Barriers

BA

SECTION

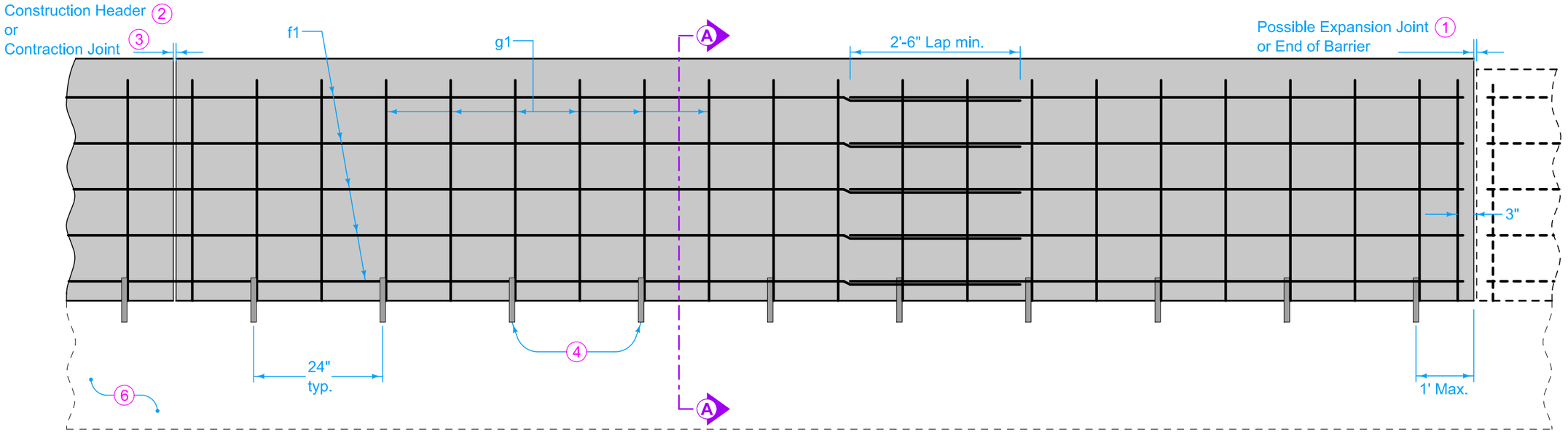
BA

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	04-15-25	Steel Beam Guardrail Components
BA-201	10-18-22	Steel Beam Guardrail Barrier Transition Section (MASH TL-3)
BA-202	04-15-25	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	04-15-25	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	04-15-25	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



ELEVATION

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.

(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) 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.

(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.

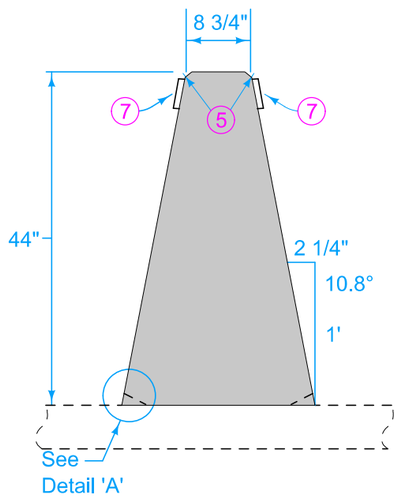
(5) Fillet all exposed corners with a $\frac{3}{4}$ inch dressed and beveled strip.

(6) Construct concrete footing when barrier is not placed on concrete slab. Apply Article 2403.03 of the Standard Specifications, but the use of forms is optional. If forms are used, place backfill around the completed footing.

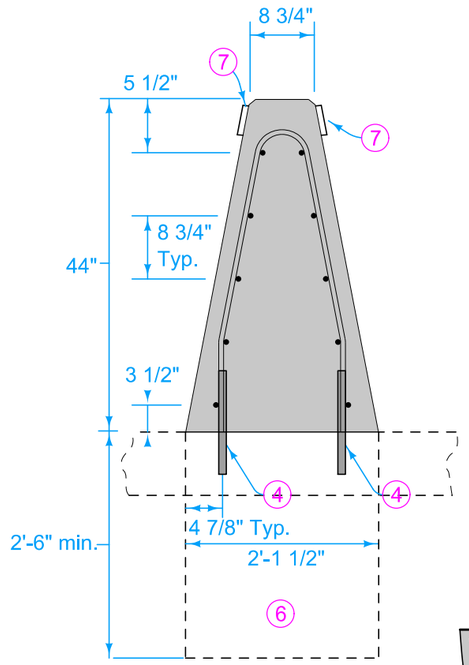
(7) Place barrier markers at 100 foot increments in areas with non-continuous lighting, or 250 foot increments in areas with continuous lighting. Marker color to be the same as adjacent edge line.

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

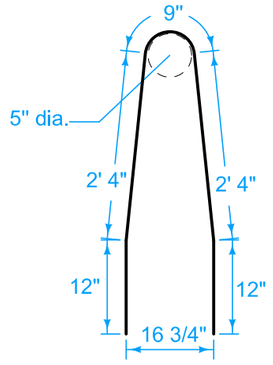
Possible Tabulation:
108-18



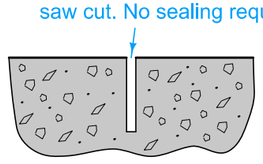
BARRIER FACE



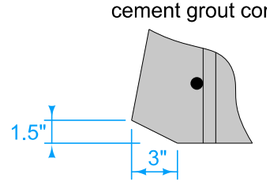
SECTION A-A



G1
BENT BAR



SAWED CONTRACTION JOINT
Saw cut top and front face



DETAIL 'A'
Special Shaping for Barrier over Intake

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	———

CONCRETE QUANTITIES
Per Foot
0.19 cy

IOWA DOT
STANDARD ROAD PLAN

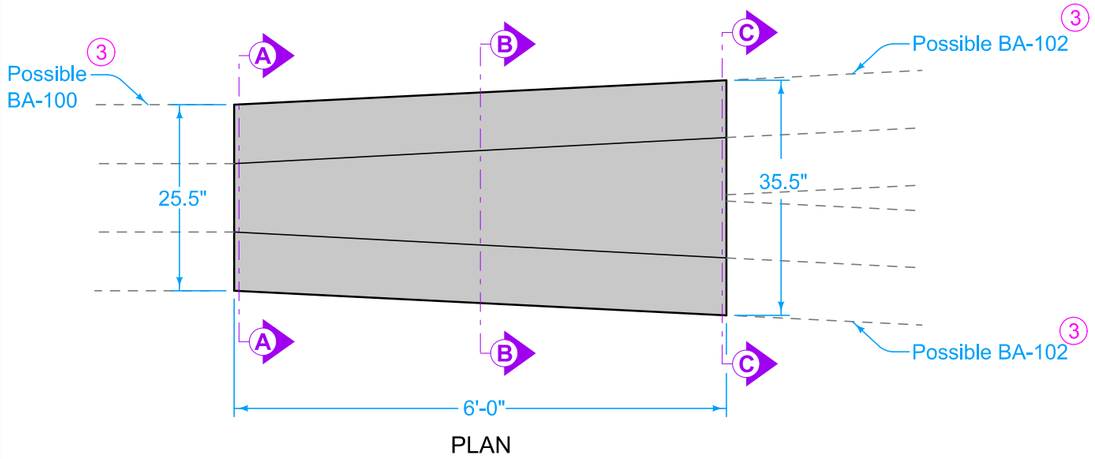
REVISION	
4	10-18-22

BA-100
SHEET 1 of 1

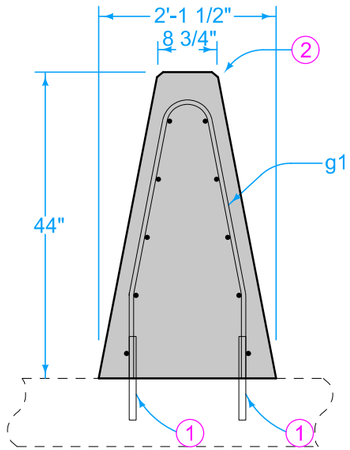
REVISIONS: Changed from F-shape to Texas single slope, Change reinforcing.

APPROVED BY DESIGN METHODS ENGINEER

44" CONCRETE MEDIAN BARRIER (FULL SECTION)



PLAN



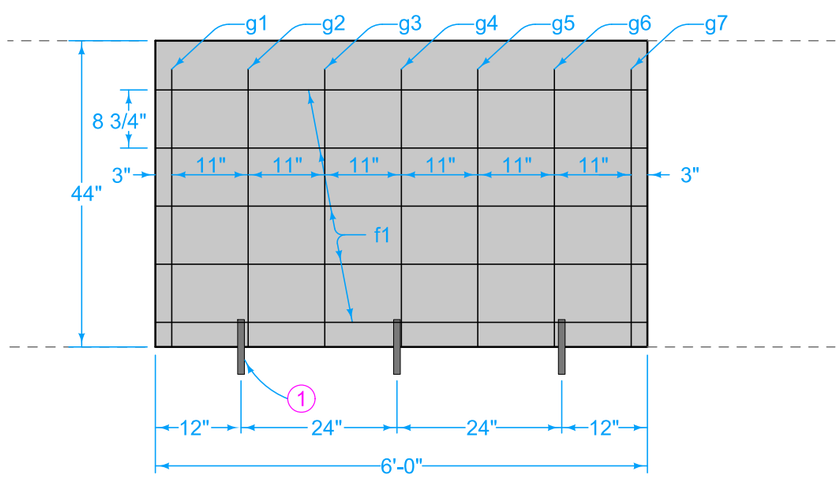
SECTION A-A

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.

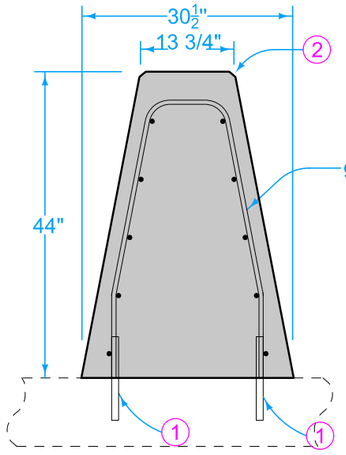
(1) Use 1 inch diameter deformed dowel bars of sufficient length to ensure 6 inch minimum embedment in barrier and supporting surface. Install bars either in supporting surface when placed or in drilled holes using polymer grout complying with Materials I.M. 491.11 or hydraulic cement grout complying with Materials I.M. 491.13.

(2) Fillet all exposed corners with a $\frac{3}{4}$ inch dressed and beveled strip.

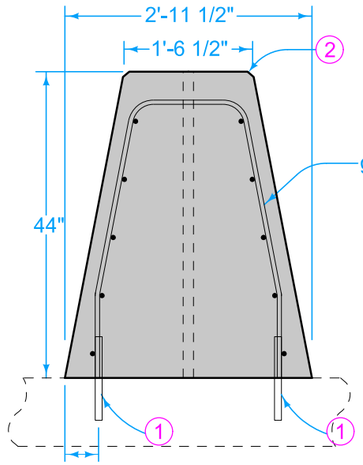
(3) Provide 3 feet overlap of reinforcing steel between sections.



ELEVATION

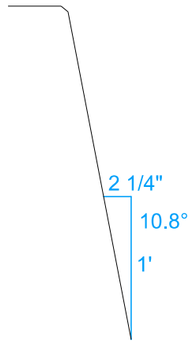


SECTION B-B

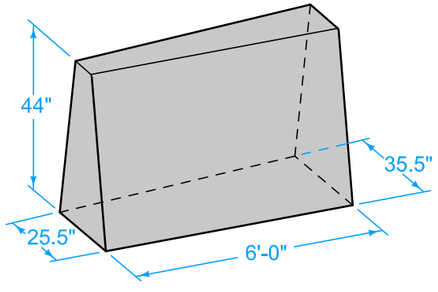


4 7/8" Typ.

SECTION C-C

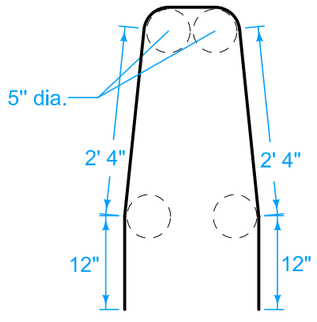


BARRIER FACE



ISOMETRIC

BENT BARS



All "g" 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:
103-18

IOWA DOT

STANDARD ROAD PLAN

REVISION	
2	10-18-22

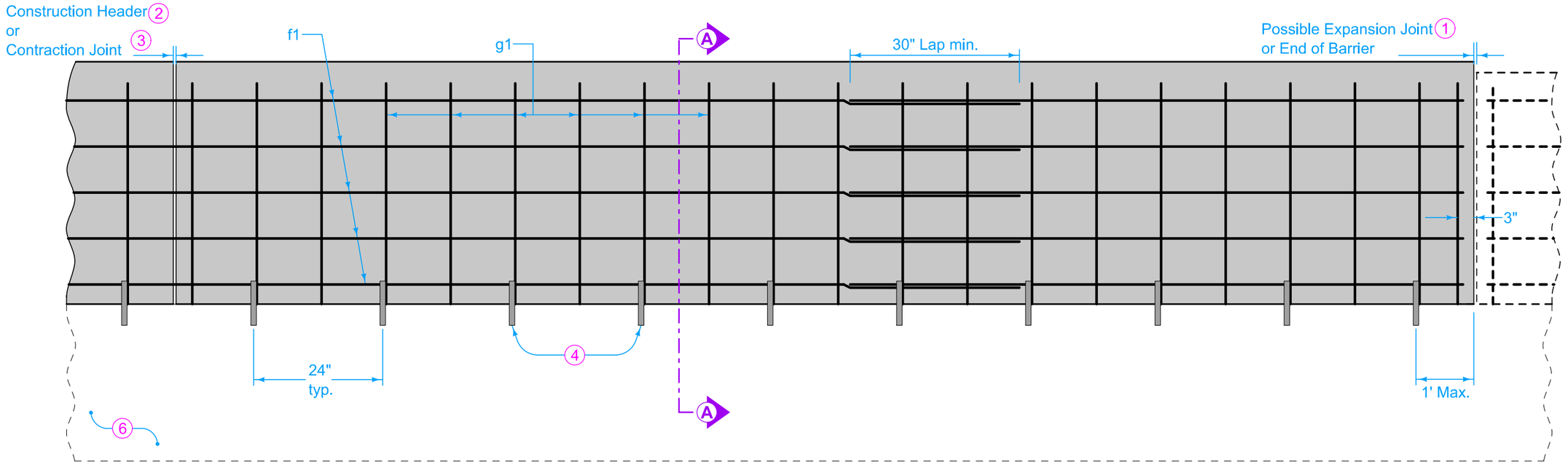
BA-101

SHEET 1 of 1

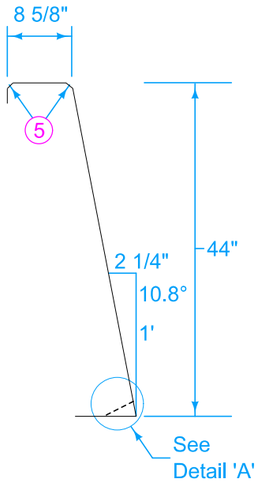
REVISIONS: Changed from F-shape to Texas single slope, Change reinforcing.

APPROVED BY DESIGN METHODS ENGINEER

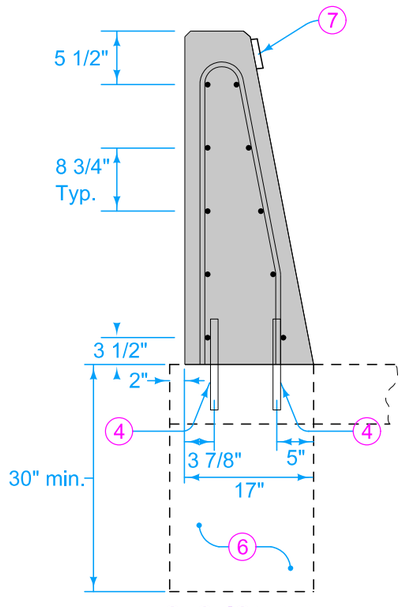
44" CONCRETE MEDIAN BARRIER WIDTH TRANSITION



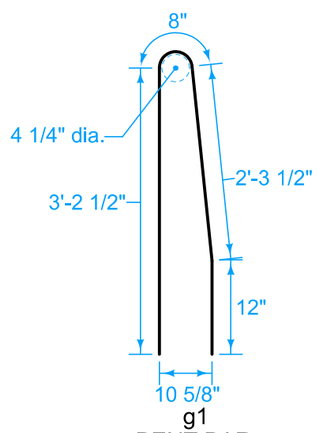
ELEVATION



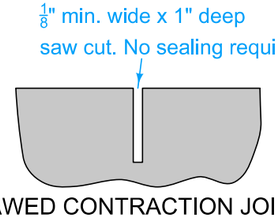
BARRIER FACE



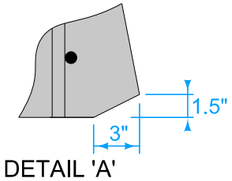
SECTION A-A



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

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	—

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

CONCRETE QUANTITIES
Per foot
0.14 cy

IOWA DOT
STANDARD ROAD PLAN

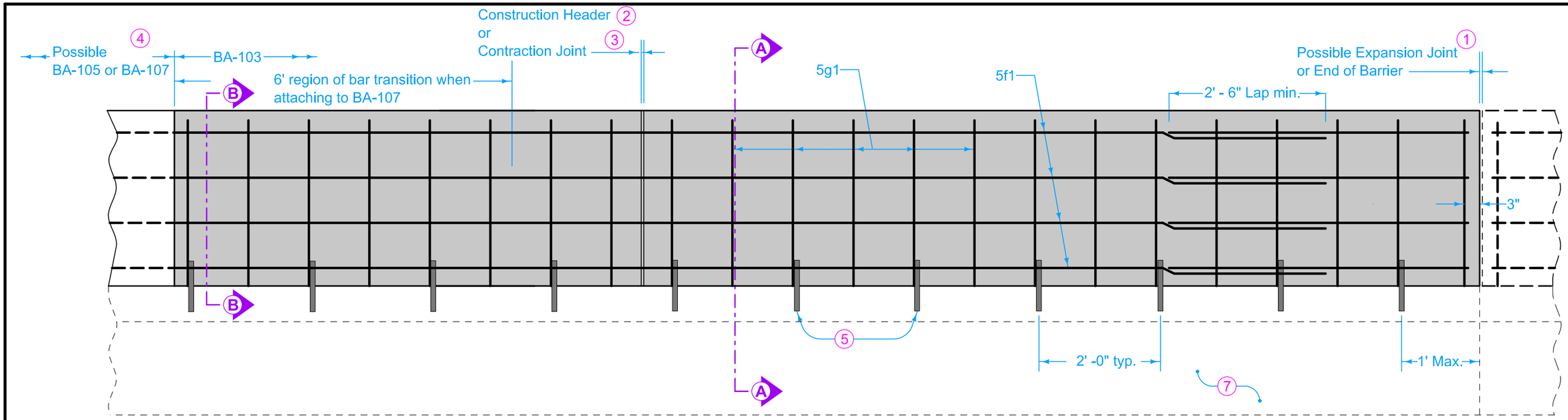
REVISION	
5	10-18-22

BA-102
SHEET 1 of 1

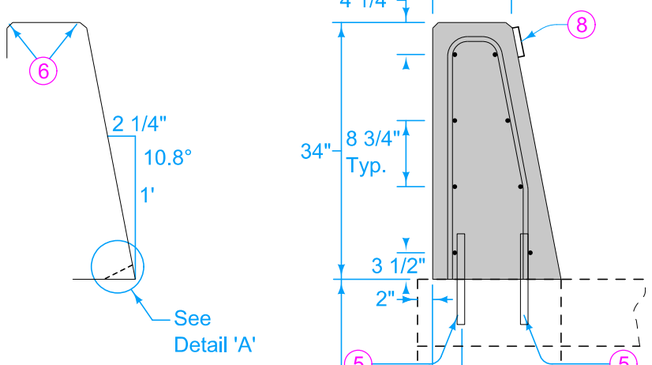
REVISIONS: Changed from F-shape to Texas single slope, Change reinforcing.

APPROVED BY DESIGN METHODS ENGINEER

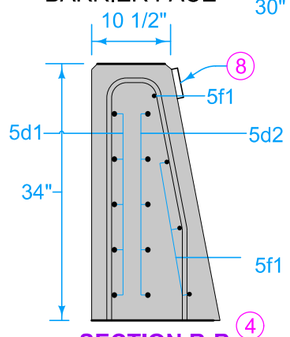
44" CONCRETE BARRIER
(HALF SECTION)



ELEVATION

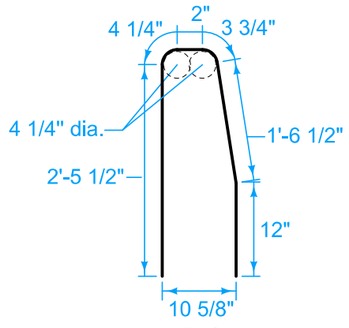


BARRIER FACE

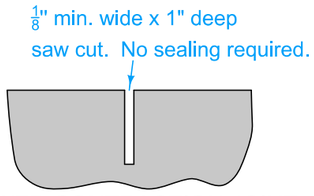


SECTION B-B
When attaching to BA-107

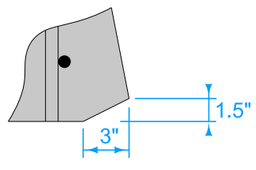
SECTION A-A



5g1
BENT BAR



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



DETAIL 'A'
Special Shaping for Barrier
over Intake

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-103barrier.

(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.

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	—

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

IOWA DOT
STANDARD ROAD PLAN

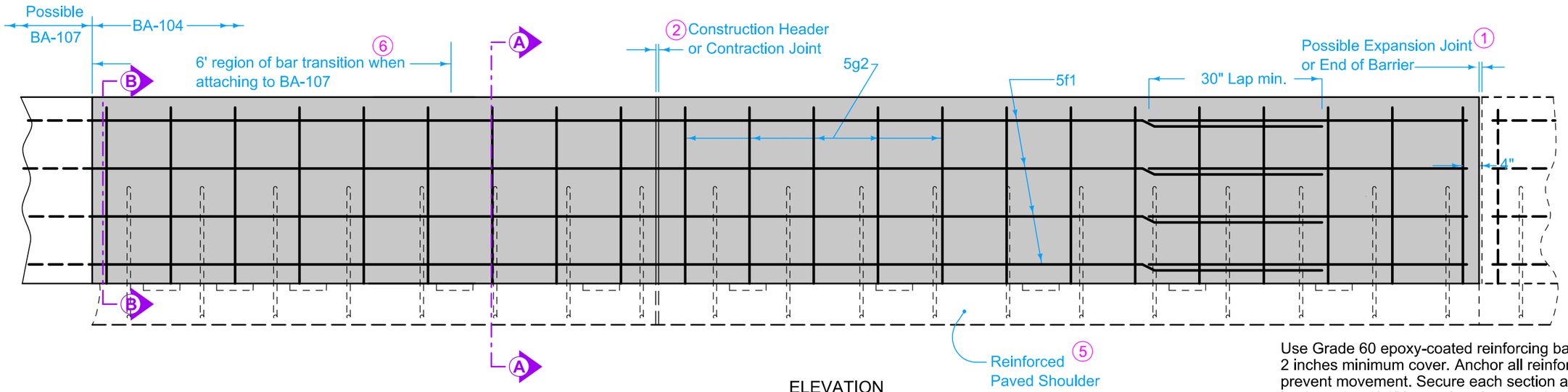
REVISION	
4	10-18-22

BA-103
SHEET 1 of 1

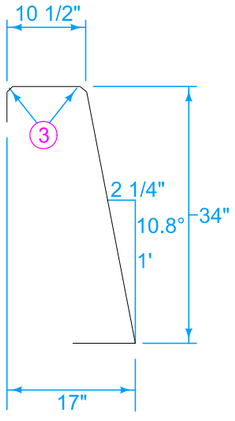
REVISIONS: Changed from F-shape to Texas single slope, Change reinforcing.

APPROVED BY DESIGN METHODS ENGINEER

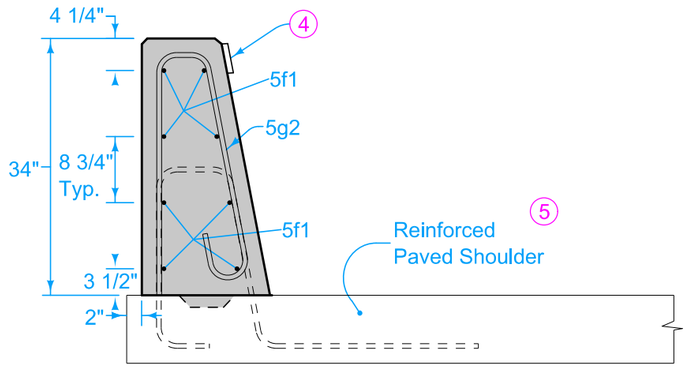
34" CONCRETE BARRIER
(HALF SECTION)



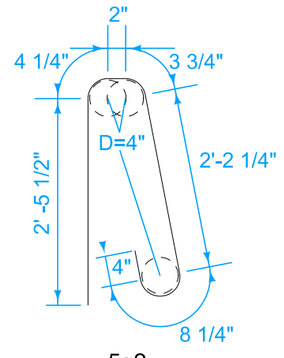
ELEVATION



BARRIER FACE



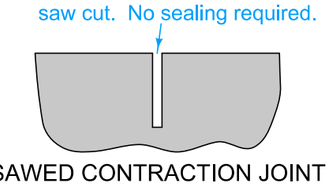
SECTION A-A



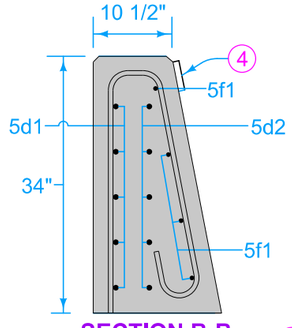
5g2
BENT BAR

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	—



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



SECTION B-B 6
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.

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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
2	10-18-22

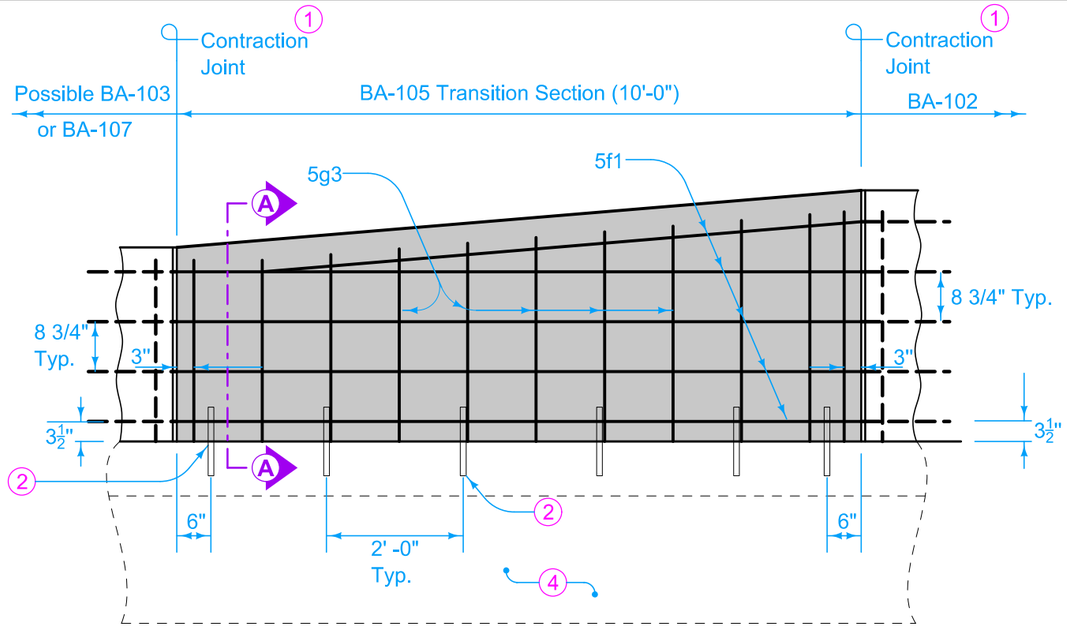
BA-104

SHEET 1 of 1

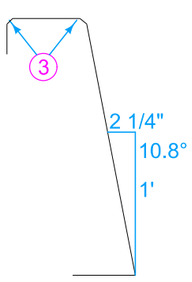
REVISIONS: Changed from F-shape to Texas single slope, Change reinforcing.

APPROVED BY DESIGN METHODS ENGINEER

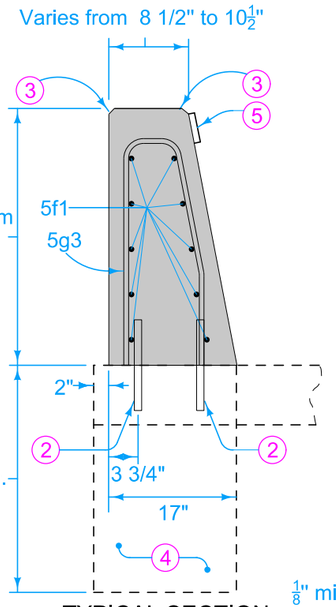
34" CONCRETE BARRIER FOR USE WITH REINFORCED PAVED SHOULDER



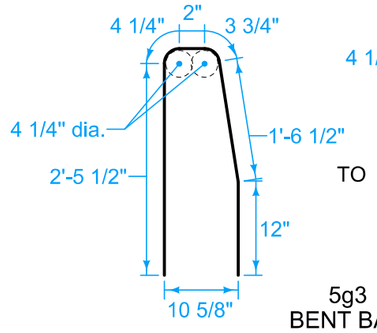
ELEVATION



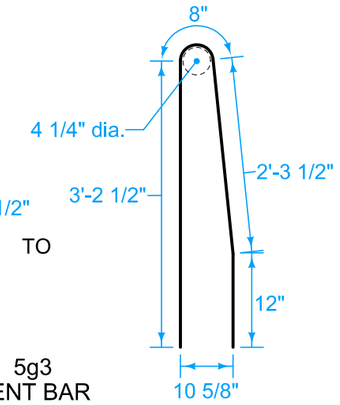
BARRIER FACE



TYPICAL SECTION



TO



5g3
BENT BAR

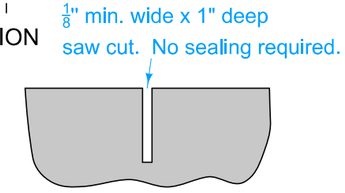
CONCRETE QUANTITIES
for one Transition Section

1.3 cy

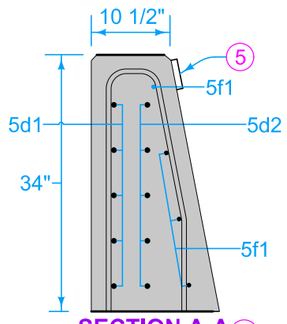
REINFORCING BAR LIST
for one Transition Section

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"



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



SECTION A-A (6)
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.

(1) 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.

(2) 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.

(3) Fillet all exposed corners with a ¾ inch dressed and beveled strip.

(4) 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.

(5) 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.

(6) 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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
2	10-18-22

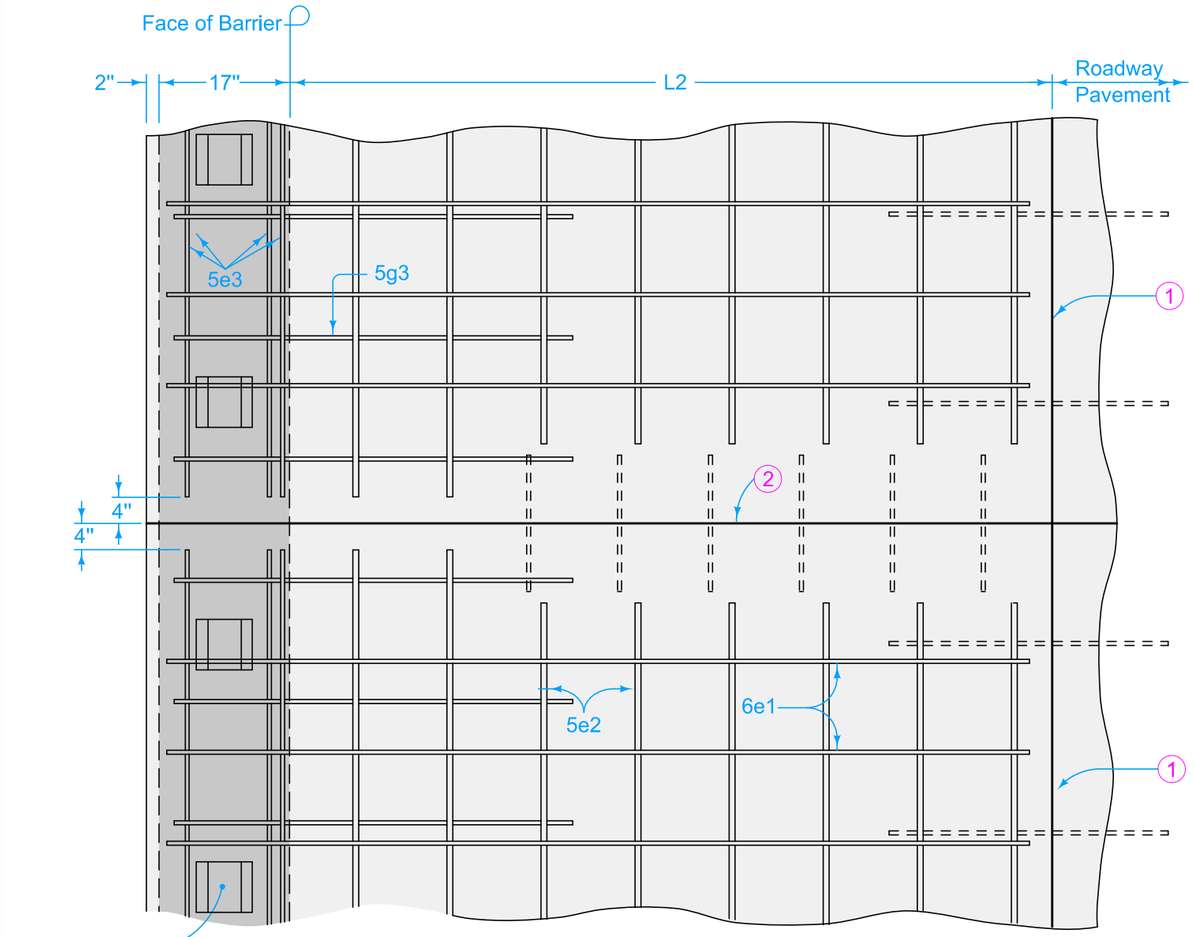
BA-105

SHEET 1 of 1

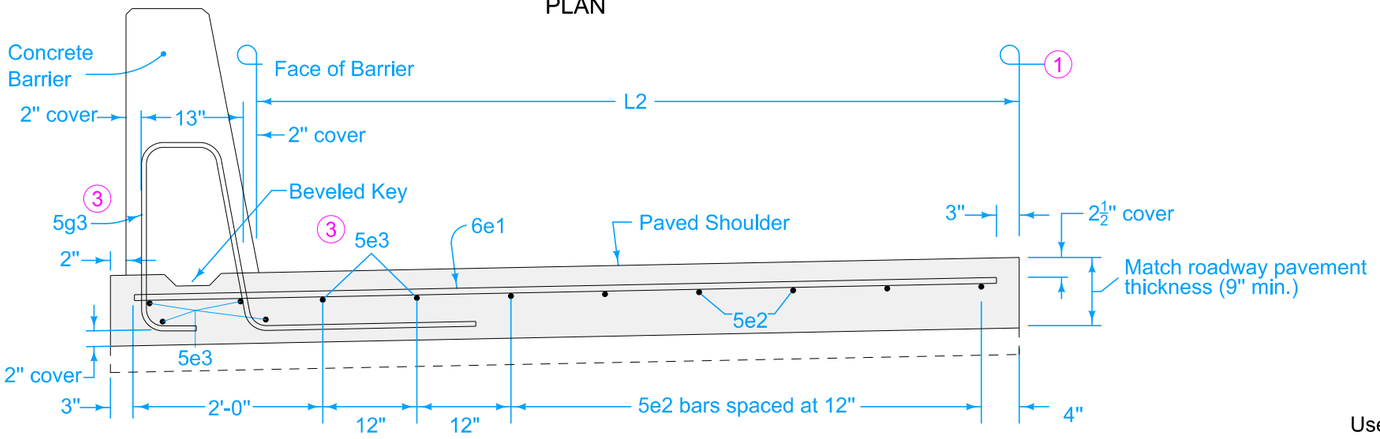
REVISIONS: Changed from F-shape to Texas single slope, Change reinforcing.

APPROVED BY DESIGN METHODS ENGINEER

34" TO 44" CONCRETE BARRIER TRANSITION SECTION

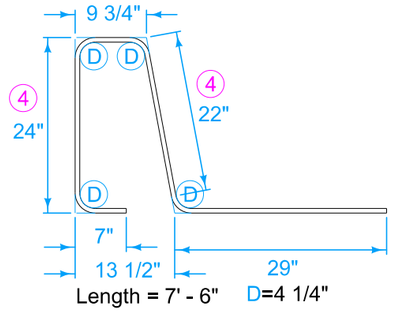


PLAN

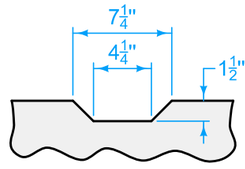


TYPICAL SECTION

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 (3)	varies	varies	(5)



5g3



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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
6	10-17-23

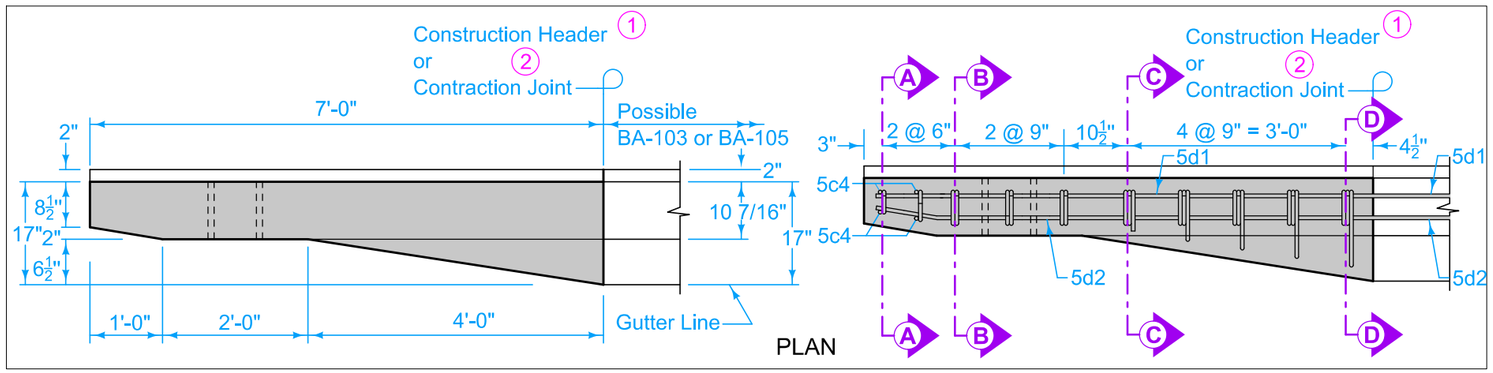
BA-106

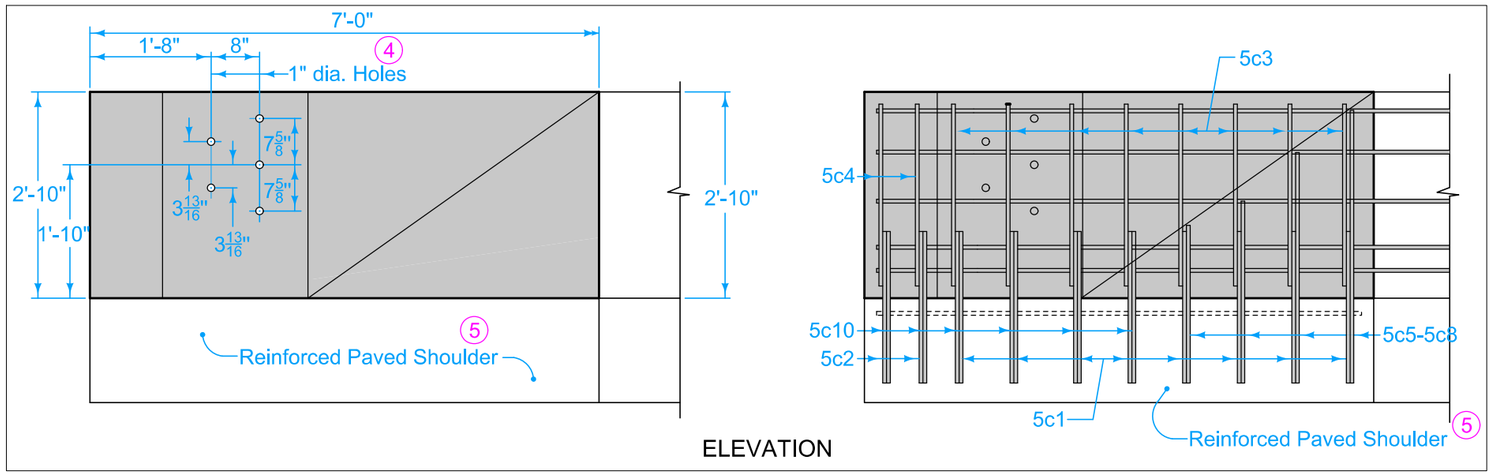
SHEET 1 of 1

REVISIONS: Modified reinforcing to fit with 17' panels.

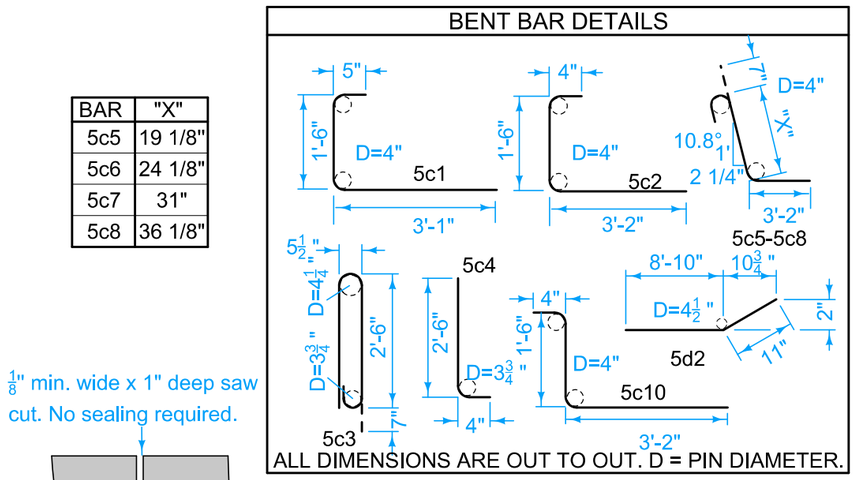
APPROVED BY DESIGN METHODS ENGINEER

REINFORCED PAVED SHOULDER FOR CONCRETE BARRIER

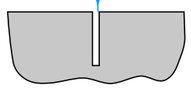




BAR	"X"
5c5	19 1/8"
5c6	24 1/8"
5c7	31"
5c8	36 1/8"



⅛" min. wide x 1" deep saw cut. No sealing required.



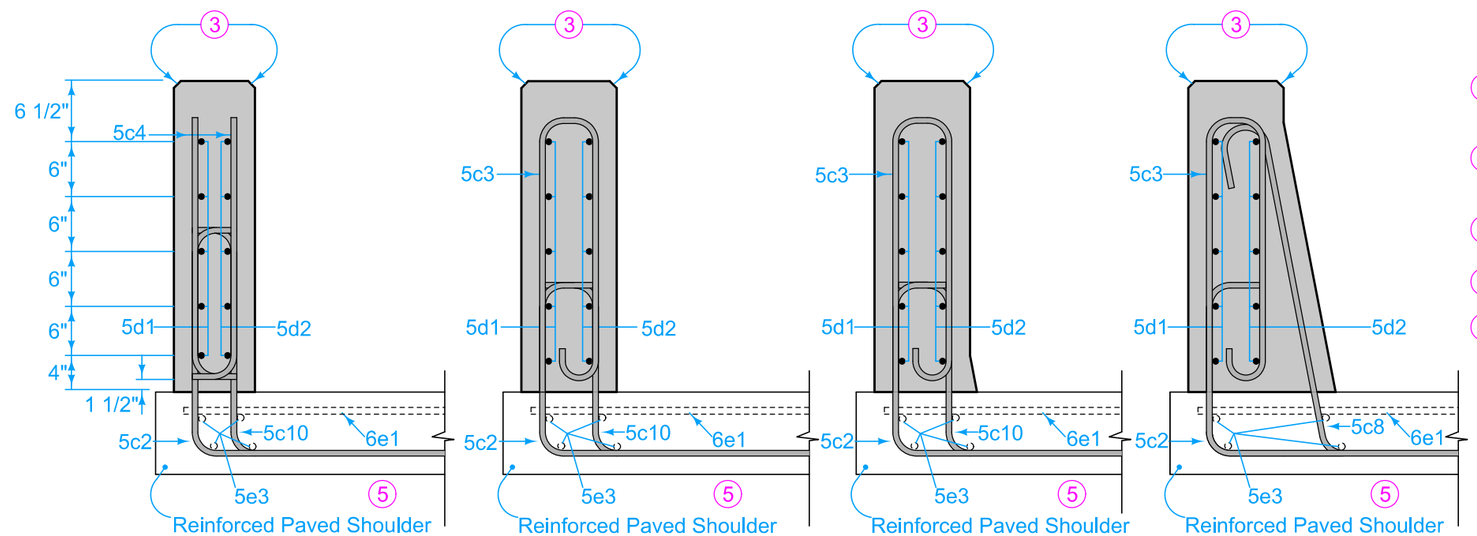
SAWED CONTRACTION JOINT

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 ¾ 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

STANDARD ROAD PLAN

REVISION	
4	10-18-22

BA-107

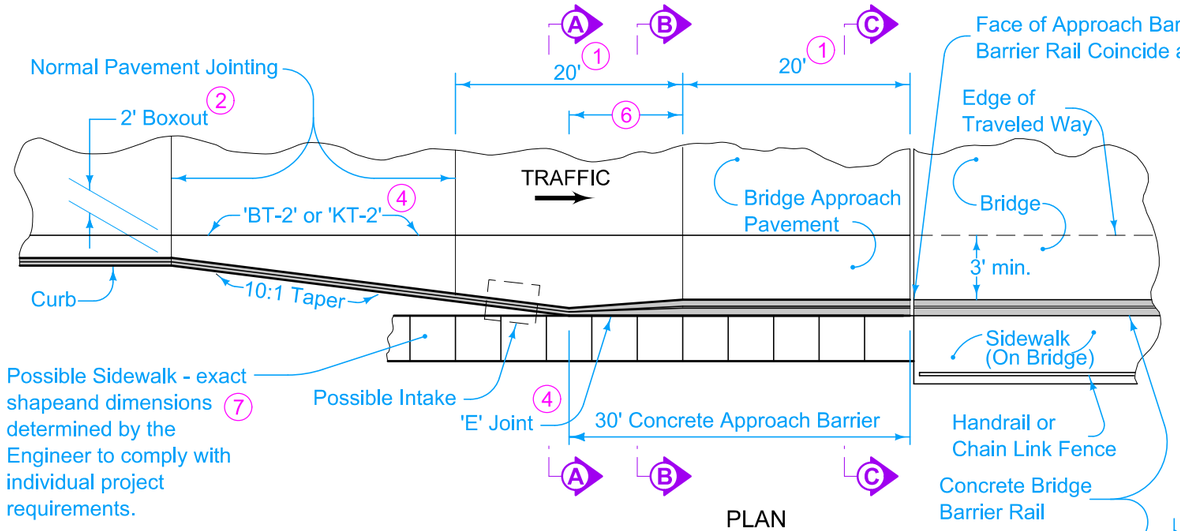
SHEET 1 of 1

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

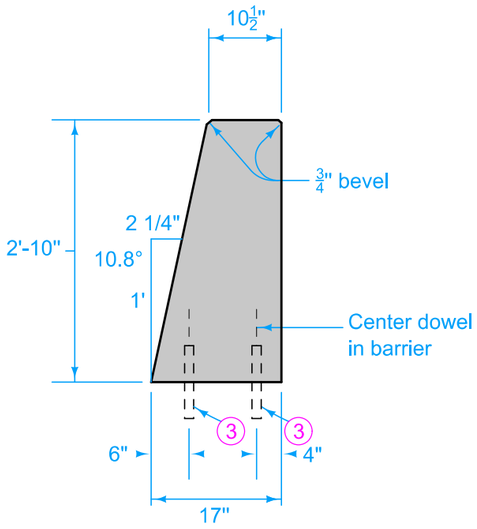
APPROVED BY DESIGN METHODS ENGINEER

CONCRETE BARRIER END SECTION

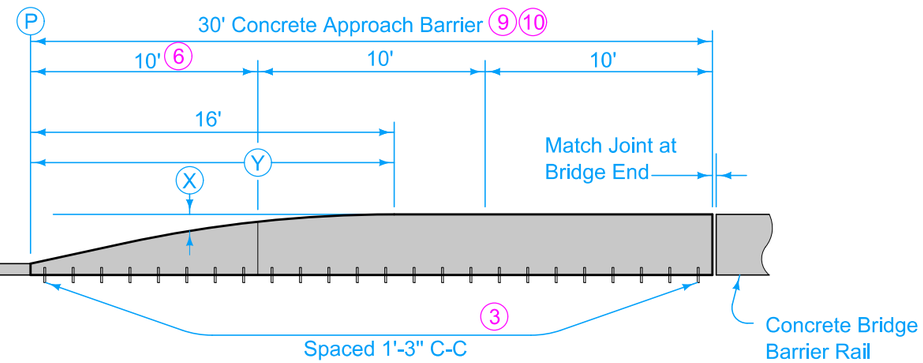
DESIGNER INFORMATION



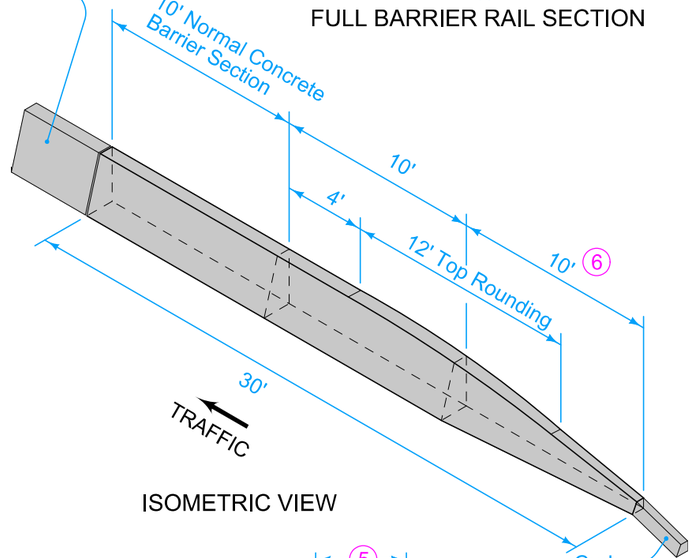
PLAN



FULL BARRIER RAIL SECTION

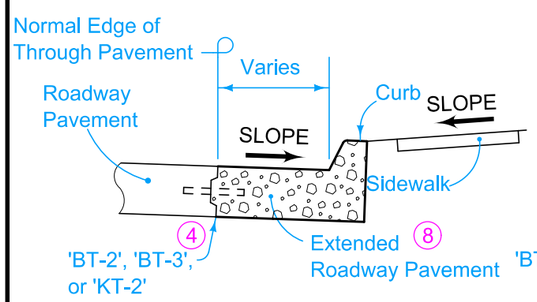


ELEVATION

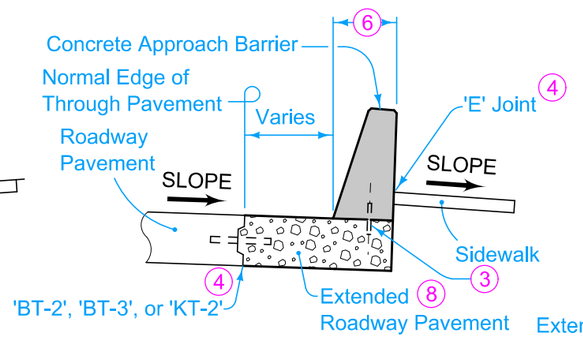


ISOMETRIC VIEW

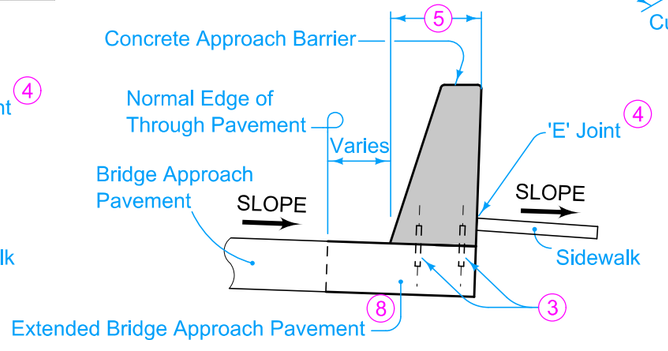
OFFSETS FOR ROUNDED BARRIER TOP																	
Y = Distance from P	ft.	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0
X = Offset to Rounded Top	ft.	2.13	1.91	1.70	1.48	1.26	1.06	0.87	0.70	0.54	0.42	0.30	0.20	0.12	0.06	0.02	0.00



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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
3	10-18-22

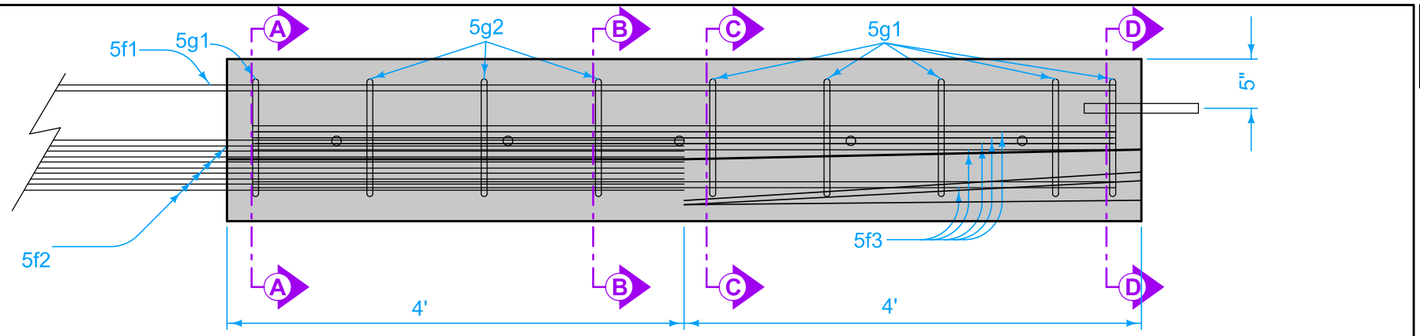
BA-108

SHEET 1 of 1

REVISIONS: Changed from F-shape to Texas single slope, Change dowel placement

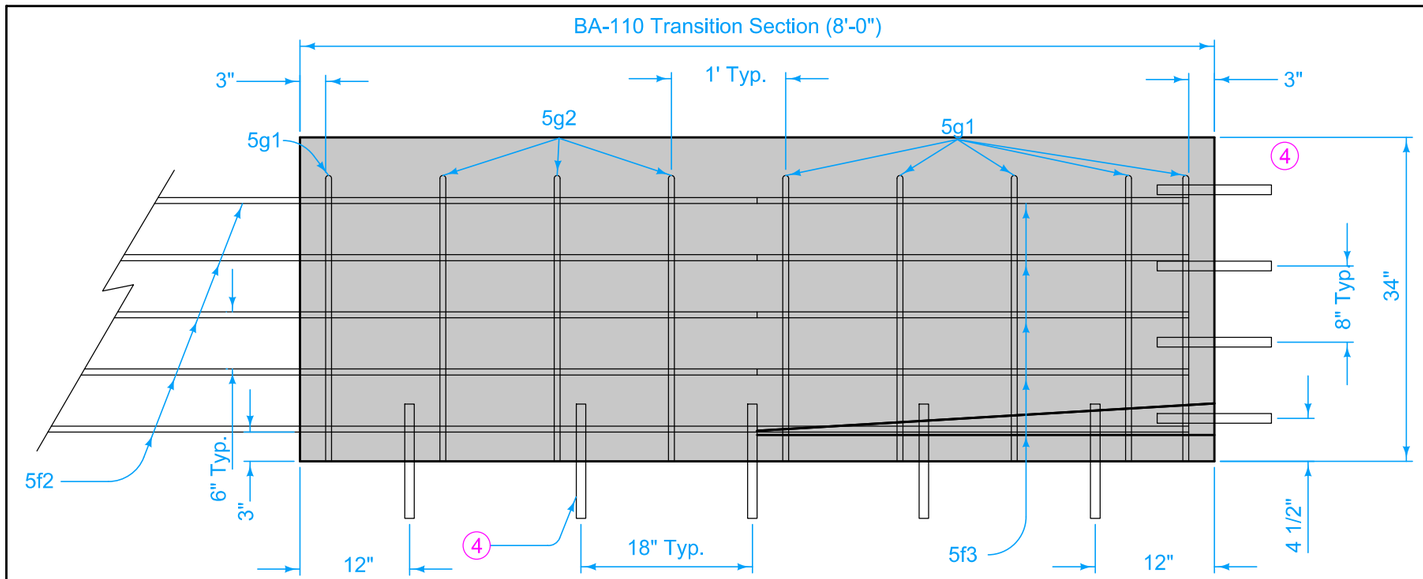
APPROVED BY DESIGN METHODS ENGINEER

CONCRETE BARRIER TAPERED END SECTION

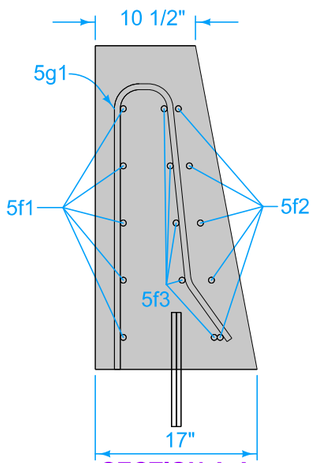


PLAN

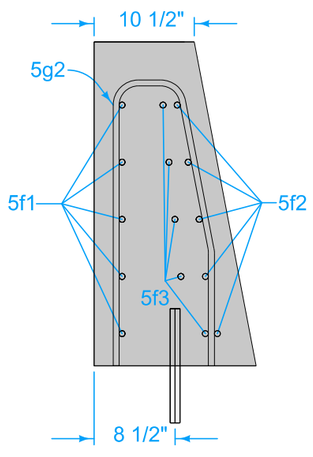
Evenly transition from single slope to existing barrier



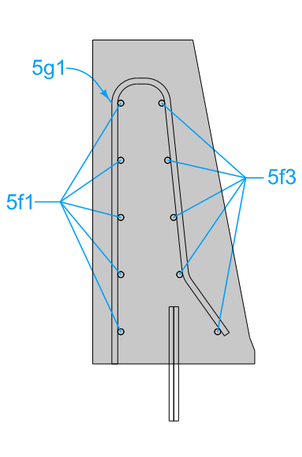
ELEVATION



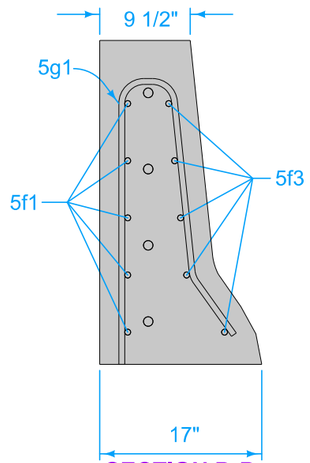
SECTION A-A



SECTION B-B



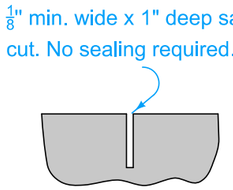
SECTION C-C



SECTION D-D

CONCRETE QUANTITITES

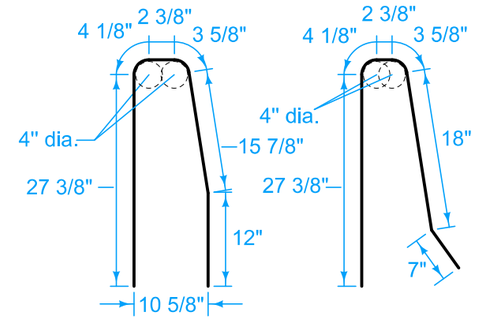
Per End Section
0.93 cy



SAWED CONTRACTION JOINT

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

BENT BAR DETAILS



5g2
BENT BAR

5g1
BENT BAR

REINFORCING BAR LIST

BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
5g1	VERTICAL	⎍	6	5'-2"	32.3
5g2	VERTICAL	⎍	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 $\frac{3}{4}$ 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

IOWA DOT
STANDARD ROAD PLAN

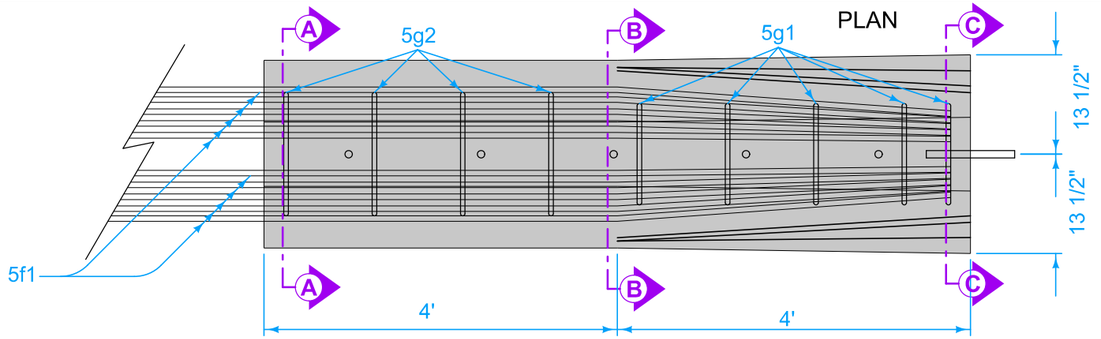
REVISION	
NEW	10-18-22

BA-110
SHEET 1 of 1

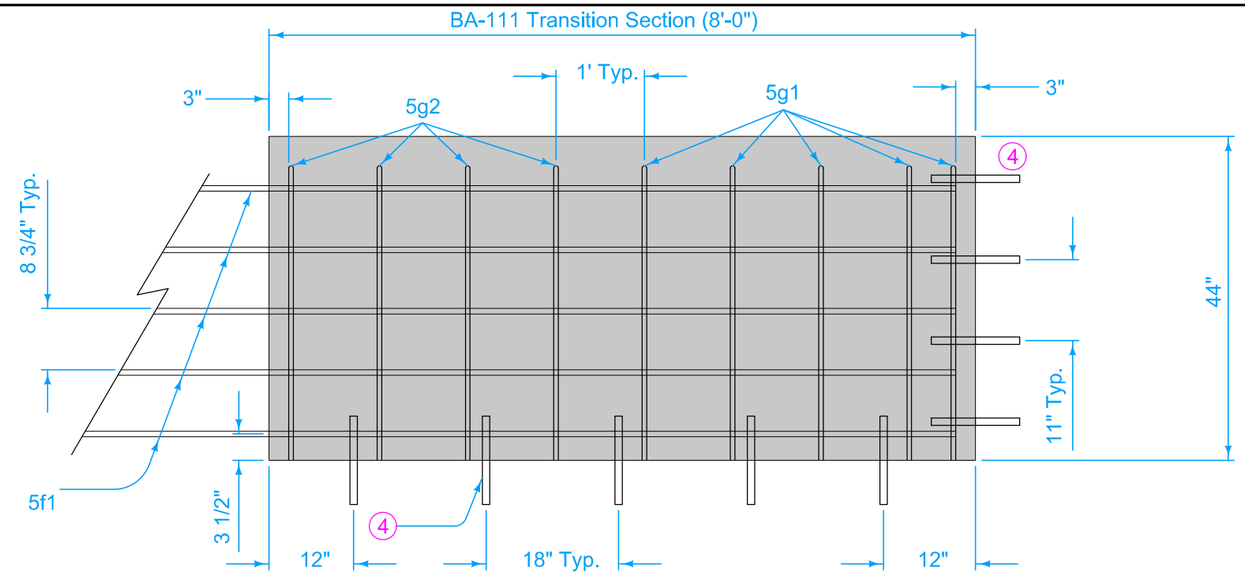
REVISIONS: New

APPROVED BY DESIGN METHODS ENGINEER

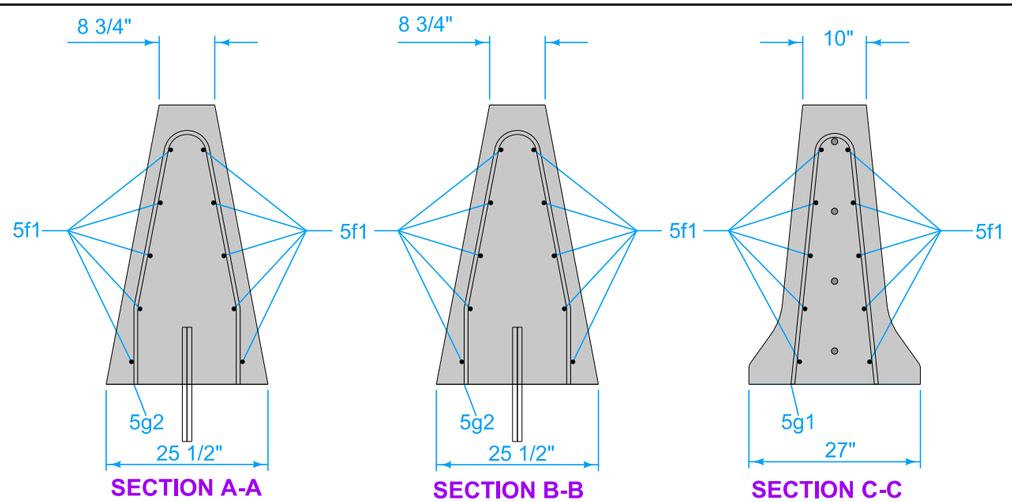
CONCRETE BARRIER
34" SINGLE SLOPE TO 34" F-SHAPE
(HALF SECTION)



Evenly transition from single slope to existing barrier

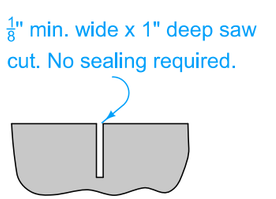


ELEVATION



SECTION A-A SECTION B-B SECTION C-C

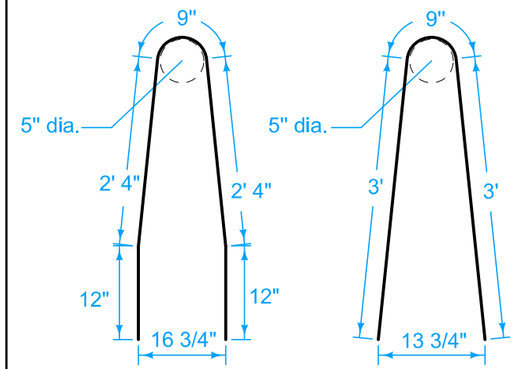
CONCRETE QUANTITIES
Per End Section
1.52 cy



SAWED CONTRACTION JOINT

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

BENT BAR DETAILS



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 $\frac{3}{4}$ 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-111

Possible Tabulation:
108-18B

IOWA DOT

STANDARD ROAD PLAN

REVISION	
NEW	4-18-23

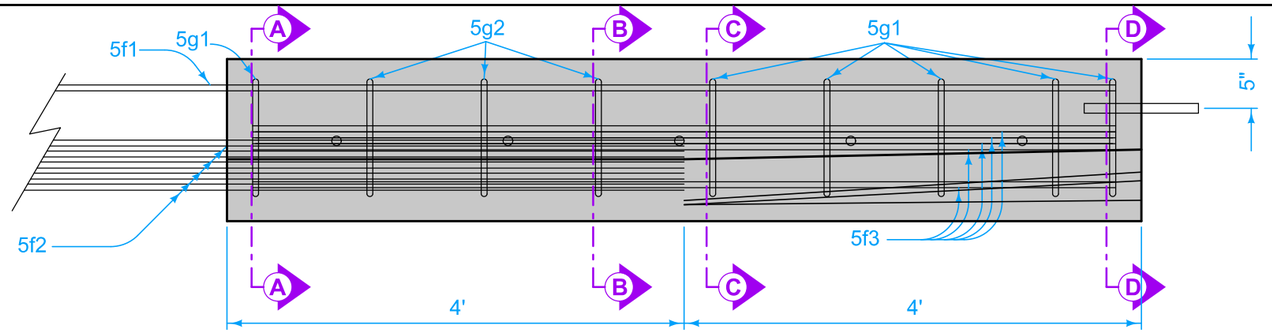
BA-111

SHEET 1 of 1

REVISIONS: New

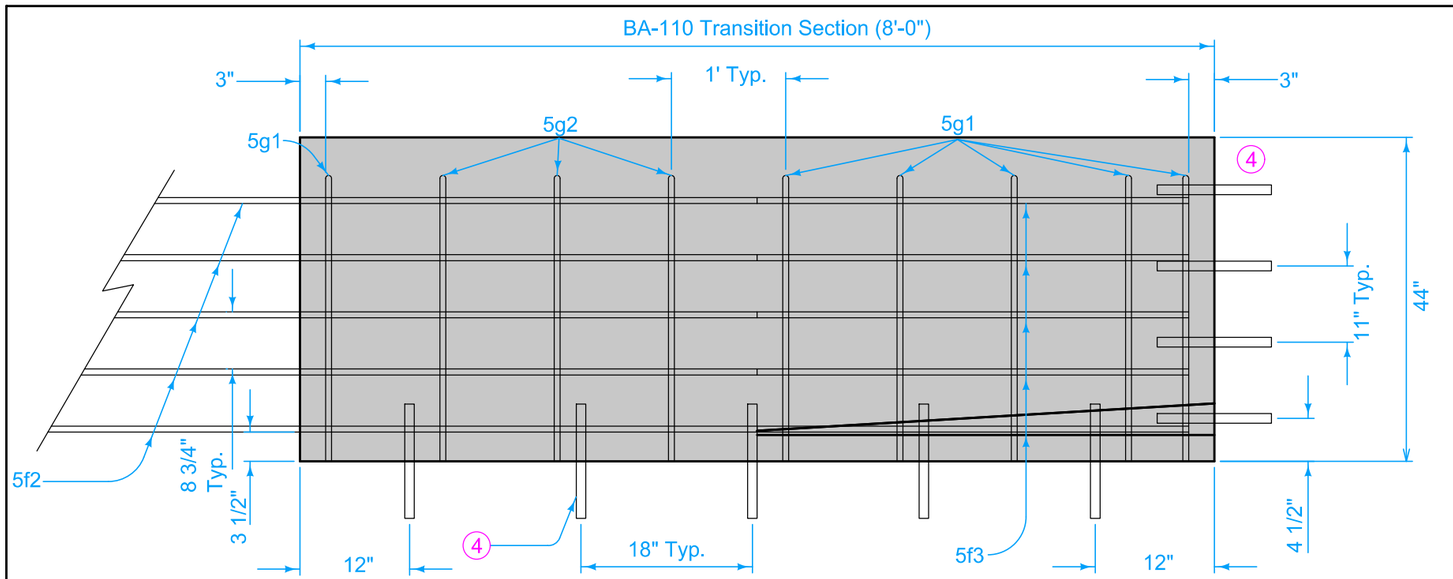
APPROVED BY DESIGN METHODS ENGINEER

CONCRETE BARRIER
44" SINGLE SLOPE TO 44" F-SHAPE
(FULL SECTION)

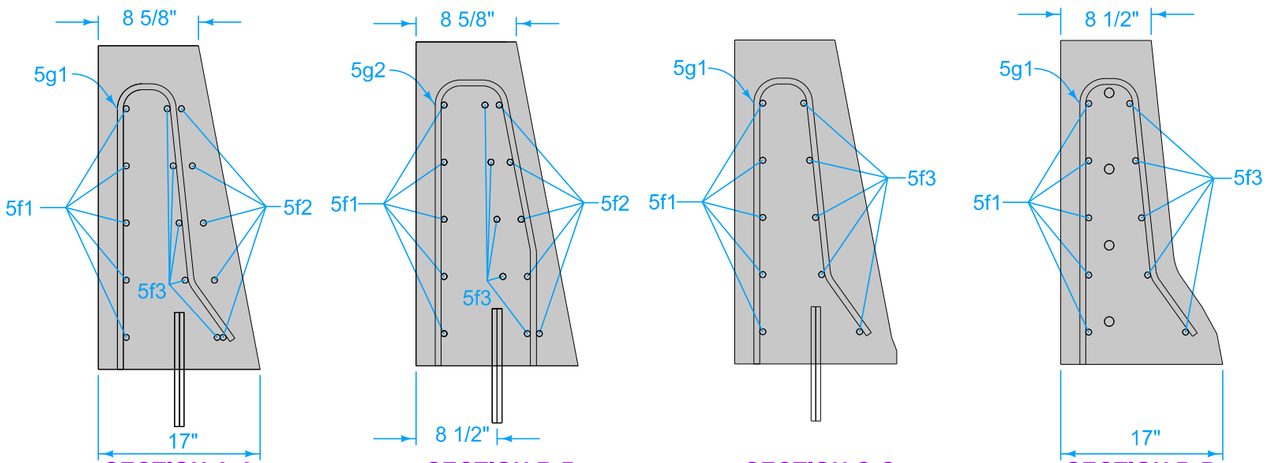


PLAN

Evenly transition from single slope to existing barrier

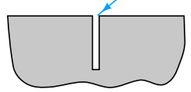


ELEVATION



CONCRETE QUANTITIES
Per Section
1.06 cy

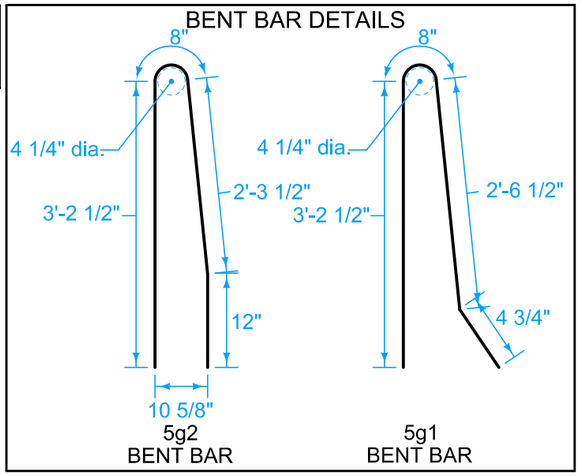
$\frac{1}{8}$" min. wide x 1" deep saw cut. No sealing required.



SAWED CONTRACTION JOINT

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

BENT BAR DETAILS



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 $\frac{3}{4}$ 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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
NEW	10-15-24

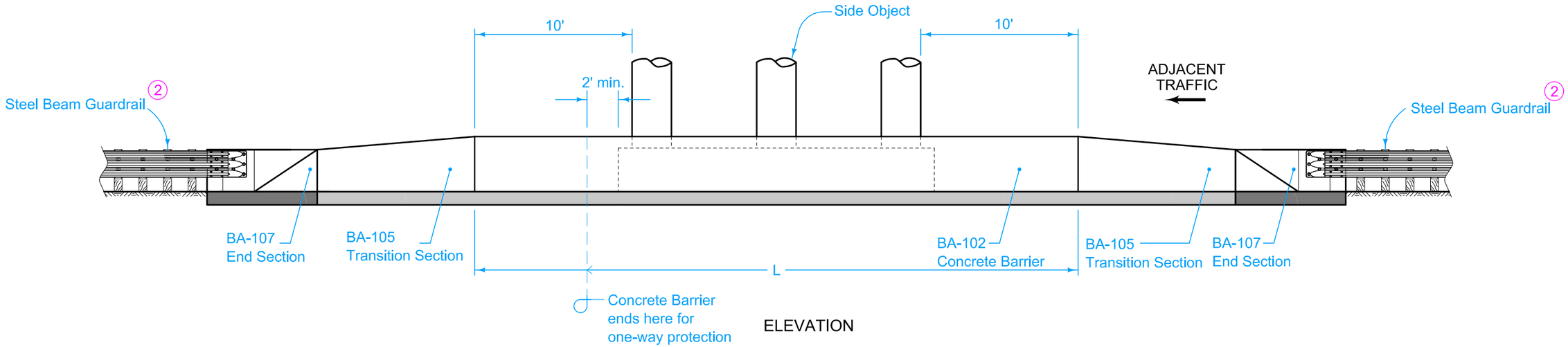
BA-112

SHEET 1 of 1

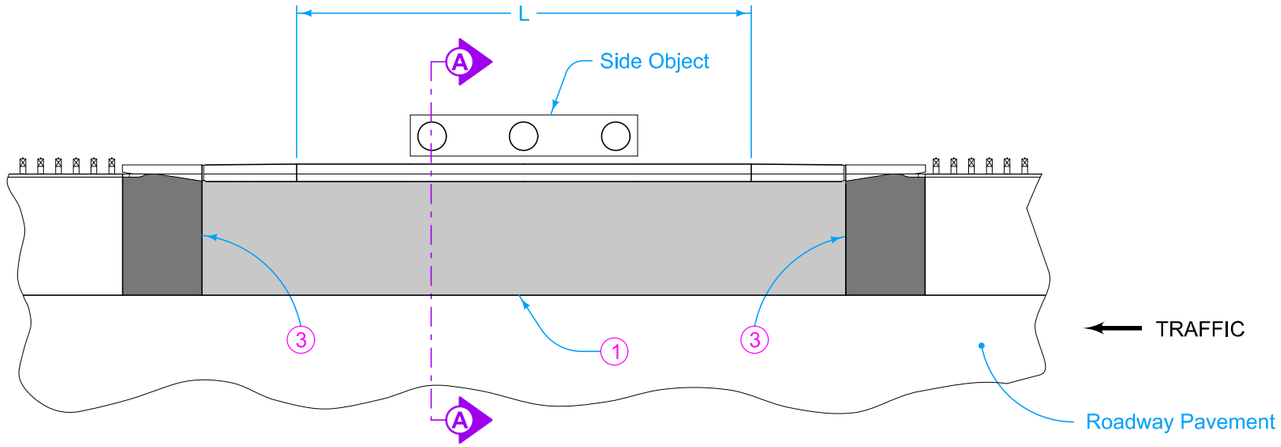
REVISIONS: New

APPROVED BY DESIGN METHODS ENGINEER

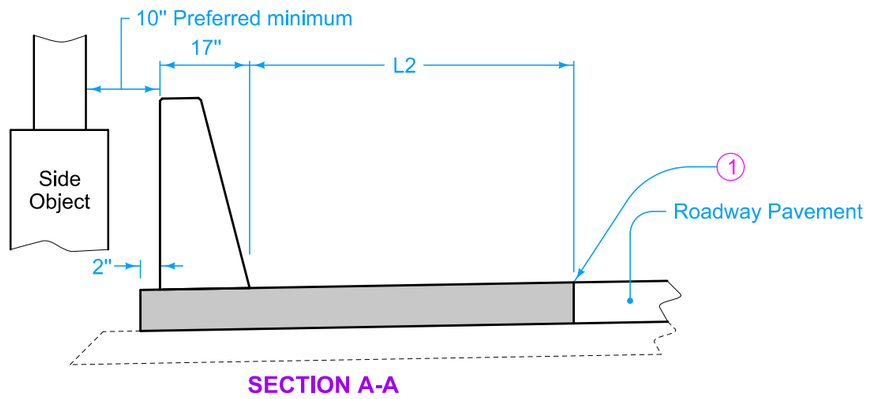
CONCRETE BARRIER
44" SINGLE SLOPE TO 44" F-SHAPE
(HALF SECTION)



ELEVATION



PLAN



SECTION A-A

LEGEND

- PCC Paved Shoulder (4)
- Reinforced PCC Paved Shoulder (5)

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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
4	10-18-22

BA-150

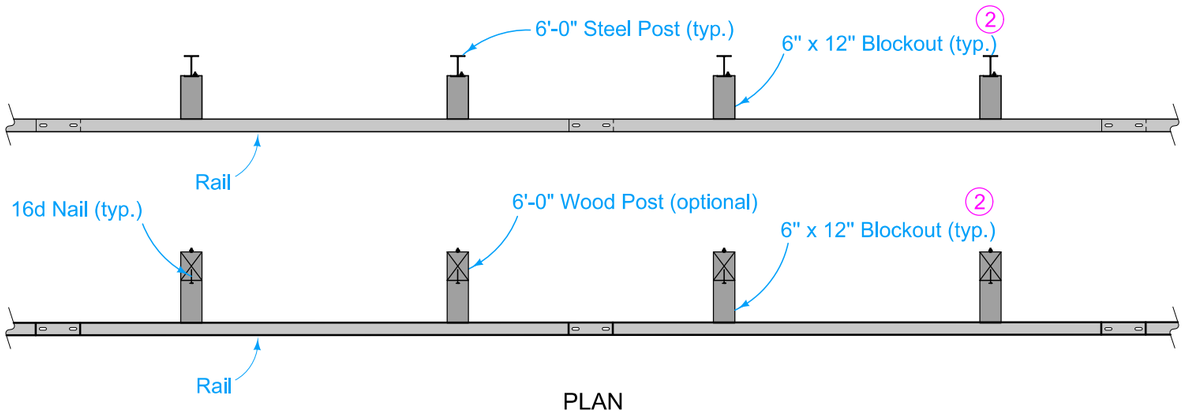
SHEET 1 of 1

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

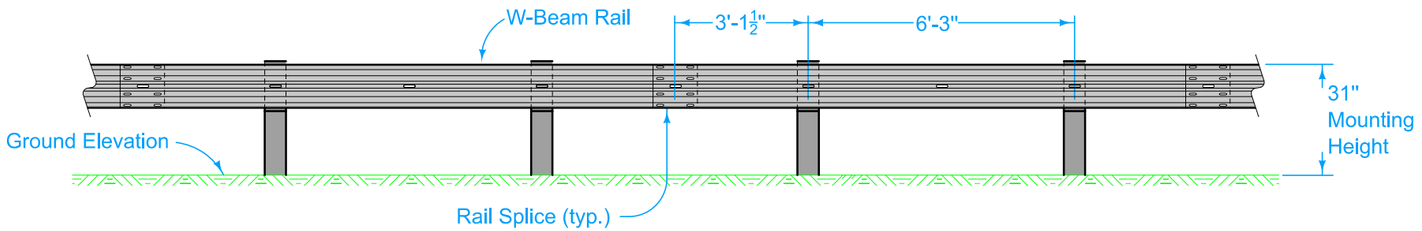
APPROVED BY DESIGN METHODS ENGINEER

SIDE OBJECT PROTECTION WITH CONCRETE BARRIER AND GUARDRAIL

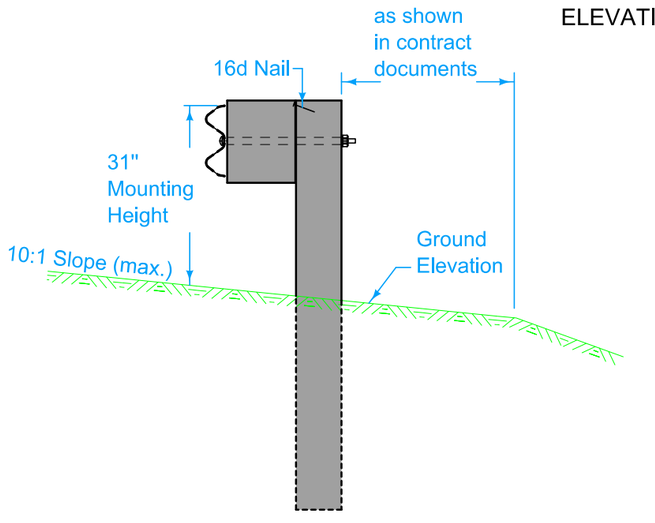
Standard W-Beam Guardrail



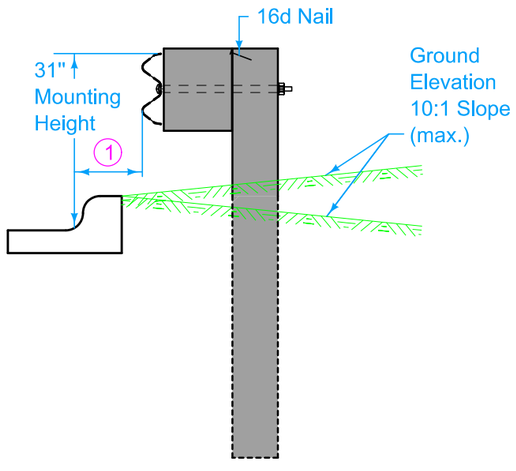
PLAN



ELEVATION



SECTION



SECTION WITH CURB

W-BEAM INSTALLATION

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. 6" maximum for 6" Standard or 6" Sloped curbs and for non-standard curbs.
2. Wood or composite only. Steel blockouts will not be allowed.

LAPPING PROCEDURE

Possible Contract Item:
Steel Beam Guardrail

IOWA DOT

STANDARD ROAD PLAN

REVISION	
7	04-15-25

BA-200

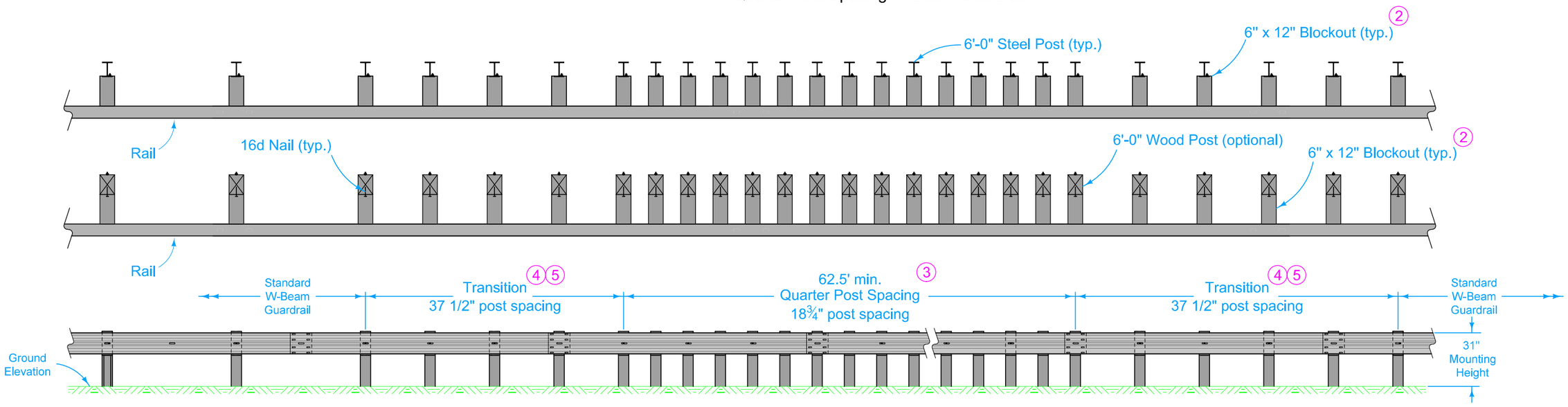
SHEET 1 of 5

REVISIONS: Removed half post spacing, added quarter post spacing

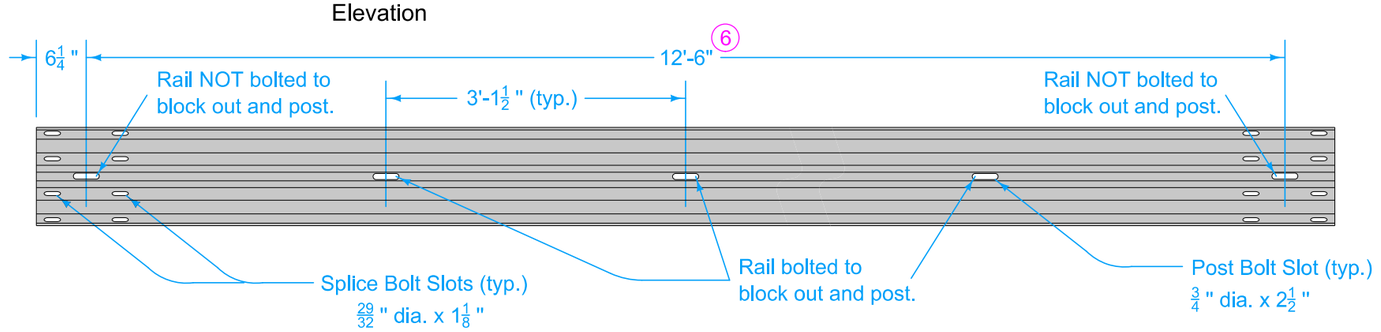
APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL COMPONENTS

Quarter Post Spacing W-Beam Guardrail

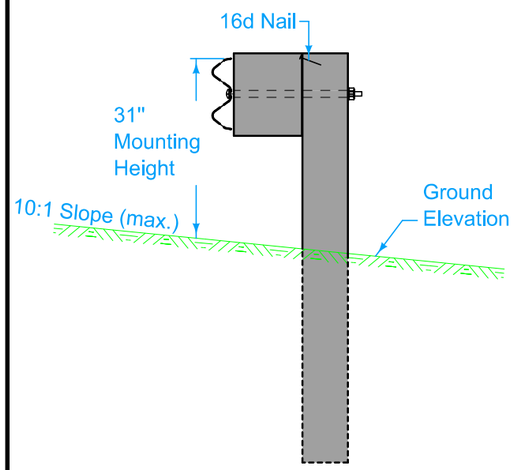


Elevation

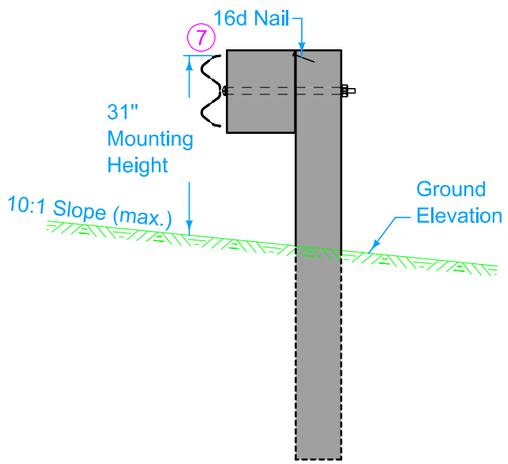


ELEVATION

W-BEAM RAIL



Rail bolted to Block out and post Section



Rail NOT bolted to Block out and post Section

(3) Posts and blockouts connect to rail at 37 1/2 inch spacing. Rail to not be bolted to post and blockouts at splice location.

(2) Wood or composite only. Steel blockouts will not be allowed.

(4) Transition length minimum of 12 feet 6 inches.

(5) Transition required at both ends of quarter post spacing.

(6) 25 foot long section will not be allowed. Additional holes in rail will not be allowed.

(7) At locations were the rail is not bolted to the post and block out the post and block out shall be bolted together.

IOWA DOT

STANDARD ROAD PLAN

REVISION	
7	04-15-25

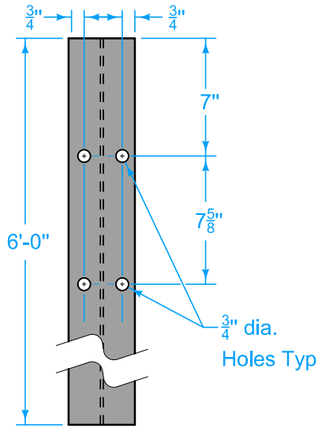
BA-200

REVISIONS: Removed half post spacing, added quarter post spacing

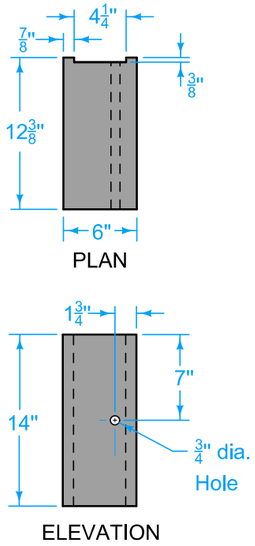
APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL COMPONENTS

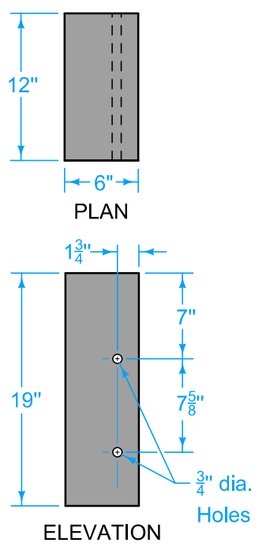
STEEL POST AND BLOCKOUT DETAILS



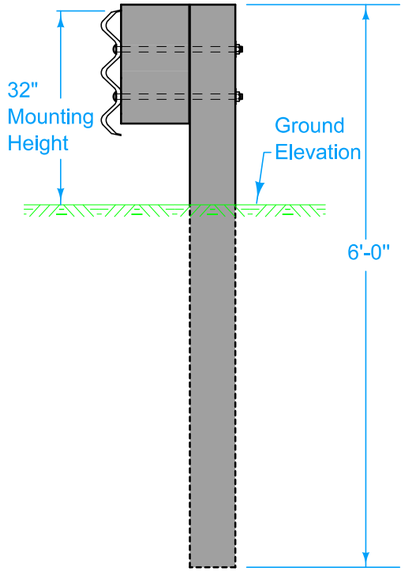
6'-0" STEEL POST
W6x9 or W6x8.5



W-BEAM BLOCKOUT (2)



THRIE-BEAM BLOCKOUT (2)

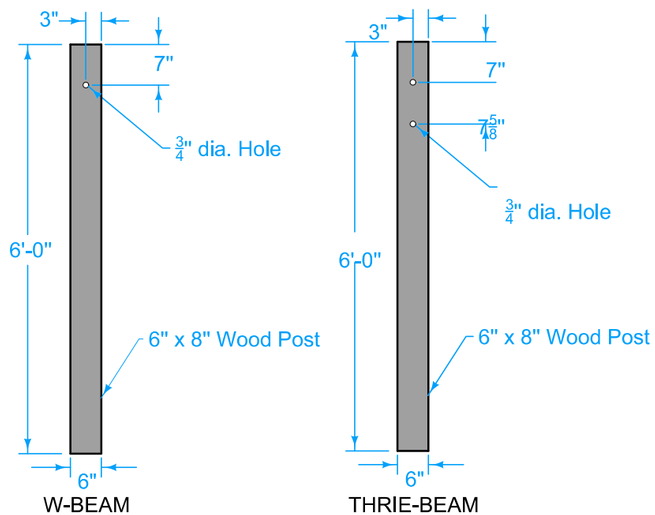


THRIE-BEAM INSTALLATION

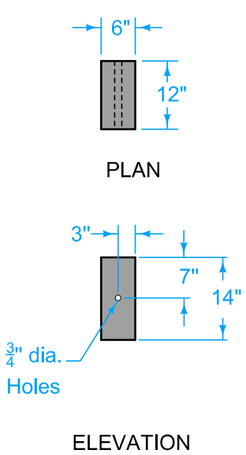
(2) Wood or composite only. Steel blockouts will not be allowed.

(8) Thrie-beam post may be substituted for W-beam post.

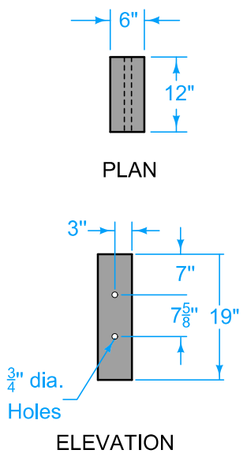
WOOD POST AND BLOCKOUT DETAILS



POSTS (8)

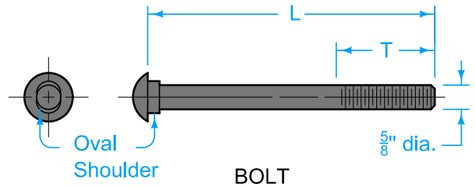


W-BEAM BLOCKOUT (2)



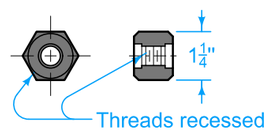
THRIE-BEAM BLOCKOUT (2)

BOLT DETAILS



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



HARDWARE

IOWA DOT

STANDARD ROAD PLAN

REVISION	
7	04-15-25

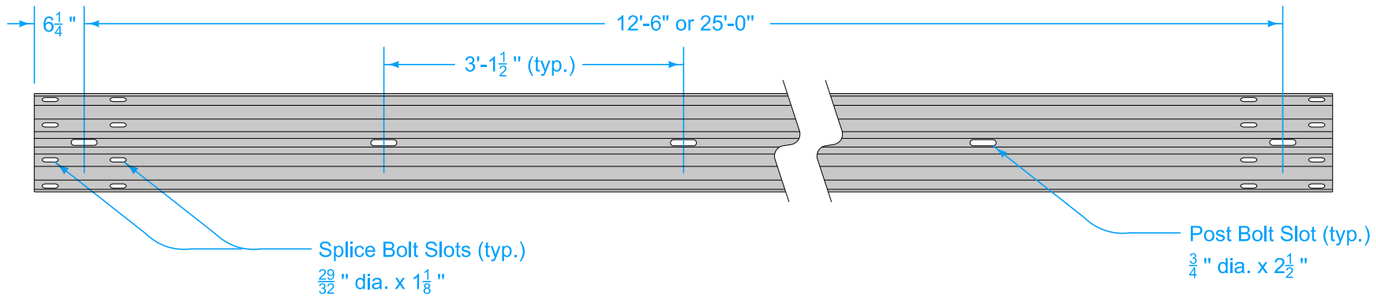
BA-200

SHEET 3 of 5

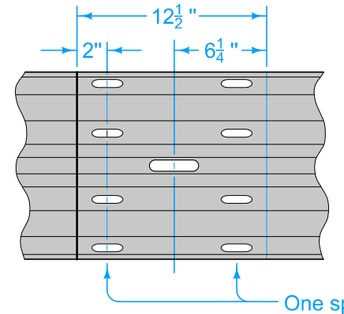
REVISIONS: Removed half post spacing, added quarter post spacing

APPROVED BY DESIGN METHODS ENGINEER

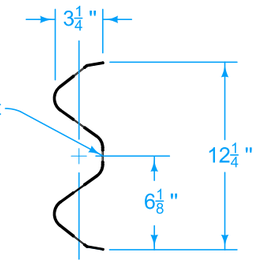
STEEL BEAM GUARDRAIL COMPONENTS



ELEVATION

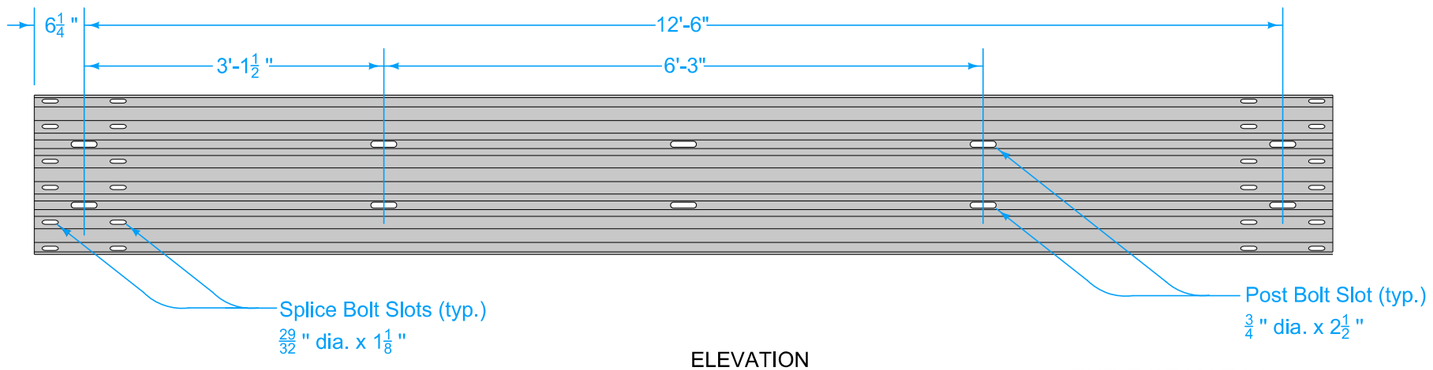


RAIL SPLICE



SECTION

W-BEAM RAIL



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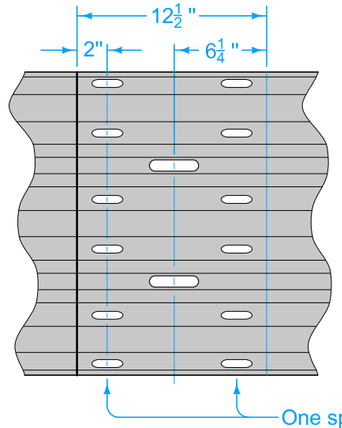
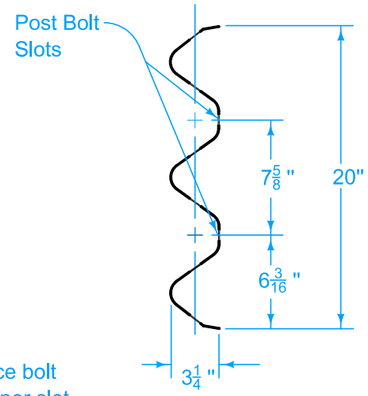
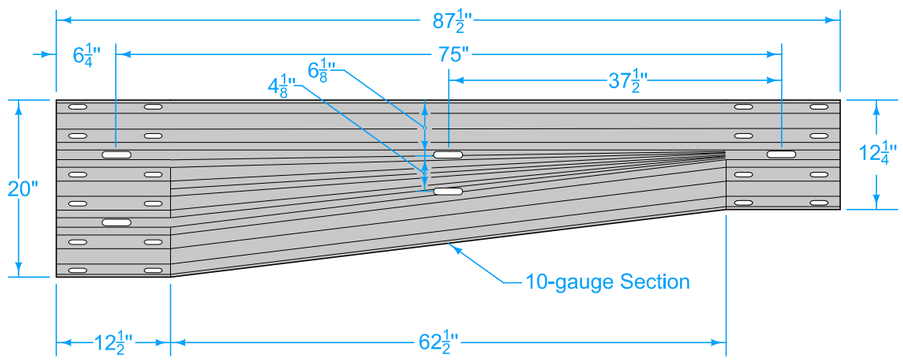


RAIL SPLICE



SECTION

THRIE-BEAM RAIL



ASYMMETRICAL TRANSITION SECTION

IOWA DOT

STANDARD ROAD PLAN

REVISION	
7	04-15-25

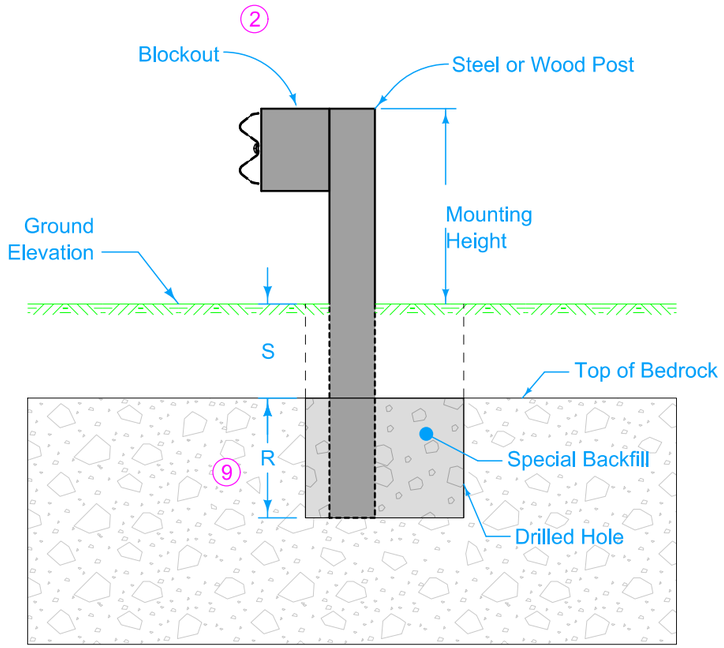
BA-200

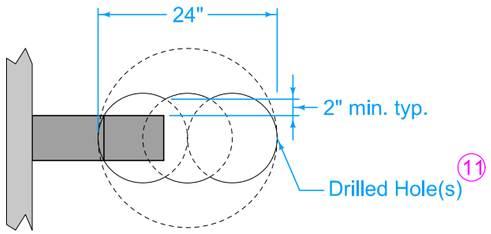
SHEET 4 of 5

REVISIONS: Removed half post spacing, added quarter post spacing

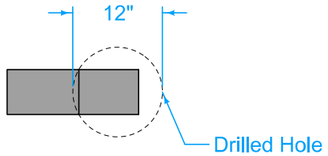
APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL COMPONENTS





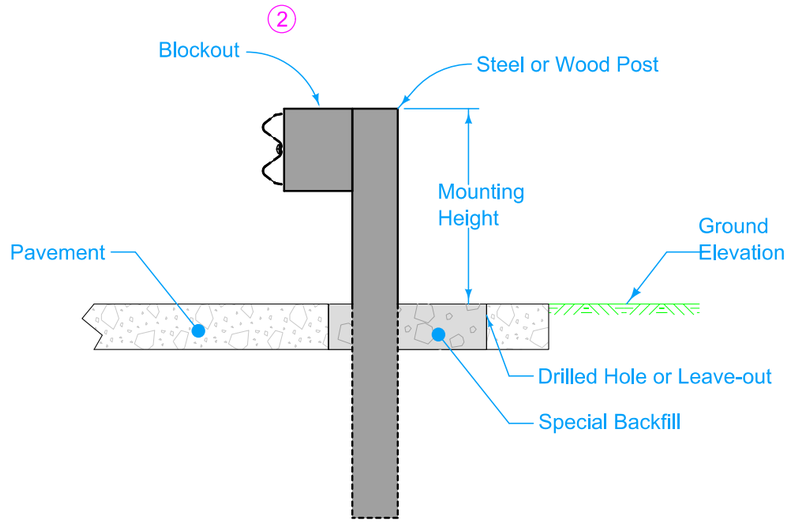
PLAN - CASE A

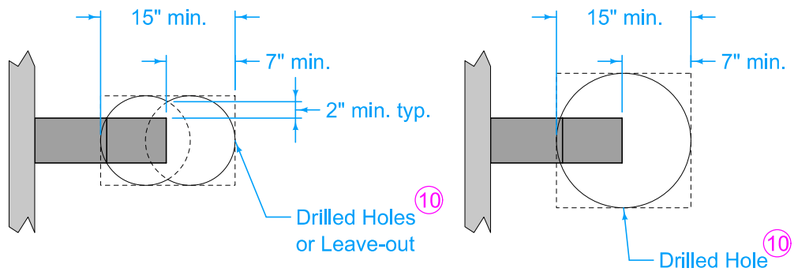


PLAN - CASE B

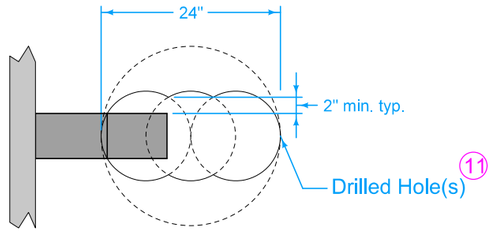
Post Embedment (9)		
Case	Depth to Bedrock	Minimum Depth to Drill into Bedrock
A	S = 0" to 16"	R = 24"
B	S = 16" to 52"	R = Post Length - Mounting Height - S

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.

(2) Wood or composite only. Steel blockouts will not be allowed.

(9) 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.

(10) 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.

(11) Use a 12 inch bit with three drills or a 24 inch bit with one drill.

IOWA DOT

REVISION
7 | 04-15-25

STANDARD ROAD PLAN

BA-200

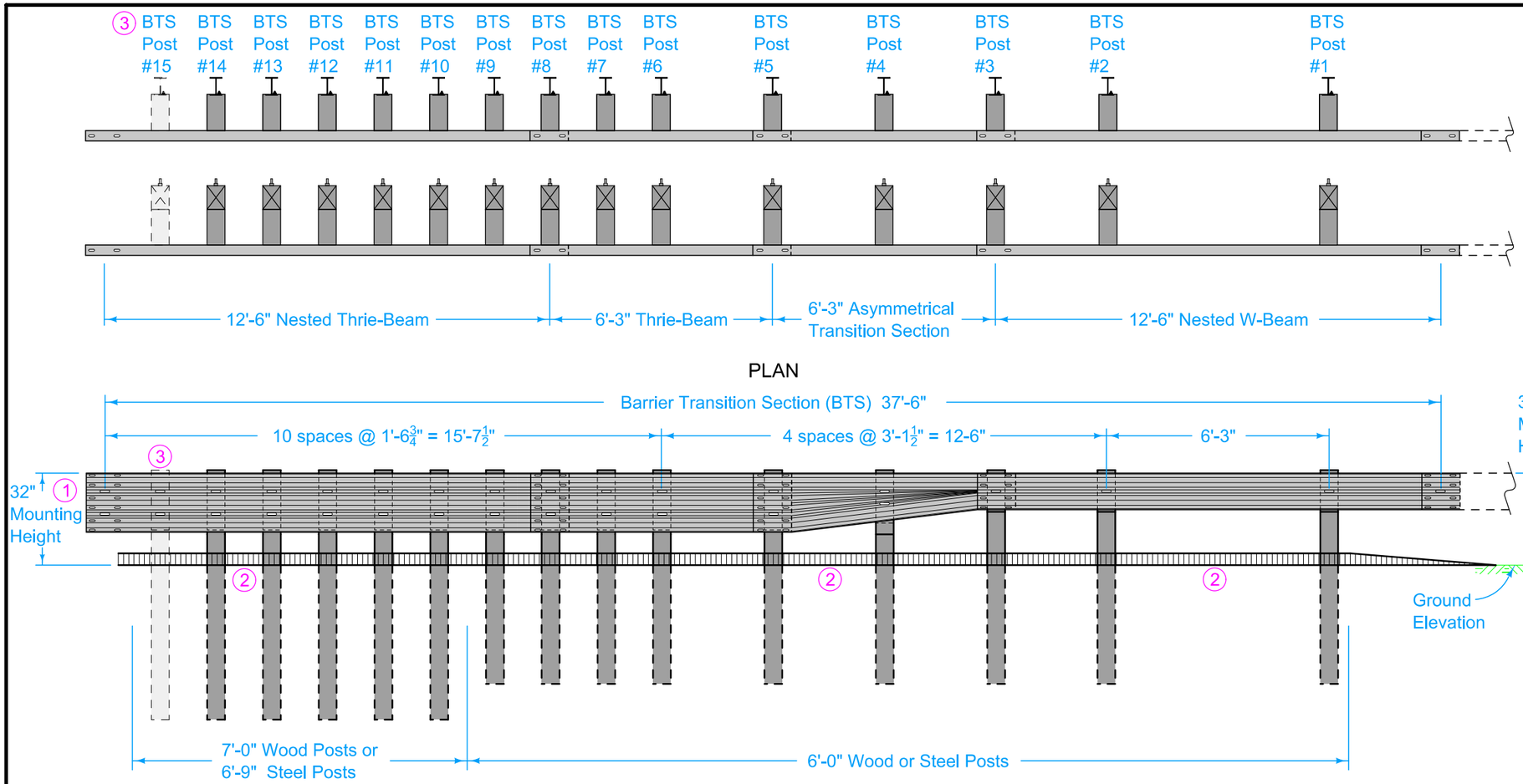
SHEET 5 of 5

REVISIONS: Removed half post spacing, added quarter post spacing

APPROVED BY DESIGN METHODS ENGINEER

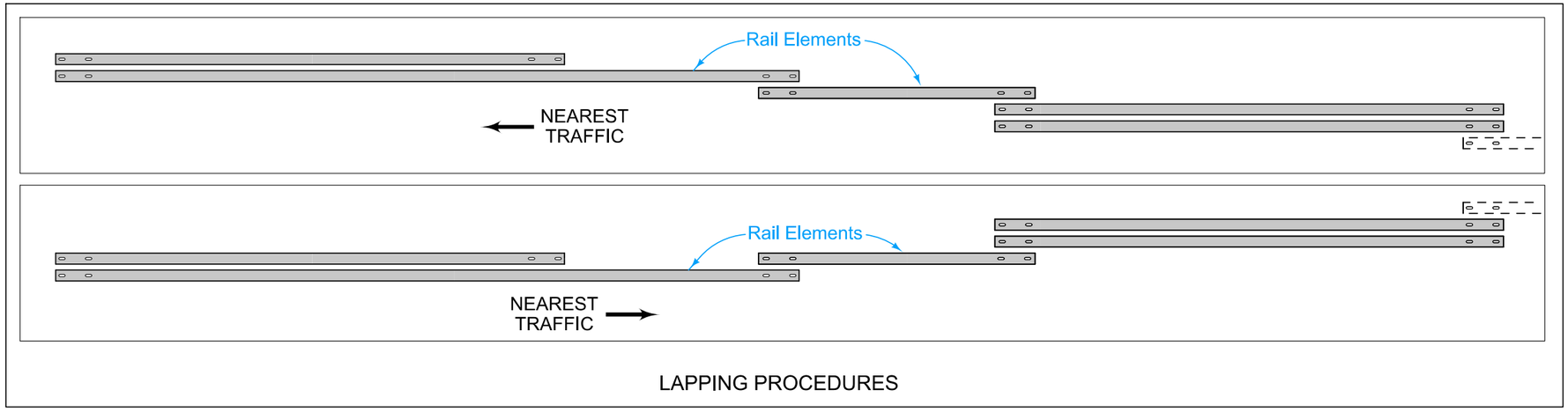
STEEL BEAM GUARDRAIL COMPONENTS

DESIGNER INFORMATION



PLAN

ELEVATION



LAPPING PROCEDURES

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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
7	10-18-22

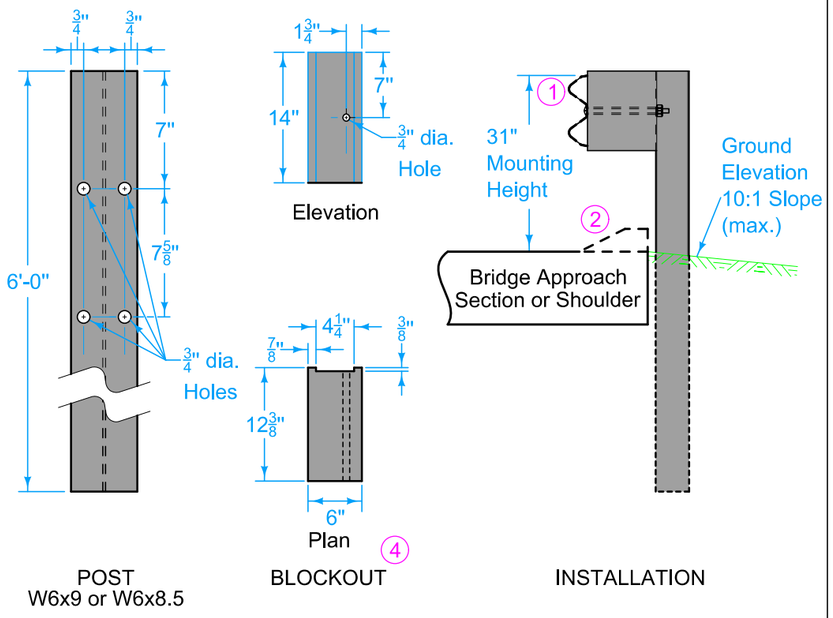
BA-201

SHEET 1 of 3

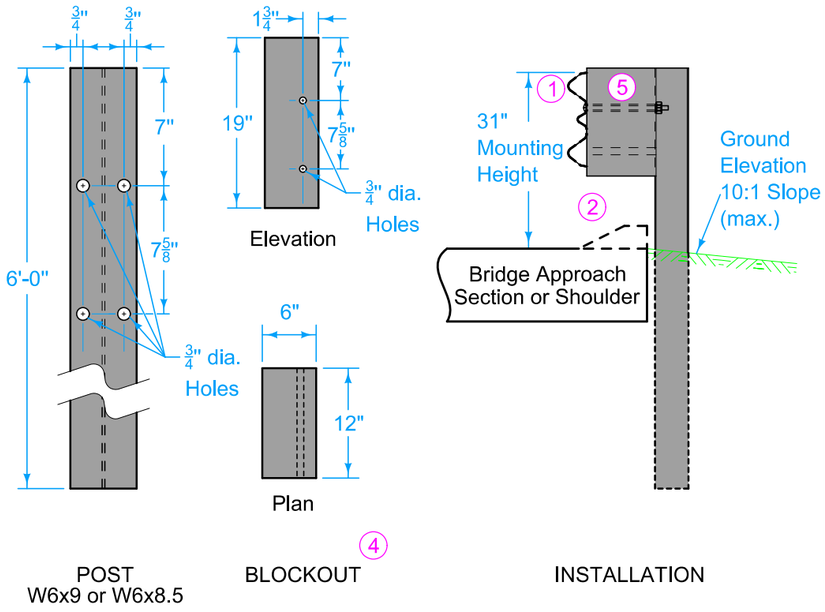
REVISIONS: Revised curb note.

APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL BARRIER TRANSITION SECTION (MASH TL-3)

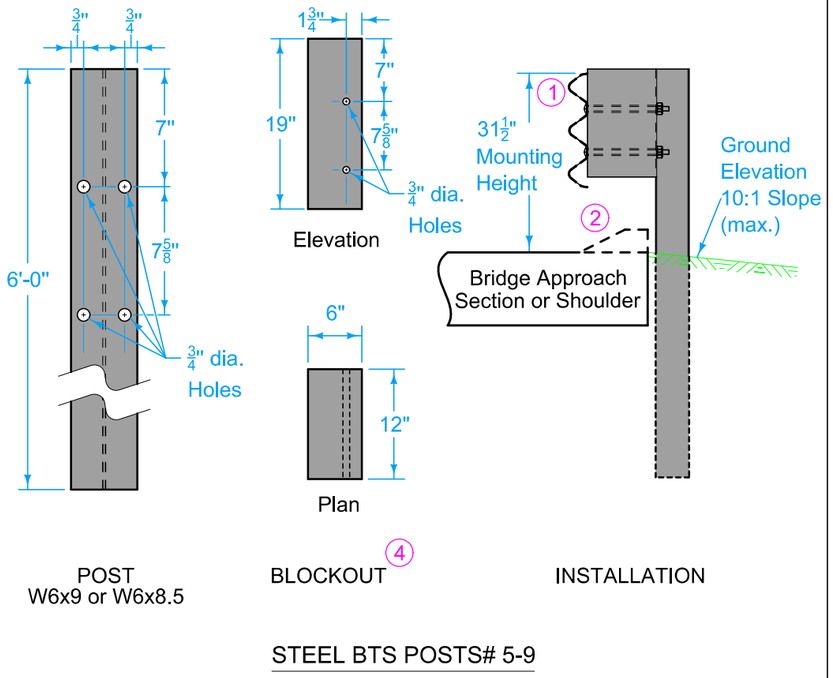


STEEL BTS POST #1-3

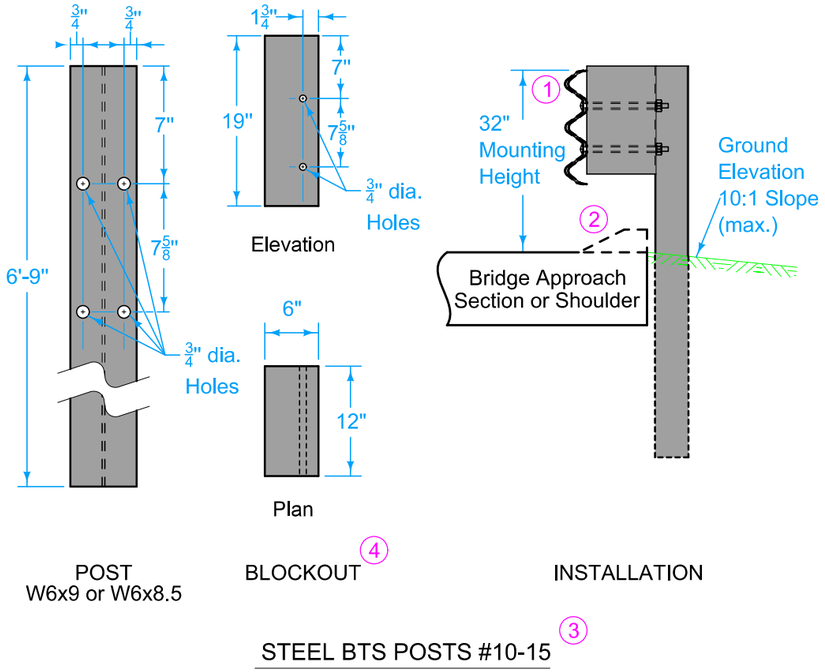


STEEL BTS POST #4

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.



STEEL BTS POSTS# 5-9



STEEL BTS POSTS #10-15 (3)

IOWA DOT

STANDARD ROAD PLAN

REVISION	
7	10-18-22

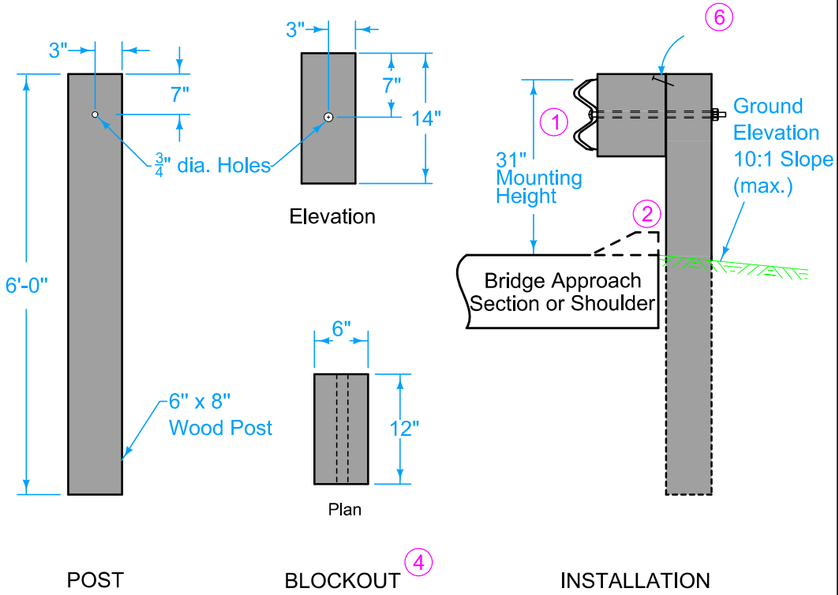
BA-201

SHEET 2 of 3

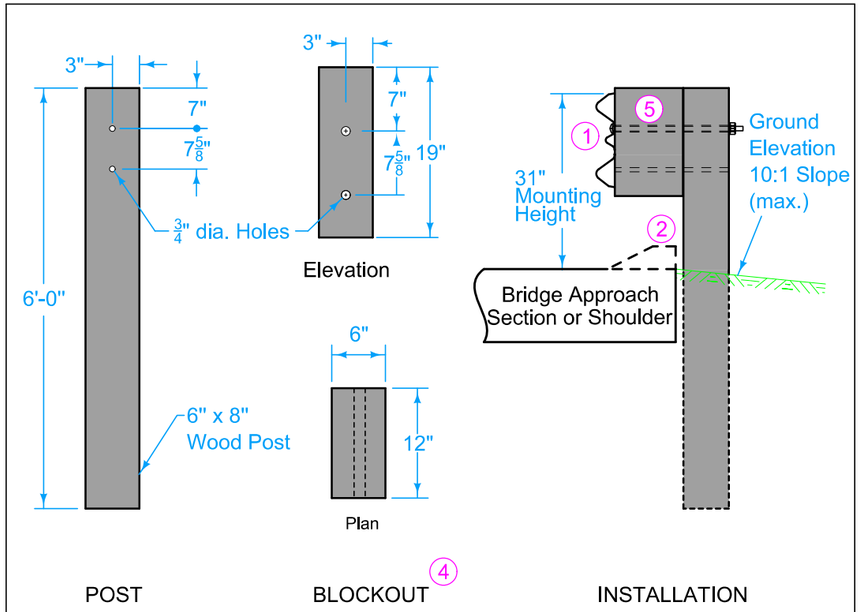
REVISIONS: Revised curb note.

APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL
BARRIER TRANSITION SECTION
(MASH TL-3)

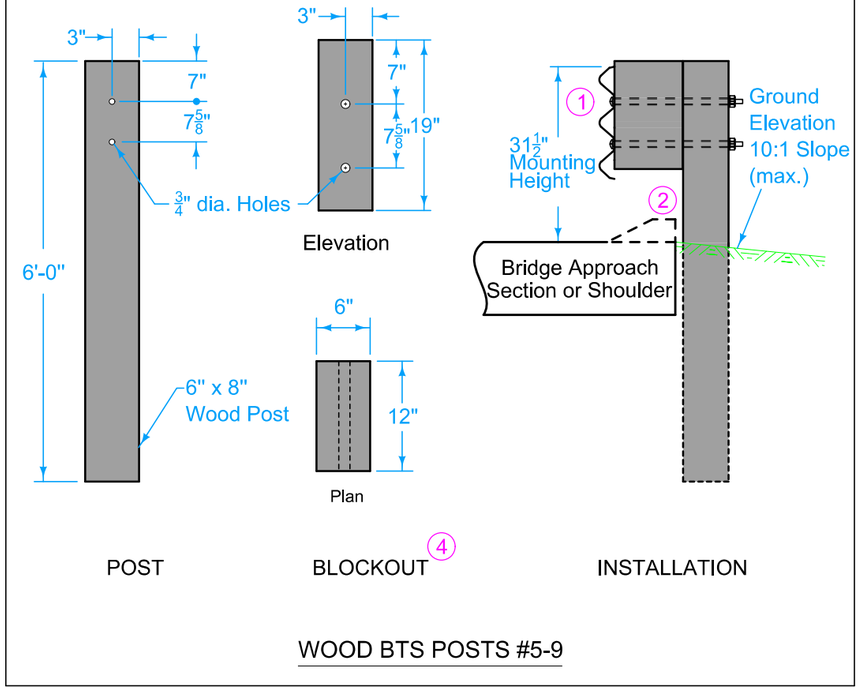


WOOD BTS POSTS #1-3

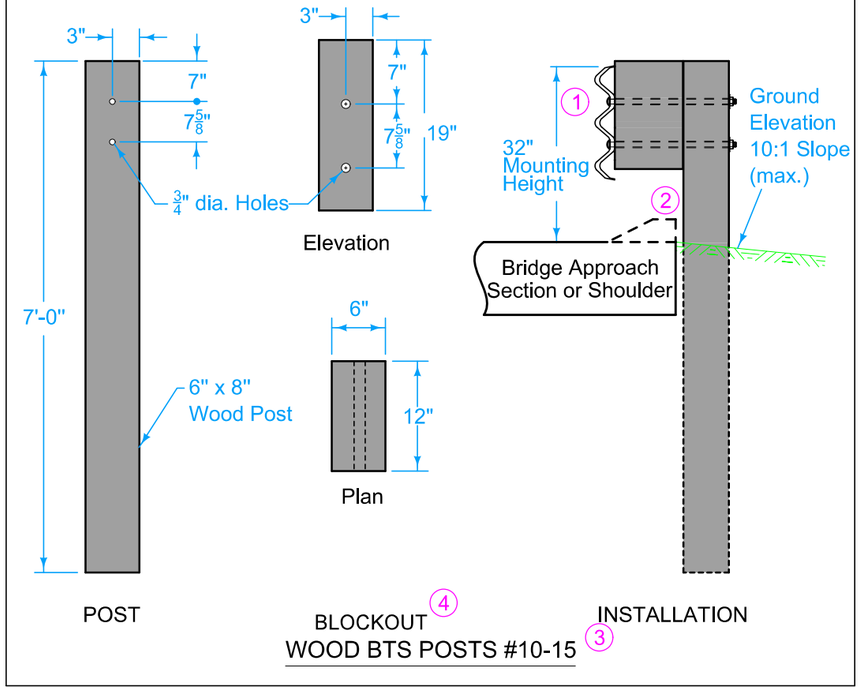


WOOD BTS POST #4

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.



WOOD BTS POSTS #5-9



WOOD BTS POSTS #10-15 3

IOWA DOT

STANDARD ROAD PLAN

REVISION	
7	10-18-22

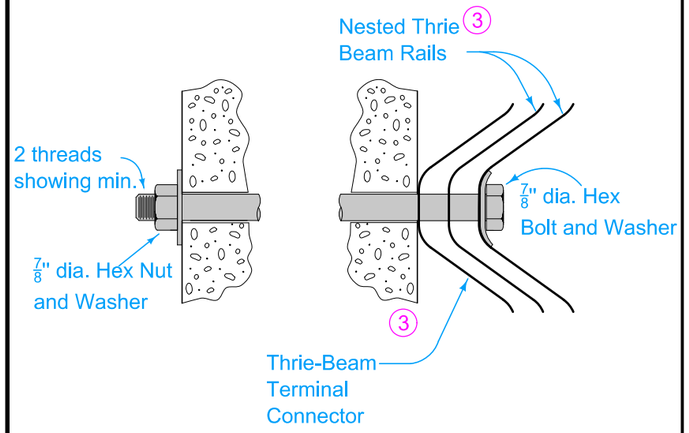
BA-201

SHEET 3 of 3

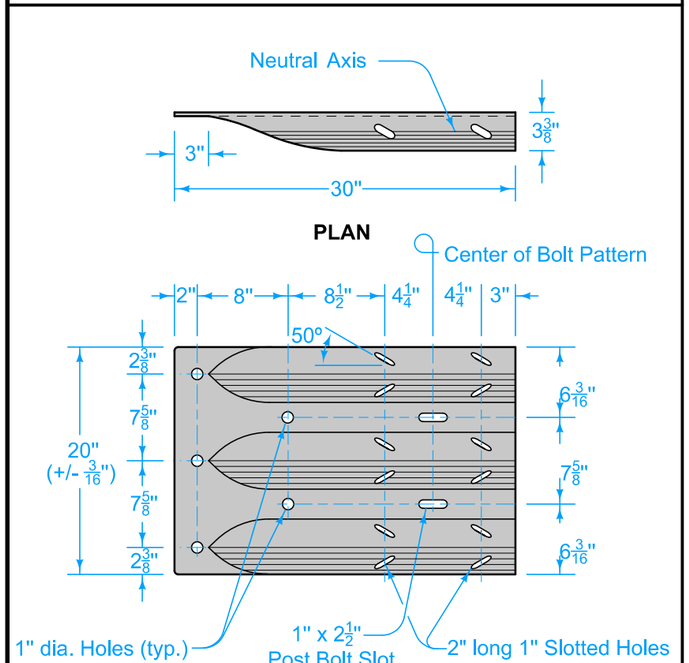
REVISIONS: Revised curb note.

APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL
BARRIER TRANSITION SECTION
(MASH TL-3)



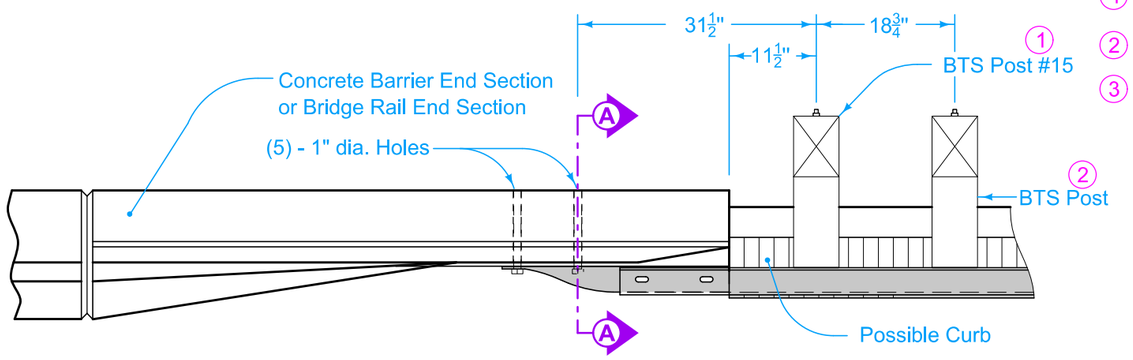
DETAIL 'A' DETAIL 'B'



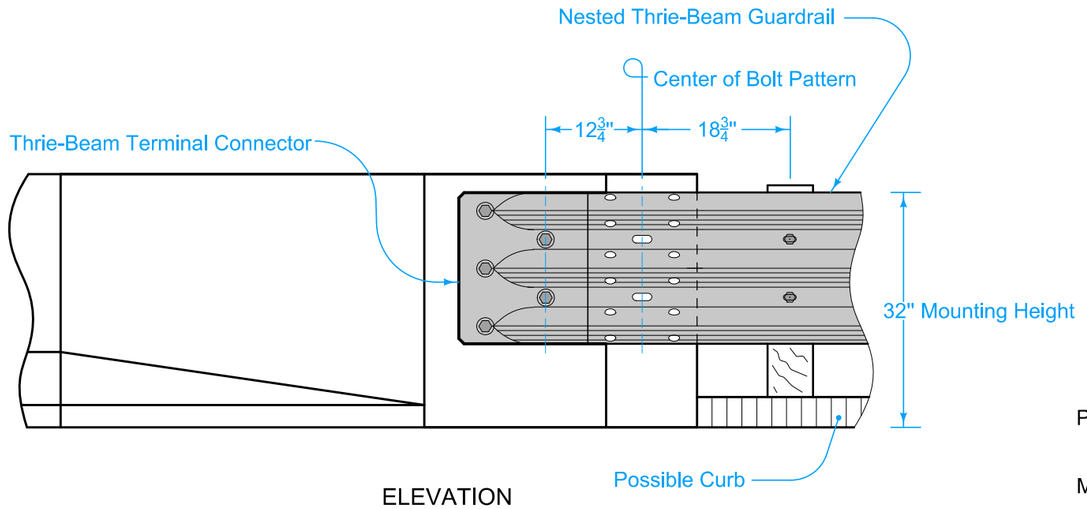
ELEVATION

THRIE - BEAM
TERMINAL CONNECTOR

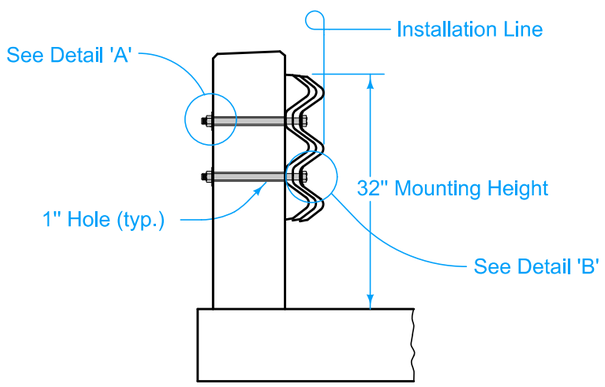
TYPE A



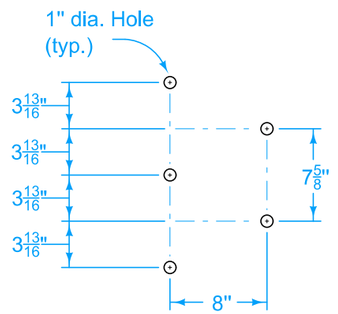
PLAN



ELEVATION



SECTION A-A



5 - BOLT PATTERN
Thrie-Beam Terminal Connector

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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
6	4-15-25

BA-202

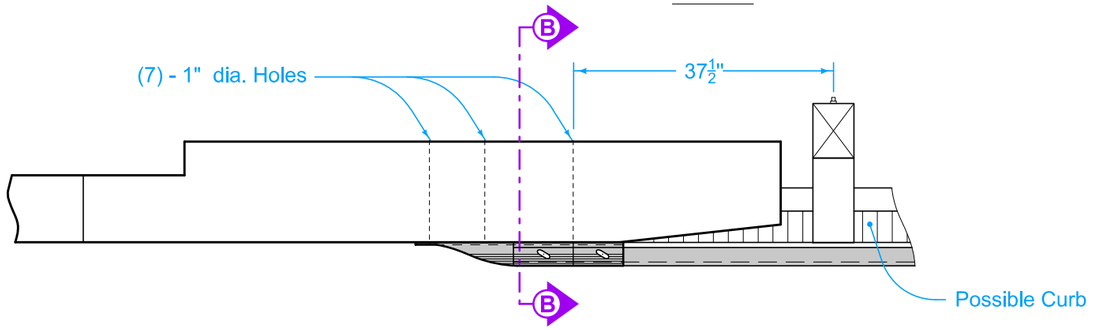
SHEET 1 of 4

REVISIONS: Added 32" mounting hieght to Type 'D'.

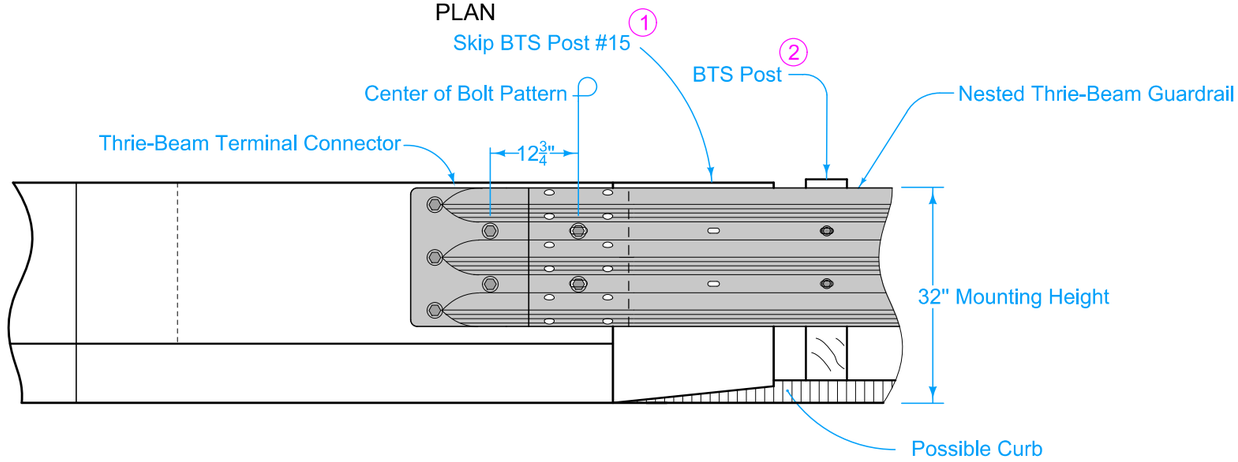
APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL BOLTED END ANCHOR

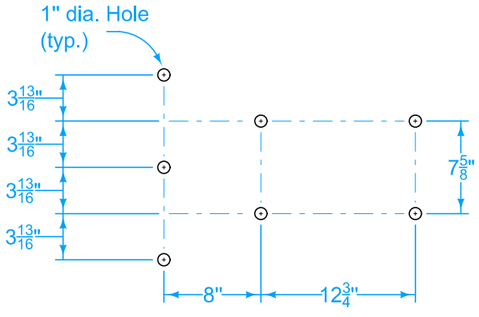
TYPE B



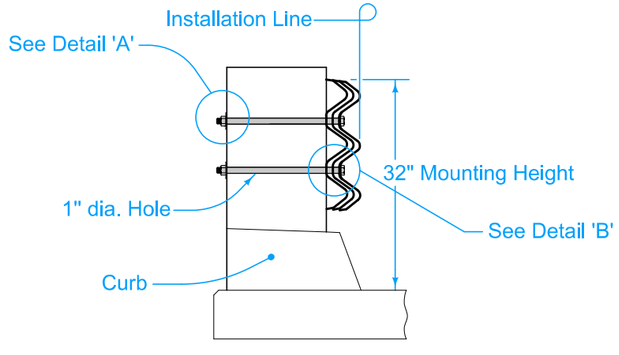
PLAN



ELEVATION



7 - BOLT PATTERN
Thrie - Beam Terminal Connector



SECTION B-B

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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
6	4-15-25

BA-202

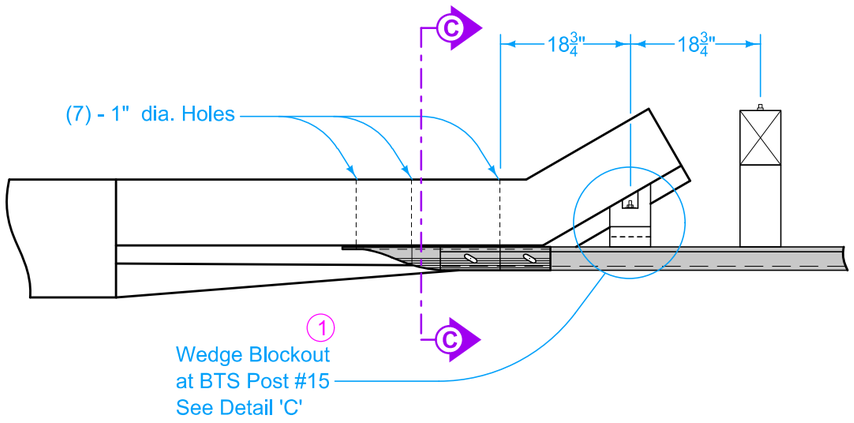
SHEET 2 of 4

REVISIONS: Added 32" mounting hieght to Type 'D'.

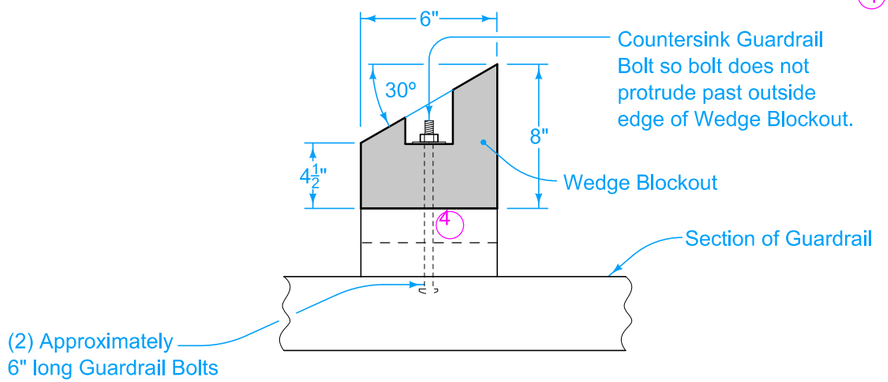
APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL
BOLTED END ANCHOR

TYPE C

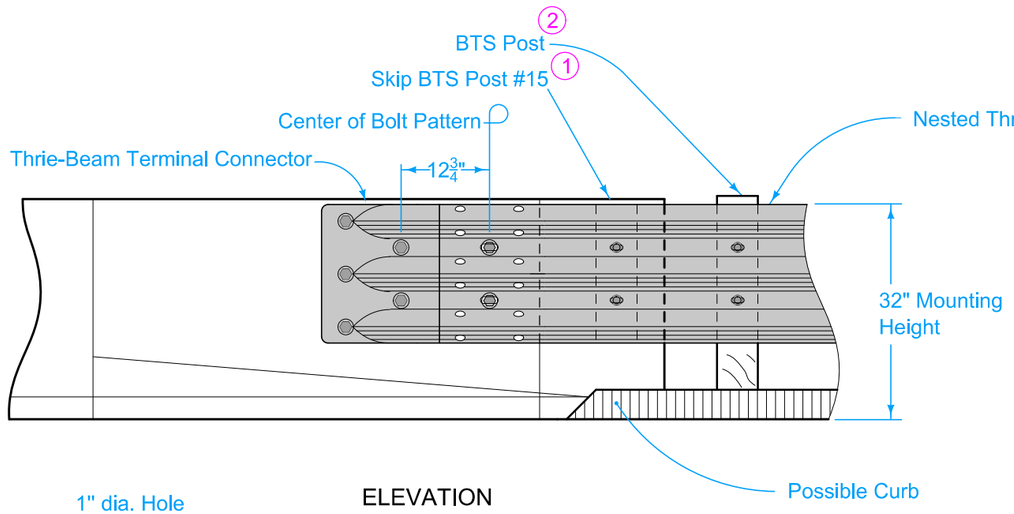


PLAN

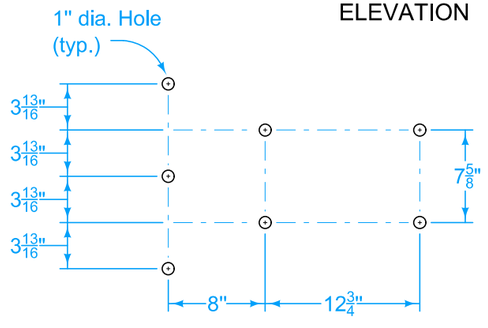


DETAIL 'C'

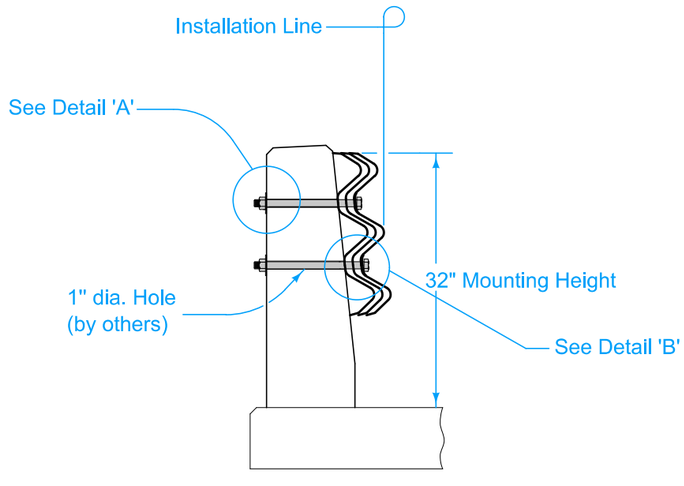
1. See BA-201.
2. BTS post # 14 BA-201. BTS post #5 BA-221.
4. Use treated spacer boards (1 in. x 6 in. or 2 in. x 6 in.) to produce a tight fit between the wedge blockout and endpost. A nominal 1 inch gap is acceptable. Spacer boards are incidental to bolted end anchor.



ELEVATION



7 - BOLT PATTERN
Thrie - Beam Terminal Connector



SECTION C-C

IOWA DOT

STANDARD ROAD PLAN

REVISION	
6	4-15-25

BA-202

SHEET 3 of 4

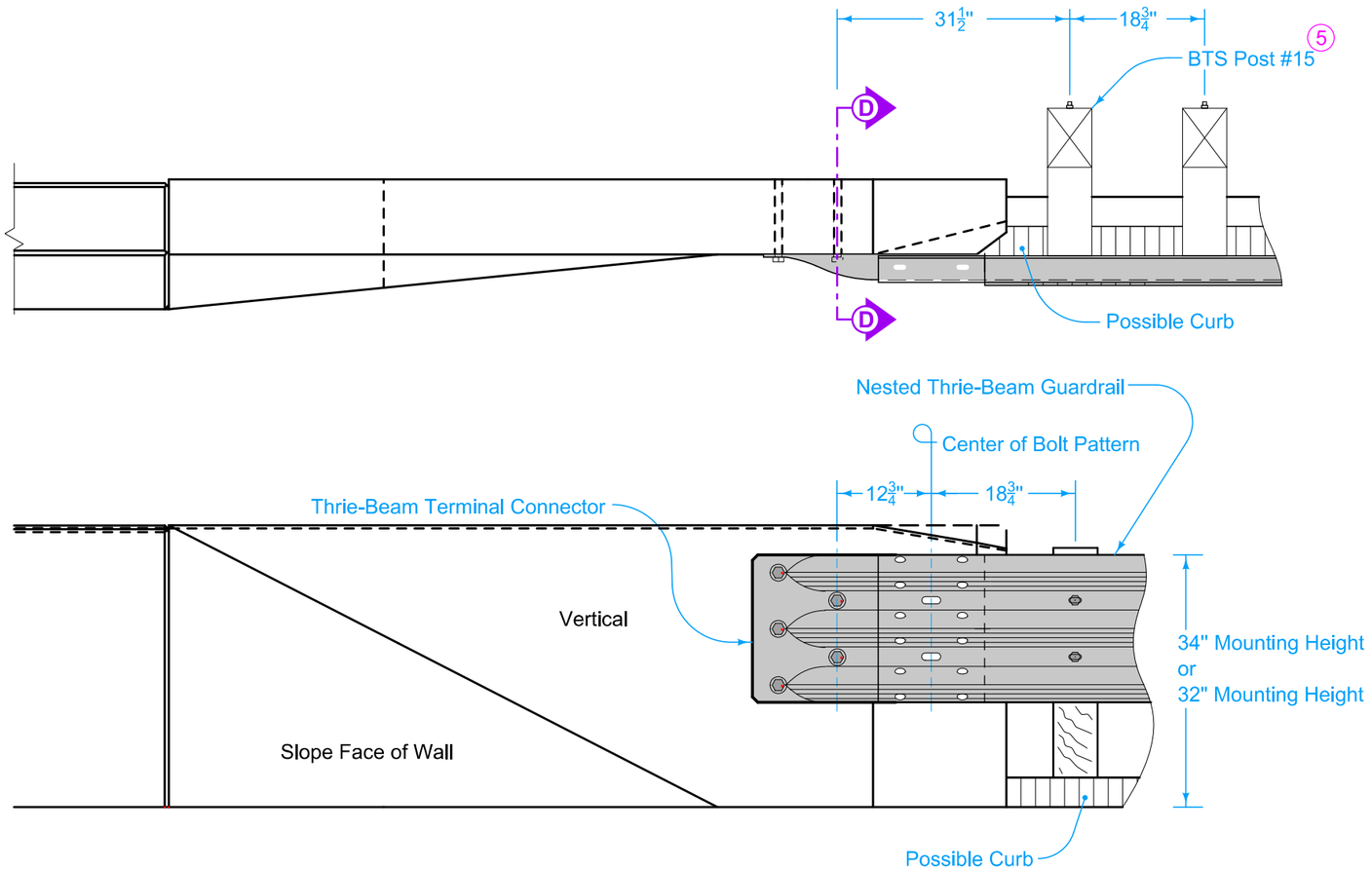
REVISIONS: Added 32" mounting hieght to Type 'D'.

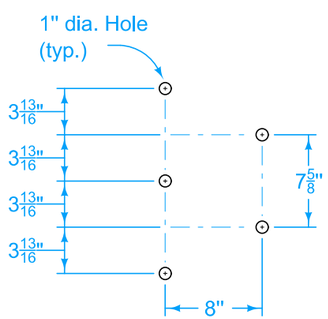
APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL
BOLTED END ANCHOR

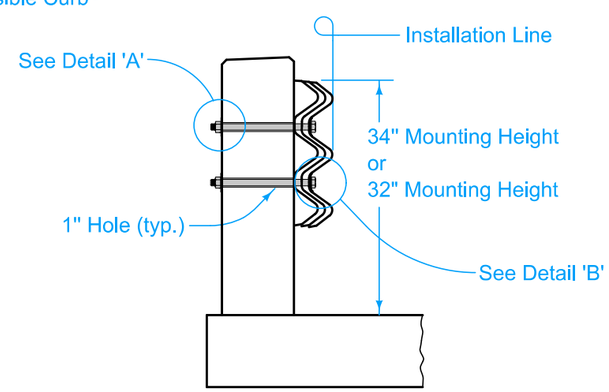
TYPE D

5 See BA-209 for 34" mounting height. See BA-201 for 32" mounting height.





5 - BOLT PATTERN
Thrie-Beam Terminal Connector



SECTION D-D

IOWA DOT
STANDARD ROAD PLAN

REVISION	
6	4-15-25

BA-202

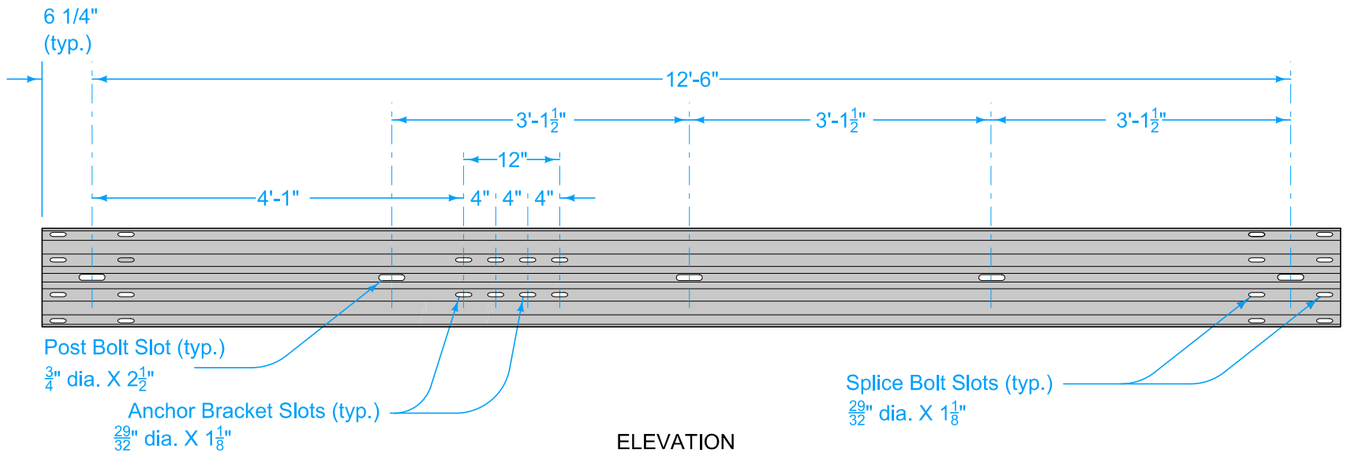
SHEET 4 of 4

REVISIONS: Added 32" mounting hieght to Type 'D'.

APPROVED BY DESIGN METHODS ENGINEER

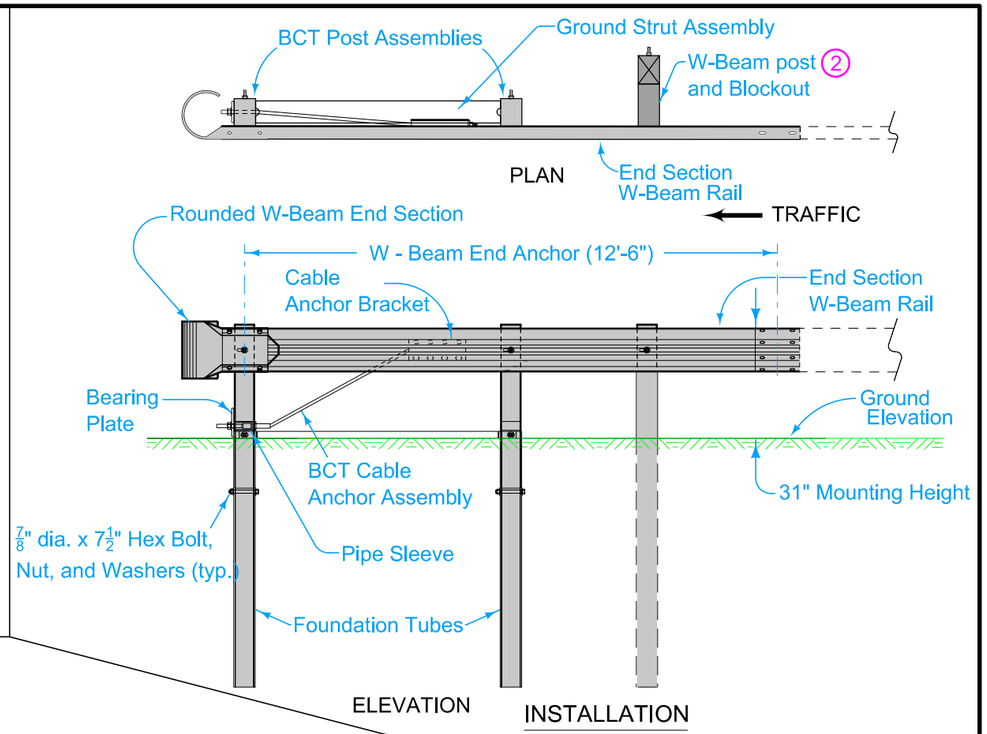
STEEL BEAM GUARDRAIL
BOLTED END ANCHOR

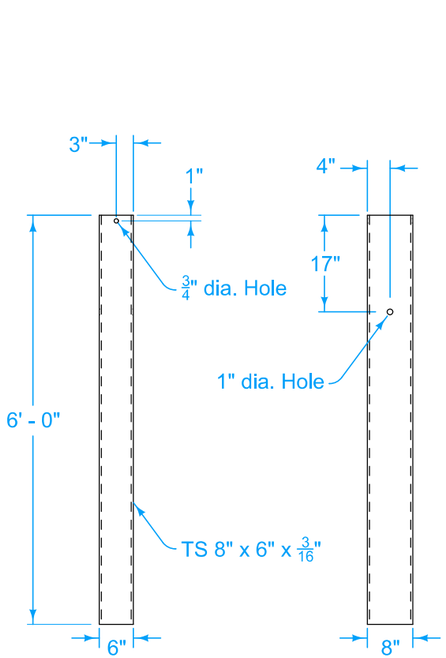
DESIGNER INFORMATION

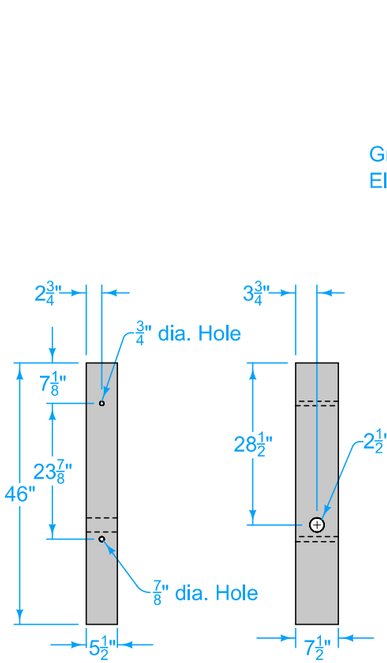


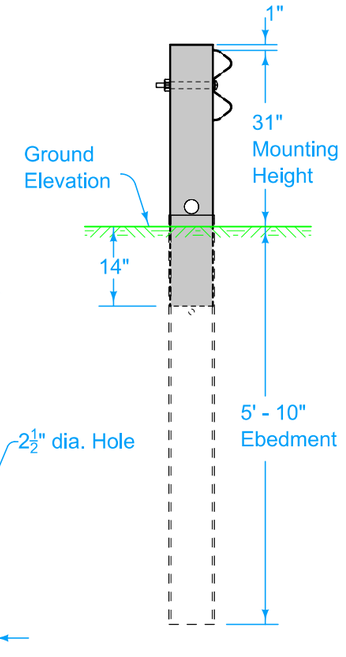
ELEVATION

END SECTION W-BEAM RAIL

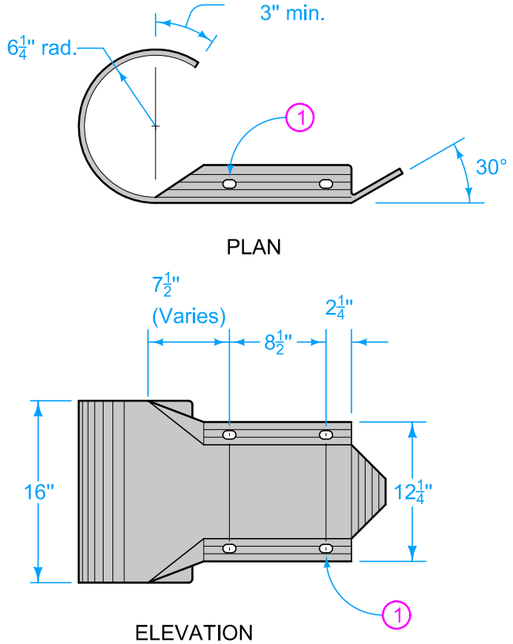








BCT POST ASSEMBLY



ROUNDED W-BEAM END SECTION

(1) 29/32" x 1⅛" slots (29/32" 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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
2	10-15-19

BA-203

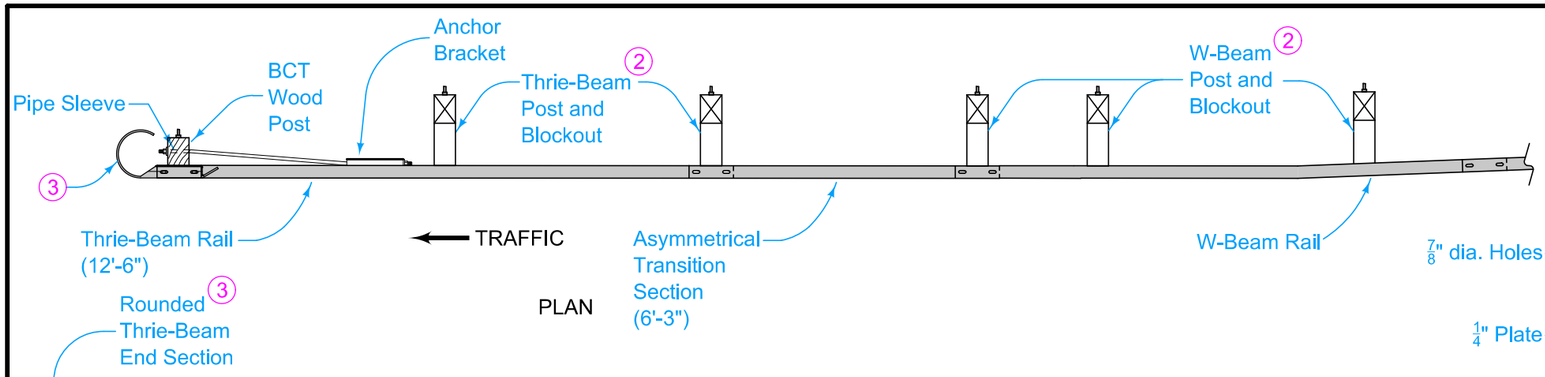
SHEET 1 of 1

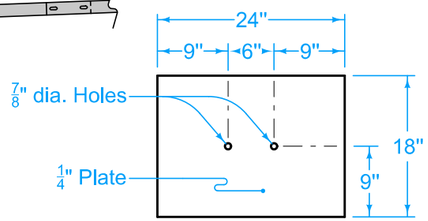
REVISIONS: New logo.

APPROVED BY DESIGN METHODS ENGINEER

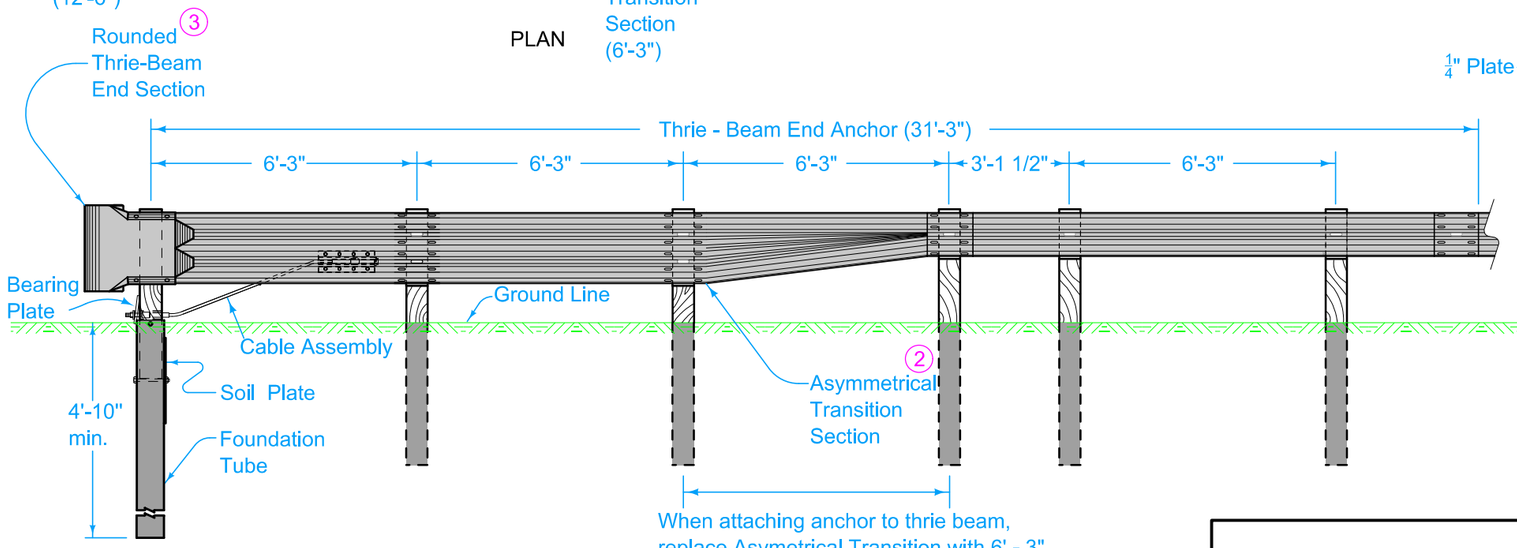
STEEL BEAM GUARDRAIL W-BEAM END ANCHOR

DESIGNER INFORMATION

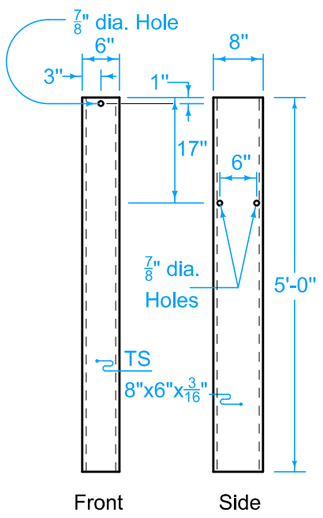




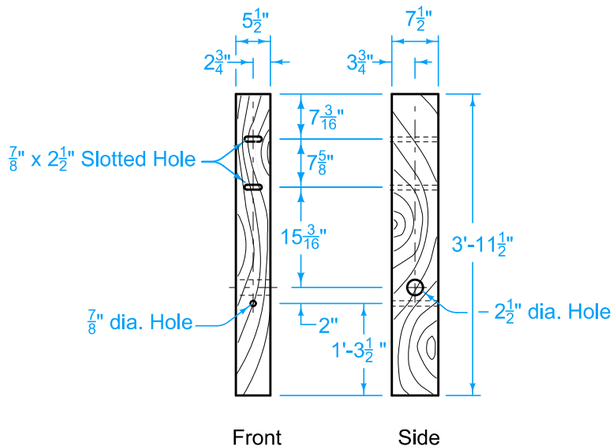
SOIL PLATE



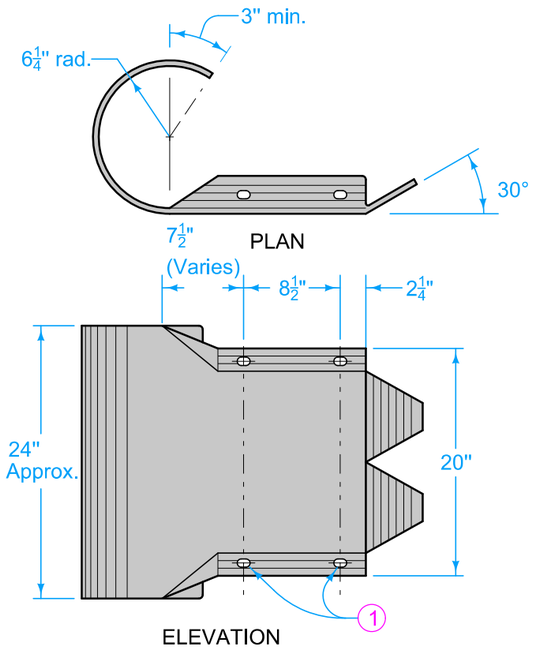
ELEVATION



FOUNDATION TUBE



BCT WOOD POST



ROUNDED THRIE-BEAM END SECTION

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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
3	10-18-22

BA-204

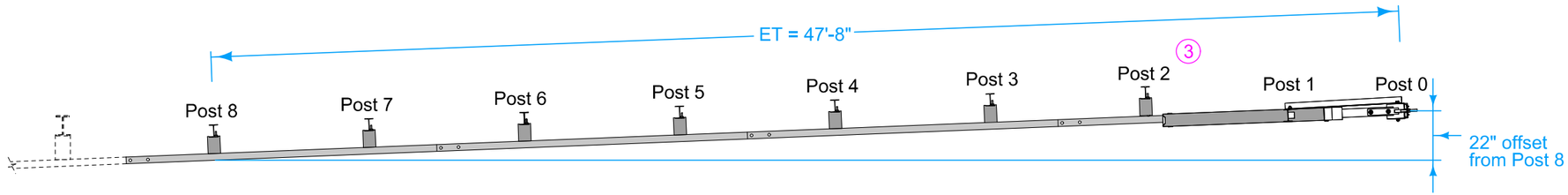
SHEET 1 of 1

REVISIONS: Added 12'-6" of W-Beam Guardrail.

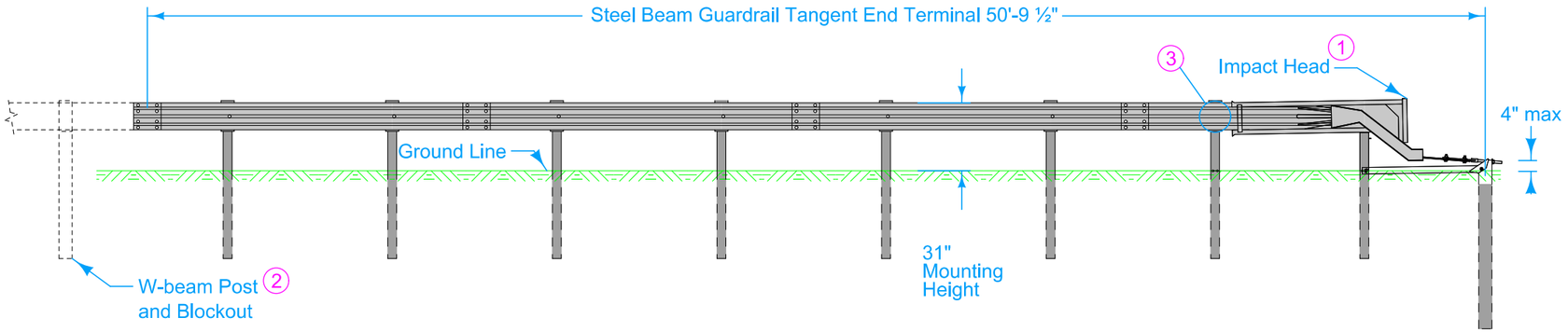
APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL
THRIE-BEAM END ANCHOR

DESIGNER INFORMATION



PLAN



ELEVATION

LAPPING PROCEDURE

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.

(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

IOWA DOT

STANDARD ROAD PLAN

REVISION
5 | 10-17-23

BA-205

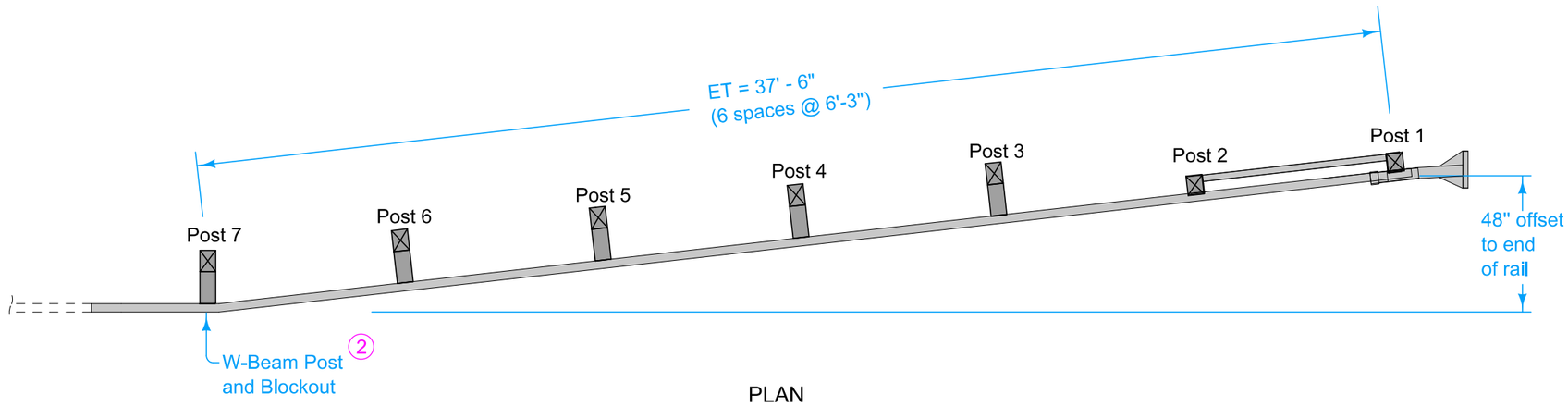
SHEET 1 of 1

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

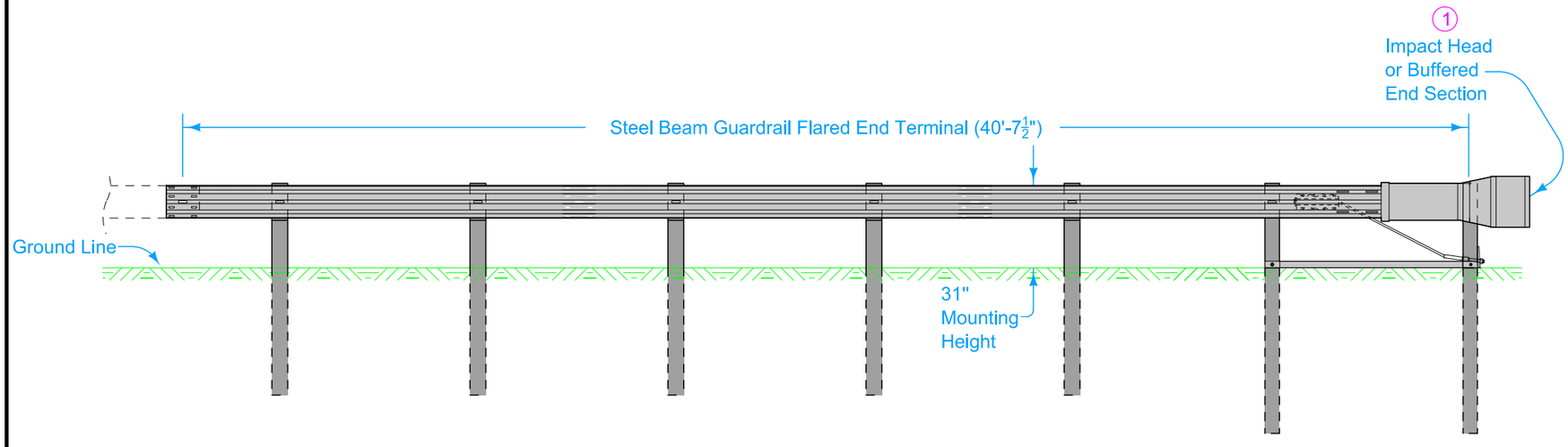
APPROVED BY DESIGN METHODS ENGINEER

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

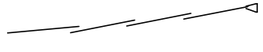
DESIGNER INFORMATION



PLAN



ELEVATION



NEAREST TRAFFIC

LAPPING PROCEDURE

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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
5	10-19-21

BA-206

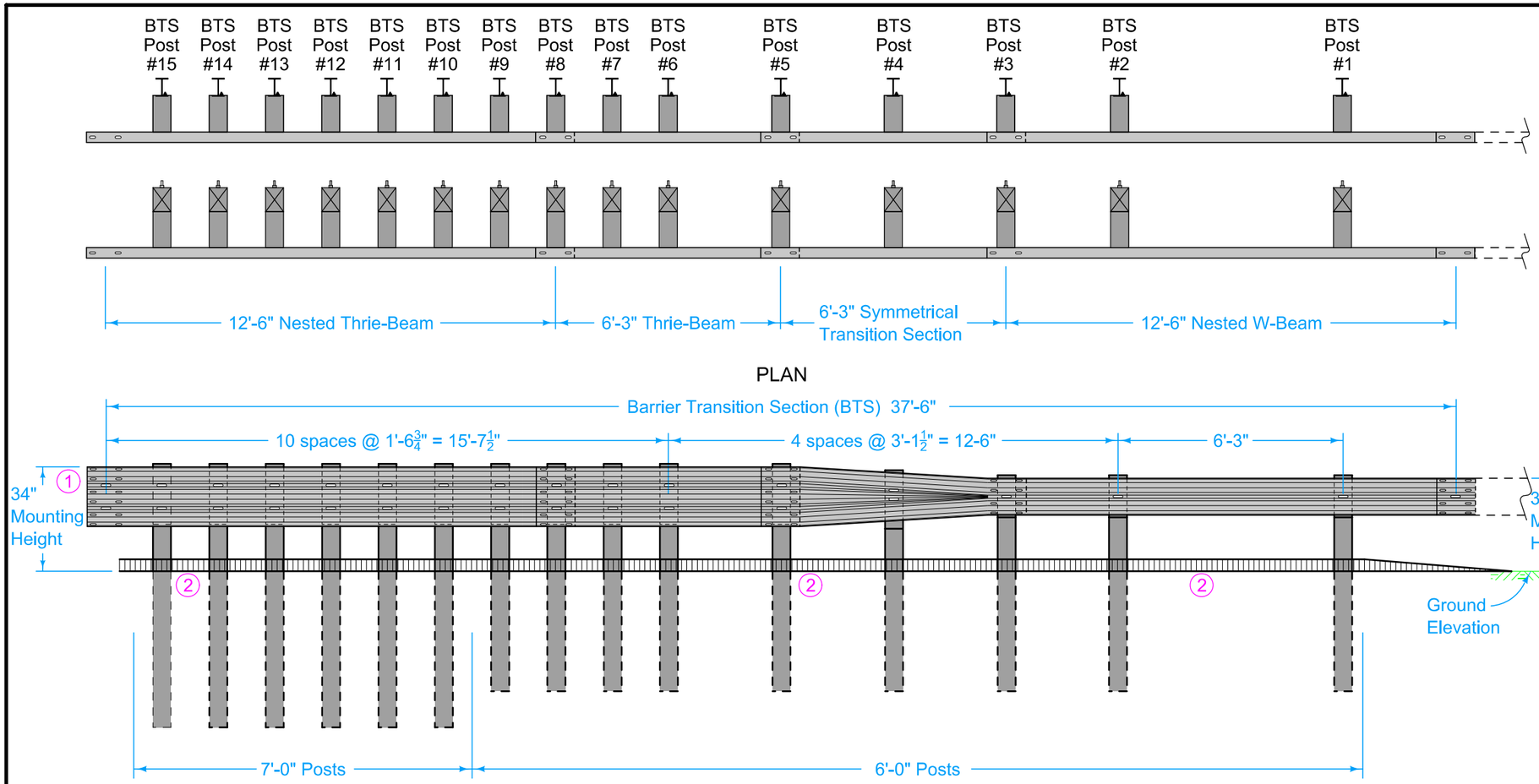
SHEET 1 of 1

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

APPROVED BY DESIGN METHODS ENGINEER

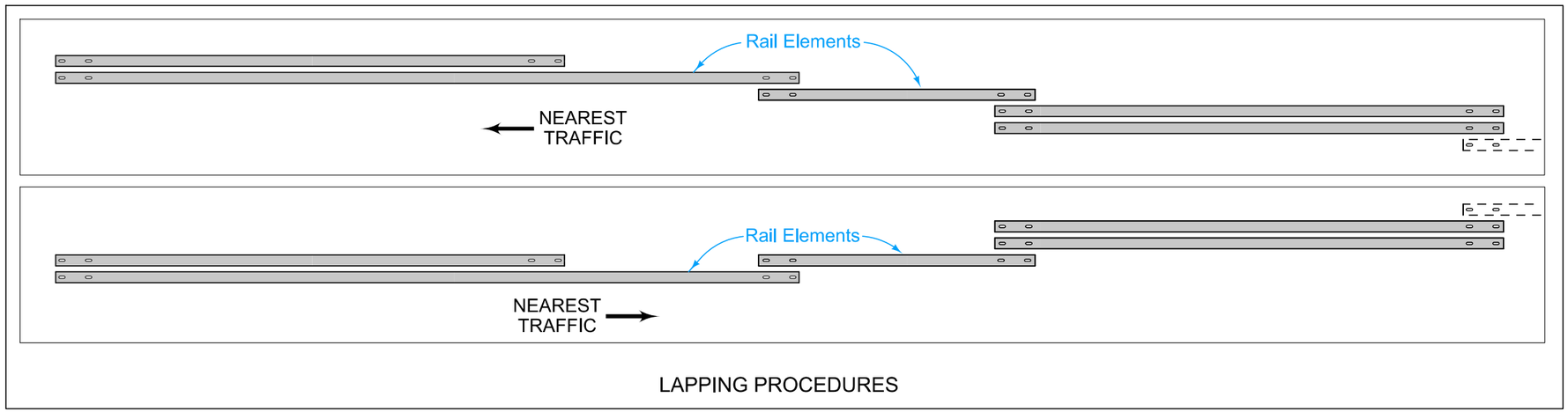
STEEL BEAM GUARDRAIL FLARED END TERMINAL FOR CABLE CONNECTION

DESIGNER INFORMATION



PLAN

ELEVATION



LAPPING PROCEDURES

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 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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
NEW	10-15-24

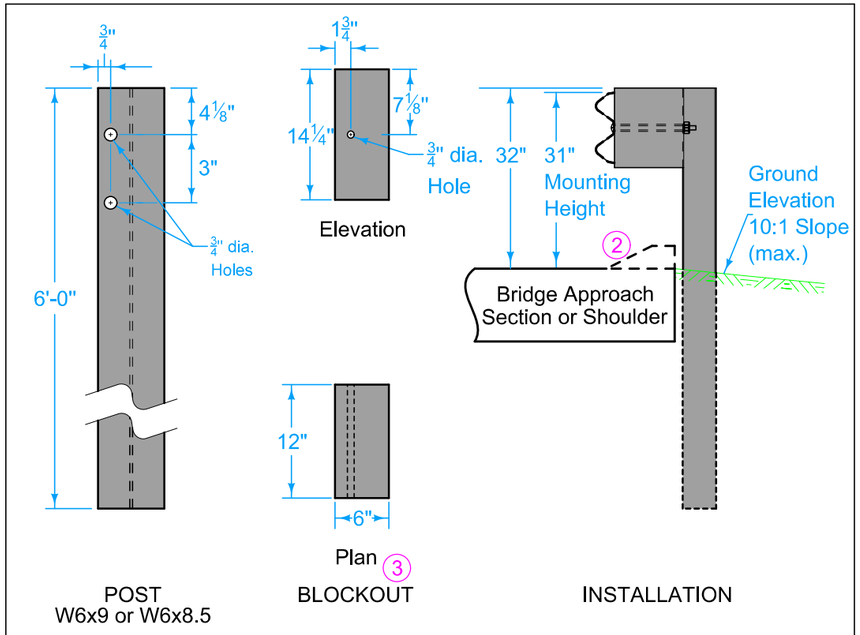
BA-209

SHEET 1 of 3

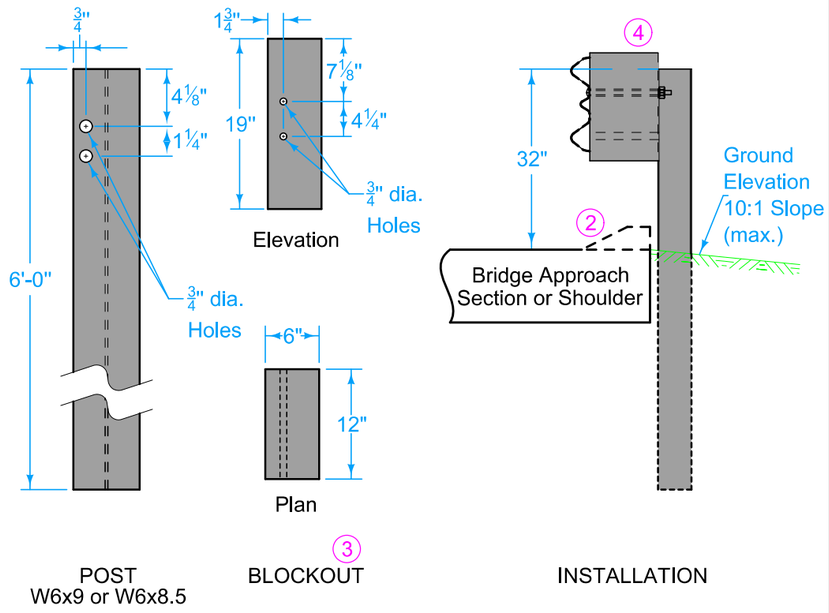
REVISIONS: NEW

APPROVED BY DESIGN METHODS ENGINEER

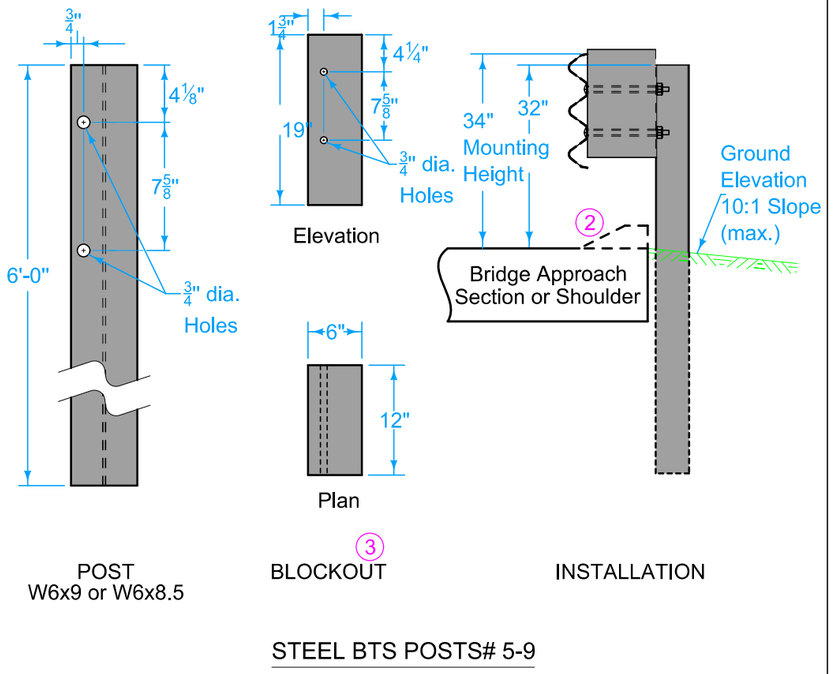
STEEL BEAM GUARDRAIL BARRIER TRANSITION SECTION (MASH TL-3, 34" mounting height)



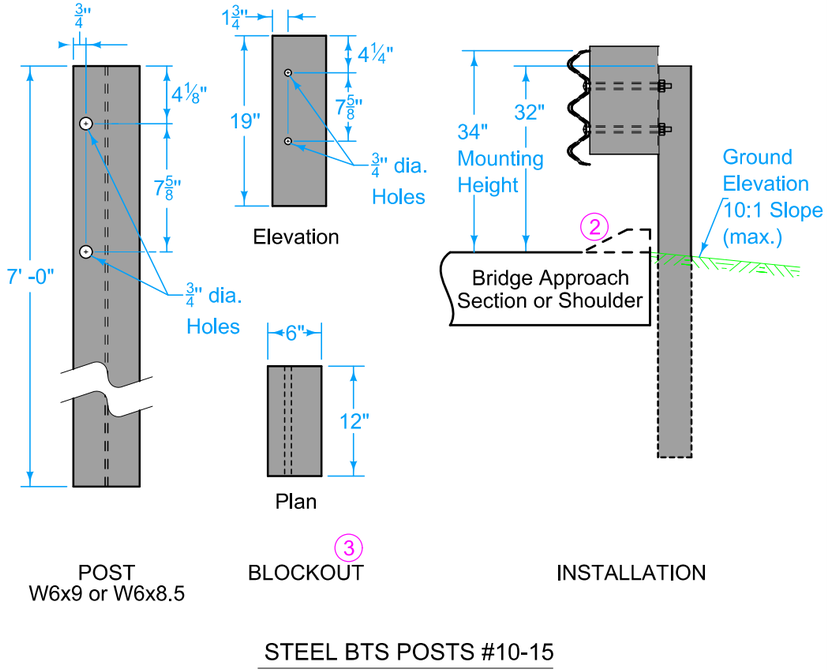
STEEL BTS POST #1-3



STEEL BTS POST #4



STEEL BTS POSTS# 5-9



STEEL BTS POSTS #10-15

(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.

IOWA DOT

STANDARD ROAD PLAN

REVISION	
NEW	10-15-24

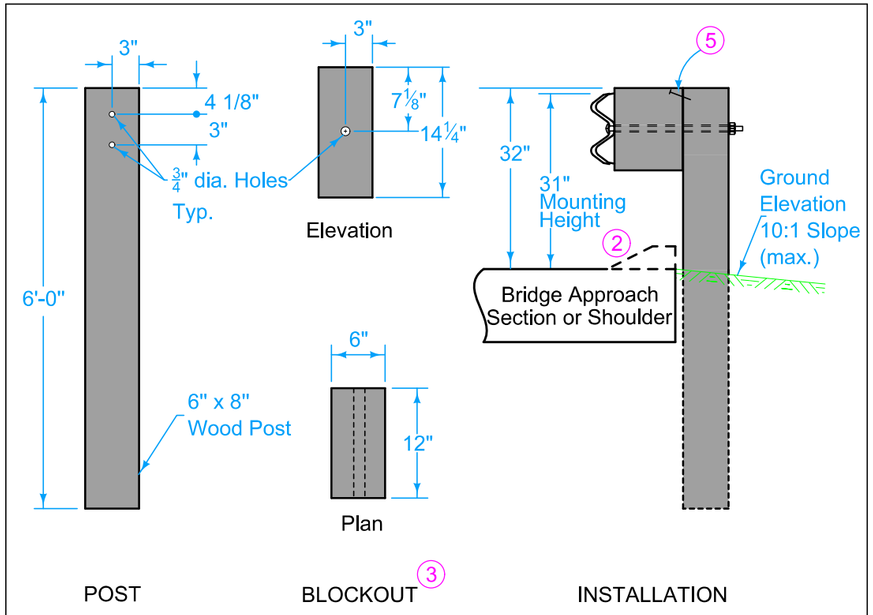
BA-209

SHEET 2 of 3

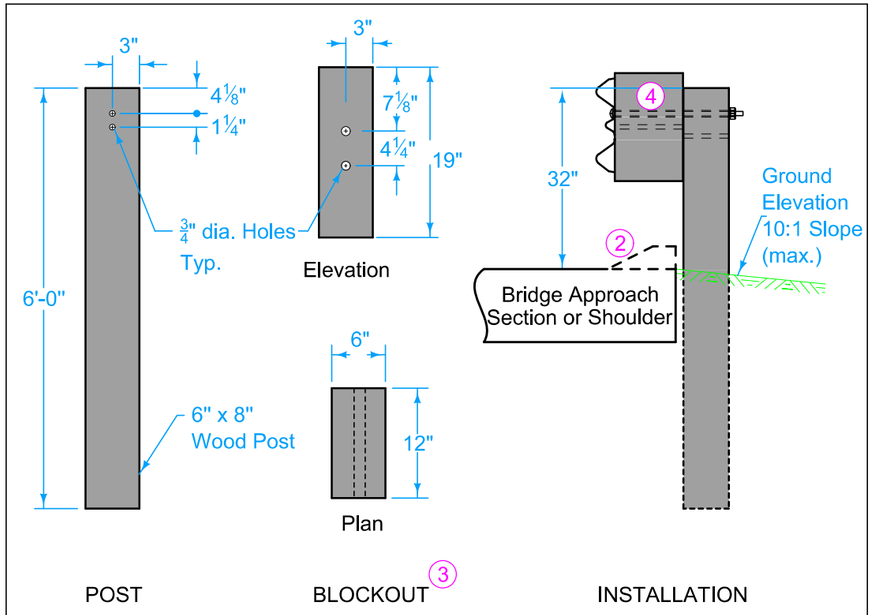
REVISIONS: NEW

APPROVED BY DESIGN METHODS ENGINEER

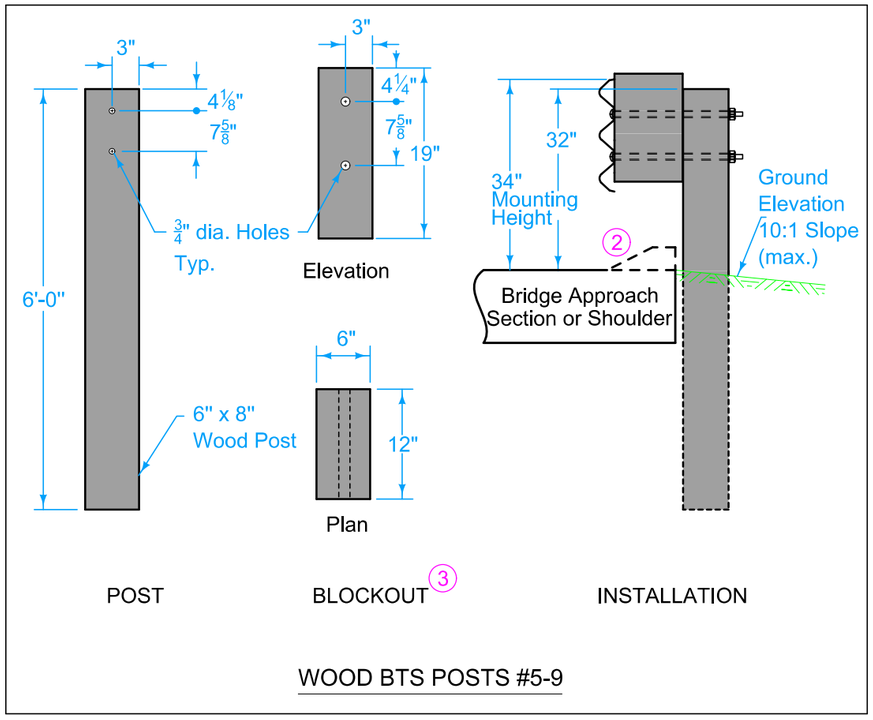
STEEL BEAM GUARDRAIL
BARRIER TRANSITION SECTION
(MASH TL-3, 34" mounting height)



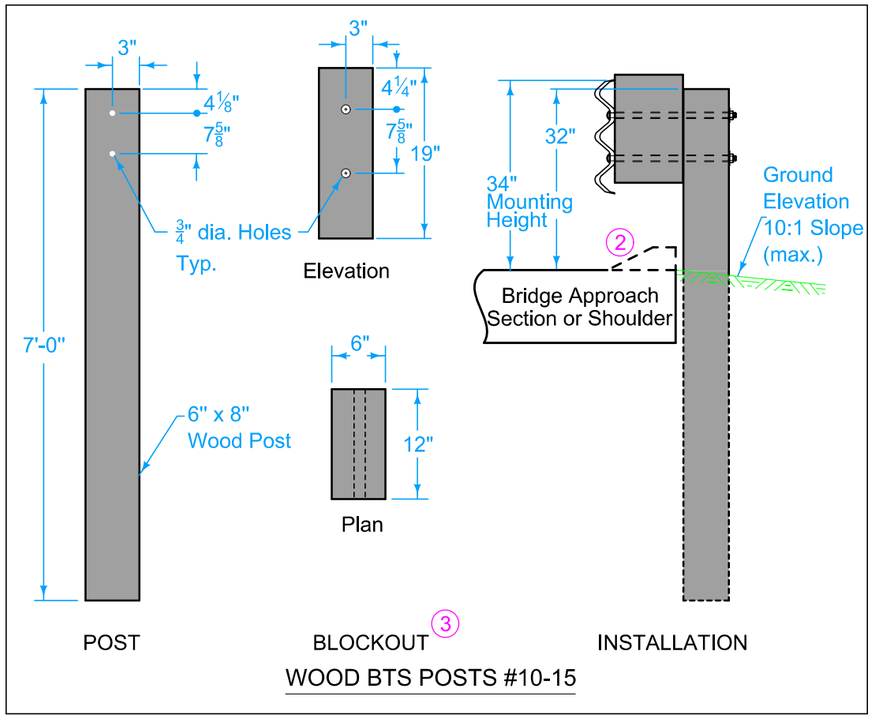
WOOD BTS POSTS #1-3



WOOD BTS POST #4



WOOD BTS POSTS #5-9



WOOD BTS POSTS #10-15

(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.

IOWA DOT

STANDARD ROAD PLAN

REVISION	
NEW	10-15-24

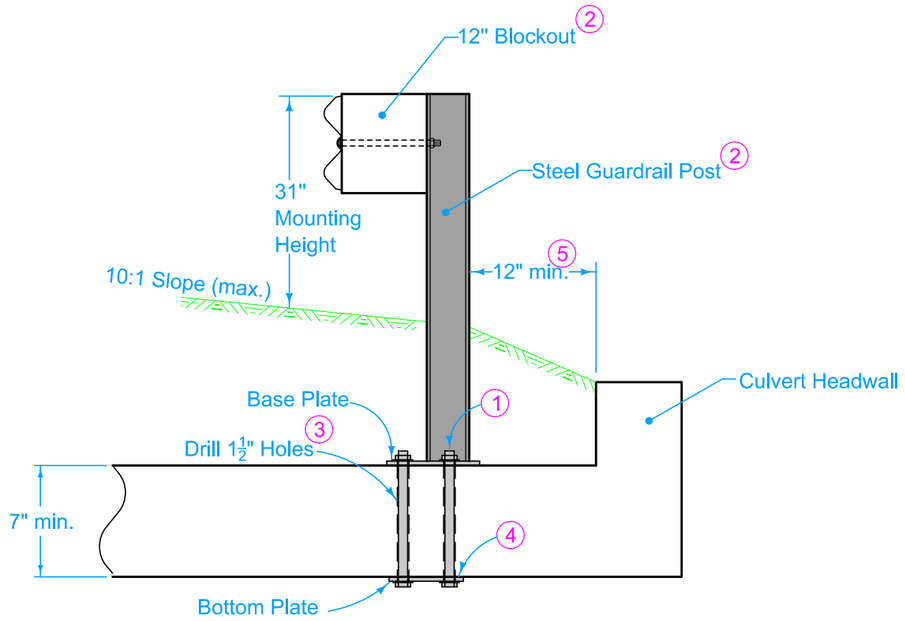
BA-209

SHEET 3 of 3

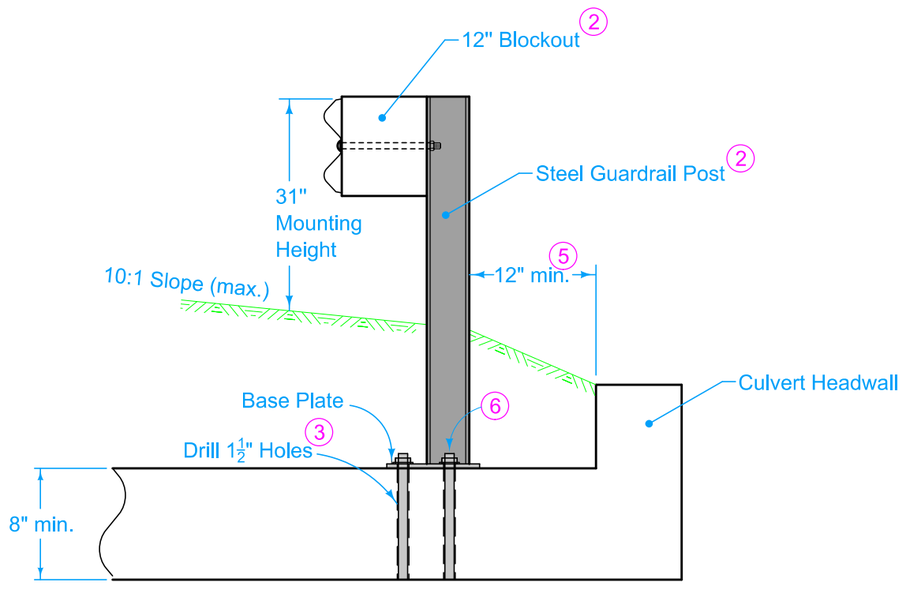
REVISIONS: NEW

APPROVED BY DESIGN METHODS ENGINEER

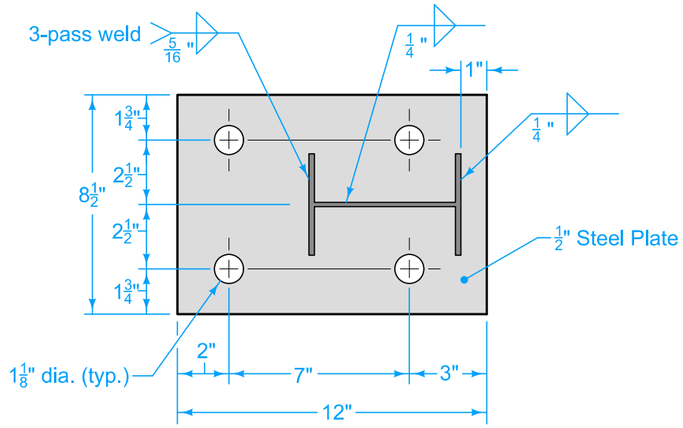
STEEL BEAM GUARDRAIL
BARRIER TRANSITION SECTION
(MASH TL-3, 34" mounting height)



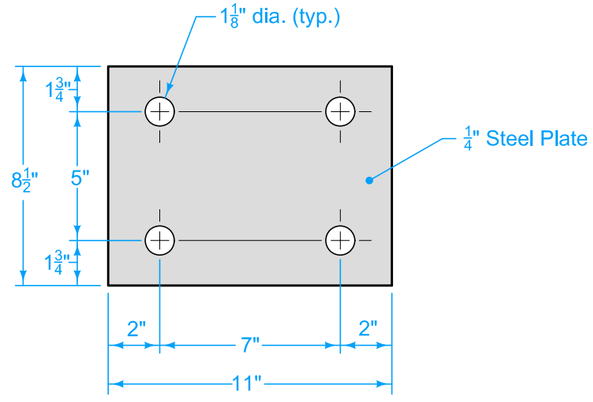
TYPICAL SECTION
(Bolt Through Connection)



TYPICAL SECTION
(Epoxy Connection)



BASE PLATE AND POST



BOTTOM PLATE

(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.

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.

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

Incidental to Adapter Unit:
1 - 12" x 8½" x ½" ASTM A36 Steel Plate
1 - 11" x 8½" x ¼" 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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
3	10-19-21

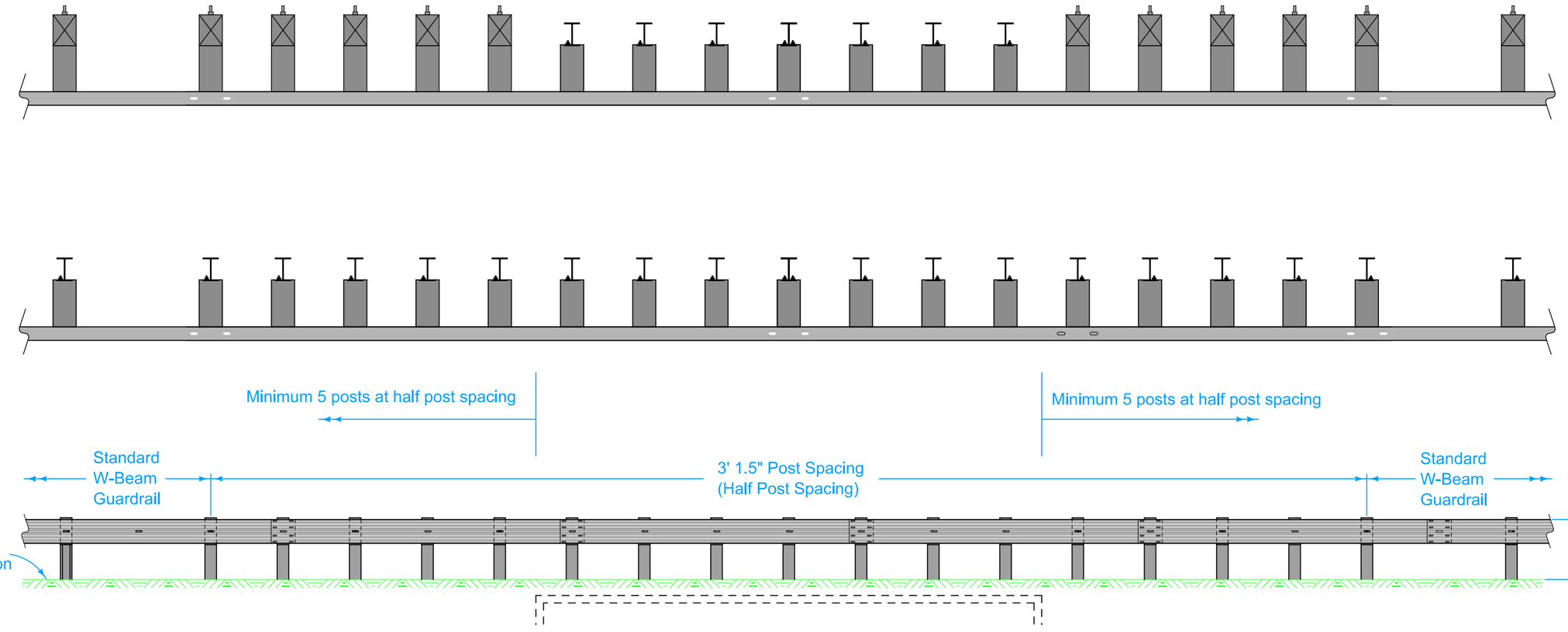
BA-210

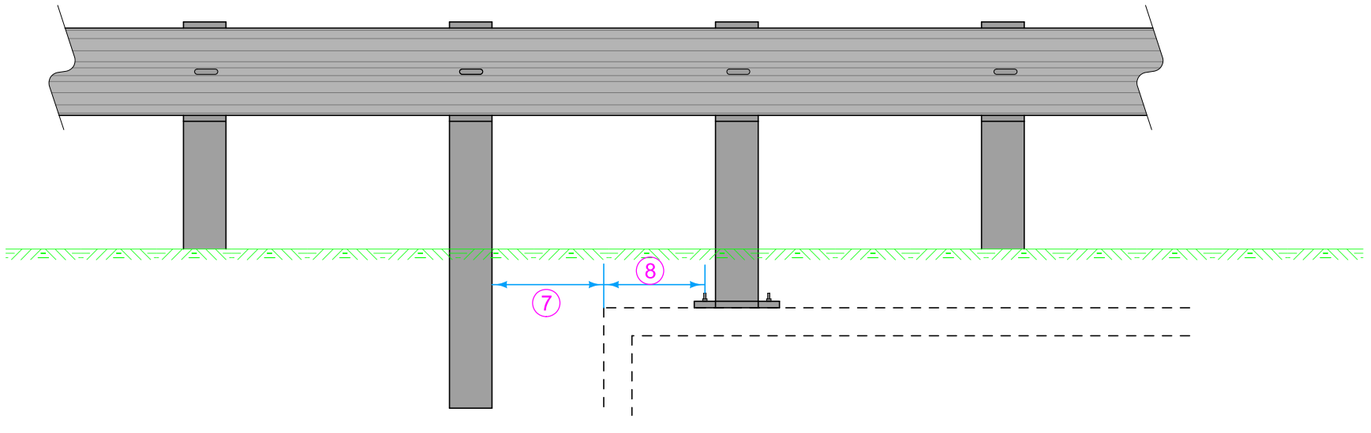
SHEET 1 of 2

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

APPROVED BY DESIGN METHODS ENGINEER

GUARDRAIL POST ADAPTER UNIT





(7) Minimum 12 inches between post and edge of culvert.

(8) Minimum 4 inches between edge of culvert and center of anchor.

IOWA DOT

STANDARD ROAD PLAN

REVISION	
3	10-19-21

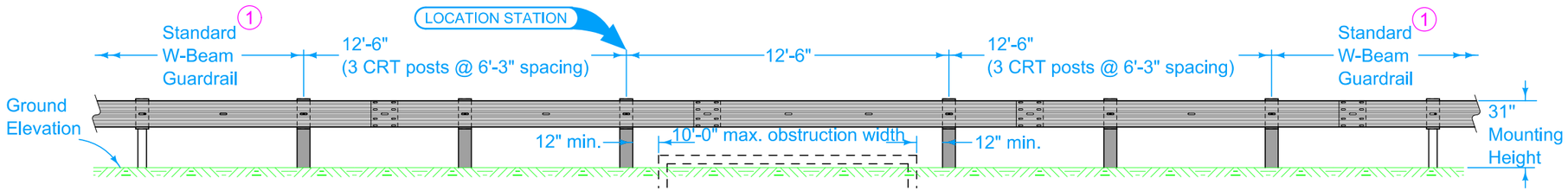
BA-210

SHEET 2 of 2

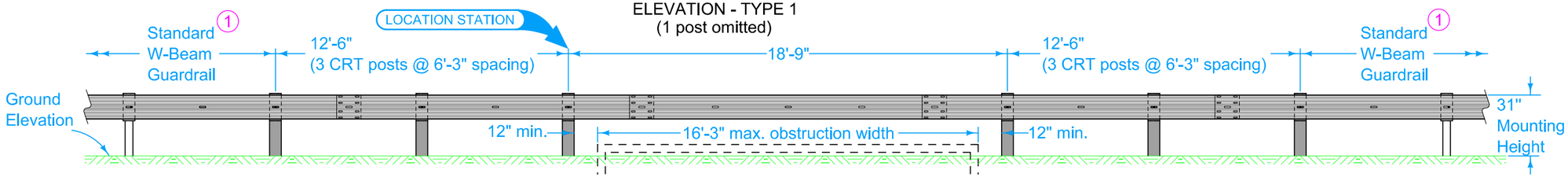
REVISIONS: Added Sheet 2. Added washers to circle notes 1 and 6. Increased offset to 12" in Typical Sections.

APPROVED BY DESIGN METHODS ENGINEER

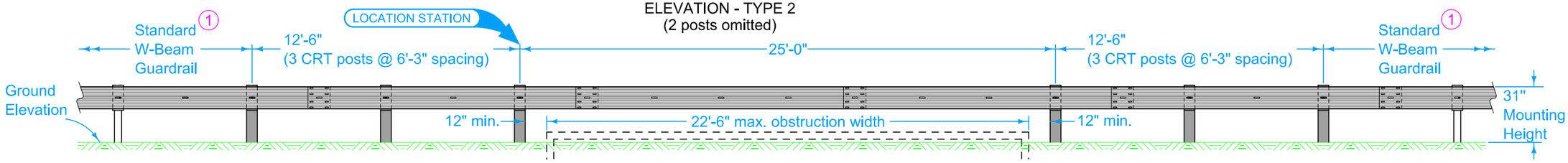
GUARDRAIL POST ADAPTER UNIT



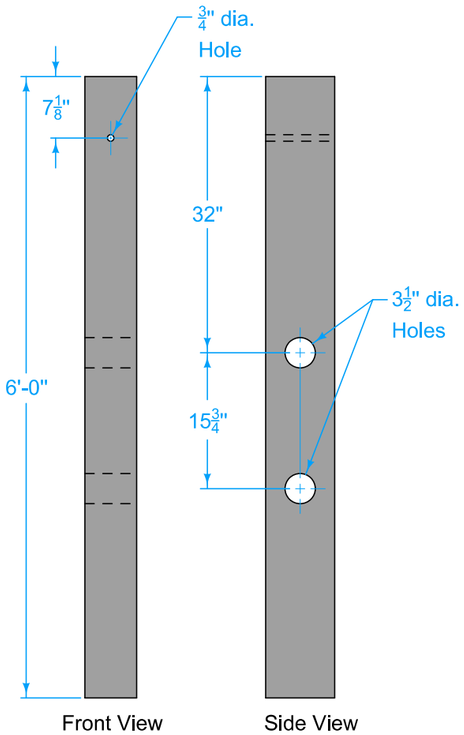
ELEVATION - TYPE 1
(1 post omitted)



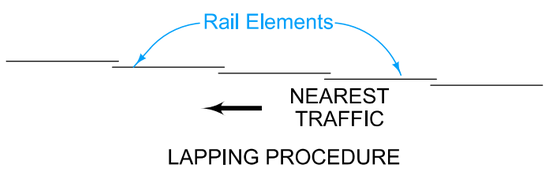
ELEVATION - TYPE 2
(2 posts omitted)



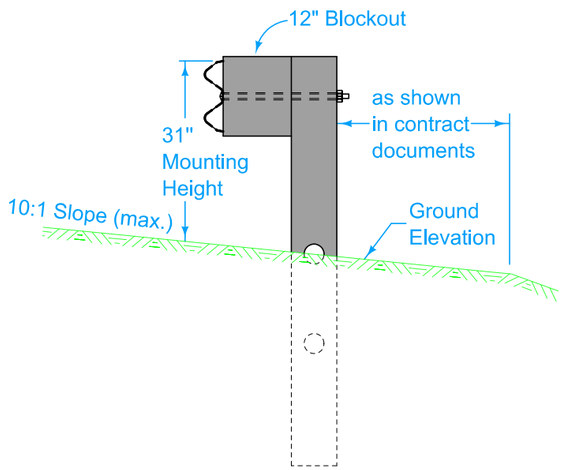
ELEVATION - TYPE 3
(3 posts omitted)



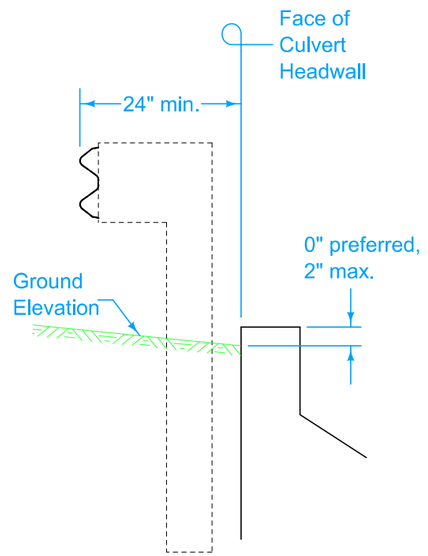
6'-0" CRT POST



LAPPING PROCEDURE



TYPICAL SECTION AT CRT POST
Level Ground



TYPICAL SECTION AT BOX CULVERT

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

IOWA DOT
STANDARD ROAD PLAN

REVISION	
2	04-15-25

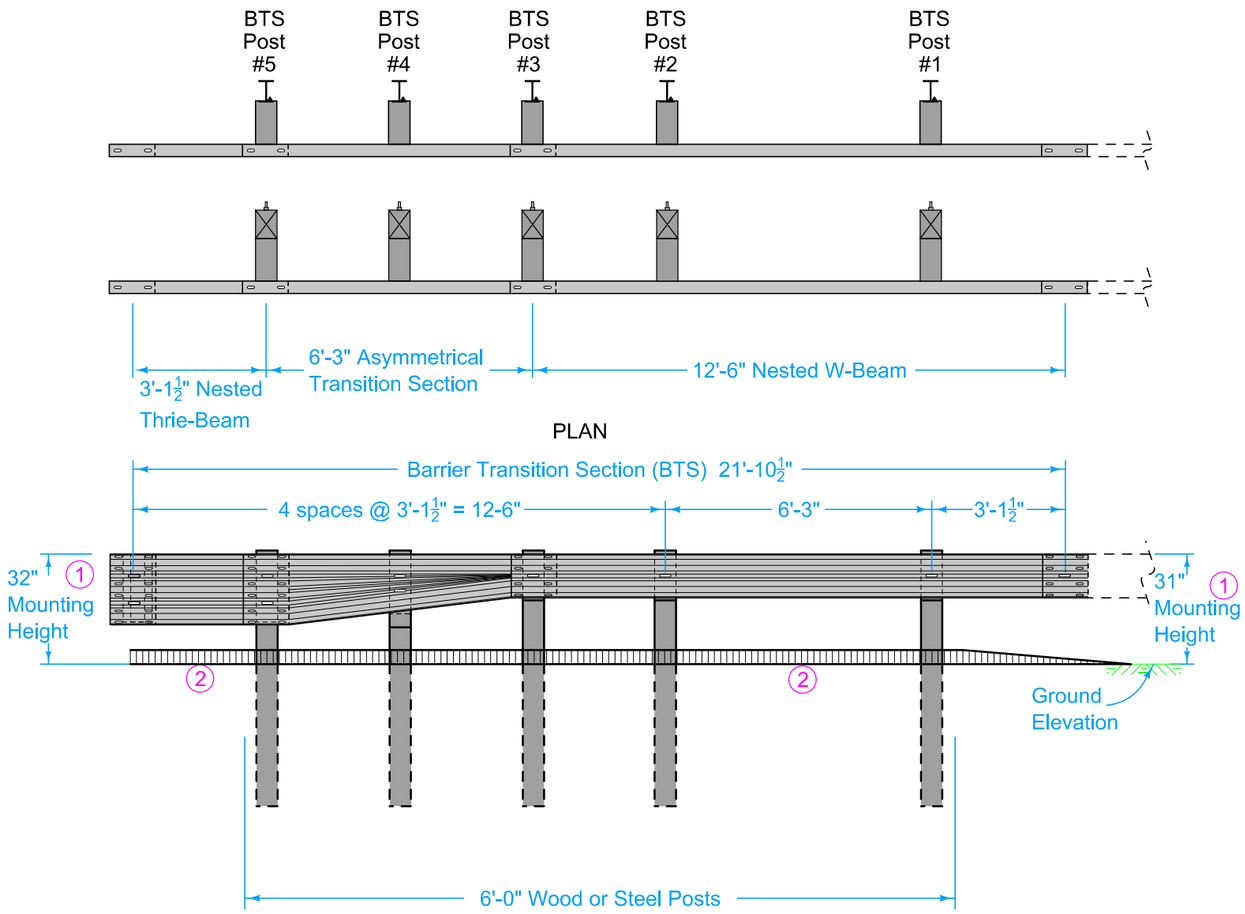
BA-211
SHEET 1 of 1

REVISIONS: Changed reference to CRT post table to 32".

APPROVED BY DESIGN METHODS ENGINEER

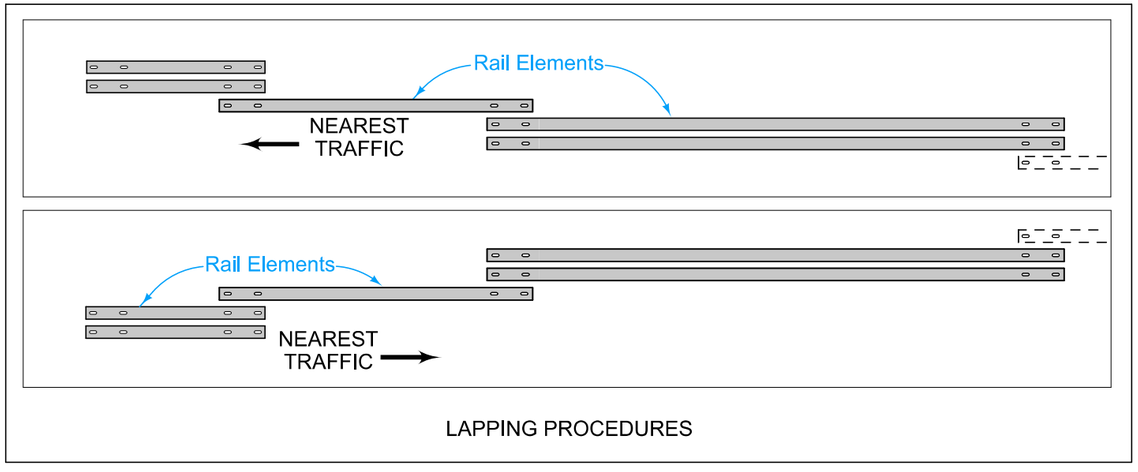
STEEL BEAM GUARDRAIL LONG-SPAN SYSTEM FOR POST CONFLICTS

DESIGNER INFORMATION



PLAN

ELEVATION



LAPPING PROCEDURES

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'-1½" Thrie-Beam rail sections
(2) 12'-6" W-Beam rail sections
Approved bolts, nuts, and washers
Refer to BA-200 for guardrail components

IOWA DOT

STANDARD ROAD PLAN

REVISION	
3	10-18-22

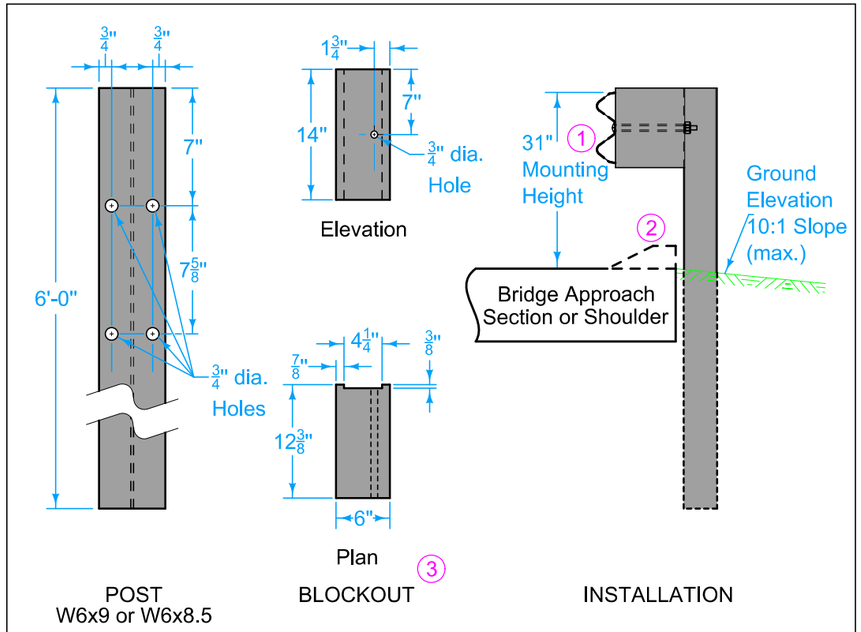
BA-221

SHEET 1 of 3

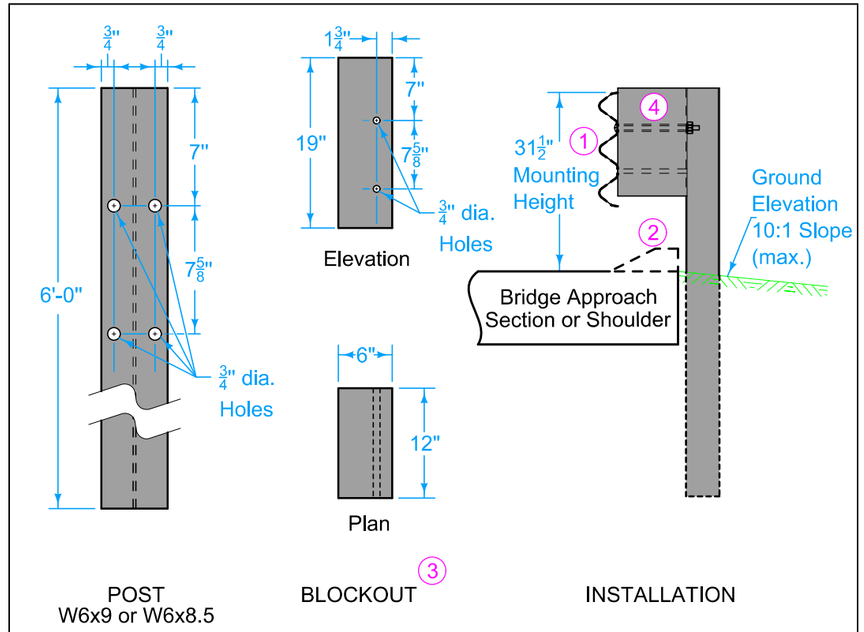
REVISIONS: Revised curb note.

APPROVED BY DESIGN METHODS ENGINEER

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

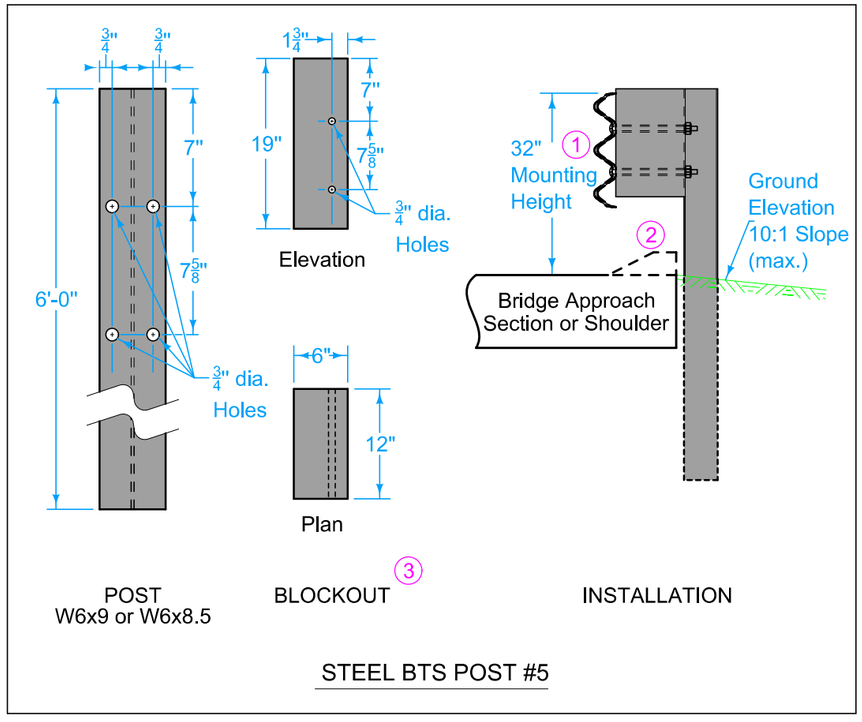


STEEL BTS POSTS #1-3



STEEL BTS POST #4

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.



STEEL BTS POST #5

IOWA DOT

STANDARD ROAD PLAN

REVISION	
3	10-18-22

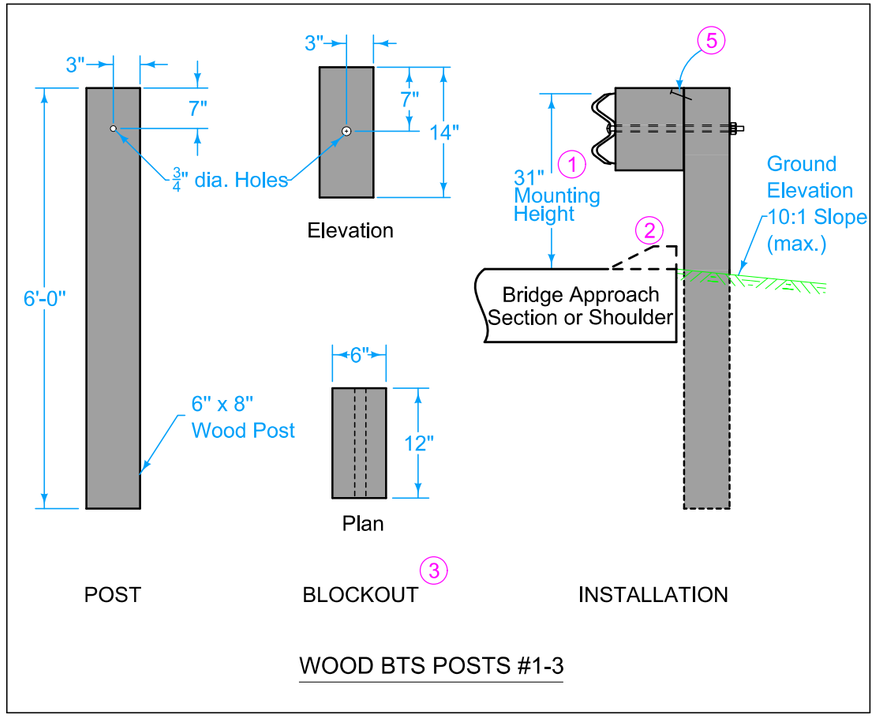
BA-221

SHEET 2 of 3

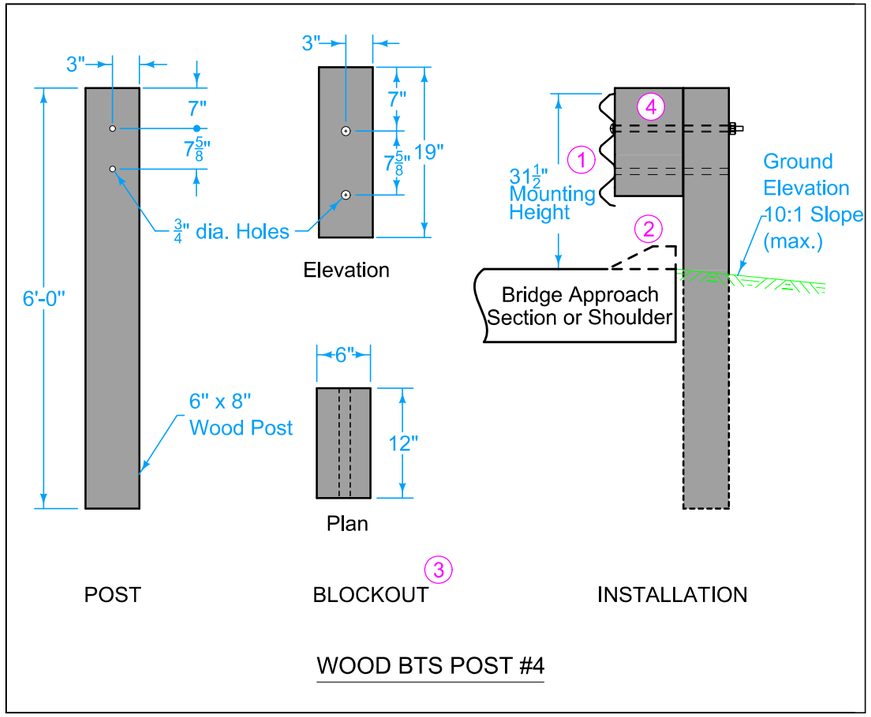
REVISIONS: Revised curb note.

APPROVED BY DESIGN METHODS ENGINEER

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

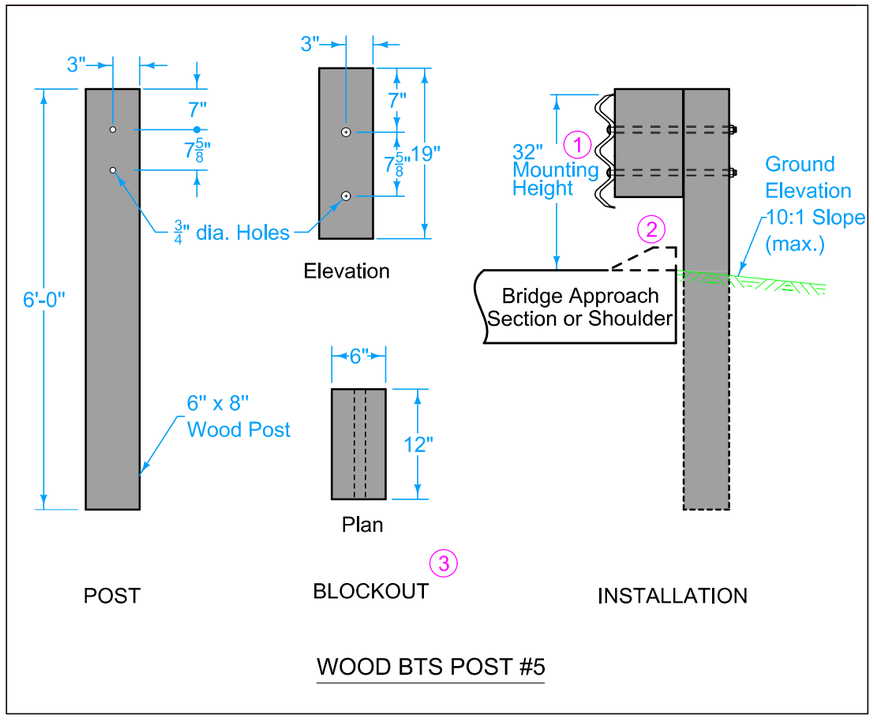


WOOD BTS POSTS #1-3



WOOD BTS POST #4

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.



WOOD BTS POST #5

IOWA DOT

STANDARD ROAD PLAN

REVISION	
3	10-18-22

BA-221

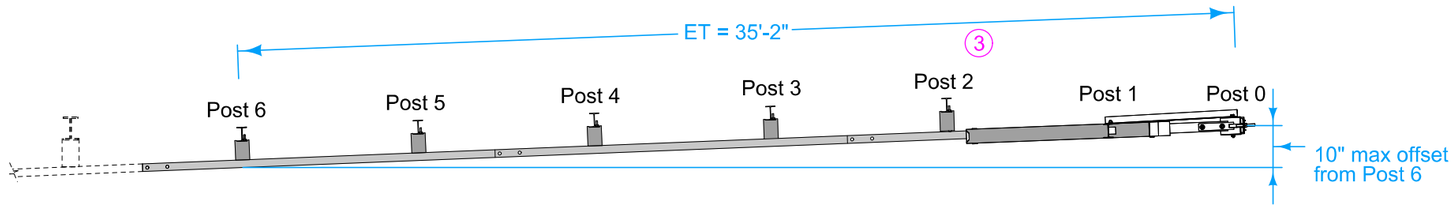
SHEET 3 of 3

REVISIONS: Revised curb note.

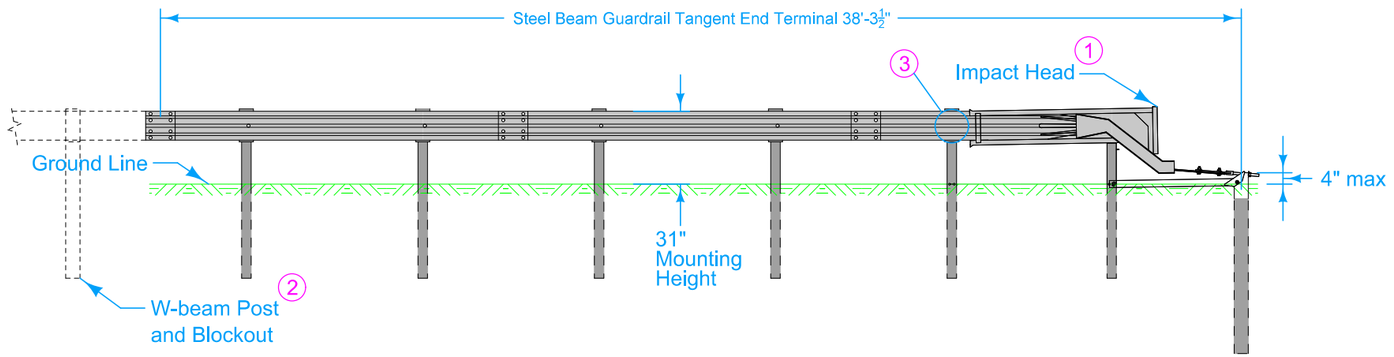
APPROVED BY DESIGN METHODS ENGINEER

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

DESIGNER INFORMATION



PLAN



ELEVATION

NEAREST TRAFFIC

LAPPING PROCEDURE

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.

(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

IOWA DOT

REVISION	
4	10-17-23

STANDARD ROAD PLAN

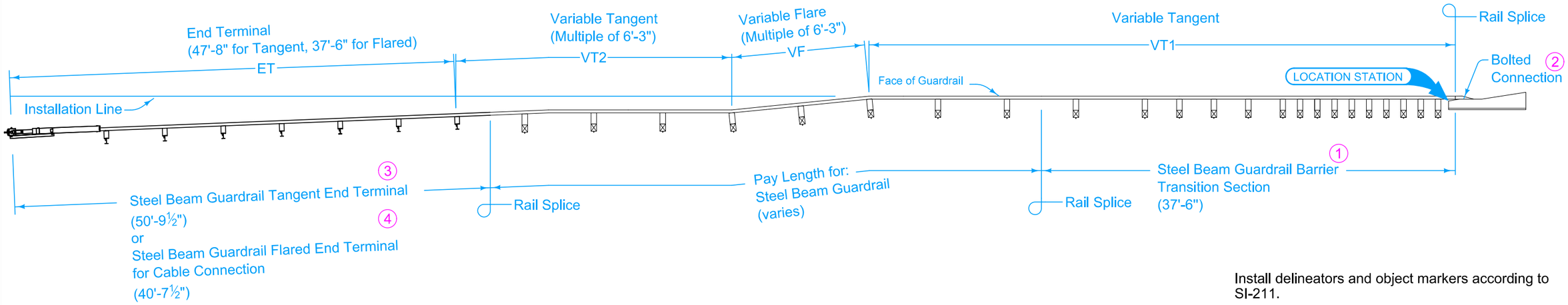
BA-225

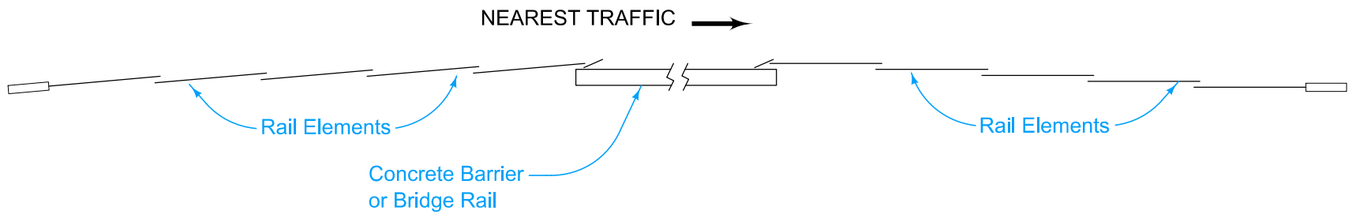
SHEET 1 of 1

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

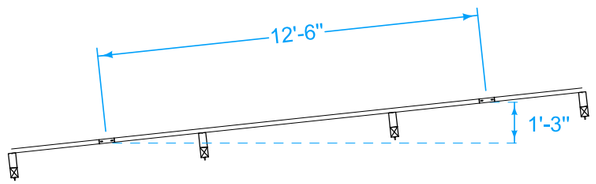
APPROVED BY DESIGN METHODS ENGINEER

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





LAPPING PROCEDURE



VARIABLE FLARE

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 or BA-209.

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

3 See BA-205.

4 See BA-206.

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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
8	04-15-25

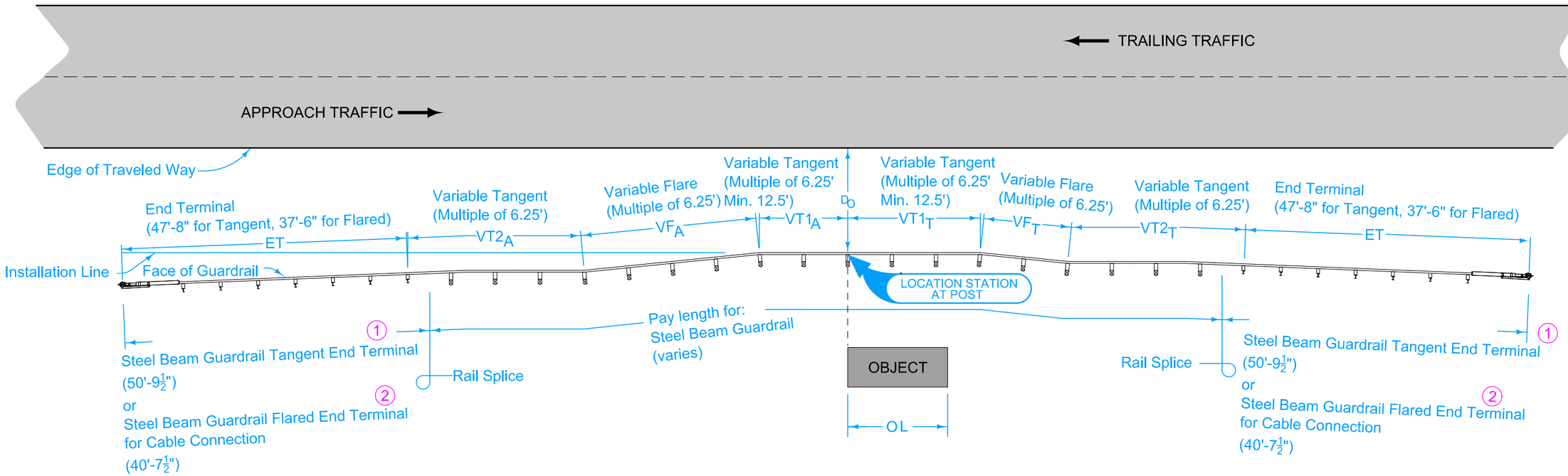
BA-250

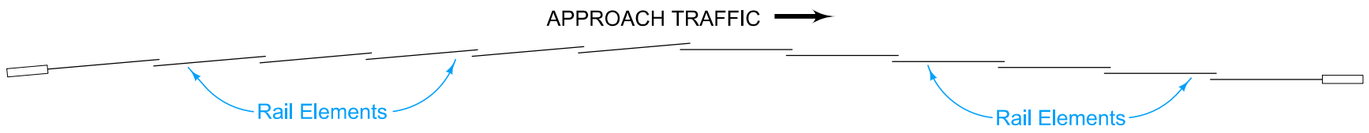
SHEET 1 of 1

REVISIONS: Added BA-209 as an option.

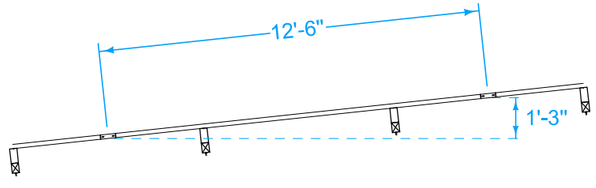
APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL INSTALLATION AT CONCRETE BARRIER OR BRIDGE RAIL END SECTION (MASH TL-3)





LAPPING PROCEDURE



VARIABLE FLARE

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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
4	04-20-21

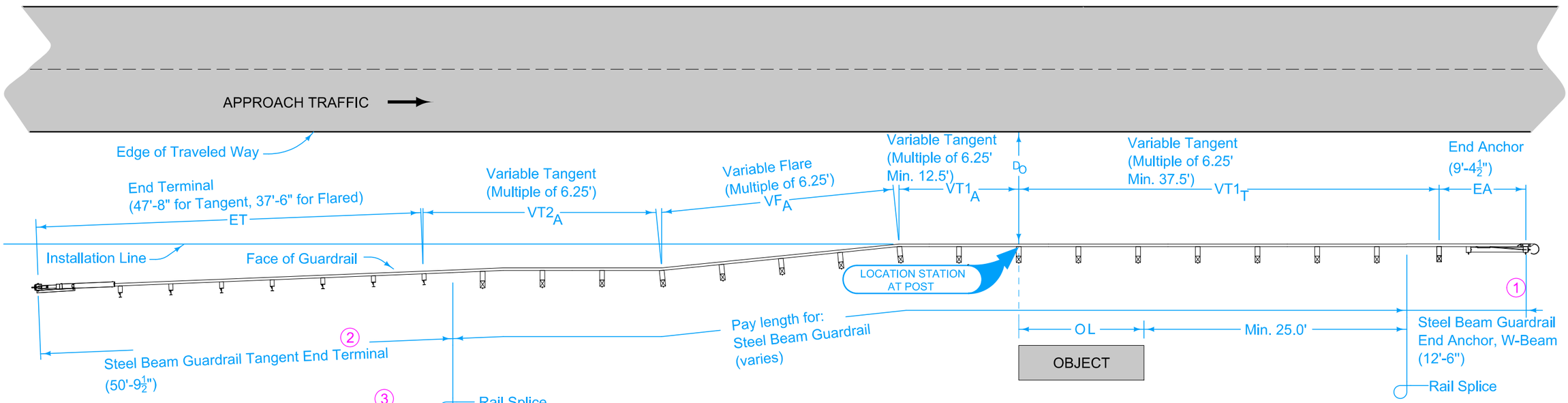
BA-251

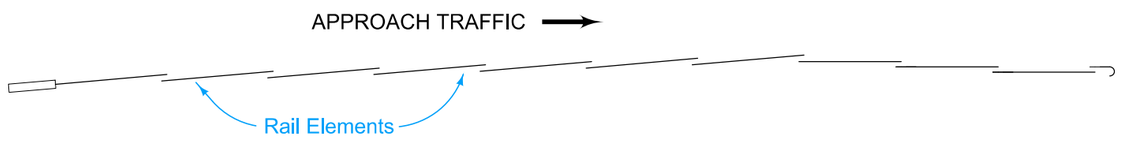
SHEET 1 of 1

REVISIONS: Modified graphics to new cells in cell library.

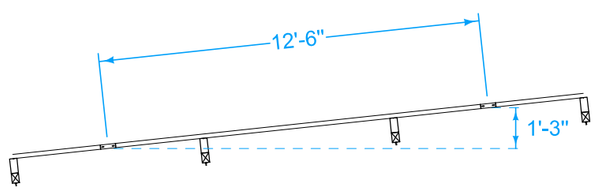
APPROVED BY DESIGN METHODS ENGINEER

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





LAPPING PROCEDURE



VARIABLE FLARE

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

IOWA DOT

STANDARD ROAD PLAN

REVISION 7 04-20-21

BA-252

SHEET 1 of 1

REVISIONS: Removed Interim from standard.

APPROVED BY DESIGN METHODS ENGINEER

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

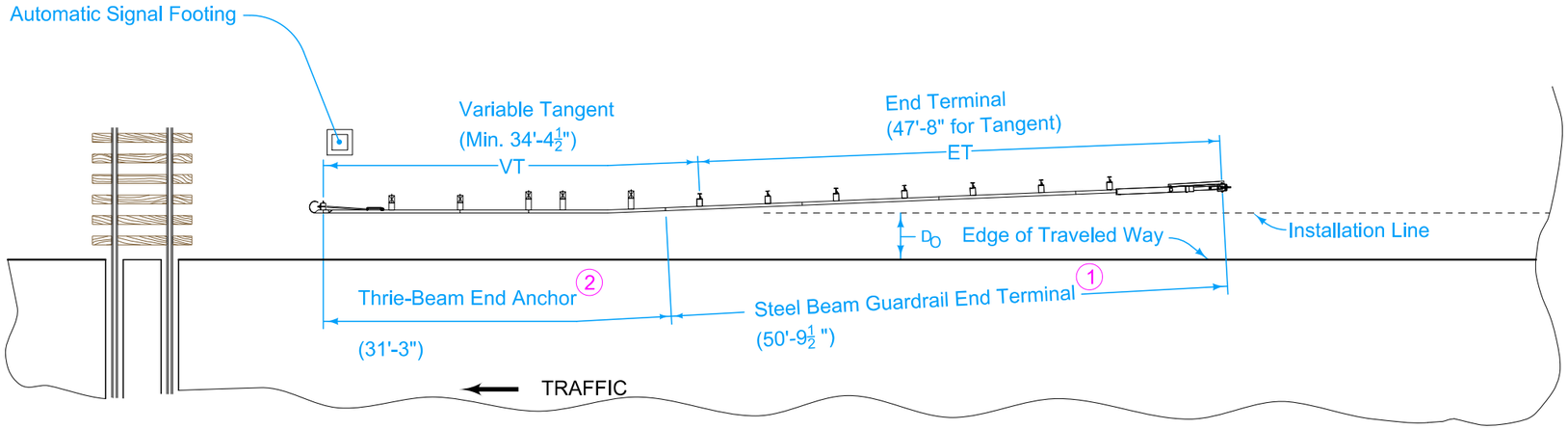
DESIGNER INFORMATION

For grading requirements, refer to EW-301.

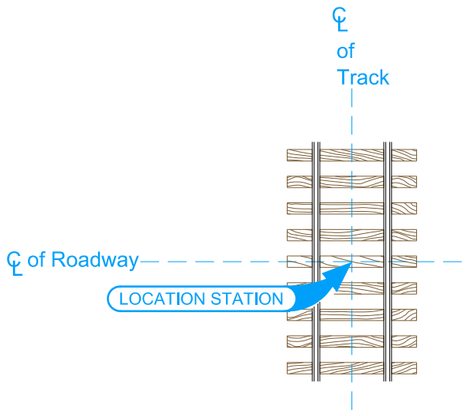
For additional guardrail requirements, refer to BA-200.

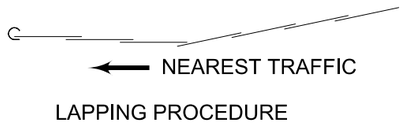
(1) Refer to BA-205.

(2) Refer to BA-204.



PLAN





LAPPING PROCEDURE

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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
5	10-18-22

BA-253

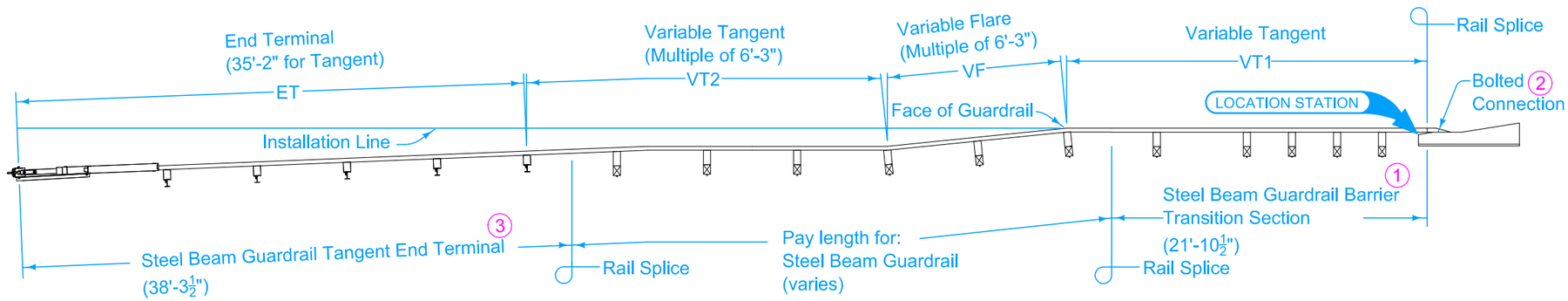
SHEET 1 of 1

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

APPROVED BY DESIGN METHODS ENGINEER

STEEL BEAM GUARDRAIL INSTALLATION AT RAILROAD SIGNAL

DESIGNER INFORMATION

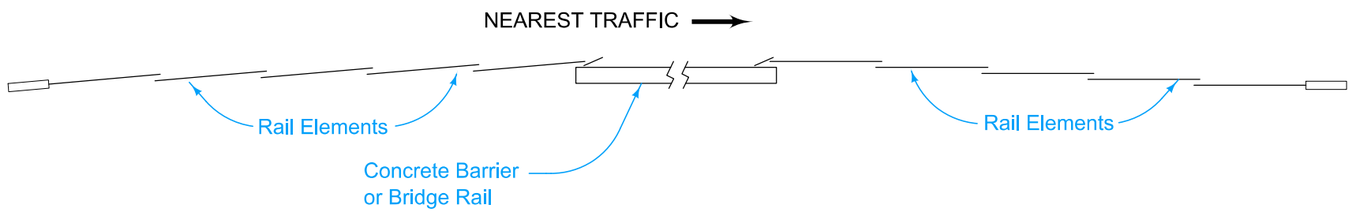


Install delineators and object markers according to SI-211.

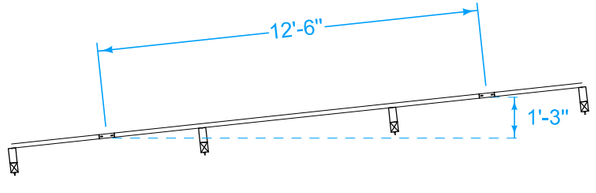
For grading requirements, see EW-301.

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



VARIABLE FLARE

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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
1	04-20-21

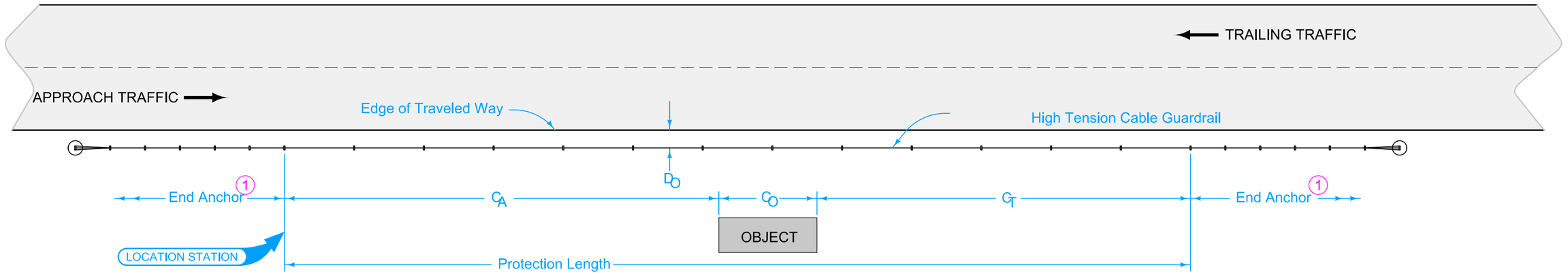
BA-260

SHEET 1 of 1

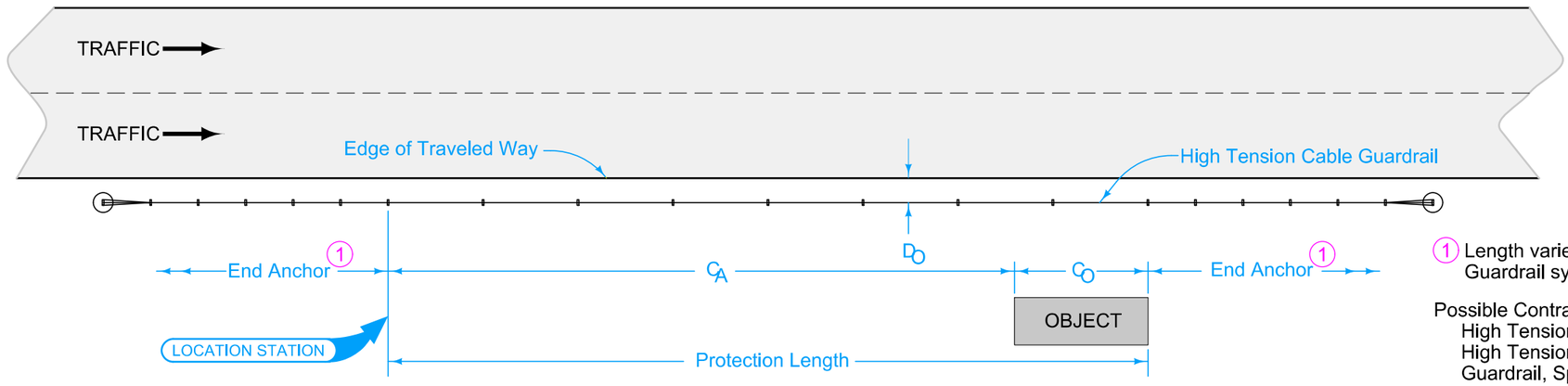
REVISIONS: Removed circle note 4.

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

IOWA DOT

STANDARD ROAD PLAN

REVISION	
3	10-19-21

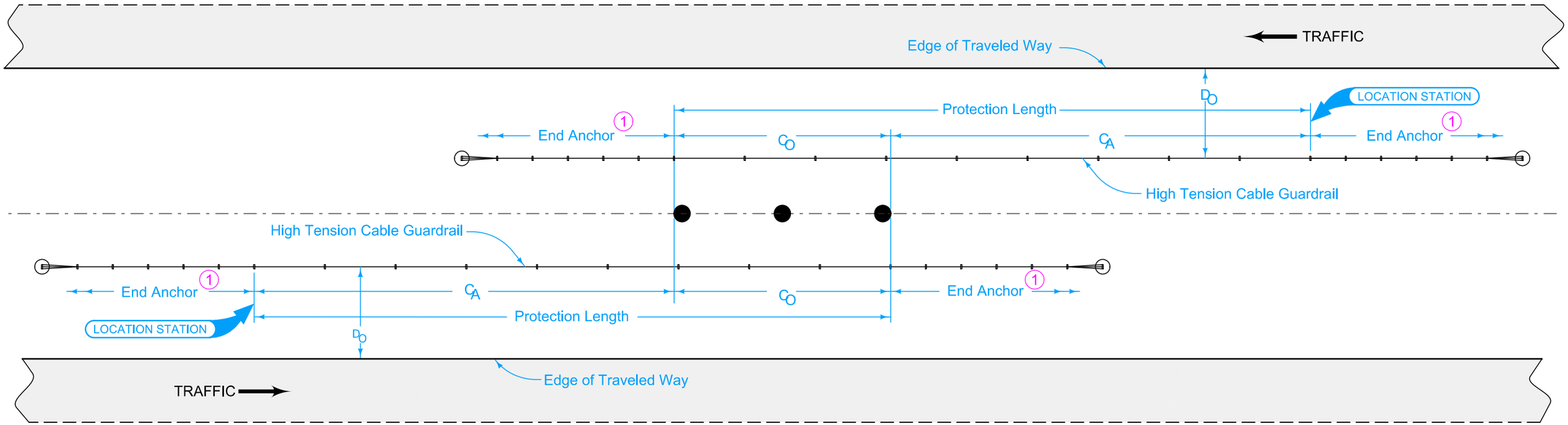
BA-351

SHEET 1 of 2

REVISIONS: Added note 1.

APPROVED BY DESIGN METHODS ENGINEER

HIGH TENSION CABLE GUARDRAIL



MEDIAN OBJECT PROTECTION

(1) Length varies depending on High Tension Cable Guardrail system.

IOWA DOT

STANDARD ROAD PLAN

REVISION	
3	10-19-21

BA-351

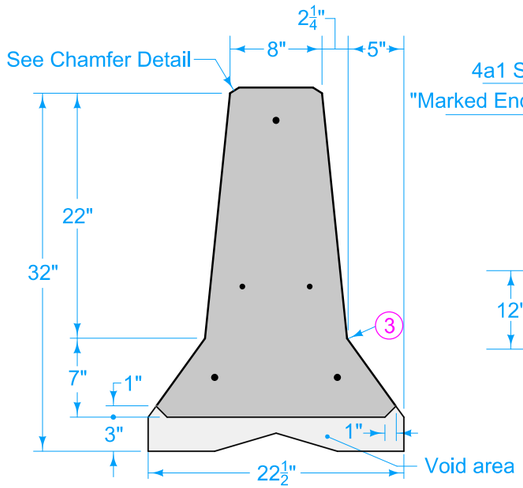
SHEET 2 of 2

REVISIONS: Added note 1.

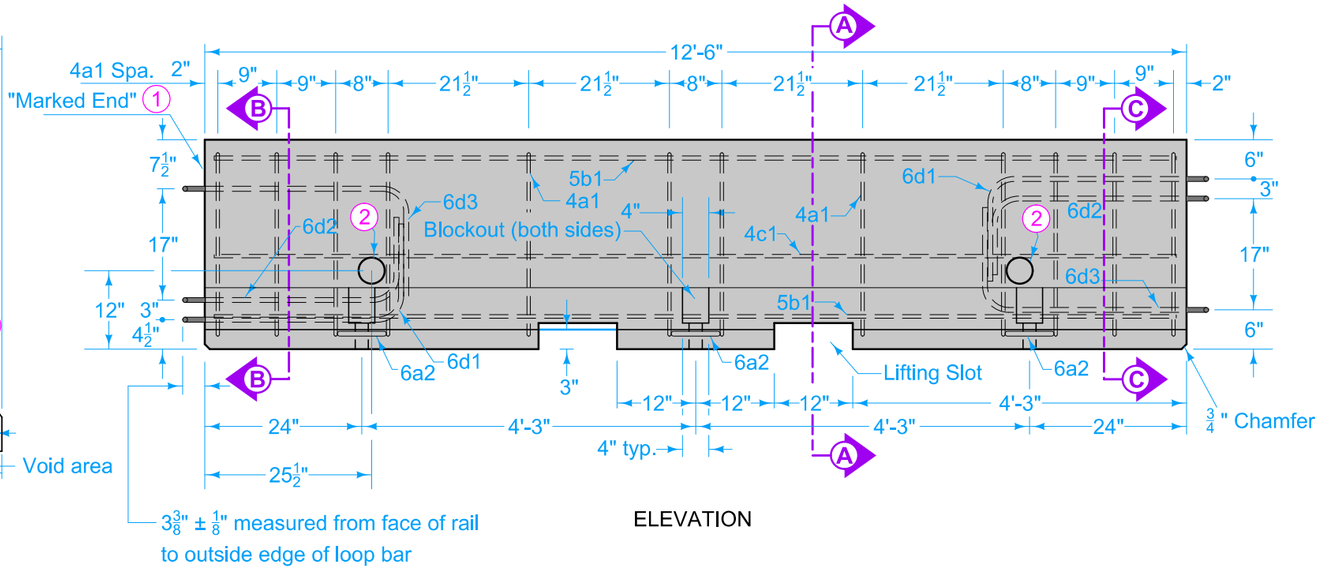
APPROVED BY DESIGN METHODS ENGINEER

HIGH TENSION CABLE GUARDRAIL

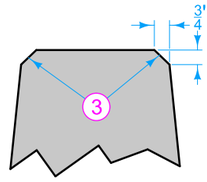
DESIGNER INFORMATION



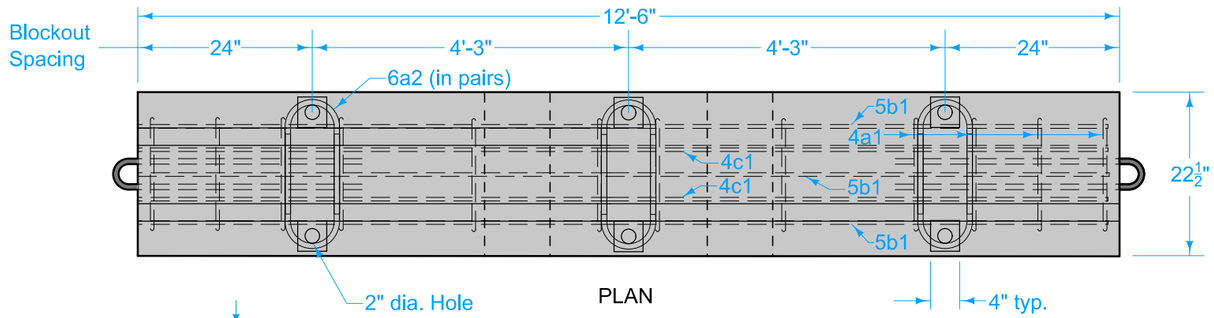
SECTION A-A
Lifting Slot



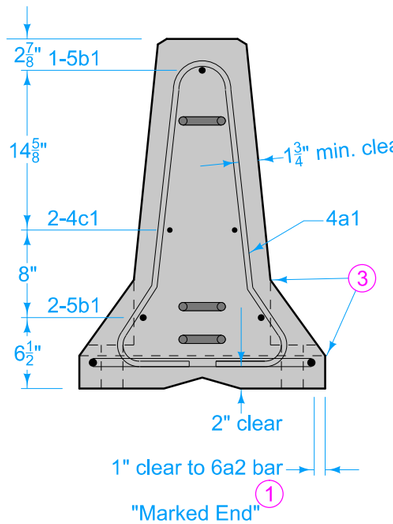
ELEVATION



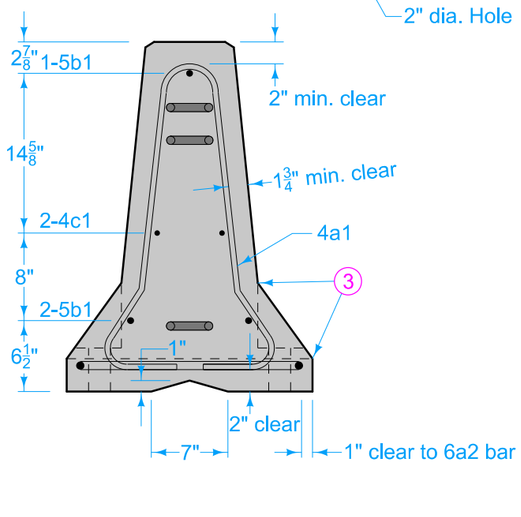
CHAMFER DETAIL



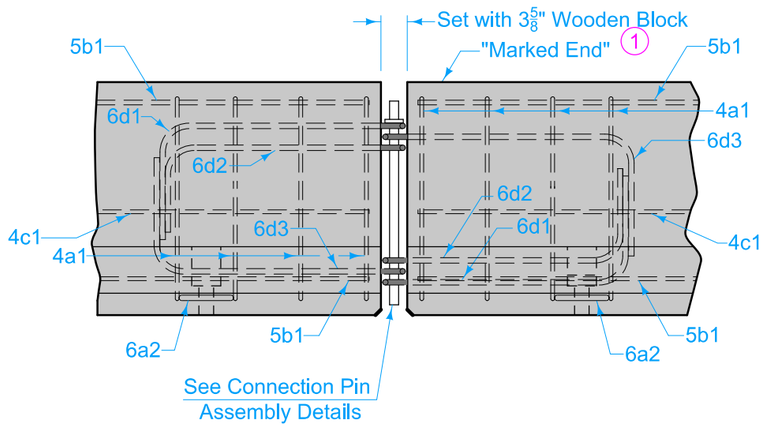
PLAN



SECTION B-B
Stirrup Placement



SECTION C-C
Stirrup Placement



BARRIER CONNECTION
(Elevation)

For loop bars 6d1, 6d2, and 6d3, use ¾" 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 3½" pin bend diameter. Install loops within ⅛" 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

IOWA DOT
STANDARD ROAD PLAN

REVISION	
3	04-20-21

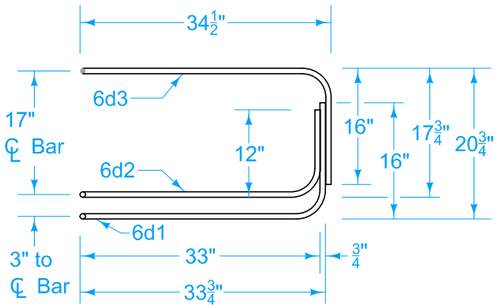
BA-401

SHEET 1 of 4

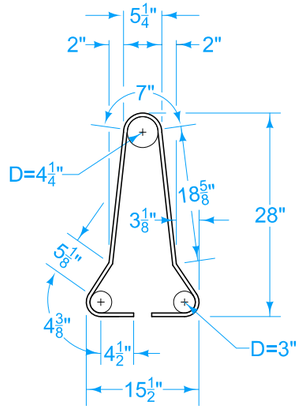
REVISIONS: Changed Obstacle to Object.

APPROVED BY DESIGN METHODS ENGINEER

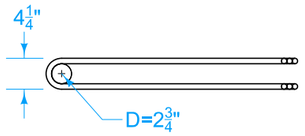
TEMPORARY BARRIER RAIL
(PRECAST CONCRETE)



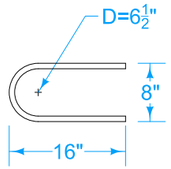
Elevation
(Marked end shown, invert for other end.)



4a1

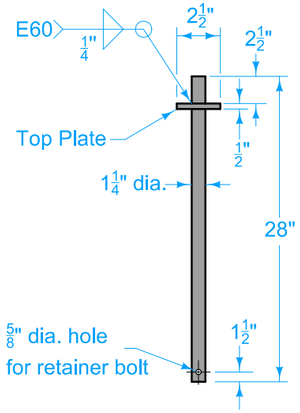


Plan
6d1, 6d2, 6d3

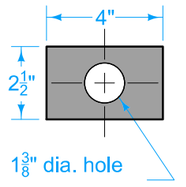


6a2

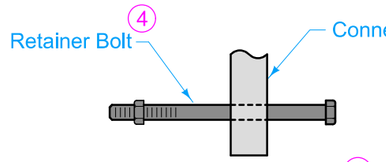
BENT BAR DETAILS
(Dimensions are out to out of bars unless otherwise noted.)



CONNECTION PIN
(A36 Steel - 10.9 lbs. each)



½" Top Plate



RETAINER BOLT & NUT ④
½" dia. bolt & nut
(ASTM A490, Grade 8)

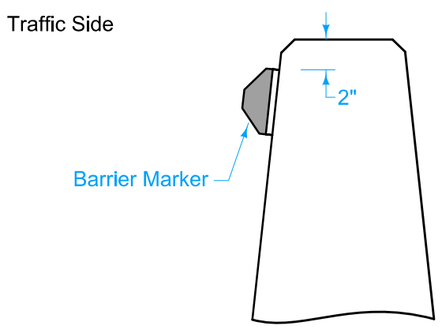
CONNECTION PIN ASSEMBLY

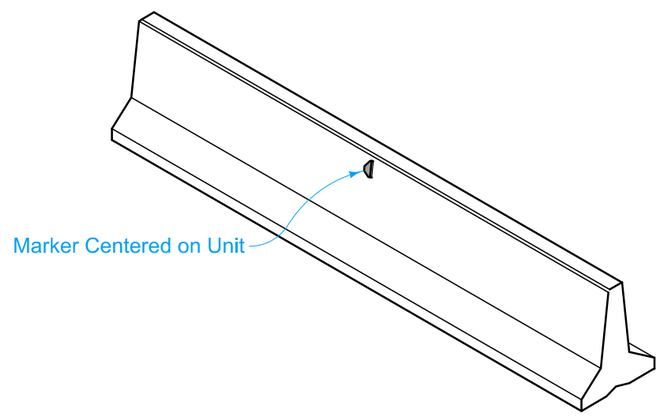
④ Retainer bolt & nut are required for connections with 2-loop barriers (previous designs) or in conjunction with Strap Anchorage.

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 ⑤

IOWA DOT
STANDARD ROAD PLAN

REVISION
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BA-401

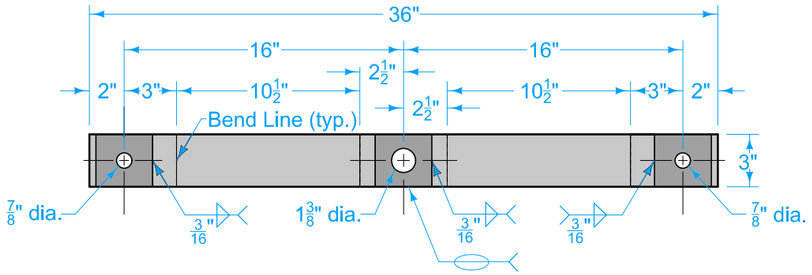
SHEET 2 of 4

REVISIONS: Changed Obstacle to Object.

APPROVED BY DESIGN METHODS ENGINEER

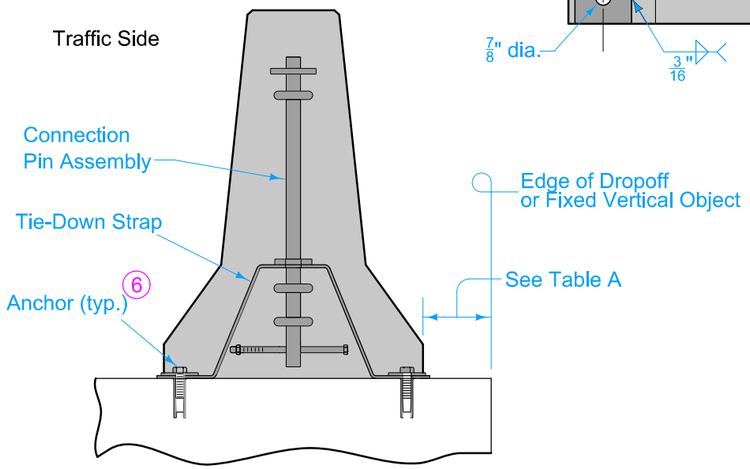
TEMPORARY BARRIER RAIL (PRECAST CONCRETE)

STRAP ANCHORAGE

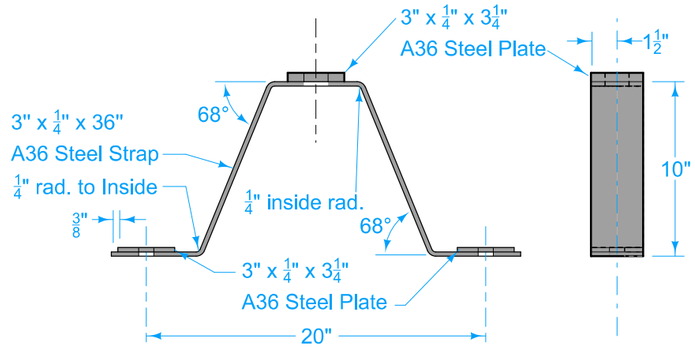


TIE-DOWN STRAP
(before bending)

For use on:
- Bridge Decks
- PCC Pavement



END VIEW

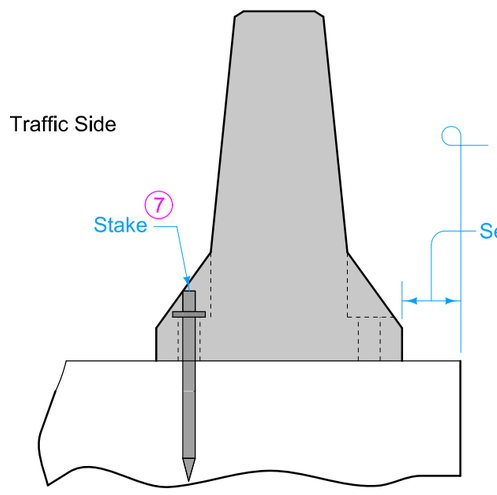


TIE-DOWN STRAP
(after bending)

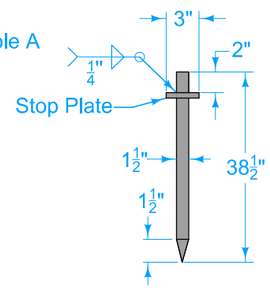
6. ¾ inch Red Head Multi-Set II drop-in anchor with ¾" dia. x 1¾" long ASTM A325 structural bolt OR Red Head Large Diameter Tapcon (¾" dia. x 4½" min.) OR Simpson Titen HD Wedge Bolt (¾" dia. x 5" min.).
7. 3 stakes required per rail section.
8. Pre-drill holes for stakes with 1⅝" core bit.

STAKE ANCHORAGE

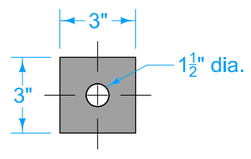
For use on:
- HMA Pavement (2" min. thickness)
- Composite Pavement 8
- PCC Pavement 8



TYPICAL SECTION



STAKE



½" STOP PLATE

TABLE A
ANCHORAGE REQUIREMENTS

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

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

IOWA DOT
STANDARD ROAD PLAN

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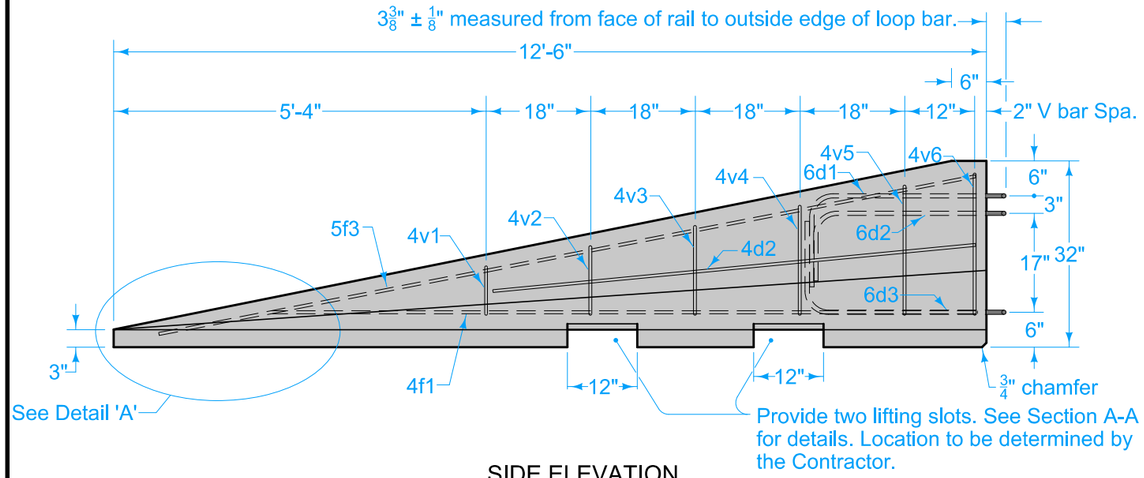
SHEET 3 of 4

REVISIONS: Changed Obstacle to Object.

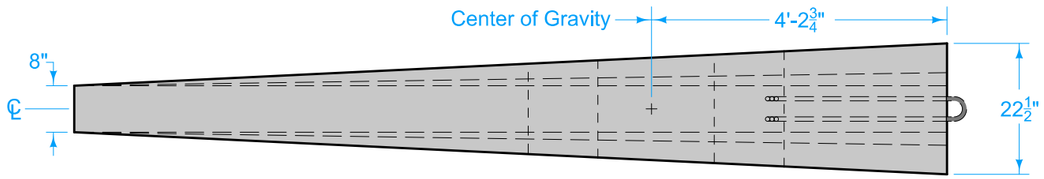
APPROVED BY DESIGN METHODS ENGINEER

TEMPORARY BARRIER RAIL (PRECAST CONCRETE)

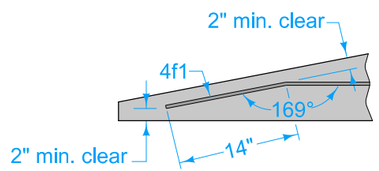
TAPERED END SECTION



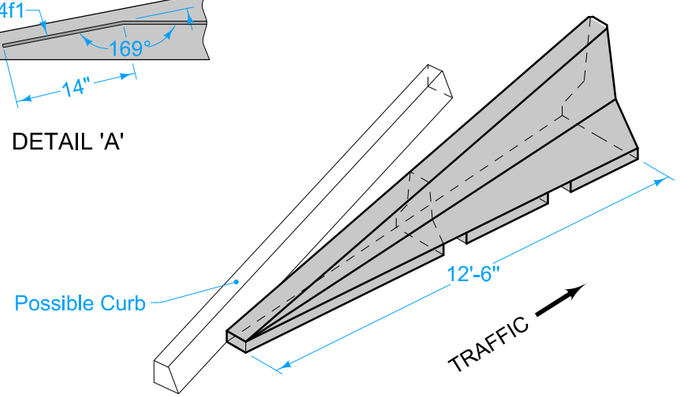
SIDE ELEVATION
(For connection to "marked end" of barrier.
Invert loop bars for other end.)



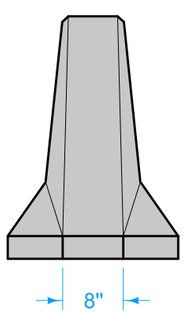
PLAN



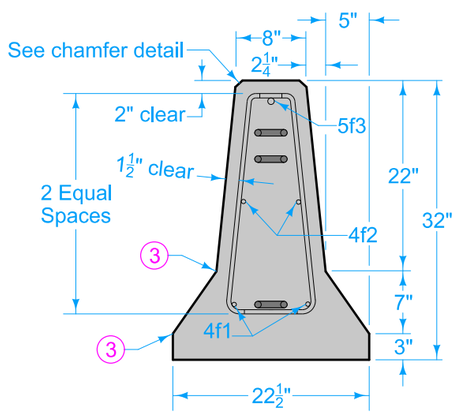
DETAIL 'A'



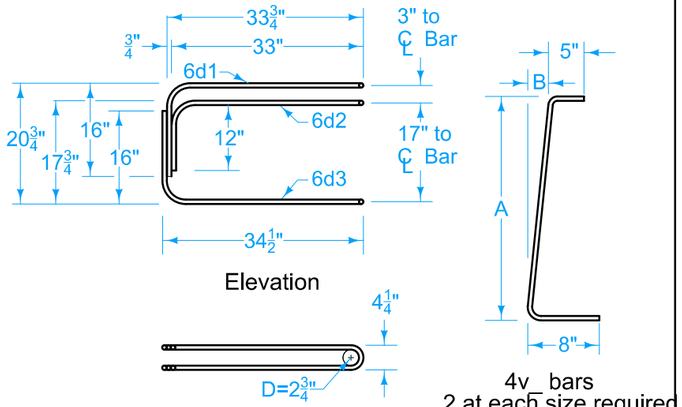
PERSPECTIVE VIEW



FRONT ELEVATION



END SECTION



6d1, 6d2, 6d3
(Connection to "Marked End" shown,
invert for other end)

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

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"	1¼"
4v3	17"	1⅝"
4v4	20"	1⅞"
4v5	24½"	2⅜"
4v6	27"	2¾"

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REVISIONS: Changed Obstacle to Object.

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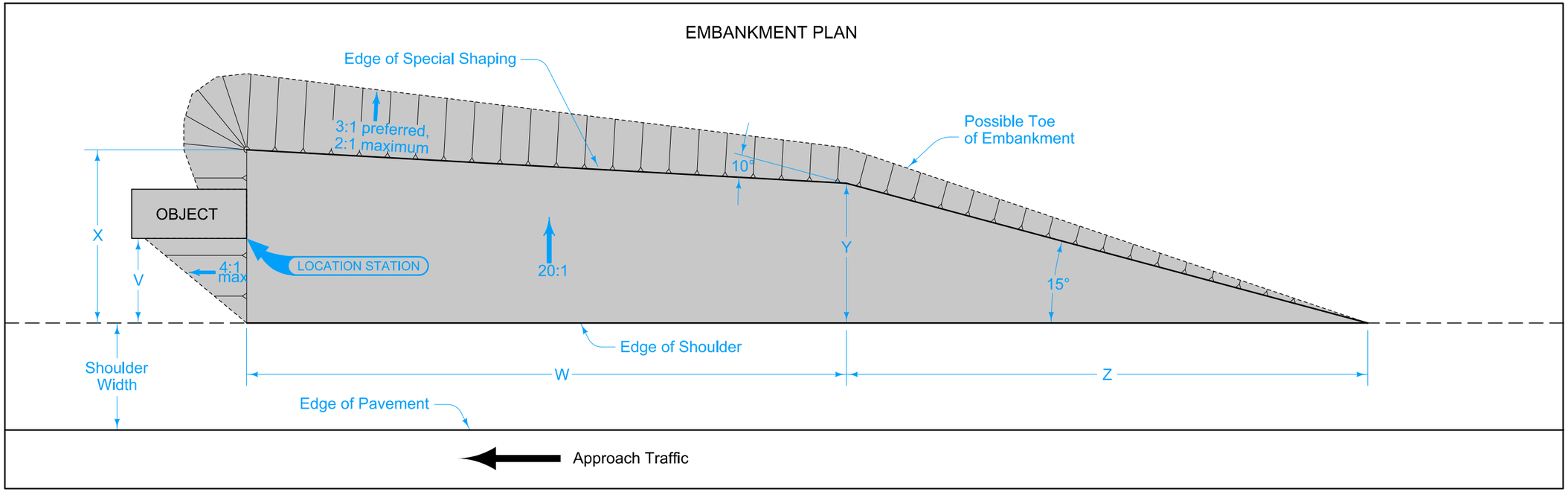
TEMPORARY BARRIER RAIL (PRECAST CONCRETE)

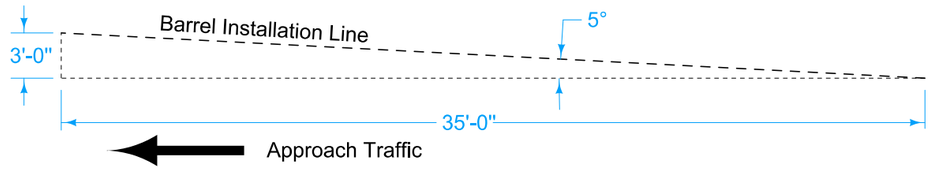
EMBANKMENT PLAN



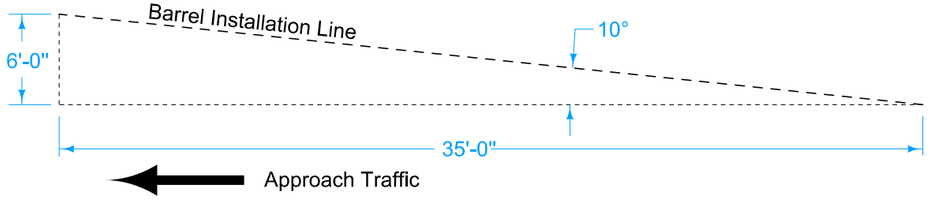
BARREL INSTALLATION LINE LAYOUT

Angle of Barrel Installation Line is measured from a line parallel to roadway centerline.

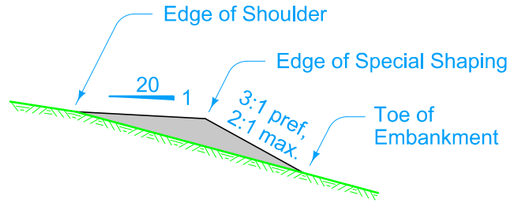
Where distance to object is less than 15 feet from edge of traveled way: (1)



Where distance to object is 15 feet or greater from edge of traveled way:



EMBANKMENT TYPICAL SECTION



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"

(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

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REVISIONS: Changed Obstacle to Object.

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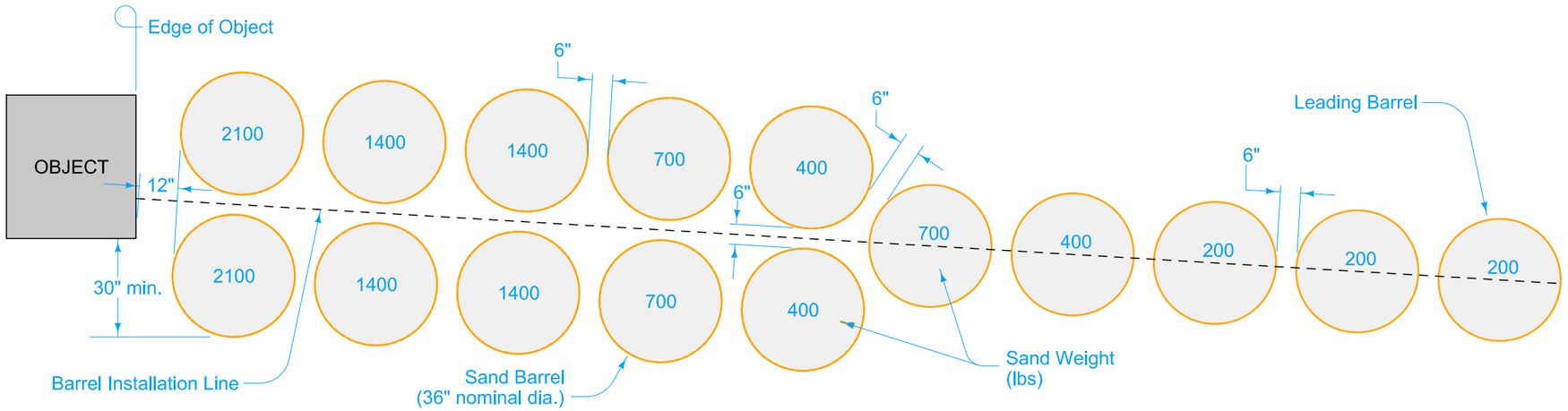
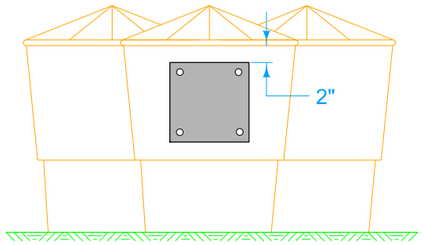
TEMPORARY CRASH CUSHIONS SAND BARREL

SAND BARREL LAYOUT

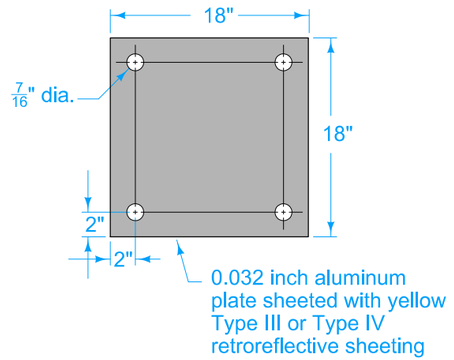


SAND BARREL DELINEATION

Mount marker plate on the leading barrel, centered on the barrel installation line.



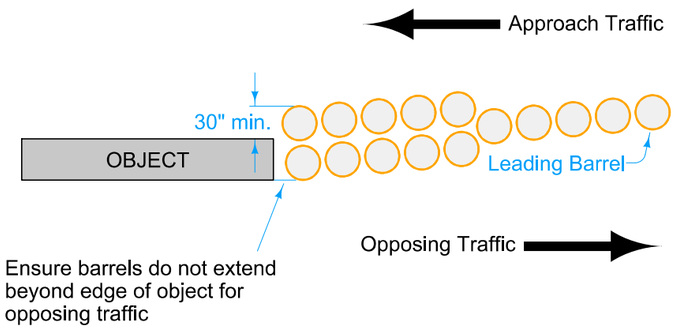
MARKER PLATE



Mount plate using four $\frac{3}{8}$" bolts, nuts, and washers meeting the requirements of Article 4186.09 for Type A signs.

Self-adhesive sheeting meeting the above requirements may be substituted for the marker plate.

PROTECTING OBJECT BETWEEN OPPOSING TRAFFIC

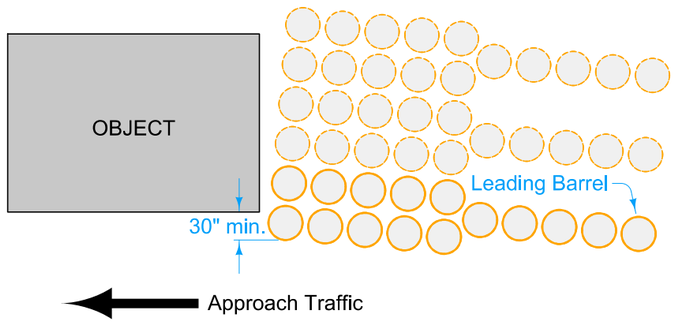


PROTECTING WIDE OBJECT

For wide object, repeat sand barrel layout as needed

An installation consisting of multiple sand barrel layouts, similar to the one shown, will be measured as a single crash cushion.

All barrels separated by 6 inches.



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REVISIONS: Changed Obstacle to Object.

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TEMPORARY CRASH CUSHIONS
SAND BARREL