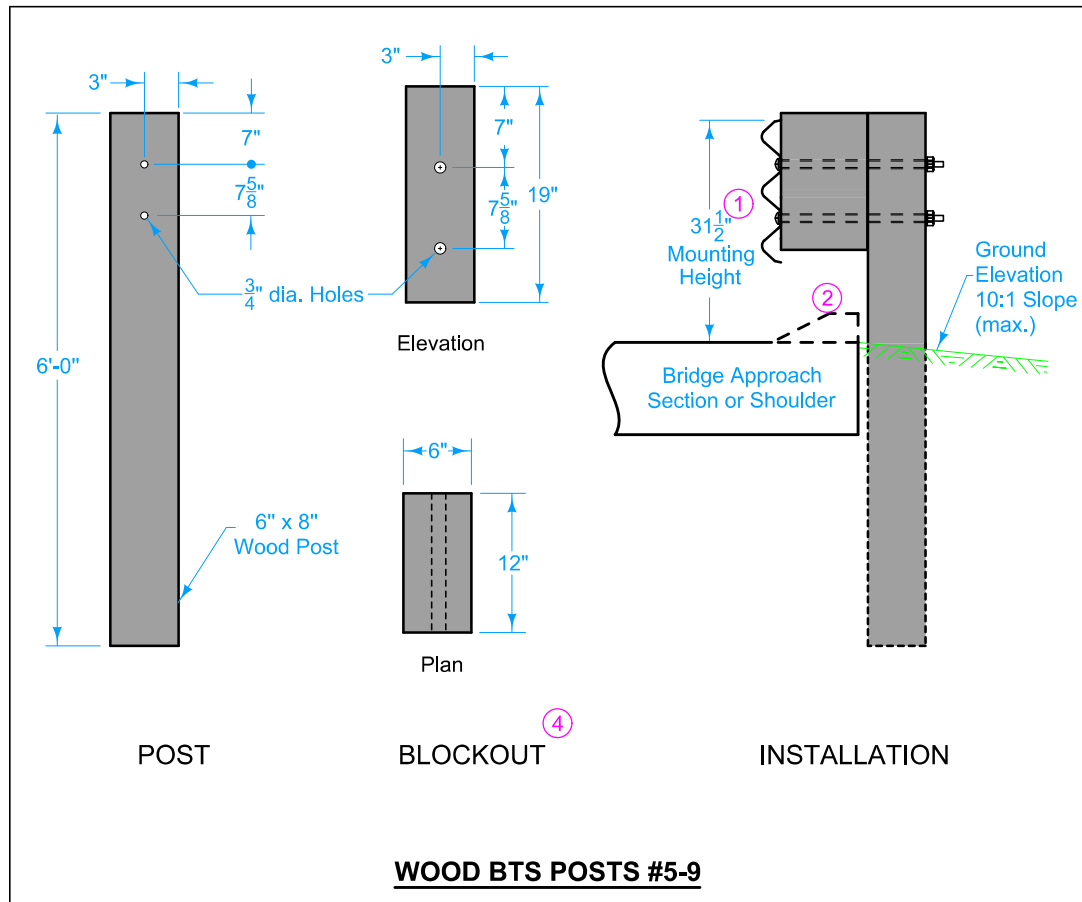
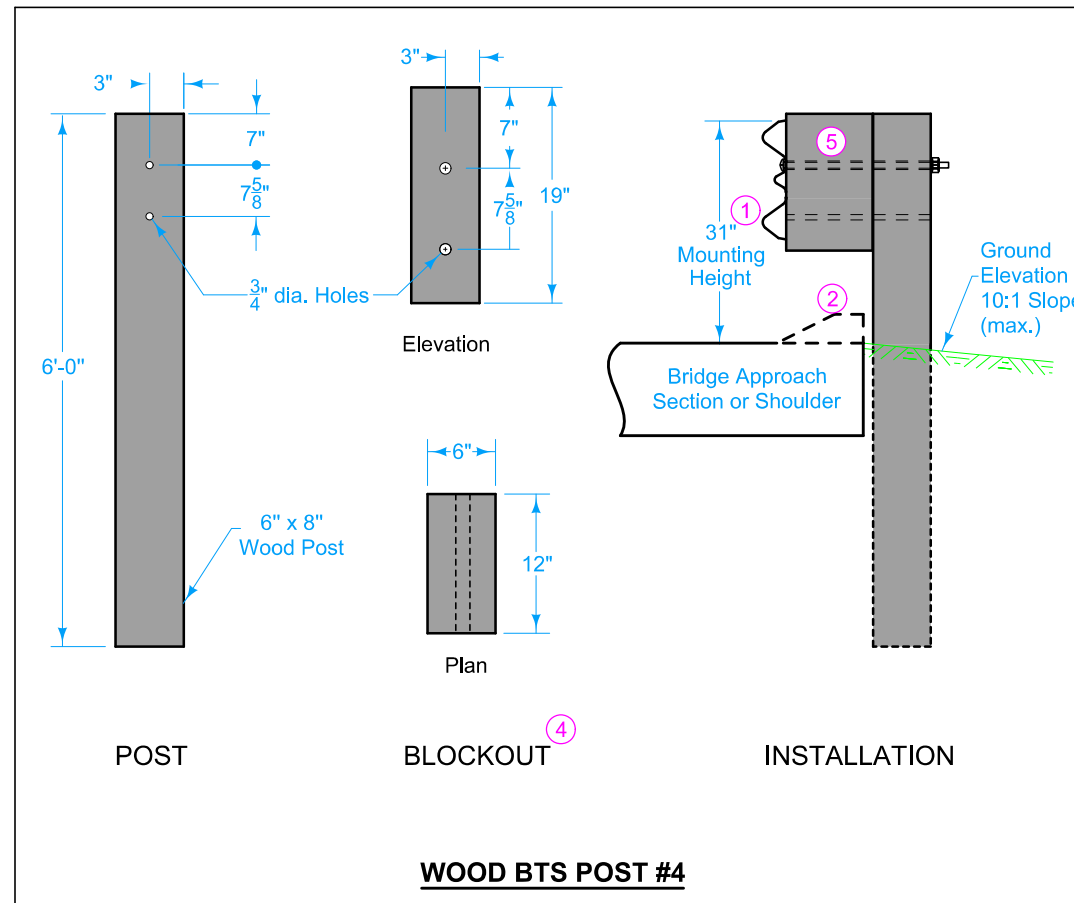
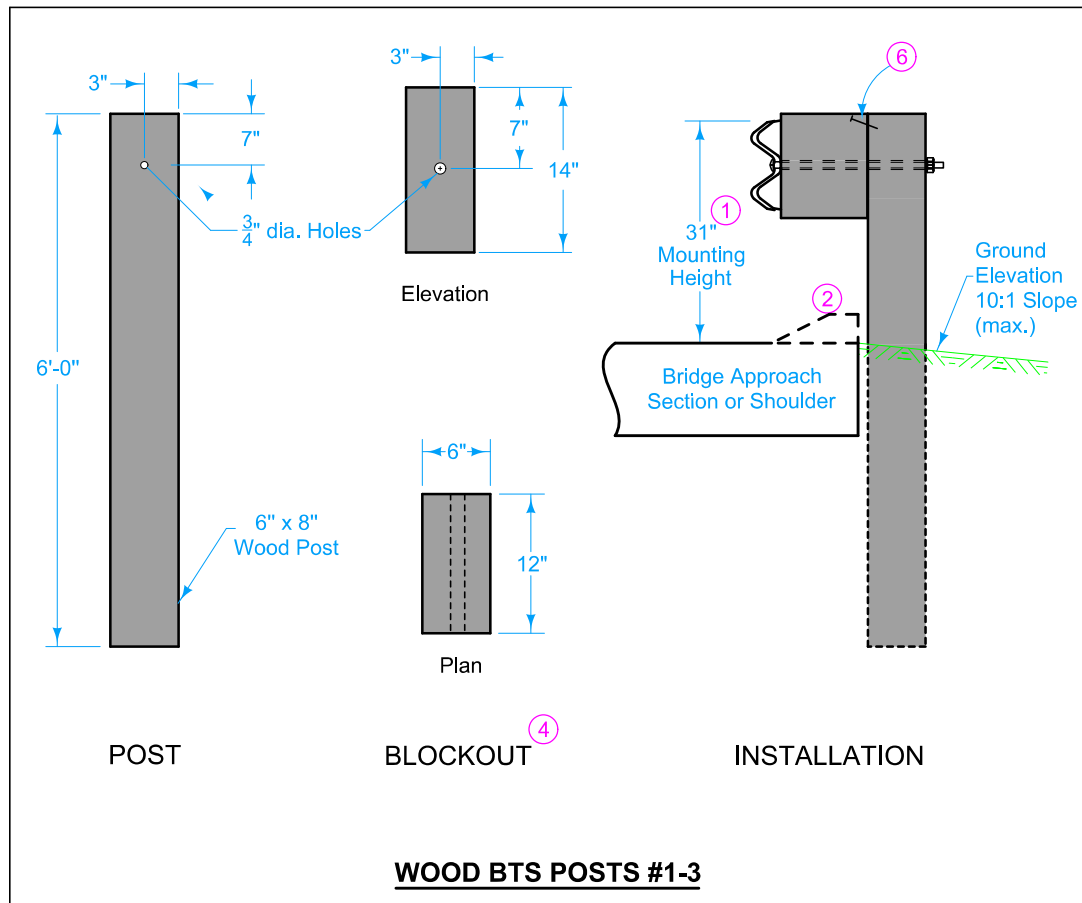
	REVISION	
	7	10-18-22
STANDARD ROAD PLAN		BA-201
REVISIONS: Revised curb note.		SHEET 1 of 3
APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL BARRIER TRANSITION SECTION (MASH TL-3)		



- ① Guardrail mounting height at barrier connection is 32 inches. Transition guardrail mounting height down to 31 inches at BTS Post #3.
- ② Possible 4 inch sloped curb. See project plans. Refer to PV-102 for curb and runout details.
- ③ Depending on end anchor type, BTS Post #15 may be eliminated or modified. See BA-202.
- ④ Wood or composite only. Steel blockouts will not be allowed.
- ⑤ Place bolt in top hole only.

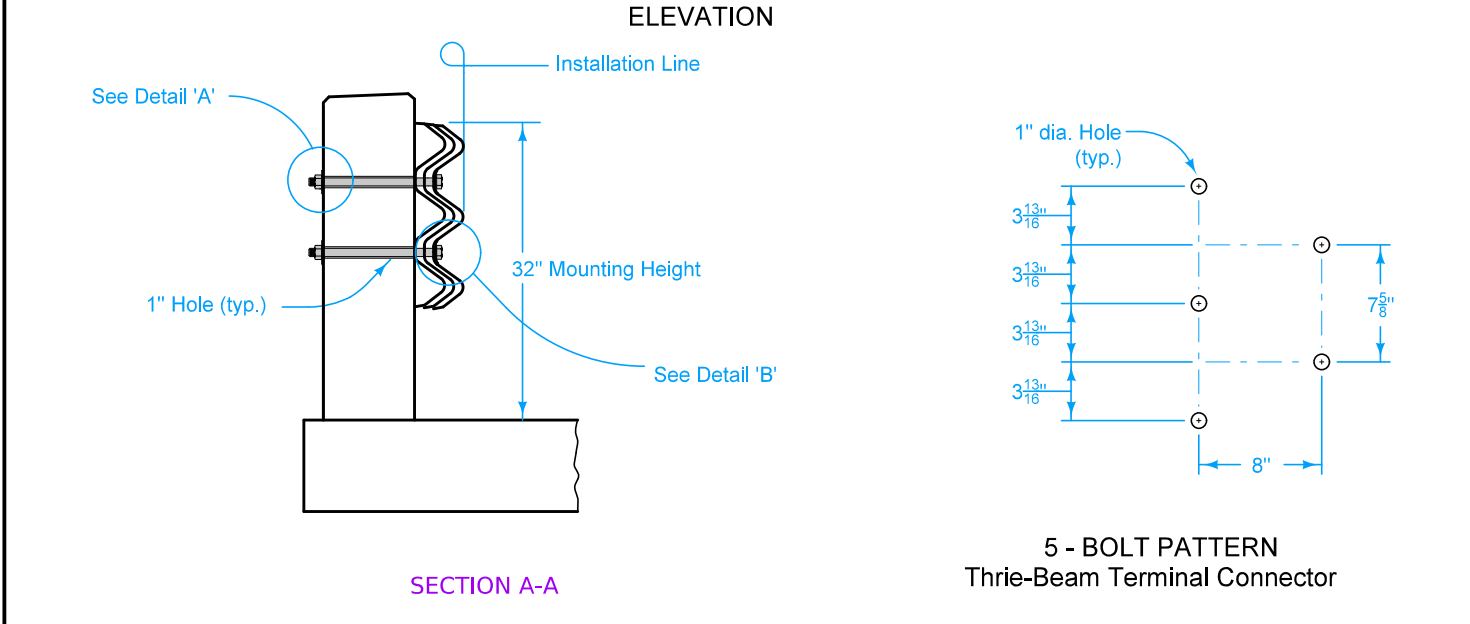
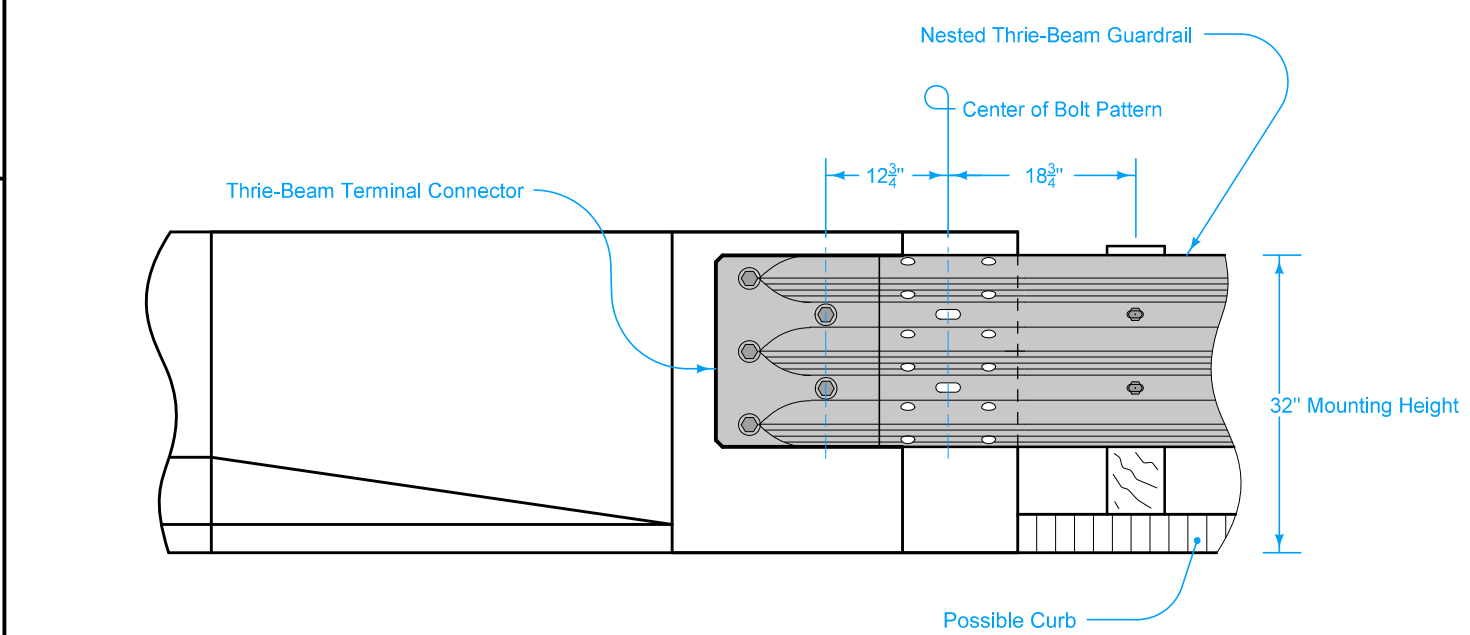
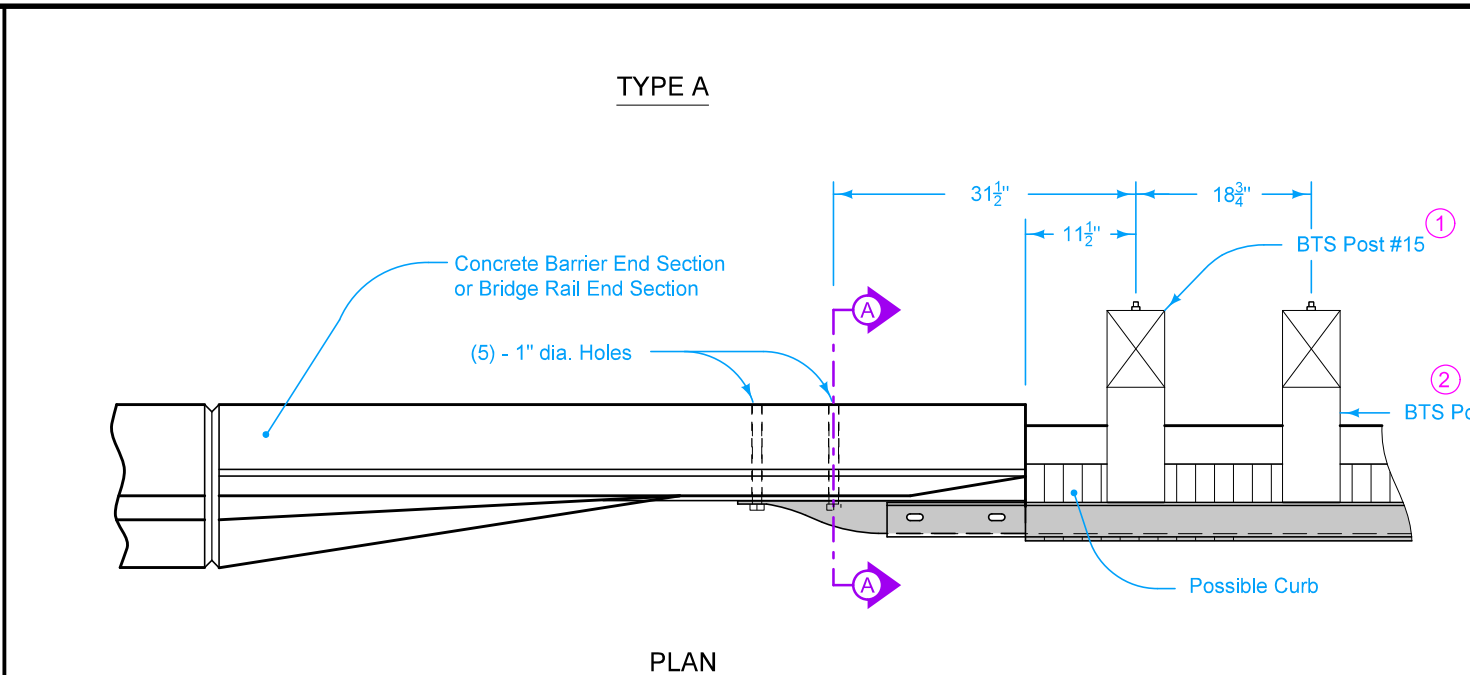
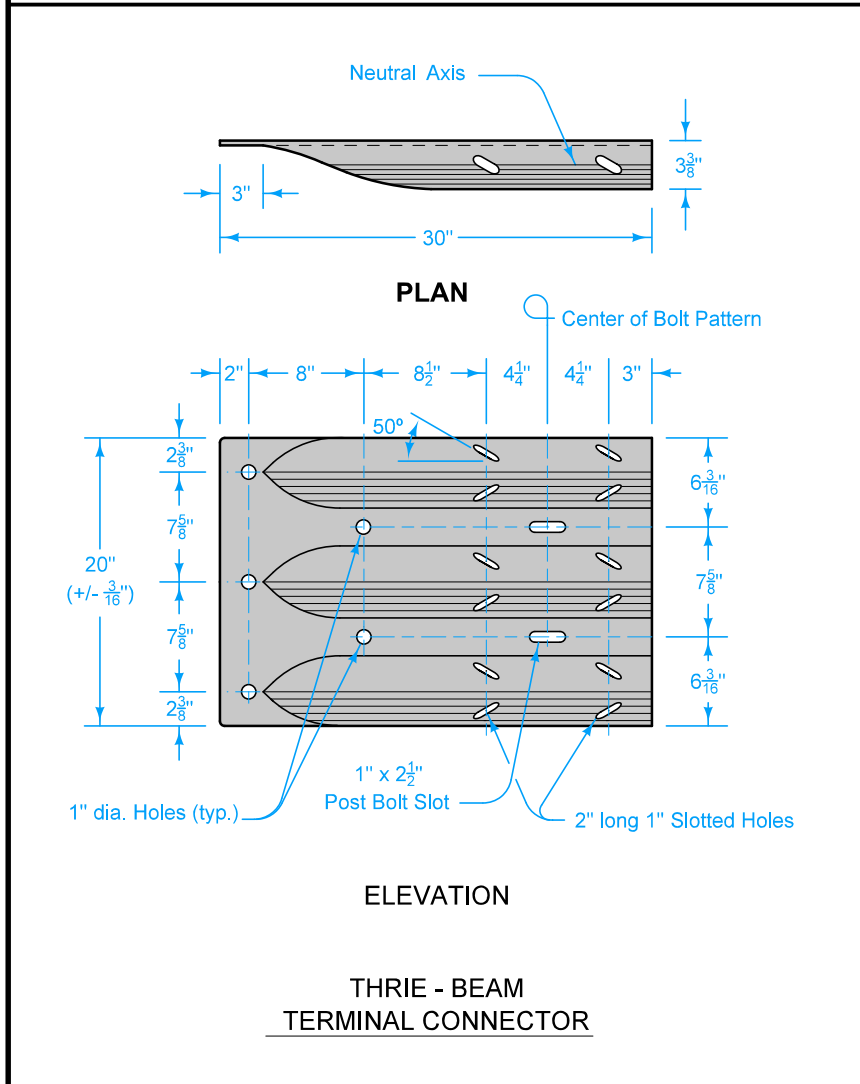
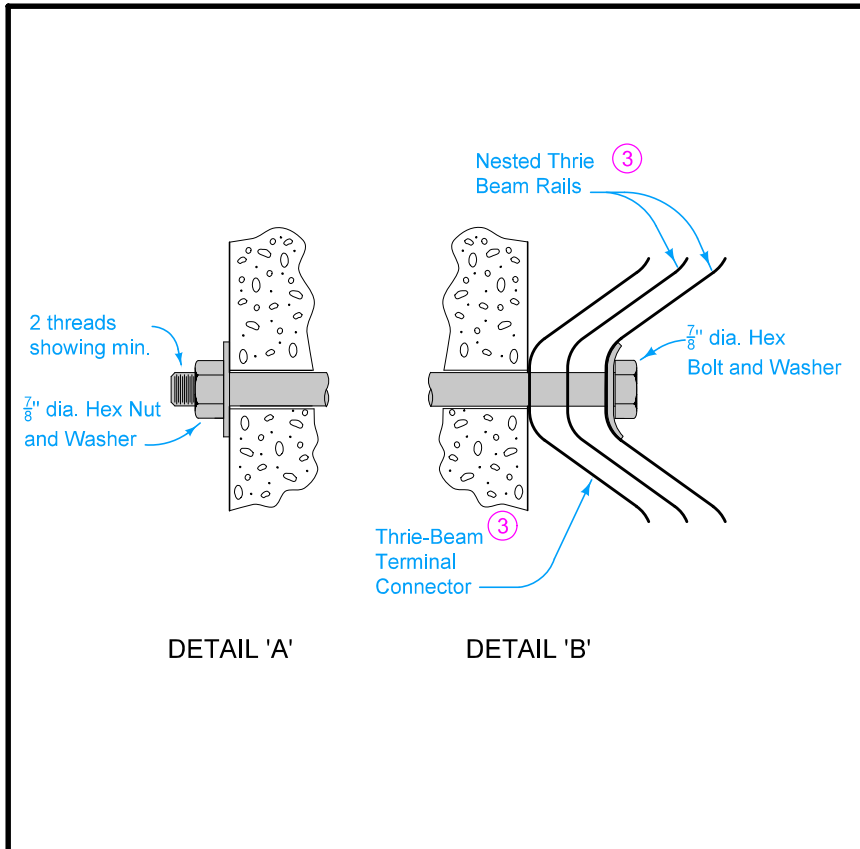


 STANDARD ROAD PLAN	REVISION	
	7	10-18-22
	BA-201	
SHEET 2 of 3		
REVISIONS: Revised curb note.		
 <small>APPROVED BY DESIGN METHODS ENGINEER</small>		
STEEL BEAM GUARDRAIL BARRIER TRANSITION SECTION (MASH TL-3)		



- ① Guardrail mounting height at barrier connection is 32 inches. Transition guardrail mounting height down to 31 inches at BTS Post #3.
- ② Possible 4 inch sloped curb. See project plans. Refer to PV-102 for curb and runout details.
- ③ Depending on end anchor type, BTS Post #15 may be eliminated or modified. See BA-202.
- ④ Wood or composite only. Steel blockouts will not be allowed.
- ⑤ Place bolt in top hole only.
- ⑥ 16d nail to prevent blockout rotation.

 STANDARD ROAD PLAN	REVISION	
	7	10-18-22
	BA-201	
SHEET 3 of 3		
REVISIONS: Revised curb note.		
 <small>APPROVED BY DESIGN METHODS ENGINEER</small>		
STEEL BEAM GUARDRAIL BARRIER TRANSITION SECTION (MASH TL-3)		



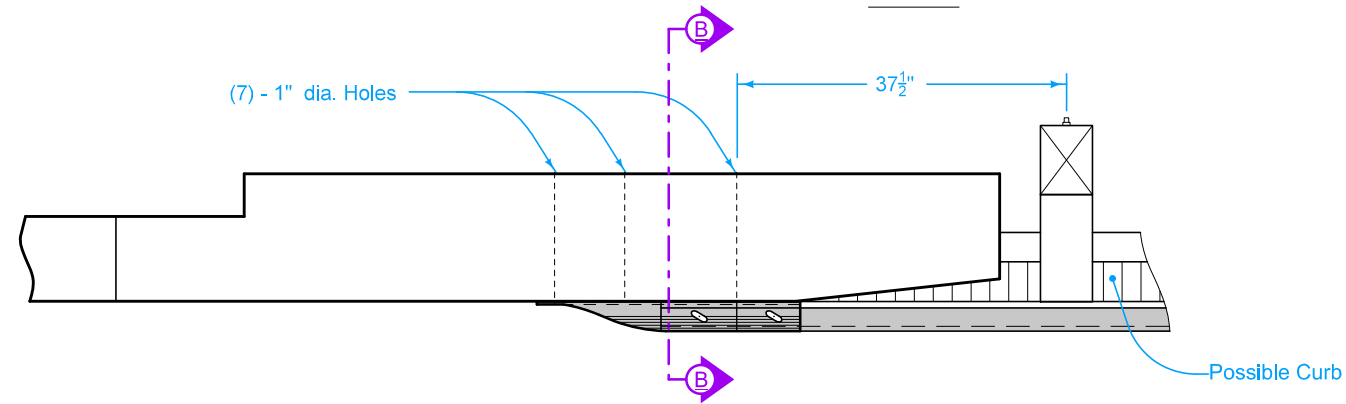
- ① See BA-201.
- ② BTS post # 14 BA-201. BTS post #5 BA-221.
- ③ Lap the Terminal Connector on the outside of the nested thrie beam rails for attachments on the trailing end of a bridge.

Possible Contract Item:
 Steel Beam Guardrail End Anchor, Bolted

Materials included in the Contract Item:
 Thrie-Beam Terminal Connector
 Approved 7/8" x sufficient length Hex Bolts
 Approved 7/8" Hex Nuts
 Approved 15/16" Washers

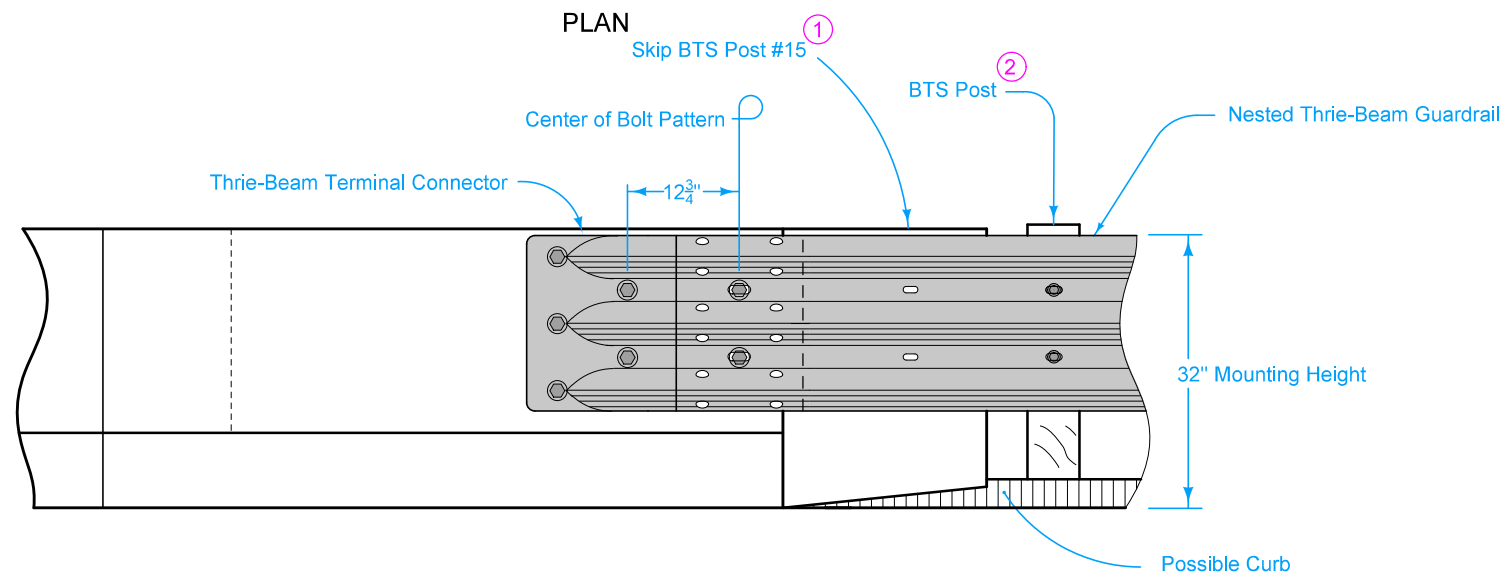
 STANDARD ROAD PLAN	REVISION	
	5	10-15-24
BA-202		
SHEET 1 of 4		
REVISIONS: Added Type 'D'.		
 APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL BOLTED END ANCHOR		

TYPE B

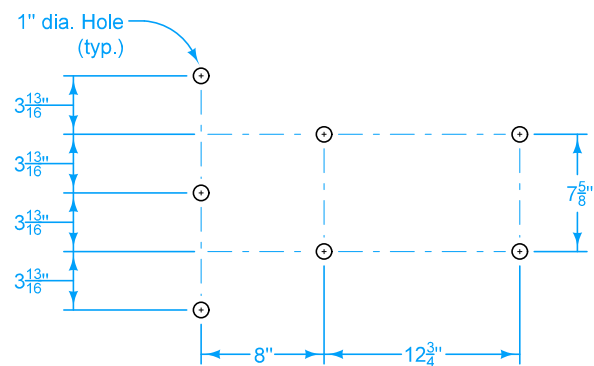


- ① See BA-201.
- ② BTS post # 14 BA-201. BTS post #5 BA-221.

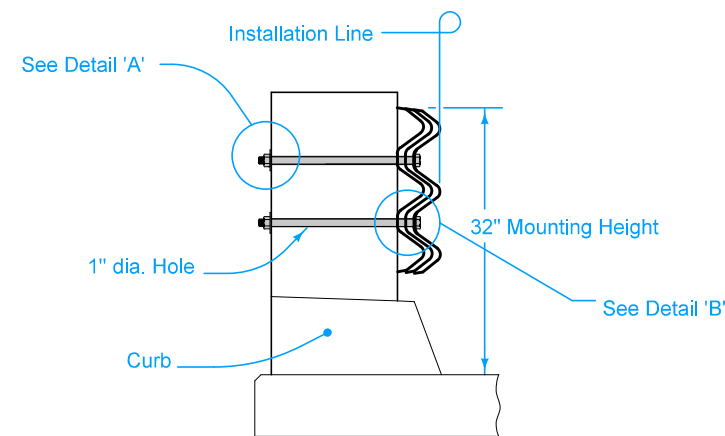
PLAN



ELEVATION



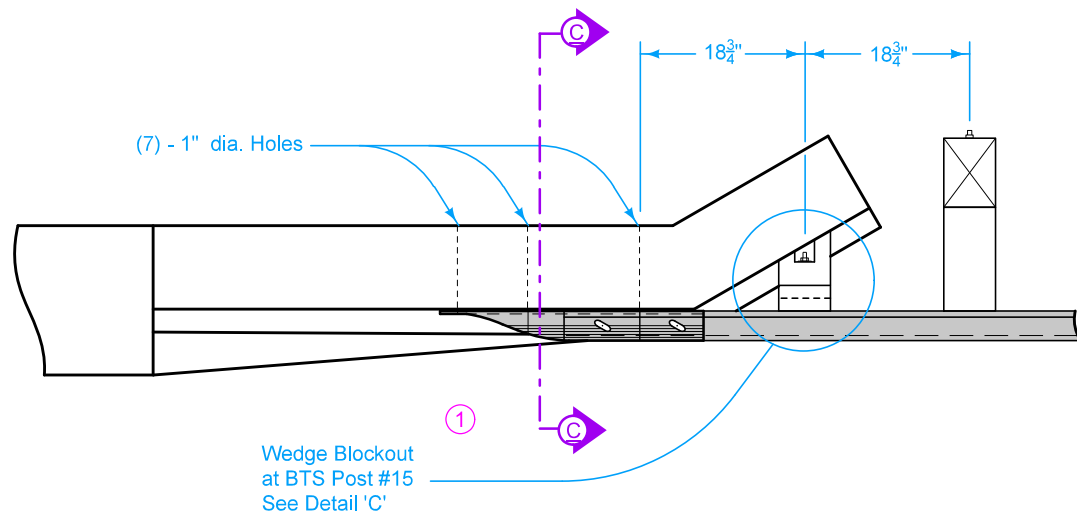
7 - BOLT PATTERN
Thrie - Beam Terminal Connector



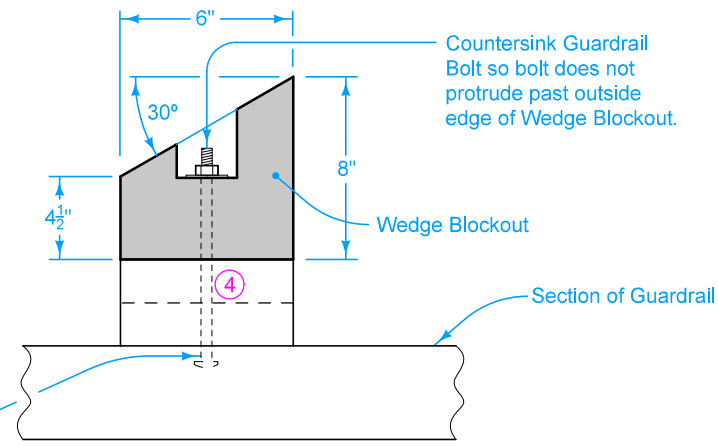
SECTION B-B

	REVISION	
	5	10-15-24
STANDARD ROAD PLAN		BA-202
REVISIONS: Added Type 'D'.		SHEET 2 of 4
 APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL BOLTED END ANCHOR		

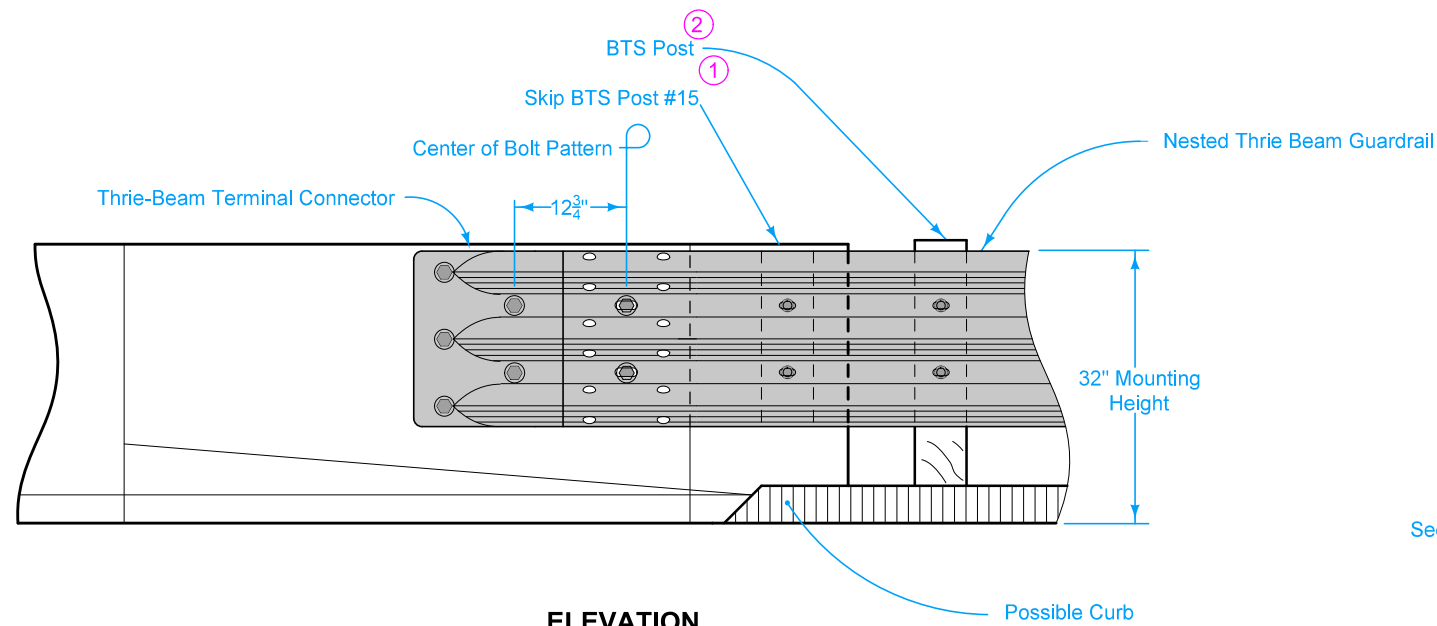
TYPE C



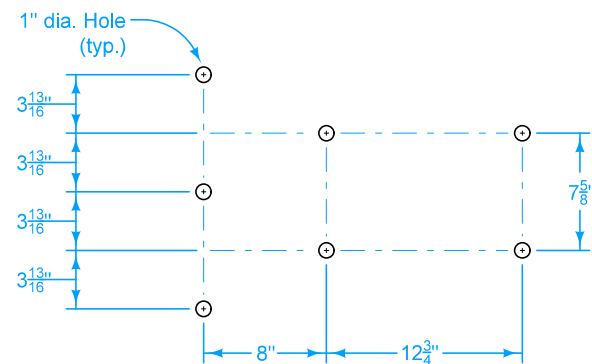
PLAN



DETAIL 'C'

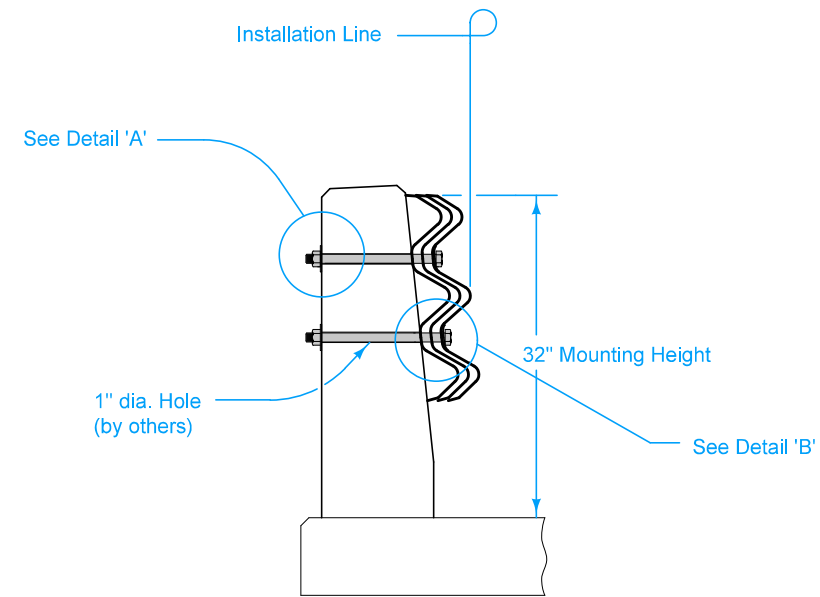


ELEVATION



7 - BOLT PATTERN

Thrie - Beam Terminal Connector



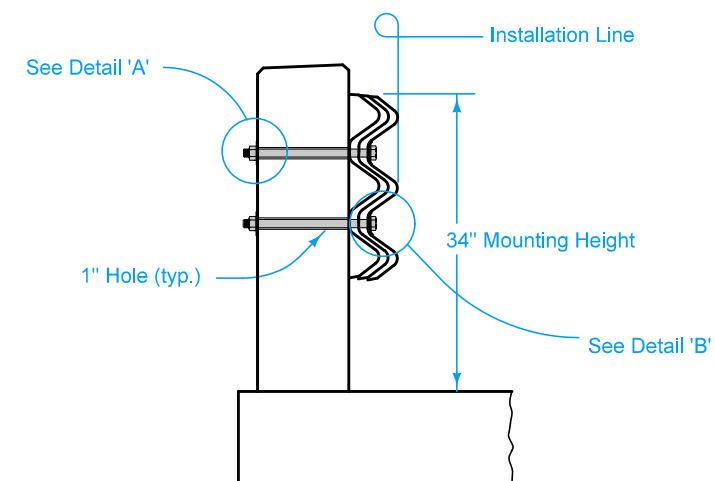
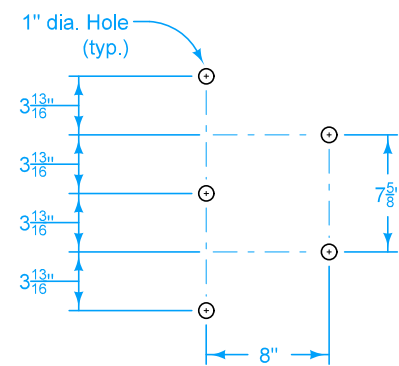
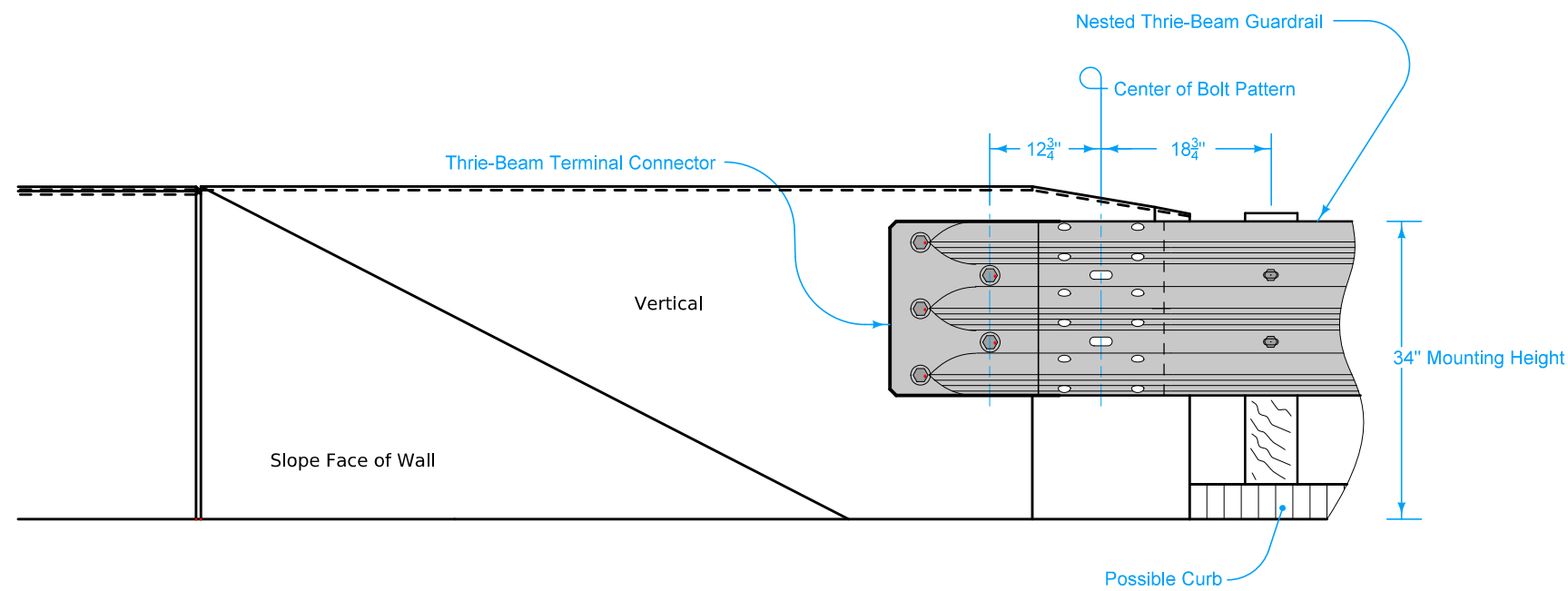
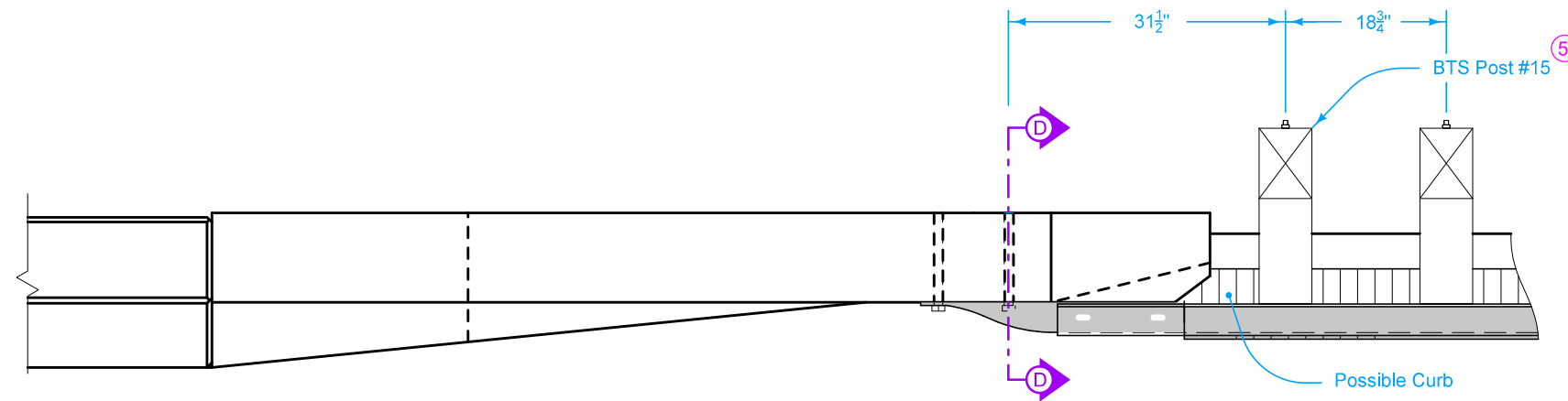
SECTION C-C

- ① See BA-201.
- ② BTS post # 14 BA-201. BTS post #5 BA-221.
- ④ Use treated spacer boards (1 in. x 6 in. or 2 in. x 6 in.) to produce a tight fit between the wedge blockout and endpost. A nominal 1 inch gap is acceptable. Spacer boards are incidental to bolted end anchor.

 IOWA DOT	REVISION	
	4	10-15-24
STANDARD ROAD PLAN		BA-202
		SHEET 3 of 4
REVISIONS: Added Type 'D'.		
 APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL BOLTED END ANCHOR		

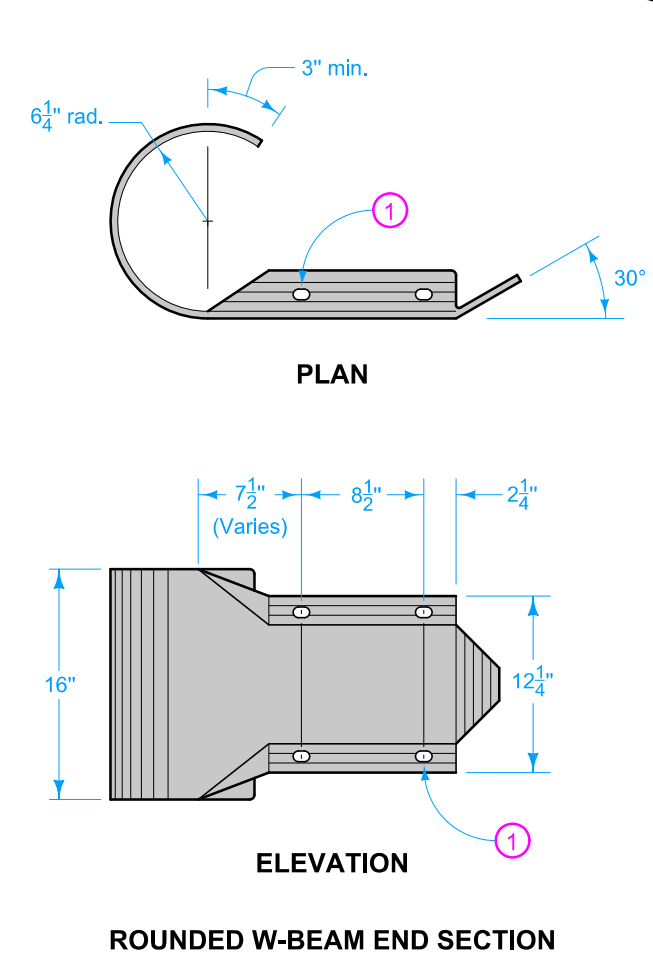
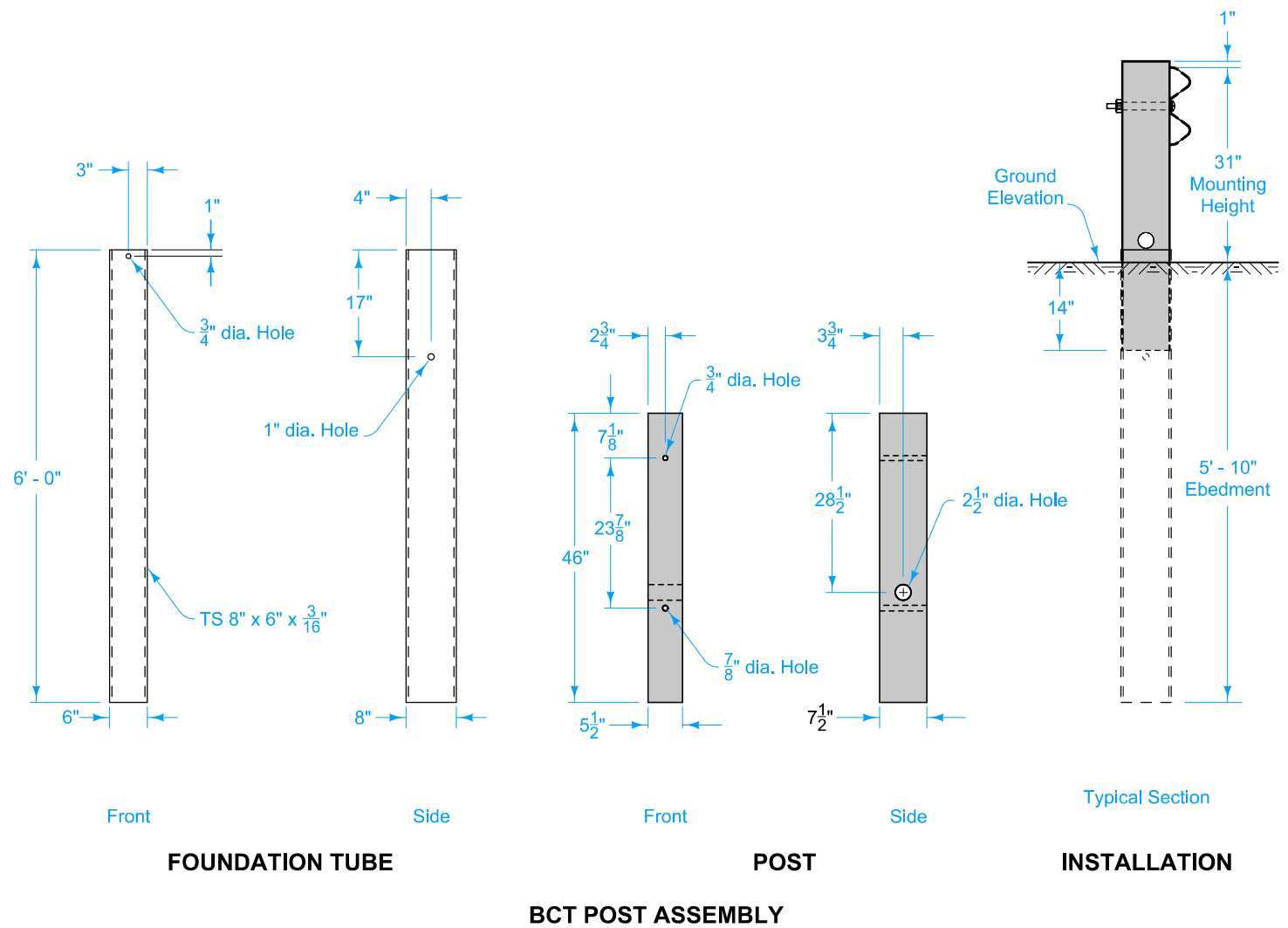
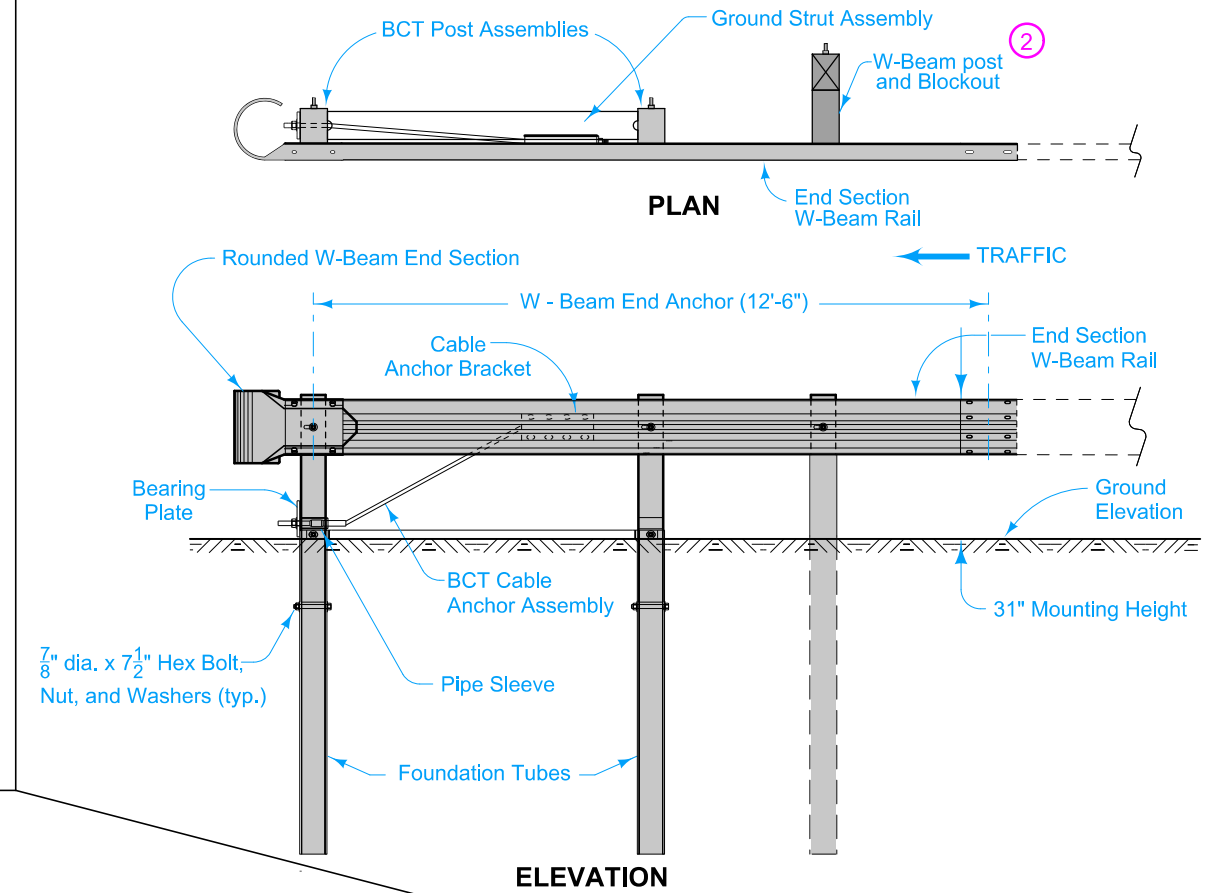
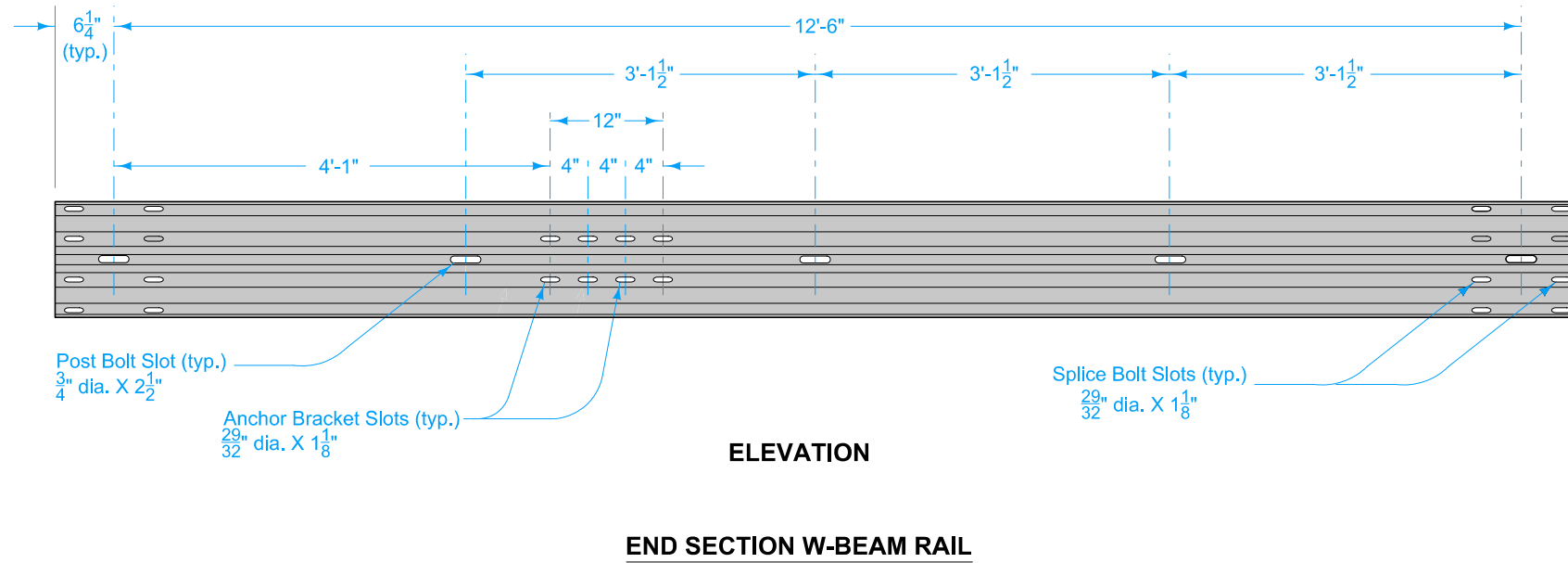
TYPE D

5 See BA-209.



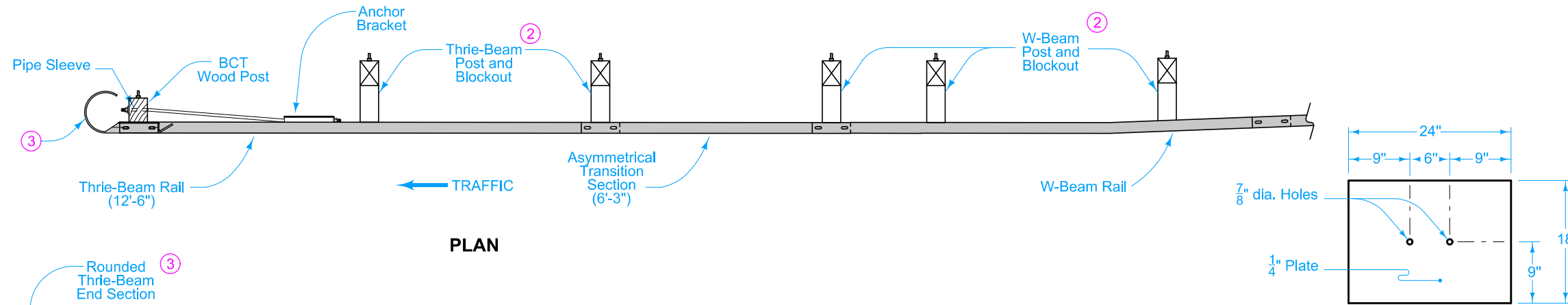
	REVISION	
	5	10-15-24
STANDARD ROAD PLAN		BA-202
REVISIONS: Added Type 'D'.		SHEET 4 of 4
 APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL BOLTED END ANCHOR		

DESIGNER INFORMATION

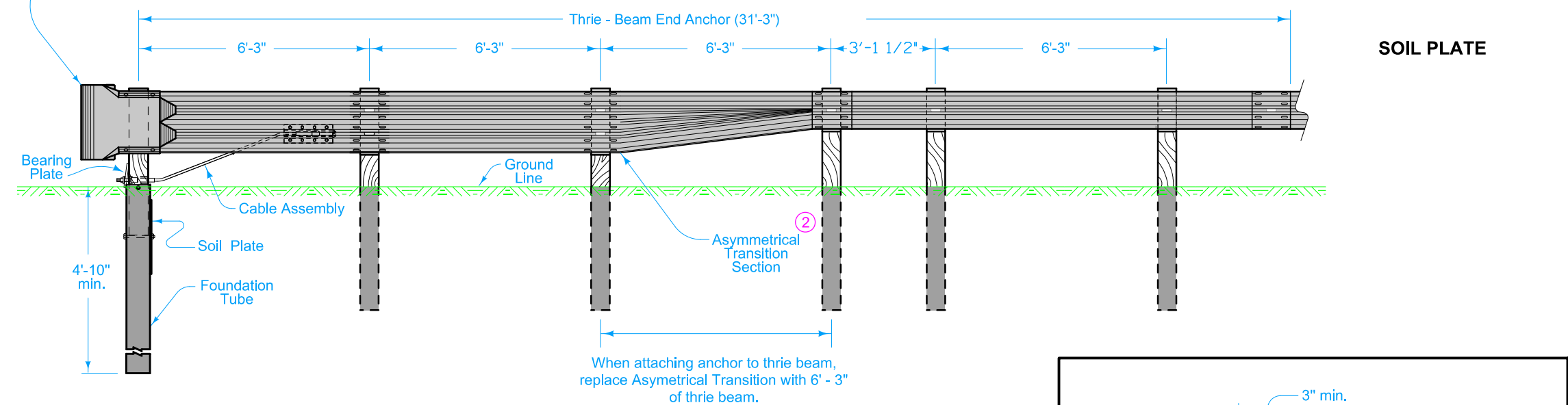


- ① 2 $\frac{9}{32}$ " x 1 $\frac{1}{8}$ " slots (2 $\frac{9}{32}$ " x 3" slots acceptable).
 - ② Refer to BA-200.
- Possible Contract Item:
Steel Beam Guardrail End Anchor, W-Beam
- Materials included in the Contract Item:
- (1) 12'-6" End Section W-Beam Rail
 - (2) Foundation Tube Assemblies
 - (2) BCT Wood Posts
 - (1) Rounded W-Beam End Section
 - (1) Cable Anchor Bracket
 - (1) BCT Cable Anchor Assembly
 - (1) Ground Strut Assembly
 - (1) Pipe Sleeve
 - (1) Bearing Plate
 - (1) W-Beam Post (wood or steel - match remainder of installation)
 - (1) W-Beam Blockout
 - Approved bolts, nuts, and washers

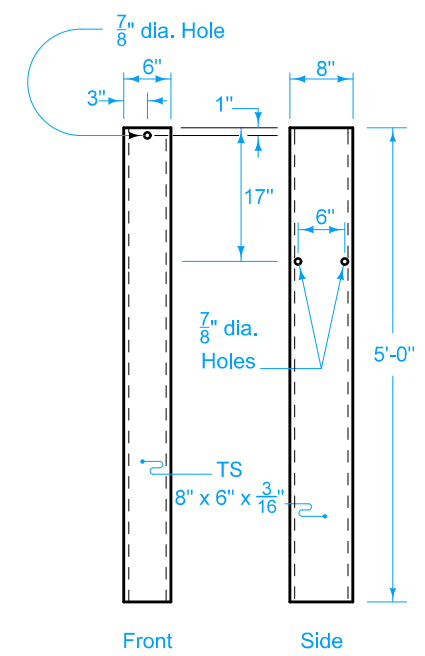
	REVISION	
	2	10-15-19
STANDARD ROAD PLAN		BA-203
REVISIONS: New logo.		SHEET 1 of 1
 APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL W-BEAM END ANCHOR		



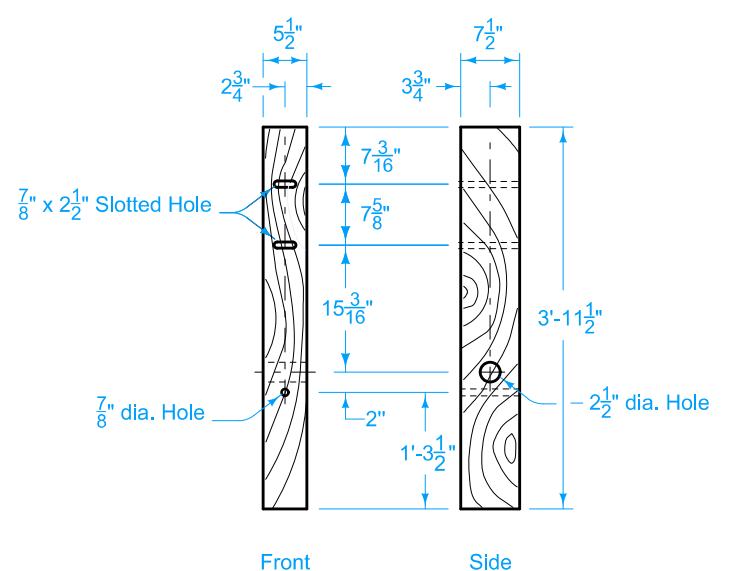
- ① Slotted holes $\frac{29}{32}$ " x $1\frac{1}{8}$ " long.
- ② Refer to **BA-200**.
- ③ Cover entire face of end section with alternating black and yellow striped adhesive sheeting. Stripes shall be approximately 3 inches in width and shall be sloped down at an angle of 45 degrees toward the side on which traffic is to pass the end anchor. Yellow stripes shall meet the retroreflectivity requirements for Type III or Type IV reflective sheeting.



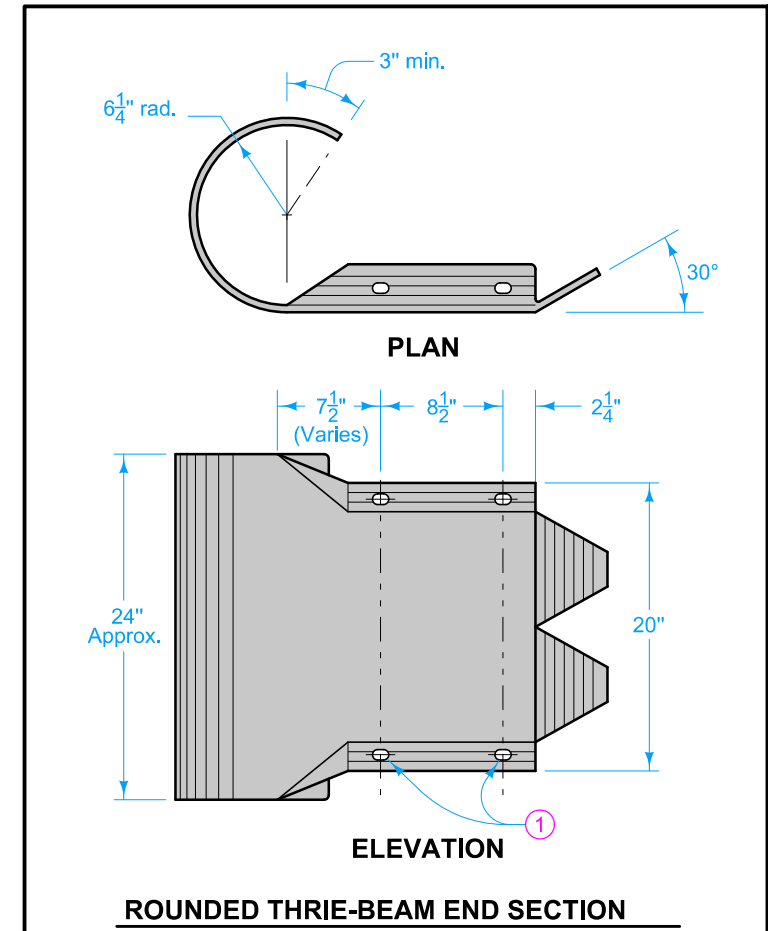
- Possible Contract Item:
Steel Beam Guardrail End Anchor, Thrie-Beam
- Materials included in the Contract Item:
- (1) 12'-6" Thrie-Beam rail section
 - (1) 12'-6" W-Beam rail section
 - (1) Asymmetrical Transition Section
 - (2) Thrie-Beam posts (wood or steel - match remainder of installation)
 - (3) W-Beam posts (wood or steel - match remainder of installation)
 - (3) W-Beam blockouts
 - (2) Thrie-Beam blockouts
 - (1) BCT Wood Post
 - (1) Rounded Thrie-Beam End Section
 - (1) Anchor Bracket Assembly
 - (1) Cable Assembly
 - (1) Foundation Tube Assembly with Soil Plate
 - (1) Pipe Sleeve
 - Approved bolts, nuts, and washers



FOUNDATION TUBE



BCT WOOD POST



ROUNDED THRIE-BEAM END SECTION

	REVISION	
	3	10-18-22
STANDARD ROAD PLAN		BA-204
REVISIONS: Added 12'-6" of W-Beam Guardrail.		SHEET 1 of 1

APPROVED BY DESIGN METHODS ENGINEER

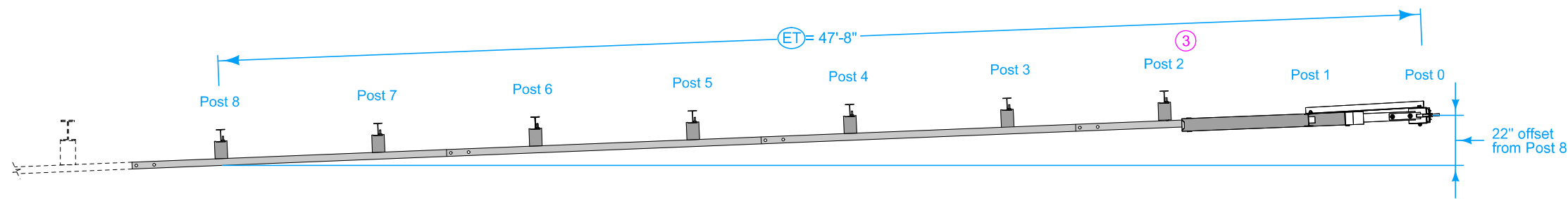
**STEEL BEAM GUARDRAIL
THRIE-BEAM END ANCHOR**

DESIGNER INFORMATION

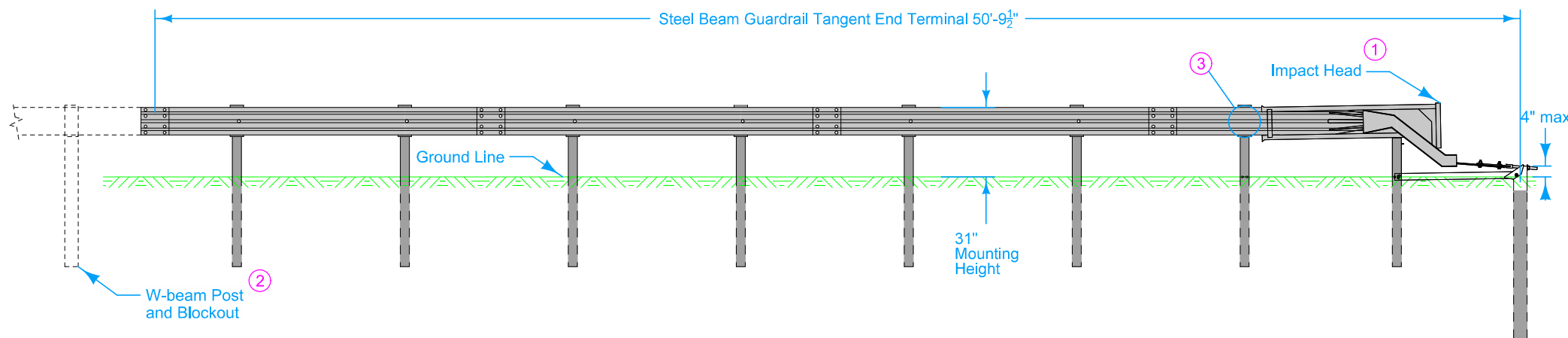
Refer to Materials I.M. 455.02 for a list of approved sources.

Use materials meeting the respective manufacturer's specifications. Install end terminals according to the manufacturer's recommendations.

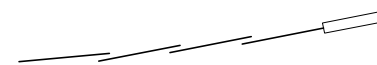
Drive posts using a hammer driver. Ensure posts are not damaged during installation. Posts may be placed in prebored holes if site conditions are such that posts cannot be driven. Place backfill material consisting of material removed or other suitable soil around posts. Place the backfill material in lifts not exceeding 4 inches. Thoroughly compact each lift before the next lift is placed.



PLAN



ELEVATION



LAPPING PROCEDURE

① Cover entire face of impact head with alternating black and yellow striped adhesive sheeting meeting the following requirements:

- Stripes are approximately 3 inches wide and slope down at a 45 degree angle toward the side on which traffic is to pass the end terminal.
- Yellow stripes meet the retroreflectivity requirements for Type III or Type IV reflective sheeting.

② Refer to BA-200.

③ Bolt only the blockout to the post. Do not bolt the rail to the post.

Possible Contract Item:
Steel Beam Guardrail Tangent End Terminal, BA-205

Possible Tabulations:
108-8A
108-8B
108-8C
108-8D

 STANDARD ROAD PLAN	REVISION	
	5	10-17-23
BA-205		SHEET 1 of 1

REVISIONS: Added note 3. Do not bolt rail to post #2 per manufactures instructions.

Shawn Miller
APPROVED BY DESIGN METHODS ENGINEER

**STEEL BEAM GUARDRAIL
TANGENT END TERMINAL
(MASH TL-3)**

DESIGNER INFORMATION

Refer to Materials I.M. 455.02 for a list of approved sources. If no MASH compliant steel beam guardrail flared end terminals are available, furnish a steel beam guardrail flared end terminal from the list of approved sources for Local Systems.

Use materials meeting the respective manufacturer's specifications. Install end terminals according to the manufacturer's recommendations.

Drive posts using a hammer driver. Ensure posts are not damaged during installation. Posts may be placed in prebored holes if site conditions are such that posts cannot be driven. Place backfill material consisting of material removed or other suitable soil around posts. Place the backfill material in lifts not exceeding 4 inches. Thoroughly compact each lift before the next lift is placed.

- ① Cover entire face of impact head or buffered end section with alternating black and yellow striped adhesive sheeting meeting the following requirements:
 - Stripes are approximately 3 inches wide and slope down at a 45 degree angle toward the side on which traffic is to pass the end terminal.
 - Yellow stripes meet the retroreflectivity requirements for Type III or Type IV reflective sheeting.

- ② Refer to BA-200.

Possible Contract Item:
Steel Beam Guardrail Flared End Terminal, BA-206

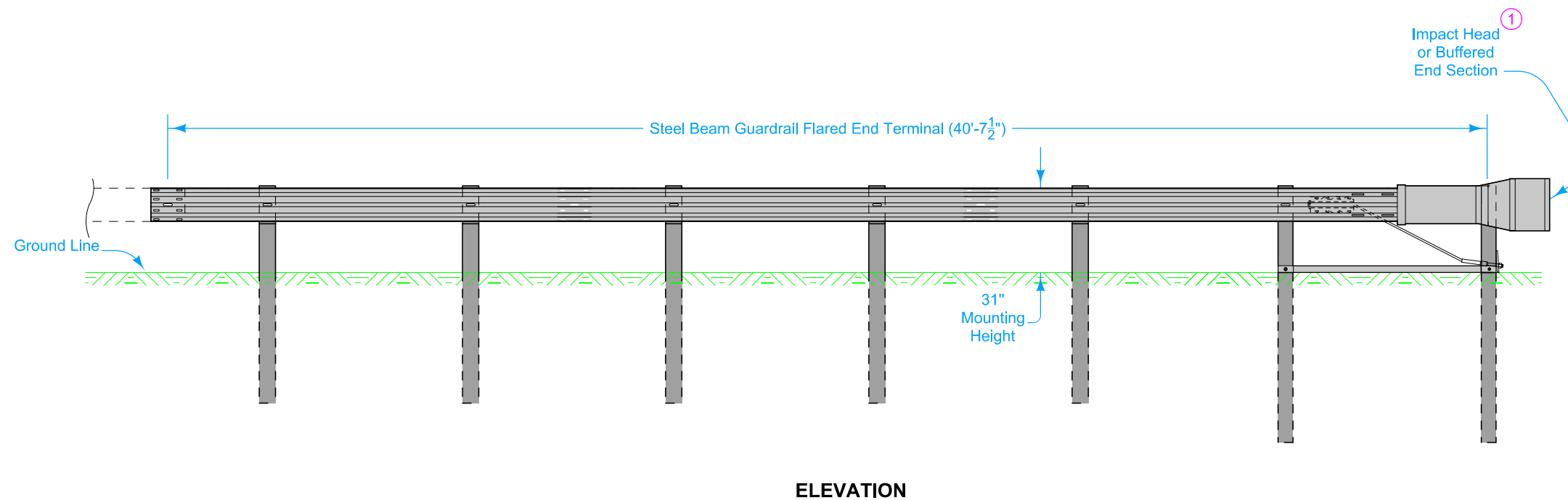
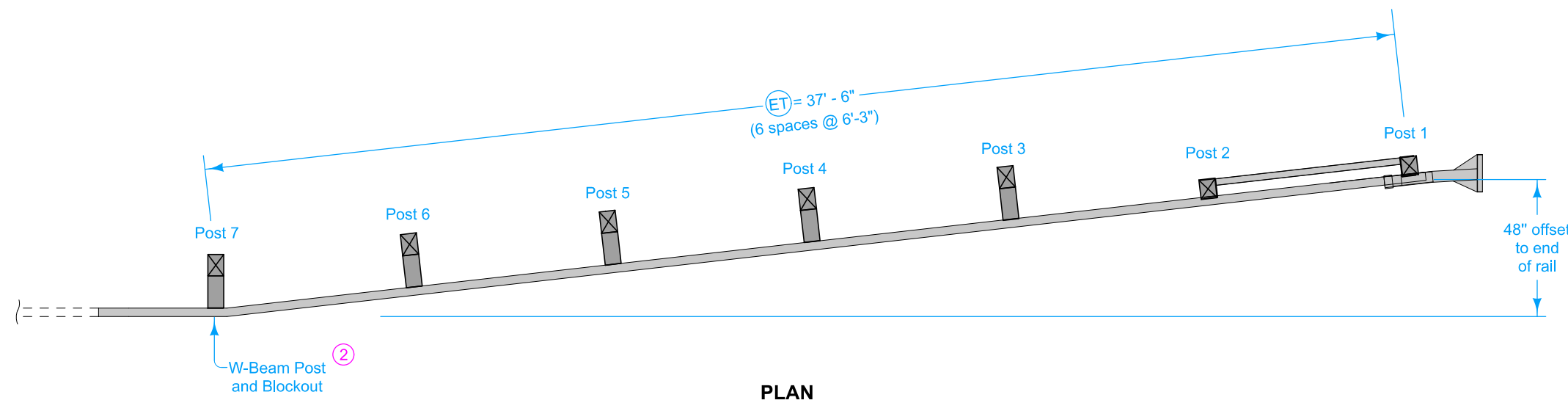
Possible Tabulations:
108-8A
108-8B
108-8C

	REVISION	
	5	10-19-21
STANDARD ROAD PLAN		BA-206
		SHEET 1 of 1

REVISIONS: Removed note about alternate post design. Added note about driving posts.

Shawn Miller
APPROVED BY DESIGN METHODS ENGINEER

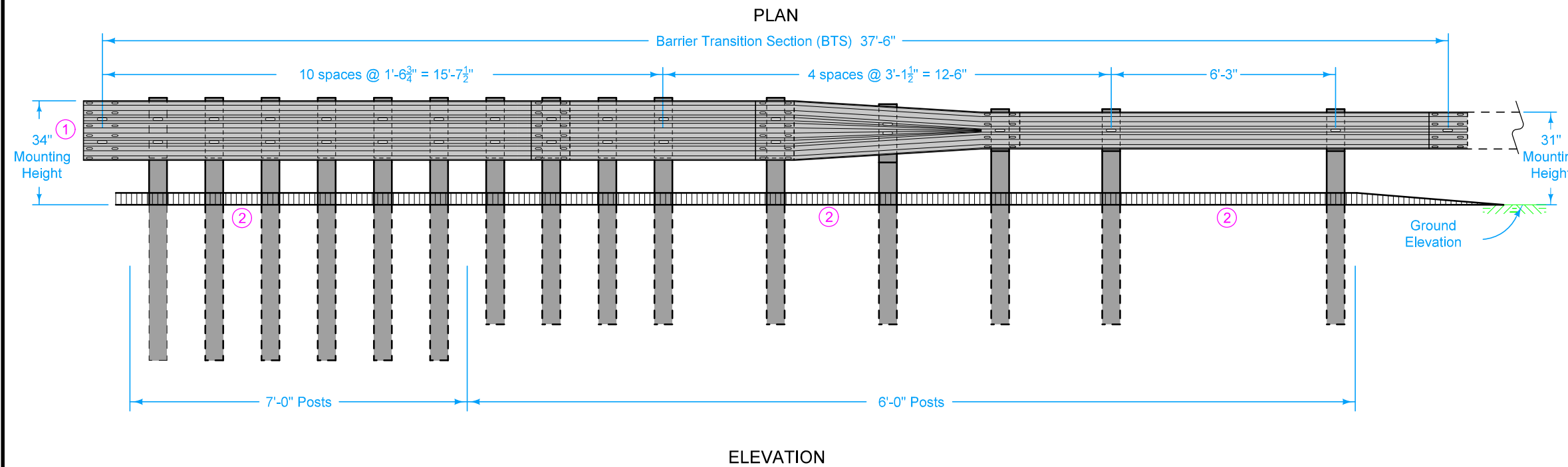
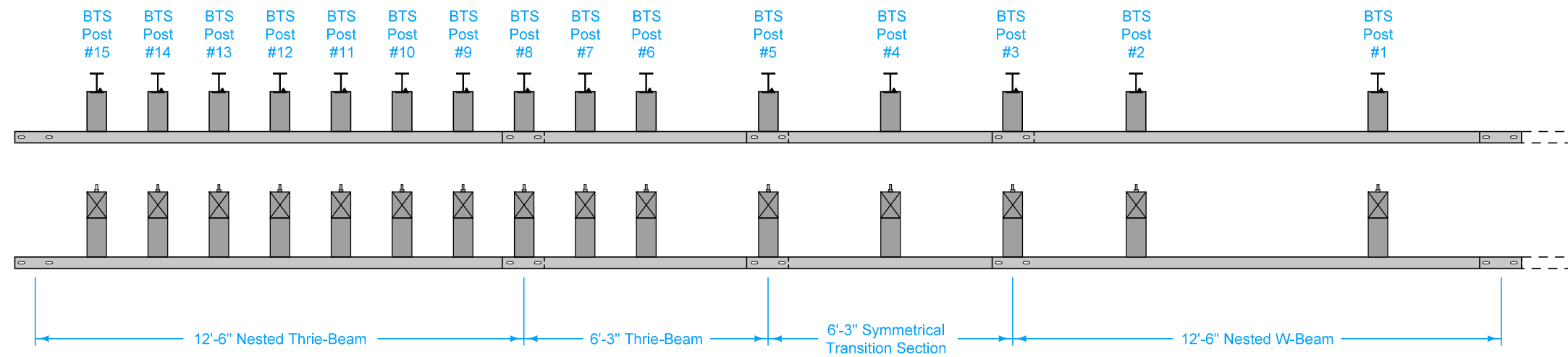
**STEEL BEAM GUARDRAIL
FLARED END TERMINAL
FOR CABLE CONNECTION**



DESIGNER INFORMATION

At Bridge End Drains, cut Scour Protection (Transition Mat and Turf Reinforcement Mat) or remove rock as required to place post(s) such that Bridge End Drains about post(s).

- ① Guardrail mounting height at barrier connection and posts 5-15 is 34 inches. Guardrail mounting height at posts 1-3 is 31 inches.
- ② Possible 4 inch sloped curb. See project plans. Refer to PV-102 for curb and runout details.



Possible Contract Item:
Steel Beam Guardrail Barrier Transition Section, BA-209

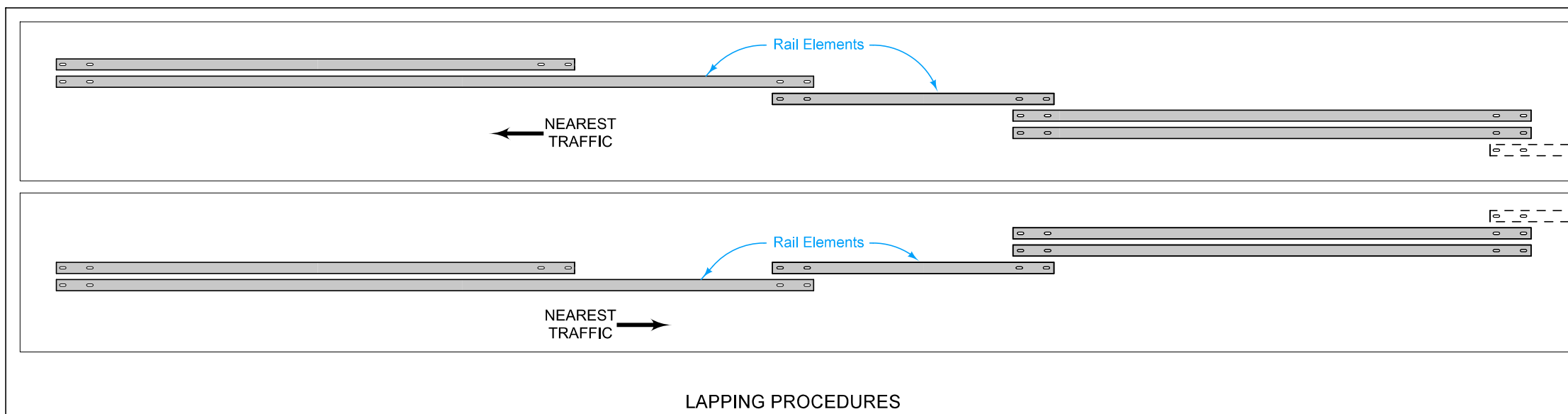
Materials included in the Contract Item:

- Steel Post Option:
- (9) W6x9 x 6'-0" posts
 - (6) W6x9 x 7'-0" posts
 - (12) 6" x 12" x 19" blockouts
 - (3) 6" x 12" x 14" blockouts
- Wood Post Option:
- (9) 6" x 8" x 6'-0" posts
 - (6) 6" x 8" x 7'-0" posts
 - (12) 6" x 12" x 19" blockouts
 - (3) 6" x 12" x 14" blockouts

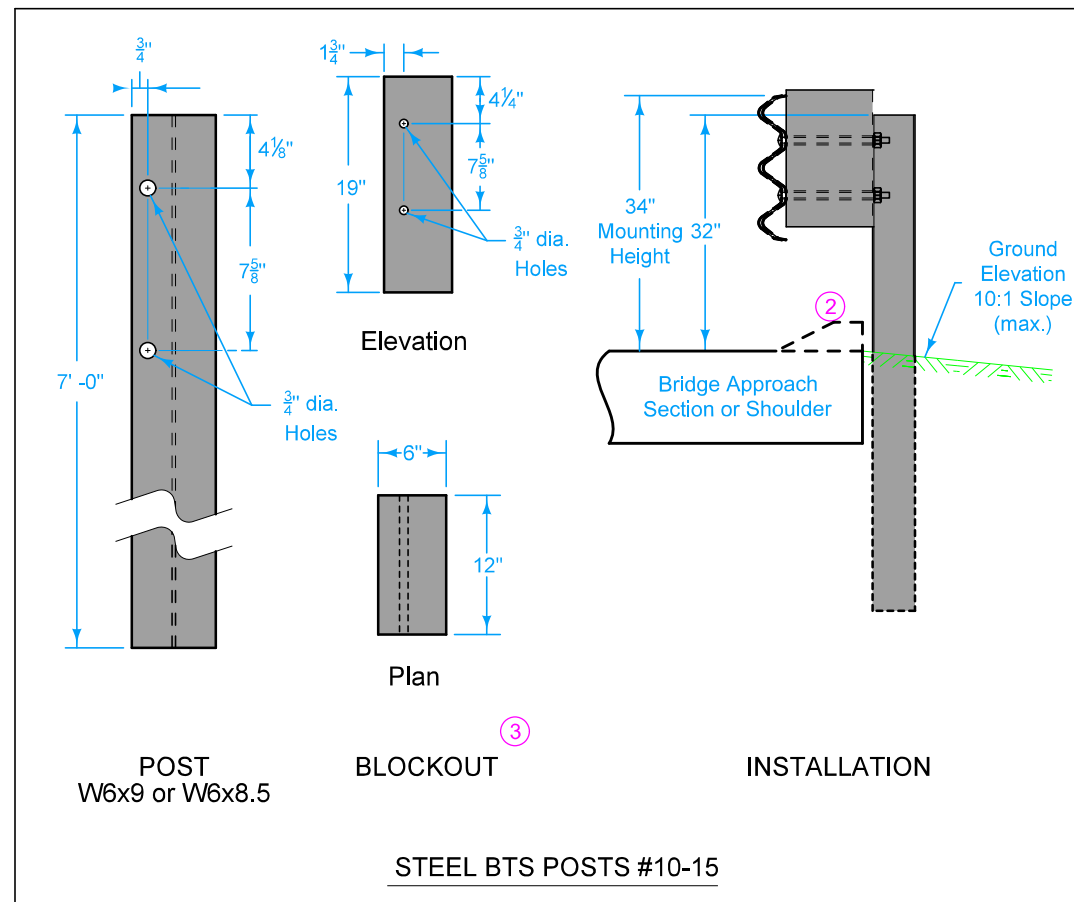
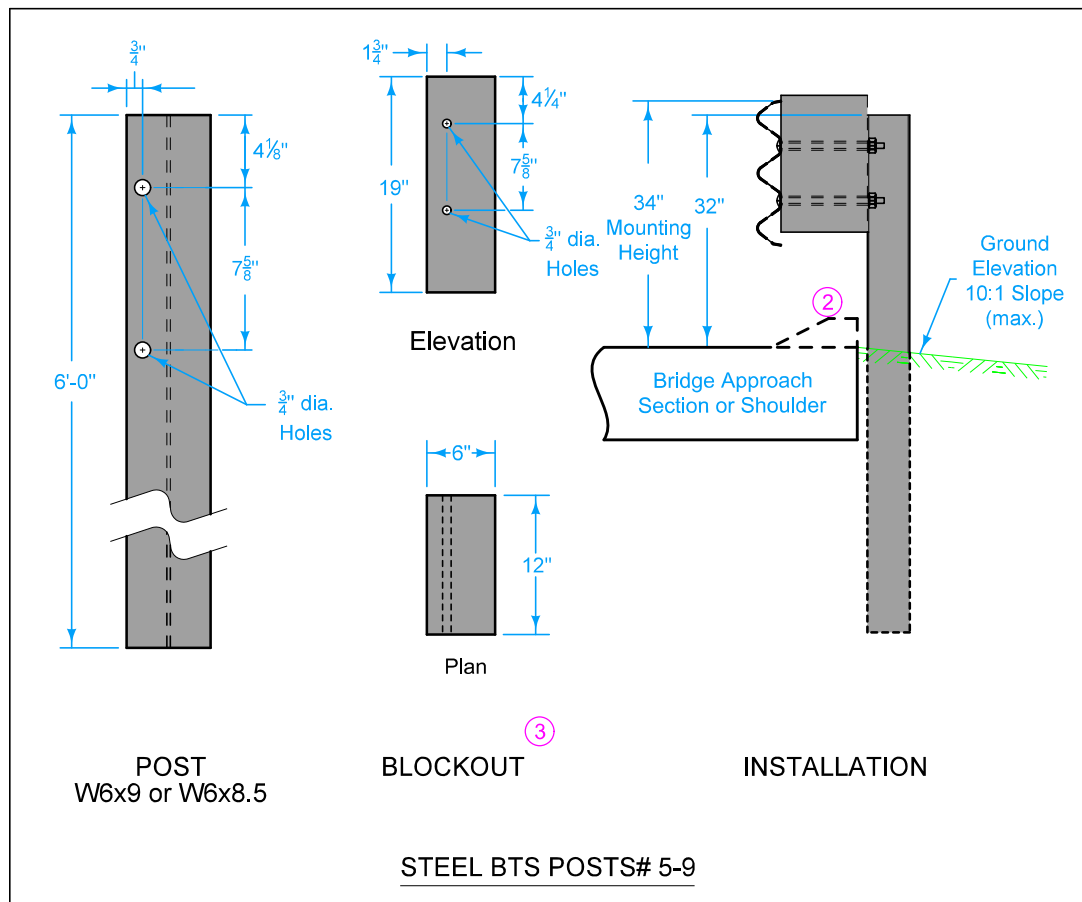
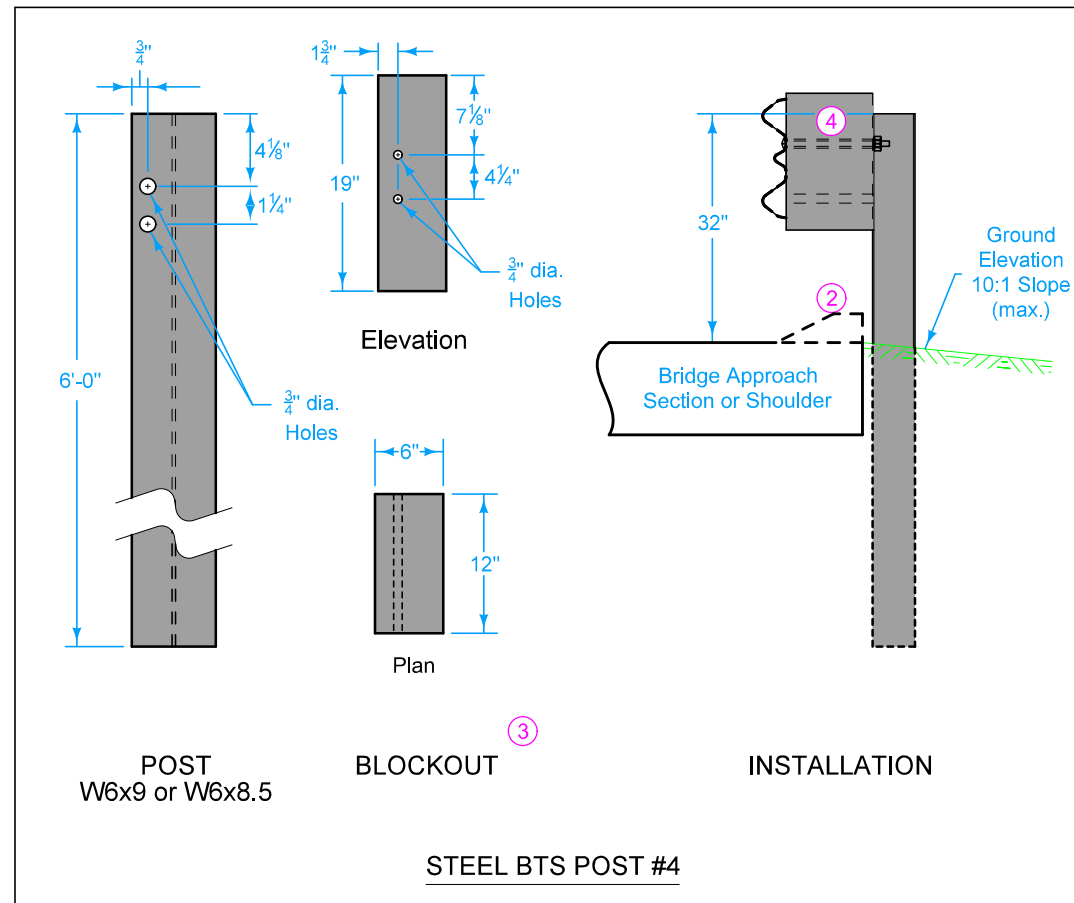
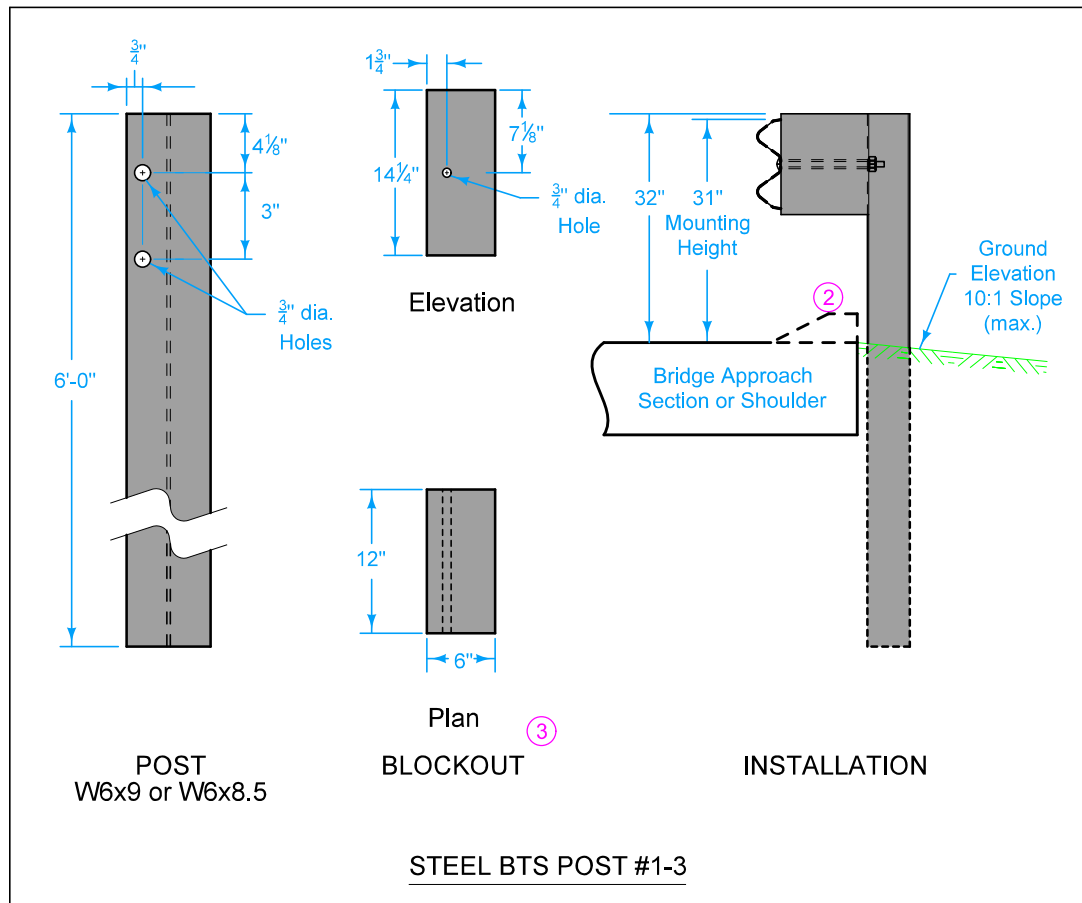
- (1) Symmetrical Transition Section
- (2) 12'-6" Thrie-Beam rail sections*
- (1) 6'-3" Thrie-Beam rail section*
- (2) 12'-6" W-Beam rail sections

Approved bolts, nuts, and washers
Refer to BA-200 for guardrail components

* One 18'-9" Thrie-Beam rail section may be substituted for one of the 12'-6" sections and the 6'-3" section as shown

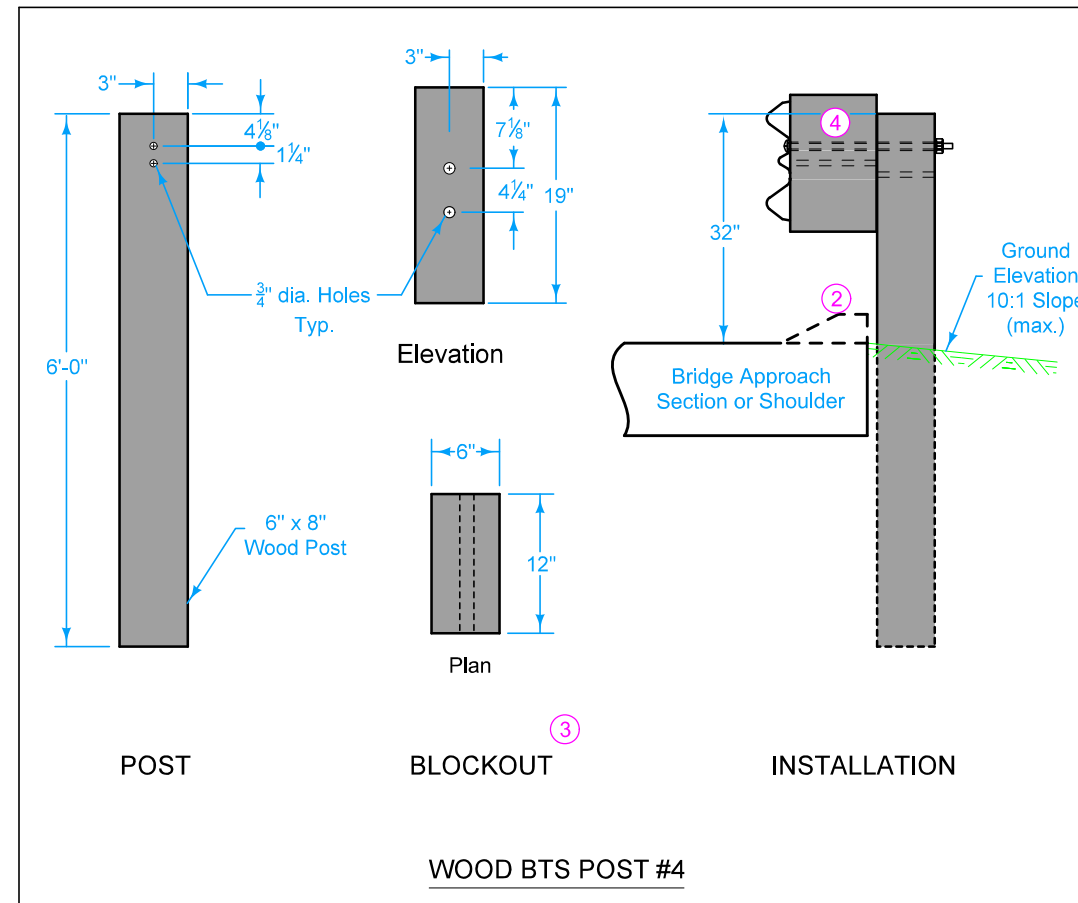
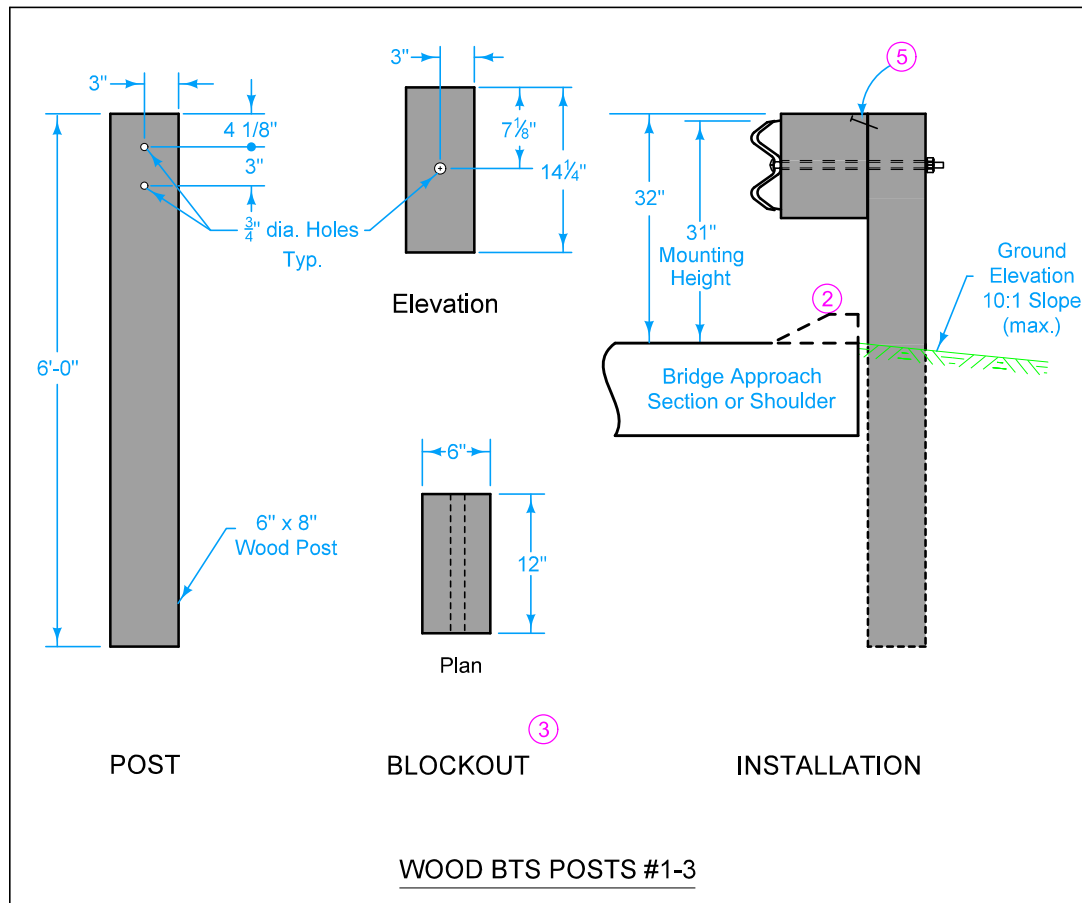


	REVISION	
	NEW	10-15-24
STANDARD ROAD PLAN		BA-209
REVISIONS: NEW		SHEET 1 of 3
 APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL BARRIER TRANSITION SECTION (MASH TL-3, 34" mounting height)		

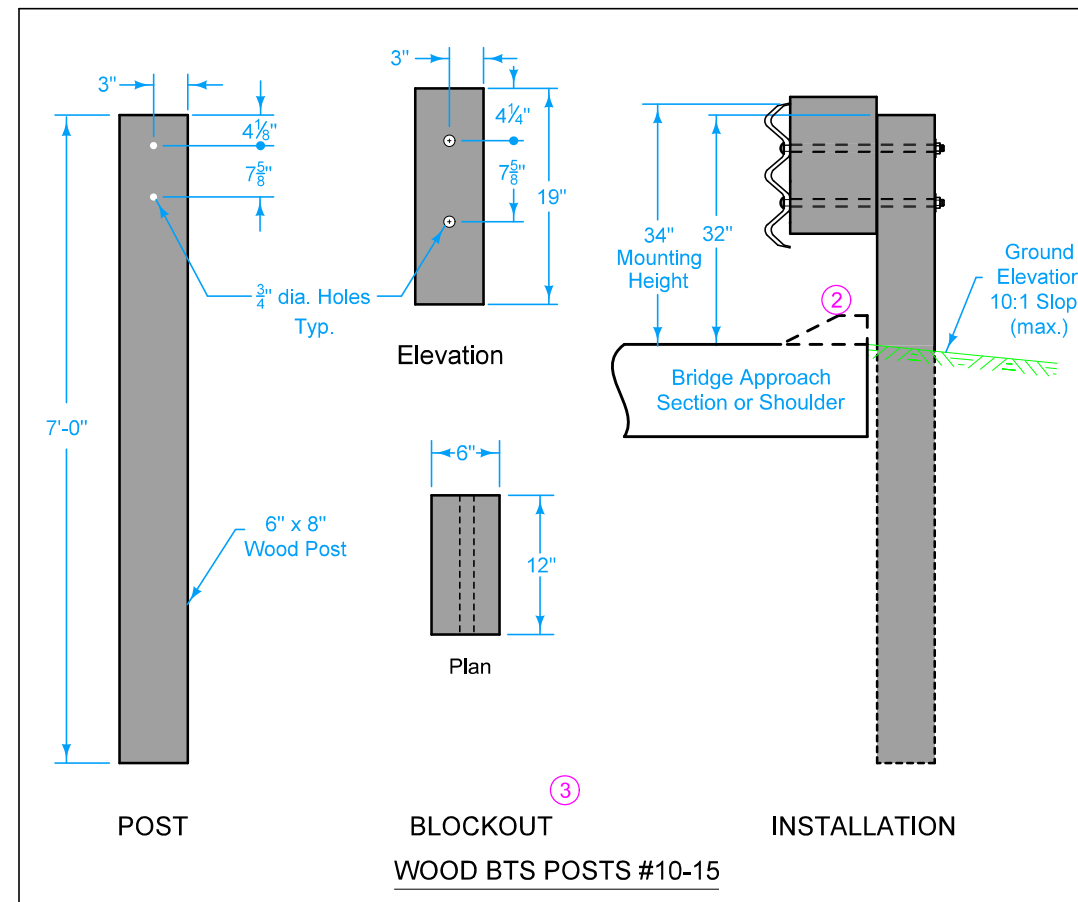
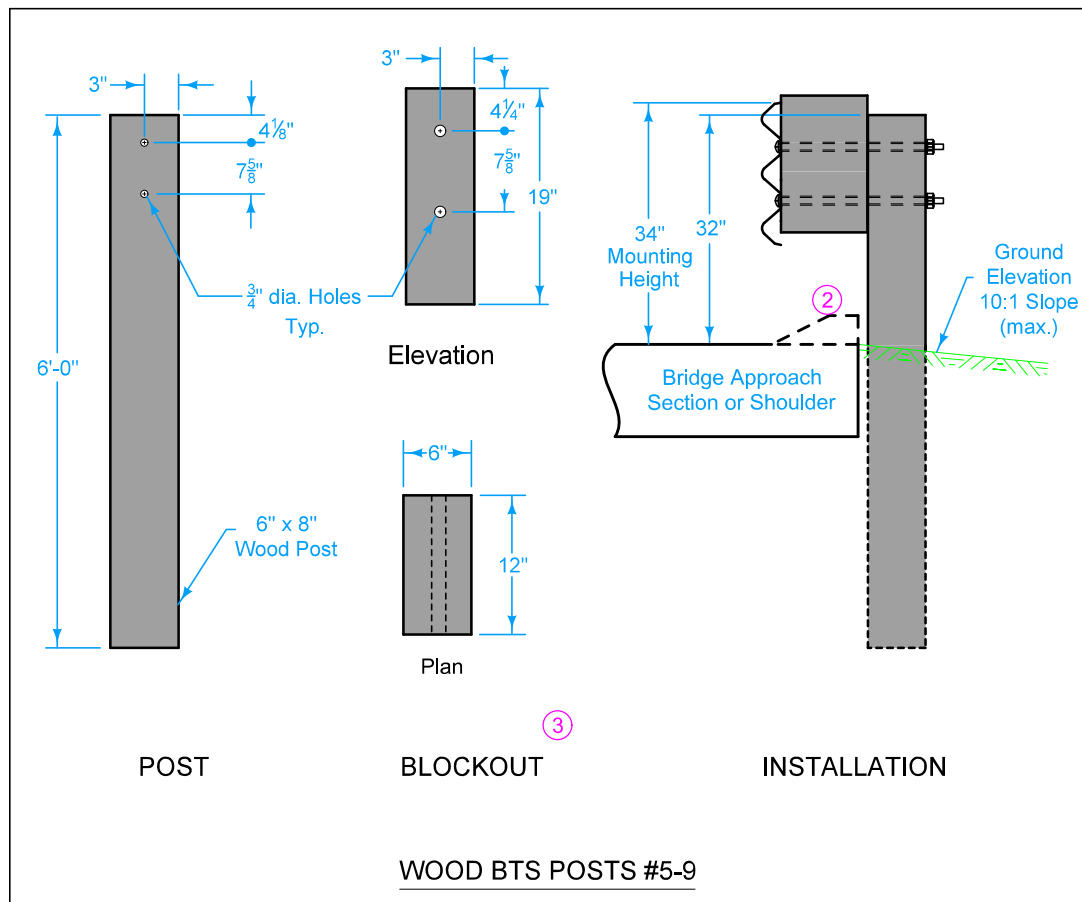


- (2) Possible 4 inch sloped curb. See project plans. Refer to PV-102 for curb and runout details.
- (3) Wood or composite only. Steel blockouts will not be allowed.
- (4) Place bolt in top hole only.

	REVISION	
	NEW	10-15-24
STANDARD ROAD PLAN		BA-209
REVISIONS: NEW		SHEET 2 of 3
 APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL BARRIER TRANSITION SECTION (MASH TL-3, 34" mounting height)		



- ② Possible 4 inch sloped curb. See project plans. Refer to PV-102 for curb and runout details.
- ③ Wood or composite only. Steel blockouts will not be allowed.
- ④ Place bolt in top hole only.
- ⑤ 16d nail to prevent blockout rotation.



	REVISION	
	NEW	10-15-24
STANDARD ROAD PLAN		BA-209
REVISIONS: NEW		SHEET 3 of 3
APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL BARRIER TRANSITION SECTION (MASH TL-3, 34" mounting height)		

Install post adapter unit on top of box culverts or similar situations when standard post embedments are not possible. Not intended for use on intakes.

Contractor may elect to fabricate posts using a 6-foot post and adjusting in the field as follows:

- A. Saw off top end to proper length and drill new holes.
- B. Treat the sawed end and drilled holes with two coats of organic zinc rich paint containing at least 94% zinc dust. Ensure the surfaces to be treated are free of oil residues due to sawing or drilling.

The price bid for "Steel Beam Guardrail, Post Adapter Unit, BA-210" is full compensation for furnishing, assembling, and installing the adapter unit as shown. Quantity shown in the contract documents.

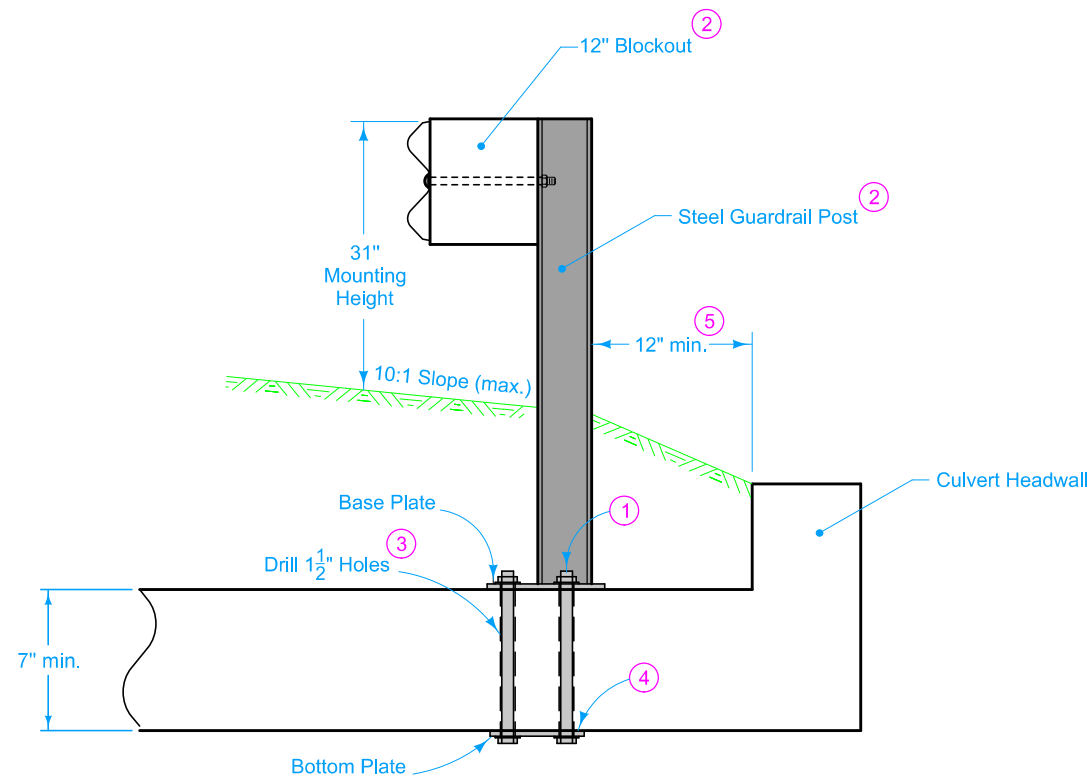
- ① Bolt length equals slab thickness plus 2 inches. Use 2 - 2.5 inch washers per bolt.
- ② Provide W6x9 or W6x8.5 steel guardrail post. Supply routed blockout or nail blockout to post in order to prevent twisting.
- ③ Drill holes using equipment designed to cut through concrete and reinforcing steel.
- ④ Grout spalling before placement of bottom plate using a grout consisting of equal parts by weight of Portland cement and concrete sand, mixed with sufficient water to form a paste.
- ⑤ Twelve inch minimum to end of top of culvert if no headwall is present.
- ⑥ Bolt length to provide a minimum of 8 inch embedment. Use 1 - 2.5 inch washer per bolt.

Possible Contract Items:
 Steel Beam Guardrail
 Steel Beam Guardrail, Post Adapter Unit, BA-210

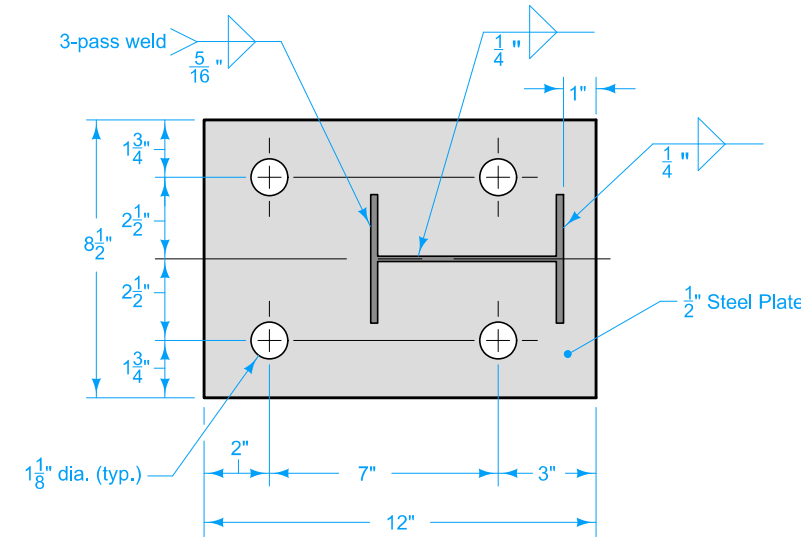
Incidental to Adapter Unit:
 1 - 12" x 8 1/2" x 1/2" ASTM A36 Steel Plate
 1 - 11" x 8 1/2" x 1/4" ASTM A36 Steel Plate
 4 - 1" ASTM A307 Hex Head bolts with one nut and two washers per bolt

Incidental to Steel Beam Guardrail:
 W6 x 9 or W6 x 8.5 Steel Guardrail Post (variable length)
 6" x 12" x 14" Blockout

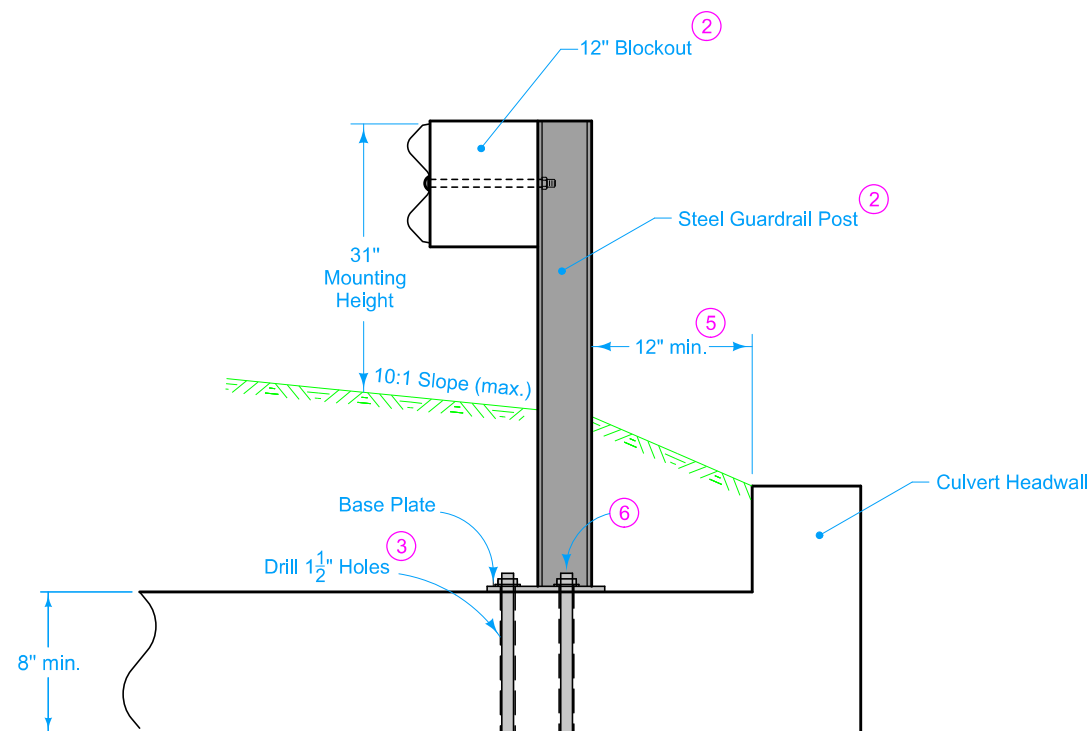
Possible Tabulations:
 108-8A
 108-8B
 108-8C



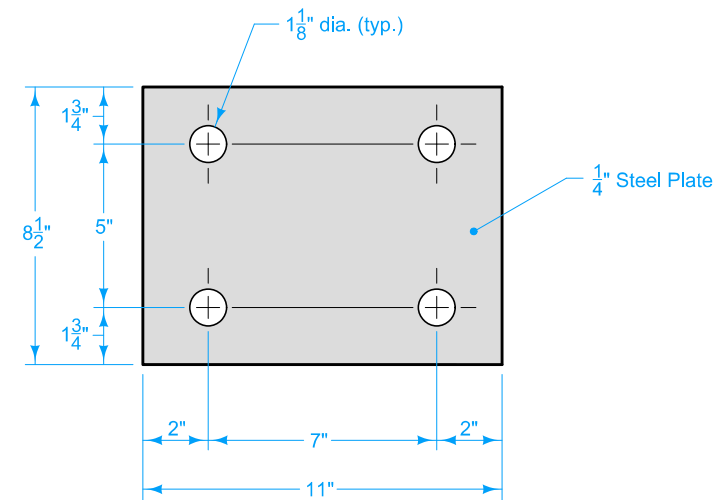
**TYPICAL SECTION
 (Bolt Through Connection)**



BASE PLATE AND POST



**TYPICAL SECTION
 (Epoxy Connection)**



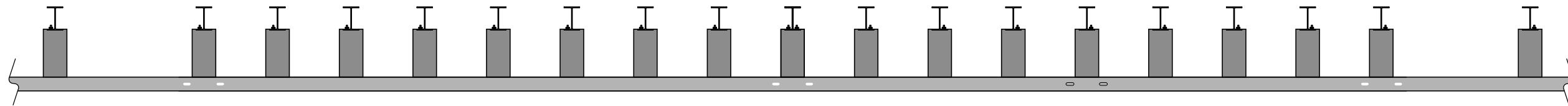
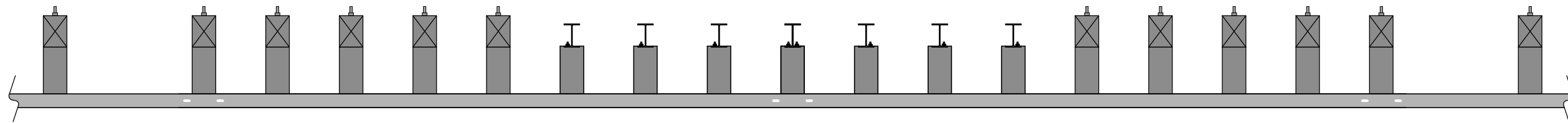
BOTTOM PLATE

IOWA DOT	REVISION	
	3	10-19-21
STANDARD ROAD PLAN		BA-210
		SHEET 1 of 2

REVISIONS: Added Sheet 2, Added washers to circle notes 1 and 6. Increased offset to 12" in Typical Sections.

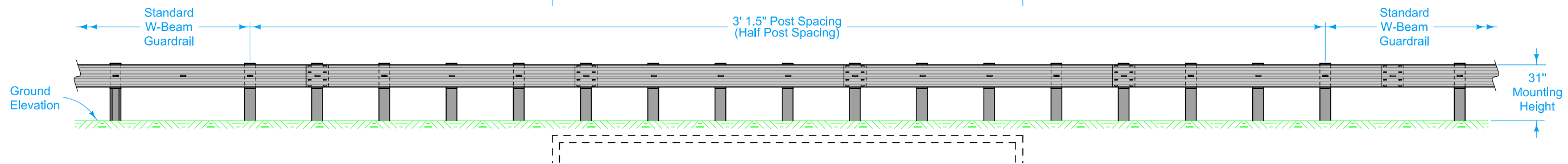
Shawn Miller
 APPROVED BY DESIGN METHODS ENGINEER

GUARDRAIL POST ADAPTER UNIT

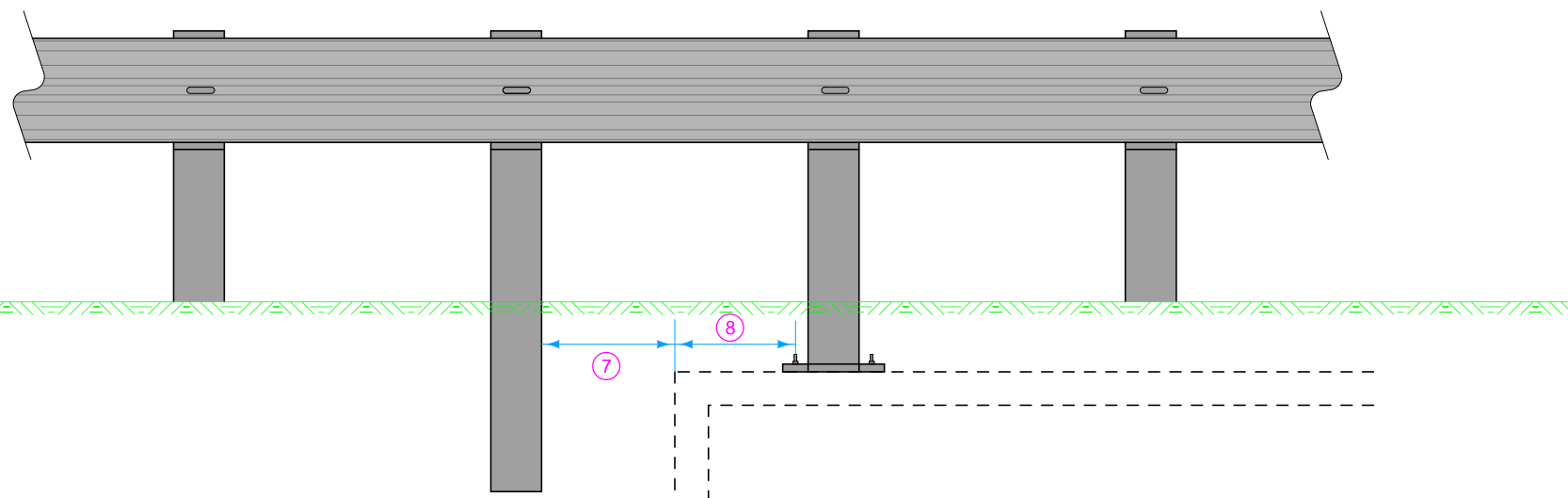


Minimum 5 posts at half post spacing

Minimum 5 posts at half post spacing

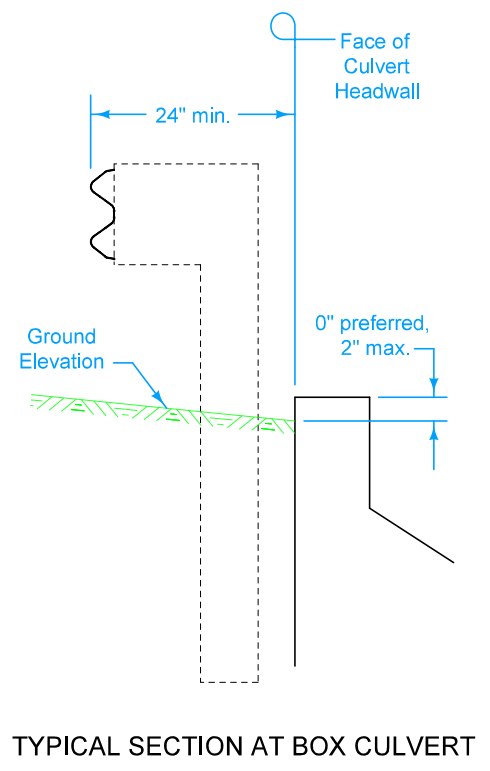
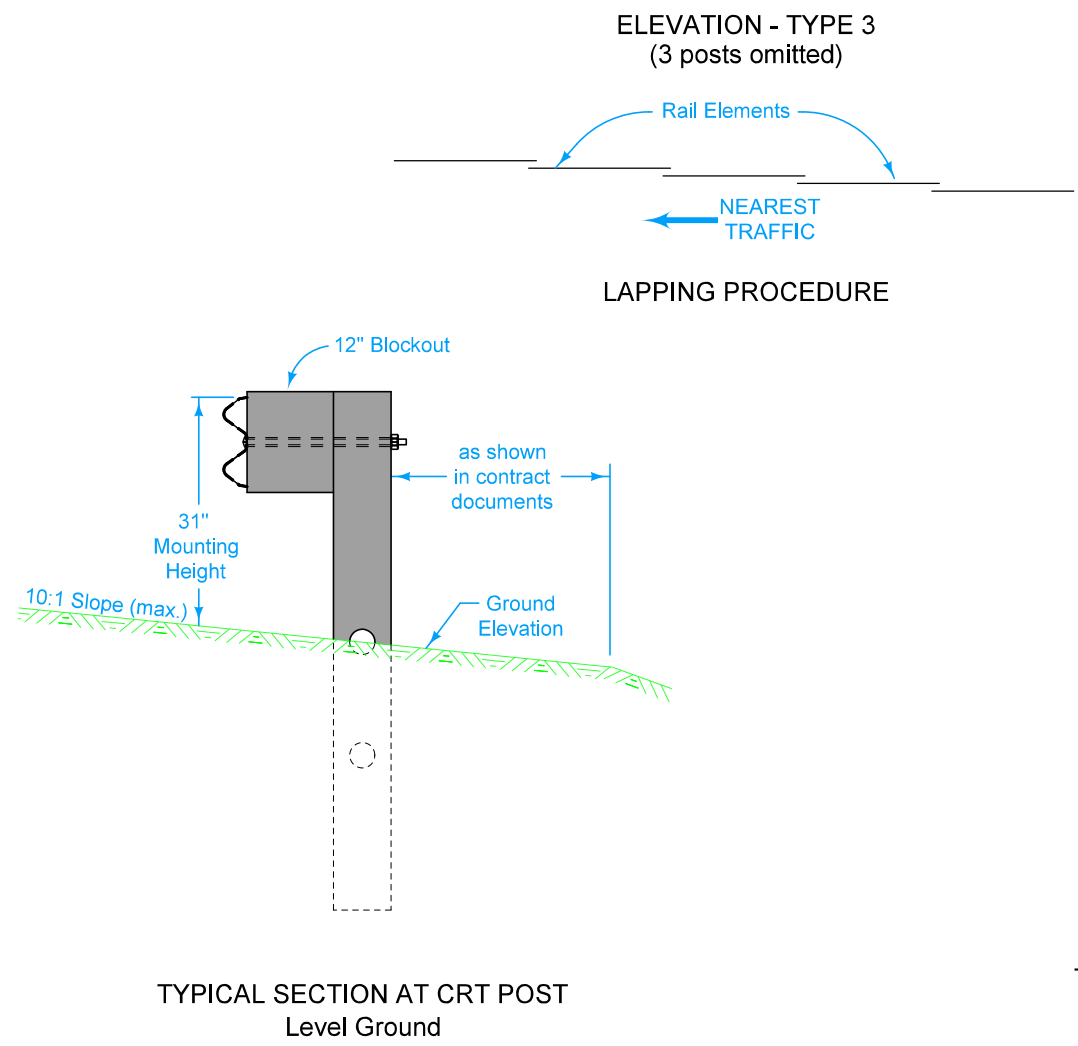
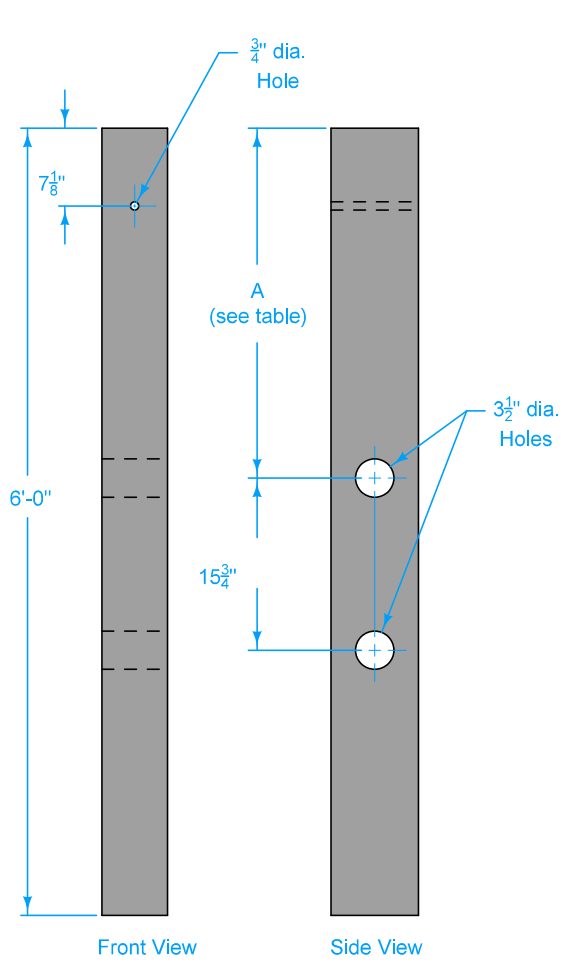
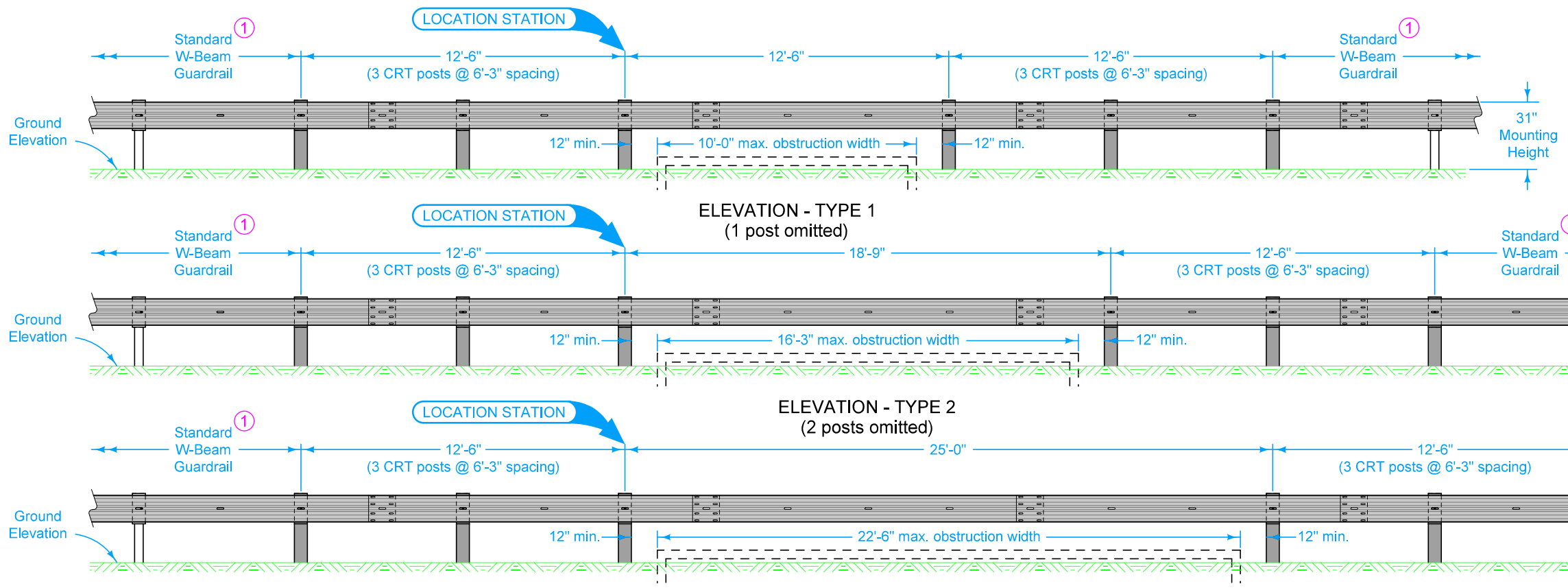


- ⑦ Minimum 12 inches between post and edge of culvert.
- ⑧ Minimum 4 inches between edge of culvert and center of anchor.



 IOWA DOT	REVISION	
	3	10-19-21
STANDARD ROAD PLAN		BA-210
		SHEET 2 of 2
REVISIONS: Added Sheet 2. Added washers to circle notes 1 and 6. Increased offset to 12" in Typical Sections.		
 APPROVED BY DESIGN METHODS ENGINEER		
GUARDRAIL POST ADAPTER UNIT		

This sheet is intended to show the method of installing w-beam guardrail at locations where normal post placements are not possible due to conflicts with underground structures.



① A minimum of 62'-6" of w-beam guardrail must be installed between the outermost CRT post and the beginning of any Variable Flare (VF) section, end terminals, end anchors, and transition sections.

Possible Contract Item:
Steel Beam Guardrail

Materials included in the Contract Item:
(6) 6" x 8" x 6'-0" CRT posts
(6) 6" x 12" x 14 1/4" blockouts
Approved bolts, nuts, and washers

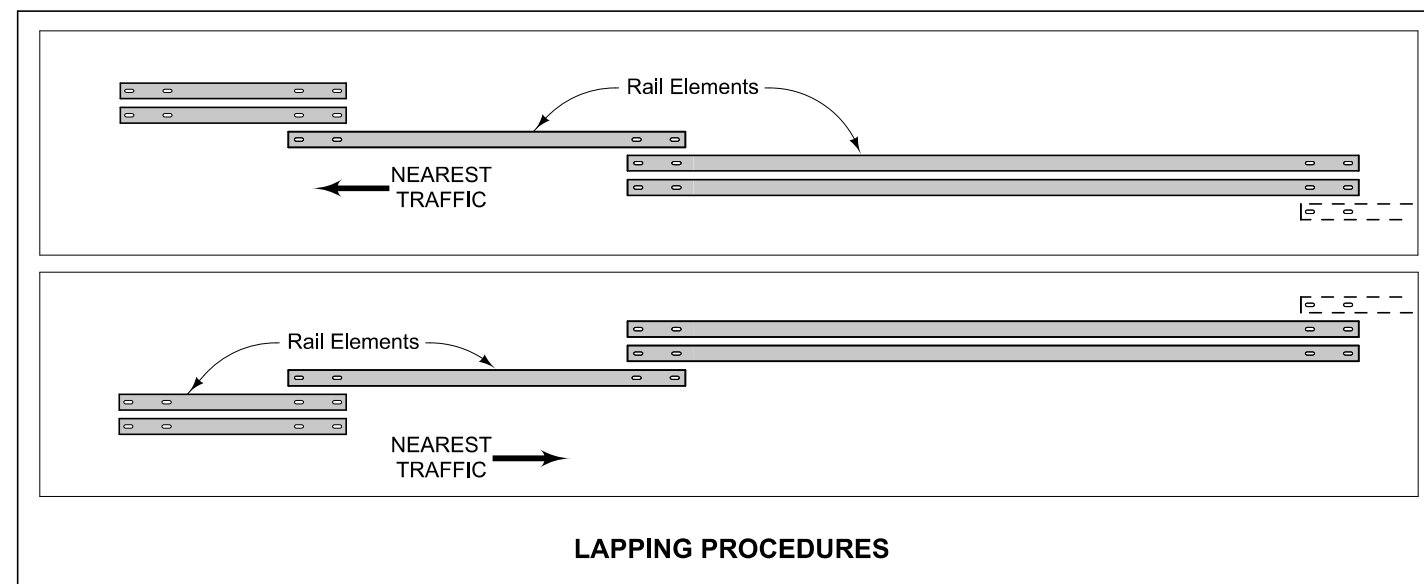
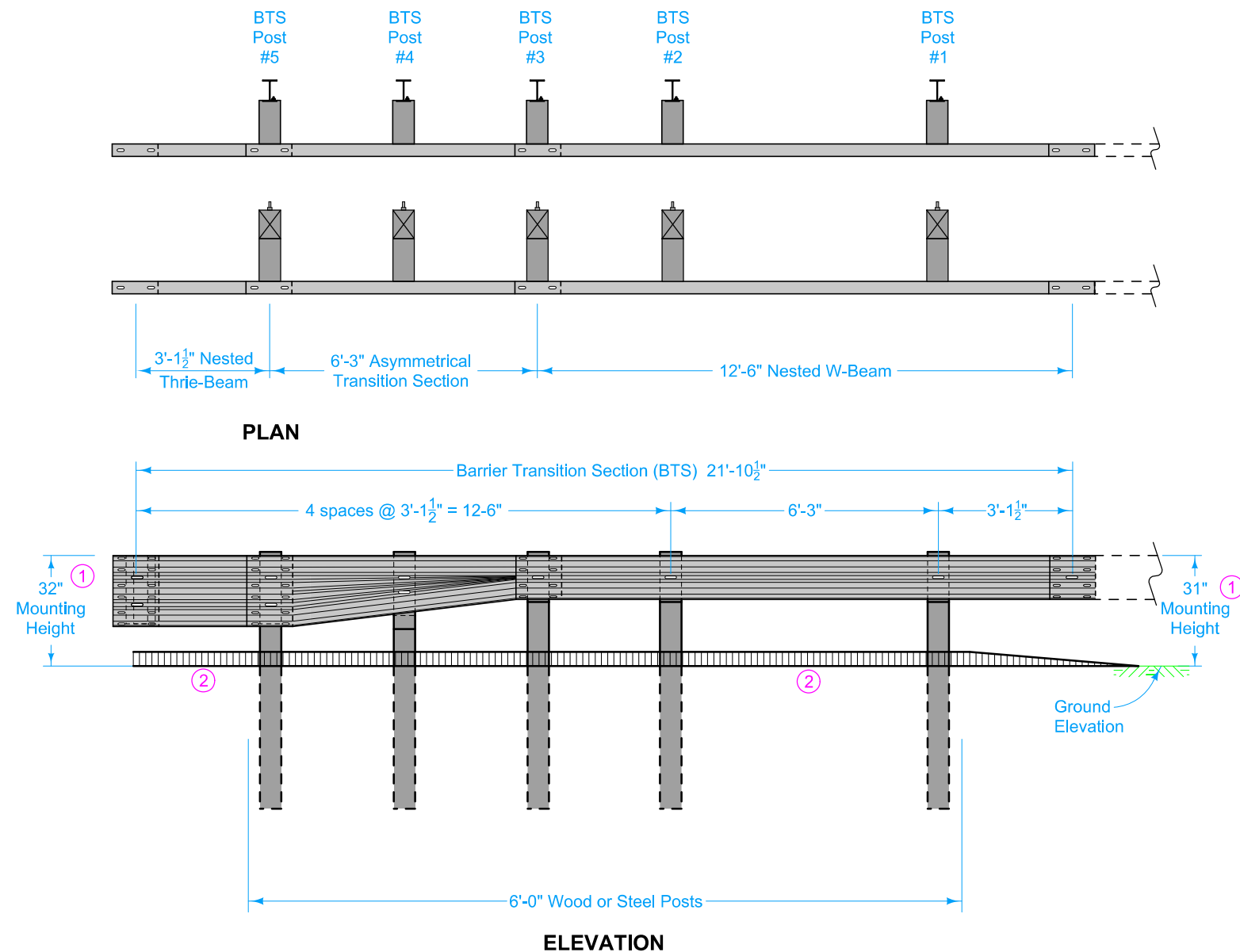
Possible Tabulations:
108-8B
108-8C

 STANDARD ROAD PLAN	REVISION	
	1	10-15-24
BA-211		
SHEET 1 of 1		
REVISIONS: Removed curb detail and circle note 3. Modified minimum length note.		
 APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL LONG-SPAN SYSTEM FOR POST CONFLICTS		

DESIGNER INFORMATION

At Bridge End Drains, cut Scour Protection (Transition Mat and Turf Reinforcement Mat) or remove rock as required to place post(s) such that Bridge End Drains abut post(s).

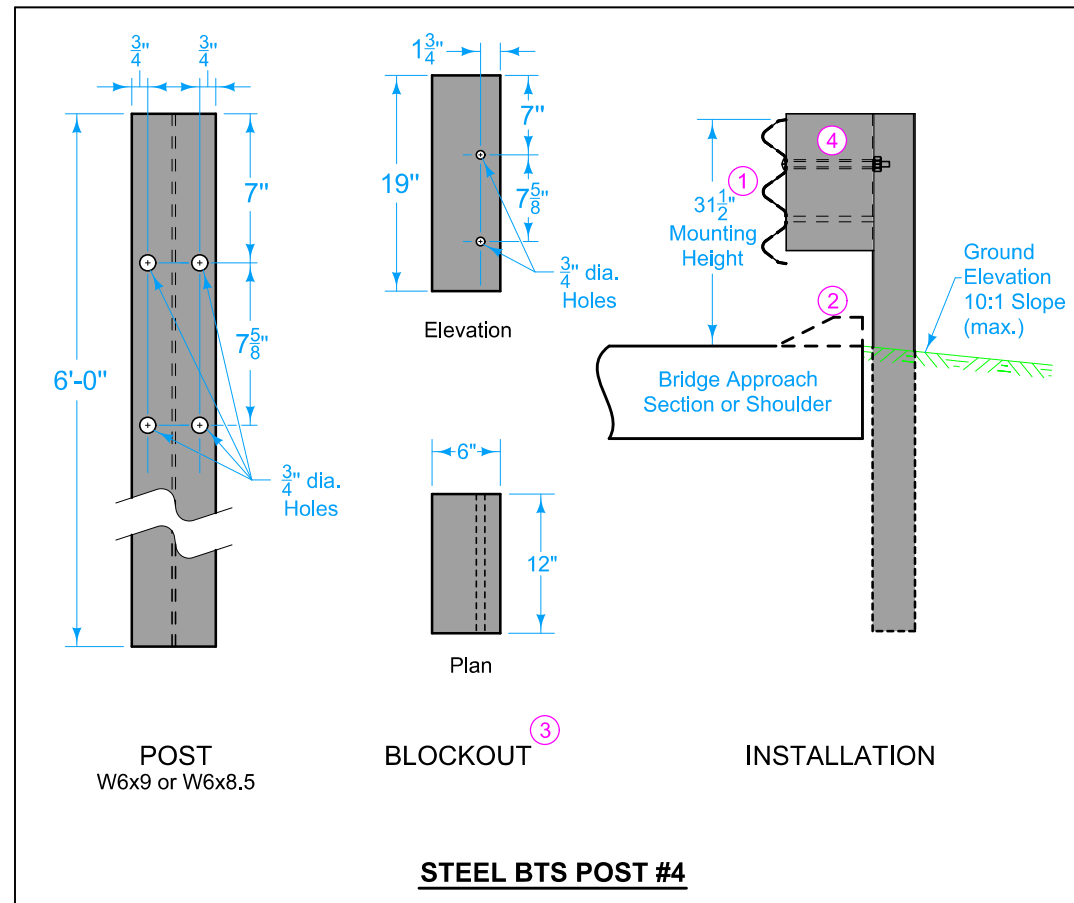
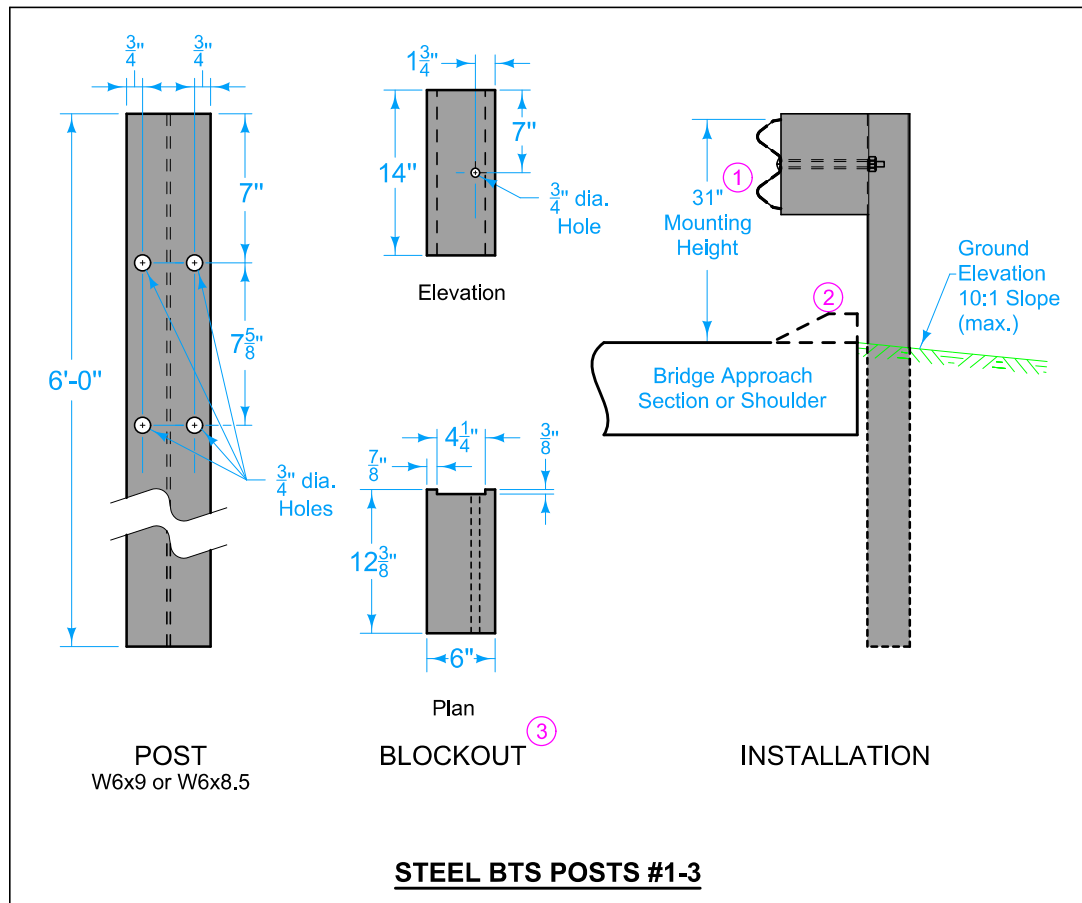
- ① Guardrail mounting height at barrier connection is 32 inches. Transition guardrail mounting height down to 31 inches at BTS Post #3.
- ② Possible 4 inch sloped curb. See project plans. Refer to PV-102 for curb and runout details.



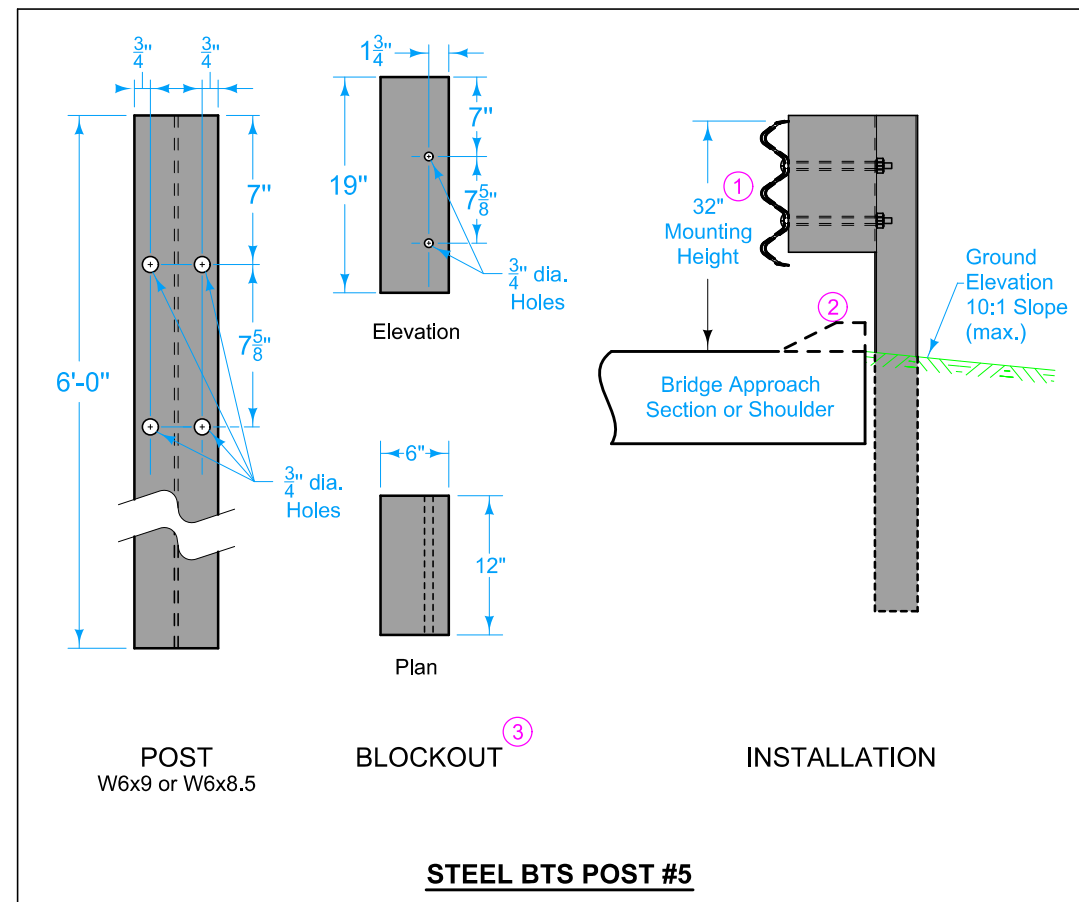
Possible Contract Item:
Steel Beam Guardrail Barrier Transition Section, BA-221

- Materials included in the Contract Item:
- Steel Post Option:
- (5) W6x9 x 6'-0" posts
 - (2) 6" x 12" x 19" blockouts
 - (3) 6" x 12" x 14" blockouts
- Wood Post Option:
- (5) 6" x 8" x 6'-0" posts
 - (2) 6" x 12" x 19" blockouts
 - (3) 6" x 12" x 14" blockouts
- (1) Asymmetrical Transition Section
 - (2) 3'-1 1/2" Thrie-Beam rail sections
 - (2) 12'-6" W-Beam rail sections
- Approved bolts, nuts, and washers
Refer to BA-200 for guardrail components

	REVISION	
	3	10-18-22
STANDARD ROAD PLAN		BA-221
REVISIONS: Revised curb note.		SHEET 1 of 3
 APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL BARRIER TRANSITION SECTION (MASH TL-2)		



- ① Guardrail mounting height at barrier connection is 32 inches. Transition guardrail mounting height down to 31 inches at BTS Post #3.
- ② Possible 4 inch sloped curb. See project plans. Refer to PV-102 for curb and runout details.
- ③ Wood or composite only. Steel blockouts will not be allowed.
- ④ Place bolt in top hole only.

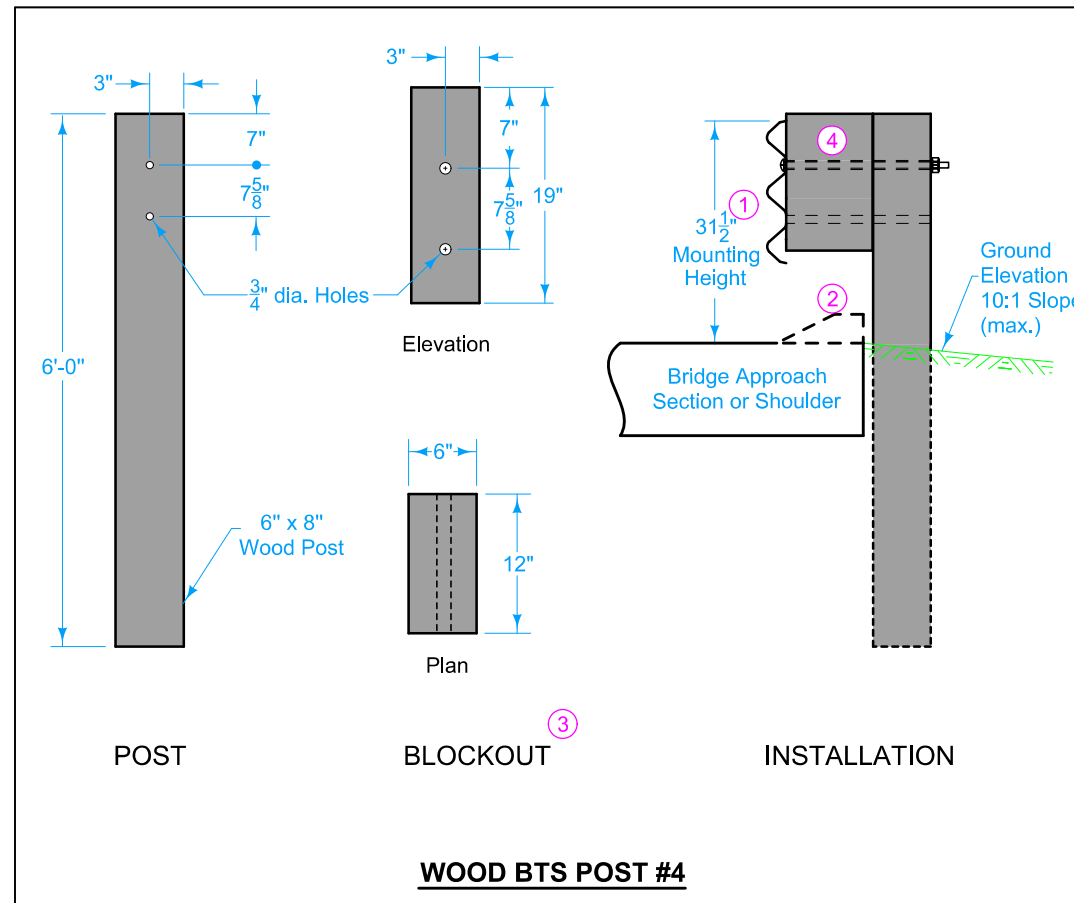
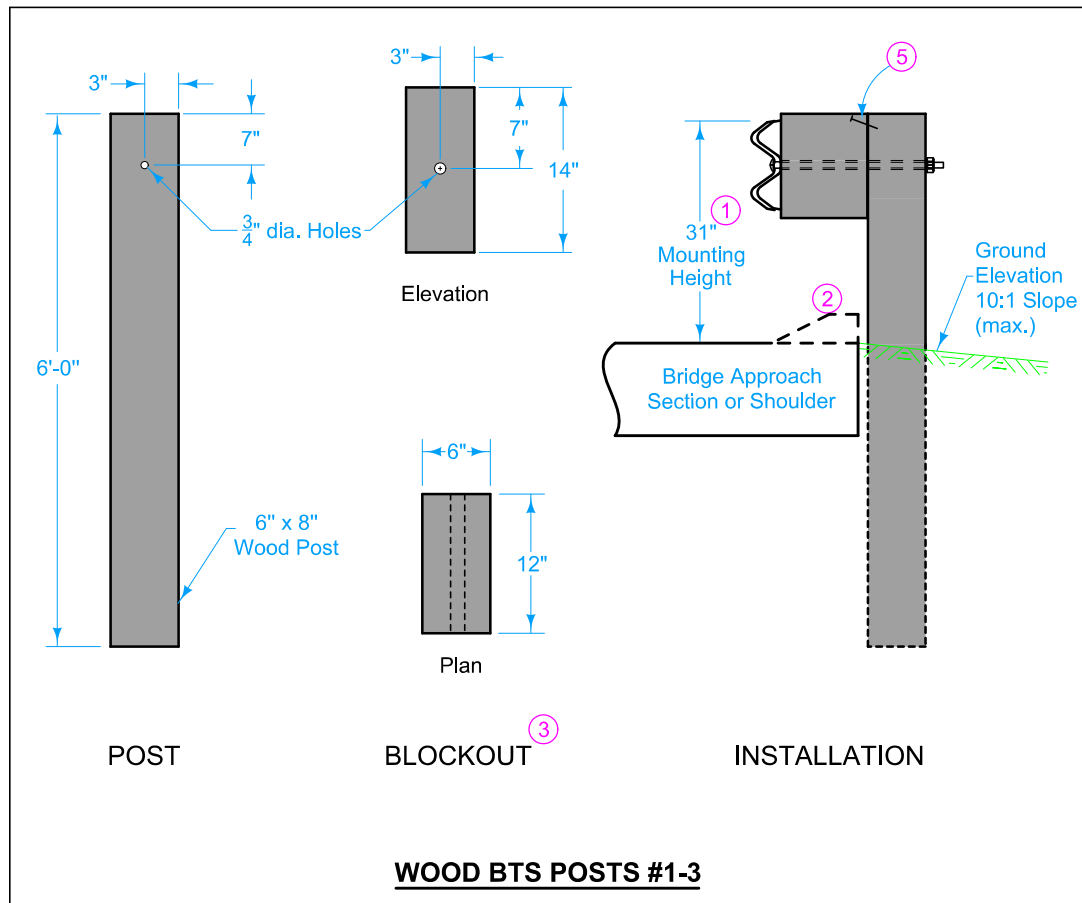


 STANDARD ROAD PLAN	REVISION	
	3	10-18-22
	BA-221	
SHEET 2 of 3		

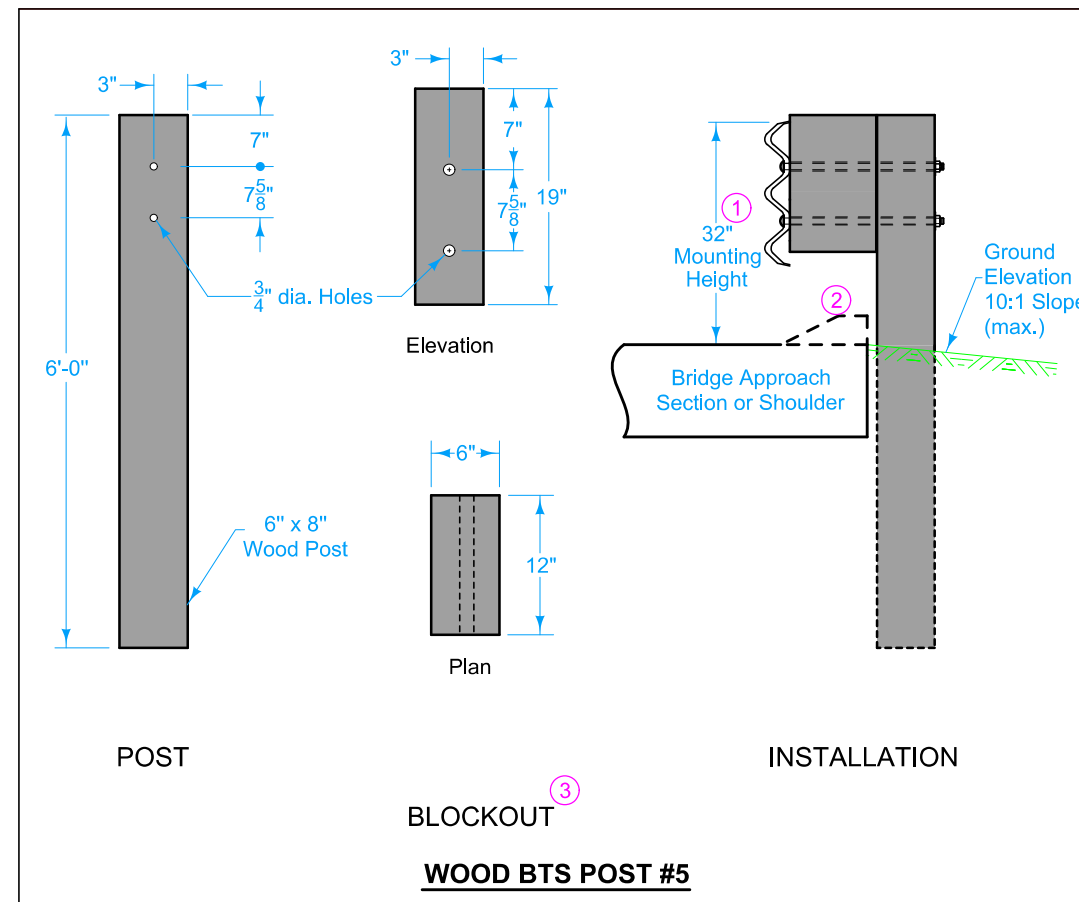
REVISIONS: Revised curb note.

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**STEEL BEAM GUARDRAIL
BARRIER TRANSITION SECTION
(MASH TL-2)**



- ① Guardrail mounting height at barrier connection is 32 inches. Transition guardrail mounting height down to 31 inches at BTS Post #3.
- ② Possible 4 inch sloped curb. See project plans. Refer to PV-102 for curb and runout details.
- ③ Wood or composite only. Steel blockouts will not be allowed.
- ④ Place bolt in top hole only.
- ⑤ 16d nail to prevent blockout rotation.



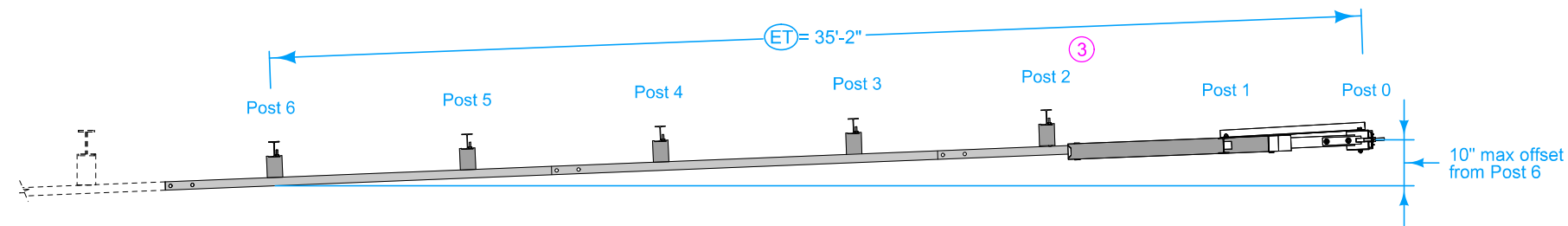
	REVISION	
	3	10-18-22
	BA-221	
STANDARD ROAD PLAN		
SHEET 3 of 3		
REVISIONS: Revised curb note.		
 APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL BARRIER TRANSITION SECTION (MASH TL-2)		

DESIGNER INFORMATION

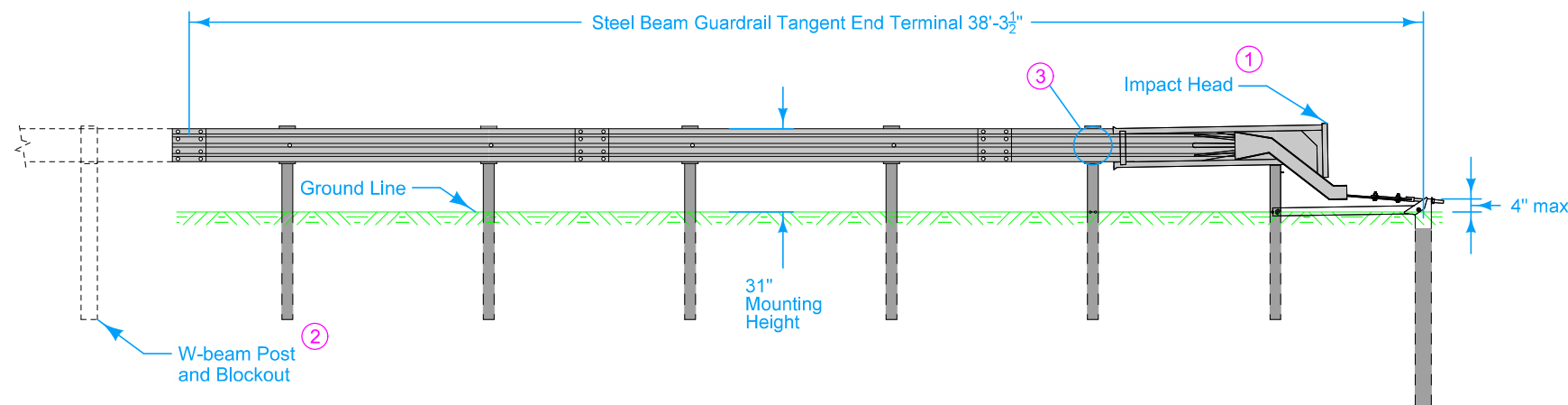
Refer to Materials I.M. 455.02 for a list of approved sources.

Use materials meeting the respective manufacturer's specifications. Install end terminals according to the manufacturer's recommendations.

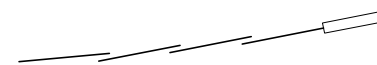
Drive posts using a hammer driver. Ensure posts are not damaged during installation. Posts may be placed in prebored holes if site conditions are such that posts cannot be driven. Place backfill material consisting of material removed or other suitable soil around posts. Place the backfill material in lifts not exceeding 4 inches. Thoroughly compact each lift before the next lift is placed.



PLAN



ELEVATION



LAPPING PROCEDURE

- ① Cover entire face of impact head with alternating black and yellow striped adhesive sheeting meeting the following requirements:
 - Stripes are approximately 3 inches wide and slope down at a 45 degree angle toward the side on which traffic is to pass the end terminal.
 - Yellow stripes meet the retroreflectivity requirements for Type III or Type IV reflective sheeting.
- ② Refer to BA-200.
- ③ Bolt only the blockout to the post. Do not bolt the rail to the post.

Possible Contract Item:
Steel Beam Guardrail Tangent End Terminal, BA-225

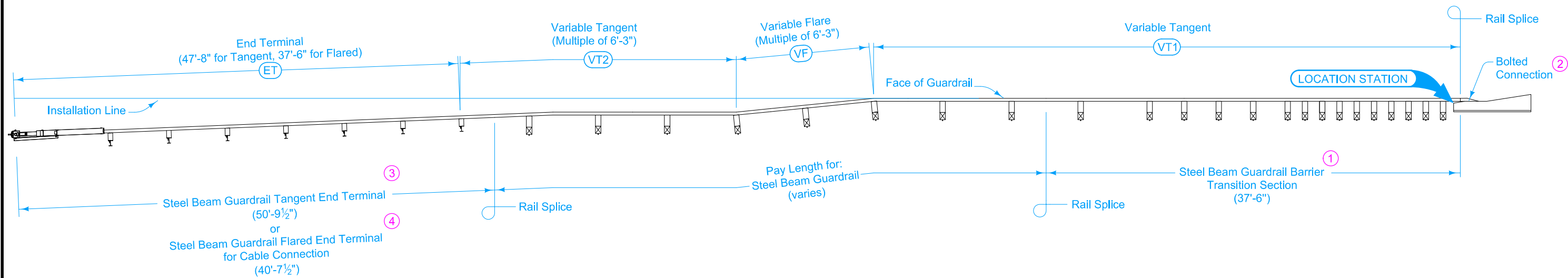
Possible Tabulation:
108-8A

	REVISION	
	4	10-17-23
STANDARD ROAD PLAN		BA-225
		SHEET 1 of 1

REVISIONS: Added note 3. Do not bolt rail to post #2 per manufactures instructions.

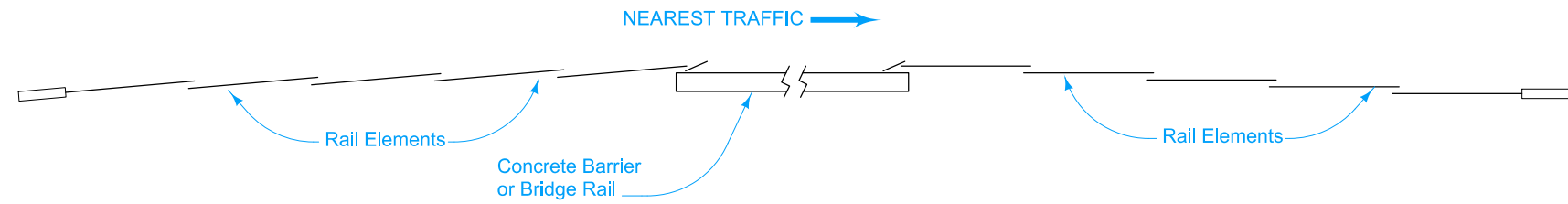
APPROVED BY DESIGN METHODS ENGINEER

**STEEL BEAM GUARDRAIL
TANGENT END TERMINAL
(MASH TL-2)**



Install delineators and object markers according to SI-211.
 For grading requirements, see EW-301.
 For general guardrail details, see BA-200.

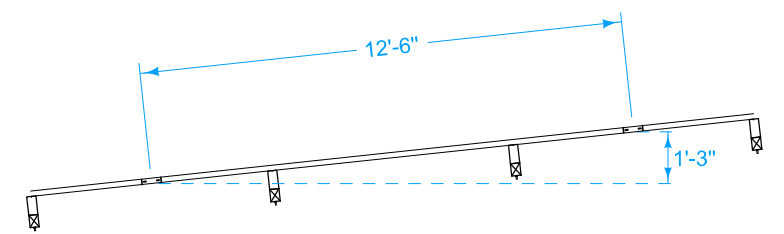
- ① See BA-201.
- ② See BA-202 for connections to concrete barriers and bridge rail end sections.
- ③ See BA-205.
- ④ See BA-206.



LAPPING PROCEDURE

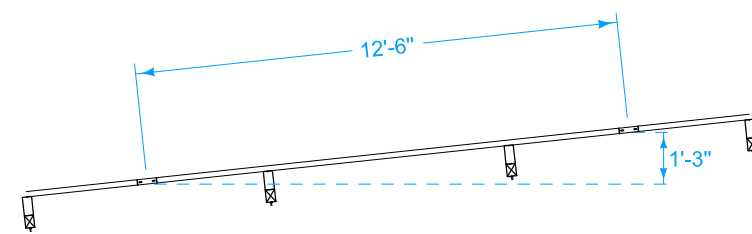
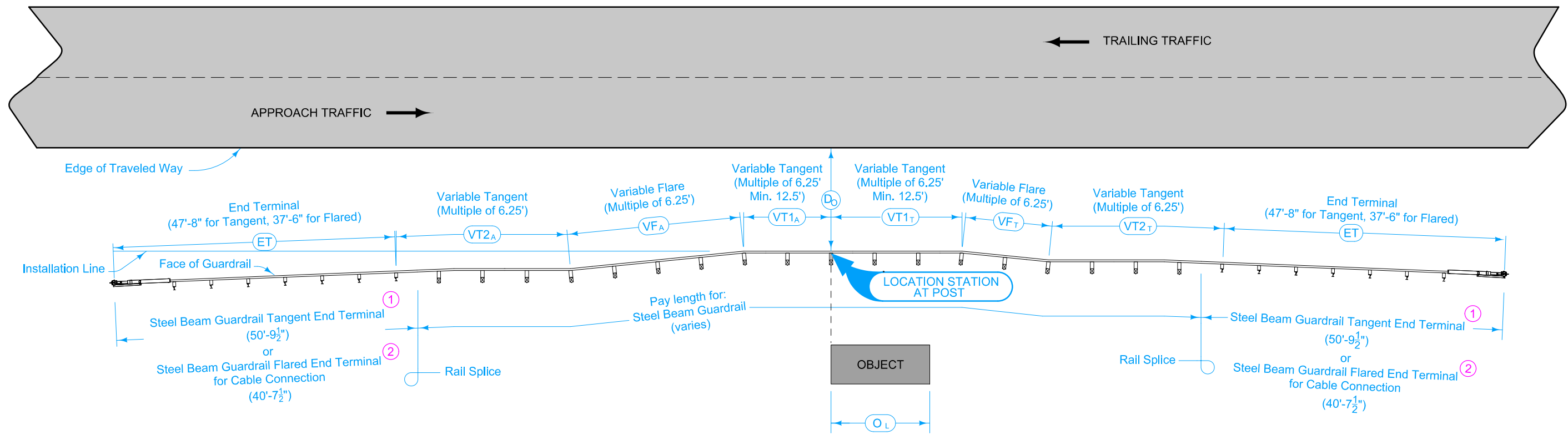
Possible Contract Items:
 Steel Beam Guardrail
 Steel Beam Guardrail Barrier Transition Section, BA-201
 Steel Beam Guardrail End Anchor, Bolted
 Steel Beam Guardrail Tangent End Terminal, BA-205
 Steel Beam Guardrail Flared End Terminal, BA-206

Possible Tabulation:
 108-8A



VARIABLE FLARE

	REVISION	
	7	04-20-21
STANDARD ROAD PLAN		BA-250
REVISIONS: Removed circle note 5.		SHEET 1 of 1
APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL INSTALLATION AT CONCRETE BARRIER OR BRIDGE RAIL END SECTION (MASH TL-3)		



Install delineators and object markers according to SI-211.

For grading requirements, see EW-301.

For general guardrail details, see BA-200.

① See BA-205.

② See BA-206.

Possible Contract Items:
 Steel Beam Guardrail
 Steel Beam Guardrail Tangent End Terminal, BA-205
 Steel Beam Guardrail Flared End Terminal, BA-206

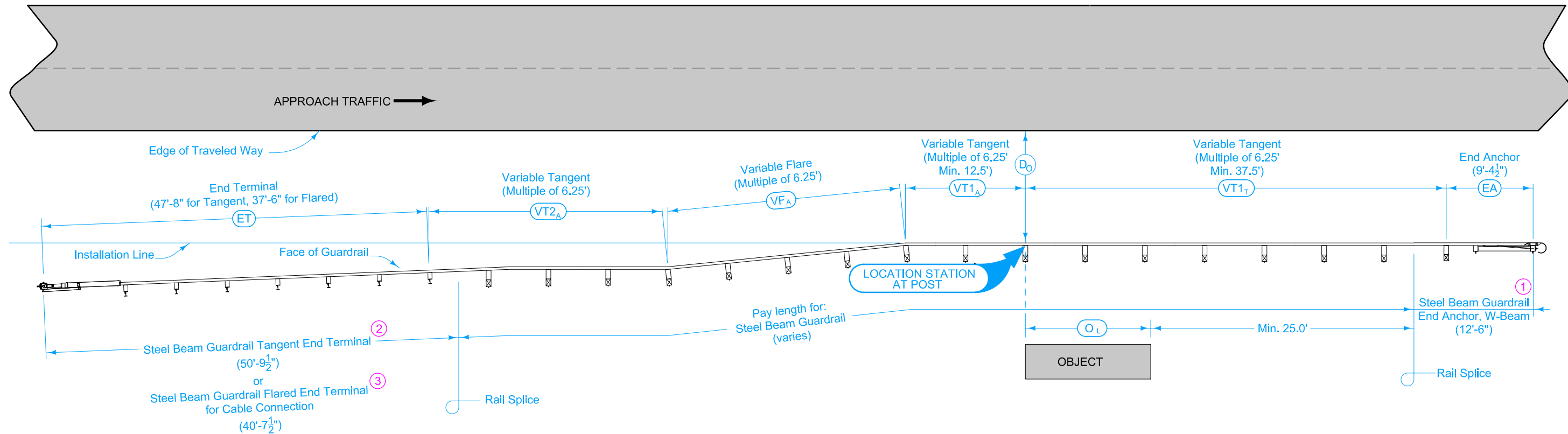
Possible Tabulation:
 108-8B

	REVISION	
	4	04-20-21
STANDARD ROAD PLAN		BA-251
		SHEET 1 of 1

REVISIONS: Modified graphics to new cells in cell library.

Steve Miller
 APPROVED BY DESIGN METHODS ENGINEER

**STEEL BEAM GUARDRAIL
 INSTALLATION AT SIDE OBJECT
 (TWO-WAY PROTECTION)**



Install delineators and object markers according to SI-211.

For grading requirements, see EW-301.

For general guardrail details, see BA-200.

① See BA-203.

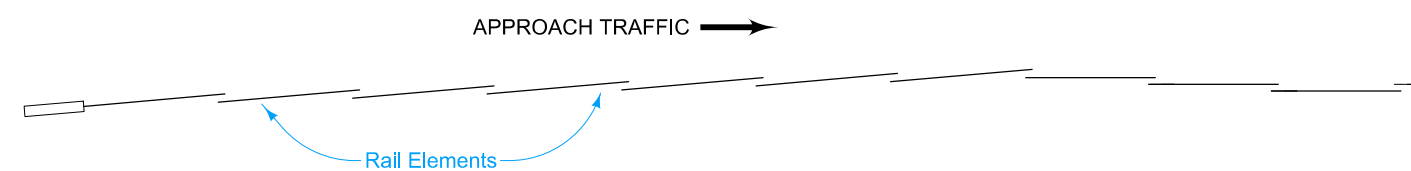
② See BA-205.

③ See BA-206.

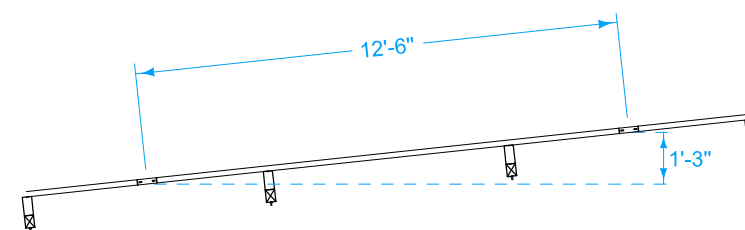
Possible Contract Items:

- Steel Beam Guardrail
- Steel Beam Guardrail End Anchor, W-Beam
- Steel Beam Guardrail Flared End Terminal, BA-206
- Steel Beam Guardrail Tangent End Terminal, BA-205

Possible Tabulation:
108-8C



LAPPING PROCEDURE



VARIABLE FLARE

	REVISION	
	7	04-20-21
STANDARD ROAD PLAN		BA-252
REVISIONS: Removed Interim from standard.		SHEET 1 of 1
 APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL INSTALLATION AT SIDE OBJECT (ONE-WAY PROTECTION)		

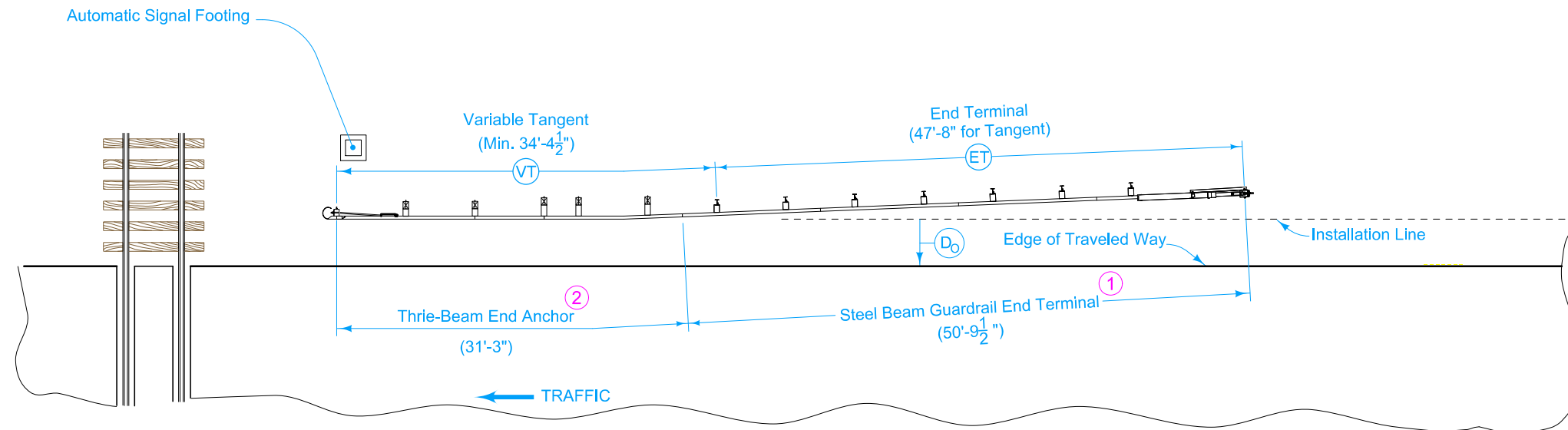
DESIGNER INFORMATION

For grading requirements, refer to [EW-301](#).

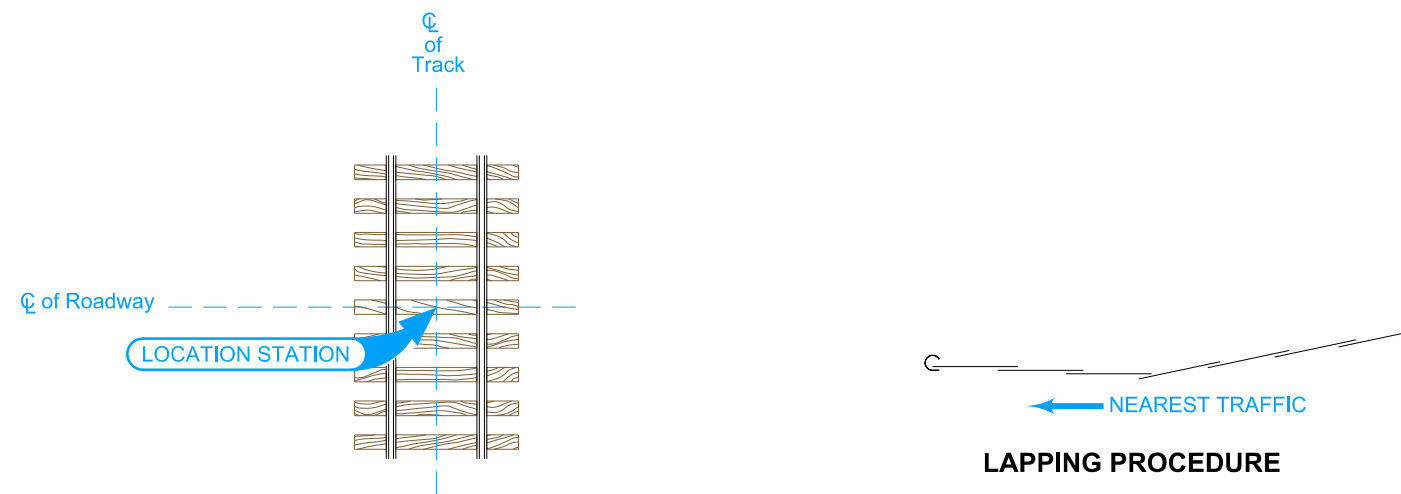
For additional guardrail requirements, refer to [BA-200](#).

① Refer to [BA-205](#).

② Refer to [BA-204](#).



PLAN



Possible Contract Items:

- Steel Beam Guardrail End Anchor, Thrie-Beam
- Steel Beam Guardrail Tangent End Terminal, BA-205

Incidental to Steel Beam Guardrail End Anchor, Thrie-Beam:

- Delineator, Rigid - Type I
- Object Marker, Type 2
- Object Marker, Type 3

Possible Tabulation:

108-8D

	REVISION	
	5	10-18-22
STANDARD ROAD PLAN	BA-253	
	SHEET 1 of 1	

REVISIONS: Modified pay length for Thrie-Beam End Anchor as a result of a modification to BA-204.

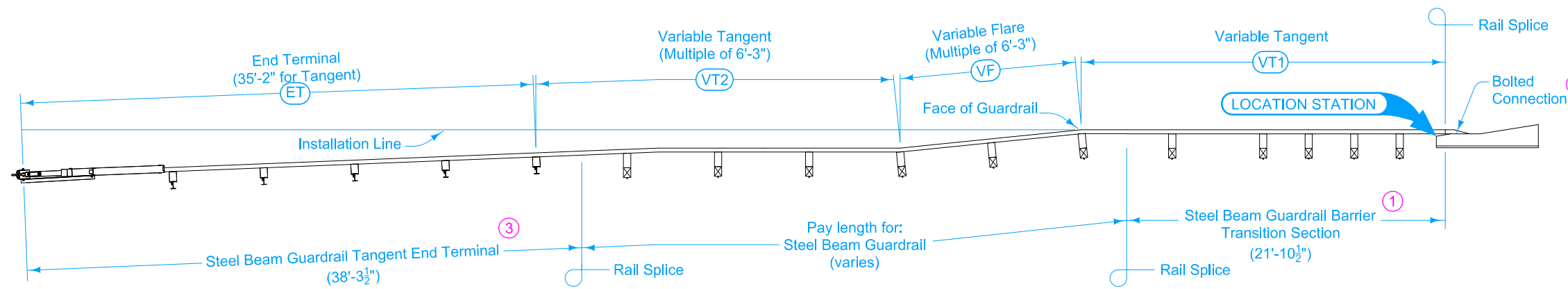
Shawn Miller
APPROVED BY DESIGN METHODS ENGINEER

**STEEL BEAM GUARDRAIL
INSTALLATION AT RAILROAD SIGNAL**

Install delineators and object markers according to SI-211.

For grading requirements, see EW-301.

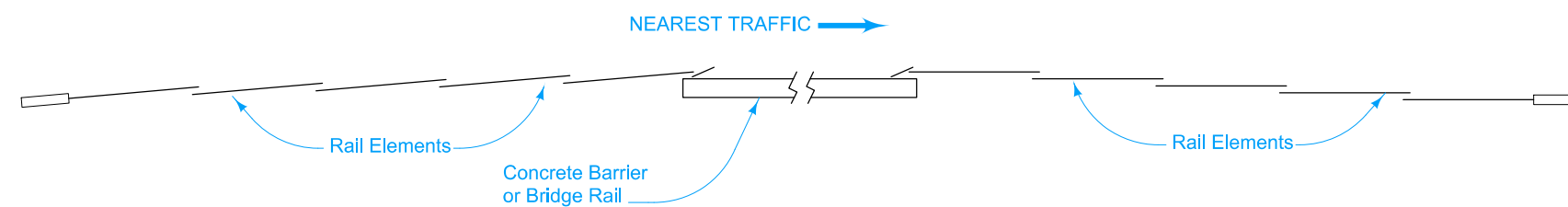
For general guardrail details, see BA-200.



① See BA-221.

② See BA-202 for connections to concrete barriers and bridge rail end sections.

③ See BA-225.



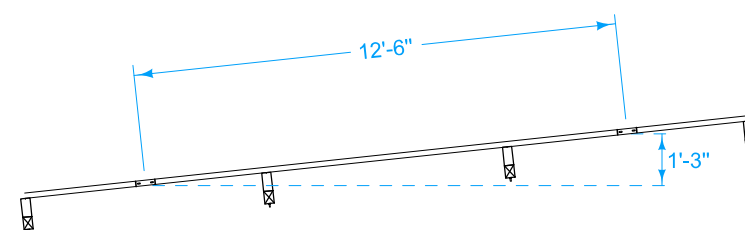
LAPPING PROCEDURE

Possible Contract Items:



- Steel Beam Guardrail
- Steel Beam Guardrail Barrier Transition Section, BA-221
- Steel Beam Guardrail End Anchor, Bolted
- Steel Beam Guardrail Tangent End Terminal, BA-225

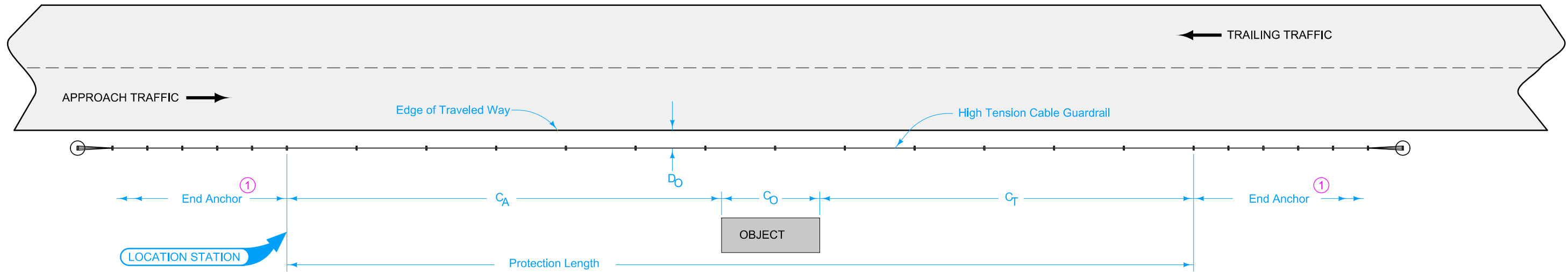
Possible Tabulation:

108-8A

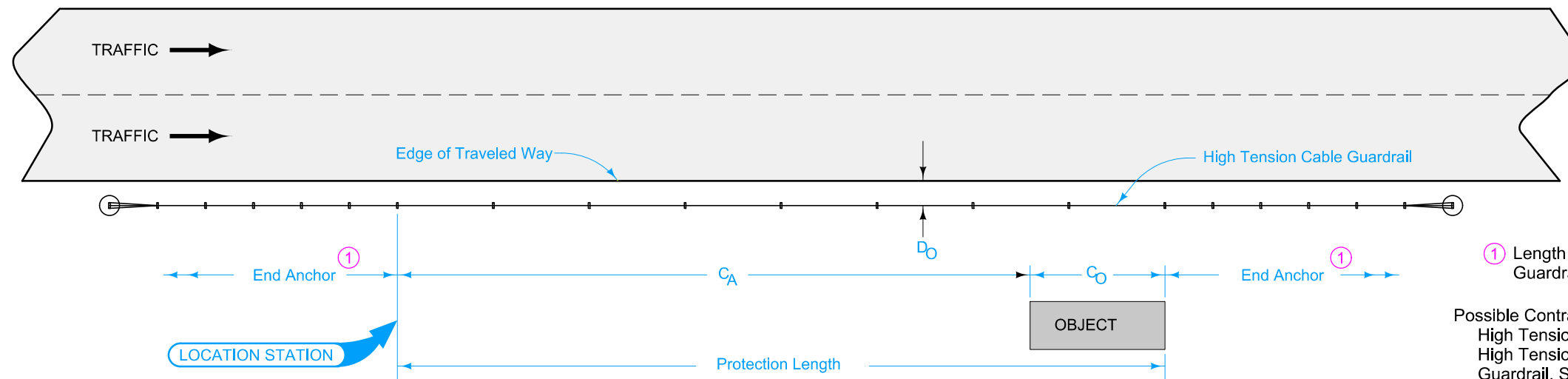


VARIABLE FLARE

	REVISION	
	1	04-20-21
STANDARD ROAD PLAN		BA-260
		SHEET 1 of 1
REVISIONS: Removed circle note 4.		
 APPROVED BY DESIGN METHODS ENGINEER		
STEEL BEAM GUARDRAIL INSTALLATION AT CONCRETE BARRIER OR BRIDGE RAIL END SECTION (MASH TL-2)		



ROADSIDE OBJECT, TWO-WAY PROTECTION



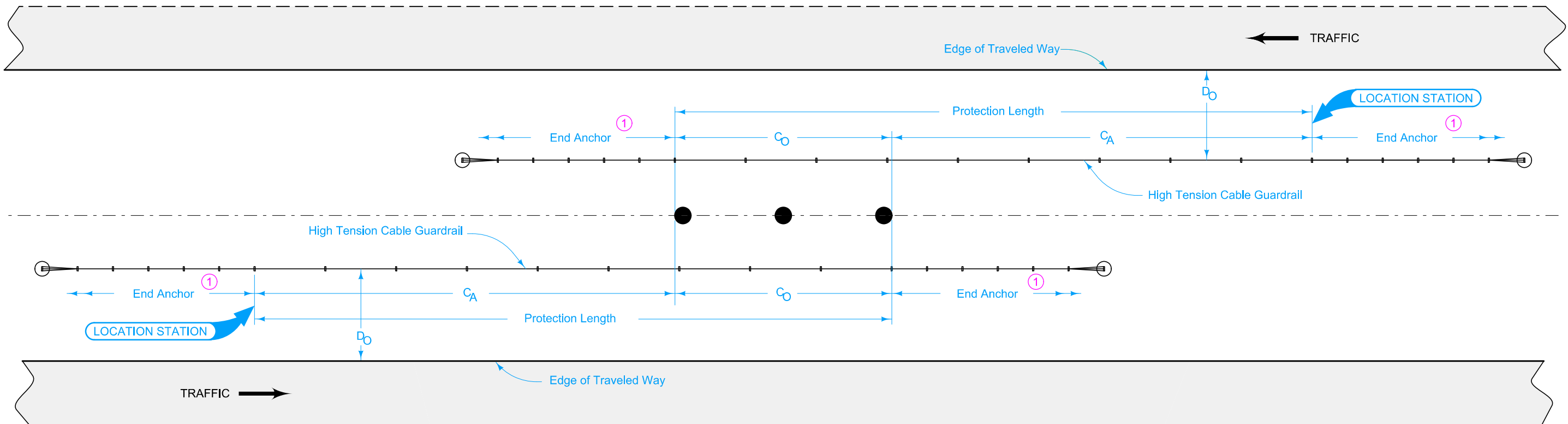
ROADSIDE OBJECT, ONE-WAY PROTECTION

① Length varies depending on High Tension Cable Guardrail system.

Possible Contract Items:
 High Tension Cable Guardrail
 High Tension Cable Guardrail, End Anchor
 Guardrail, Special Anchor Section



Possible Tabulation:
 108-9A

	REVISION	
	3	10-19-21
STANDARD ROAD PLAN		BA-351
REVISIONS: Added note 1.		SHEET 1 of 2
APPROVED BY DESIGN METHODS ENGINEER		
HIGH TENSION CABLE GUARDRAIL		

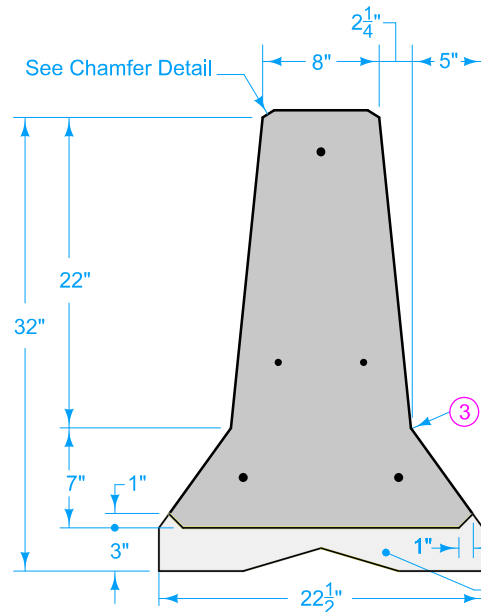


MEDIAN OBJECT PROTECTION

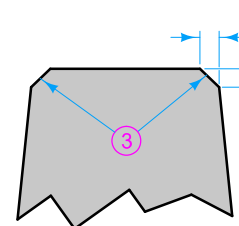
① Length varies depending on High Tension Cable Guardrail system.

	REVISION	
	3	10-19-21
STANDARD ROAD PLAN	BA-351	
REVISIONS: Added note 1.	SHEET 2 of 2	
 APPROVED BY DESIGN METHODS ENGINEER		
HIGH TENSION CABLE GUARDRAIL		

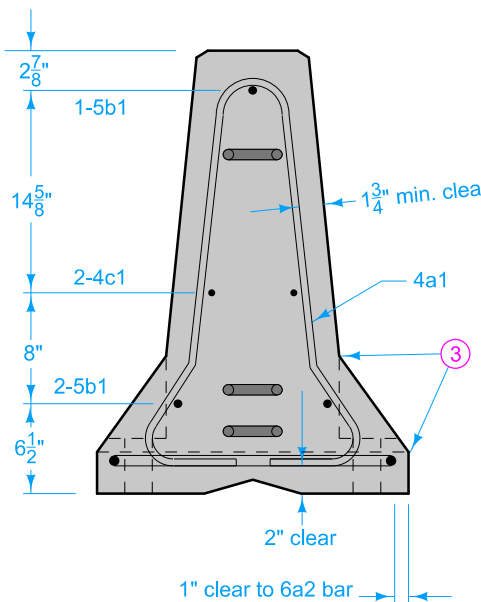
DESIGNER INFORMATION



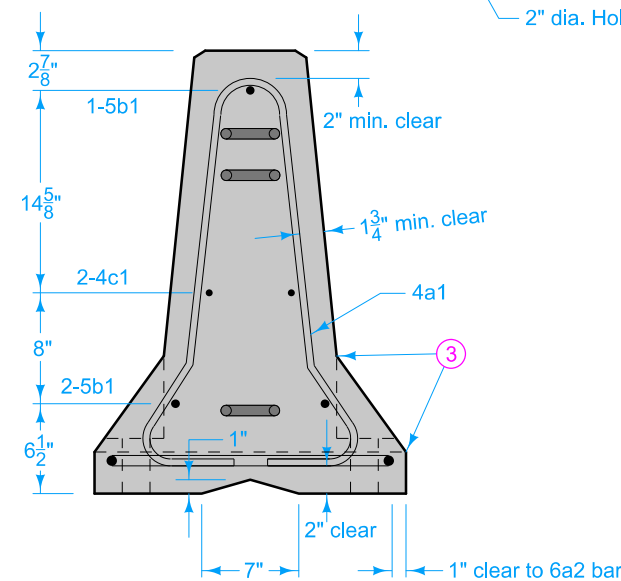
SECTION A-A
Lifting Slot



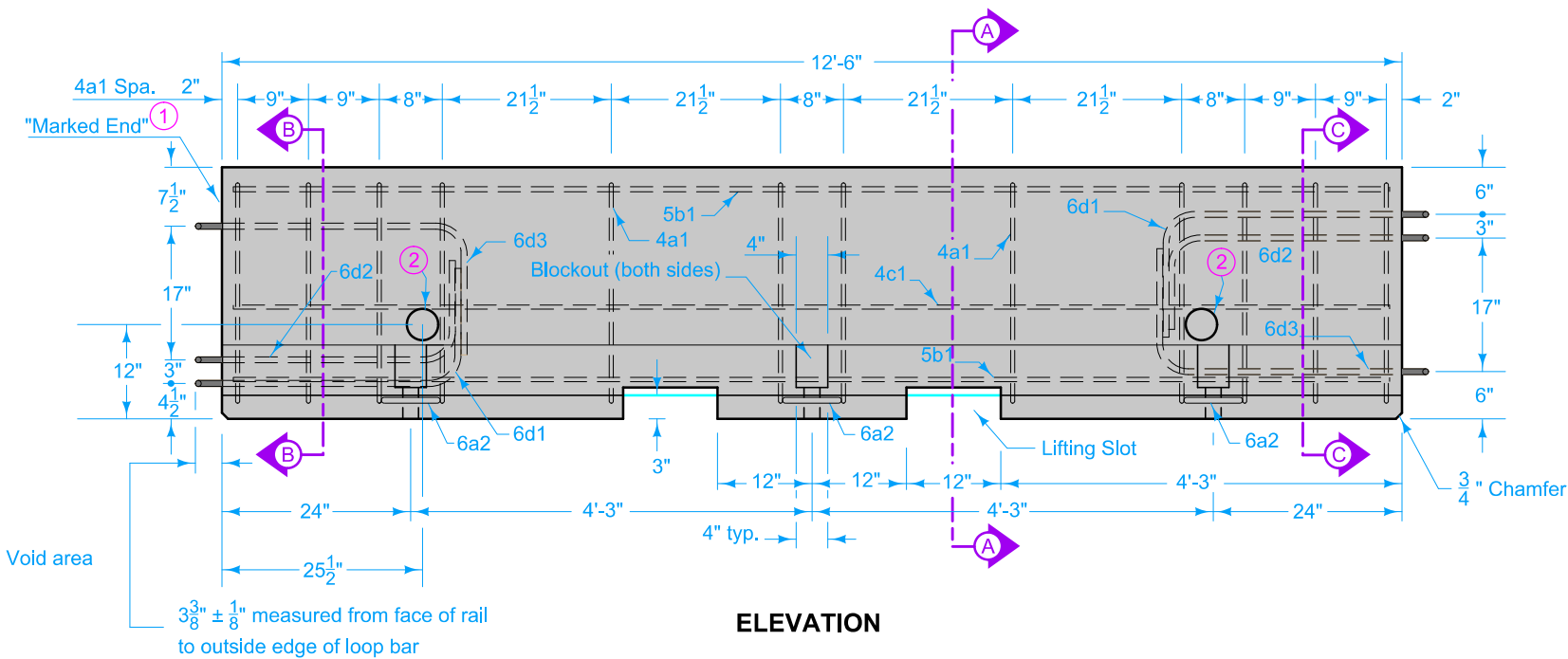
CHAMFER DETAIL



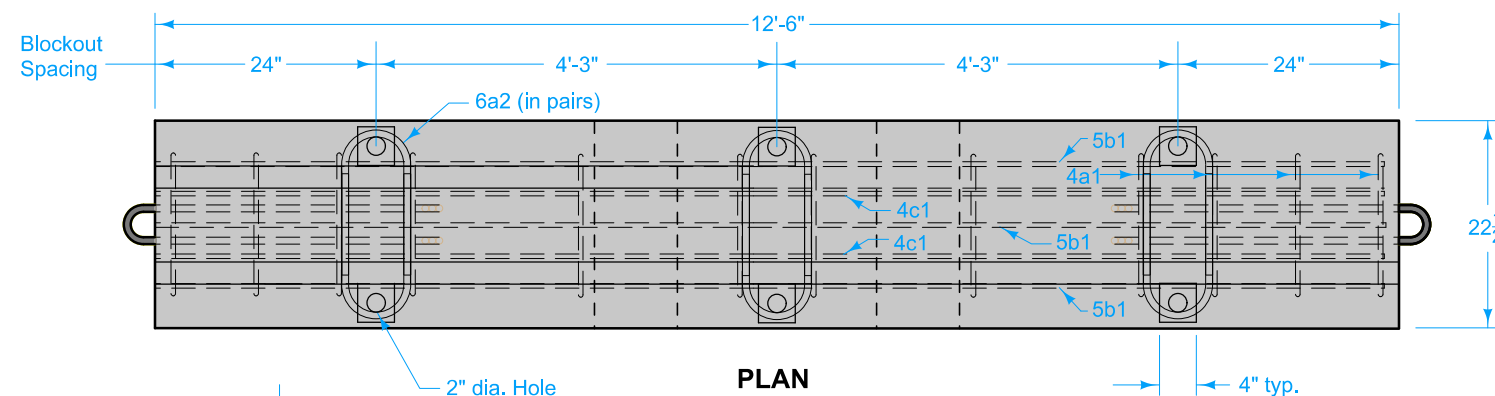
SECTION B-B
Stirrup Placement



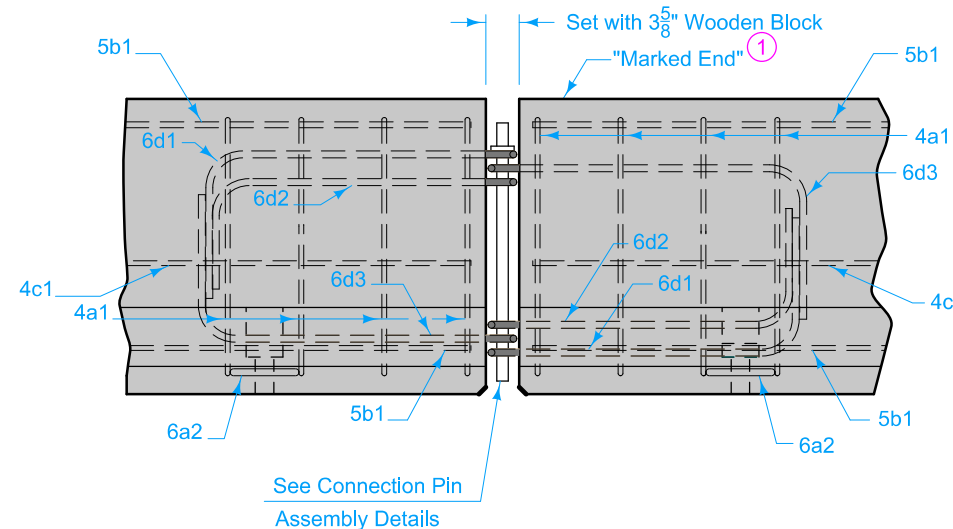
SECTION C-C
Stirrup Placement



ELEVATION



PLAN



BARRIER CONNECTION
(Elevation)

For loop bars 6d1, 6d2, and 6d3, use $\frac{3}{4}$ " smooth steel bars with a minimum yield strength of 60 ksi, a tensile strength of not less than 1.25 times the yield strength but a minimum of 80 ksi, a minimum 14% elongation in 8 inches, and passing a 180 degree bend test using a $3\frac{1}{2}$ " pin bend diameter.

Install loops within $\frac{1}{8}$ " of the plan dimensions.

Use Grade 60, ASTM A615 for all other reinforcements. Do not lift or move using loop bars 6d1, 6d2 or 6d3.

Provide for an approved monitoring schedule with a person on call and available 24 hours a day, each day of the week, to realign barrier which has been struck. Initiate service within one hour of notification of need.

Unless stated otherwise in the plans, the barrier rail sections shall be the property of the Contractor. Remove from the site upon completion of work.

Following removal of anchorage, fill all holes with an approved non-shrink grout.

Tapered end section is not designed for use within 30 feet of traffic on facilities with speed limits 55 mph or greater, nor within 10 feet of traffic on facilities with speed limits 40 mph to 50 mph.

Estimated quantity of concrete for one taper section is 0.6 cubic yards.

Include the cost of anchorage, when required in the price bid for "Temporary Barrier Rail, Concrete".

① Permanently mark one end of each rail section with manufacturing information. The "marked end" is that end of the barrier having one loop bar at the top and two loop bars at the bottom. Include the following information in the marking:

- Manufacturer Identification
- Date Manufactured (Month and Year)
- BA-401 Type A

② Lifting hole, 4 inch diameter PVC Pipe.

③ 1 inch radius allowed.

Possible Contract Item:
Temporary Barrier Rail, Concrete

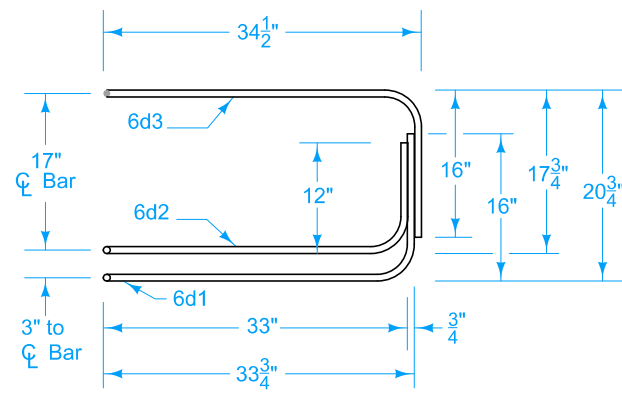
Possible Tabulation:
108-33

 STANDARD ROAD PLAN	REVISION	
	3	04-20-21
BA-401		SHEET 1 of 4

REVISIONS: Changed Obstacle to Object.

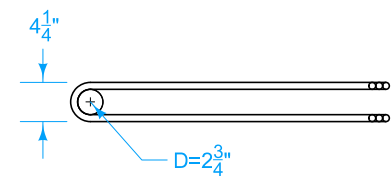
Shawn Miller
APPROVED BY DESIGN METHODS ENGINEER

TEMPORARY BARRIER RAIL
(PRECAST CONCRETE)



Elevation

(Marked end shown, invert for other end.)

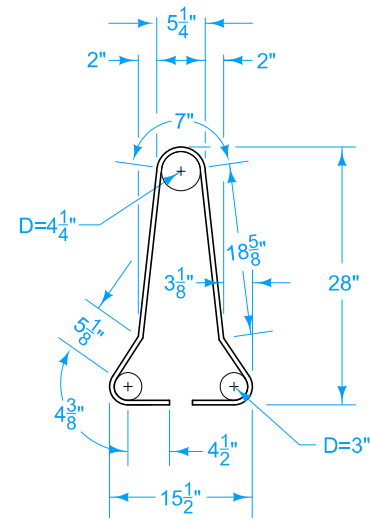


Plan

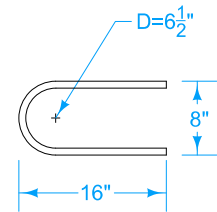
6d1, 6d2, 6d3

BENT BAR DETAILS

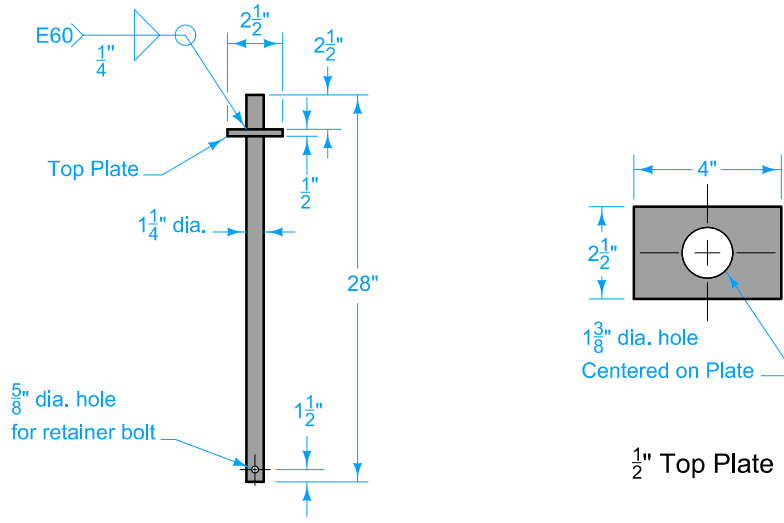
(Dimensions are out to out of bars unless otherwise noted.)



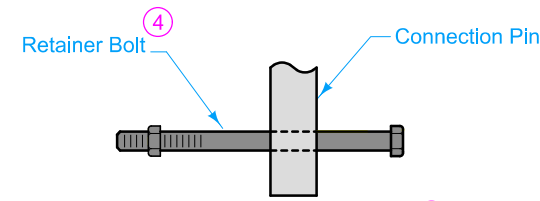
4a1



6a2



CONNECTION PIN
(A36 Steel - 10.9 lbs. each)



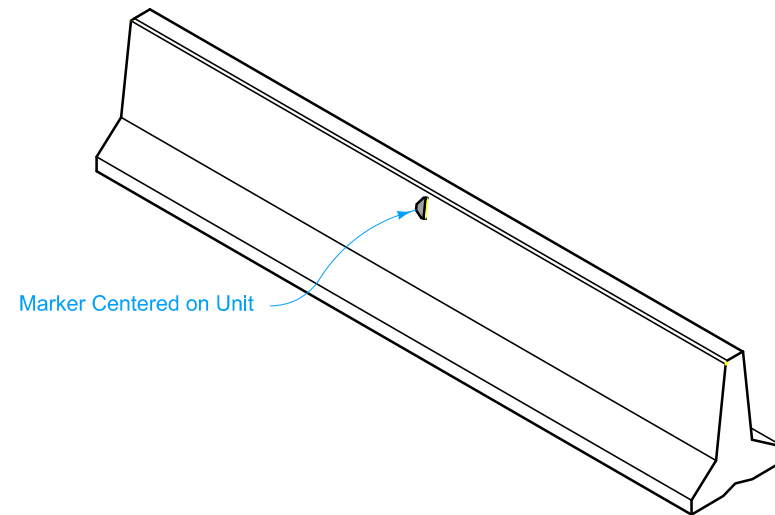
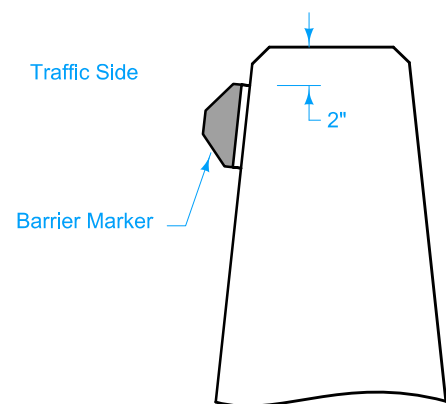
RETAINER BOLT & NUT
1/2" dia. bolt & nut
(ASTM A490, Grade 8)

CONNECTION PIN ASSEMBLY

- ④ Retainer bolt & nut are required for connections with 2-loop barriers (previous designs) or in conjunction with Strap Anchorage.
- ⑤ Furnish and install Barrier Markers. Attach to the barrier in a manner approved by the manufacturer. Markers to face oncoming traffic and match the adjacent edge line in color. Maintain the markers and promptly repair or replace any damaged or missing units. Include costs for furnishing, installing and maintaining markers in the price bid for "Temporary Barrier Rail, Concrete."

Per 12'-6" Barrier Section

REINFORCING A615 Gr. 60					
Bar	Bar Size	Shape	No. of Bars	Length Ft.	Weight Lbs.
4a1	4		12	6'-0"	48.1
6a2	6		6	35"	26.3
5b1	5		3	12'-2"	38.1
4c1	4		2	12'-2"	16.3
LOOP ASSEMBLY					
6d1	6		2	8'-5"	25.3
6d2	6		2	7'-7"	22.8
6d3	6		2	8'-6"	25.5



BARRIER MARKER PLACEMENT

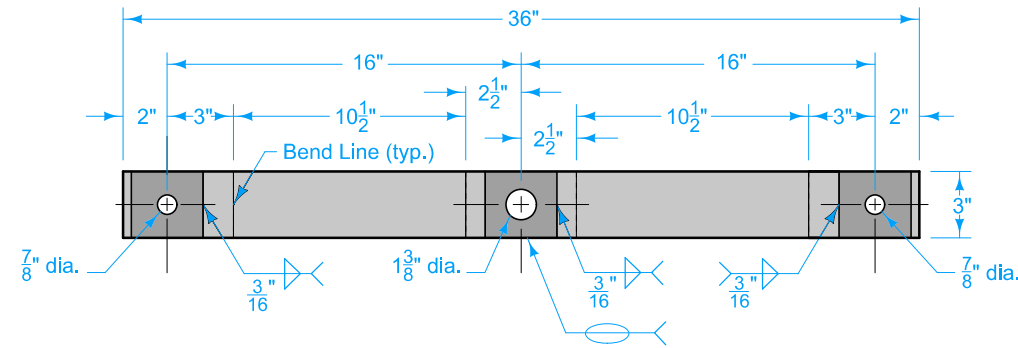
	REVISION	
	3	04-20-21
STANDARD ROAD PLAN		BA-401
REVISIONS: Changed Obstacle to Object.		SHEET 2 of 4

APPROVED BY DESIGN METHODS ENGINEER

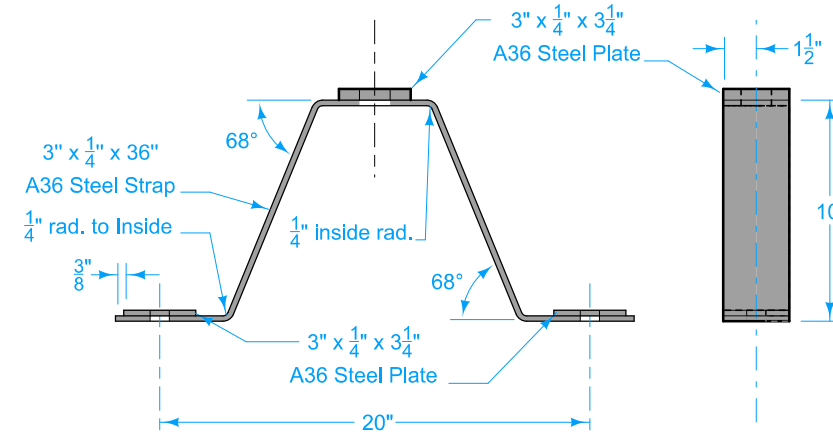
**TEMPORARY BARRIER RAIL
(PRECAST CONCRETE)**

STRAP ANCHORAGE

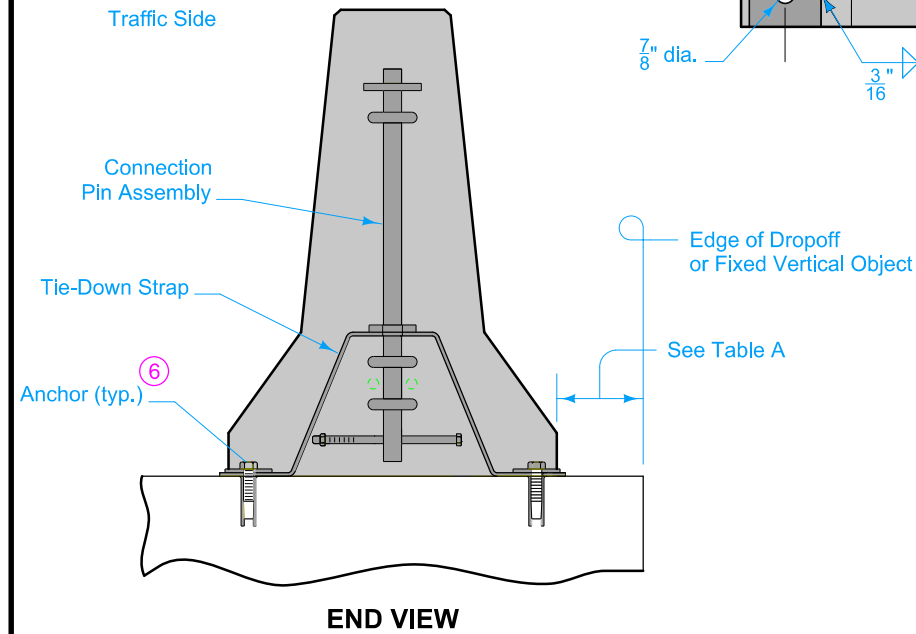
For use on:
Bridge Decks
PCC Pavement



TIE-DOWN STRAP
(before bending)

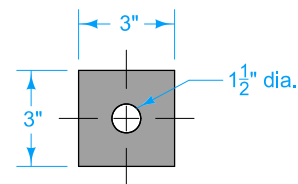
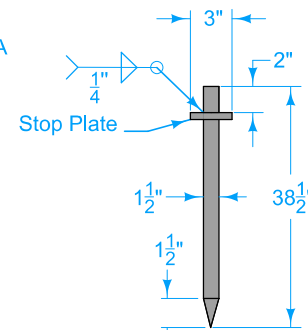
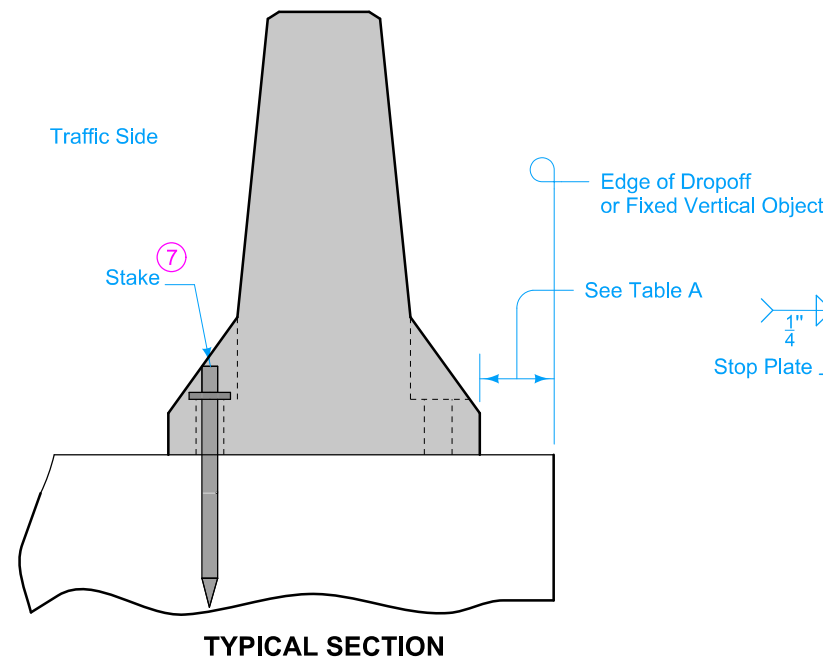


TIE-DOWN STRAP
(after bending)



STAKE ANCHORAGE

For use on:
HMA Pavement (2" min. thickness) (8)
Composite Pavement (8)
PCC Pavement (8)



1" STOP PLATE

TABLE A
ANCHORAGE REQUIREMENTS

Object	Dropoff Depth	Min. offset where TBR is Unanchored	Min. offset where TBR is Anchored
		24"	6"
Dropoff*	from pavement	≤ 24"	24"
		> 24"	45"
Fixed vertical object	from bridge	≤ 3"	1"
		> 3"	45"
		N/A	6"

* A dropoff is a slope of 2H:1V or steeper

- (6) 3/4 inch Red Head Multi-Set II drop-in anchor with 3/4" dia. x 1 3/4" long ASTM A325 structural bolt OR Red Head Large Diameter Tapcon (3/4" dia. x 4 1/2" min.) OR Simpson Titen HD Wedge Bolt (3/4" dia. x 5" min.).
- (7) 3 stakes required per rail section.
- (8) Pre-drill holes for stakes with 1 5/8" core bit.

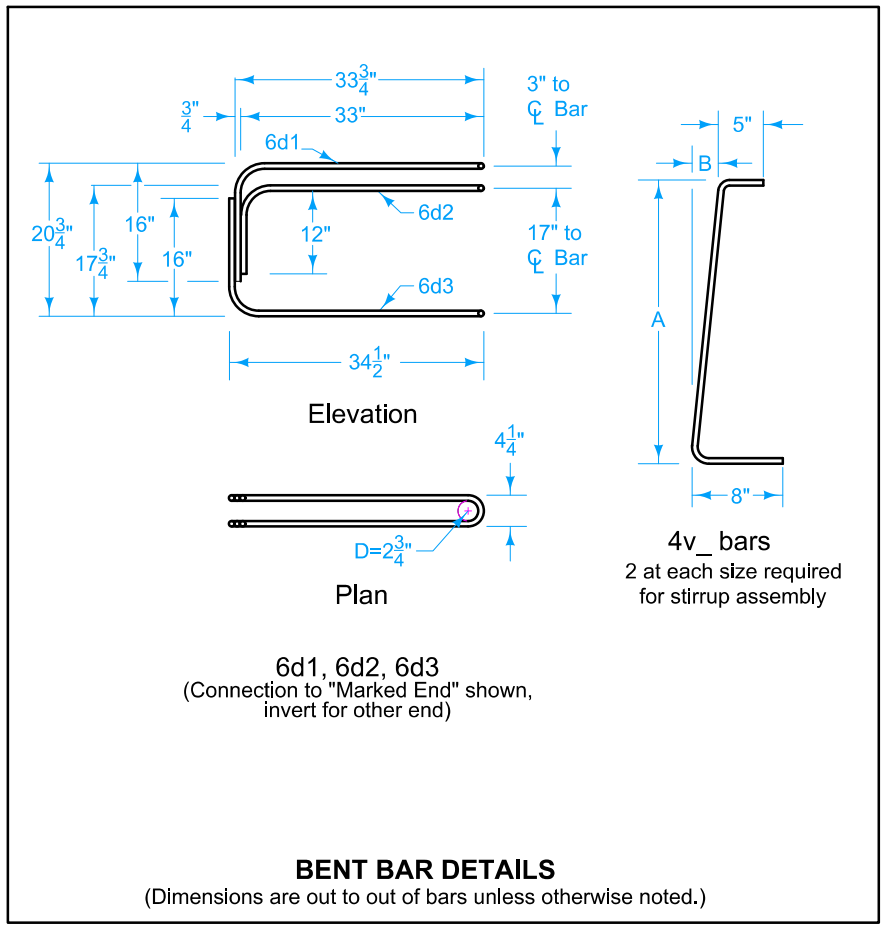
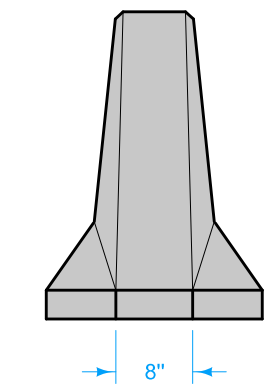
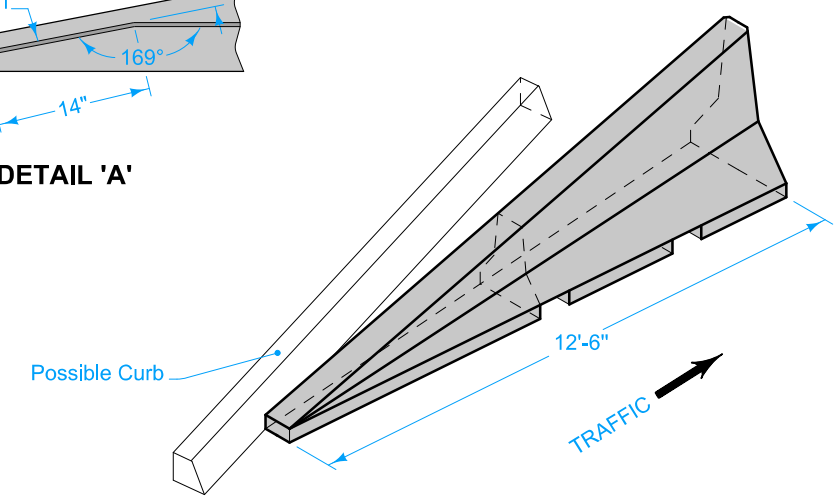
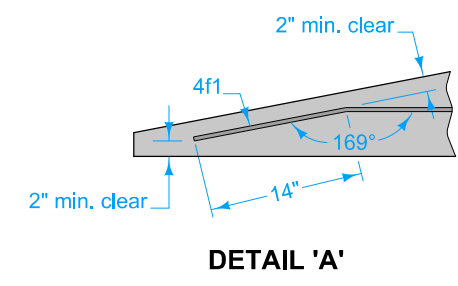
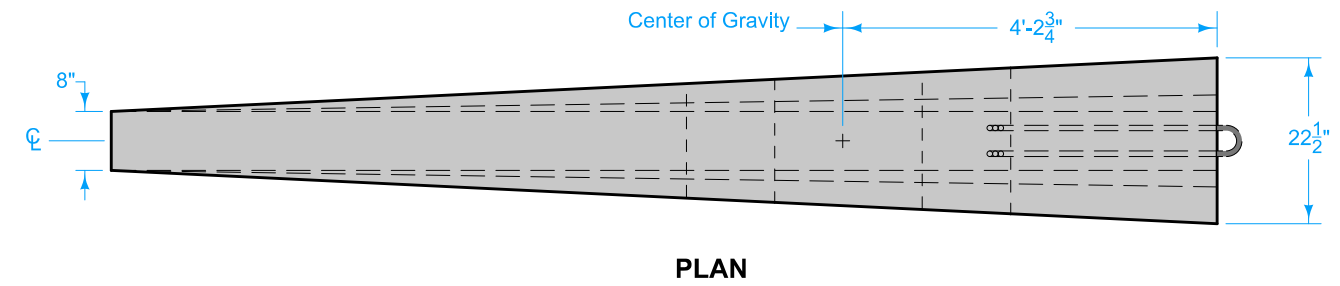
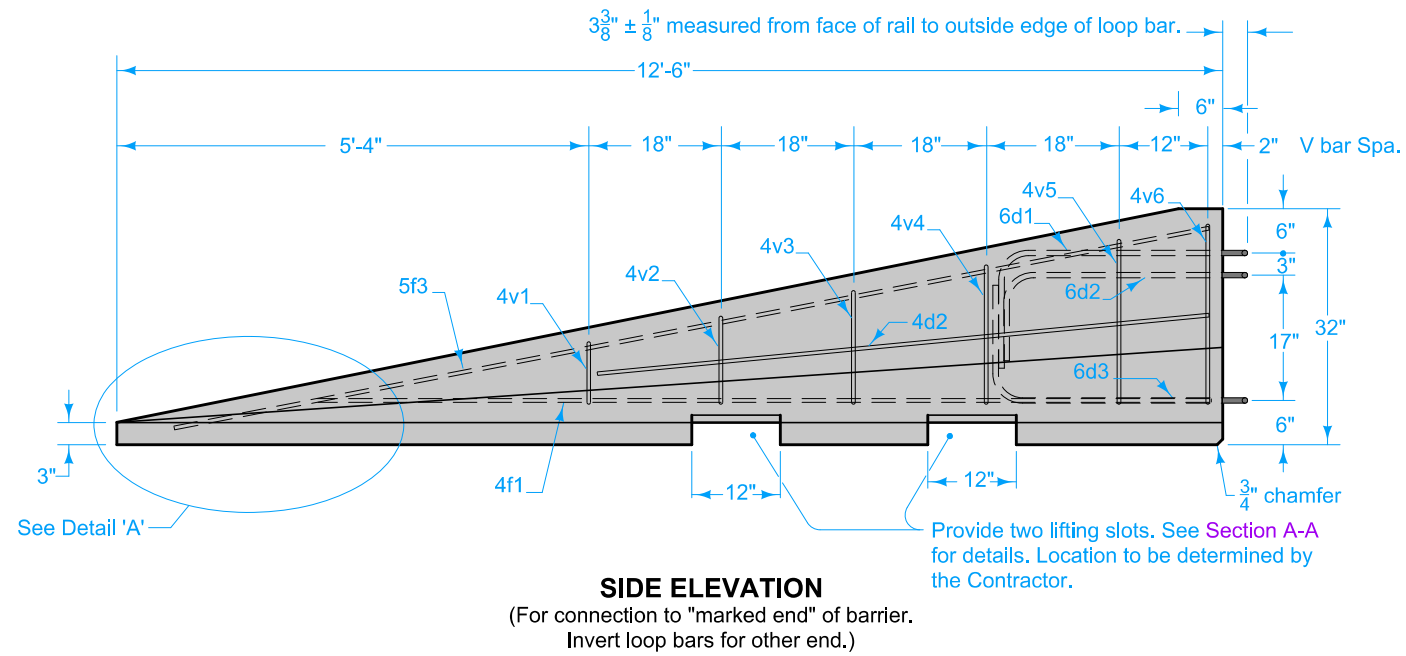
	REVISION	
	3	04-20-21
STANDARD ROAD PLAN		BA-401
		SHEET 3 of 4

REVISIONS: Changed Obstacle to Object.

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TEMPORARY BARRIER RAIL
(PRECAST CONCRETE)

TAPERED END SECTION

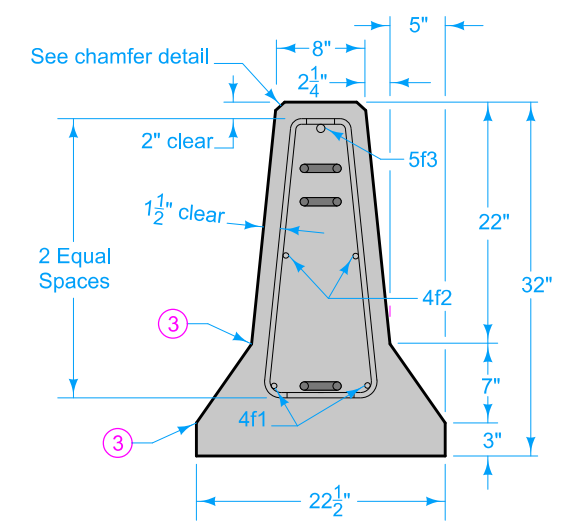


③ 1 inch radius allowed.

Per 12'-6" Barrier Taper Section

REINFORCING A615 Gr. 60					
Bar	Bar Size	Shape	No. of Bars	Length ft.	Weight lbs.
4v1	4	[	2	23"	2.6
4v2	4	[	2	26"	2.9
4v3	4	[	2	30"	3.3
4v4	4	[	2	33"	3.7
4v5	4	[	2	3'-2"	4.2
4v6	4	[	2	3'-4"	4.5
4f1	4	—	2	12'-0"	16.0
4f2	4	—	2	7'-6"	10.0
5f3	5	—	1	11'-9"	12.3
LOOP ASSEMBLY					
6d1	6	⌋	1	8'-5"	12.6
6d2	6	⌋	1	7'-7"	11.4
6d3	6	⌋	1	8'-6"	12.8

Bar	A	B
4v1	10"	1"
4v2	13"	1 1/4"
4v3	17"	1 5/8"
4v4	20"	1 7/8"
4v5	24 1/2"	2 3/8"
4v6	27"	2 3/4"

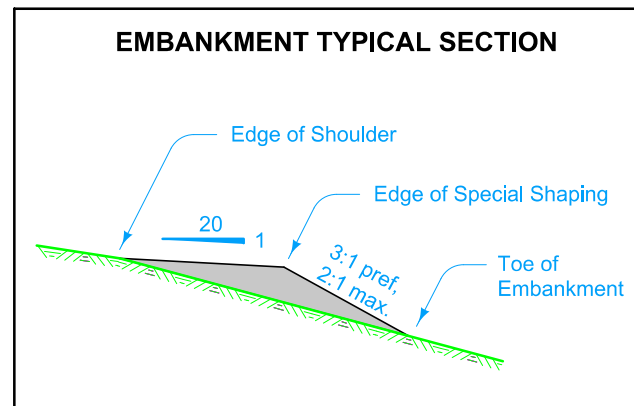
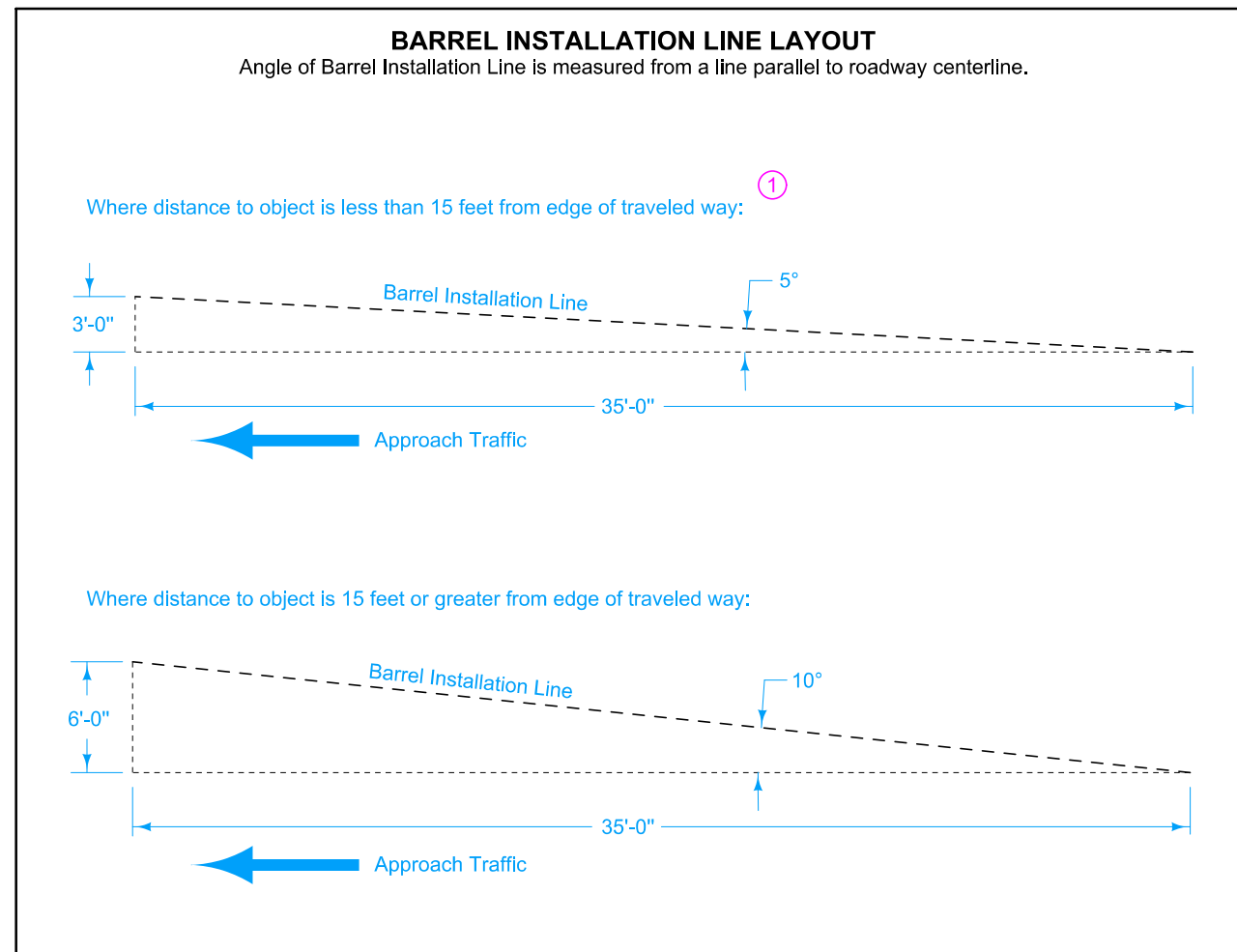
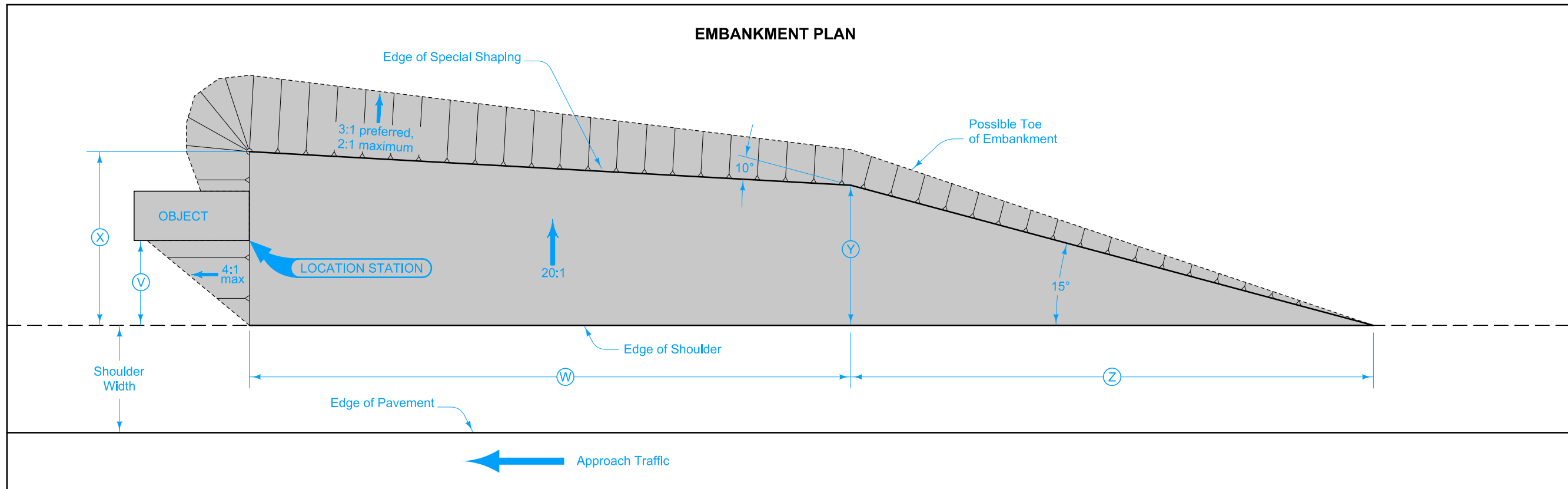


	REVISION
	3 04-20-21
STANDARD ROAD PLAN	BA-401
SHEET 4 of 4	

REVISIONS: Changed Obstacle to Object.

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TEMPORARY BARRIER RAIL (PRECAST CONCRETE)



① For object located within the traveled way where space is limited, Barrel Installation Line may be parallel to roadway centerline. In this case, Y dimension equals X dimension.

Possible Contract Items:
 Embankment In Place
 Temporary Crash Cushion

Possible Tabulation:
 108-30

EMBANKMENT DIMENSIONS

For Object Widths:	Sand Barrel Layouts Required	W	X	Y (must not be negative)	Z
3'-6" or less	1	24'-3"	V + 5'-3"	V + 3'-3"	3.73(V) + 12'-0"
3'-7" - 10'-7"	2	25'-0"	V + 12'-3"	V + 10'-0"	3.73(V) + 38'-0"
10'-8" - 17'-9"	3	25'-9"	V + 19'-3"	V + 17'-0"	3.73(V) + 64'-0"
17'-10" - 32'-3"	4	26'-6"	V + 26'-3"	V + 24'-0"	3.73(V) + 89'-0"

 STANDARD ROAD PLAN	REVISION
	2 | 04-20-21
BA-500	
SHEET 1 of 2	
REVISIONS: Changed Obstacle to Object.	
 APPROVED BY DESIGN METHODS ENGINEER	
TEMPORARY CRASH CUSHIONS SAND BARREL	

