

BRIDGE RAIL

# Guide

2005



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# Bridge Rail Guide 2005

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# Bridge Rail Guide 2003

## TEST LEVEL INDEX

Test Level	Impact Speed	Vehicle Type
<b>TL-1</b>	50 kph/30 mph	820kg Car; 2000kg Pickup
<b>TL-2</b>	70 kph/45 mph	820kg Car; 2000kg Pickup
<b>TL-3</b>	100 kph/62 mph	820kg Car; 2000kg Pickup
<b>TL-4</b>	100 kph/62 mph 80 kph/50 mph	820kg Car; 2000kg Pickup 8,000kg Single Unit Truck
<b>TL-5</b>	100 kph/62 mph 80 kph/50 mph	820kg Car; 2000kg Pickup 36,000kg Tractor Trailer
<b>TL-6</b>	100 kph/62 mph 80 kph/50 mph	820kg Car; 2000kg Pickup 36,000kg Tanker Truck

Comments or changes may be forwarded to [Martha.Nevai@fhwa.dot.gov](mailto:Martha.Nevai@fhwa.dot.gov).

This project was funded by: FHWA California Division; FHWA HQ Structures; FHWA Federal Lands Division; Caltrans.

Information contained within this guide should be verified with the contact agency for accuracy prior to use.

Updated bridge rail guide can be found at: <http://www.fhwa.dot.gov/bridge/bridgerail/>

Section 1

W-BEAM BRIDGE RAIL



# Section 1

## W-BEAM BRIDGE RAIL

Name	Location	Test Level
Texas T101	Federal Lands	TL-2
Side Mount W Beam	Michigan	TL-3
Box Beam Rail	Ohio	TL-2
Type T6 - Tubular W-Beam	Texas	TL-2
W-Beam Retrofit	West Virginia	TL-2

## Texas T101 Transition Rail

**Height:**  
32"

**Cost per linear foot:**  
\$90

**Test level:**  
TL-2

**Utilized in:**  
Federal Lands

**Contact:**  
Mark Clabaugh, P.E.  
Federal Lands Bridge Office  
21400 Ridgetop Circle  
Sterling, VA 20166  
(703) 404-6235



## Texas T101

Plans Not Yet Available.

## Side Mount W Beam

**Height:**  
28"

**Cost per linear foot:**  
\$65

**Test level:**  
TL-3

**Utilized in:**  
Michigan

**Contact:**  
Steve Beck  
Michigan Dept  
of Transportation  
State Transportation Building  
425 W. Ottawa Street  
P.O. Box 30050  
Lansing, MI 48909  
(517) 373-0097





## Side Mount W Beam

Plans Not Yet Available.

## Box Beam Rail (W-Beam Backed with Steel Beam)

**Height:**  
27"

**Cost per linear foot:**  
\$41

**Test level:**  
TL-2

**Utilized in:**  
Ohio

**Contact:**  
Matt Shamis  
Federal Highway  
Administration- Ohio Division  
200 North High Street  
Room 328  
Columbus, OH 43215  
(614) 280-6847





## Type T6 - Tubular W-Beam

**Height:**  
27"

**Cost per linear foot:**  
\$38

**Test level:**  
TL-2

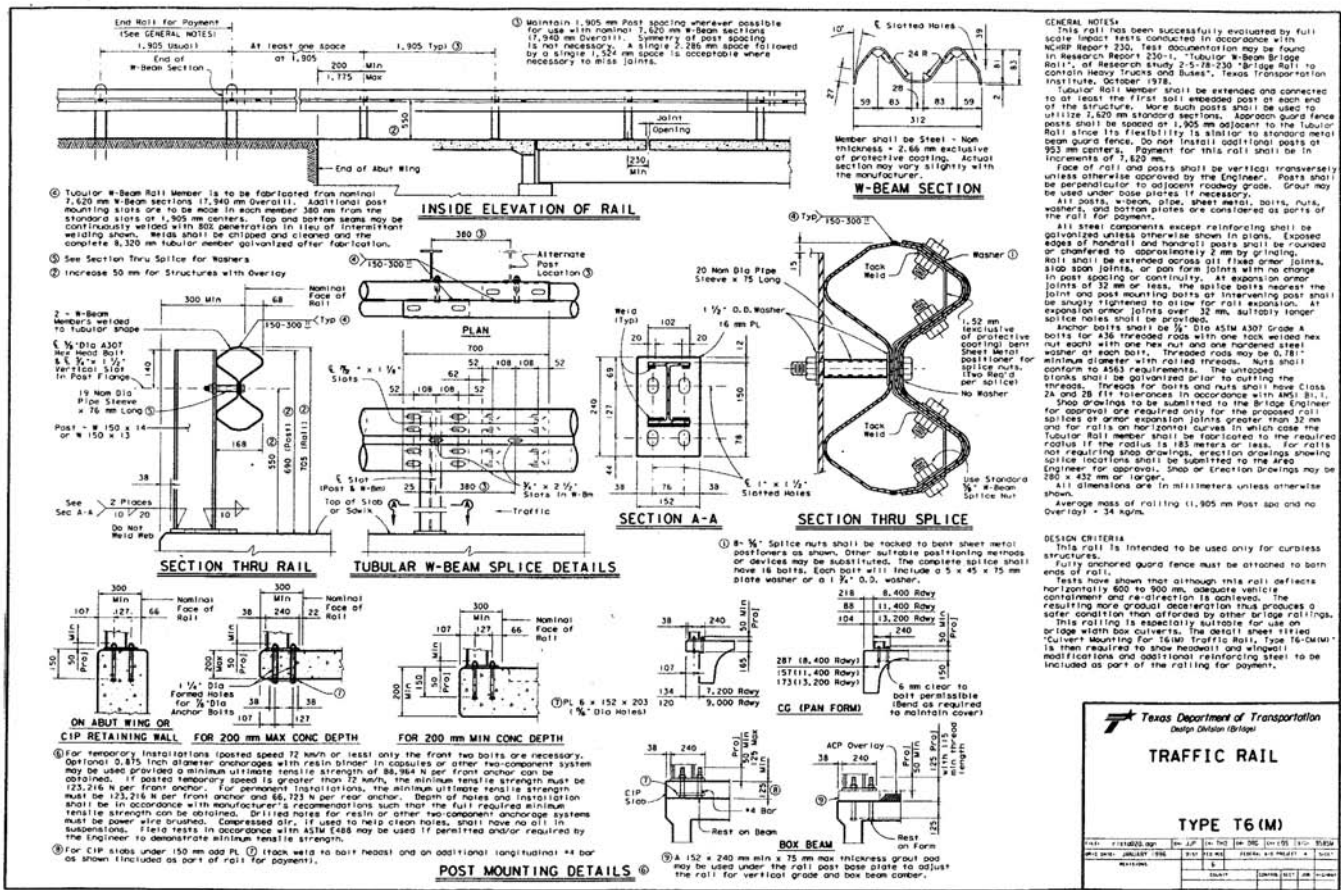
**Utilized in:**  
Texas

**Contact:**  
Mark Bloschock  
Texas DOT Bridge Division  
RA118  
125 E. 11th Street  
Austin, TX 78701-2483  
(512) 416-2178



# W-Beam Bridge Rail

## Type T6 - Tubular W-Beam



## W-Beam Retrofit

**Height:**  
28.5"

**Cost per linear foot:**  
\$\_

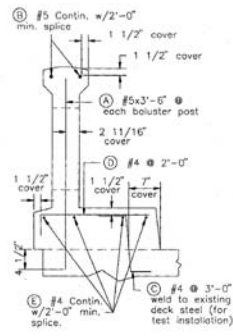
**Test level:**  
TL-2

**Utilized in:**  
West Virginia

**Contact:**  
Jim Shook  
West Virginia Dept  
of Transportation  
Building 5  
1900 Kanawha Blvd E  
Charleston, WV 25305  
(304) 558-9747

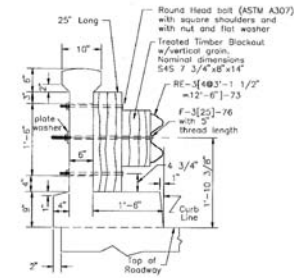


## W-Beam Retrofit



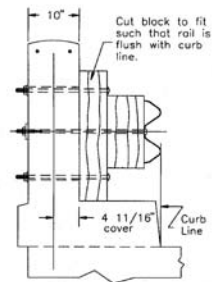
TYPICAL CONCRETE RAIL SECTION REINFORCING

Figure 1. Drawings for concrete baluster bridge railing.



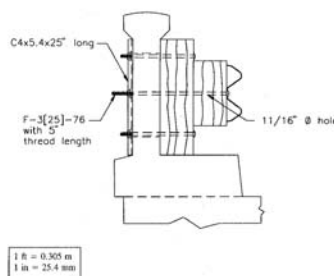
TYPICAL CONCRETE RAIL SECTION WITH W-BEAM RETROFIT WHEN  $\phi$  5/8" BOLT CAN NOT GO THROUGH CONCRETE RAILING VOID

Figure 2. Drawings for W-beam retrofit for concrete baluster bridge railing.



SECTION AT END OF RAILING

Figure 2. Drawings for W-beam retrofit for concrete baluster bridge railing (continued).



TYPICAL CONCRETE RAIL SECTION WITH W-BEAM RETROFIT WHEN  $\phi$  5/8" BOLT CAN GO THROUGH CONCRETE RAILING VOID

Figure 2. Drawings for W-beam retrofit for concrete baluster bridge railing (continued).

Section **2**

THRIE-BEAM BRIDGE RAIL





# Section 2

## THRIE-BEAM BRIDGE RAIL

Name	Location	Test Level
Delaware Thrie-Beam Retrofit Railing	Delaware	TL-4
Michigan Bridge Railing, Thrie-Beam Retrofit (R4 Type)	Michigan	TL-4
Missouri Thrie-Beam Rail and Channel, Top-Mounted	Missouri	TL-3
Nebraska Tubular Thrie-Beam Bridge Rail	Nebraska	TL-3
Oregon Thrie-Beam Side Mount	Oregon	TL-2
Washington State 10 Gauge Thrie-Beam Retrofit	Washington	TL-2

## Delaware Thrie-Beam Retrofit Railing

**Height:**  
32"

**Cost per linear foot:**  
\$\_\_

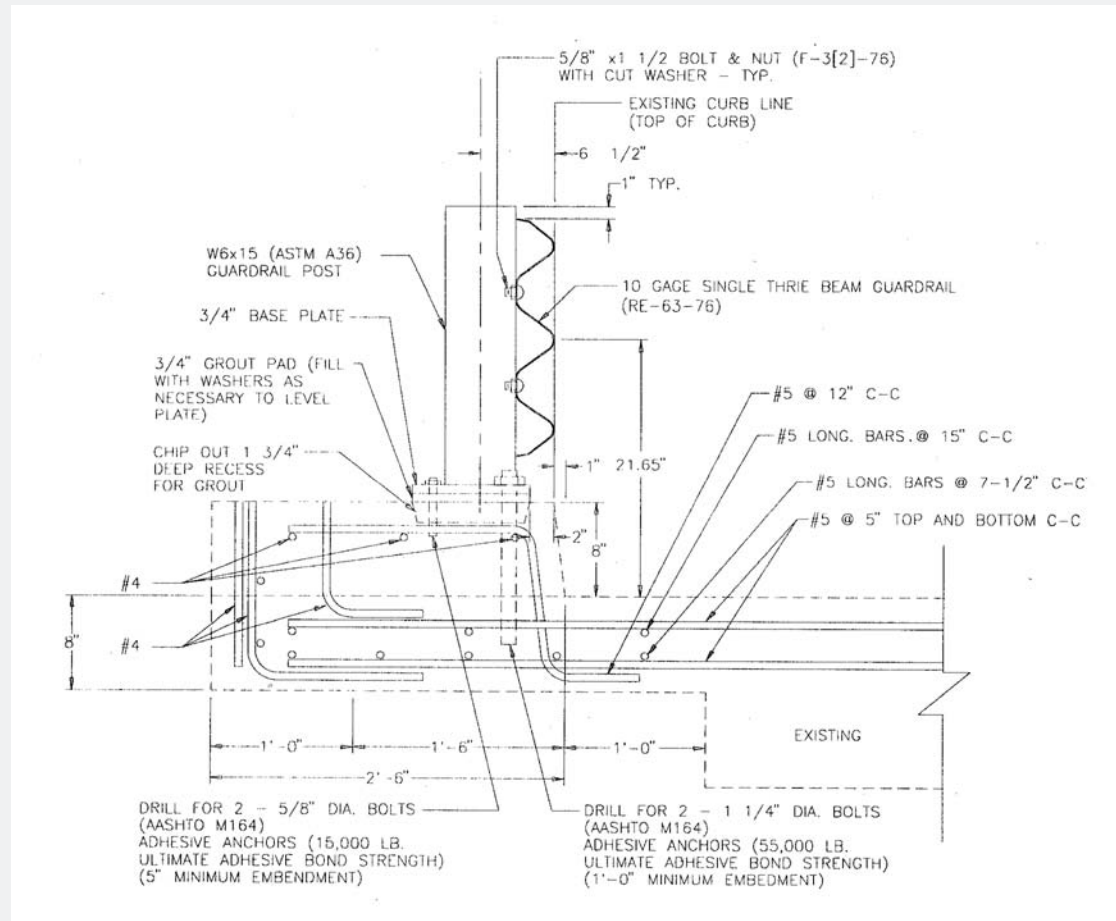
**Test level:**  
TL-4

**Utilized in:**  
Delaware

**Contact:**  
Jiten Soneji  
Delaware Departmentt  
of Transportation  
800 Bay Road  
P.O. Box 778  
Dover, DE 19903  
(302) 760-2299



## Delaware Curb Mounted Thrie-Beam Retrofit Railing



## Michigan Bridge Railing, Thrie-Beam Retrofit (R4 Type)

**Height:**  
34"

**Cost per linear foot:**  
\$25

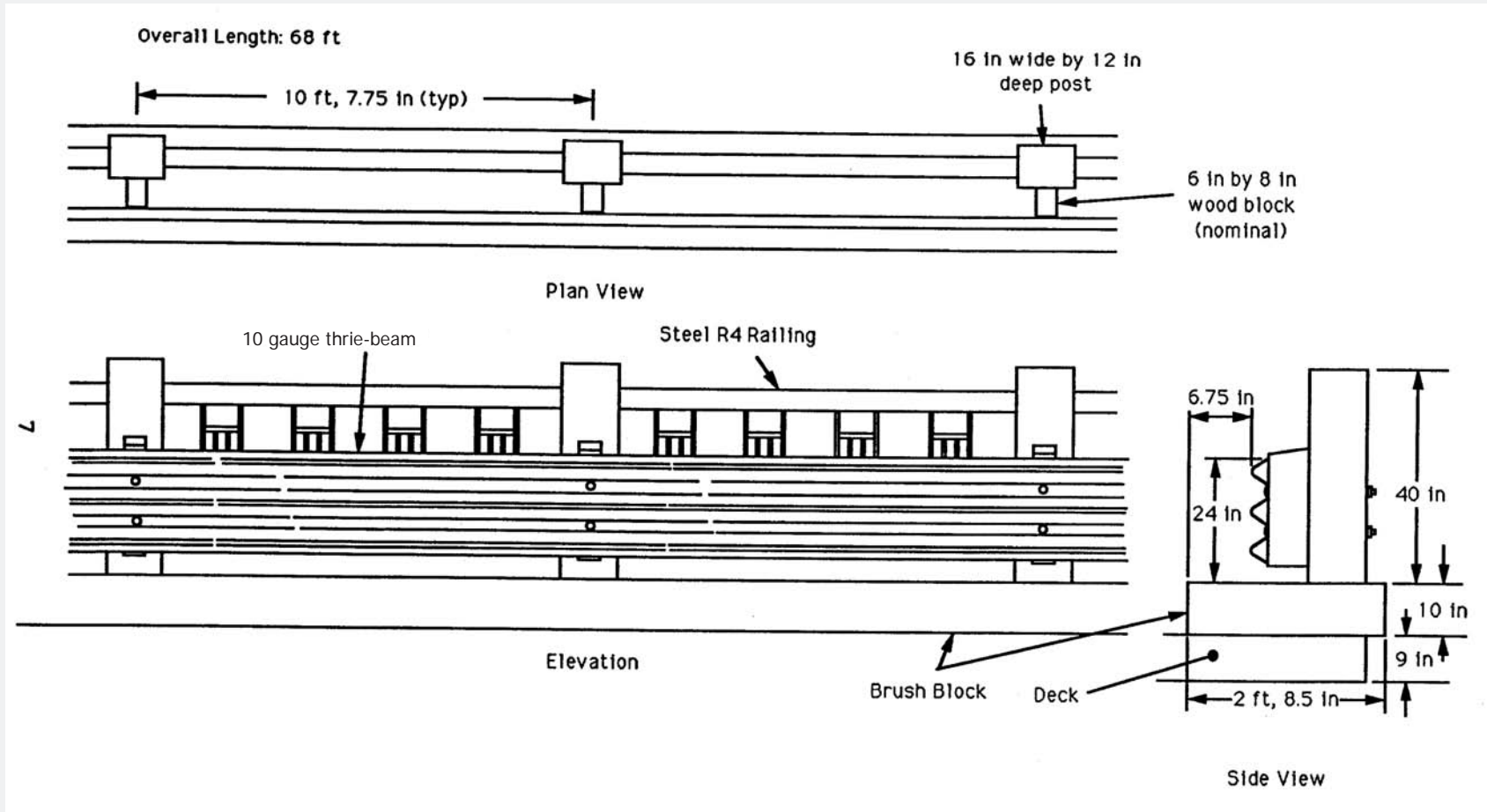
**Test level:**  
TL-4

**Utilized in:**  
Michigan

**Contact:**  
Steve Beck  
Michigan Dept  
of Transportation  
State Transportation Building  
425 W. Ottawa Street  
P.O. Box 30050  
Lansing, MI 48909  
(517) 373-0097



## Michigan Bridge Railing, Thrie-Beam Retrofit (R4 Type)



## Missouri Thrie-Beam Rail and Channel, Top Mounted

**Height:**  
30.5"

**Cost per linear foot:**  
\$100-125

**Test level:**  
TL-3

**Utilized in:**  
Missouri

**Contact:**  
Peter Clogston, P.E.  
Federal Highway Admin,  
Missouri Division Office  
209 Adams Street  
Jefferson City, MO 65101  
(573) 638-2613

Photo Not Yet Available



## Nebraska Tubular Thrie-Beam Bridge Rail

**Height:**  
32"

**Cost per linear foot:**  
\$\_

**Test level:**  
TL-3

**Utilized in:**  
Nebraska

**Contact:**  
Federal Highway  
Administration  
100 Centennial Mall-North  
Room 220  
Lincoln, NE 68508  
(402) 437-5977

Photo Not Yet Available





## Oregon Thrie-Beam Side Mount

**Height:**  
29"

**Cost per linear foot:**  
\$63.60

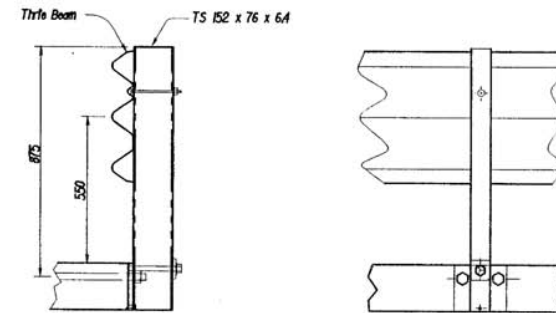
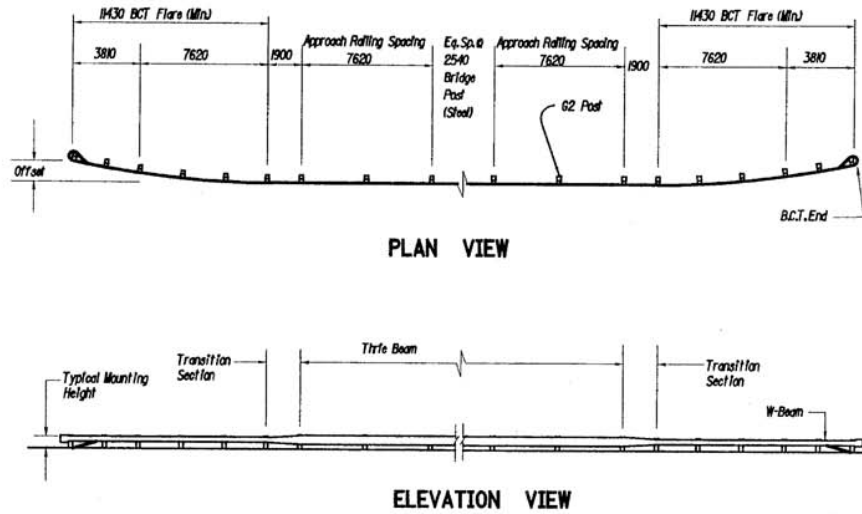
**Test level:**  
TL-2

**Utilized in:**  
Oregon

**Contact:**  
Antony P. Stratis, P.E.  
Tech Center Bridge Manager  
Region 1  
123 NW Flanders Street  
Portland, OR 97209  
(503) 731-8490



## Oregon Thrie-Beam Side Mount

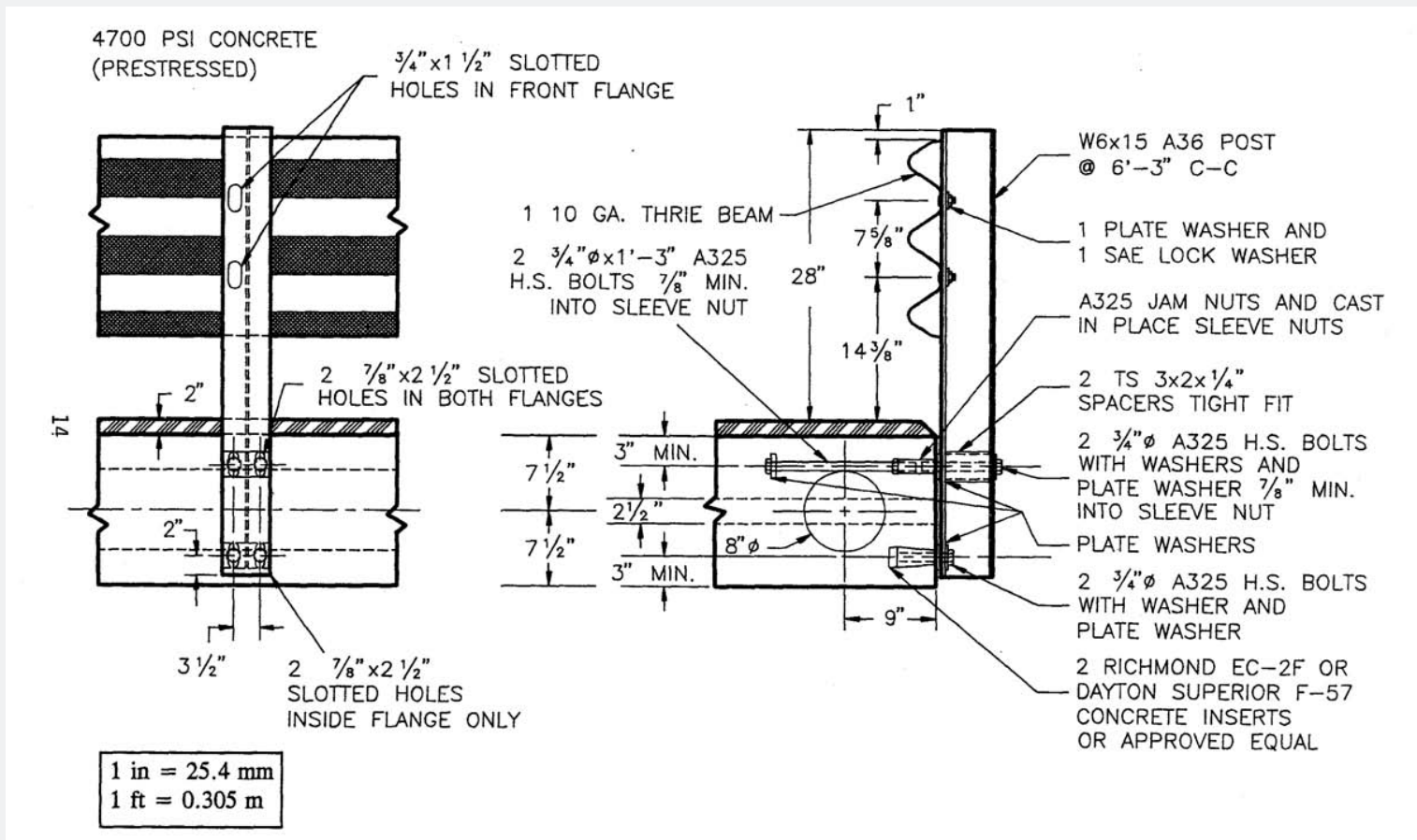


All Dimensions Shown Are mm unless Otherwise Noted.

FIGURE D.1 Side-Mounted Thrie-Beam Bridge Railing

Rail Height	810 mm			
Test Vehicle	902-kg Car	1022-kg Car	1022-kg Car	9080-kg Bus
Impact Speed km/h	99	94	97	72
Impact Angle Degrees	14.1	16.0	16.0	7.7

## Oregon Thrie-Beam Side Mount



## Washington 10 Gauge Thrie-Beam Retrofit (curb mounted)

**Height:**  
30"

**Cost per linear foot:**  
\$40

**Test level:**  
TL-2

**Utilized in:**  
Washington State

**Contact:**  
Scott Sargent  
WSDOT Bridge and  
Structures Office  
P.O. Box 47340  
Olympia, WA 98504-7340  
(360) 705-7753



## Washington 10 Gauge Thrie-Beam Retrofit

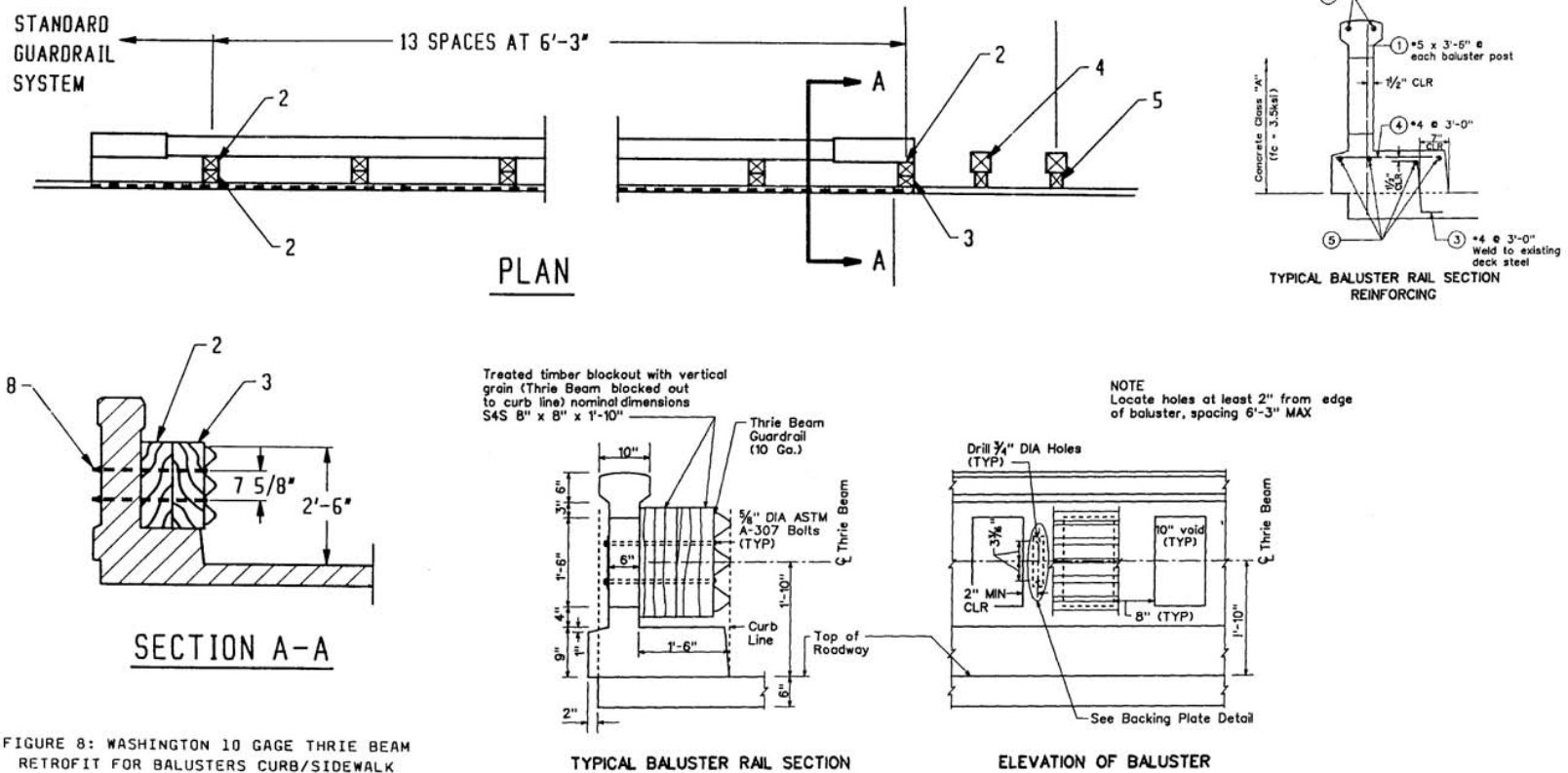


FIGURE 8: WASHINGTON 10 GAGE THRIE BEAM RETROFIT FOR BALUSTERS CURB/SIDEWALK

Section 3

METAL TUBE BRIDGE RAIL



# Section 3

## METAL TUBE BRIDGE RAIL

Subsection	Name	Location	Test Level
Aluminum Tube Bridge Rails	Foothills Parkway Aluminum Bridge	Federal Lands	TL-2
	Standard 1-Bar Metal Rail	North Carolina	TL-2
Steel Tube Bridge Rails Attached to Bottom of Deck	Texas Energy-Absorbing Bridge Rail	Texas	TL-3
Steel Tube Bridge Rails Attached to Side of Deck	California Type 18	California	TL-3
	California Side Mount Type 115 Rail	California	TL-2
	California Type 116 Rail	California	TL-2
	California Type 117 Rail	California	TL-2
	Illinois 2399- Type Side Mount	Illinois	TL-4
	2-Tube Oregon Side Mount	Oregon	TL-4



# Section 3

## METAL TUBE BRIDGE RAIL

Subsection	Name	Location	Test Level
Steel Tube Bridge Rails Attached to Top of Deck	Texas Type 421 Aesthetic Rail	Texas	TL-2
	Washington, DC Historic Bridge Rail Retrofit (Curb Mount)	Washington, DC	TL-2
Steel Tube Bridge Rails Attached to Parapet	Alaska Rail - Curb Mounted	Alaska	TL-4
	California Type 9 (AASHTO BR2)	California	TL-2
	California ST-10 Rail	California	TL-4
	Bridge Railing, Aesthetic Parapet Type BR 27D	Michigan	TL-4
	Minnesota Combination Bridge Rail Design #3	Minnesota	TL-4
	Type C202	Texas	TL-5

# Section 3

## METAL TUBE BRIDGE RAIL

Subsection	Name	Location	Test Level
Curb Mounted Steel Tube Bridge Rails	George Washington Parkway Steel Bridge Rail	Federal Lands	TL-2
	Illinois 2399 - Curb Mount	Illinois	TL-4
	Michigan Multi Tube Bridge Railing	Michigan	TL-4
	Bridge Railing, 2 Tube	Michigan	TL-4
	NETC 2-Rail Curb-Mounted Railing	New England	TL-4
	Two-Rail Barrier	New York	TL-4
	Three-Rail Barrier Top Deck Flush Mount	New York	TL-4
	Four-Rail Barrier	New York	TL-4
	Five-Rail Barrier	New York	TL-4

# Section 3

## METAL TUBE BRIDGE RAIL

Subsection	Name	Location	Test Level
Steel Tube Bridge Rails Attached to Curb	Oregon 2-Tube Curb Mount	Oregon	TL-2
	Oregon 3-Tube Curb Mount	Oregon	TL-4
	Wyoming 2-Tube Steel Railing	Wyoming	TL-4
	Wyoming 2-Tube, Curb-Mounted	Wyoming	TL-3

## Foothills Parkway Aluminum Bridge Rail

**Height:**  
33"

**Cost per linear foot:**  
\$75

**Test level:**  
TL-2

**Utilized in:**  
Federal Lands

**Contact:**  
Mark Clabaugh, P.E.  
Federal Lands Bridge Office  
21400 Ridgetop Circle  
Sterling, VA 20166  
(703) 404-6235





## Standard 1-Bar Metal Rail

**Height:**  
32"

**Cost per linear foot:**  
\$110

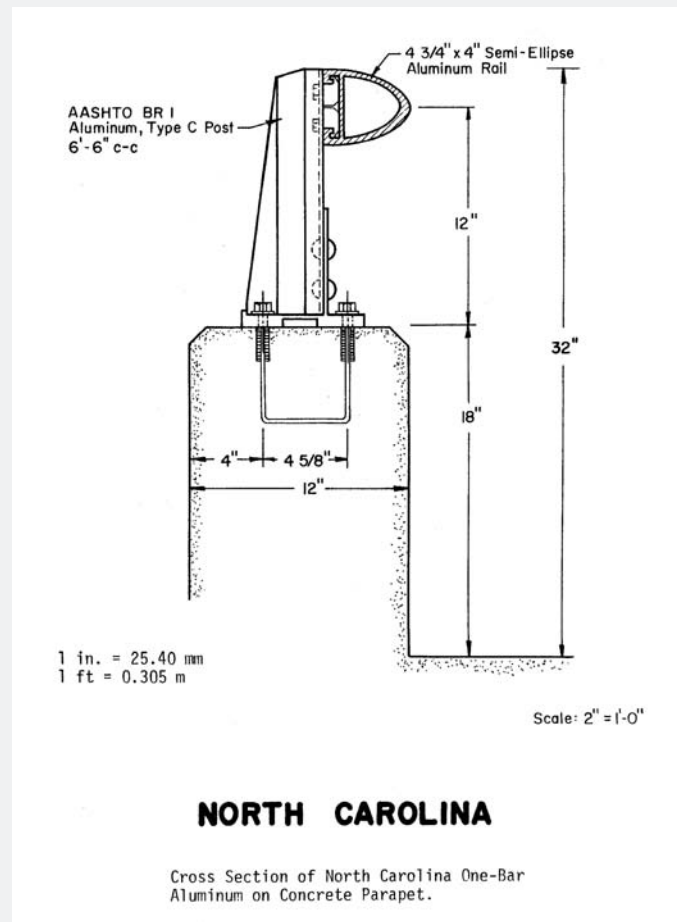
**Test level:**  
TL-2

**Utilized in:**  
North Carolina

**Contact:**  
John Emerson, P.E.  
North Carolina Dept  
of Transportation  
1500 Mail Service Center  
Raleigh, NC 27699  
(919) 733-4362



## Standard 1-Bar Metal Rail



### Texas Energy Absorbing Bridge Rail

Height:  
27"

Cost per linear foot:  
\$\_

Test level:  
TL-3

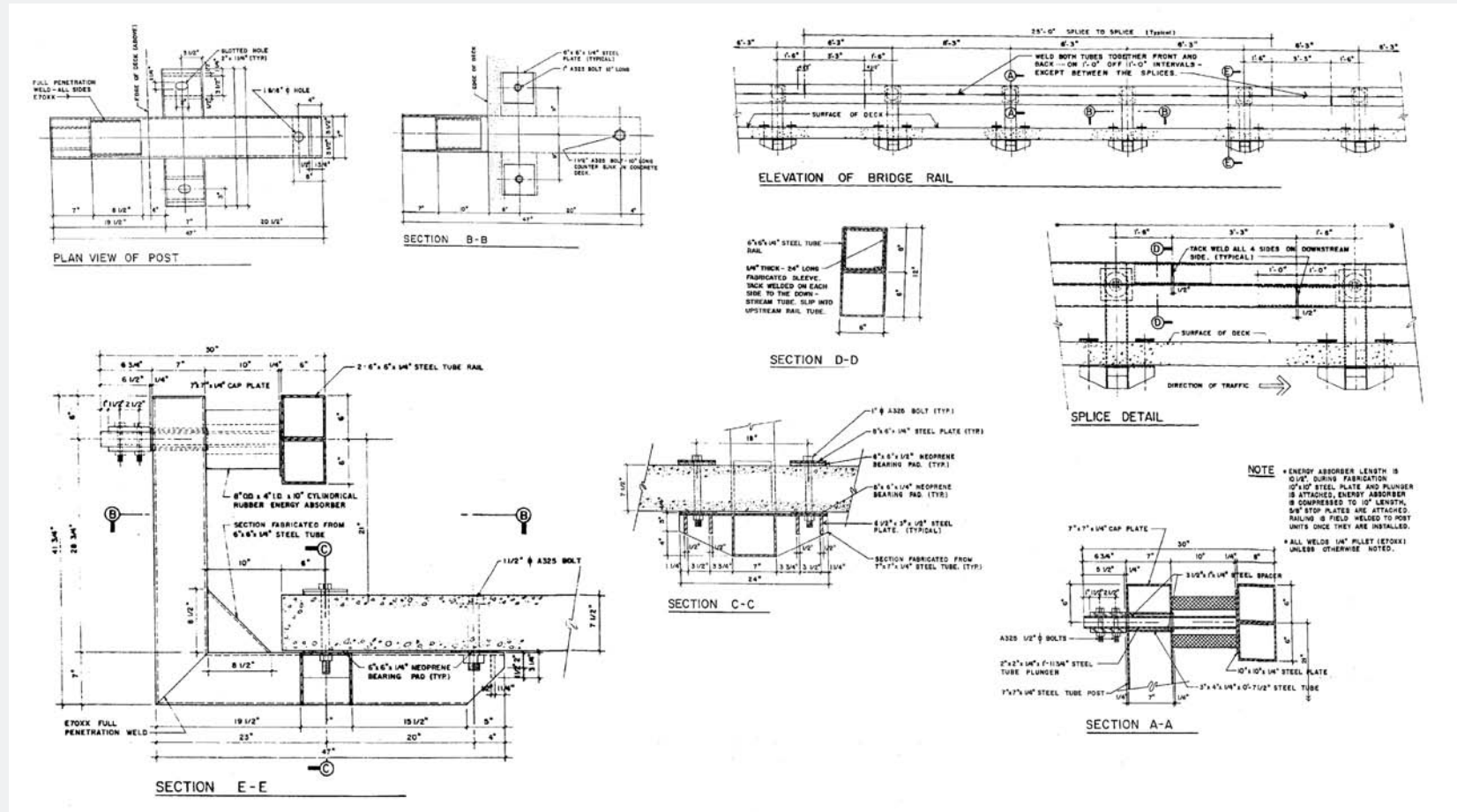
Utilized in:  
Texas

Contact:  
Mark Bloschock  
Texas DOT Bridge Division  
RA118  
125 E. 11th Street  
Austin, TX 78701-2483  
(512) 416-2178

Photo Not Yet Available



## Texas Energy Absorbing Bridge Rail



Section **3**

# Steel Tube Bridge Rail Attached to Side of Deck

## California Type 18

**Height:**  
36"

**Cost per linear foot:**  
\$\_

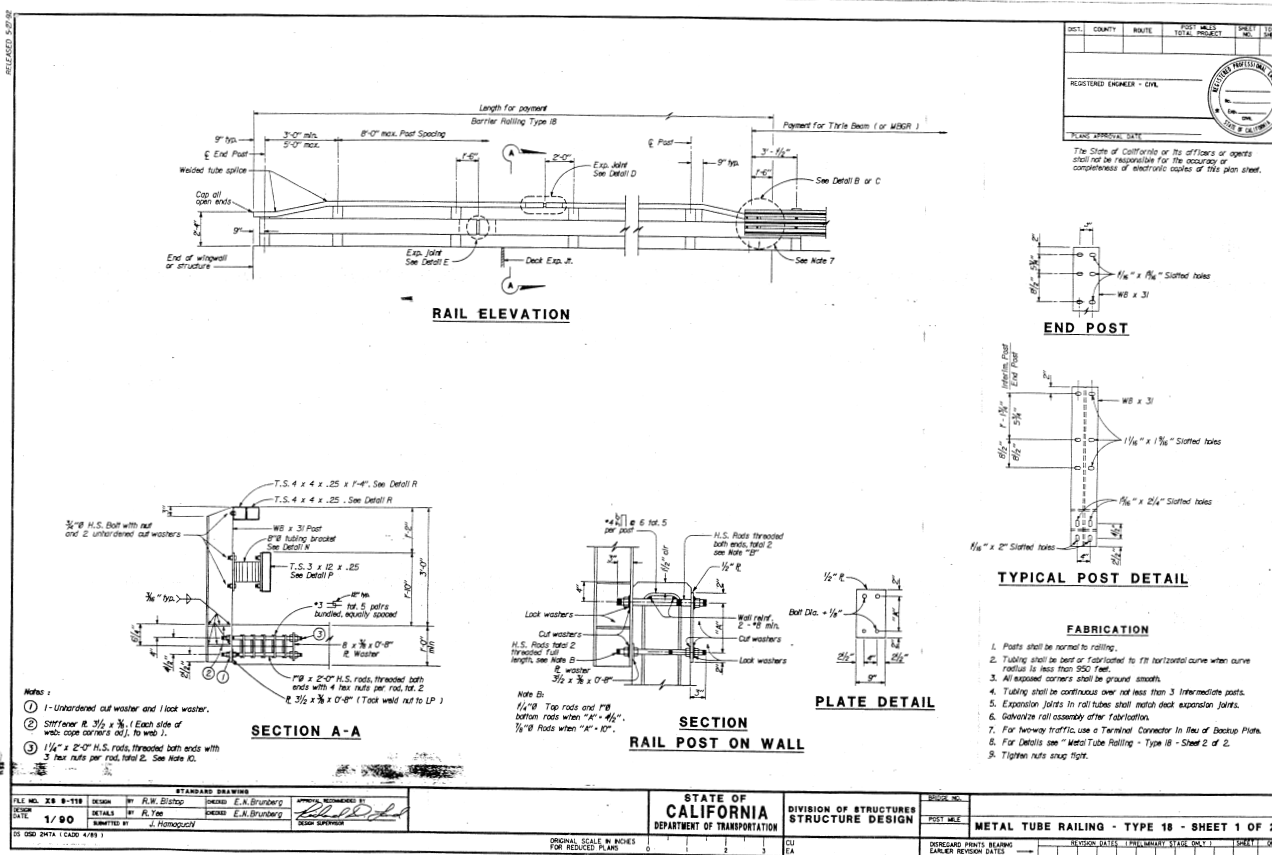
**Test level:**  
TL-2

**Utilized in:**  
California

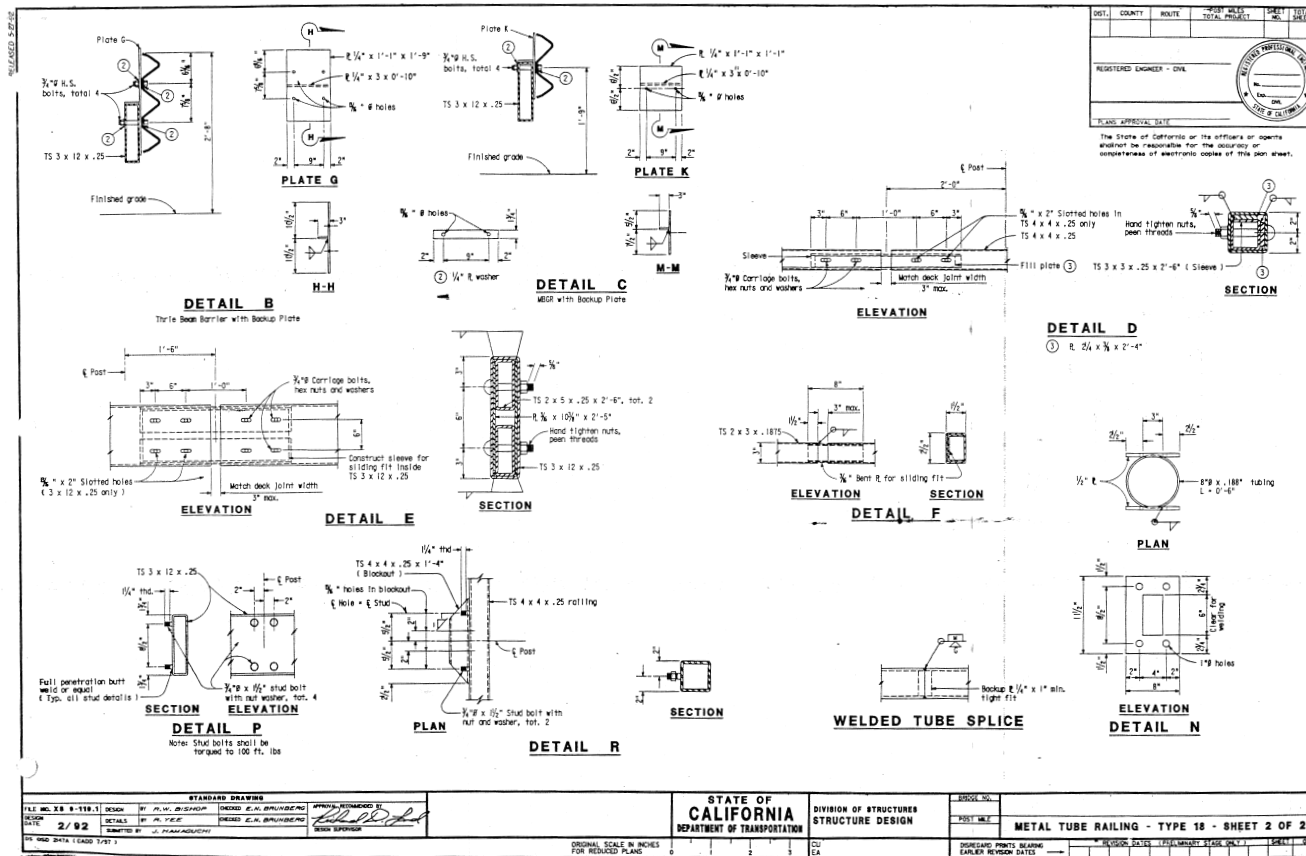
**Contact:**  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805



## California Type 18



## California Type 18



### California Side Mount Type 115 Rail

**Height:**  
30"

**Cost per linear foot:**  
\$\_\_

**Test level:**  
TL-2

**Utilized in:**  
California

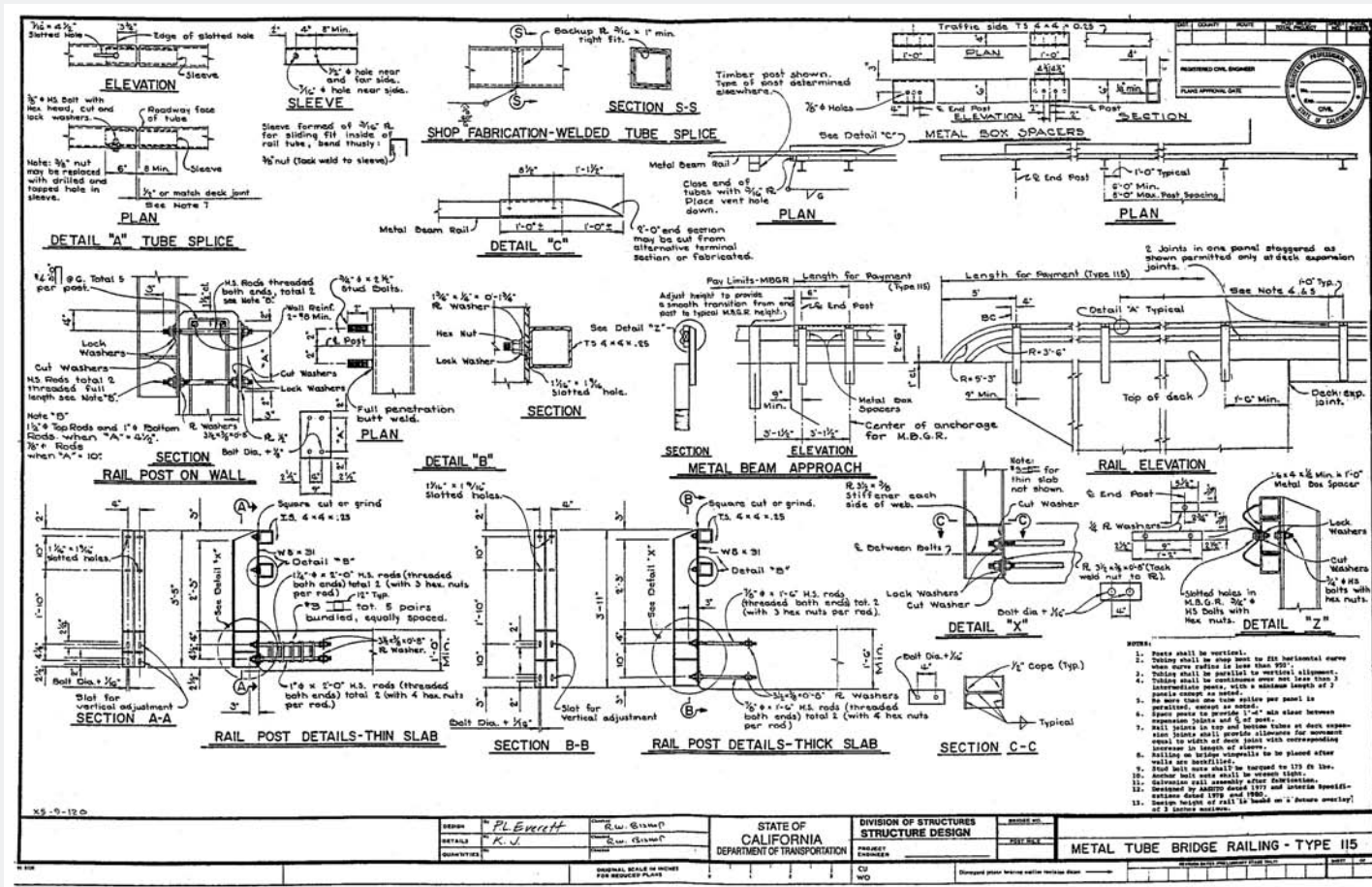
**Contact:**  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805



# Section 3

# Steel Tube Bridge Rail Attached to Side of Deck

## California Side Mount Type 115 Rail



Section **3**

**Steel Tube Bridge Rail Attached to Side of Deck**

**California Type 116 Rail**

**Height:**  
42"

**Cost per linear foot:**  
\$\_\_

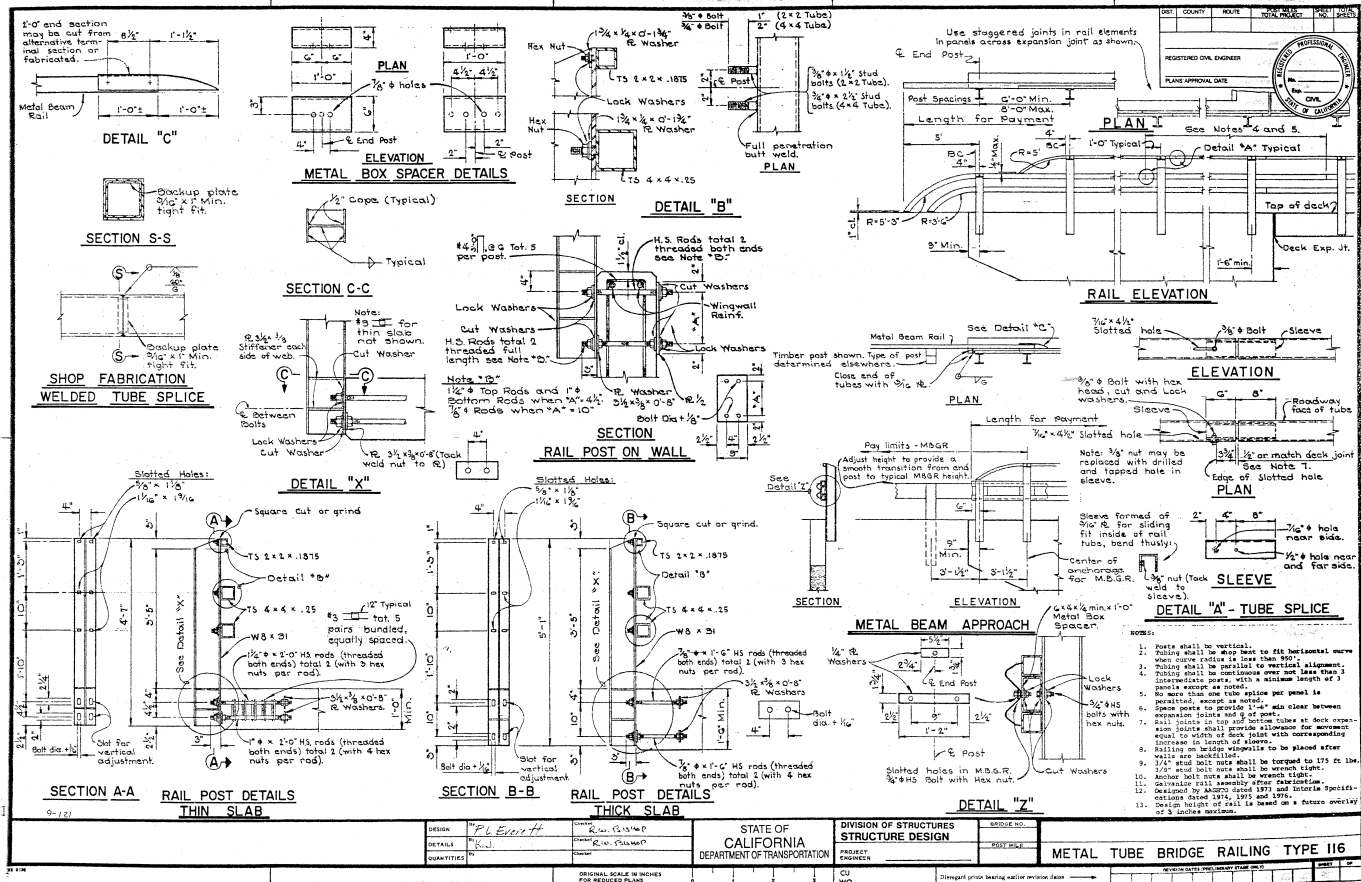
**Test level:**  
TL-2

**Utilized in:**  
California

**Contact:**  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805



California Type 116 Rail





### California Type 117 Rail

Height:  
54"

Cost per linear foot:  
\$\_\_

Test level:  
TL-2

Utilized in:  
California

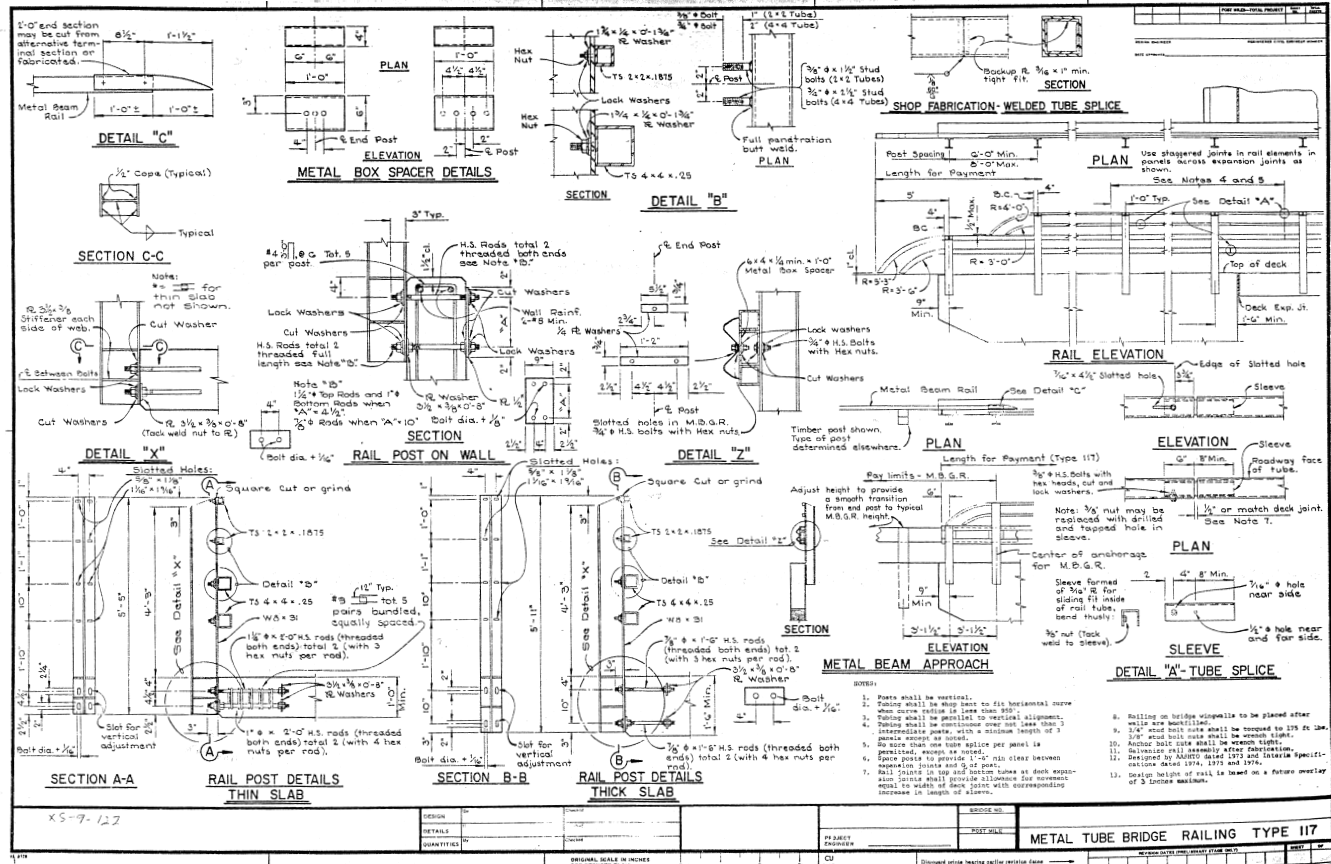
Contact:  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805



# Section 3

# Steel Tube Bridge Rail Attached to Side of Deck

## California Type 117 Rail



**Illinois 2399 - Type Side Mount**

**Height:**  
32"

**Cost per linear foot:**  
\$75

**Test level:**  
TL-4

**Utilized in:**  
Illinois

**Contact:**  
Thomas J. Domagalski  
Illinois Dept of Transportation  
2300 South Dirksen Parkway  
Room 240  
Springfield, IL 62764  
(217) 782-2125





Section **3**

# Steel Tube Bridge Rail, Attached to Side of Deck

## Oregon 2-Tube Side Mount

**Height:**  
32"

**Cost per linear foot:**  
\$77

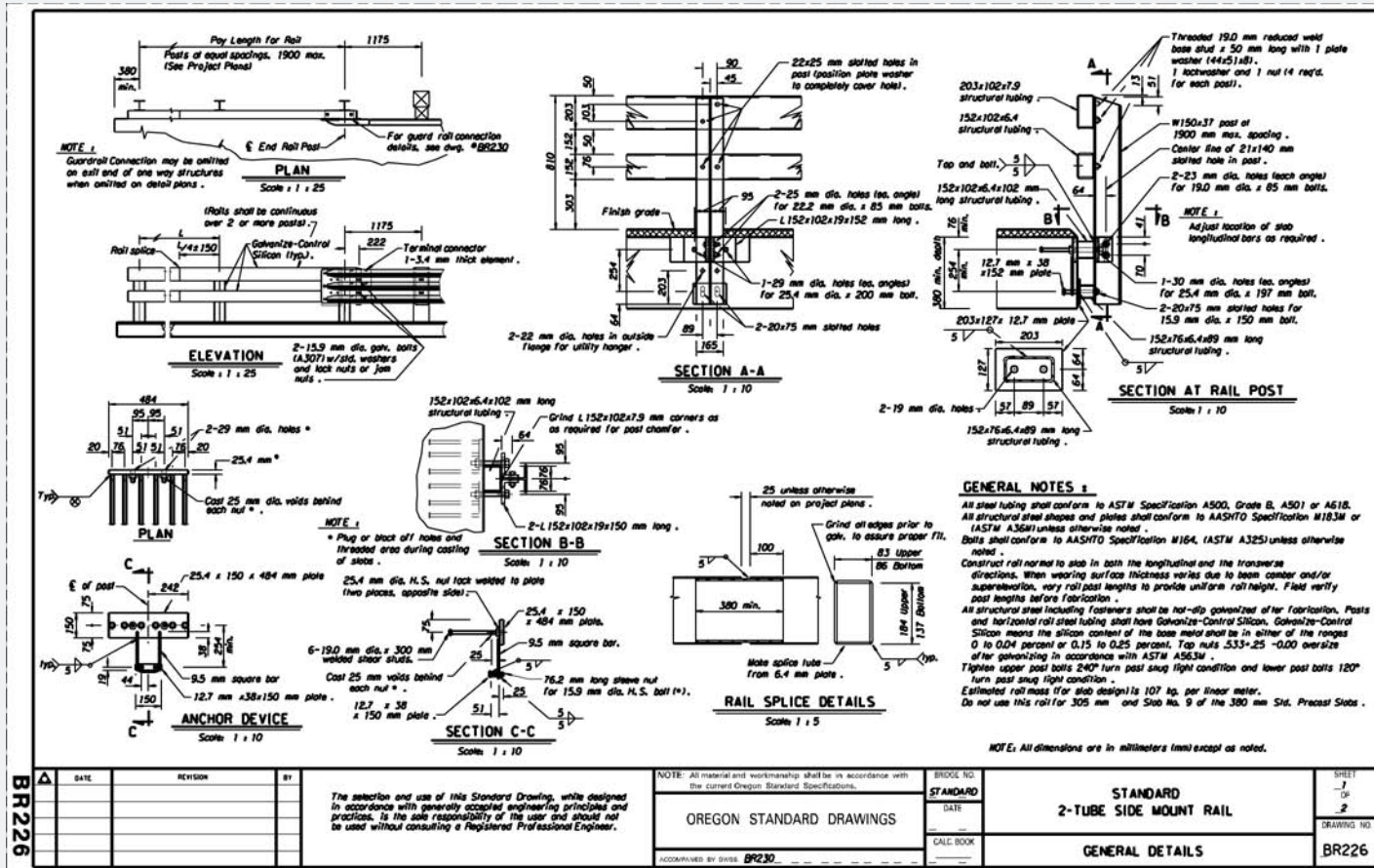
**Test level:**  
TL-4

**Utilized in:**  
Oregon

**Contact:**  
Antony P. Stratis, P.E.  
Tech Center Bridge Manager  
Region 1  
123 NW Flanders Street  
Portland, OR 97209  
(503) 731-8490



## Oregon 2-Tube Side Mount



**Texas Type 421 Aesthetic Rail**

**Height:**  
32"

**Cost per linear foot:**  
\$\_\_

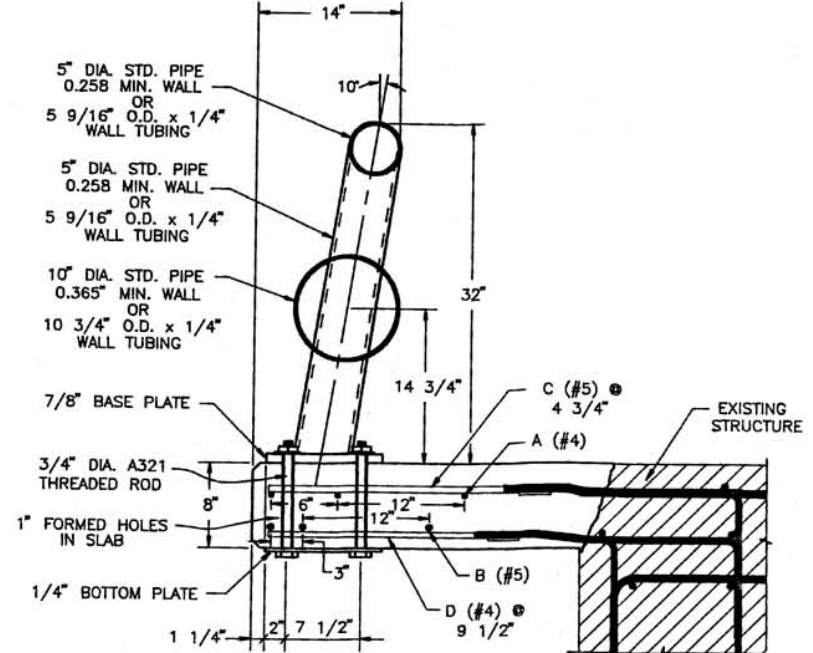
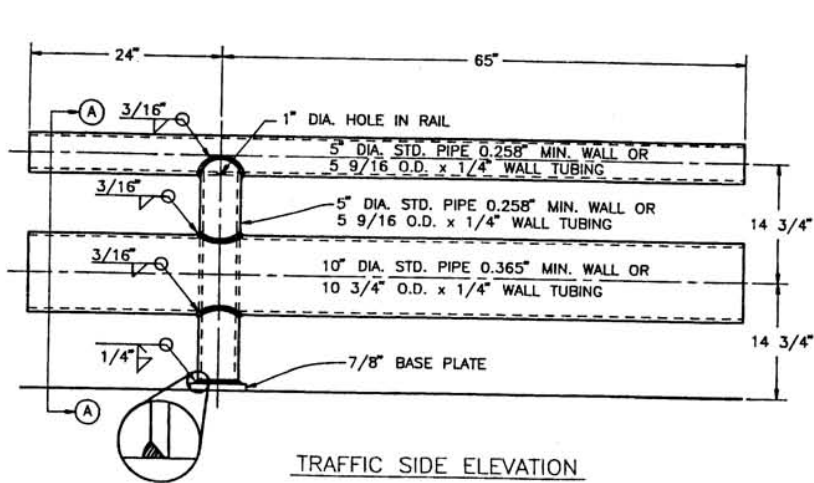
**Test level:**  
TL-2

**Utilized in:**  
Texas

**Contact:**  
Mark Bloschock  
Texas DOT Bridge Division  
RA118  
125 E. 11th Street  
Austin, TX 78701-2483  
(512) 416-2178



Texas Type 421 Aesthetic Rail





**Washington, DC Historic Bridge Rail Retrofit (Curb Mount)**

**Height:**  
27"

**Cost per linear foot:**  
\$\_\_

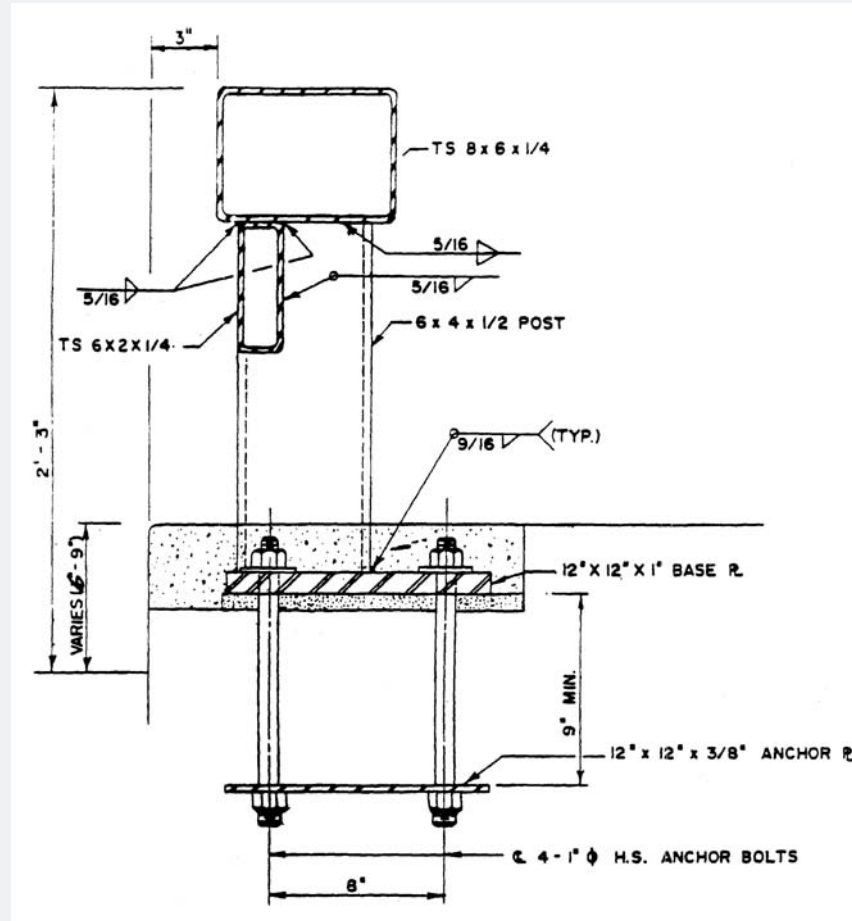
**Test level:**  
TL-2

**Utilized in:**  
Washington, DC

**Contact:**  
Robert McNeely  
District Dept of Transportation  
1403 W Street, NW  
Washington, DC 20009  
(202) 438-7770



Washington, DC Historic Bridge Rail Retrofit (Curb Mount)



## Alaska Rail - Curb Mounted

**Height:**  
32"

**Cost per linear foot:**  
\$90

**Test level:**  
TL-4

**Utilized in:**  
Alaska

**Contact:**  
Richard Pratt  
Alaska Dept of Transportation  
3132 Channel Drive  
Juneau, AK 99801  
(907) 465-2975





**California Type 9 (AASHTO BR2)**

**Height:**  
27"

**Cost per linear foot:**  
\$\_\_

**Test level:**  
TL-2

**Utilized in:**  
California

**Contact:**  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805





## California ST-10 Rail

**Height:**  
33"

**Cost per linear foot:**  
\$120

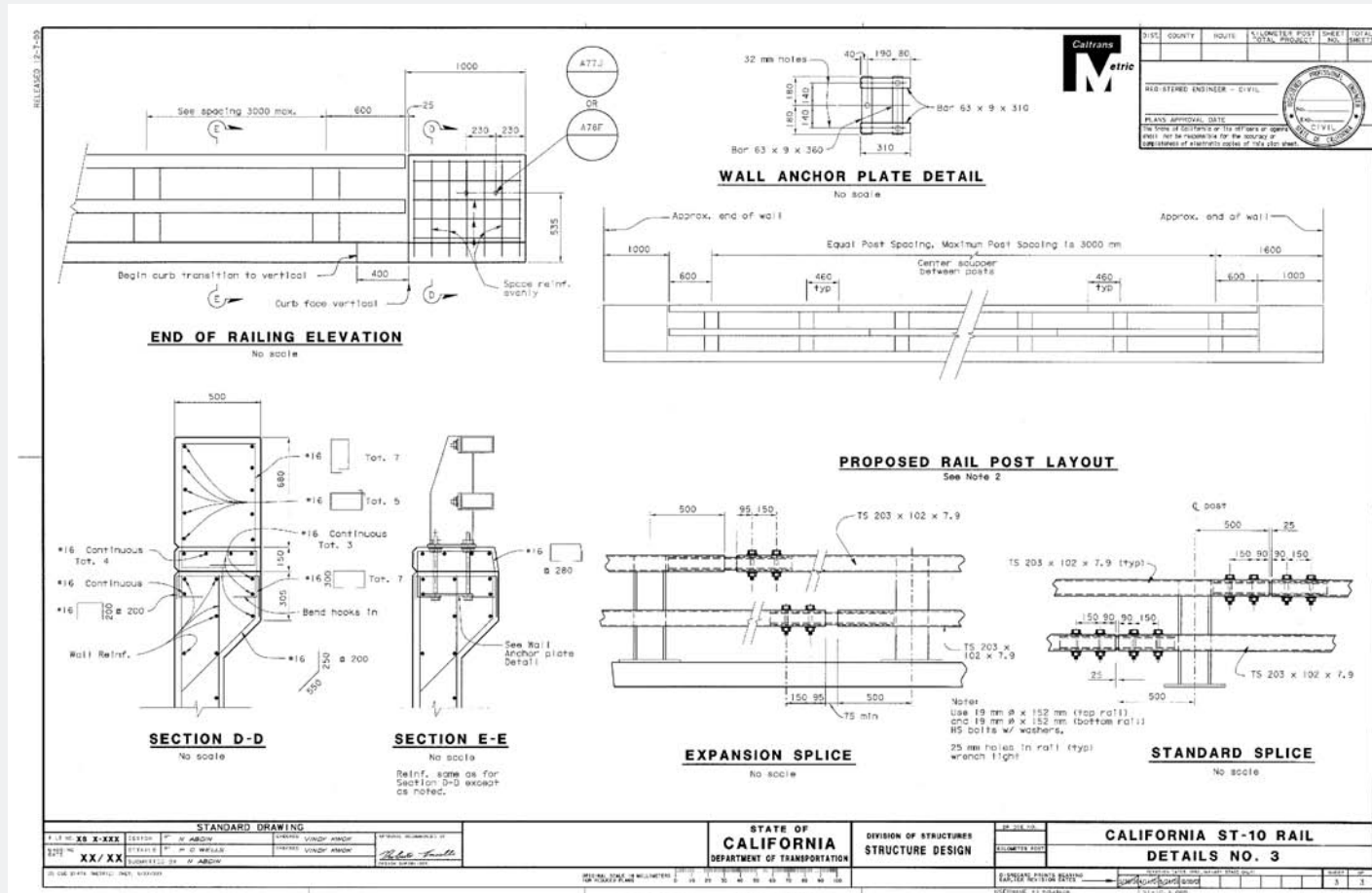
**Test level:**  
TL-4

**Utilized in:**  
California

**Contact:**  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805

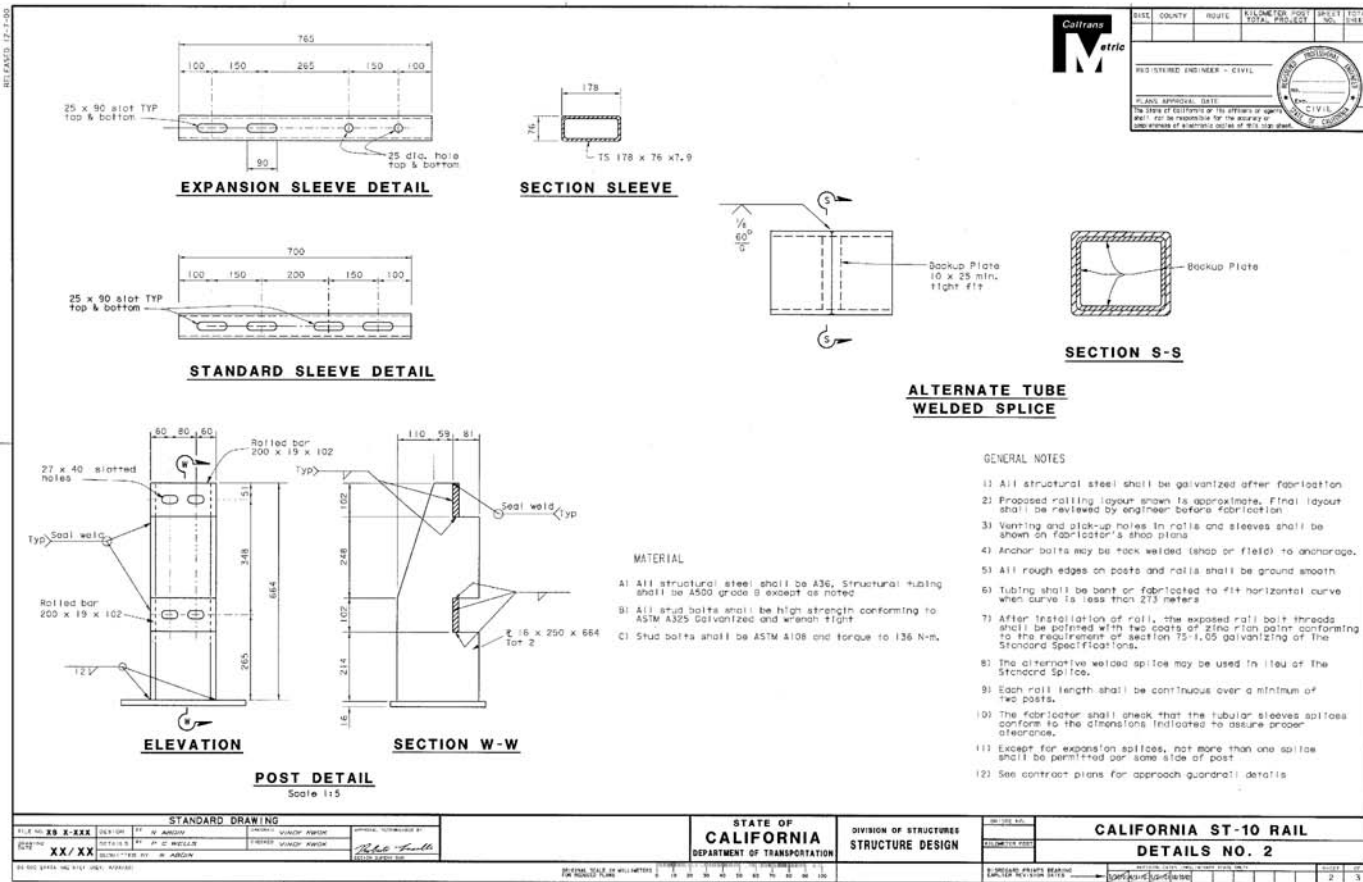


## California ST-10 Rail





## California ST-10 Rail



## Bridge Railing, Aesthetic Parapet Type BR 27D

**Height:**  
42"

**Cost per linear foot:**  
\$120

**Test level:**  
TL-4

**Utilized in:**  
Michigan

**Contact:**  
Steve Beck  
Michigan Dept  
of Transportation  
State Transportation Building  
425 W. Ottawa Street  
P.O. Box 30050  
Lansing, MI 48909  
(517) 373-0097



**Bridge Railing, Aesthetic Parapet Type BR 27D**

Plans Not Yet Available.

## Minnesota Combination Bridge Rail, Design #3

**Height:**  
36"

**Cost per linear foot:**  
\$75

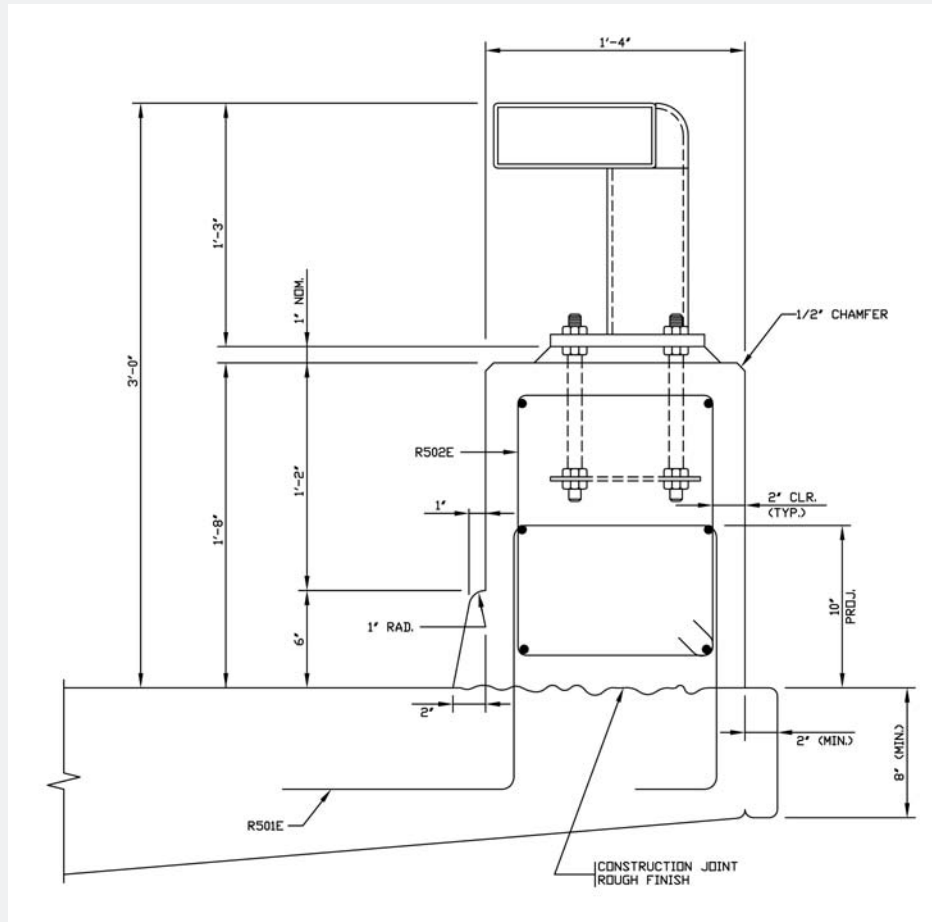
**Test level:**  
TL-4

**Utilized in:**  
Minnesota

**Contact:**  
Raymond Cekalla  
Minnesota DOT Bridge Office  
3485 Hadley Avenue North  
Mail Stop 610  
Oakdale, MN 55128-3307  
(651) 747-2172



Minnesota Combination Bridge Rail, Design #3



**Type C202**

**Height:**  
54"

**Cost per linear foot:**  
\$\_

**Test level:**  
TL-5

**Utilized in:**  
Texas

**Contact:**  
Mark Bloschock  
Texas DOT Bridge Division  
RA118  
125 E. 11th Street  
Austin, TX 78701-2483  
(512) 416-2178

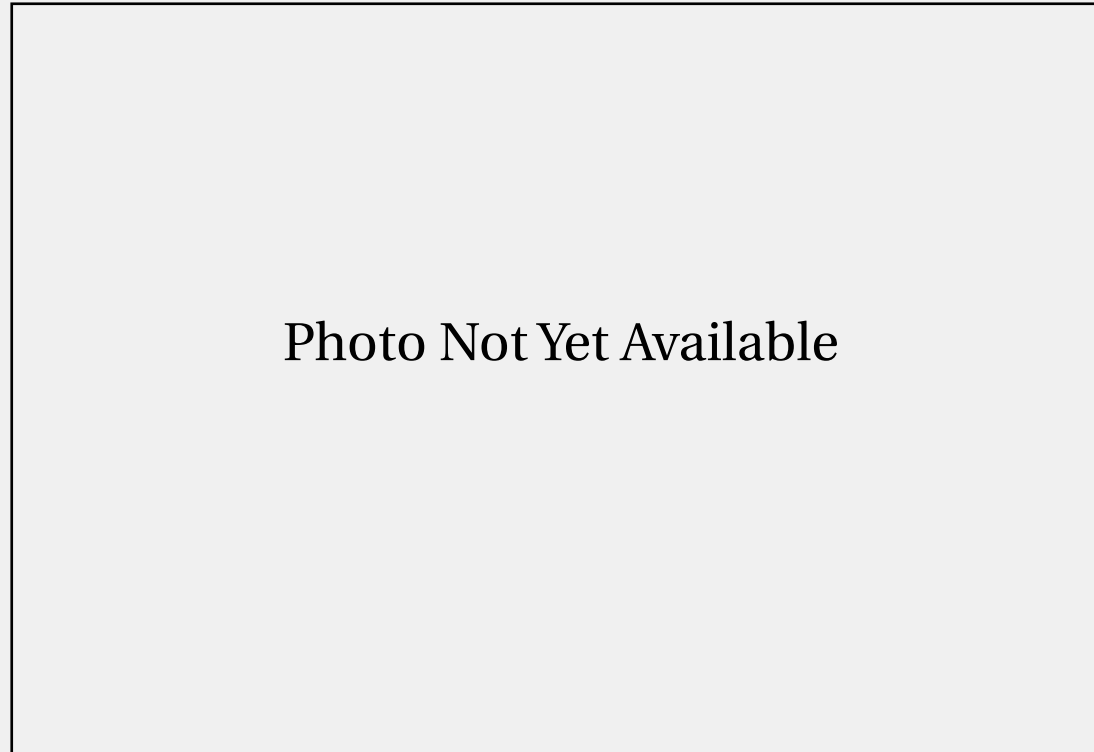
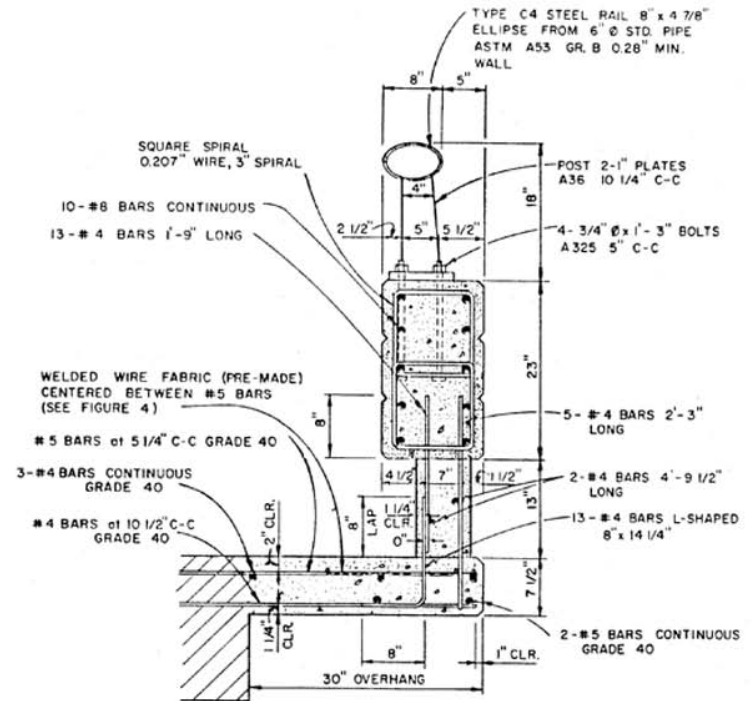
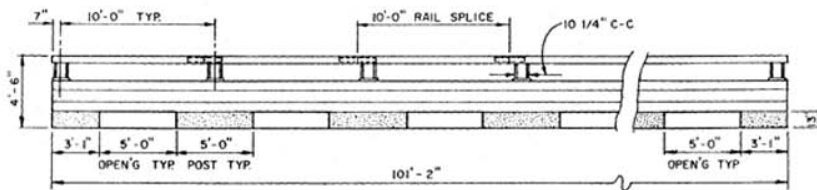


Photo Not Yet Available

## Type C202



Cross Section of the Modified C202 Bridge Rail.

## George Washington Parkway Steel Bridge Rail

**Height:**  
42"

**Cost per linear foot:**  
\$200

**Test level:**  
TL-3

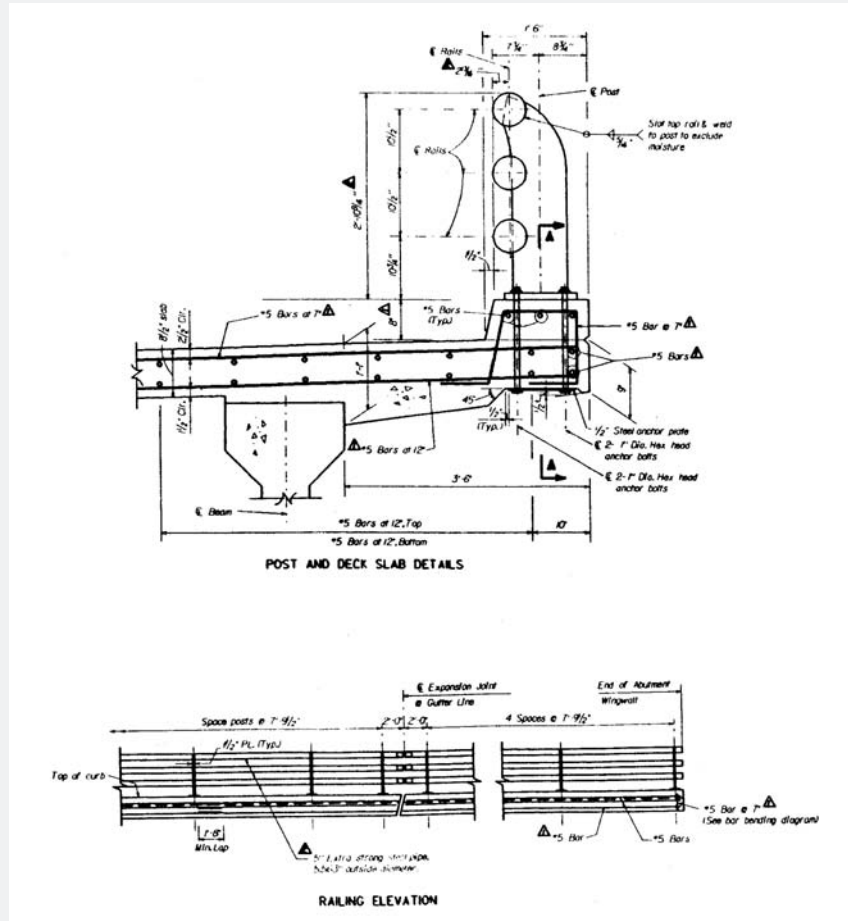
**Utilized in:**  
George Washington  
Parkway, Virginia

**Contact:**  
Mark Clabaugh, P.E.  
Federal Lands Bridge Office  
21400 Ridgetop Circle  
Sterling, VA 20166  
(703) 404-6235





George Washington Parkway Steel Bridge Rail



## Illinois 2399 - Curb Mount

**Height:**  
32"

**Cost per linear foot:**  
\$75

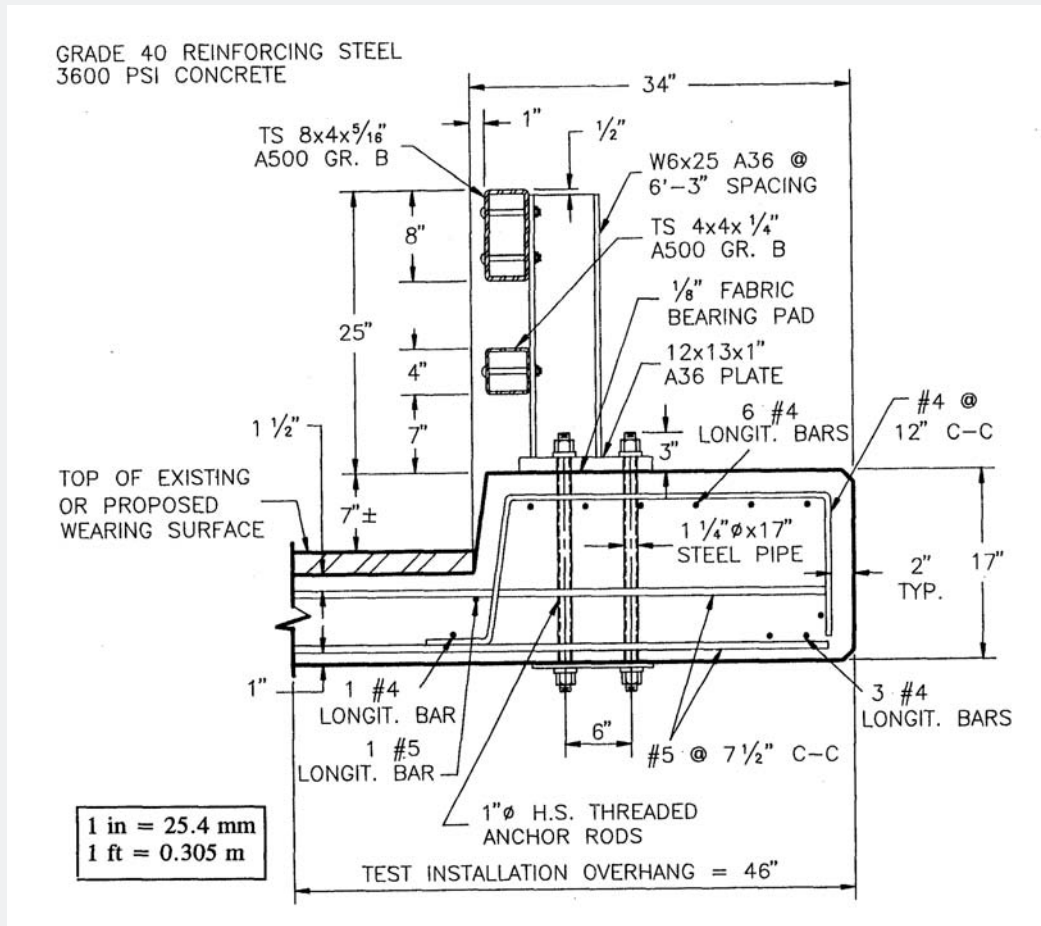
**Test level:**  
TL-4

**Utilized in:**  
Illinois

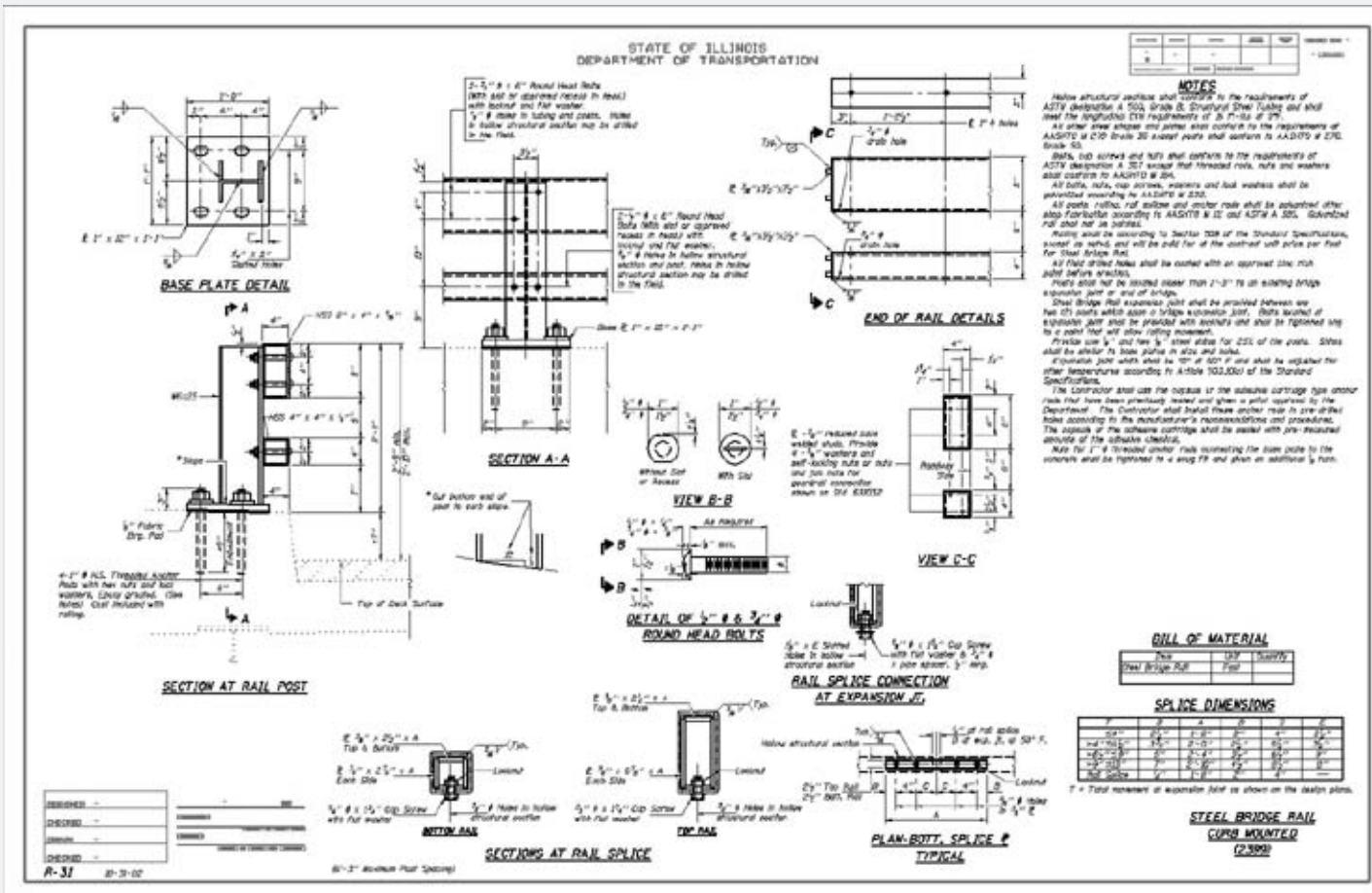
**Contact:**  
Thomas J. Domagalski  
Illinois Dept of Transportation  
2300 South Dirksen Parkway  
Room 240  
Springfield, IL 62764  
(217) 782-2125



Illinois 2399 - Curb Mount



Illinois 2399 - Curb Mount



## Michigan Multi Tube Bridge Railing

**Height:**  
42"

**Cost per linear foot:**  
\$150

**Test level:**  
TL-4

**Utilized in:**  
Michigan

**Contact:**  
Steve Beck  
Michigan Dept  
of Transportation  
State Transportation Building  
425 W. Ottawa Street  
P.O. Box 30050  
Lansing, MI 48909  
(517) 373-2090



**Michigan Multi Tube Bridge Railing**

Plans Not Yet Available.

## Bridge Railing, 2 Tube

**Height:**  
32.5"

**Cost per linear foot:**  
\$100

**Test level:**  
TL-4

**Utilized in:**  
Michigan

**Contact:**  
Steve Beck  
Michigan Dept  
of Transportation  
State Transportation Building  
425 W. Ottawa Street  
P.O. Box 30050  
Lansing, MI 48909  
(517) 373-0097



**Bridge Railing, 2 Tube**

Plans Not Yet Available.



**NETC 2-Rail Curb-Mounted Railing**

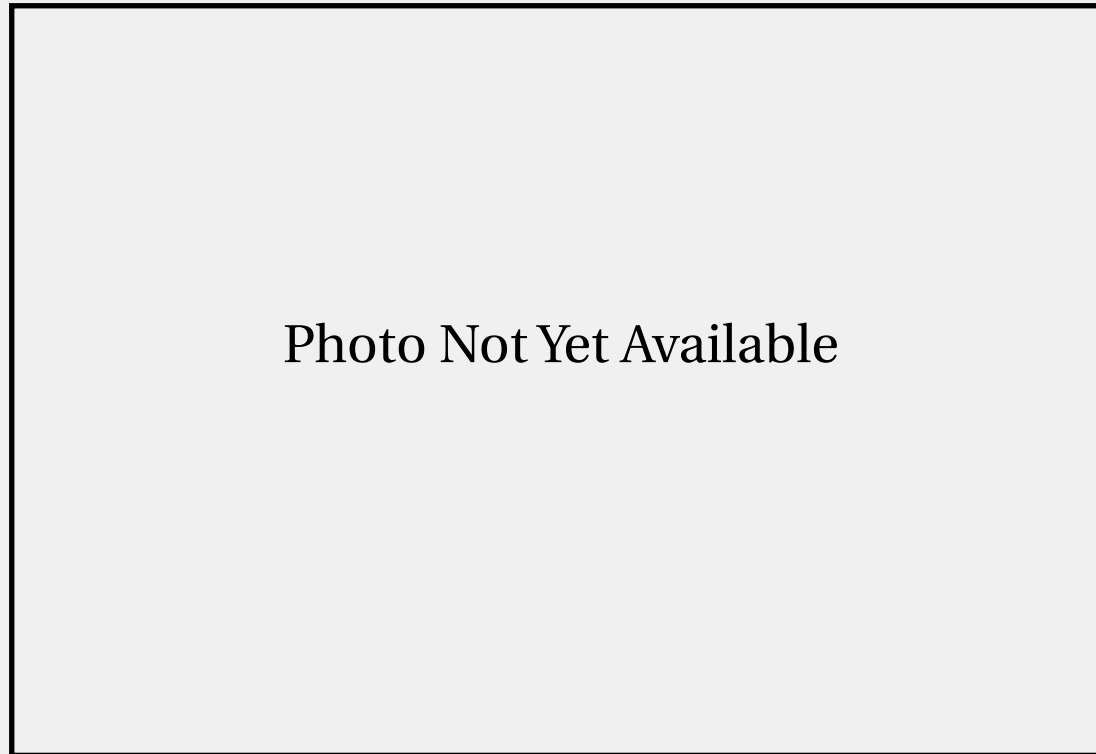
**Height:**  
34"

**Cost per linear foot:**  
\$\_

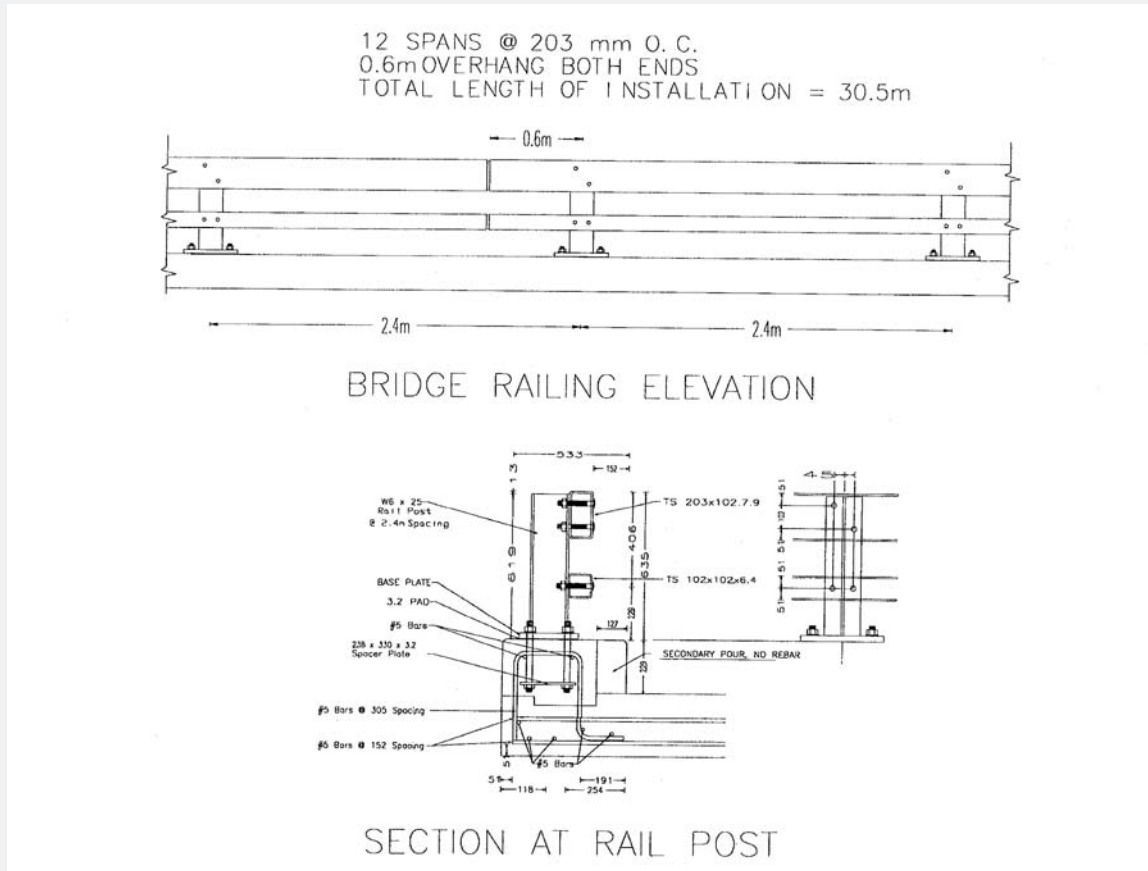
**Test level:**  
TL-4

**Utilized in:**  
Nebraska

**Contact:**  
Gerald M. McCarthy  
Connecticut  
Transportation Institute  
University of Connecticut  
179 Middle Turnpike,  
Unit 5202  
Storrs, CT 06269  
(860) 486-5400



**NETC 2-Rail Curb-Mounted Railing**



## Two-Rail Barrier

**Height:**  
32"

**Cost per linear foot:**  
\$243

**Test level:**  
TL-4

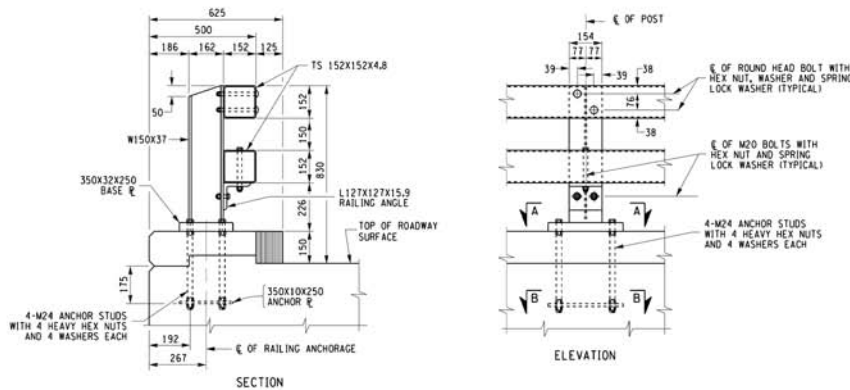
**Utilized in:**  
New York

**Contact:**  
Harry White  
New York State Dept  
of Transportation  
1220 Washington Avenue  
Albany, NY 12232  
(518) 485-1148

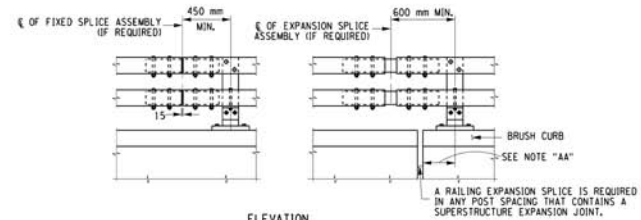


## Two-Rail Barrier

BD-RS1  
R2



STEEL BRIDGE RAILING  
(TWO-RAIL - BRUSH CURB)  
SCALE 1:10



STEEL BRIDGE RAILING SPLICE DETAILS  
(TWO-RAIL - BRUSH CURB)  
SCALE 1:20

**DESIGNER NOTES:**

NOTE "AA":  
THE MINIMUM DISTANCE FROM THE POST TO AN EXPANSION JOINT SHALL BE DETERMINED BY THE MINIMUM EDGE DISTANCE OF 125 mm FROM ANY ANCHOR STUD TO THE END OF THE SLAB, OR TO THE EXPANSION JOINT RECESS POUR, IF ONE IS USED. ON PRESTRESSED CONCRETE BRIDGES, THE POST SHALL BE LOCATED TO MINIMIZE ANCHOR PLATE/END BLOCK REINFORCEMENT CONFLICTS. POST SPACING SHALL BE ADJUSTED ACCORDINGLY.

THE MAXIMUM CENTER TO CENTER SPACING OF RAILING POSTS IS 2.5 m. THESE RAILINGS ARE ADEQUATE FOR A TL-4 (PL-2) SERVICE LEVEL.

FOR SECTIONS A-A & B-B, SEE BD-R5B.

FOR SPLICE DETAILS, SEE BD-R5B.

FOR DETAILS OF RAILING ANGLE, SEE BD-R53.

FOR DETAILS OF ROUND HEAD BOLT, SEE BD-R53.

FOR TRANSITION DETAILS, SEE BD-R54.

**NOTES:**

ALL RAILING IS TO BE FABRICATED AND ERECTED ACCORDING TO SECTION 588 OF THE STANDARD SPECIFICATIONS.

PRIOR TO GALVANIZING THE ASSEMBLED POST, GRIND ALL EDGES TO A MINIMUM RADIUS OF 2 mm.

BOLTS SHALL BE TORQUED SNUG TIGHT (APPROXIMATELY 135 N-m).

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE NOTED.

ISSUED 4/7/98		STATE OF NEW YORK DEPARTMENT OF TRANSPORTATION STRUCTURES DESIGN AND CONSTRUCTION DIVISION
REVISED		
2/1/00		
11/5/01		
STEEL BRIDGE RAILING TWO-RAIL AND THREE-RAIL		
APPROVED: 11/5/01 ORIGINAL SIGNED BY JAMES M. O'CONNELL, PE DEPUTY CHIEF ENGINEER (STRUCTURES)		ISSUED UNDER E1 98-012 EFFECTIVE WITH THE LETTING OF 10/22/98

## Three-Rail Barrier Top Deck Flush Mount

**Height:**  
32"

**Cost per linear foot:**  
\$515

**Test level:**  
TL-4

**Utilized in:**  
New York

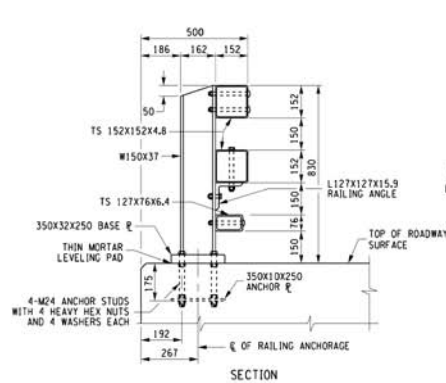
**Contact:**  
Harry White  
New York State Dept  
of Transportation  
1220 Washington Avenue  
Albany, NY 12232  
(518) 485-1148



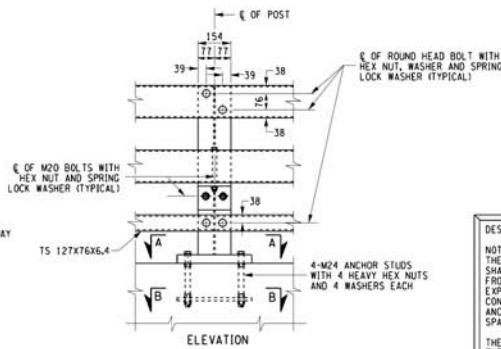
Photo Not Yet Available

**Three-Rail Barrier**

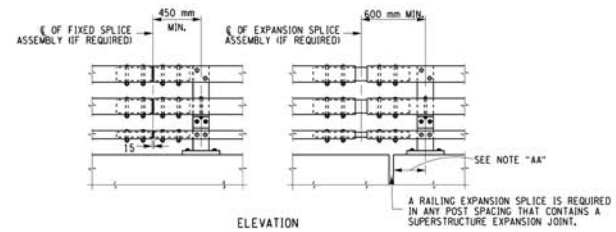
BD-RS1  
R2



STEEL BRIDGE RAILING  
(THREE-RAIL - CURBLESS)  
SCALE 1:10



ELEVATION



ELEVATION

STEEL BRIDGE RAILING SPLICE DETAILS  
(THREE-RAIL - CURBLESS)  
SCALE 1:20

**DESIGNER NOTES:**

NOTE "AA":  
THE MINIMUM DISTANCE FROM THE POST TO AN EXPANSION JOINT SHALL BE DETERMINED BY THE MINIMUM EDGE DISTANCE OF 125 mm FROM ANY ANCHOR STUD TO THE END OF THE SLAB, OR TO THE EXPANSION JOINT RECESS POUR, IF ONE IS USED. ON PRESTRESSED CONCRETE BRIDGES THE POST SHALL BE LOCATED TO MINIMIZE ANCHOR PLATE/END BLOCK REINFORCEMENT CONFLICTS. POST SPACING SHALL BE ADJUSTED ACCORDINGLY.

THE MAXIMUM CENTER TO CENTER SPACING OF RAILING POSTS IS 2.5 m. THESE RAILINGS ARE ADEQUATE FOR A TL-4 (PL-2) SERVICE LEVEL.

FOR SECTIONS A-A & B-B, SEE BD-RS1.

FOR SPLICE DETAILS, SEE BD-RS8.

FOR DETAILS OF RAILING ANGLE, SEE BD-RS3.

FOR DETAILS OF ROUND HEAD BOLT, SEE BD-RS3.

FOR TRANSITION DETAILS, SEE BD-RS4.

**NOTES:**

ALL RAILING IS TO BE FABRICATED AND ERECTED ACCORDING TO SECTION 568 OF THE STANDARD SPECIFICATIONS.

PRIOR TO GALVANIZING THE ASSEMBLED POST, GRIND ALL EDGES TO A MINIMUM RADIUS OF 2 mm.

BOLTS SHALL BE TORQUED SNUG TIGHT (APPROXIMATELY 135 N-m).

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS UNLESS OTHERWISE NOTED.

ISSUED 4/7/98	STATE OF NEW YORK DEPARTMENT OF TRANSPORTATION STRUCTURES DESIGN AND CONSTRUCTION DIVISION
REVISED	
2/1/00	
11/5/01	STEEL BRIDGE RAILING TWO-RAIL AND THREE-RAIL
APPROVED: 11/5/01	ISSUED UNDER E1 98-012 EFFECTIVE WITH THE LETTING OF 10/22/98
ORIGINAL SIGNED BY JAMES M. O'CONNELL, PE DEPUTY CHIEF ENGINEER (STRUCTURES)	

## Four-Rail Barrier

**Height:**  
42"

**Cost per linear foot:**  
\$515

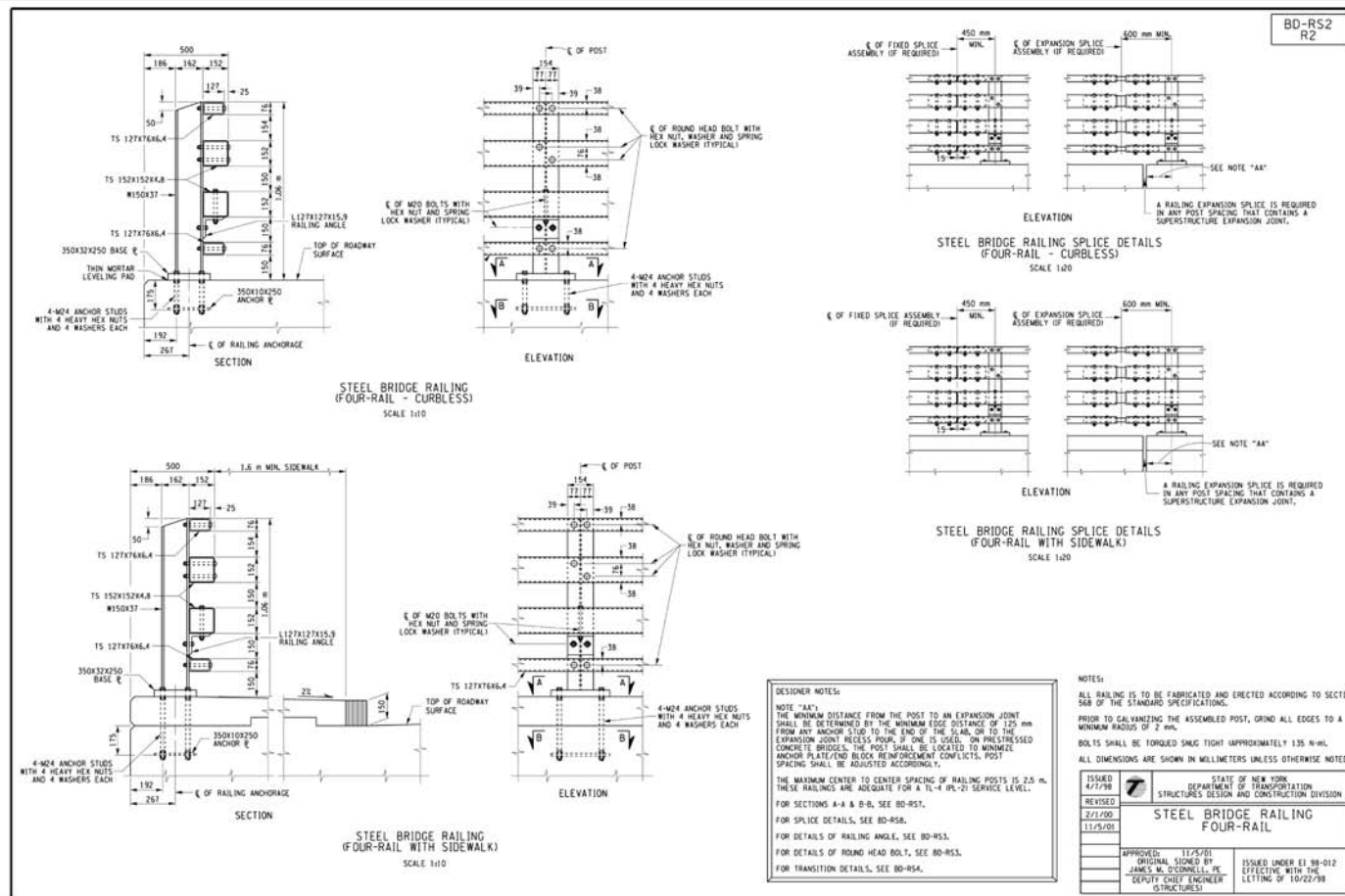
**Test level:**  
TL-4

**Utilized in:**  
New York

**Contact:**  
Harry White  
New York State Dept  
of Transportation  
1220 Washington Avenue  
Albany, NY 12232  
(518) 485-1148



**Four-Rail Barrier**





## Five-Rail Barrier

**Height:**  
56"

**Cost per linear foot:**  
\$382

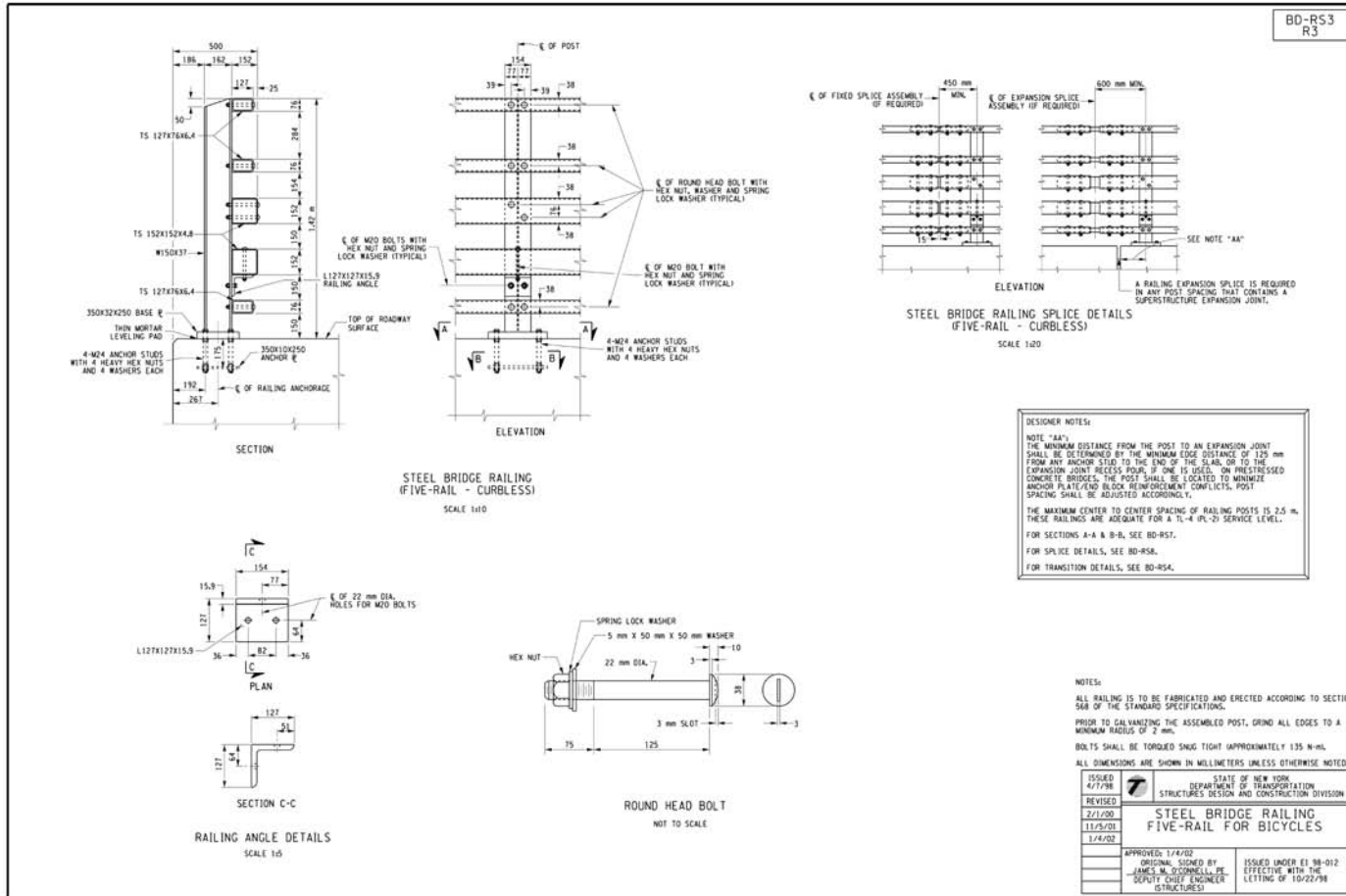
**Test level:**  
TL-4

**Utilized in:**  
New York

**Contact:**  
Harry White  
New York State Dept  
of Transportation  
1220 Washington Avenue  
Albany, NY 12232  
(518) 485-1148



**Five-Rail Barrier**



## Oregon 2-Tube Curb Mount

**Height:**  
32"

**Cost per linear foot:**  
\$90

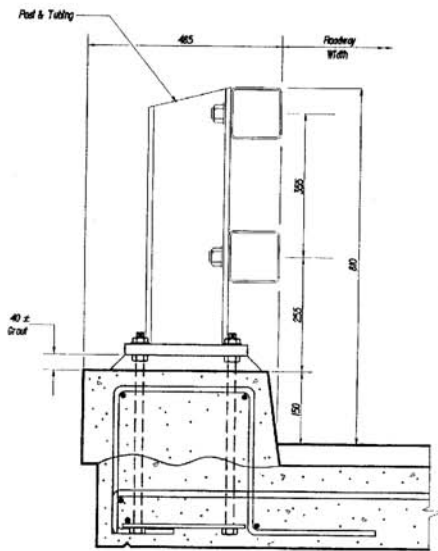
**Test level:**  
TL-2

**Utilized in:**  
Oregon

**Contact:**  
Antony P. Stratis, P.E.  
Tech Center Bridge Manager  
Region 1  
123 NW Flanders Street  
Portland, OR 97209  
(503) 731-8490



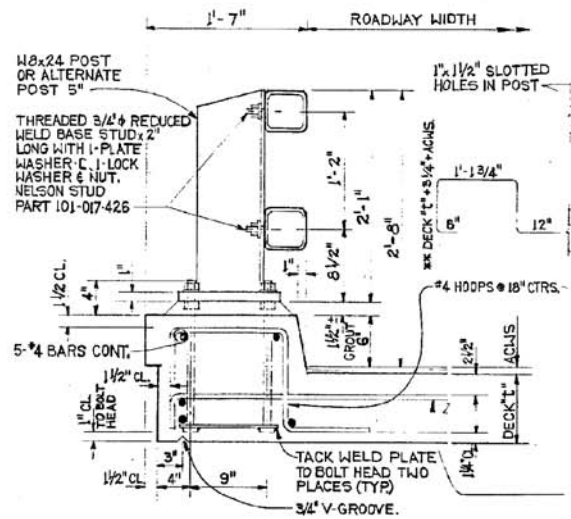
## Oregon 2-Tube Curb Mount



All Dimensions Shown Are mm unless Otherwise Noted.

**CURB MOUNT-POST DETAIL**

FIGURE D.5 2-Tube Curb-Mounted Bridge Railing



**CURB MOUNT-POST DET**  
1 1/2" = 1'-0" (1 = 8)

FIGURE D.5 Oregon 2-Tube Curb Mounted Bridge Railing

Rail Height	810 mm	
Test Vehicle	905-kg Car	2107-kg Car
Impact Speed km/h	94	97
Impact Angle Degrees	18.8	25

## Oregon 3-Tube Curb Mount

**Height:**  
42"

**Cost per linear foot:**  
\$80

**Test level:**  
TL-4

**Utilized in:**  
Oregon

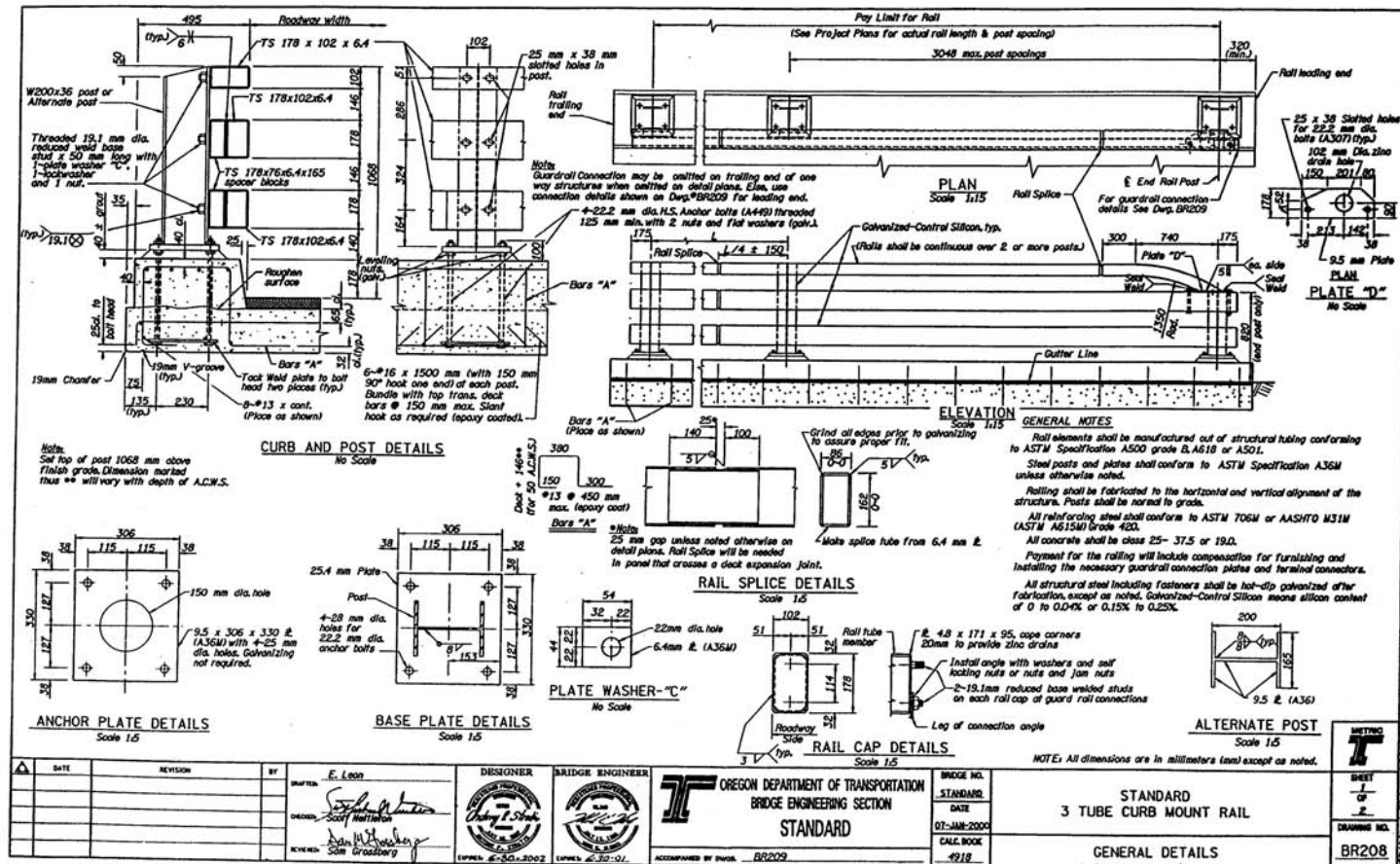
**Contact:**  
Antony P. Stratis, P.E.  
Tech Center Bridge Manager  
Region 1  
123 NW Flanders Street  
Portland, OR 97209  
(503) 731-8490



# Section 3

# Steel Tube Bridge Rail, Attached to Curb

## Oregon 3-Tube Curb Mount





Section **3**

# Steel Tube Bridge Rail, Attached to Curb

## Wyoming 2-Tube Steel Railing

**Height:**  
32"

**Cost per linear foot:**  
\$55

**Test level:**  
TL-4

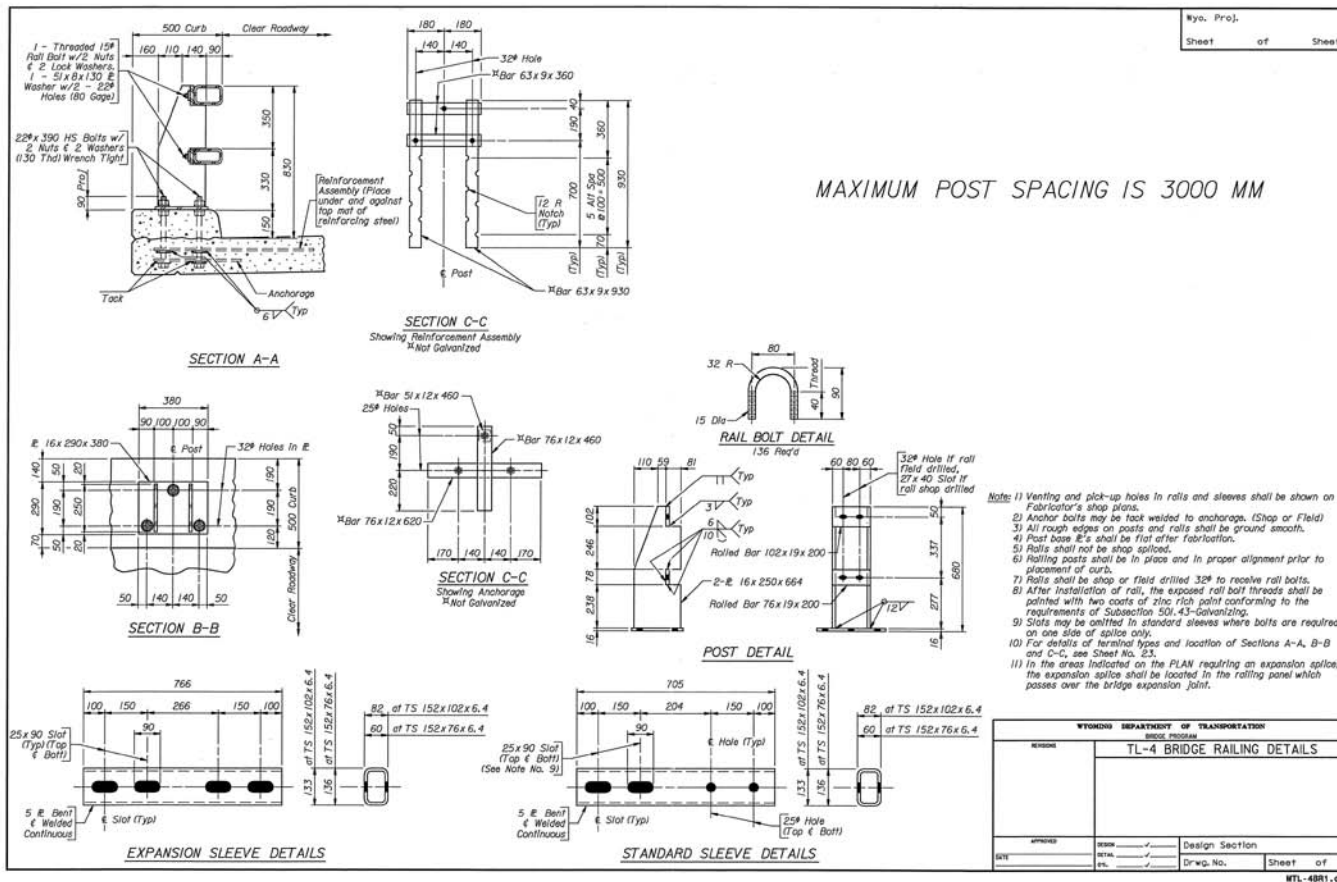
**Utilized in:**  
Wyoming

**Contact:**  
Lee Potter, P.E.  
Federal Highway Admin,  
Wyoming Division  
2617 E. Lincolnway, Suite D  
Cheyenne, WY 82001  
(307) 772-2004 ext 146





## Wyoming 2-Tube Steel Railing



MAXIMUM POST SPACING IS 3000 MM



## Wyoming 2-Tube, Curb-Mounted

**Height:**  
29"

**Cost per linear foot:**  
\$53

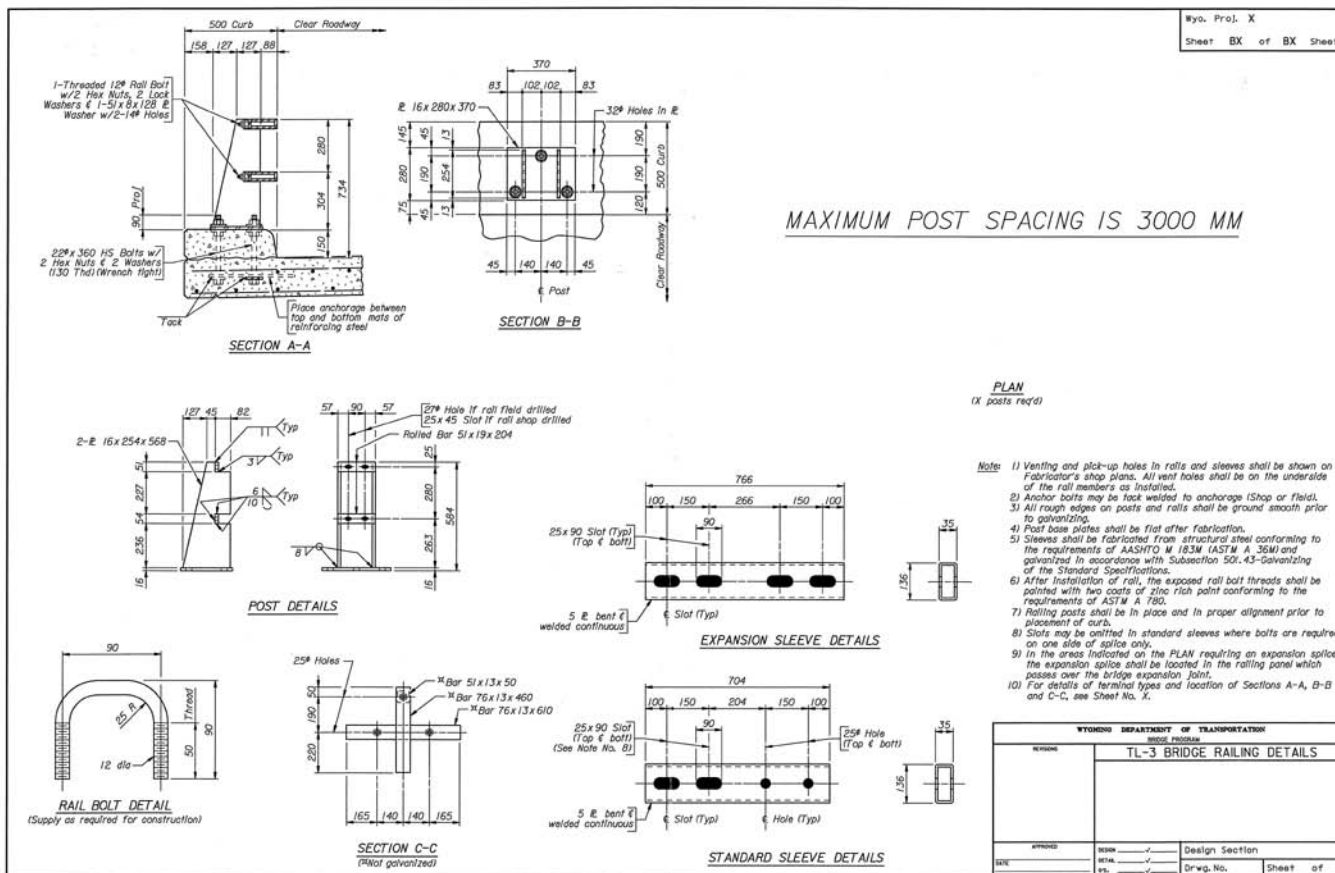
**Test level:**  
TL-3

**Utilized in:**  
Wyoming

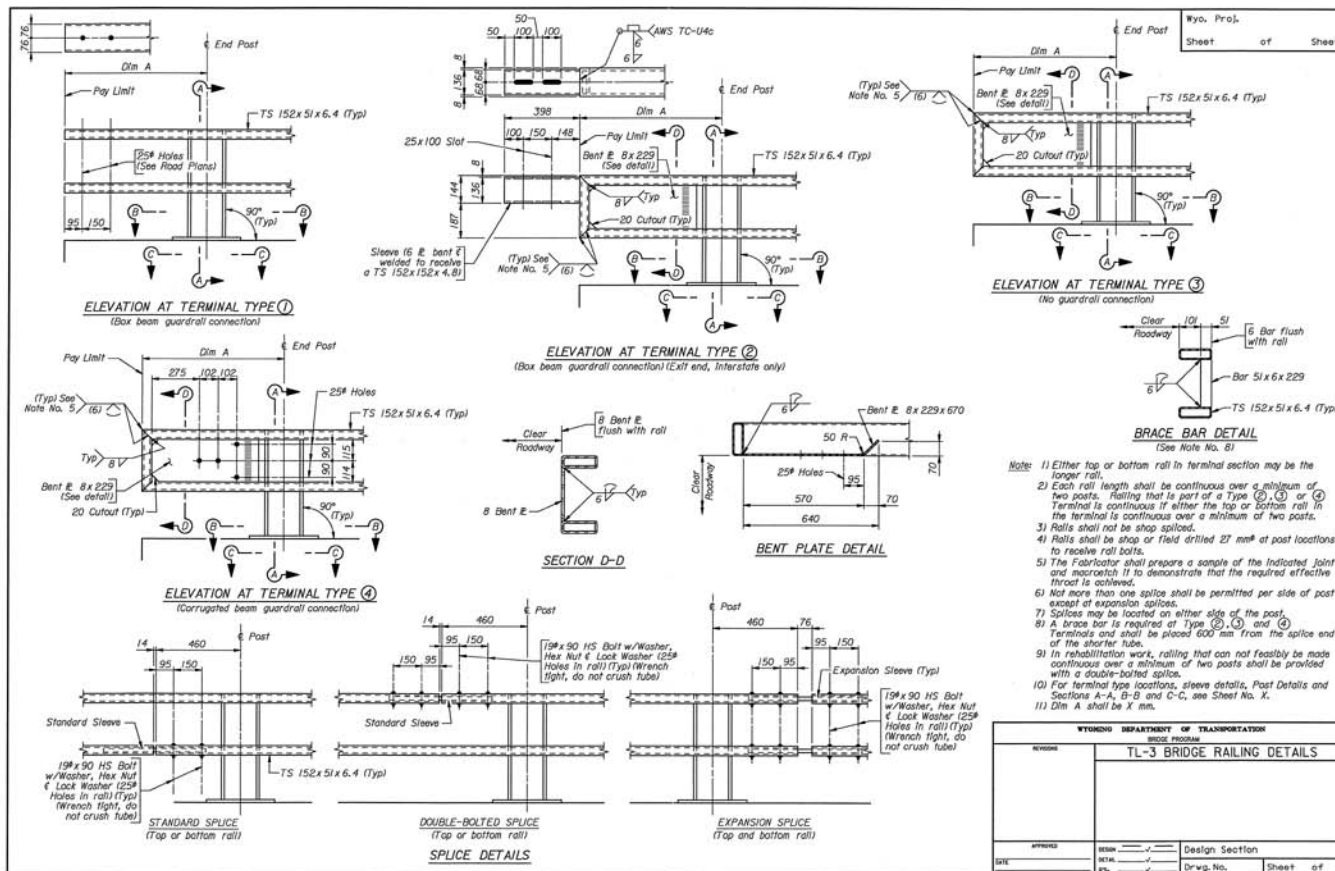
**Contact:**  
Lee Potter, P.E.  
Federal Highway Admin,  
Wyoming Division  
2617 E. Lincolnway, Suite D  
Cheyenne, WY 82001  
(307) 772-2004 ext 146



## Wyoming 2-Tube, Curb-Mounted



## 2-Tube, Curb-Mounted



Section 4

VERTICAL CONCRETE PARAPET



# Section 4

## VERTICAL CONCRETE PARAPET

Name	Location	Test Level
32" New Jersey Shape Concrete Barrier	California	TL-4
Type 80 & 80 SW Concrete Barrier	California	TL-4
Baltimore Washington Parkway Stone Rail	Federal Lands	TL-2
Federal Lands Modified Kansas Corral Bridge Rail	Federal Lands	TL-2
Natchez Trace Concrete Bridge Rail	Federal Lands	TL-2
New Jersey Barrier	Georgia	TL-4
Vertical Parapet with Single-Pipe Aluminum Handrail	Georgia	TL-4
Vertical Parapet with Two-Pipe Aluminum Handrail	Georgia	TL-2

# Section 4

## VERTICAL CONCRETE PARAPET

Name	Location	Test Level
Vertical Parapet with Security Fence	Georgia	TL-4
Iowa Concrete Open Railing	Iowa	TL-2
Iowa Concrete Block Railing Retrofit	Iowa	TL-4
Modified Kansas Corral Rail	Kansas	TL-2
Kansas 32" Corral Rail	Kansas	TL-4
42" Single Slope Concrete Barrier	Missouri	TL-5
Concrete Beam and Post	Nebraska	TL-2
Nebraska Open Concrete Bridge Rail	Nebraska	TL-4
TR1 Modified Bridge Rail	Oklahoma	TL-2



# Section 4

## VERTICAL CONCRETE PARAPET

Subsection	Name	Location	Test Level
	Parapet Flush Mount	Oregon	TL-4
	Parapet Sidewalk Mount	Oregon	TL-4
	Type T501SW	Texas	TL-4
	Type C411	Texas	TL-2
	Type T203	Texas	TL-3
	Texas Type T411 Aesthetic Rail	Texas	TL-2
	Texas TT Rail	Texas	TL-6
	NJ Barrier	Missouri	TL-4
Vertical Concrete Parapet with Aluminum Tube Bridge Rail	New Jersey Concrete Barrier	California	TL-4
	Type 26 Concrete Barrier with Sidewalk	California	TL-2

# Section 4

## VERTICAL CONCRETE PARAPET

Subsection	Name	Location	Test Level
Vertical Concrete Parapet with Aluminum Tube Bridge Rail	Type 732 Concrete Barrier	California	TL-4
	Type 736 Concrete Barrier	California	TL-4
	Type 742 Concrete Barrier	California	TL-5
Aluminum Tube Bridge Rails	LB Foster Precast NJ Shape, Bolted Down	New Jersey	TL-4
	California Type 20	California	TL-3
New Jersey Barrier with Rail	New Jersey Barrier w/22" Steel Bicycle Rail	Georgia	TL-4
	Bicycle Rail Attachment to Safety Shape Concrete Rail	Minnesota	TL-4
	New Jersey Safety Shape Parapet	Nevada	TL-3
	Type HT	Texas	TL-5
	Type T501	Texas	TL-6

**32" New Jersey Shape Concrete Barrier**

**Height:**  
32"

**Cost per linear foot:**  
\$47

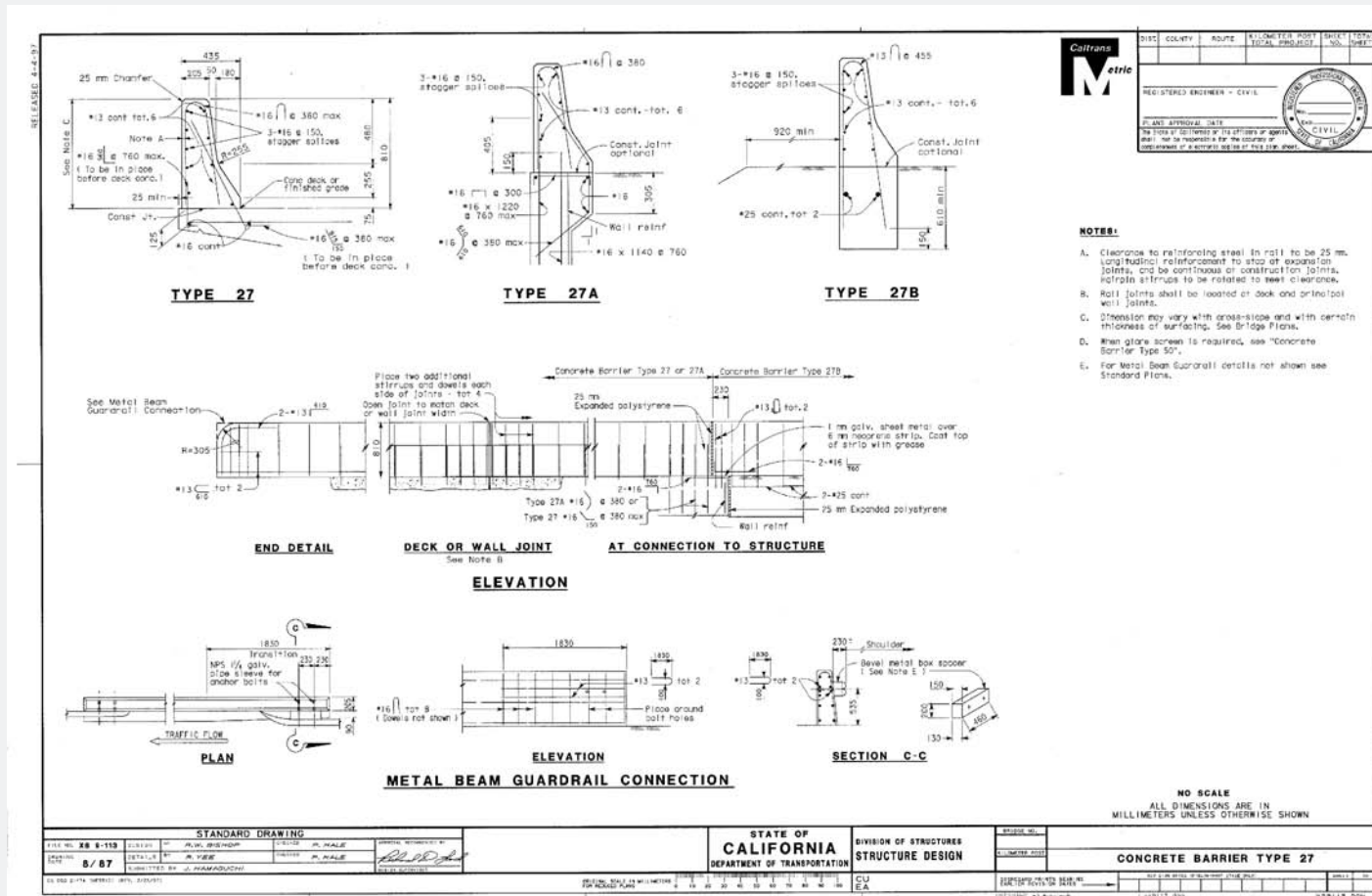
**Test level:**  
TL-4

**Utilized in:**  
California

**Contact:**  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805



## 32" New Jersey Shape Concrete Barrier



## Type 80 and 80 SW Concrete Barrier

**Height:**  
32"

**Cost per linear foot:**  
\$150

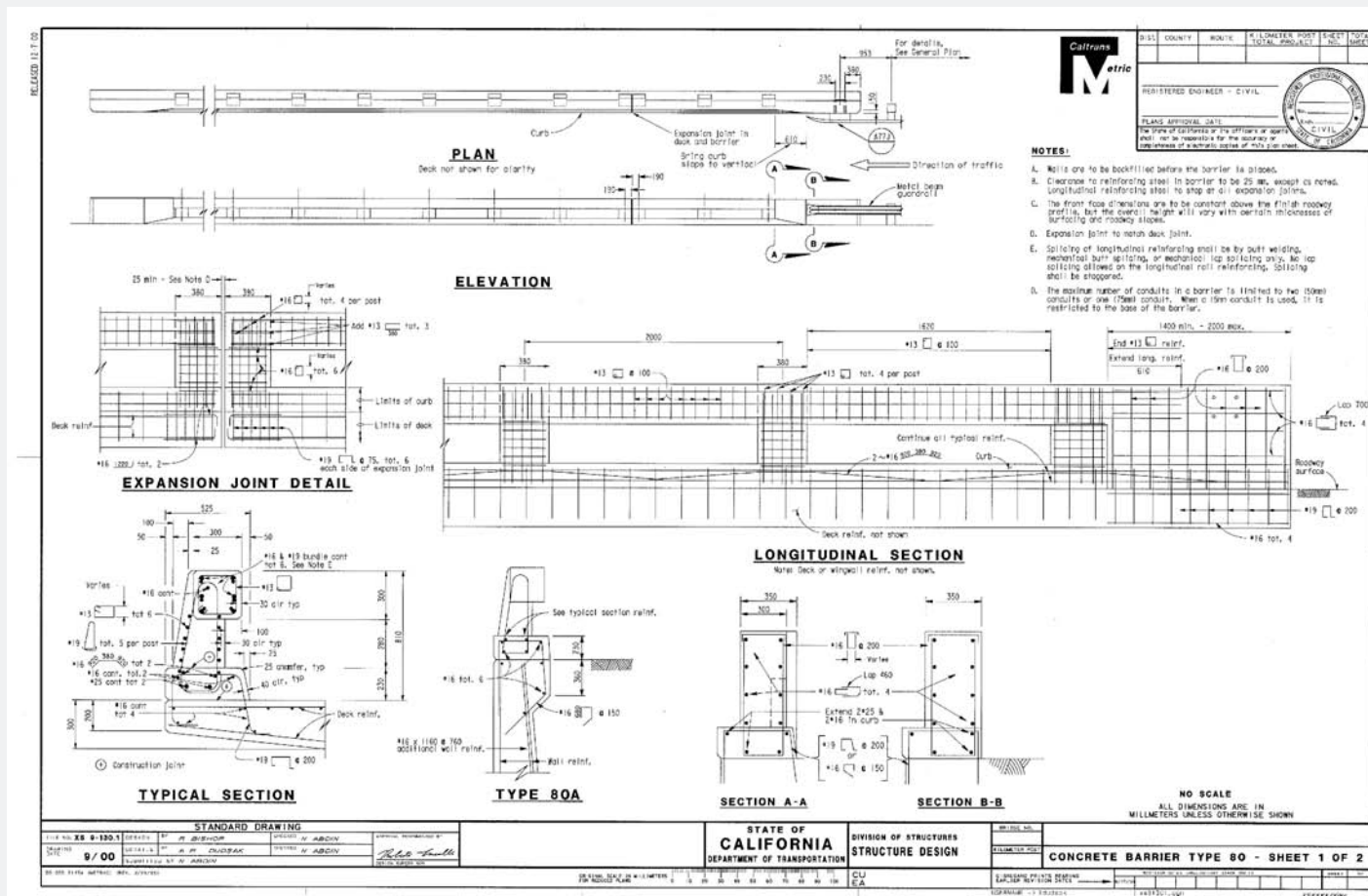
**Test level:**  
TL-4

**Utilized in:**  
California

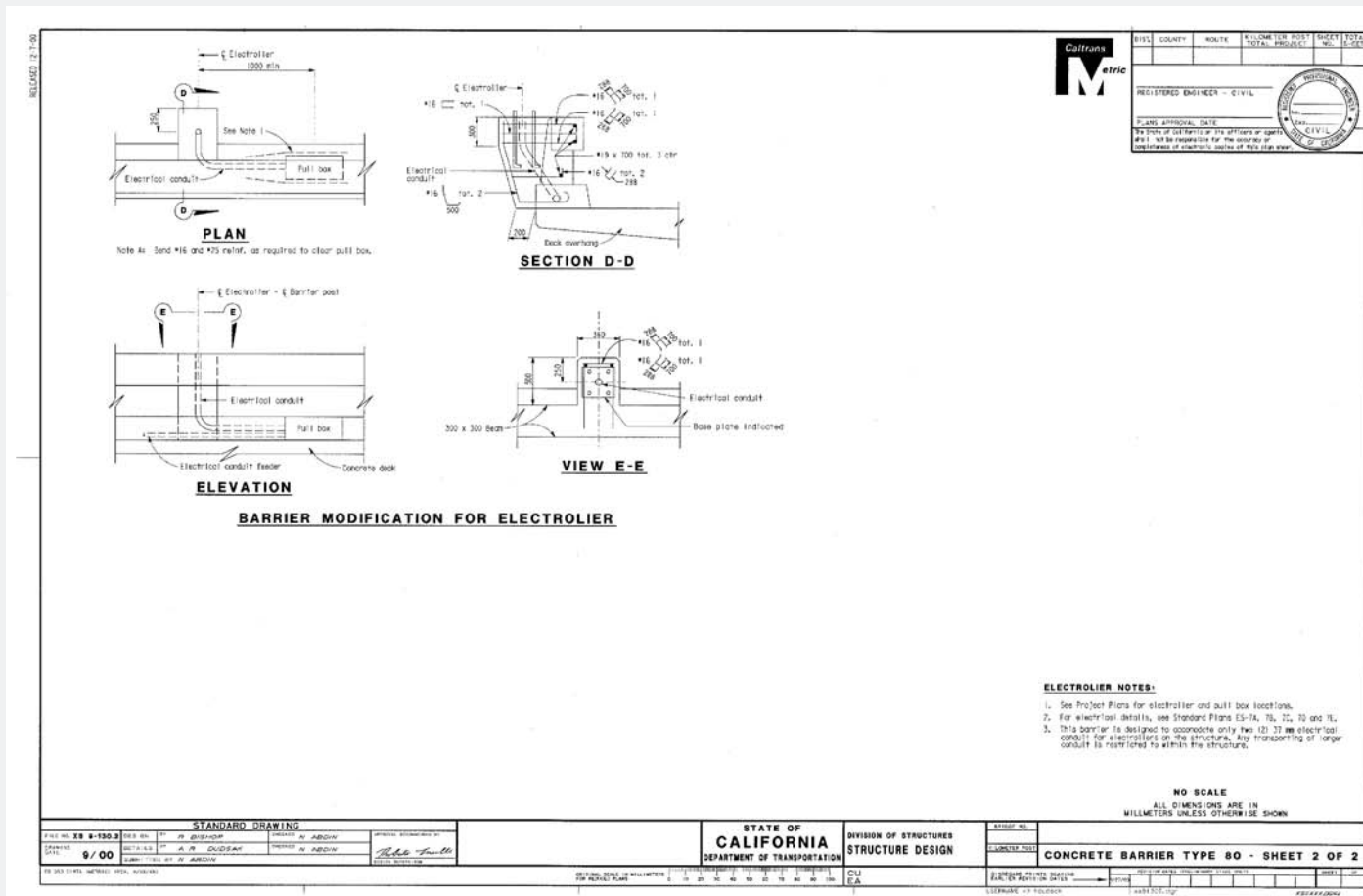
**Contact:**  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805



## Type 80 and 80 SW Concrete Barrier



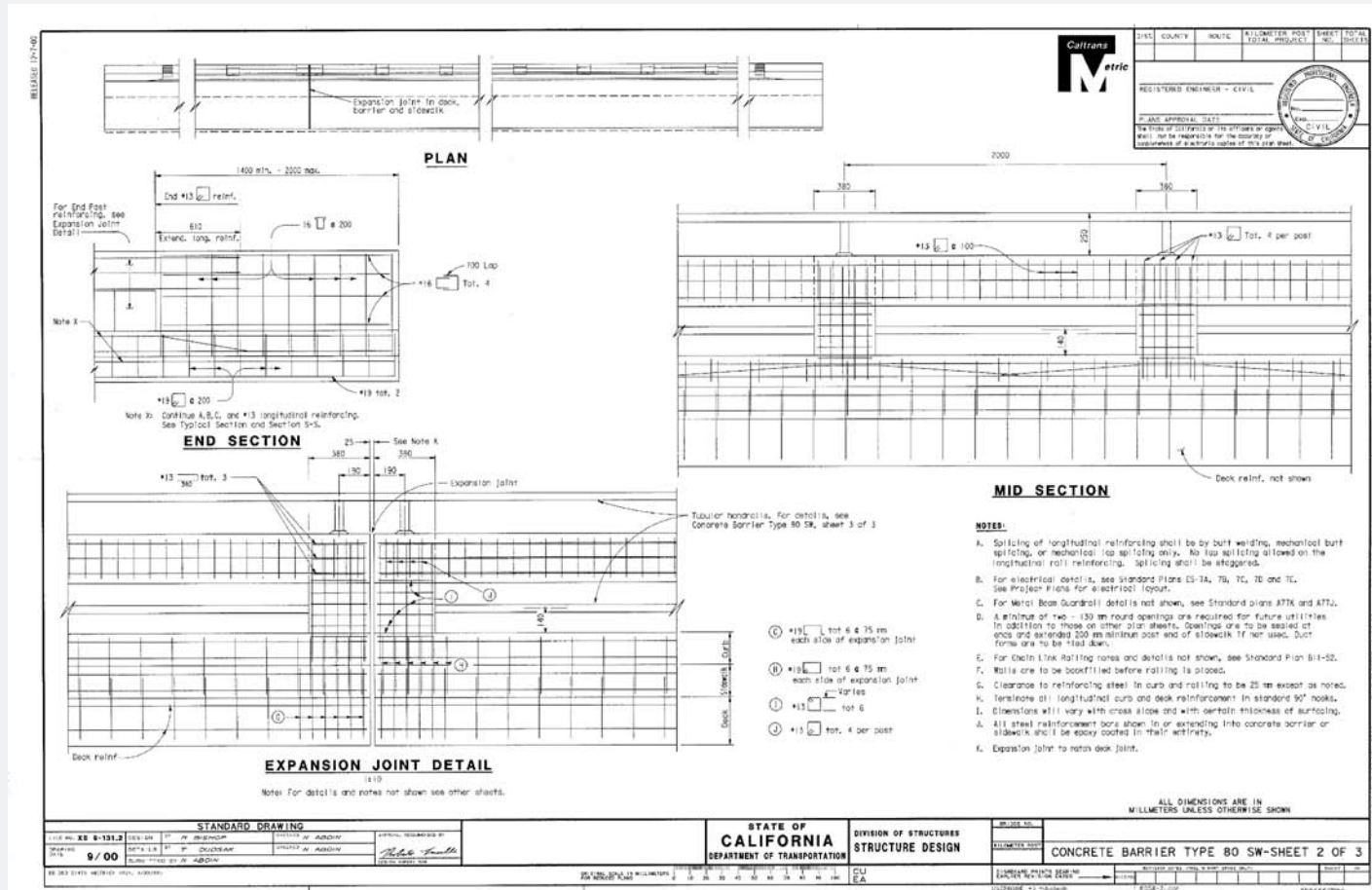
## Type 80 and 80 SW Concrete Barrier



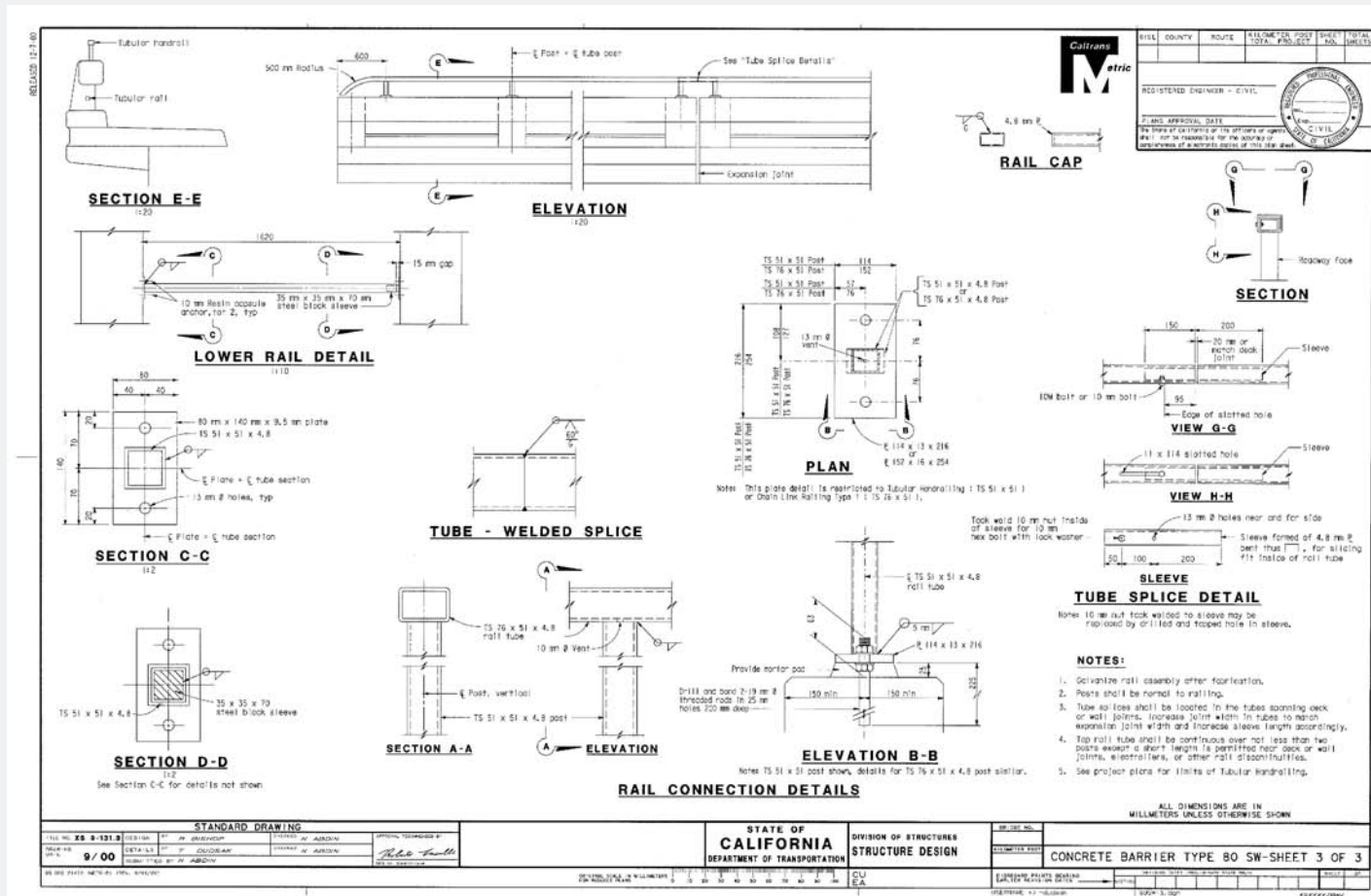




## Type 80 and 80 SW Concrete Barrier



## Type 80 and 80 SW Concrete Barrier



## Baltimore Washington Parkway Stone Rail

**Height:**  
32"

**Cost per linear foot:**  
\$300

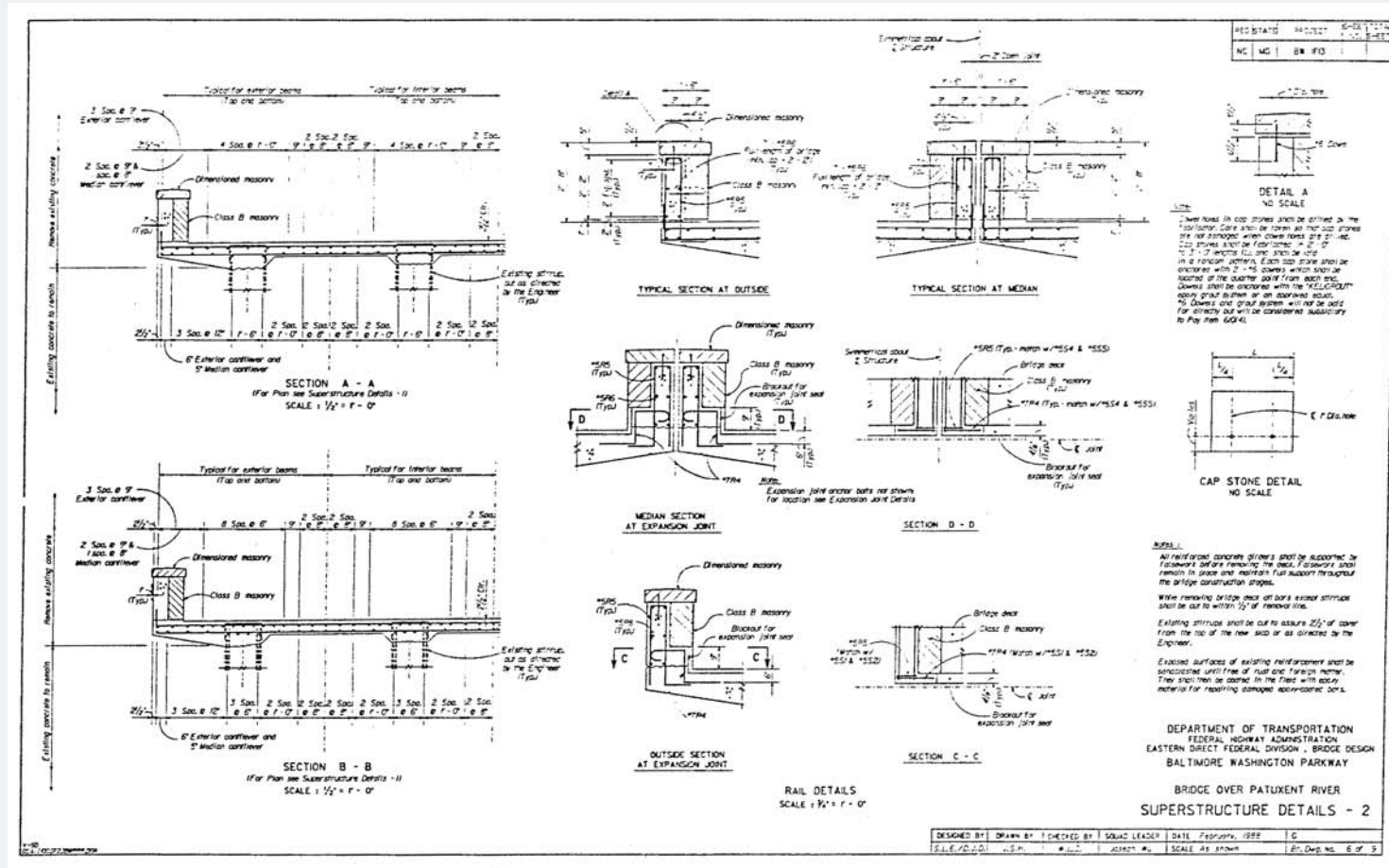
**Test level:**  
TL-3

**Utilized in:**  
Baltimore Washington  
Parkway, Maryland

**Contact:**  
Mark Clabaugh, P.E.  
Federal Lands Bridge Office  
21400 Ridgetop Circle  
Sterling, VA 20166  
(703) 404-6235



## Baltimore Washington Parkway Stone Rail



## Federal Lands Modified Kansas Corral Bridge Rail

**Height:**  
27"

**Cost per linear foot:**  
\$90

**Test level:**  
TL-2

**Utilized in:**  
Federal Lands

**Contact:**  
Mark Clabaugh, P.E.  
Federal Lands Bridge Office  
21400 Ridgetop Circle  
Sterling, VA 20166  
(703) 404-6235





## Natchez Trace Concrete Bridge Rail

**Height:**  
32.5"

**Cost per linear foot:**  
\$90

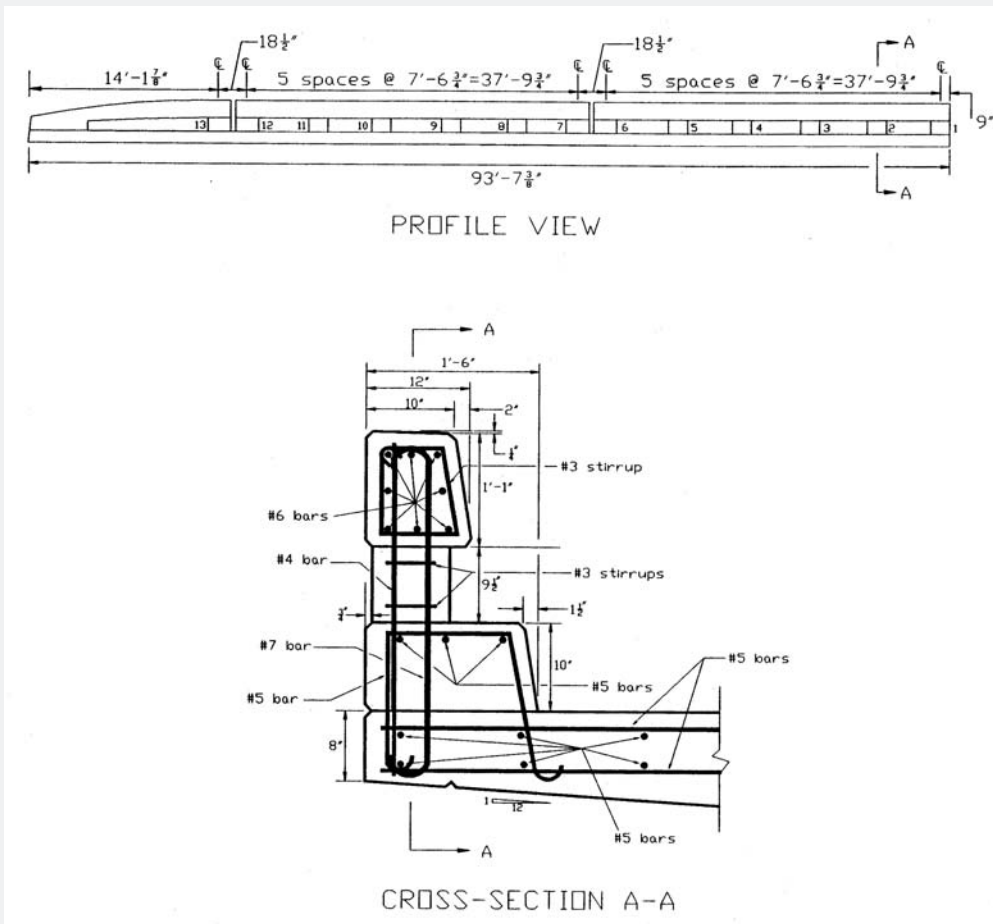
**Test level:**  
TL-3

**Utilized in:**  
Federal Lands

**Contact:**  
Mark Clabaugh, P.E.  
Federal Lands Bridge Office  
21400 Ridgetop Circle  
Sterling, VA 20166  
(703) 404-6235



## Natchez Trace Concrete Bridge Rail





## New Jersey Barrier

**Height:**  
32"

**Cost per linear foot:**  
\$34

**Test level:**  
TL-4

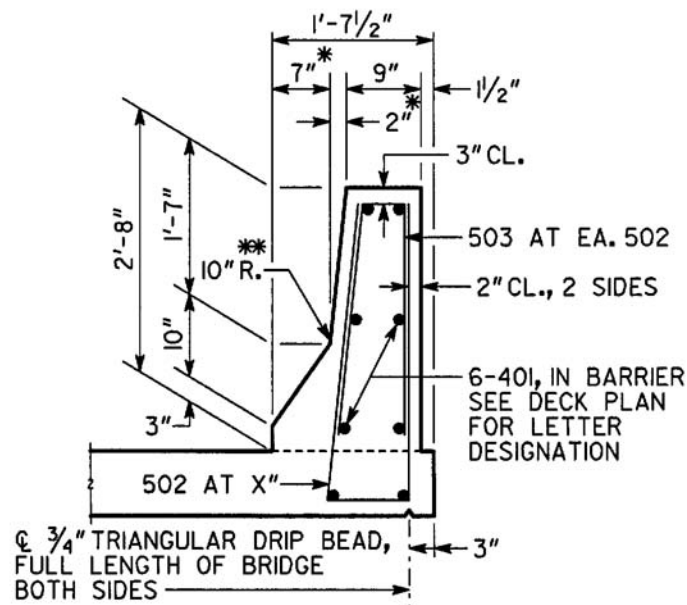
**Utilized in:**  
Georgia

**Contact:**  
Paul Liles  
Georgia Dept of Transportation  
No. 2 Capitol Square, SW  
Atlanta, GA 30334  
(404) 656-5280



## New Jersey Barrier

- \* TAPERS TO 0" AT END POST
- \*\* AT CONTRACTOR'S OPTION, 10" RADIUS MAY BE REPLACED BY STRAIGHT INTERSECTING SLOPES.



New Jersey Concrete Barrier

## Vertical Parapet with Single-Pipe Aluminum Handrail

**Height:**  
42"

**Cost per linear foot:**  
\$80

**Test level:**  
TL-4

**Utilized in:**  
Georgia

**Contact:**  
Paul Liles  
Georgia Dept of Transportation  
No. 2 Capitol Square, SW  
Atlanta, GA 30334  
(404) 656-5280





## Vertical Parapet with Two-Pipe Aluminum Handrail

**Height:**  
42"

**Cost per linear foot:**  
\$90

**Test level:**  
TL-2

**Utilized in:**  
Georgia

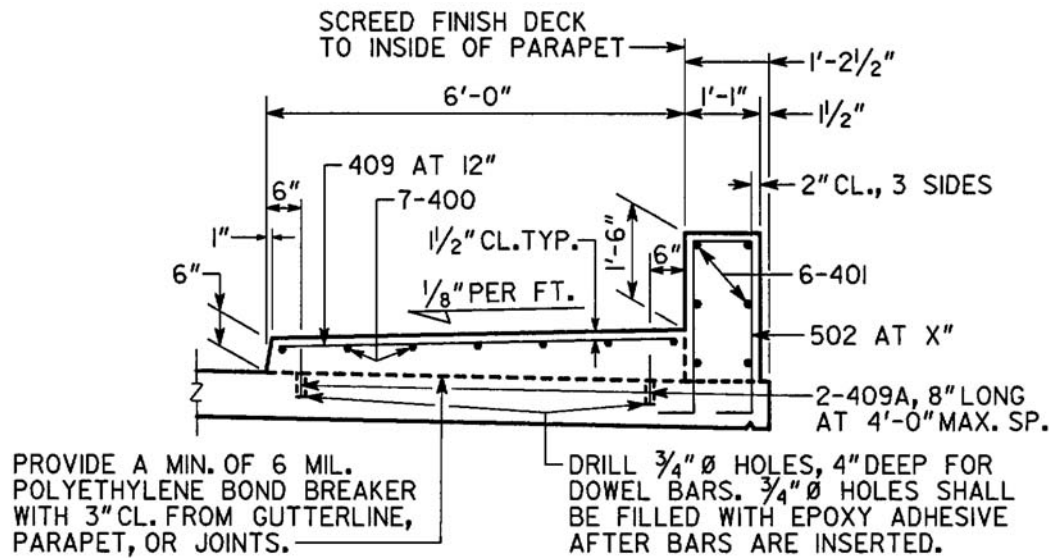
**Contact:**  
Paul Liles  
Georgia Dept of Transportation  
No. 2 Capitol Square, SW  
Atlanta, GA 30334  
(404) 656-5280



## Vertical Parapet with Two-Pipe Aluminum Handrail

PLACE TRANSVERSE SIDEWALK MARKINGS  
ON SIDEWALK SPACED AT 5'-0"±.

COST OF BOND BREAKER AND EPOXY ADHESIVE TO BE  
INCLUDED IN PRICE BID FOR SUPERSTRUCTURE ITEMS.



1'-6" Vertical Parapet and Sidewalk  
(Used With 2'-0" Two Pipe Aluminum Hand Rail)

## Vertical Parapet with Security Fence

**Height:**  
34"

**Cost per linear foot:**  
\$55

**Test level:**  
TL-4

**Utilized in:**  
Georgia

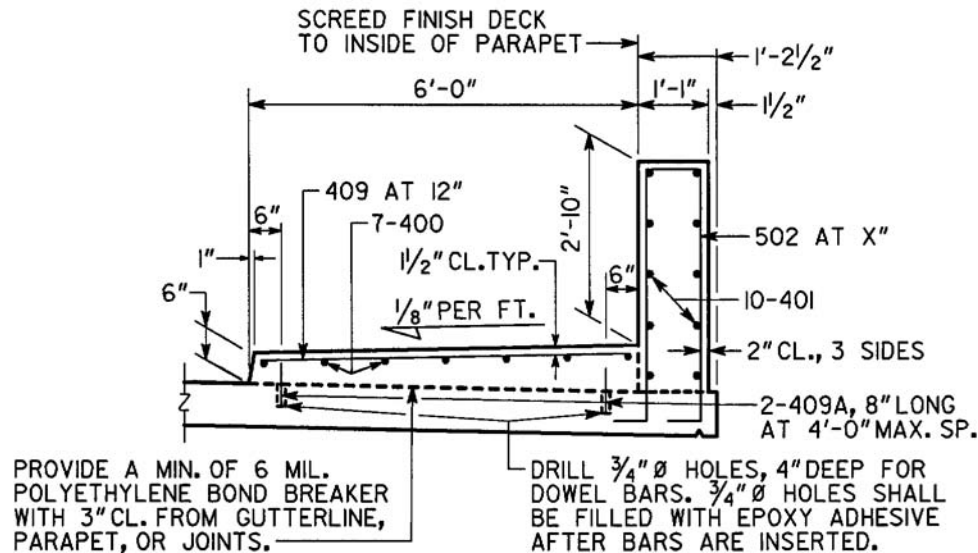
**Contact:**  
Paul Liles  
Georgia Dept of Transportation  
No. 2 Capitol Square, SW  
Atlanta, GA 30334  
(404) 656-5280



## Vertical Parapet with Security Fence

PLACE TRANSVERSE SIDEWALK MARKINGS  
ON SIDEWALK SPACED AT 5'-0"±.

COST OF BOND BREAKER AND EPOXY ADHESIVE TO BE  
INCLUDED IN PRICE BID FOR SUPERSTRUCTURE ITEMS.



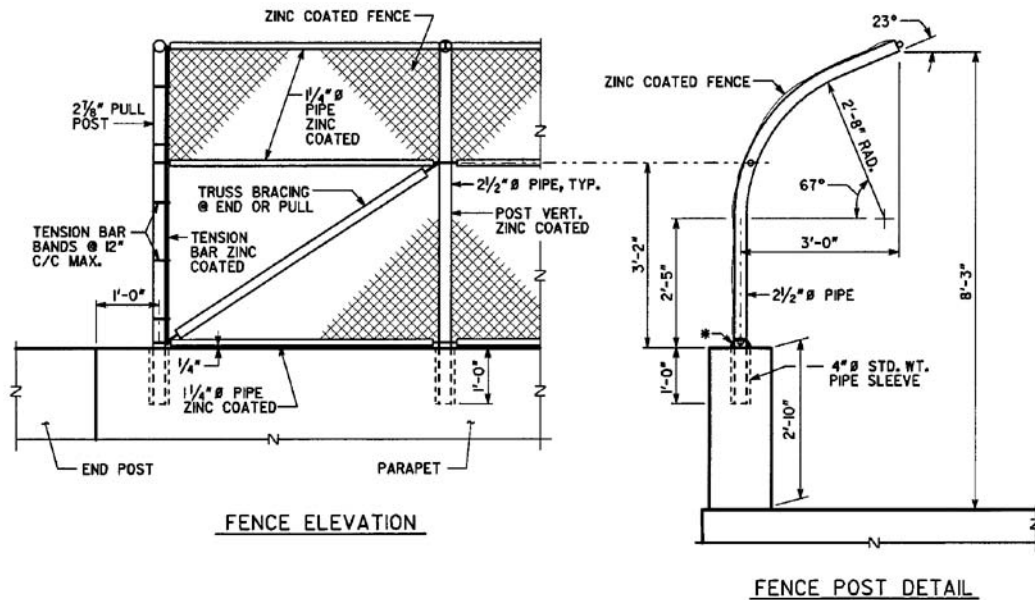
2'-10" Vertical Parapet and Sidewalk  
(Used With Security Fence)



## Vertical Parapet with Security Fence

**FENCE NOTES:**

1. FENCE SHALL BE 9 GAGE CHAIN LINK ZINC COATED TWO INCH SECURITY FENCE.
2. 4"Ø SLEEVE SHALL BE CAST IN THE PARAPET. NON-SHRINK GROUT SHALL BE ALLOWED TO CURE FOR THREE DAYS BEFORE FENCE FABRIC IS INSTALLED.
3. PROVIDE EXPANSION SLEEVE FOR ALL RAILS TO MATCH SUPERSTRUCTURE JOINTS.
4. FOR POST SPACING, SEE BRIDGE SHEET X.
5. FOR FURTHER DETAILS, SEE GEORGIA DOT SPECIFICATIONS SECTIONS 643 AND 894.
6. FABRIC SHALL BE FASTENED TO POST AT INTERVALS NOT GREATER THAN 14".



\* NON-SHRINK PORTLAND CEMENT GROUT, TROWEL TO PROVIDE POSITIVE DRAINAGE.

## Iowa Concrete Open Railing

**Height:**  
29"

**Cost per linear foot:**  
\$36

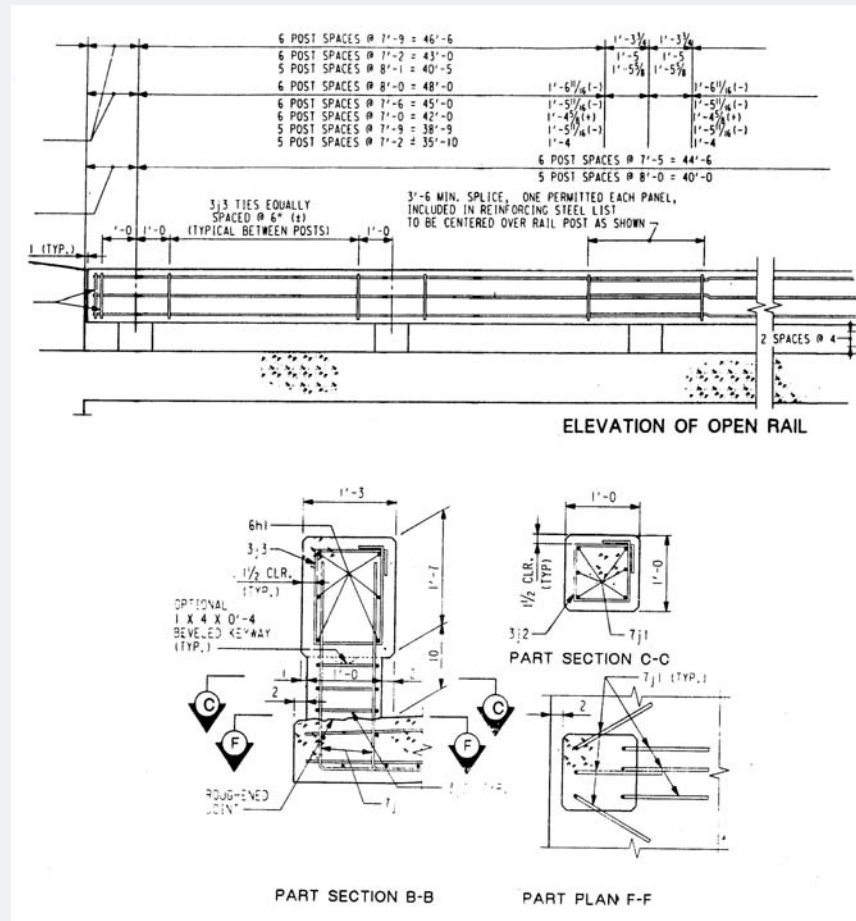
**Test level:**  
TL-2

**Utilized in:**  
Iowa

**Contact:**  
Norman McDonald  
Iowa Dept of Transportation  
800 Lincoln Way  
Ames, IA 50010  
(515) 239-1101



## Iowa Concrete Open Railing



## Iowa Concrete Block Railing Retrofit

**Height:**  
34"

**Cost per linear foot:**  
\$40

**Test level:**  
TL-4

**Utilized in:**  
Iowa

**Contact:**  
Norman McDonald  
Iowa Dept of Transportation  
800 Lincoln Way  
Ames, IA 50010  
(515) 239-1101





## Modified Kansas Corral Rail

**Height:**  
27"

**Cost per linear foot:**  
\$35 (w/out curb)  
\$41 (w/ curb)

**Test level:**  
TL-2

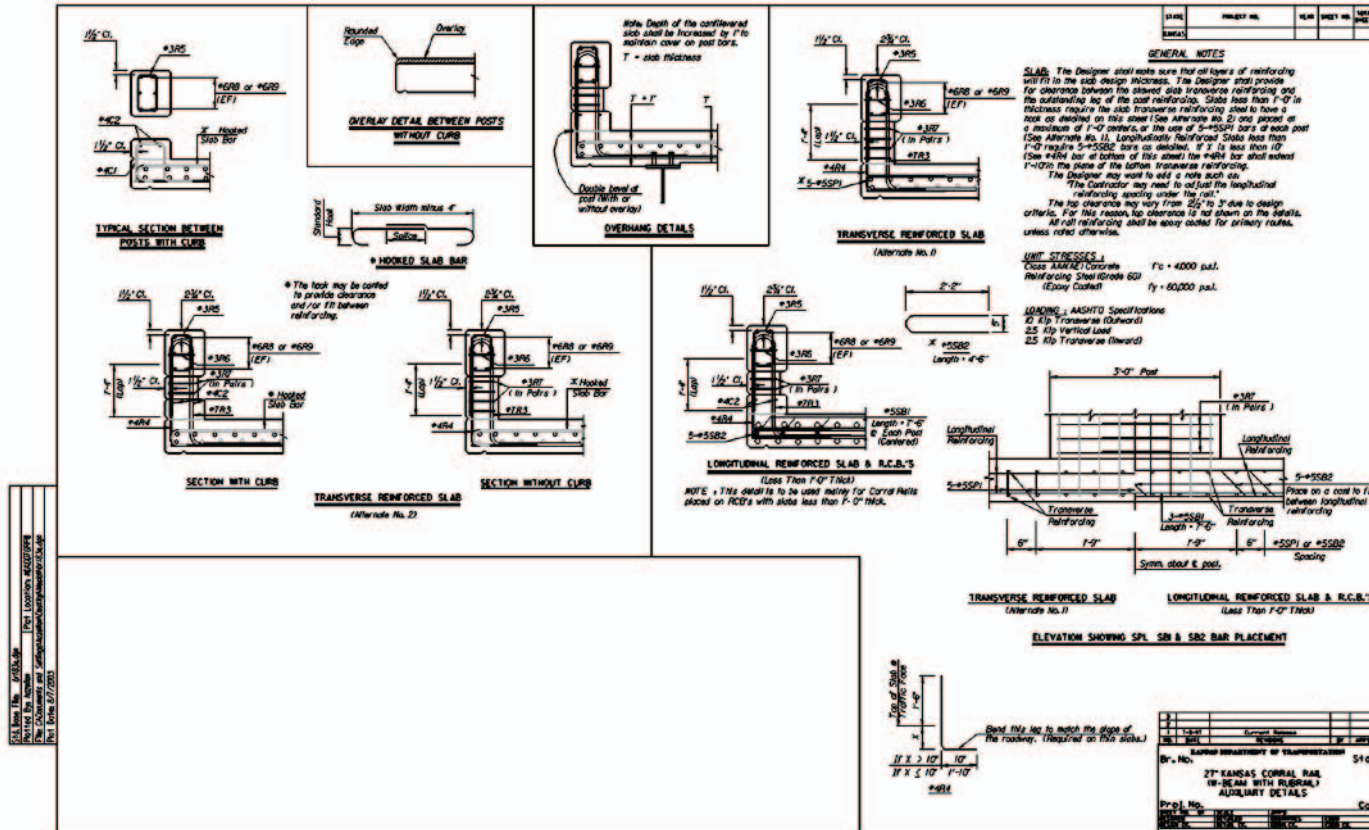
**Utilized in:**  
Kansas

**Contact:**  
Kenneth F. Hurst  
Kansas DOT  
700 Harrison, 13th Floor  
Topeka, KS 66603-3754  
(785) 296-3761





## Modified Kansas Corral Rail





## Kansas 32" Corral Rail

**Height:**  
32"

**Cost per linear foot:**  
\$42 (w/out curb)  
\$48 (w/ curb)

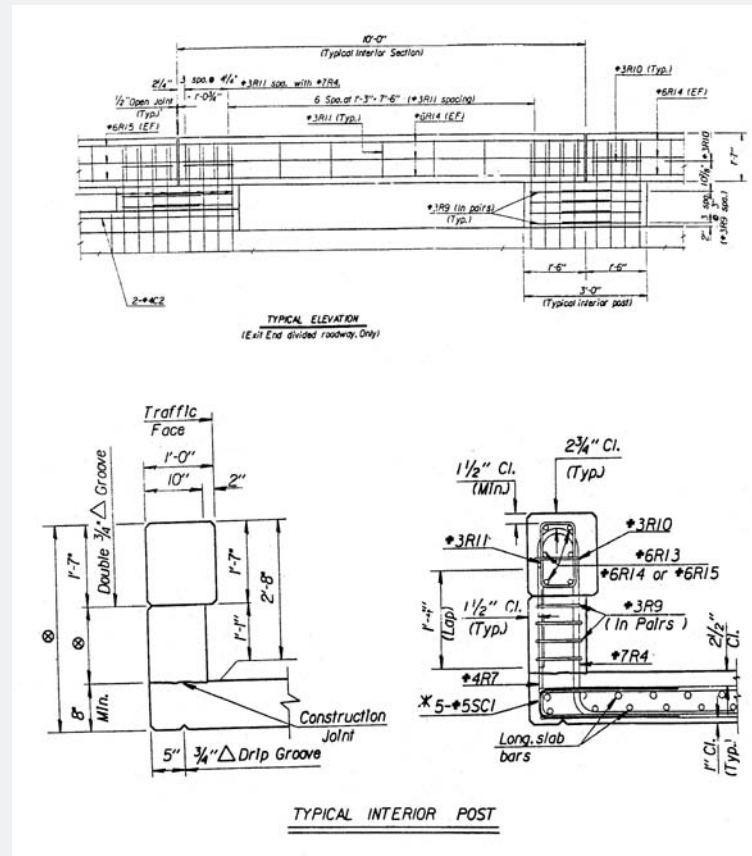
**Test level:**  
TL-4

**Utilized in:**  
Kansas

**Contact:**  
Kenneth F. Hurst  
Kansas DOT  
700 Harrison, 13th Floor  
Topeka, KS 66603-3754  
(785) 296-3761



## Kansas 32" Corral Rail



## 42" Single Slope Concrete Barrier

**Height:**  
42"

**Cost per linear foot:**  
\$70-75

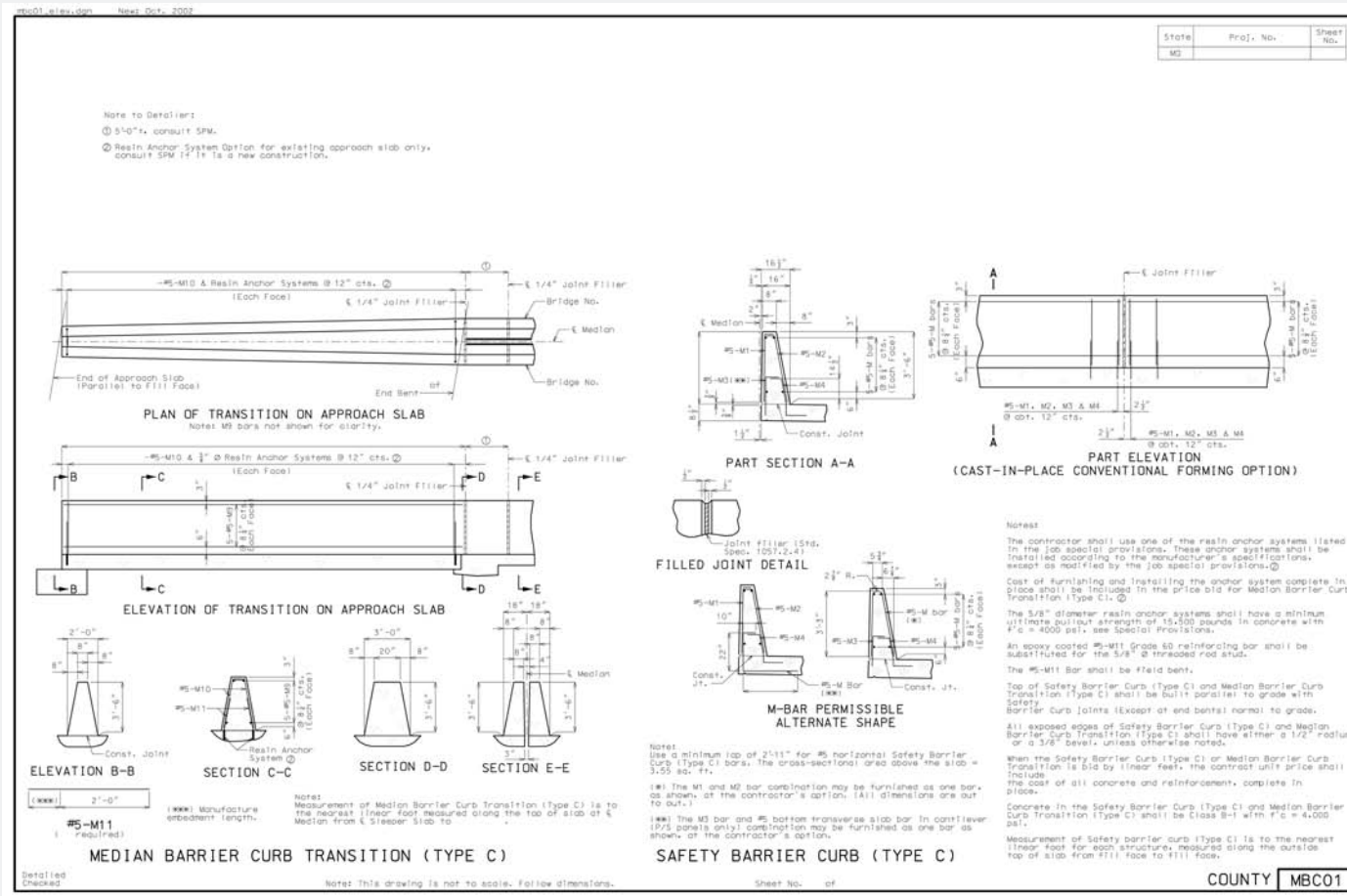
**Test level:**  
TL-5

**Utilized in:**  
Missouri

**Contact:**  
Peter Clogston, P.E.  
Federal Highway Admin,  
Missouri Division Office  
209 Adams Street  
Jefferson City, MO 65101  
(573) 638-2613



## 42" Single Slope Concrete Barrier



## Concrete Beam and Post

**Height:**  
29"

**Cost per linear foot:**  
\$\_\_

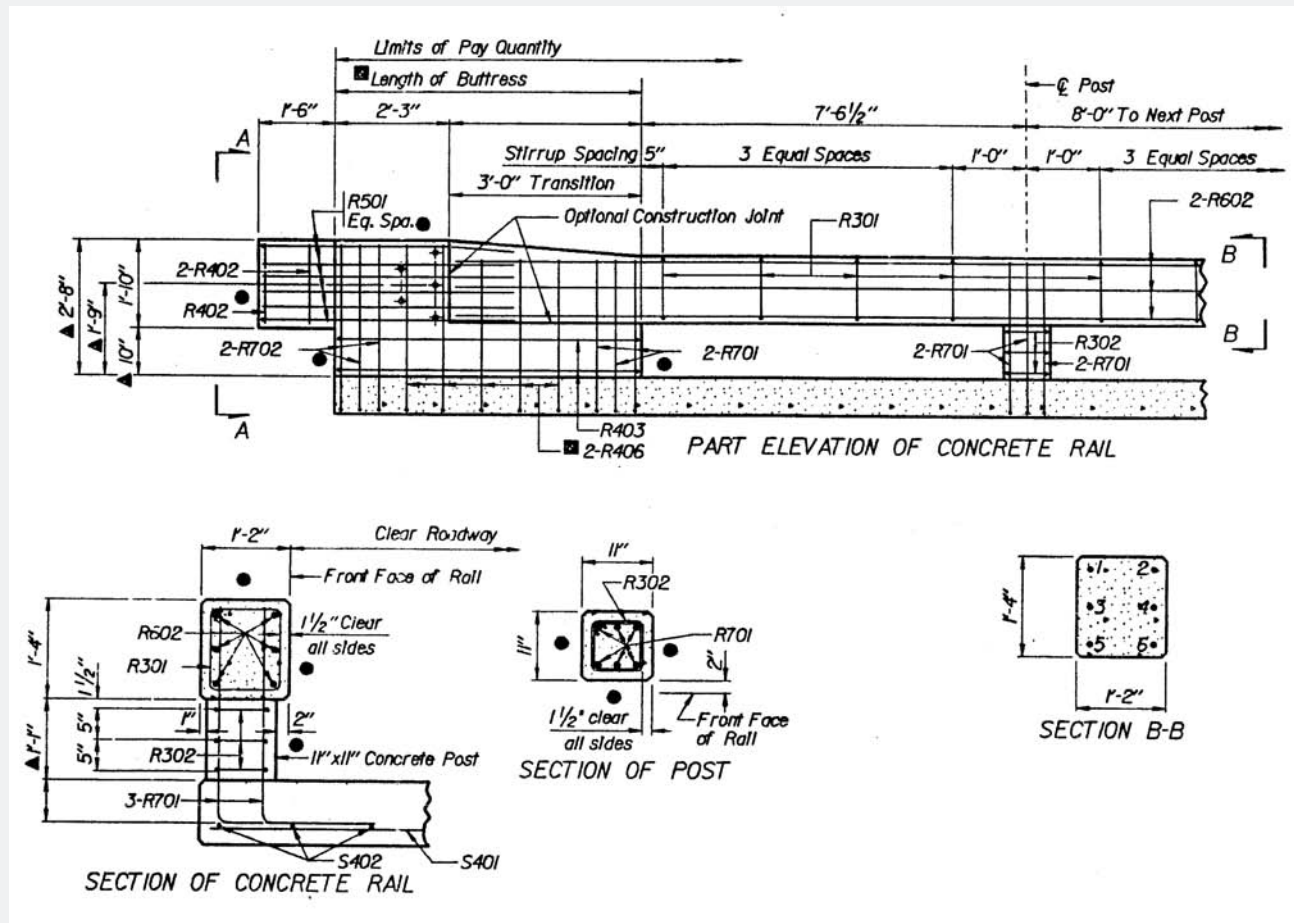
**Test level:**  
TL-2

**Utilized in:**  
Nebraska

**Contact:**  
Milo D. Cress  
Federal Highway  
Administration  
100 Centennial Mall-North  
Room 220  
Lincoln, NE 68508  
(402) 437-5977



## Concrete Beam and Post



## Nebraska Open Concrete Bridge Rail

**Height:**  
29"

**Cost per linear foot:**  
\$\_\_

**Test level:**  
TL-4

**Utilized in:**  
Nebraska

**Contact:**  
Milo D. Cress  
Federal Highway  
Administration  
100 Centennial Mall-North  
Room 220  
Lincoln, NE 68508  
(402) 437-5977







**TR1 Modified Bridge Rail**

**Height:**  
29"

**Cost per linear foot:**  
\$35

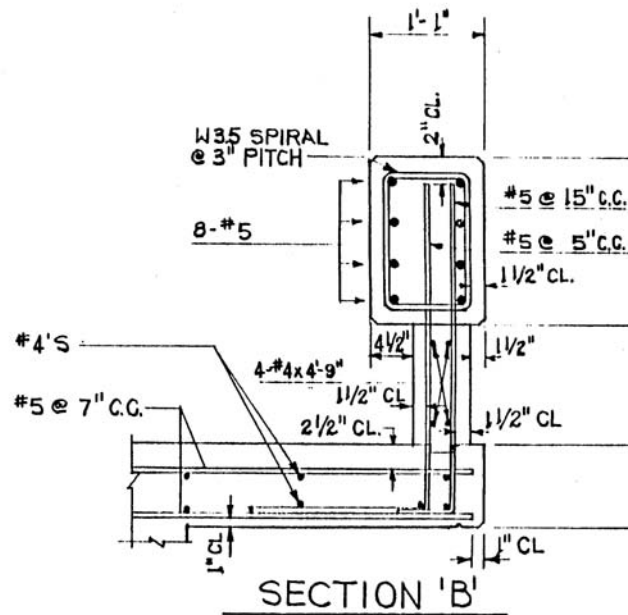
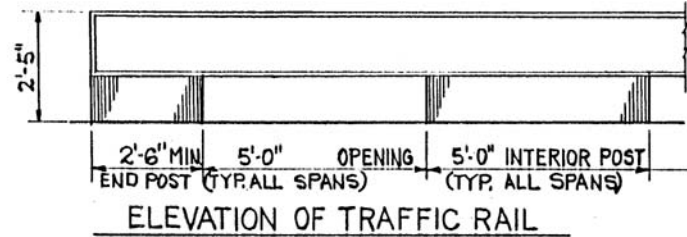
**Test level:**  
TL-2

**Utilized in:**  
Oklahoma

**Contact:**  
Greg Allen  
Oklahoma Dept  
of Transportation  
200 N.E. 21st Street  
Oklahoma City, OK 73105  
(405) 521-2606



TR1 Modified Bridge Rail



## Parapet Flush Mount

**Height:**  
54"

**Cost per linear foot:**  
\$92

**Test level:**  
TL-4

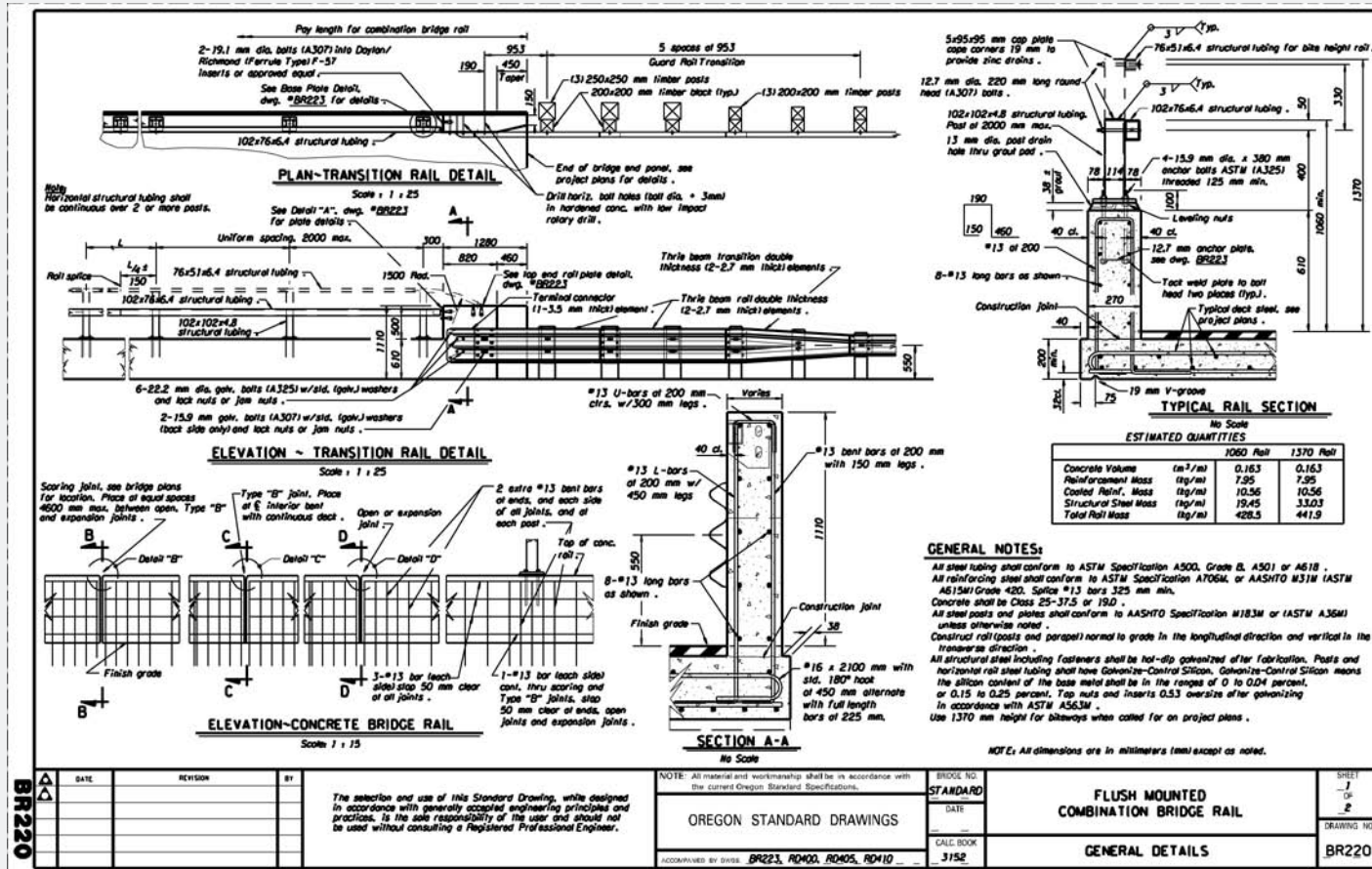
**Utilized in:**  
Oregon

**Contact:**  
Antony P. Stratis, P.E.  
Tech Center Bridge Manager  
Region 1  
123 NW Flanders Street  
Portland, OR 97209  
(503) 731-8490



# Vertical Concrete Parapet

## Parapet Flush Mount



BR220

DATE	REVISION	BY

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications.
OREGON STANDARD DRAWINGS
REVISIONS BY DATE
315E

BROCK NO.	STANDARD
DATE	
CALL BOOK	315E

FLUSH MOUNTED COMBINATION BRIDGE RAIL
GENERAL DETAILS

SHEET	1 OF 2
DRAWING NO.	BR220

## Parapet Sidewalk Mount

**Height:**  
54"

**Cost per linear foot:**  
\$92

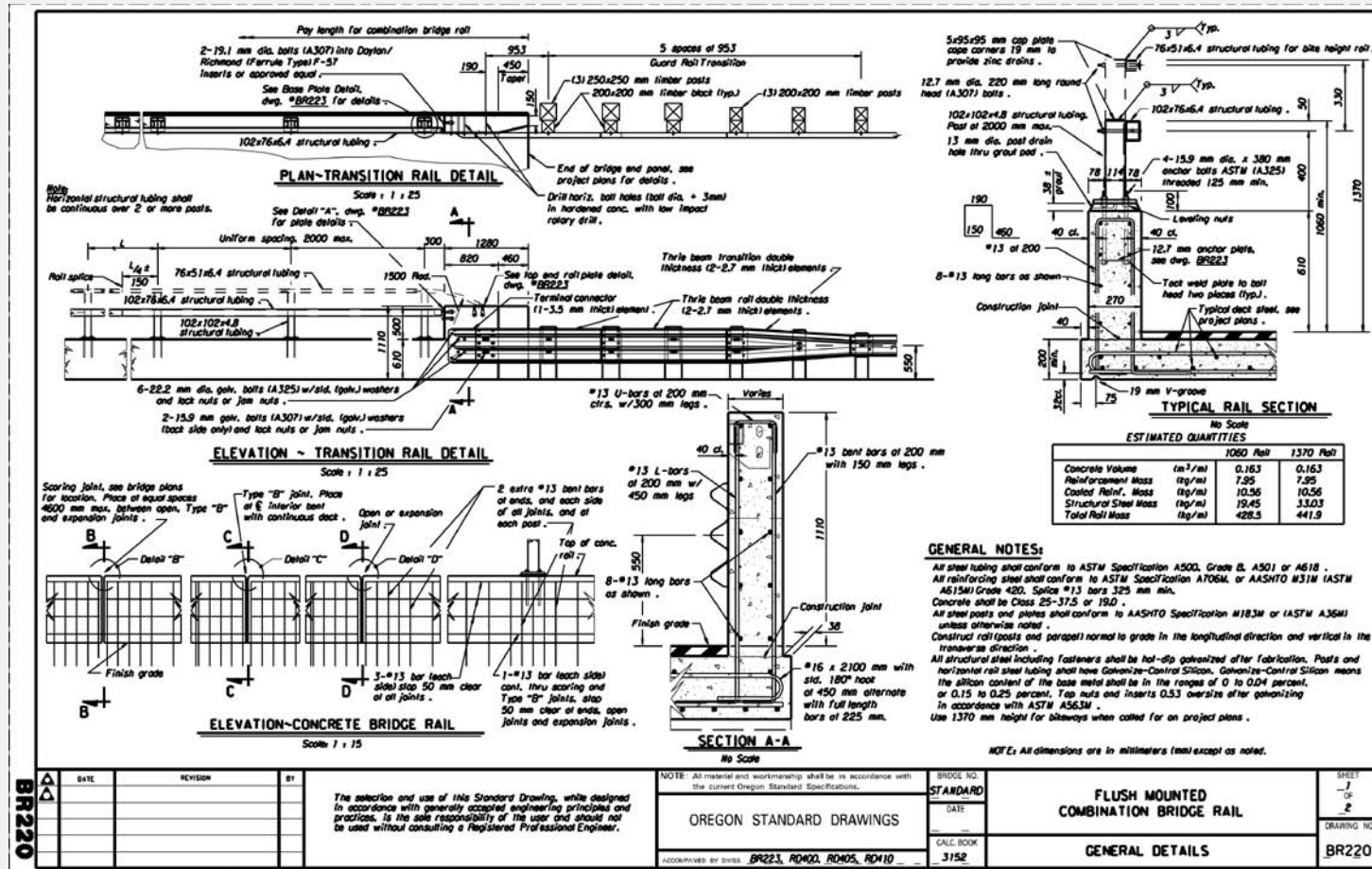
**Test level:**  
TL-4

**Utilized in:**  
Oregon

**Contact:**  
Antony P. Stratis, P.E.  
Tech Center Bridge Manager  
Region 1  
123 NW Flanders Street  
Portland, OR 97209  
(503) 731-8490



## Parapet Sidewalk Mount



## Type T501SW

**Height:**  
72"

**Cost per linear foot:**  
\$107

**Test level:**  
TL-4

**Utilized in:**  
Texas

**Contact:**  
Mark Bloschock  
Texas DOT Bridge Division  
RA118  
125 E. 11th Street  
Austin, TX 78701-2483  
(512) 416-2178



## Type T501SW

Plans Not Yet Available.



## Type C411

**Height:**  
42"

**Cost per linear foot:**  
\$75

**Test level:**  
TL-2

**Utilized in:**  
Texas

**Contact:**  
Mark Bloschock  
Texas DOT Bridge Division  
RA118  
125 E. 11th Street  
Austin, TX 78701-2483  
(512) 416-2178





## Type T203

**Height:**  
27"

**Cost per linear foot:**  
\$38

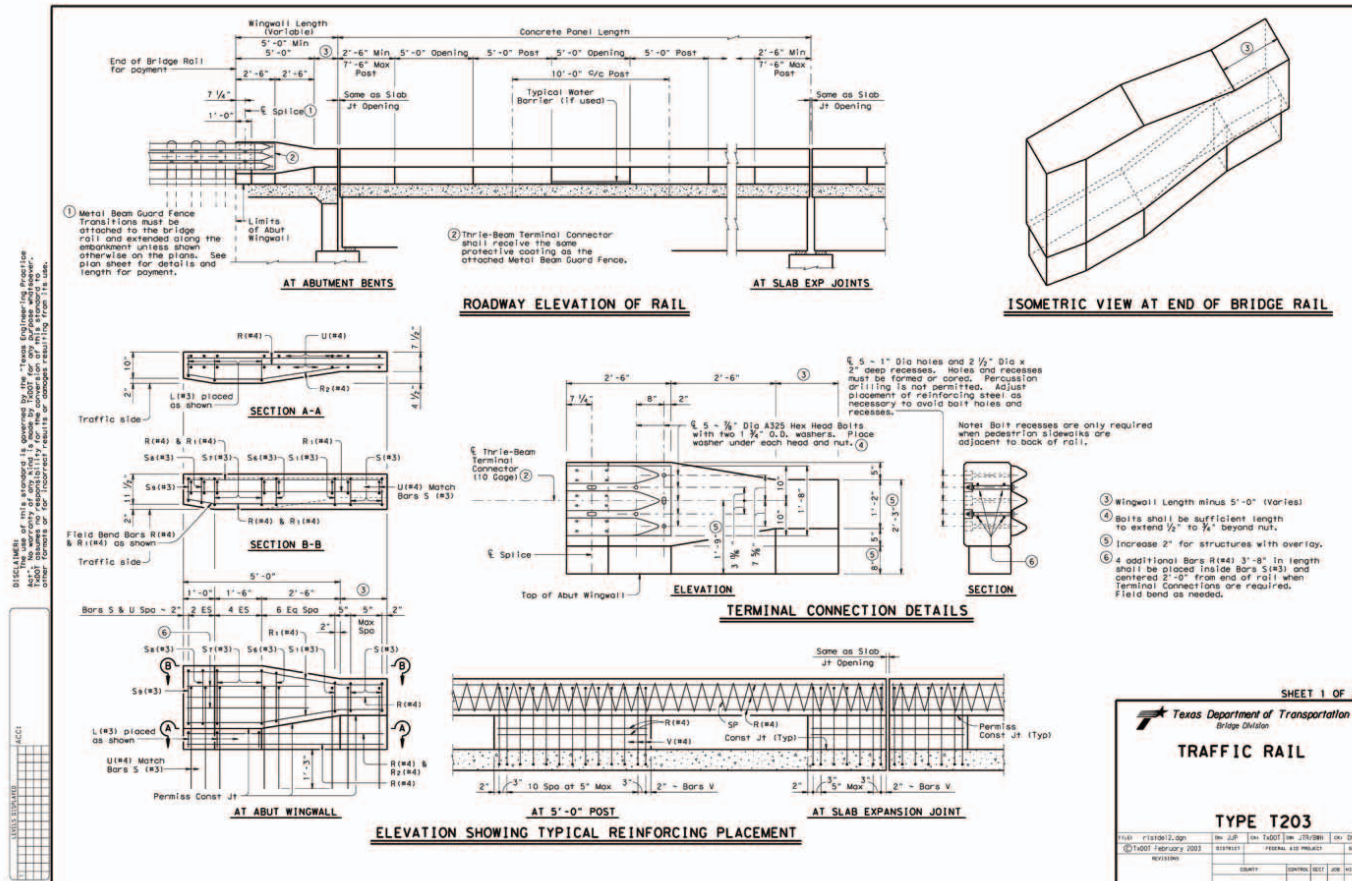
**Test level:**  
TL-3

**Utilized in:**  
Texas

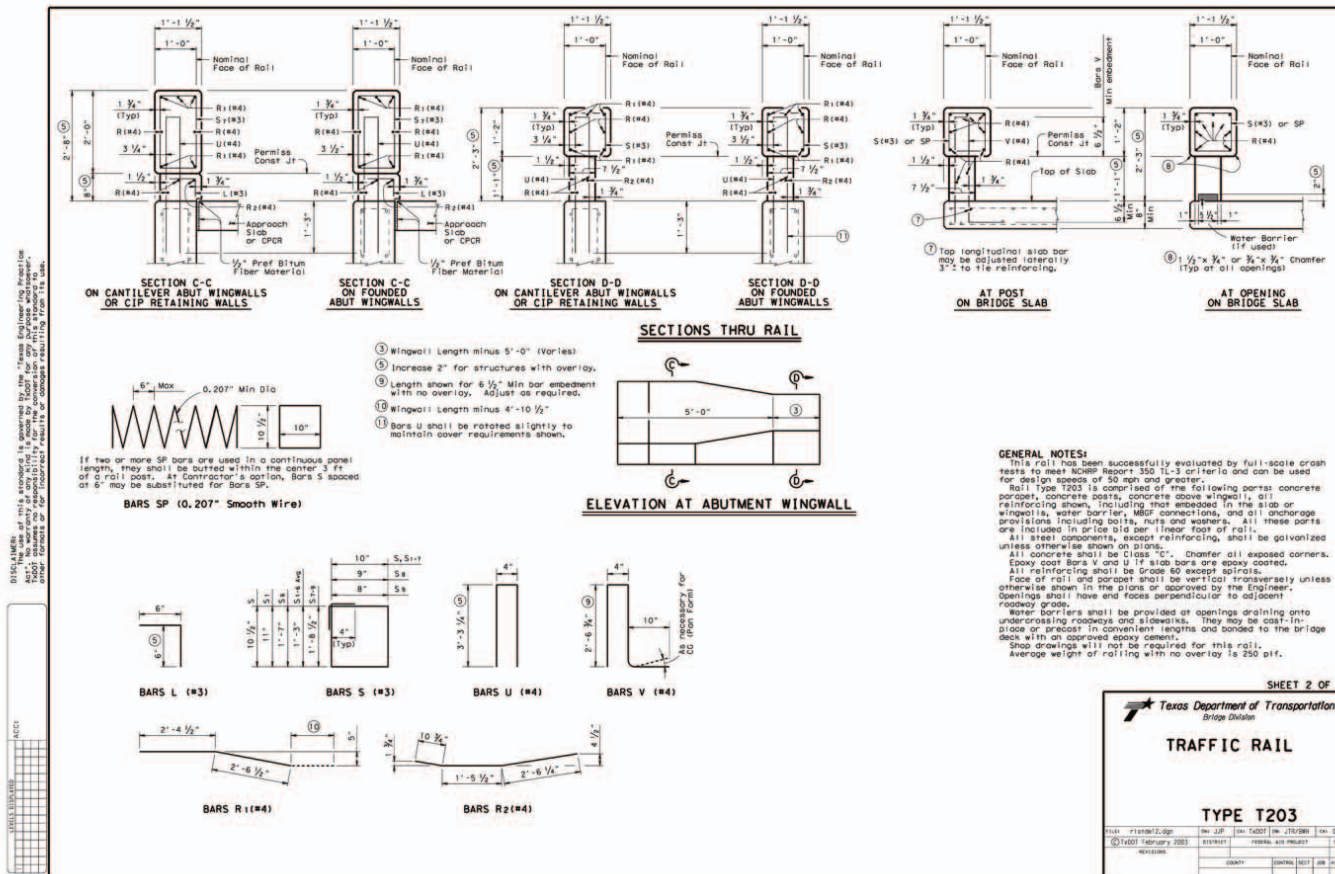
**Contact:**  
Mark Bloschock  
Texas DOT Bridge Division  
RA118  
125 E. 11th Street  
Austin, TX 78701-2483  
(512) 416-2178



## Type T203



## Type T203



## Texas Type T411 Aesthetic Rail

**Height:**  
32"

**Cost per linear foot:**  
\$75

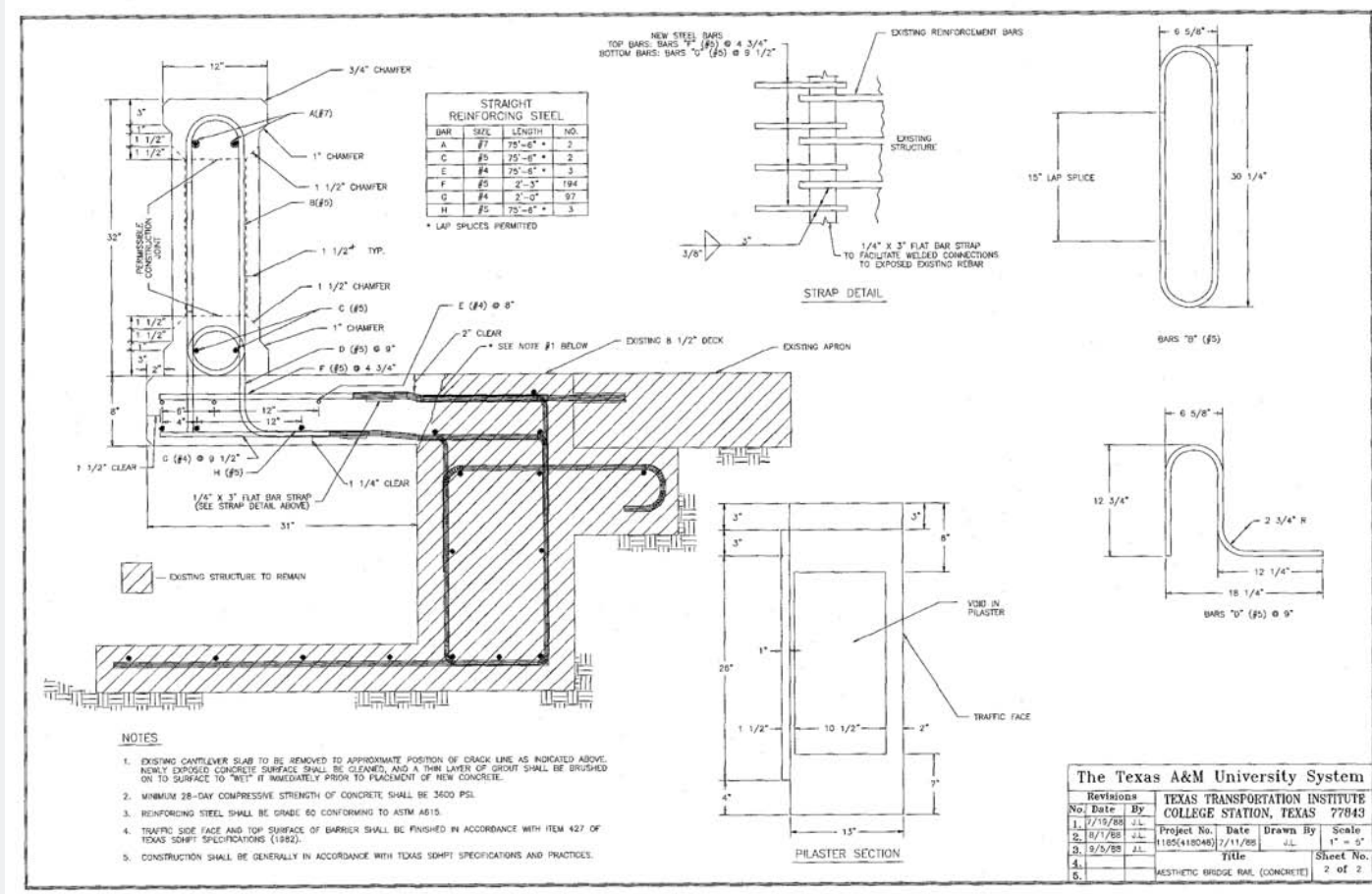
**Test level:**  
TL-2

**Utilized in:**  
Texas

**Contact:**  
Mark Bloschock  
Texas DOT Bridge Division  
RA118  
125 E. 11th Street  
Austin, TX 78701-2483  
(512) 416-2178



## Texas Type T411 Aesthetic Rail



## Texas TT Rail

**Height:**  
90"

**Cost per linear foot:**  
\$250

**Test level:**  
TL-6

**Utilized in:**  
Texas

**Contact:**  
Mark Bloschock  
Texas DOT Bridge Division  
RA118  
125 E. 11th Street  
Austin, TX 78701-2483  
(512) 416-2178







## NJ Barrier

**Height:**  
32"

**Cost per linear foot:**  
\$50-55

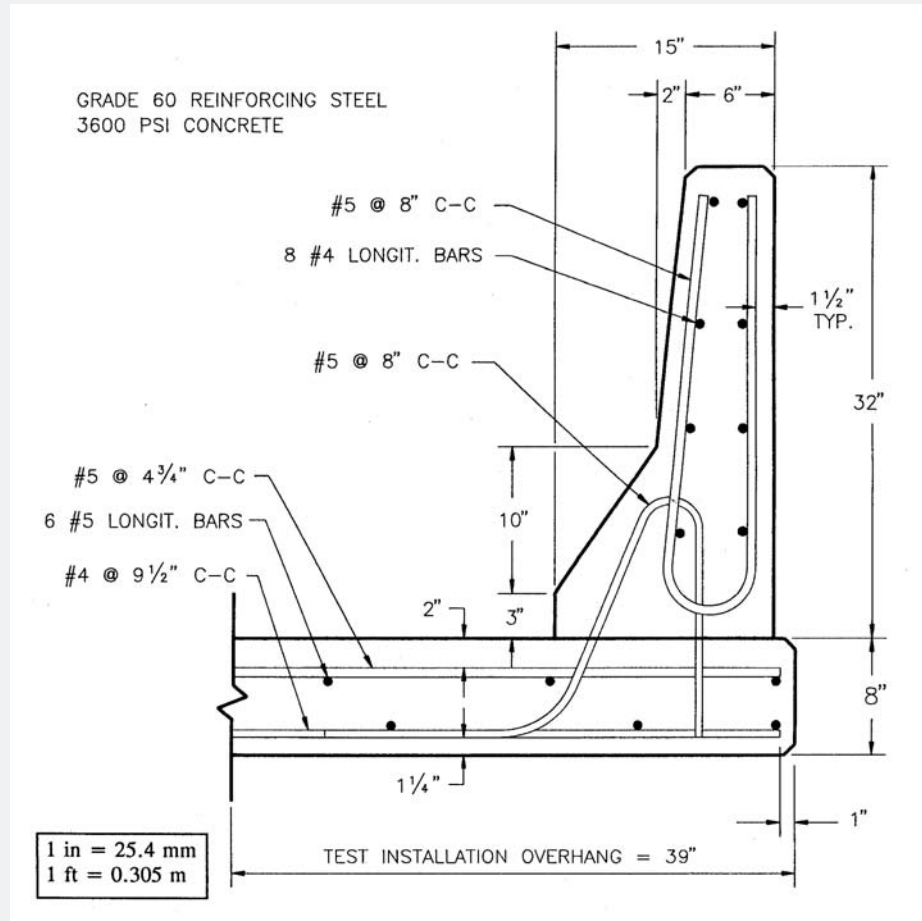
**Test level:**  
TL-4

**Utilized in:**  
Missouri

**Contact:**  
Peter Clogston, P.E.  
Federal Highway Admin,  
Missouri Division Office, RA118  
209 Adams Street  
Jefferson City, MO 65101  
(573) 638-2613



## NJ Barrier



## New Jersey Concrete Barrier

**Height:**  
32"

**Cost per linear foot:**  
\$50

**Test level:**  
TL-4

**Utilized in:**  
California

**Contact:**  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805





### Type 26 Concrete Barrier with Sidewalk

**Height:**  
36"

**Cost per linear foot:**  
\$90

**Test level:**  
TL-2

**Utilized in:**  
California

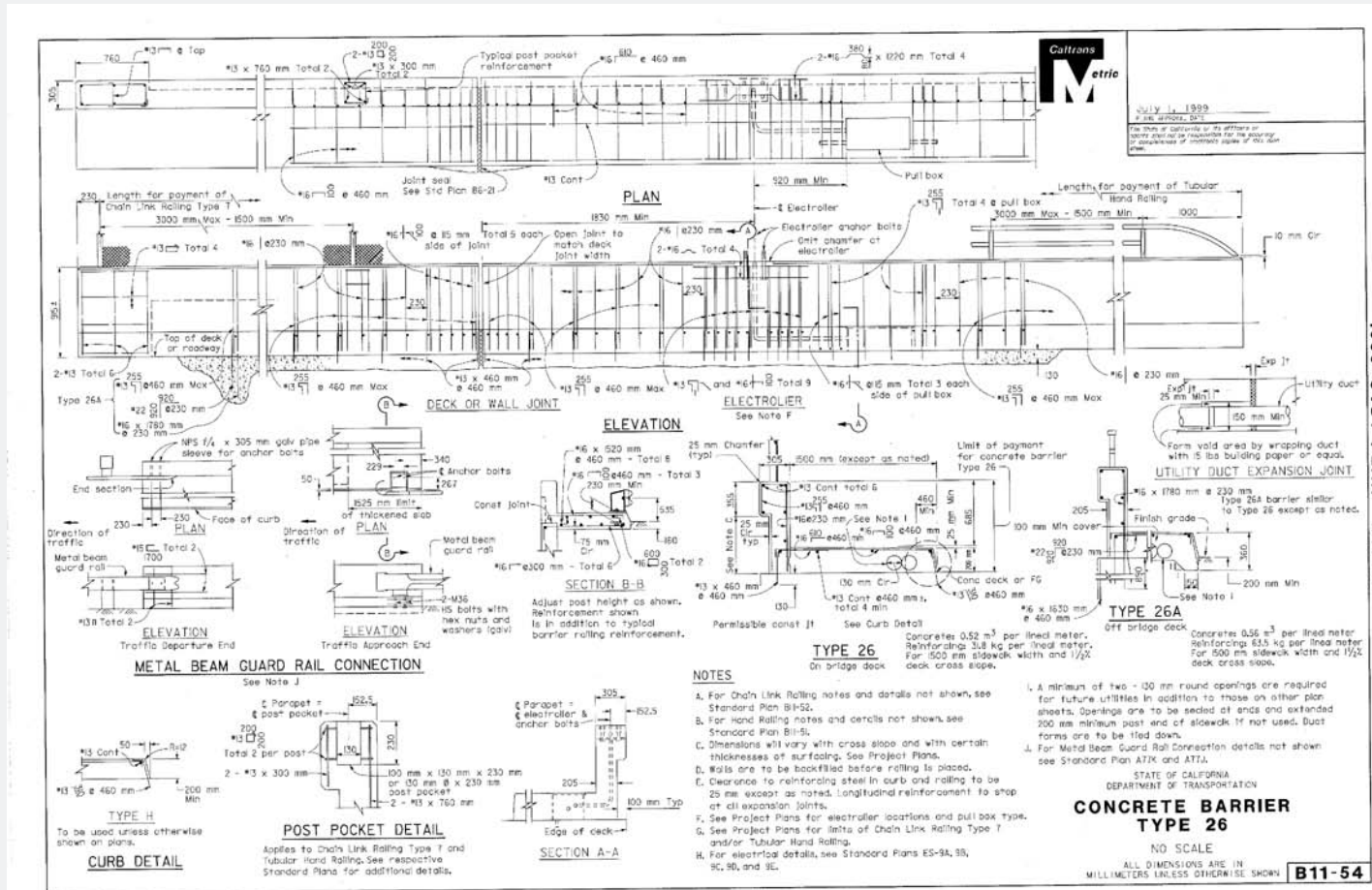
**Contact:**  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805



# Section 4

# Vertical Concrete Parapet with Aluminum Tube Bridge Rail

## Type 26 Concrete Barrier with Sidewalk



## Type 732 Concrete Barrier

**Height:**  
32"

**Cost per linear foot:**  
\$70

**Test level:**  
TL-4

**Utilized in:**  
California

**Contact:**  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805







## Type 736 Concrete Barrier

**Height:**  
36"

**Cost per linear foot:**  
\$70

**Test level:**  
TL-4

**Utilized in:**  
California

**Contact:**  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805





## Type 742 Concrete Barrier

**Height:**  
42"

**Cost per linear foot:**  
\$85

**Test level:**  
TL-5

**Utilized in:**  
California

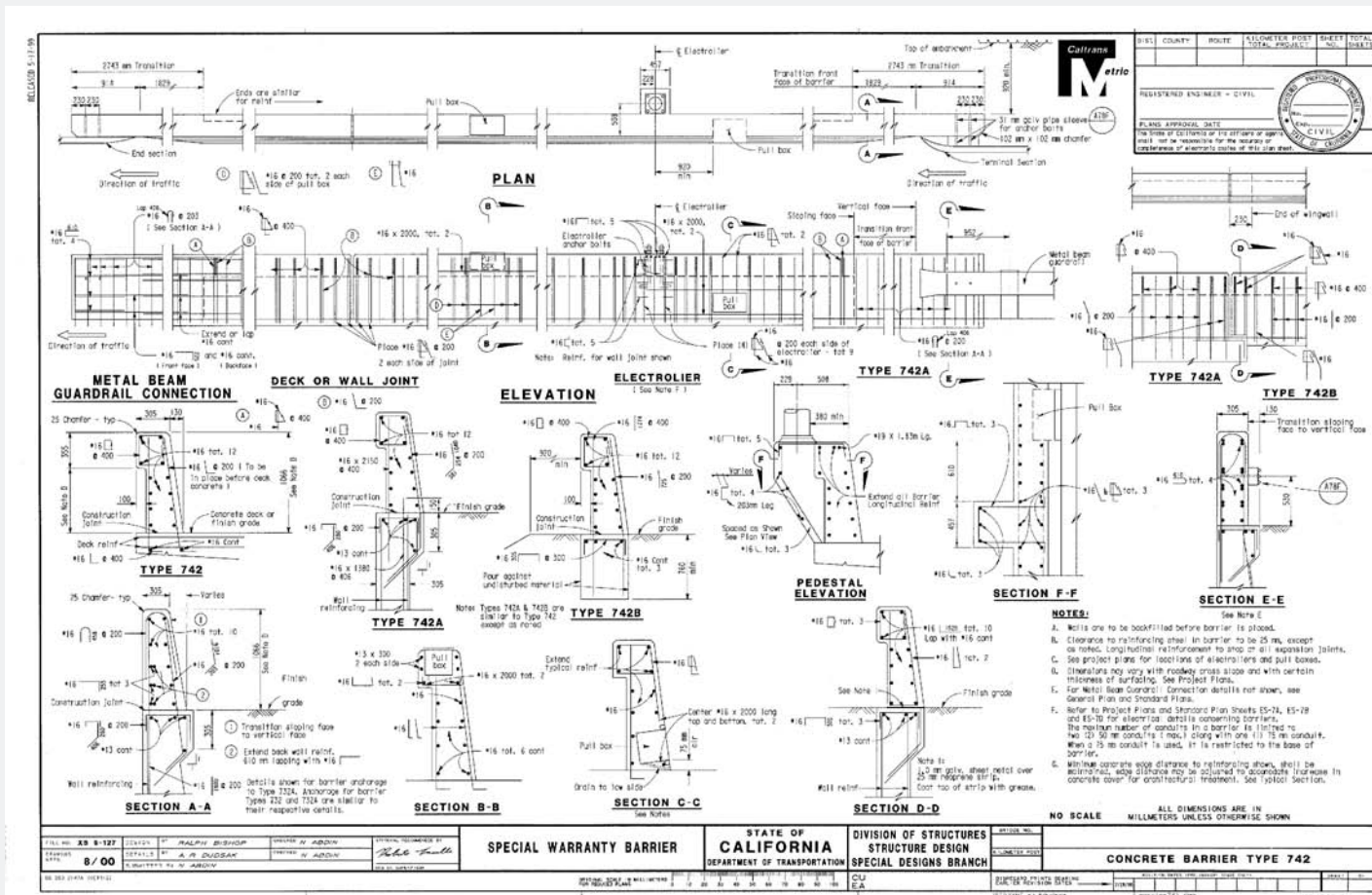
**Contact:**  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805



# Section 4

# Vertical Concrete Parapet with Aluminum Tube Bridge Rail

## Type 742 Concrete Barrier



## LB Foster Precast NJ Shape, Bolted Down

**Height:**  
34"

**Cost per linear foot:**  
\$\_

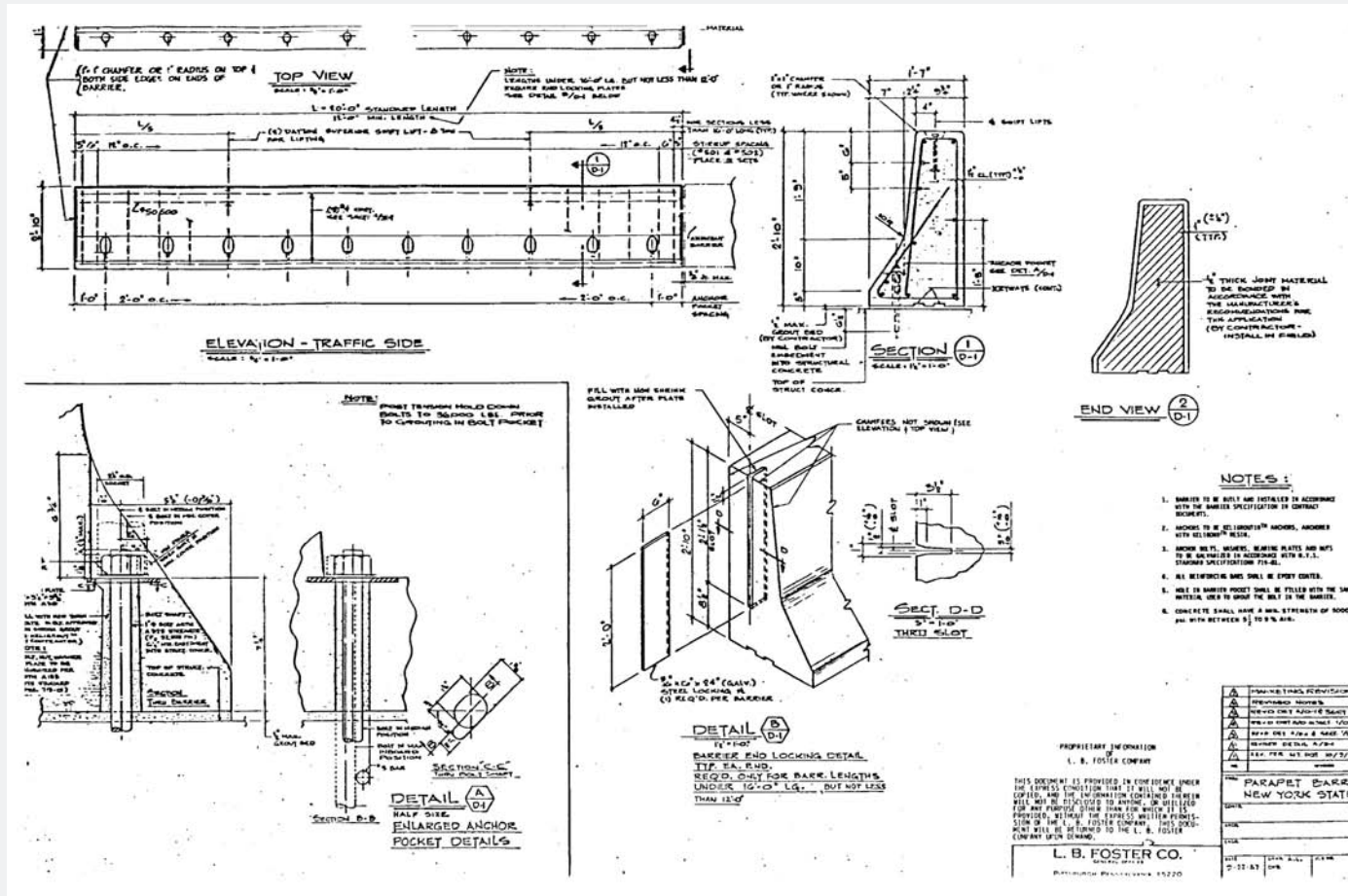
**Test level:**  
TL-4

**Utilized in:**  
New Jersey

**Contact:**  
Jose Lopez  
New Jersey Dept  
of Transportation  
1035 Parkway Avenue  
Trenton, NJ 08625  
(609) 530-2457

Photo Not Yet Available

## LB Foster Precast NJ Shape, Bolted Down



## California Type 20

**Height:**  
39"

**Cost per linear foot:**  
\$\_

**Test level:**  
TL-3

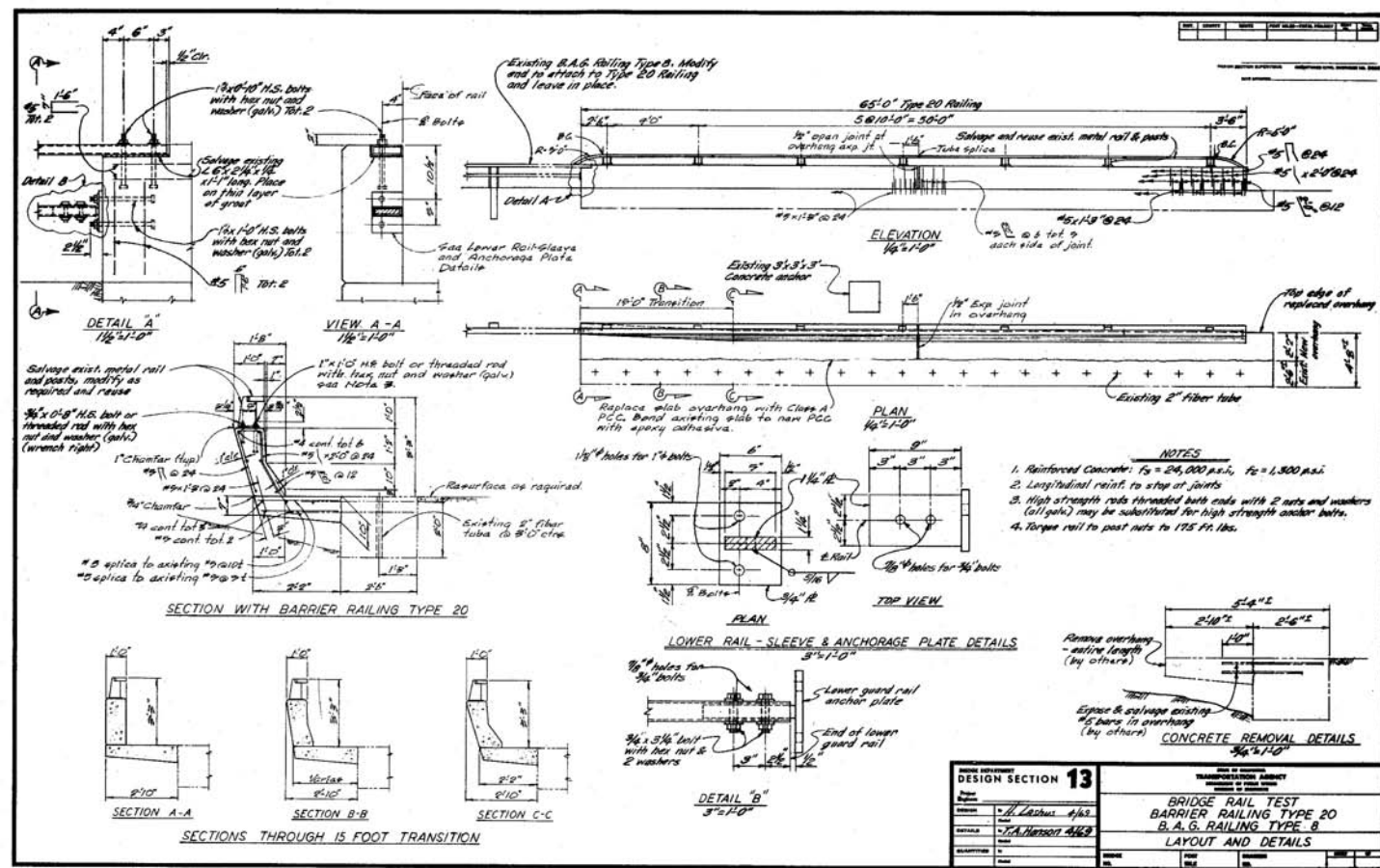
**Utilized in:**  
California

**Contact:**  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805

**Photo Not Yet Available.**



## California Type 20



## New Jersey Barrier with 22" Steel Bicycle Rail

**Height:**  
54"

**Cost per linear foot:**  
\$68

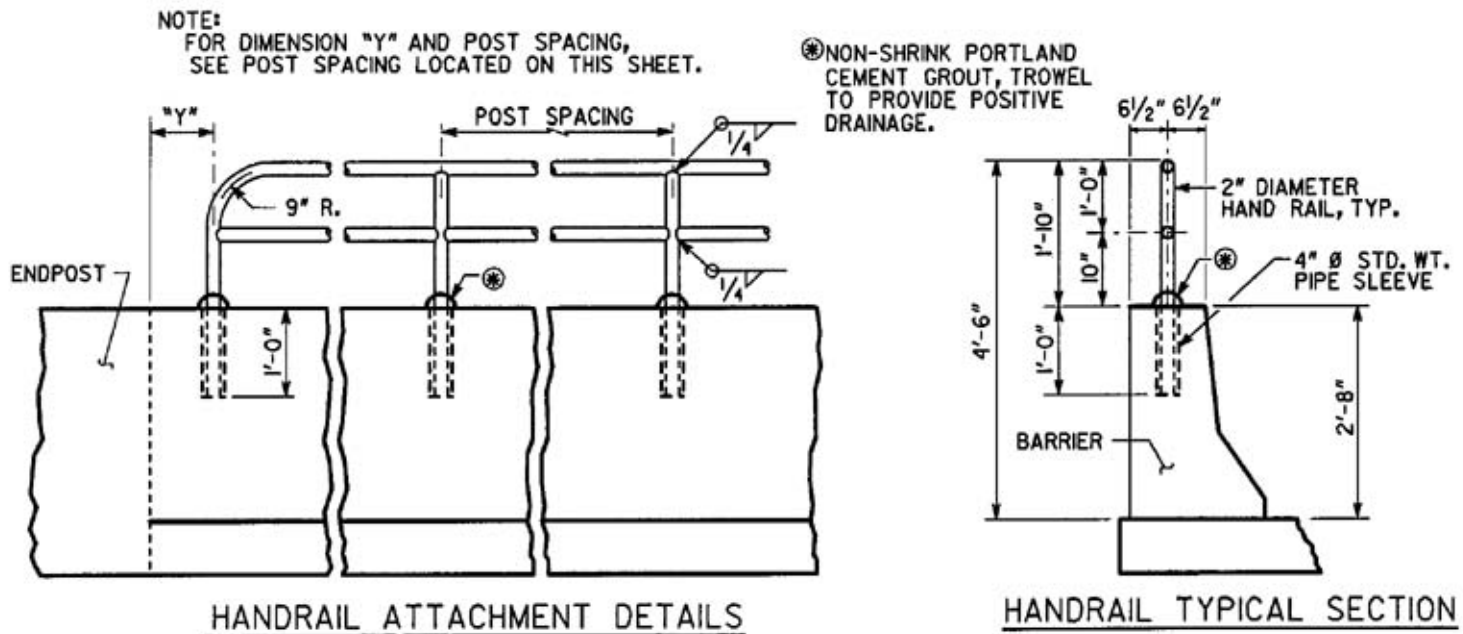
**Test level:**  
TL-4

**Utilized in:**  
Georgia

**Contact:**  
Paul Liles  
Georgia Dept of Transportation  
No. 2 Capitol Square, SW  
Atlanta, GA 30334  
(404) 656-5280



## New Jersey Barrier with 22" Steel Bicycle Rail



NOTE: FOR ADDITIONAL DETAILS SEE GA. STD. 9031-R.

New Jersey Concrete Barrier with 1'-10" Steel Bicycle Rail

## Bicycle Rail Attachment to Safety Shape Concrete Rail

**Height:**  
54.5"

**Cost per linear foot:**  
\$75

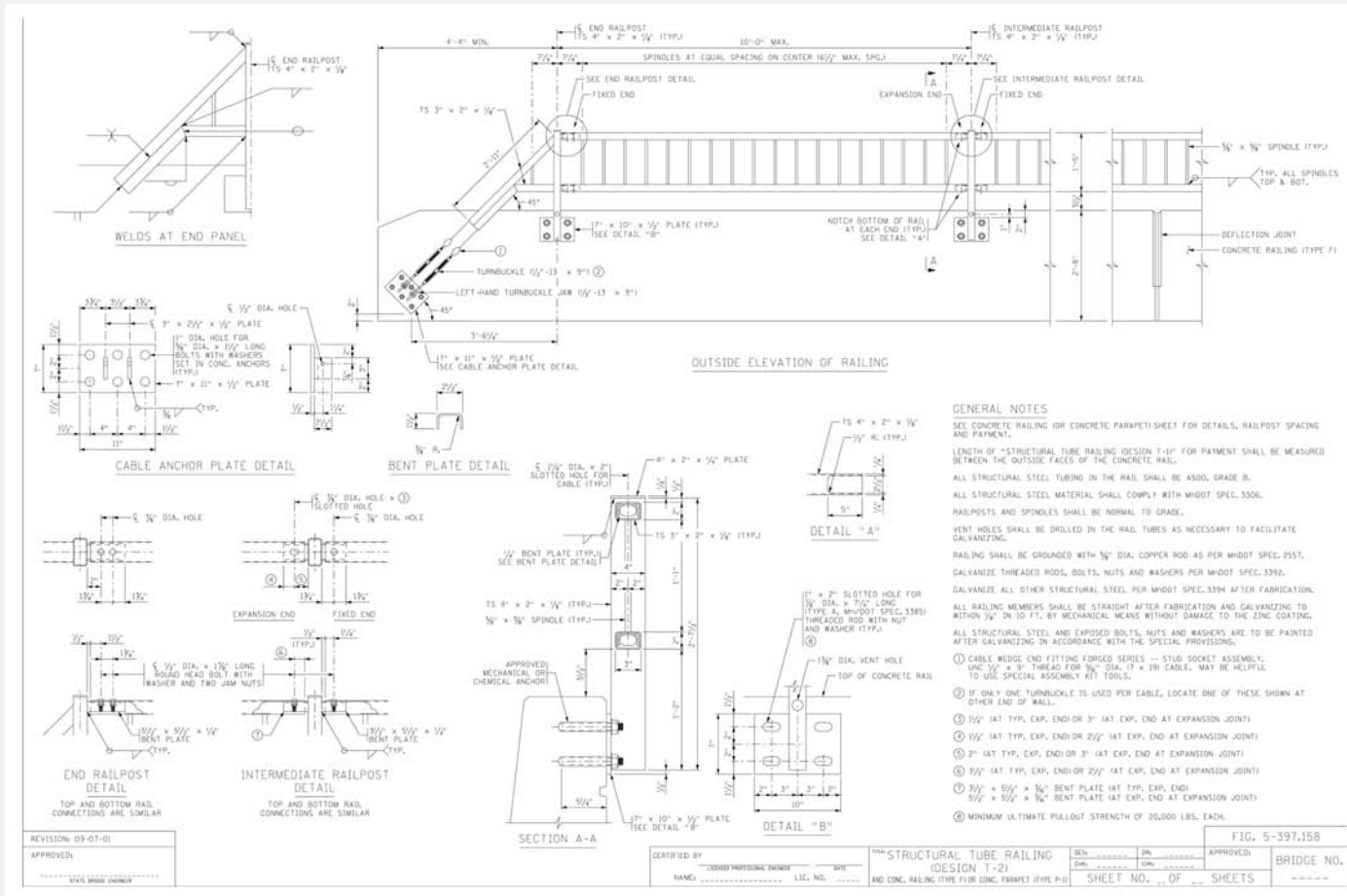
**Test level:**  
TL-4

**Utilized in:**  
Minnesota

**Contact:**  
Raymond Cekalla  
Minnesota DOT Bridge Office  
3485 Hadley Avenue North  
Mail Stop 610  
Oakdale, MN 55128-3307  
(651) 747-2172



## Bicycle Rail Attachment to Safety Shape Concrete Rail



## New Jersey Safety Shape Parapet

**Height:**  
39"

**Cost per linear foot:**  
\$\_\_

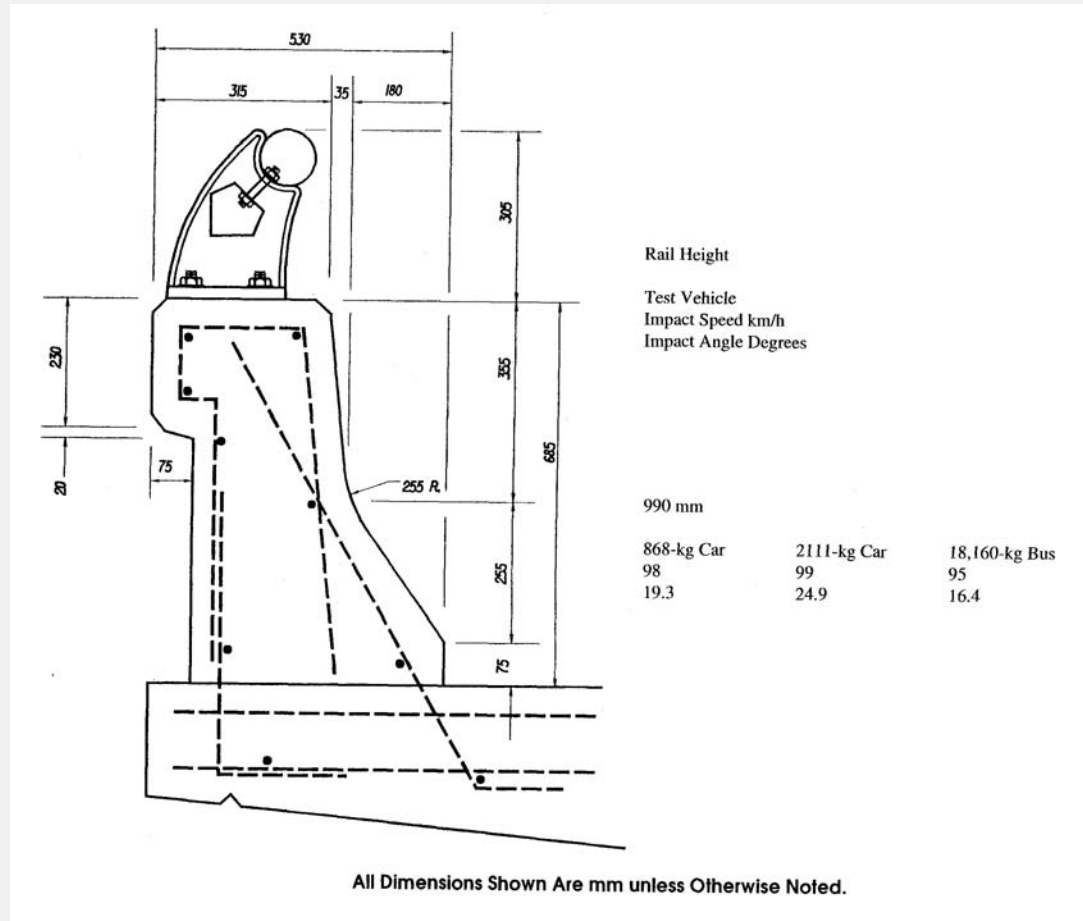
**Test level:**  
TL-4

**Utilized in:**  
Nevada

**Contact:**  
Bill Crawford  
Nevada Dept of Transportation  
1263 South Stewart Street  
Room 405  
Carson City, NV 89712  
(775) 888-7542



## New Jersey Safety Shape Parapet



Section **4**

# New Jersey Barrier with Rail

## Type HT

**Height:**  
50"

**Cost per linear foot:**  
\$95

**Test level:**  
TL-5

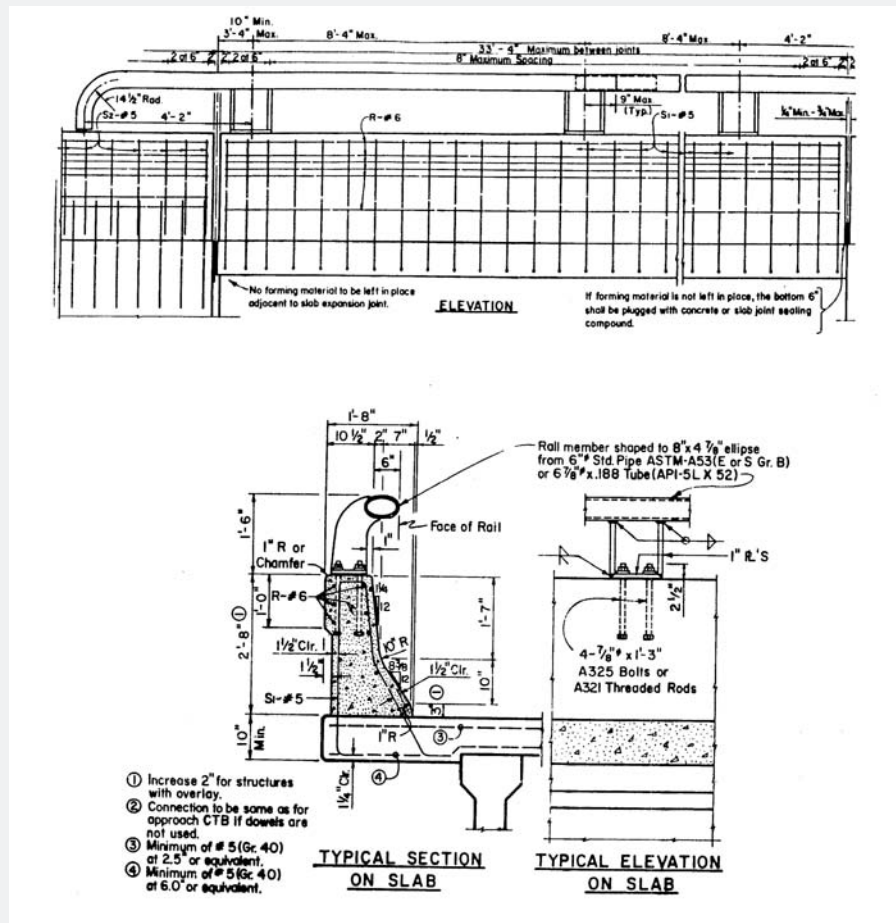
**Utilized in:**  
Texas

**Contact:**  
Mark Bloschock  
Texas DOT Bridge Division  
RA118  
125 E. 11th Street  
Austin, TX 78701-2483  
(512) 416-2178





## Type HT



Section 5

F-Shape Concrete Barrier



# Section 5

## F-SHAPE CONCRETE BARRIER

	Name	Location	Test Level
	32" F-Shape	Florida	TL-4
	42" F-Shape	Florida	TL-5
	Soundwall/F-Shape	Florida	TL-4
	Vertical Face Guide, 34" Retrofit	Florida	TL-4
	Vertical Face Guide, 42" Retrofit	Florida	TL-4

Section **5**

# F-Shape Concrete Barrier/Single Slope

## 32" F-Shape

**Height:**  
32"

**Cost per linear foot:**  
\$35

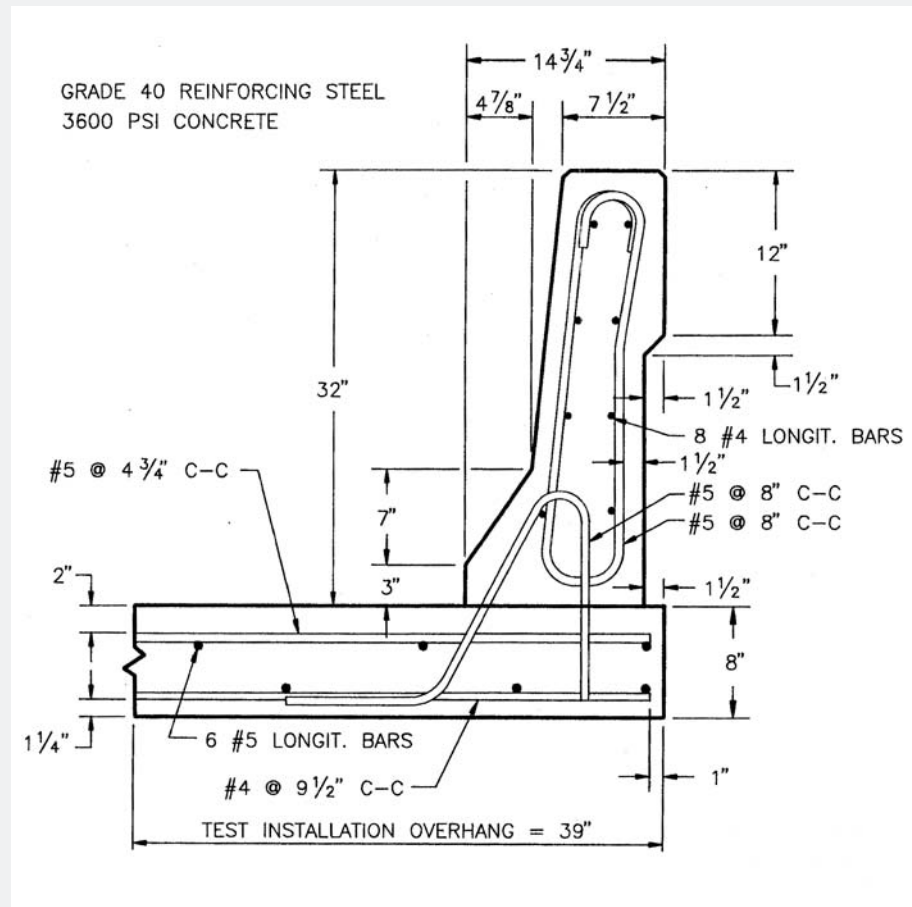
**Test level:**  
TL-4

**Utilized in:**  
Florida

**Contact:**  
Charles Boyd  
Florida Dept of Transportation  
605 Suwannee Street  
Mail Station 33  
Tallahassee, FL 32399-0450  
(850) 414-4275



## 32" F-Shape



## 42" F-Shape

**Height:**  
42"

**Cost per linear foot:**  
\$45

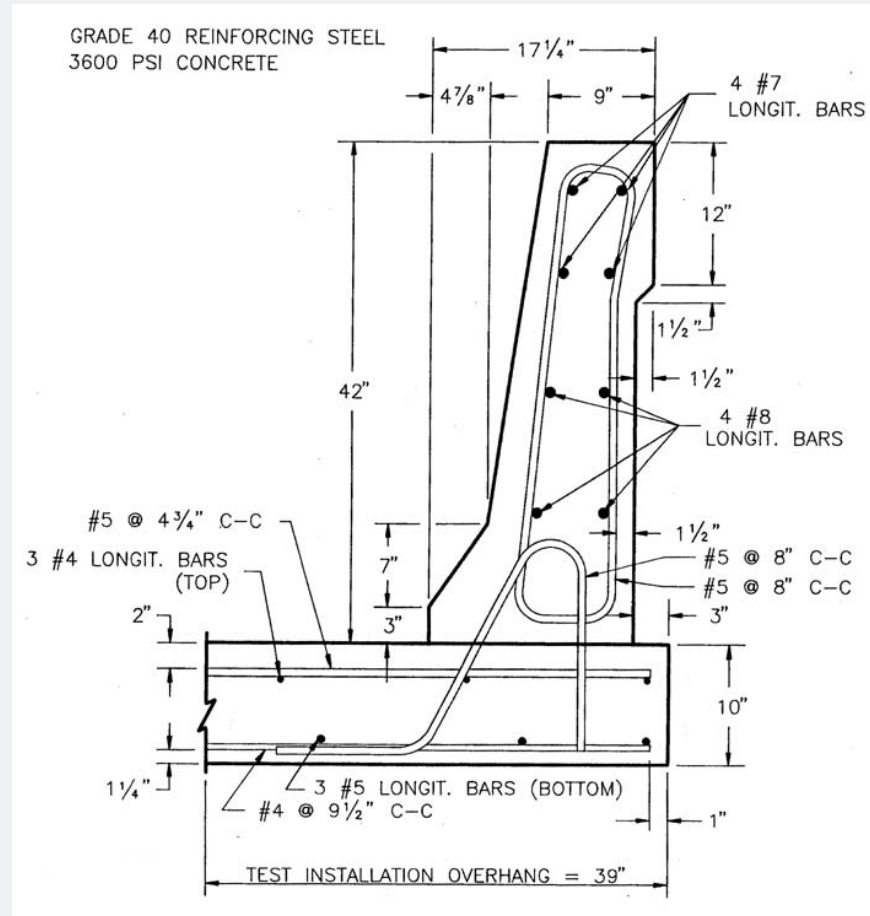
**Test level:**  
TL-5

**Utilized in:**  
Florida

**Contact:**  
Charles Boyd  
Florida Dept of Transportation  
605 Suwannee Street  
Mail Station 33  
Tallahassee, FL 32399-0450  
(850) 414-4275



## 42" F-Shape



## Soundwall/F-Shape

**Height:**  
8'

**Cost per linear foot:**  
\$200

**Test level:**  
TL-4

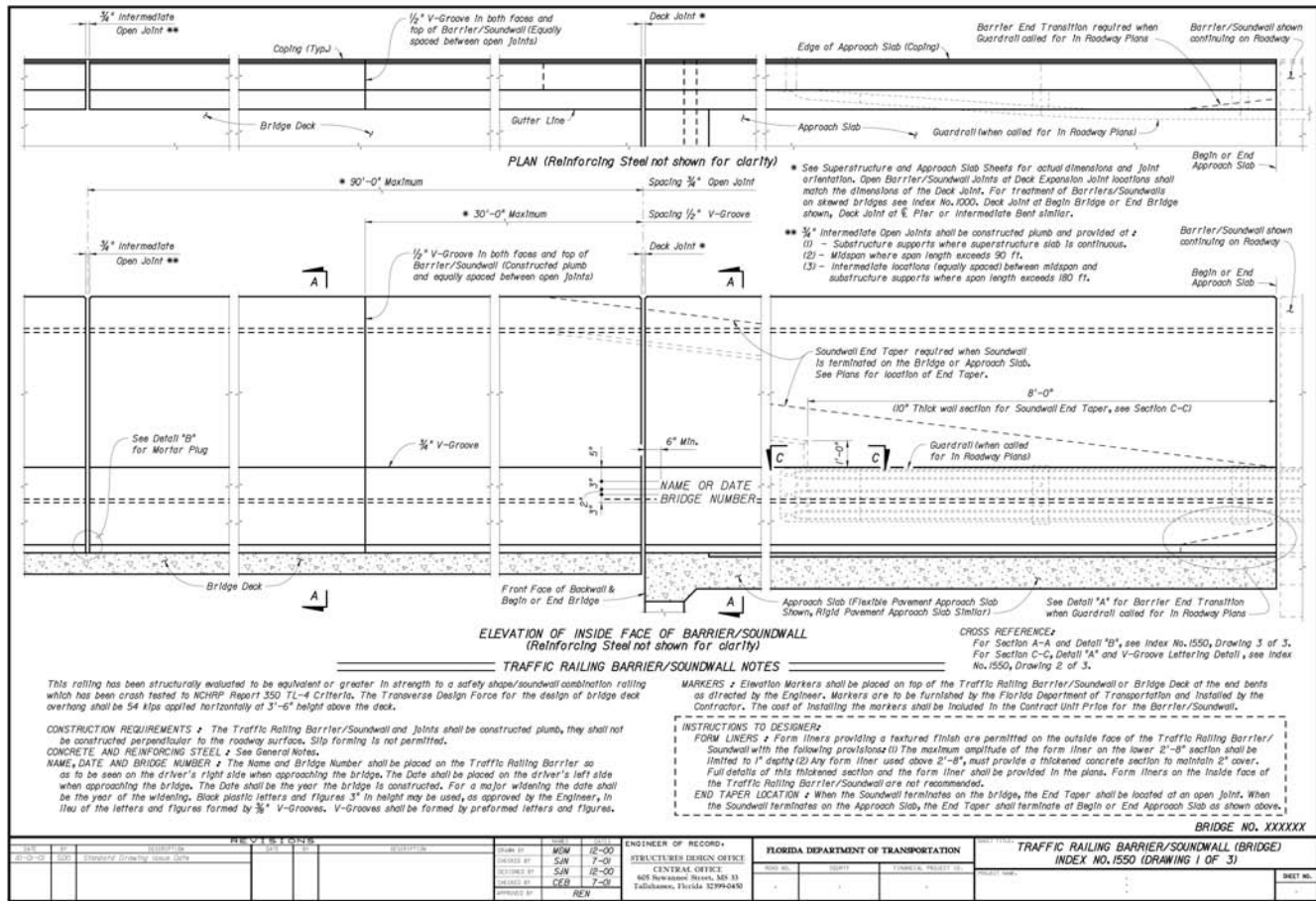
**Utilized in:**  
Florida

**Contact:**  
Charles Boyd  
Florida Dept of Transportation  
605 Suwannee Street  
Mail Station 33  
Tallahassee, Fl 32399-0450  
(850) 414-4275

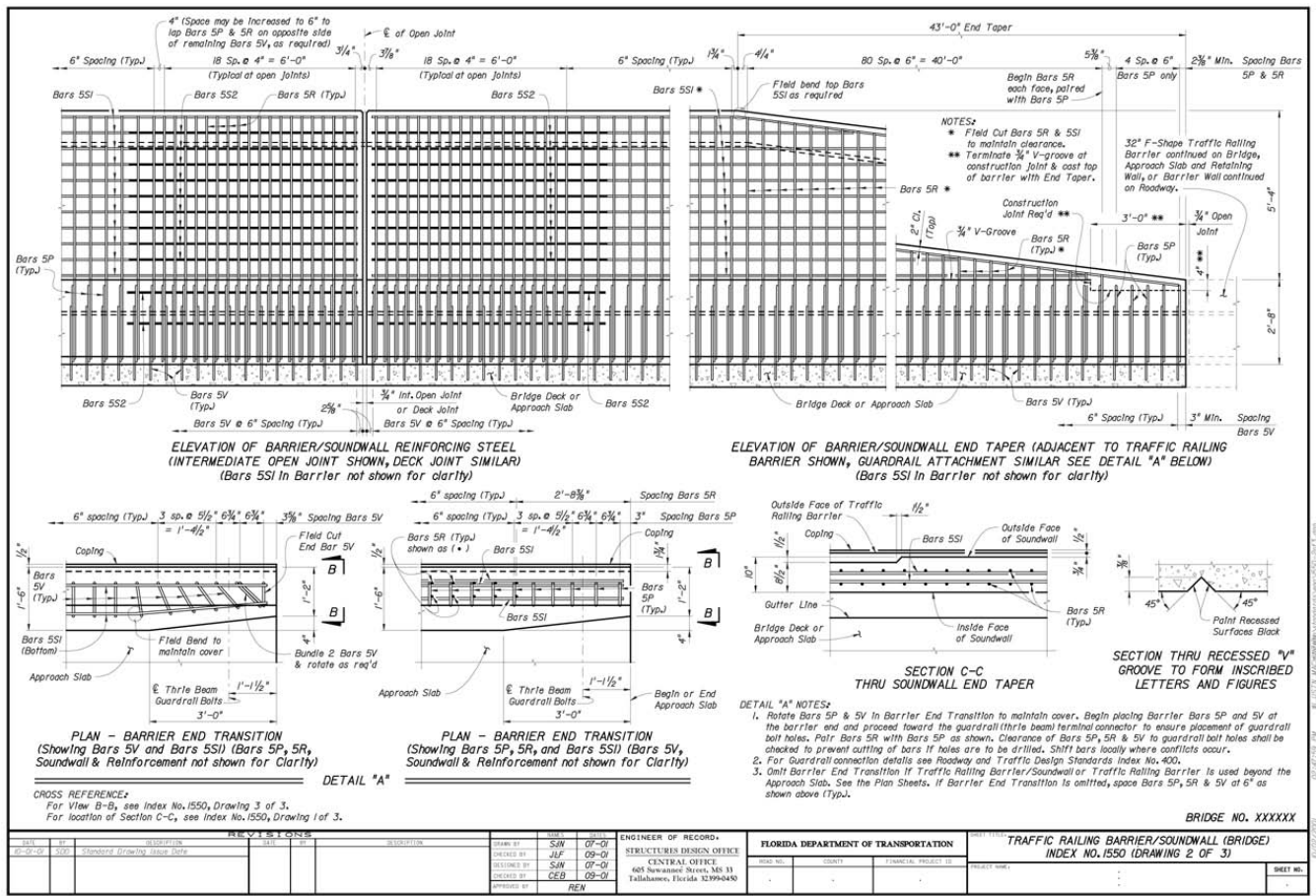




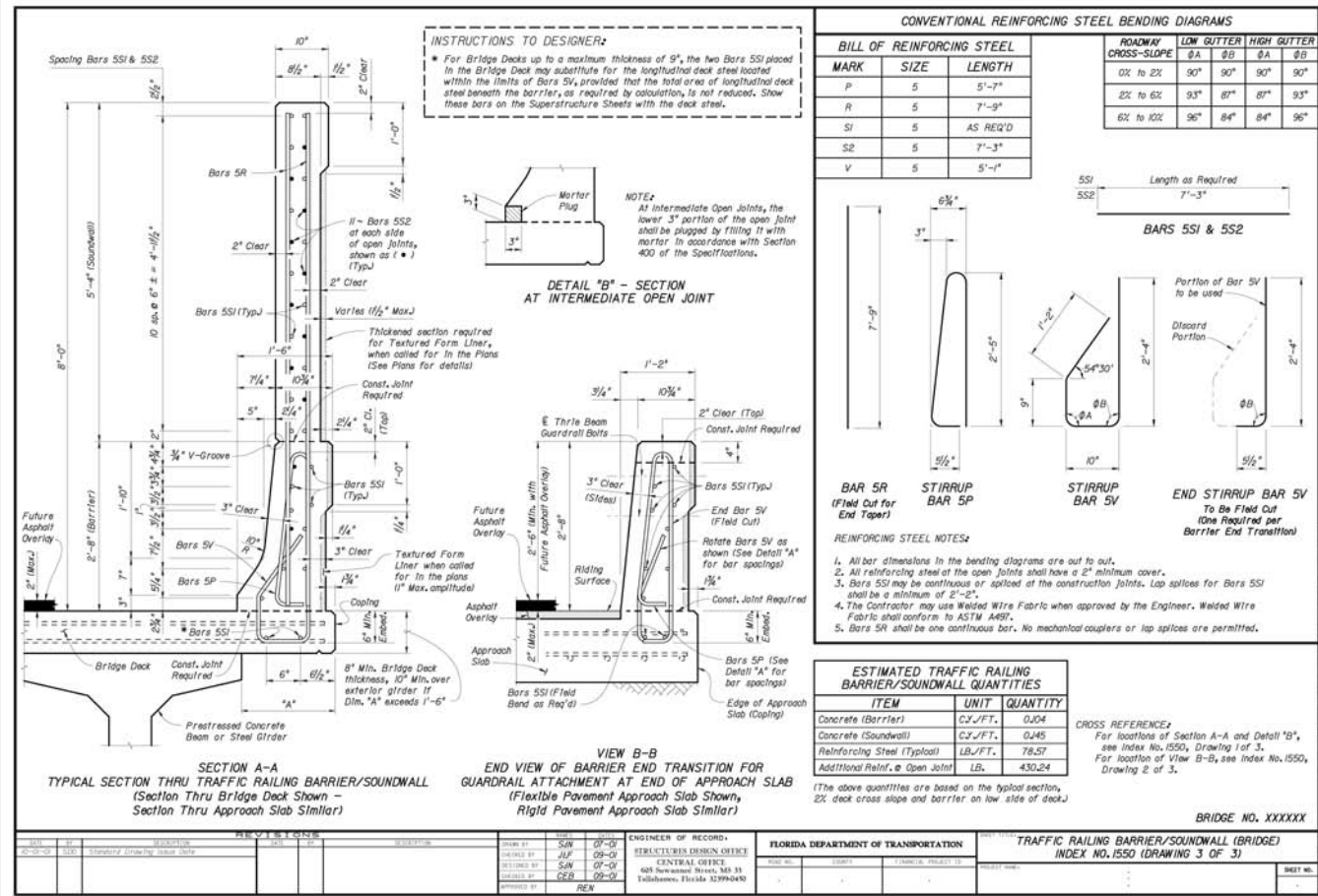
## Soundwall/ F-Shape



## Soundwall/ F-Shape



## Soundwall/ F-Shape



## Vertical Face Guide, 34" Retrofit

**Height:**  
34"

**Cost per linear foot:**  
\$40

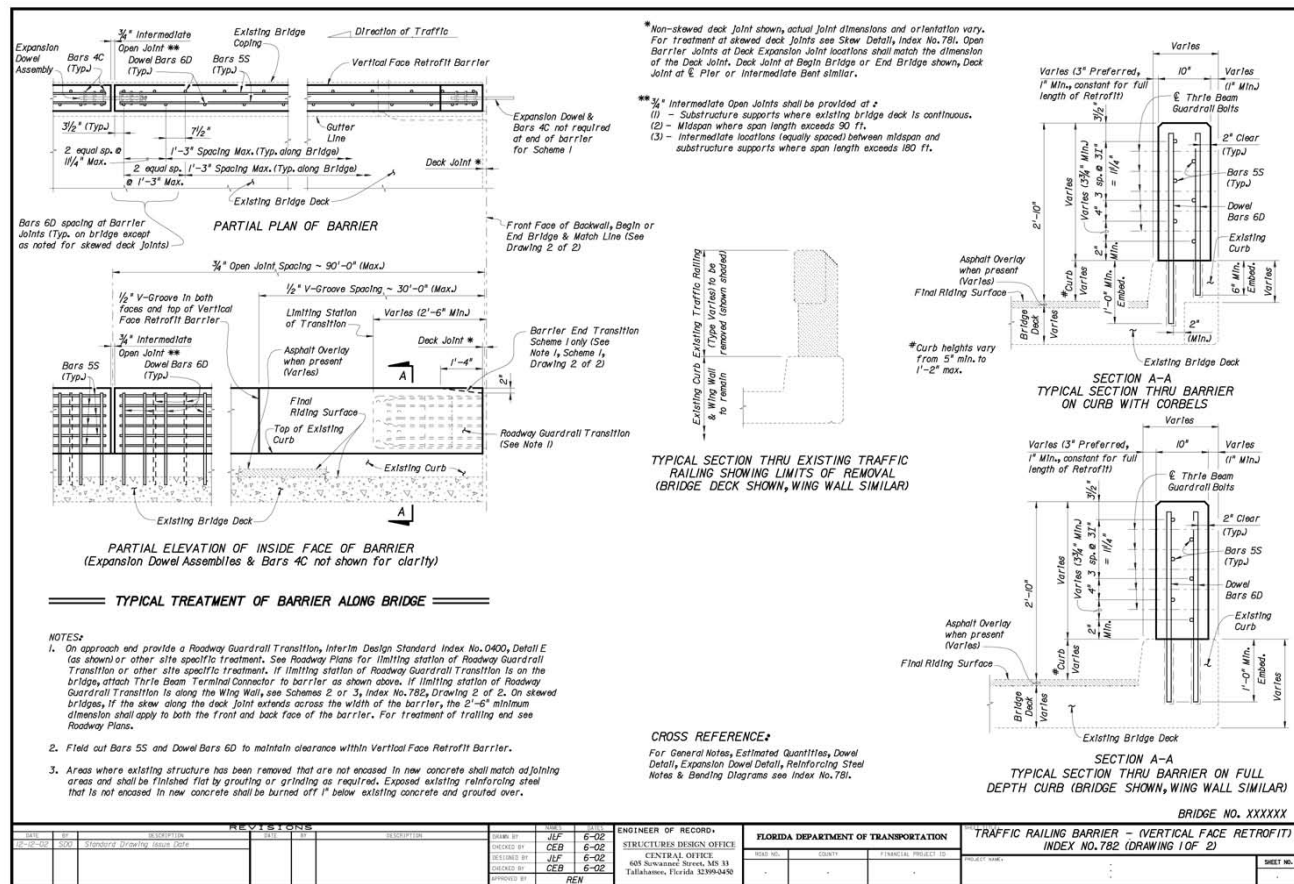
**Test level:**  
TL-4

**Utilized in:**  
Florida

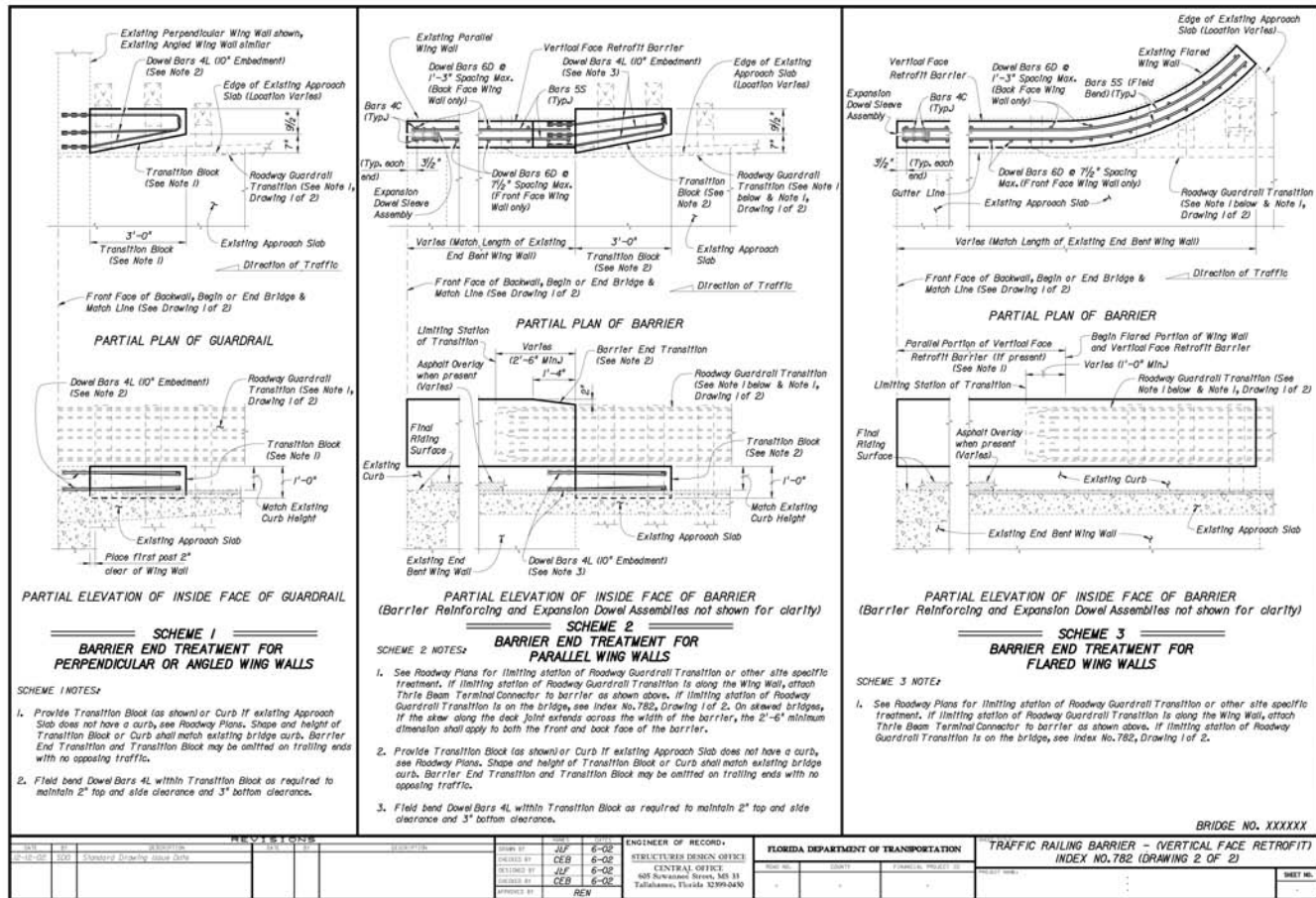
**Contact:**  
Charles Boyd  
Florida Dept of Transportation  
605 Suwannee Street  
Mail Station 33  
Tallahassee, FL 32399-0450  
(850) 414-4275



## Vertical Face Guide, 34" Retrofit



## Vertical Face Guide, 34" Retrofit



## Vertical Face Guide, 42" Retrofit

**Height:**  
42"

**Cost per linear foot:**  
\$55

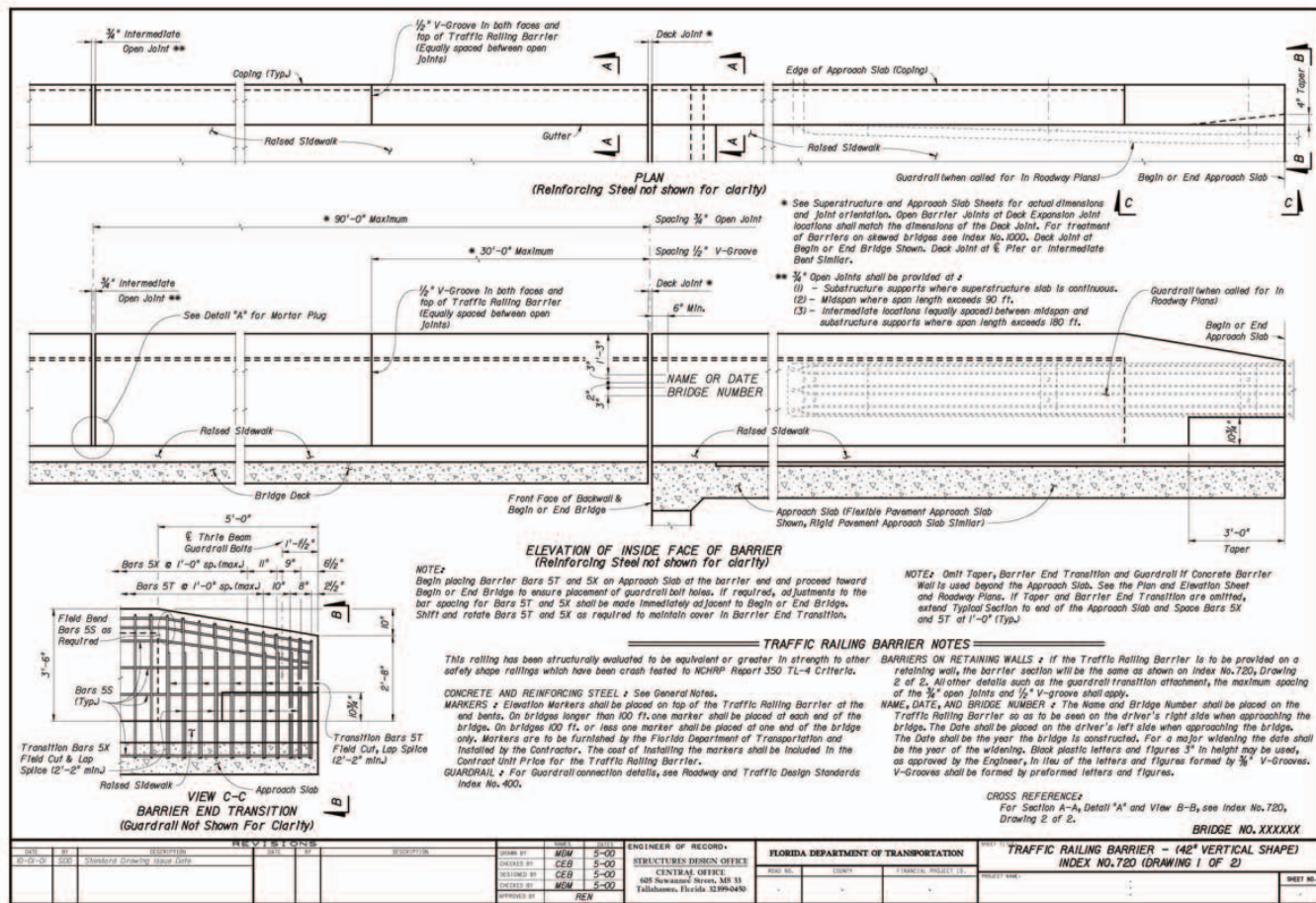
**Test level:**  
TL-4

**Utilized in:**  
Florida

**Contact:**  
Charles Boyd  
Florida Dept of Transportation  
605 Suwannee Street  
Mail Station 33  
Tallahassee, FL 32399-0450  
(850) 414-4275



## Vertical Face Guide, 42" Retrofit





Section 6

TIMBER BRIDGE RAILS



# Section 6

## TIMBER BRIDGE RAIL

	Name	Location	Test Level
	Timber Rail 3 Bridge Rail	Oklahoma	TL-2
	Panel-Lam Timber Vehicle Bridge Rail	?	TL-?
	Curb-Type Glu-Lam Rail for Longitudinal Timber Decks	?	TL-1
	Glu-Lam Rail with Steel Box Attachment, side mount	?	TL-2
	Glu-Lam Timber Rail with Curb, GC8000 design	?	TL-4
	Timber Curbs for Longitudinal Timber Decks	?	Below TL-1
	W-Beam Breakaway Timber Post Railing	?	TL-1
	Steel Thrie-Beam Rail, side mount	?	TL-2

# Section 6

## TIMBER BRIDGE RAIL

Name	Location	Test Level
Steel Thrie-Beam Rail with Upper Channel, TCB8000 design	?	TL-4
W-Beam Breakaway Steel Post Railing	?	TL-1

## Timber Rail 3 Bridge Rail

Height:  
27"

Cost per linear foot:  
\$\_\_

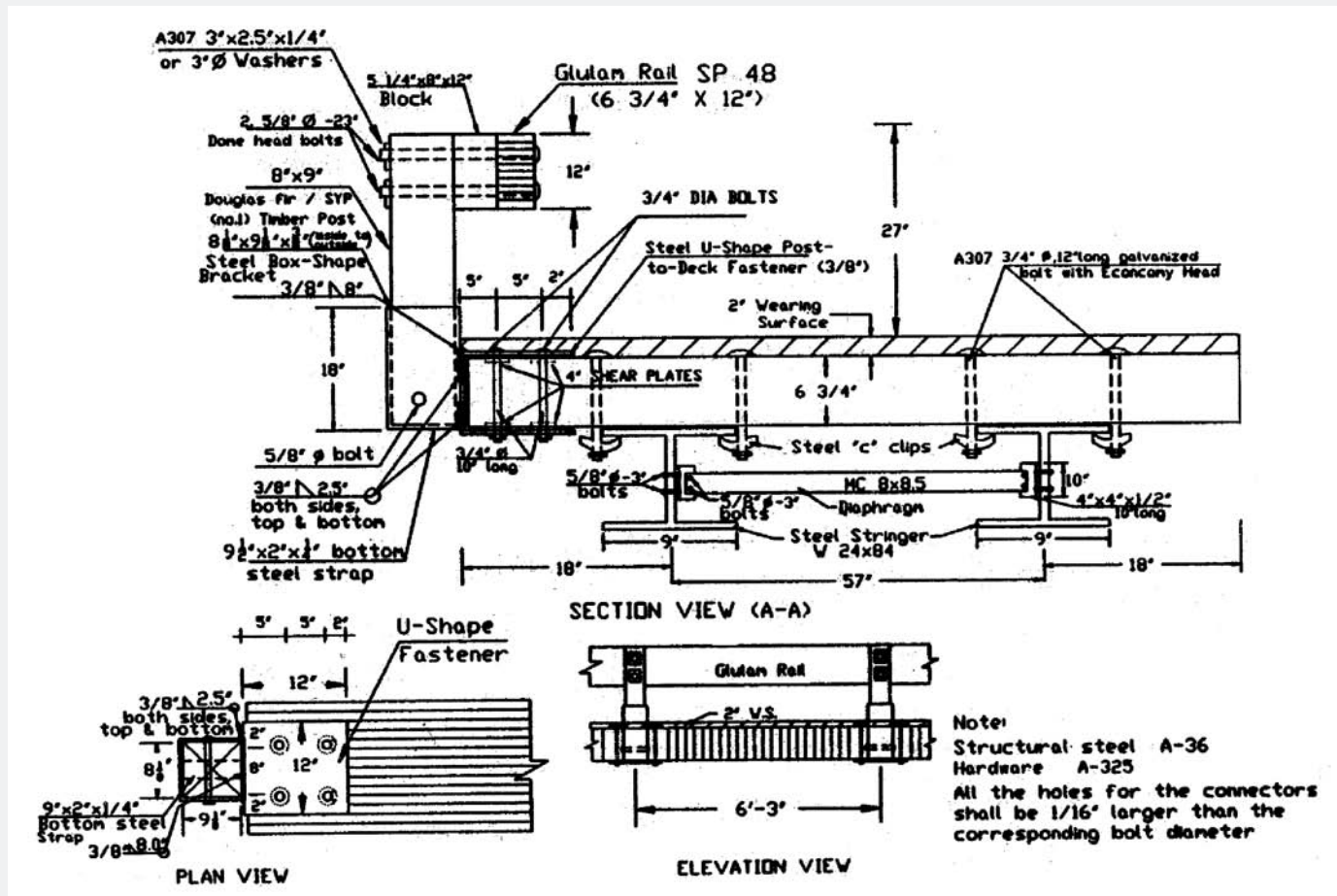
Test level:  
TL-3

Utilized in:  
—

Contact:  
—



## Timber Rail 3 Bridge Rail



## Panel-Lam Timber Vehicle Bridge Rail

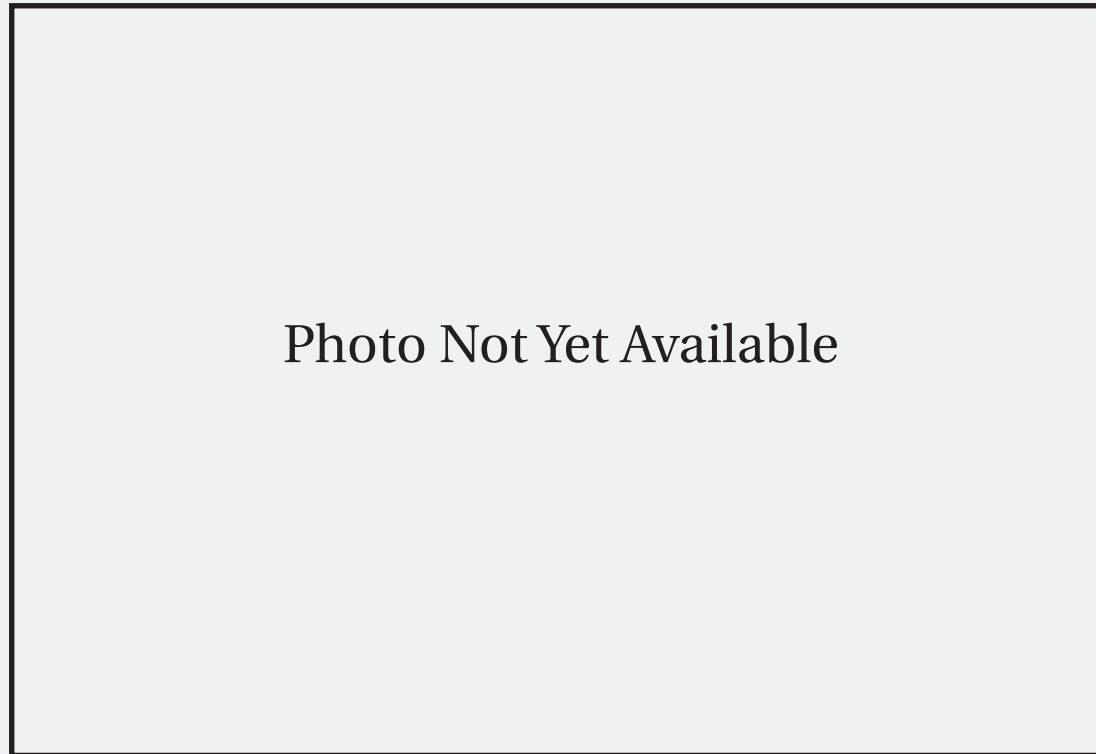
Height:  
48"

Cost per linear foot:  
\$\_

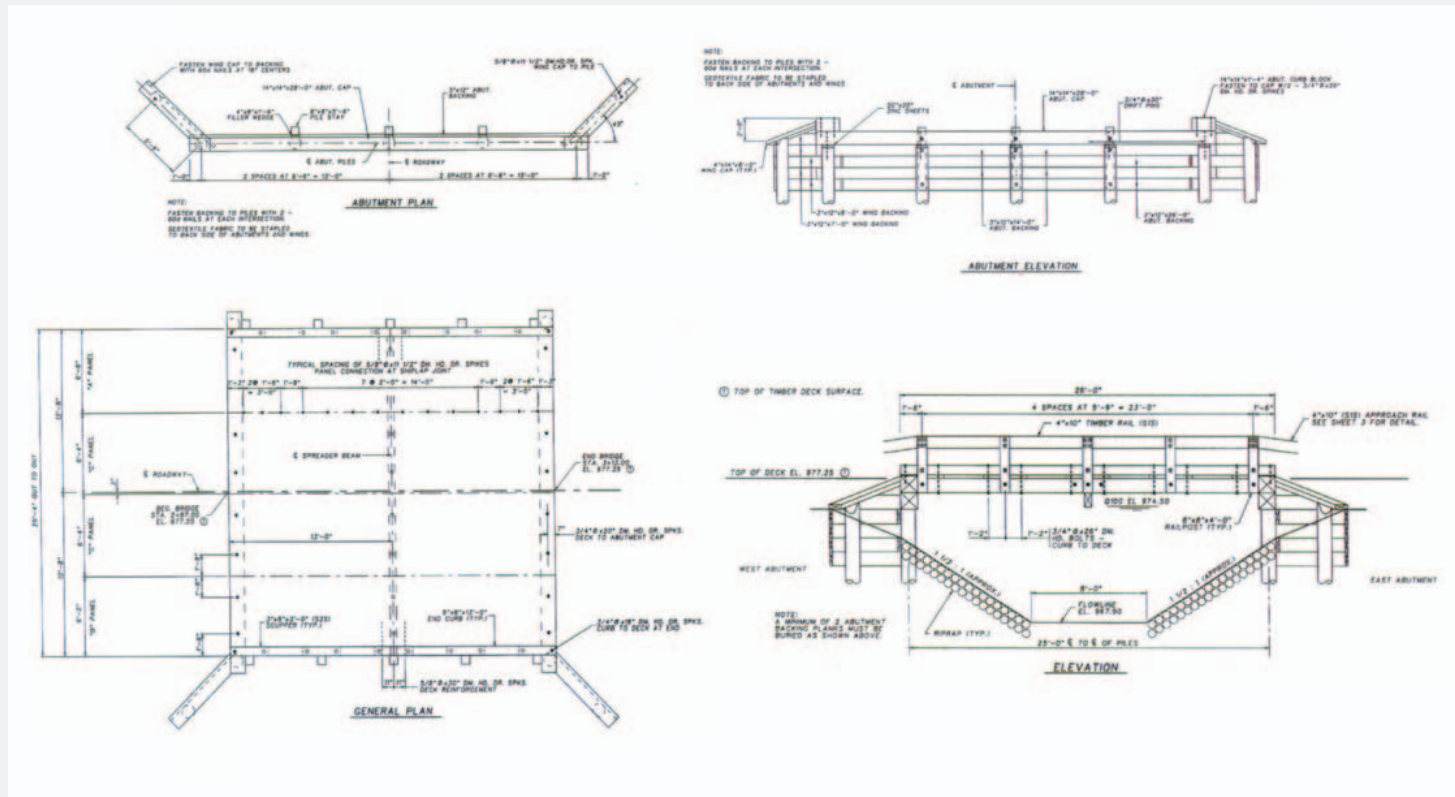
Test level:  
—

Utilized in:  
—

Contact:  
Nahed Abdin  
California Dept  
of Transportation  
1801 30th Street, FM1-2/9I  
Sacramento, CA 95816  
(916) 227-8805



## Panel-Lam Timber Vehicle Bridge Rail



## Curb-Type Glu-Lam Rail for Longitudinal Timber Decks

Height:  
21"

Cost per linear foot:  
\$\_\_

Test level:  
TL-1

Utilized in:

Contact:

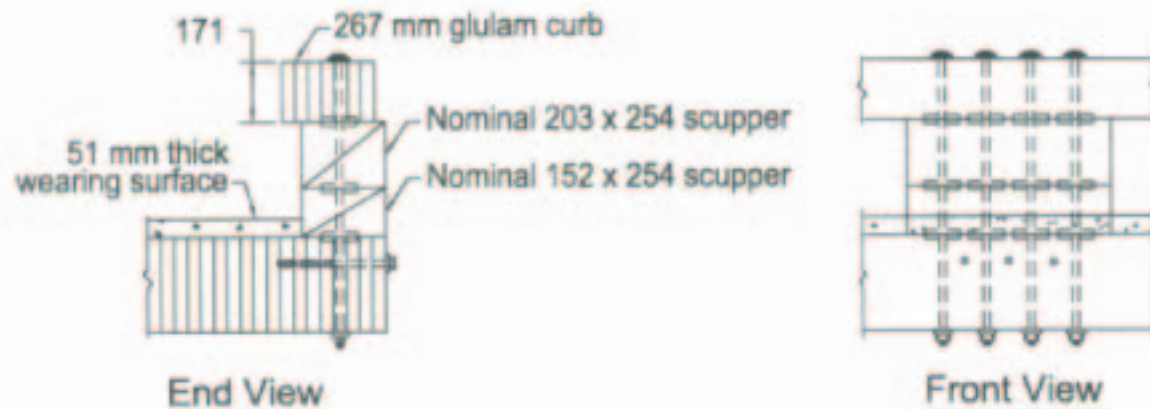
Ronald K. Faller, Ph.D., P.E.  
Research Assistant Professor  
Midwest Roadside  
Safety Facility  
University of Nebraska-Lincoln  
527 Nebraska Hall  
Lincoln, NE 68588-0529  
(402) 472-6864





## Curb-Type Glu-Lam Rail for Longitudinal Timber Decks

Curb-type Rail



\*Dimensions in mm.

The low-height, curb-type timber rail was constructed with a glu-lam timber rail and supported with scupper blocks. The curb and scupper blocks, spaced 3048 mm on center, were connected to the bridge deck with bolts and timber connectors.

## Glu-Lam Rail with Steel Box Attachment, side mount

Height:  
32"

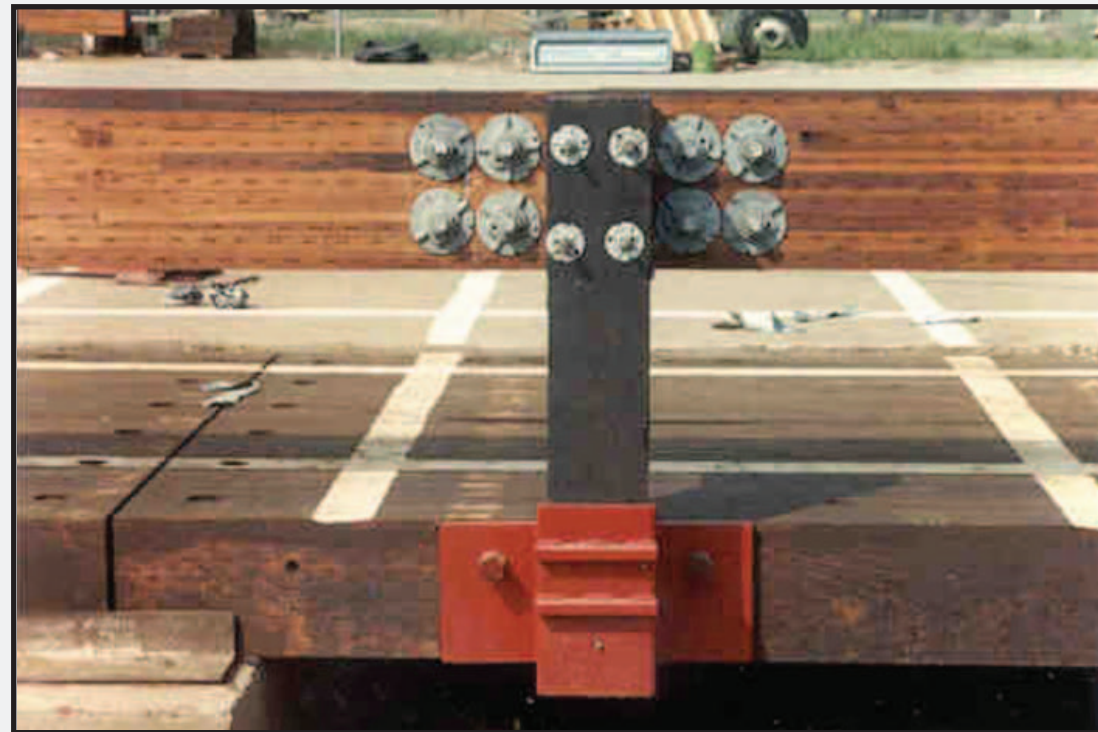
Cost per linear foot:  
\$\_\_

Test level:  
TL-2

Utilized in:

Contact:

Ronald K. Faller, Ph.D., P.E.  
Research Assistant Professor  
Midwest Roadside  
Safety Facility  
University of Nebraska-Lincoln  
527 Nebraska Hall  
Lincoln, NE 68588-0529  
(402) 472-6864





## Glu-Lam Timber Rail with Curb, GC8000 design

Height:  
33"

Cost per linear foot:  
\$\_\_

Test level:  
TL-4

Utilized in:

Contact:

Ronald K. Faller, Ph.D., P.E.  
Research Assistant Professor  
Midwest Roadside  
Safety Facility  
University of Nebraska-Lincoln  
527 Nebraska Hall  
Lincoln, NE 68588-0529  
(402) 472-6864



## Glu-Lam Timber Rail with Curb, GC8000 design

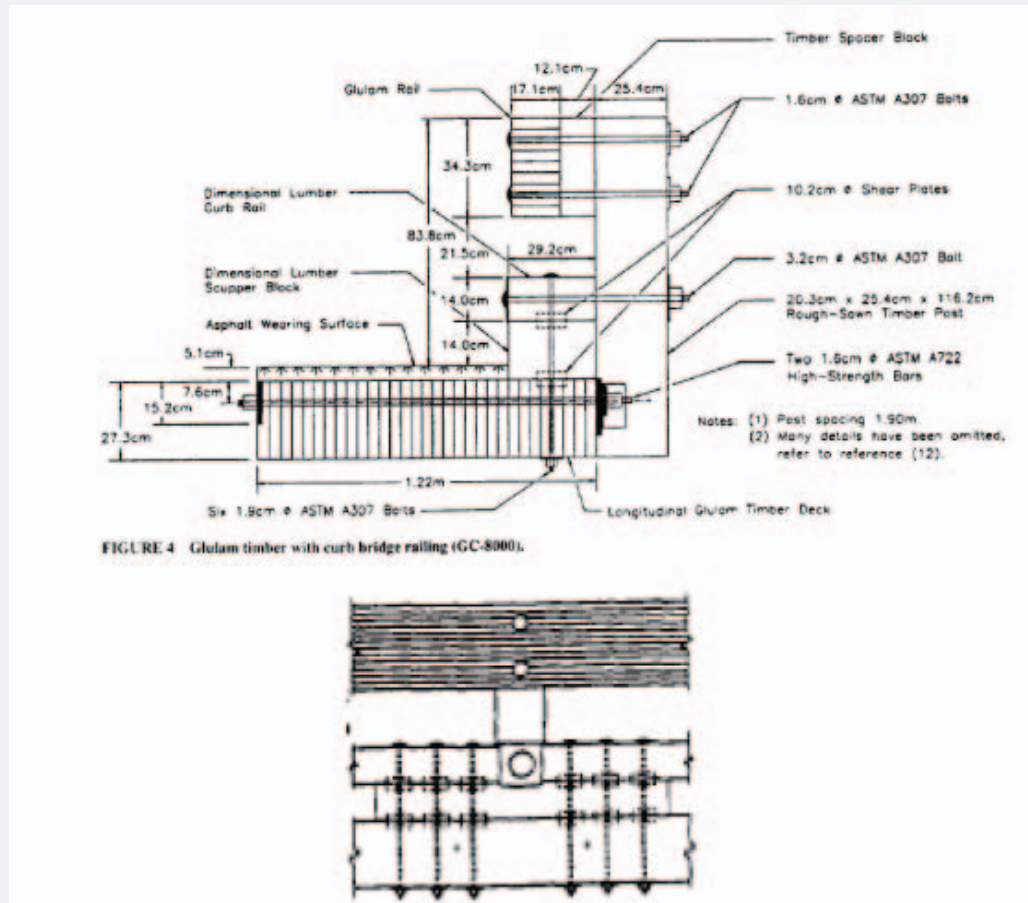


FIGURE 4 Glulam timber with curb bridge railing (GC-8000).

## Timber Curbs for Longitudinal Timber Decks

**Height:**  
12"

**Cost per linear foot:**  
\$\_\_

**Test level:**  
Below TL-1

**Utilized in:**

**Contact:**

Ronald K. Faller, Ph.D., P.E.  
Research Assistant Professor  
Midwest Roadside  
Safety Facility  
University of Nebraska-Lincoln  
527 Nebraska Hall  
Lincoln, NE 68588-0529  
(402) 472-6864



## Timber Curbs for Longitudinal Timber Decks

**General Configuration**

Option 1; Section A-A

Option 2; Section A-A

**A Curb Details**

Option 1 - Sawn Lumber

Option 1 - Glulam

Option 2 - Sawn Lumber

Option 2 - Glulam

**B Curb Splice Details**

Option 1

Option 2

**C Scupper Block Detail**

**D Scupper Block Detail**

**E Scupper Block Detail**

**Design**

- These curb railings were specifically sized based for low-volume road applications using a 4x4x8 glulam curb that includes an inherent camber of 1/8 inch and impact angle of 15 degrees. These railings are adaptable to longitudinal dimensional, symmetrical, well-ventilated, and glulam-laminated glulam timber decks that are 10 in. or greater in actual thickness. For additional information, refer to Development of Low-Volume Curb-Type Bridge Railings for Timber Bridge Decks (Miller and others 1998).
- Drawings include member design for both curb railing options with details for both sawn lumber and glulam configurations. In all cases, the actual height of the curb railing shall be 12 in. across the central way (top of wearing surface on top of bridge deck if a wearing surface is installed, but not greater than 14 in. above the bridge deck).
- Scupper blocks are included in the curb railing design to provide the required curb height and allow drainage for each railing. Scupper blocks for either option may be sawn lumber or glulam and may require adjustment in the height dimension to achieve the actual curb height specified in Note 2 based on actual dimensions of the curb and scupper block members. In the case of the sawn lumber option 2, the two scupper blocks may be replaced with a single block of the required dimension.
- Each curb railing is shown with a 2-in. thick continuous spacer strip installed to serve both as a measure for an installed pavement wearing surface. If a timber or glulam wearing surface is used, the strip should be under the wearing surface only (not continuous) to allow for free drainage of the strip. The strip may be eliminated and the scupper block height adjusted accordingly. If no wearing surface is used, the strip may be eliminated.
- Dimensions for sawn lumber are nominal dimensions. Actual dimensions will vary depending on surfacing but shall not be less than 1/8 in. less than the stated nominal dimensions.
- Dimensions for glulam are actual dimensions. The R S/N is standard glulam width may be increased to a minimum 6-1/2 in. to allow for other standard glulam sizes. In such cases, detail dimensions shall be modified accordingly.

**Materials**

- Sawn lumber and glulam shall comply with the requirements of AASHTO M118 and shall be pressure treated with wood preservative in accordance with AASHTO M115. Glulam shall be non-alkali-sulfate wet use adhesives to an industrial appearance grade.
- Curbs and scupper blocks may be sawn lumber or glulam. When sawn lumber is used, members shall be closely graded by 1 (Quality 1) or Douglas Fir-Larch. Glulam and other species and grades of sawn lumber may be used provided that the minimum calculated values for the species and grade are not less than the following:  
 $F_b = 1,300 \text{ psi}$ ;  $E = 1,300,000 \text{ psi}$
- Blocks shall comply with the ASTM A575 requirements, Grade 2, and shall preferably be dome head timber blocks. Slots on the top of the curb shall be closed (see Note 10).
- All steel components and fasteners shall be galvanized in accordance with AASHTO M111 or M152 or shall otherwise be protected with an equal or superior protection.

**Fabrication and Construction**

- To the extent possible, all wood shall be cut, dried, and completely kiln-dried prior to pressure treatment with preservative. Other Note: Number of wood in required if wood is damaged, all cuts, bore holes, and damage shall be immediately treated with wood preservative in accordance with AASHTO M115.
- Glulam member installation systems shall be provided under full loads and under rule that are in contact with wood. When the size and strength of the fasteners are sufficient to develop compression strength without wood crushing, fasteners may be limited under heads of dome head timber blocks.

The bridge railings described on these drawings were developed and crash tested under a cooperative research agreement between the Midwest Roadside Safety Facility of the University of Nebraska-Lincoln and the USDA Forest Service, Forest Products Laboratory.

University of Nebraska-Lincoln

UAS

Crash-Tested Bridge Rails for Longitudinal Wood Decks on Low-Volume Roads

Low Volume Curb Railing

August 1998

Sheet 1 of 1

## W-Beam Breakaway Timber Post Railing

**Height:**  
29"

**Cost per linear foot:**  
\$\_\_

**Test level:**  
TL-1

**Utilized in:**

**Contact:**

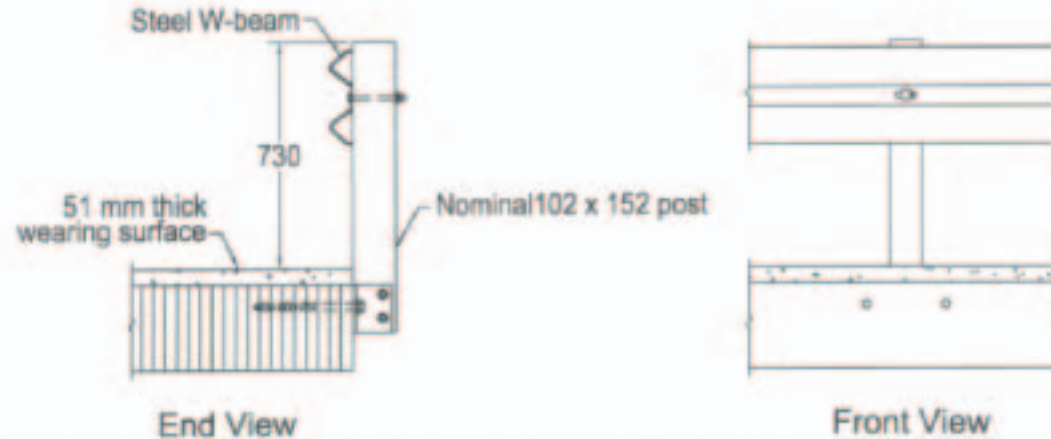
Ronald K. Faller, Ph.D., P.E.  
Research Assistant Professor  
Midwest Roadside  
Safety Facility  
University of Nebraska-Lincoln  
527 Nebraska Hall  
Lincoln, NE 68588-0529  
(402) 472-6864





## W-Beam Breakaway Timber Post Railing

Flexible Steel Rail



The flexible steel rail consisted of a 12-gauge W-beam rail mounted to breakaway sawed lumber posts spaced 1905 mm on center. The lower end of the post was placed between two steel angles that were connected to the vertical edge of the bridge deck with lag screws.

## Steel Thrie-Beam Rail, side mount

Height:  
32"

Cost per linear foot:  
\$\_\_

Test level:  
TL-2

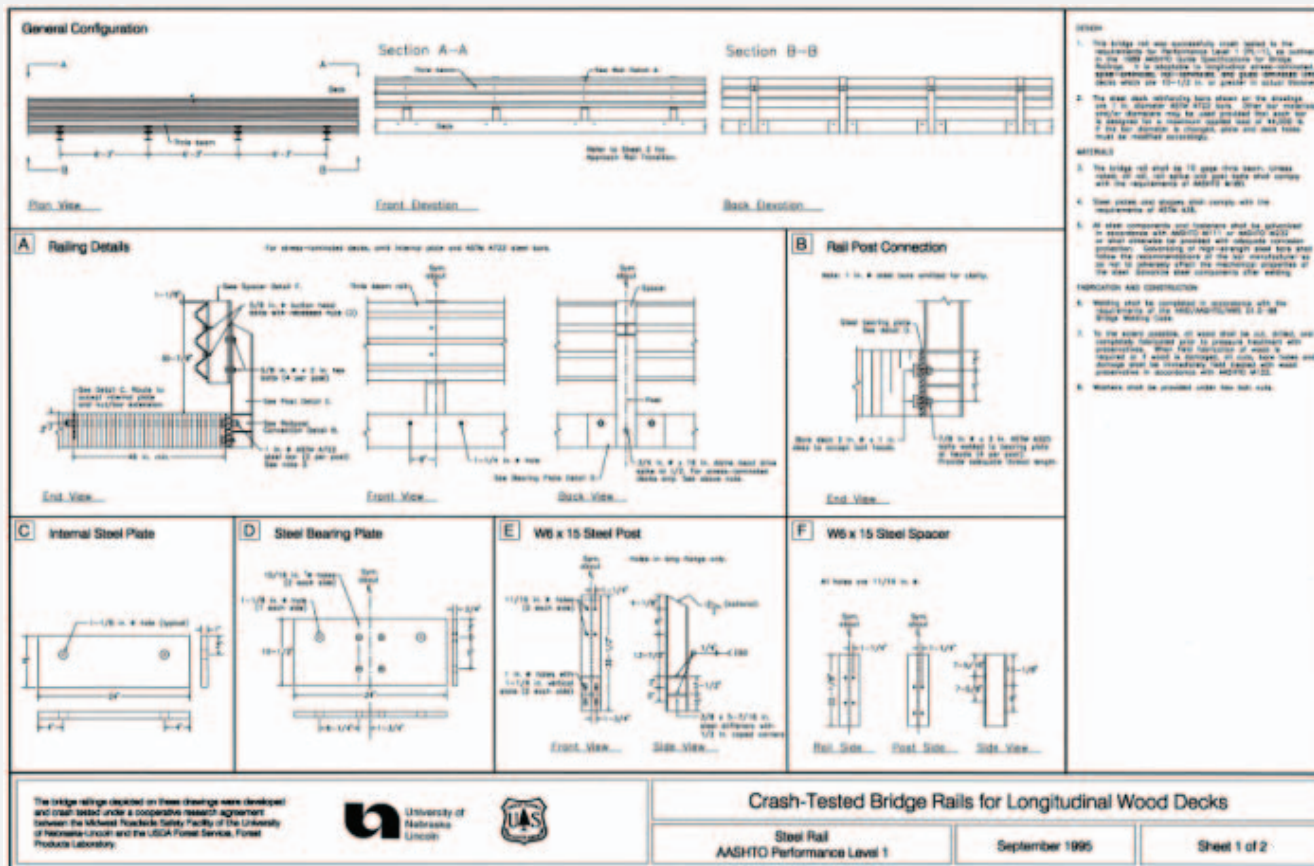
Utilized in:

Contact:

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## Steel Thrie-Beam Rail, side mount



## Steel Thrie-Beam Rail with Upper Channel, TCB8000 design

**Height:**  
33"

**Cost per linear foot:**  
\$\_\_

**Test level:**  
TL-4

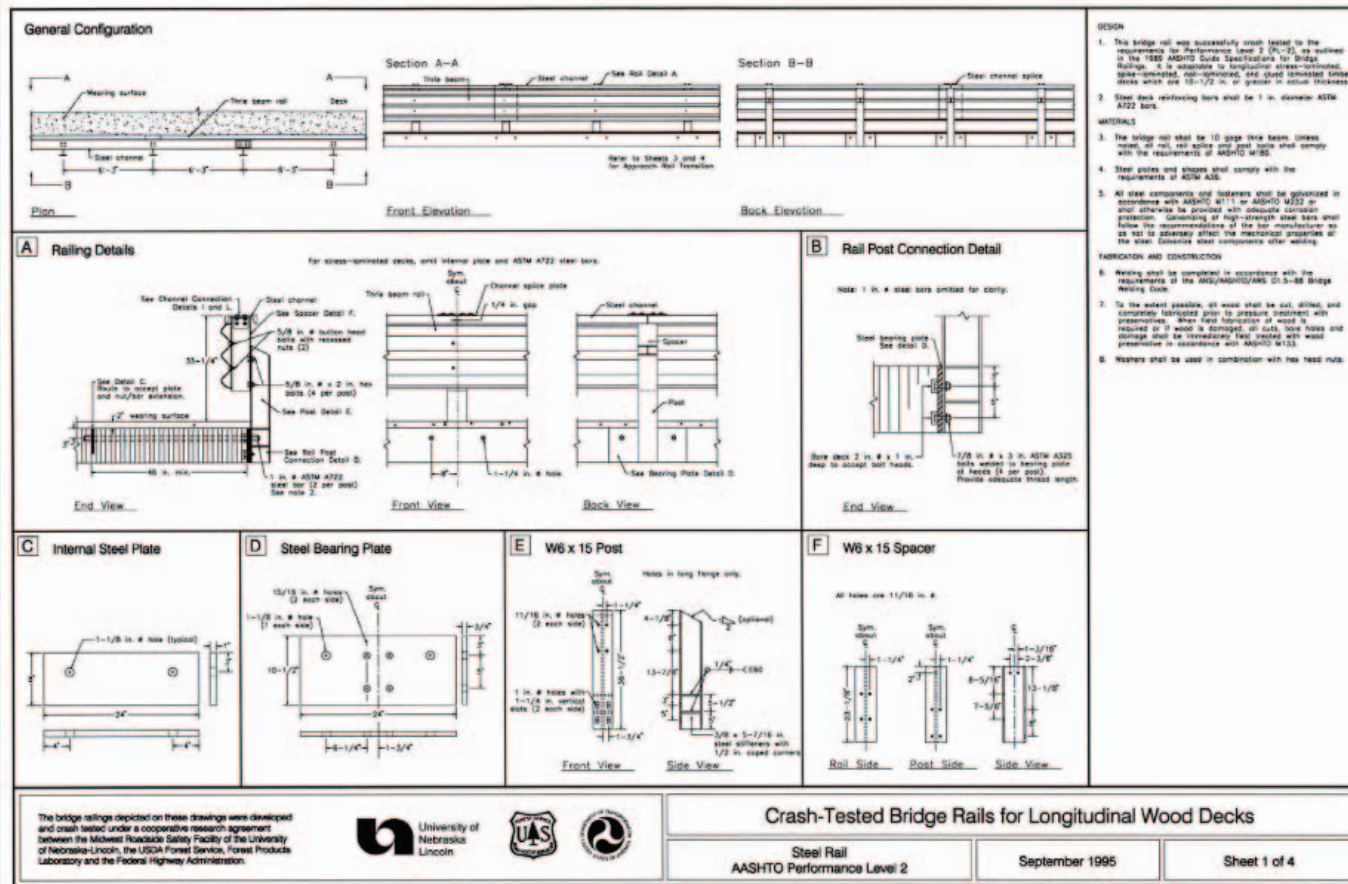
**Utilized in:**

**Contact:**

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## Steel Thrie-Beam Rail with Upper Channel, TCB8000 design



## W-Beam Breakaway Steel Post Railing

**Height:**  
41"

**Cost per linear foot:**  
\$\_\_

**Test level:**  
TL-1

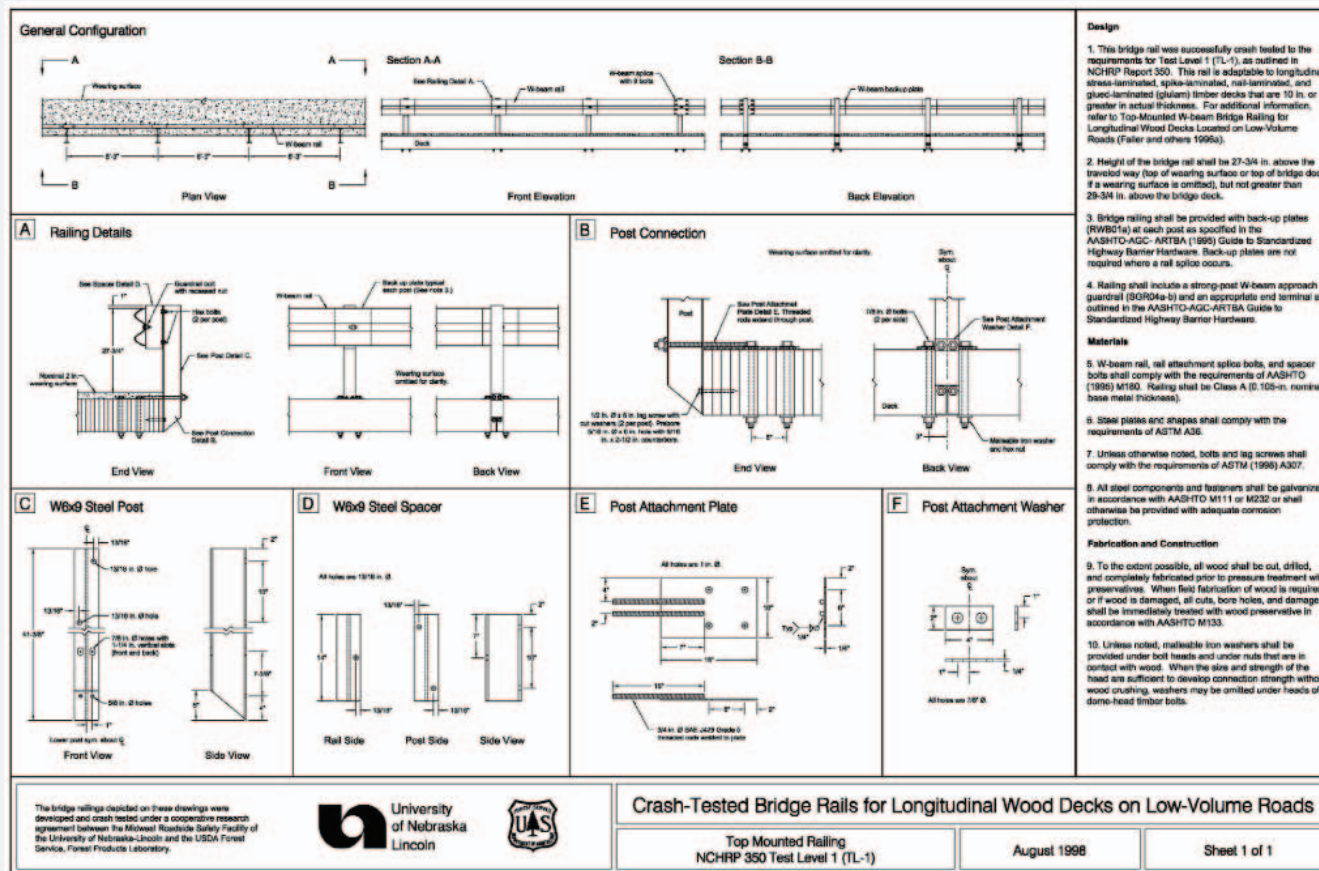
**Utilized in:**

**Contact:**

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## W-Beam Breakaway Steel Post Railing



# INDEX

## **1. W-Beam Bridge Rail**

Texas T101

Side Mount W Beam

Box Beam Rail

Type T6 - Tubular W Beam

W-Beam Retrofit

## **2. Thrie-Beam Bridge Rail**

Delaware Thrie-Beam Retrofit Railing

Michigan Bridge Railing, Thrie-Beam Retrofit (R4 Type)

Missouri Thrie-Beam and Channel, Top Mounted

Nebraska Tubular Thrie-Beam Bridge Rail

Oregon Thrie-Beam Side Mount

Washington 10-Gauge Thrie-Beam Retrofit

## **3. Metal Tube Bridge Rail**

### **Aluminum Tube Bridge Rail**

Foothills Parkway Aluminum Bridge

Standard 1-Bar Metal Rail

### **Steel Tube Bridge Rail**

#### **Attached to Bottom of Deck**

Texas Energy-Absorbing Bridge Rail

### **Steel Tube Bridge Rail**

#### **Attached to Side of Deck**

California Type 18

California Side Mount Type 115 Rail

California Type 116 Rail

California Type 117 Rail



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Illinois 2399-Type Side Mount

2-Tube Side Mount

## **Steel Tube Bridge Rail Attached to Top of Deck**

Texas Type 421 Aesthetic  
Bridge Rail

Washington, D.C. Historic  
Bridge Rail Retrofit

Alaska Rail - Curb Mounted

California Type 9 (AASHTO  
BR2)

California ST-10 Rail

Bridge Railing, Aesthetic  
Parapet Type BR 27D

Minnesota Combination Bridge  
Rail, Design #3

Type C202

## **Steel Tube Bridge Rail Attached to Curb**

George Washington Parkway  
Steel Bridge Rail

Illinois 2399 - Curb Mount

Michigan Multi Tube Bridge  
Railing

Bridge Railing, 2-Tube

NETC 2-Rail Curb-Mounted  
Railing

Two-Rail Barrier

Three-Rail Barrier Top Deck  
Flush Mount

Four-Rail Barrier

Five-Rail Barrier

Oregon 2-Tube Curb Mount

Oregon 3-Tube Curb Mount

Wyoming 2-Tube Steel Railing

Wyoming 2-Tube, Curb-Mounted

## **4. Vertical Concrete Parapet**

32" New Jersey Shape Concrete  
Barrier

Type 80 and 80 SW Concrete  
Barrier

Baltimore Washington Parkway  
Stone Rail

Federal Lands Modified Kansas  
Corral Bridge Rail

Natchez Trace Concrete Bridge  
Rail

New Jersey Barrier

Vertical Parapet with Single-  
Pipe Aluminum Handrail

Vertical Parapet with Two-Pipe  
Aluminum Handrail

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Vertical Parapet with Security Fence

Iowa Concrete Open Railing

Iowa Concrete Block Railing Retrofit

Modified Kansas Corral Rail

Kansas 32" Corral Rail

42" Single Slope Concrete Barrier

Concrete Beam and Post

Nebraska Open Concrete Bridge Rail

TR1 Modified Bridge Rail

Parapet Flush Mount

Parapet Sidewalk Mount

Type T501SW

Type C411

Type T203

Texas Type T411 Aesthetic Rail

Texas TT Rail

NJ Barrier

## **Vertical Concrete Parapet with Aluminum Tube Bridge Rail**

New Jersey Concrete Barrier

Type 26 Concrete Barrier with Sidewalk

Type 732 Concrete Barrier

Type 736 Concrete Barrier

Type 742 Concrete Barrier

## **Aluminum Tube Bridge Rail**

LB Foster Precast NJ Shape, Bolted Down

California Type 20

## **New Jersey Barrier with Rail**

New Jersey Barrier with 22" Steel Bicycle Rail

Bicycle Rail Attachment to Safety Shape Concrete Rail

New Jersey Safety Shape Parapet

Type HT

# INDEX

## 5. F-Shape Concrete Barrier/Single Slope

32" F-Shape

42" F-Shape

Soundwall/F-Shape

Vertical Face Guide, 34" Retrofit

Vertical Face Guide, 42" Retrofit

## 6. Timber Bridge Rail

Timber Rail 3 Bridge Rail

Panel-Lam Timber Vehicle Bridge Rail

Curb-Type Glu-Lam Rail for Longitudinal Timber Decks

Glu-Lam Rail with Steel Box Attachment, side mount

Glu-Lam Timber Rail with Curb, GC8000 design

Timber Curbs for Longitudinal Timber Decks

W-Beam Breakaway Timber Post Railing

Steel Thrie-Beam Rail, side mount

Steel Thrie-Beam Rail with Upper Channel, TCB8000 design

W-Beam Breakaway Steel Post Railing