# BRIDGE RAIL Guide 2005

# Contents

# Bridge Rail Guide 2005

Contents

# Bridge Rail Guide 2003

## TEST LEVEL INDEX

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

Comments or changes may be forwarded to 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 |

# W-Beam Bridge Rail

## 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

# W-Beam Bridge Rail

## Texas T101

Plans Not Yet Available.

# W-Beam Bridge Rail

## 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

# W-Beam Bridge Rail

## Side Mount W Beam

Plans Not Yet Available.

# W-Beam Bridge Rail

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

Height:
27"

Cost per linear foot:
$41

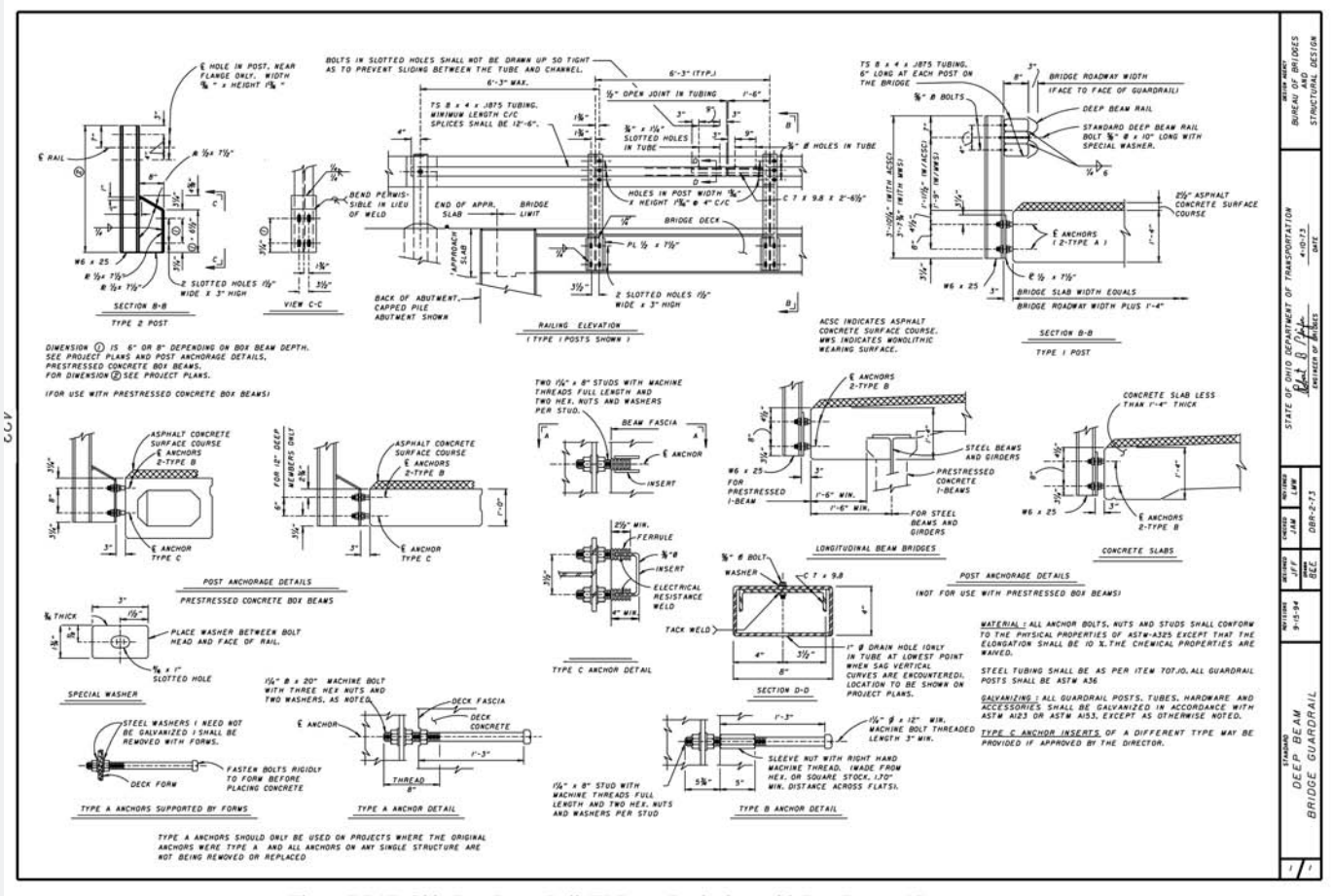
Test level:
TL-2

Utilized in:
Ohio

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

# W-Beam Bridge Rail

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



# W-Beam Bridge Rail

## Type T6 - Tubular W-Beam

Height:
27"

Cost per linear foot:
$38

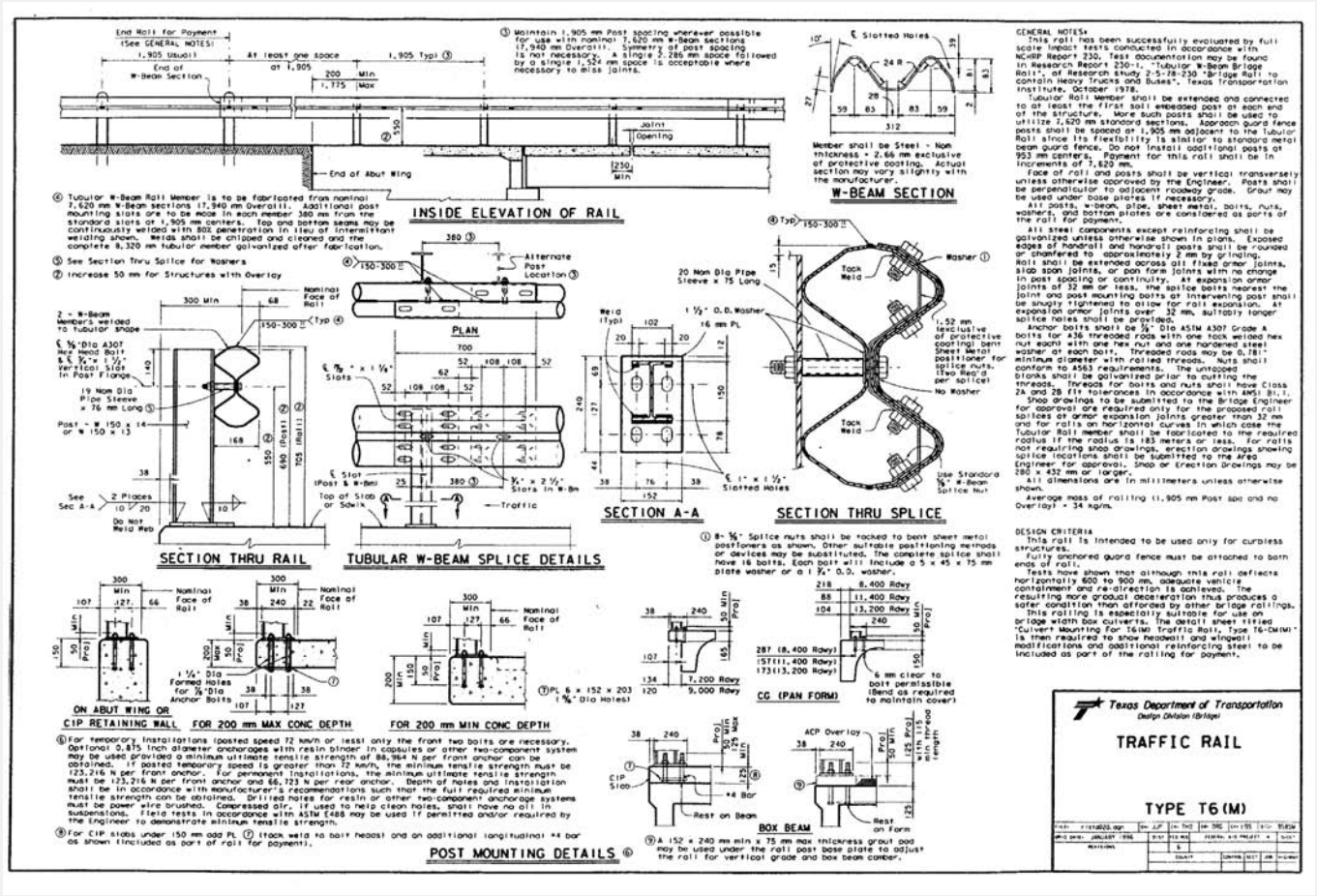
Test level:
TL-2

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 Bridge Rail

## W-Beam Retrofit

Height:
28.5"

Cost per linear foot:
$__

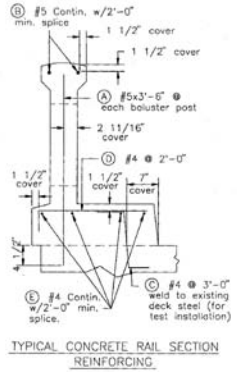
Test level:
TL-2

Utilized in:
West Virginia

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

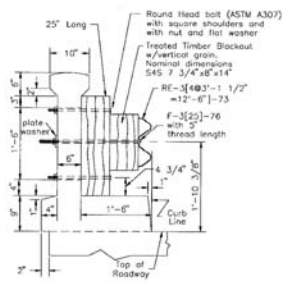
# W-Beam Bridge Rail

## W-Beam Retrofit



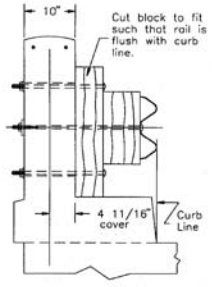

TYPICAL CONCRETE RAIL SECTION
REINFORCING

Figure 1. Drawings for concrete baluster bridge railing.



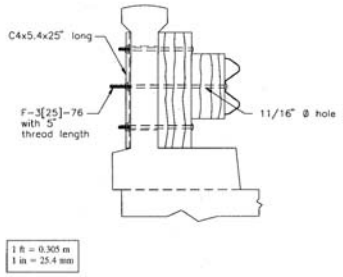

TYPICAL CONCRETE RAIL SECTION
WITH W-BEAM RETROFIT
WHEN ℄ 5/8"ø BOLT
CAN NOT GO THROUGH CONCRETE RAILING VOID

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 ℄ 5/8"ø 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 |

# Thrie-Beam Bridge Rail

## Delaware Thrie-Beam Retrofit Railing

Height:
32"

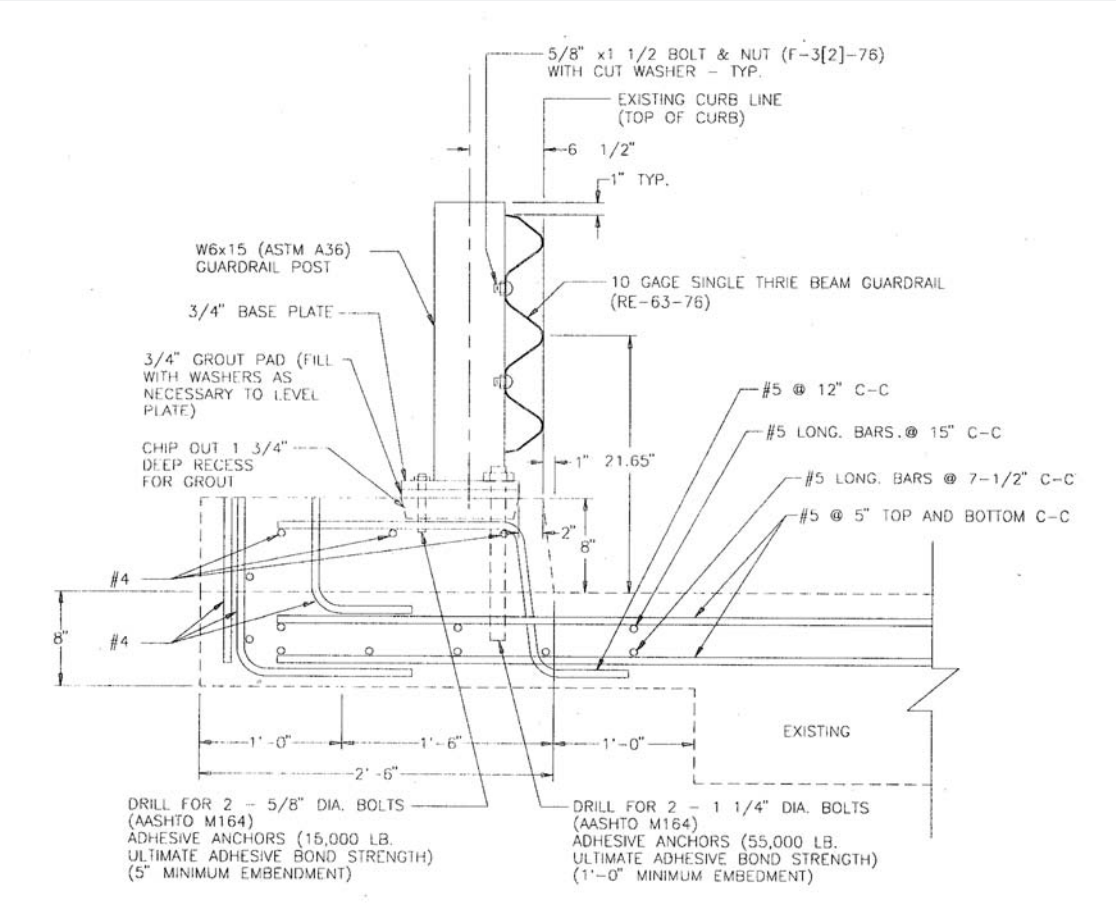
Cost per linear foot:
$__

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



# Thrie-Beam Bridge Rail

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

Height:
34"

Cost per linear foot:
$25

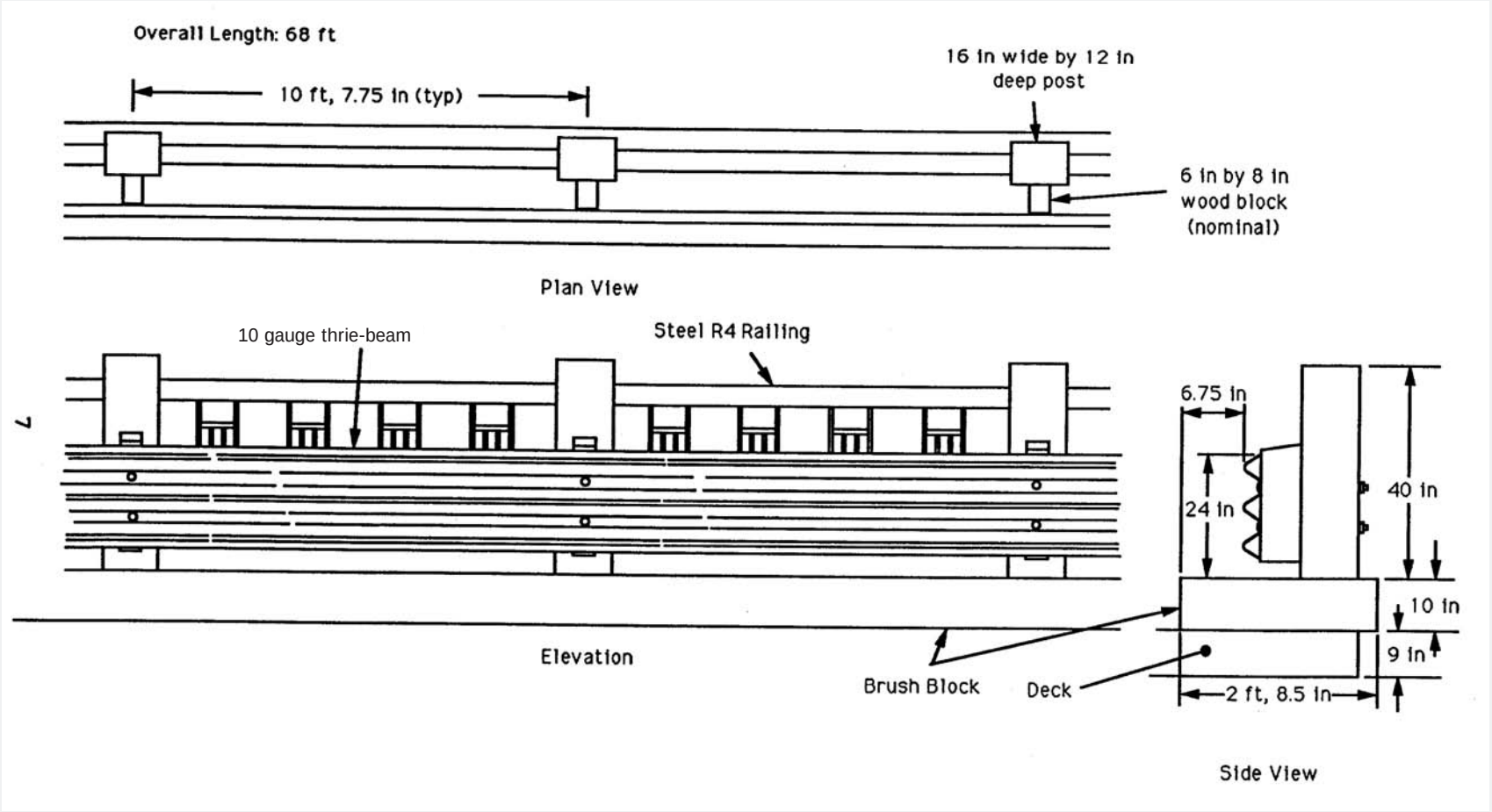
Test level:
TL-4

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

# Thrie-Beam Bridge Rail

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



# Thrie-Beam Bridge Rail

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

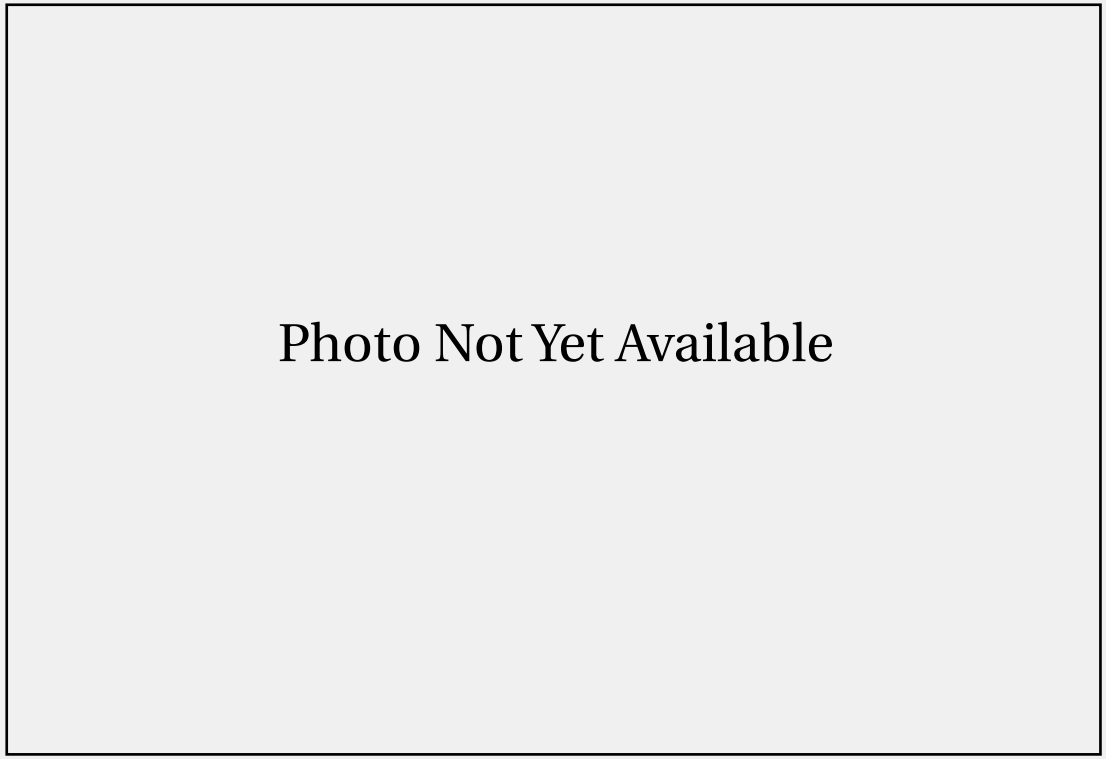
Height:
30.5"

Cost per linear foot:
$100-125

Test level:
TL-3

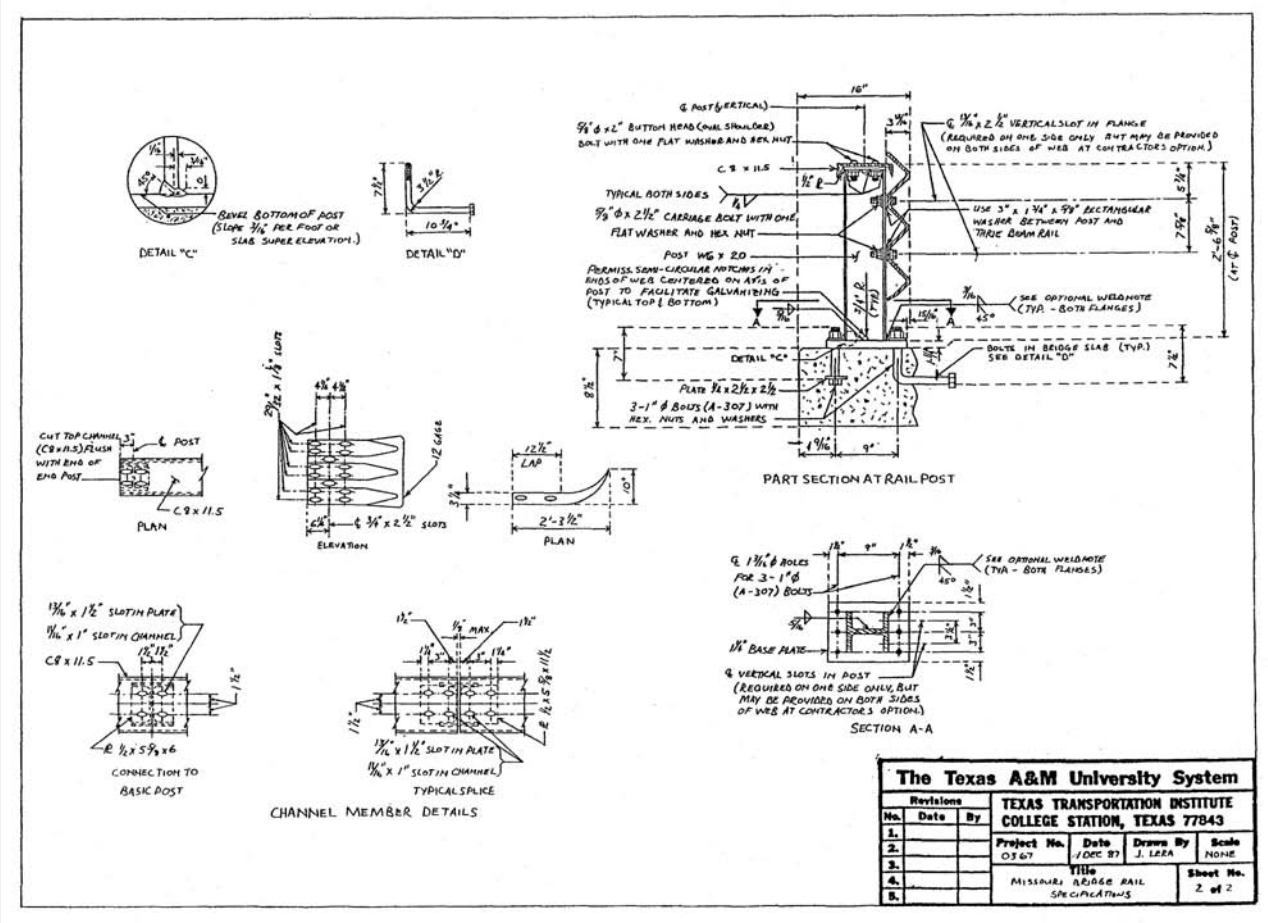
Utilized in:
Missouri

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



# Thrie-Beam Bridge Rail

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



# Thrie-Beam Bridge Rail

## Nebraska Tubular Thrie-Beam Bridge Rail

Height:
32"

Cost per linear foot:
$__

Test level:
TL-3

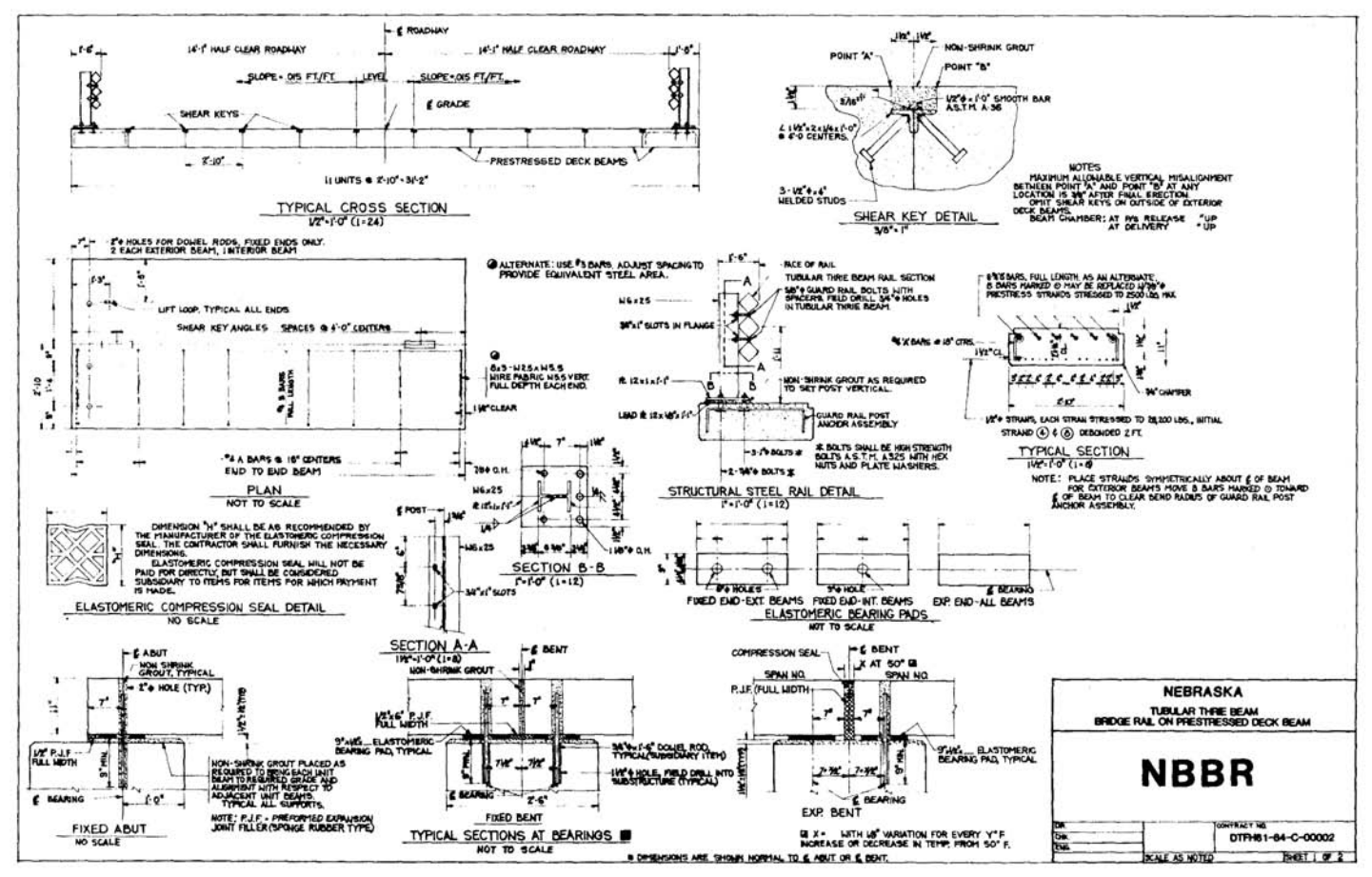
Utilized in:
Nebraska

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

Photo Not Yet Available

# Thrie-Beam Bridge Rail

## Nebraska Tubular Thrie-Beam Bridge Rail



# Thrie-Beam Bridge Rail

## Oregon Thrie-Beam Side Mount

Height:
29"

Cost per linear foot:
$63.60

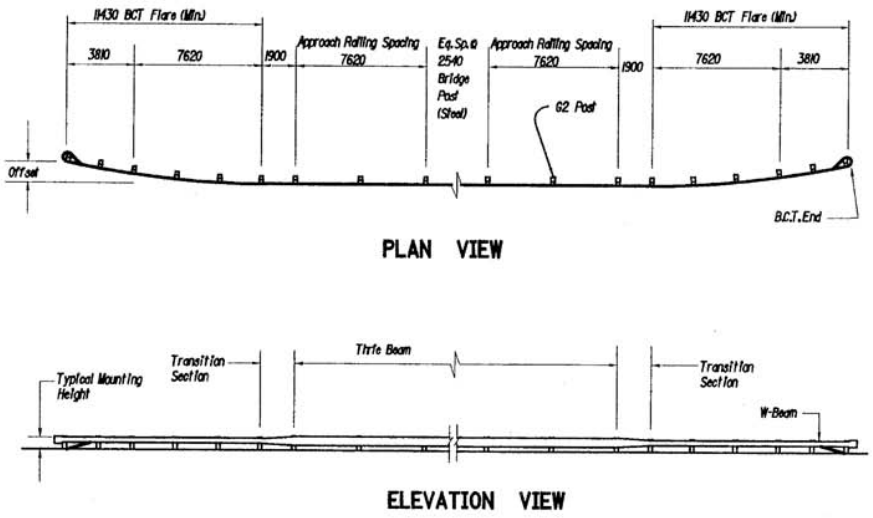
Test level:
TL-2

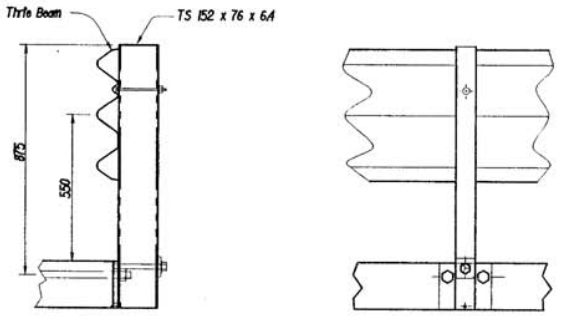
Utilized in:
Oregon

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

# Thrie-Beam Bridge Rail

## Oregon Thrie-Beam Side Mount



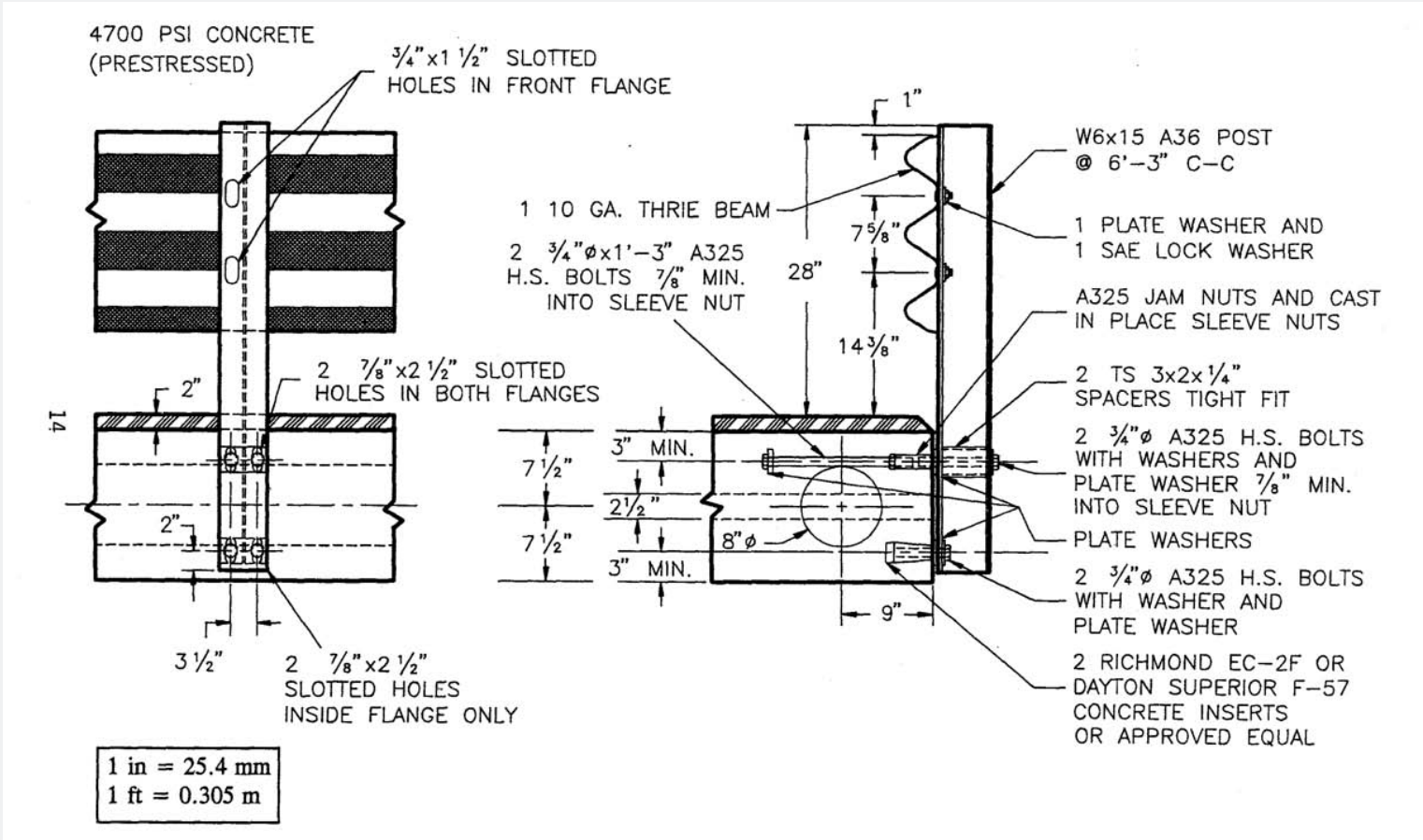

All Dimensions Shown Are mm unless Otherwise Noted.

**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 |

# Thrie-Beam Bridge Rail

## Oregon Thrie-Beam Side Mount



# Thrie-Beam Bridge Rail

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

Height:
30"

Cost per linear foot:
$40

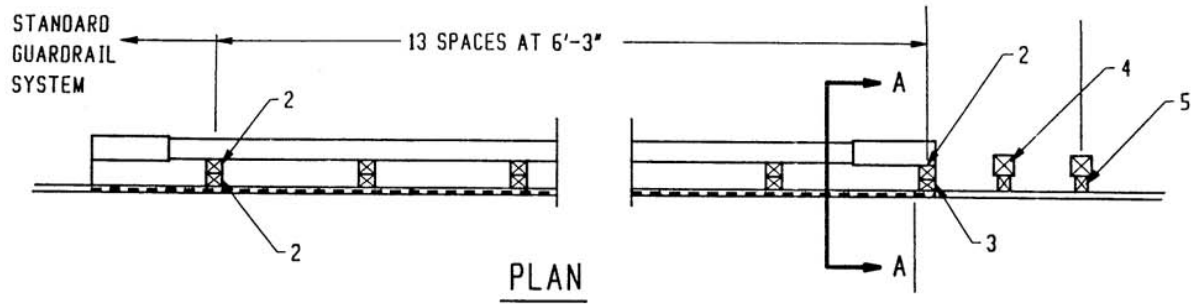
Test level:
TL-2

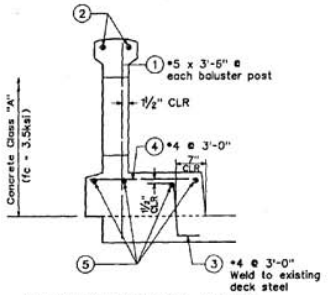
Utilized in:
Washington State

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

# Thrie-Beam Bridge Rail

## Washington 10 Gauge Thrie-Beam Retrofit




TYPICAL BALUSTER RAIL SECTION
REINFORCING

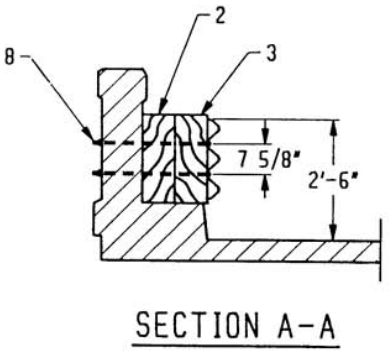
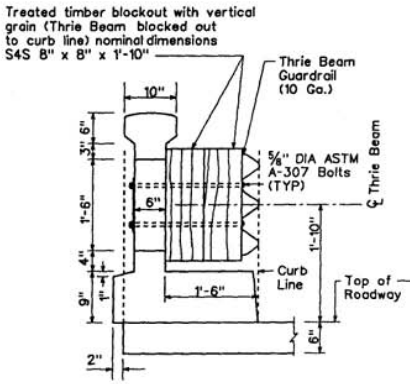
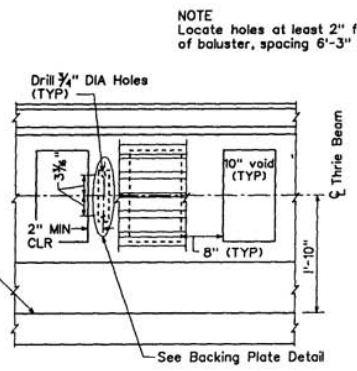



FIGURE 8: WASHINGTON 10 GAGE THRIE BEAM RETROFIT FOR BALUSTERS CURB/SIDEWALK




TYPICAL BALUSTER RAIL SECTION




ELEVATION OF BALUSTER

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 |

# Aluminum Tube Bridge Rail

## Foothills Parkway Aluminum Bridge Rail

Height:
33"

Cost per linear foot:
$75

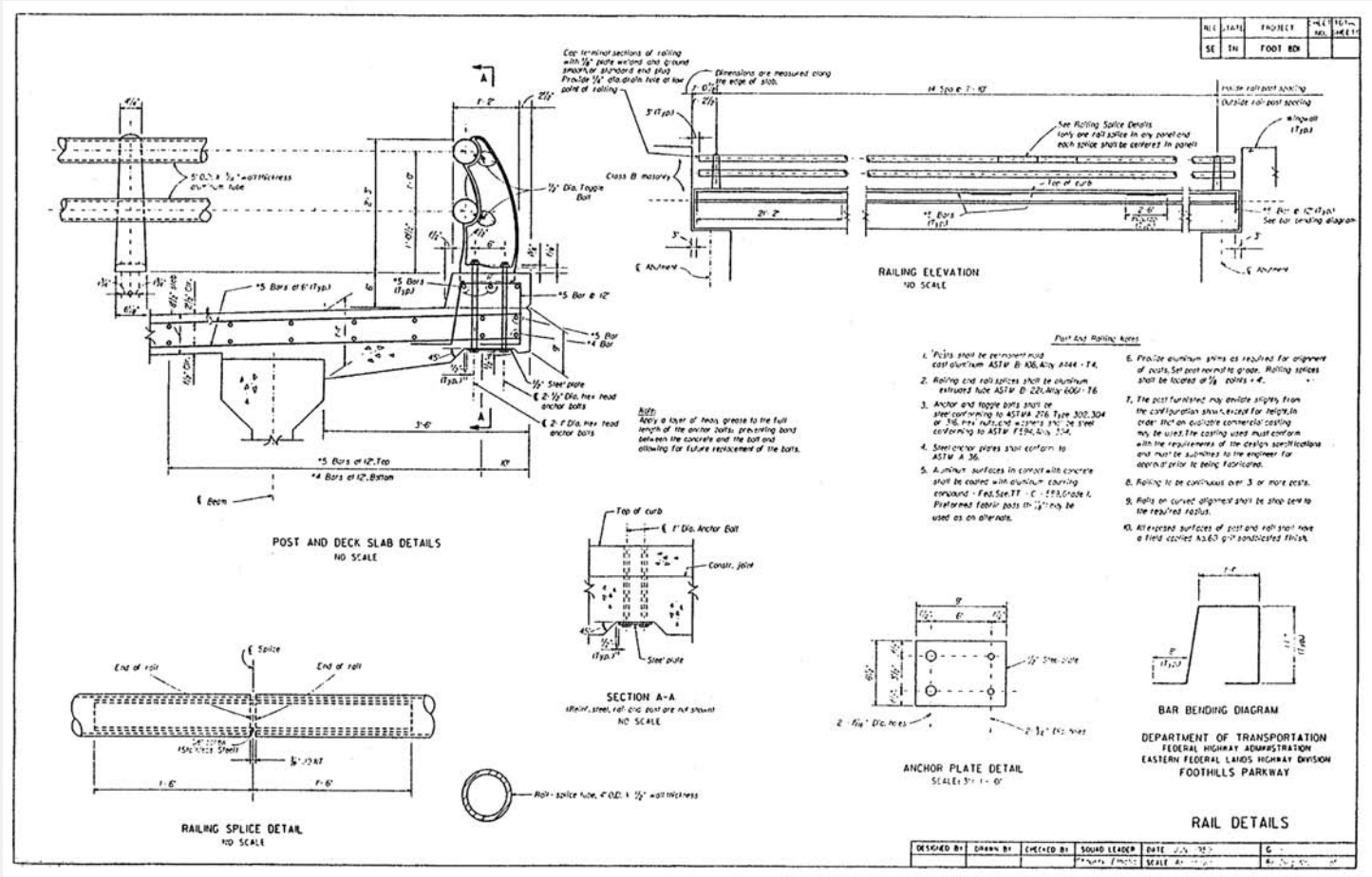
Test level:
TL-2

Utilized in:
Federal Lands

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

# Aluminum Tube Bridge Rail

## Foothills Parkway Aluminum Bridge Rail



# Aluminum Tube Bridge Rail

## Standard 1-Bar Metal Rail

Height:
32"

Cost per linear foot:
$110

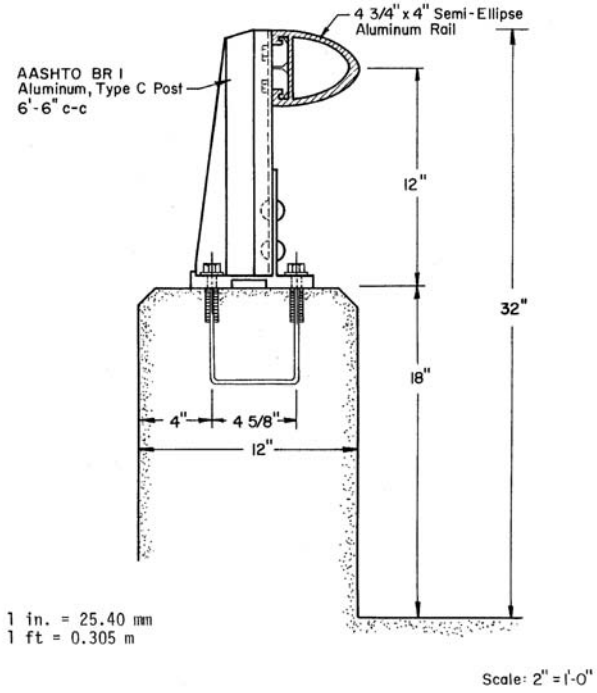
Test level:
TL-2

Utilized in:
North Carolina

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

# Aluminum Tube Bridge Rail

## Standard 1-Bar Metal Rail




**NORTH CAROLINA**

Cross Section of North Carolina One-Bar
Aluminum on Concrete Parapet.

# Steel Tube Bridge Rail Attached to Bottom of Deck

## Texas Energy Absorbing Bridge Rail

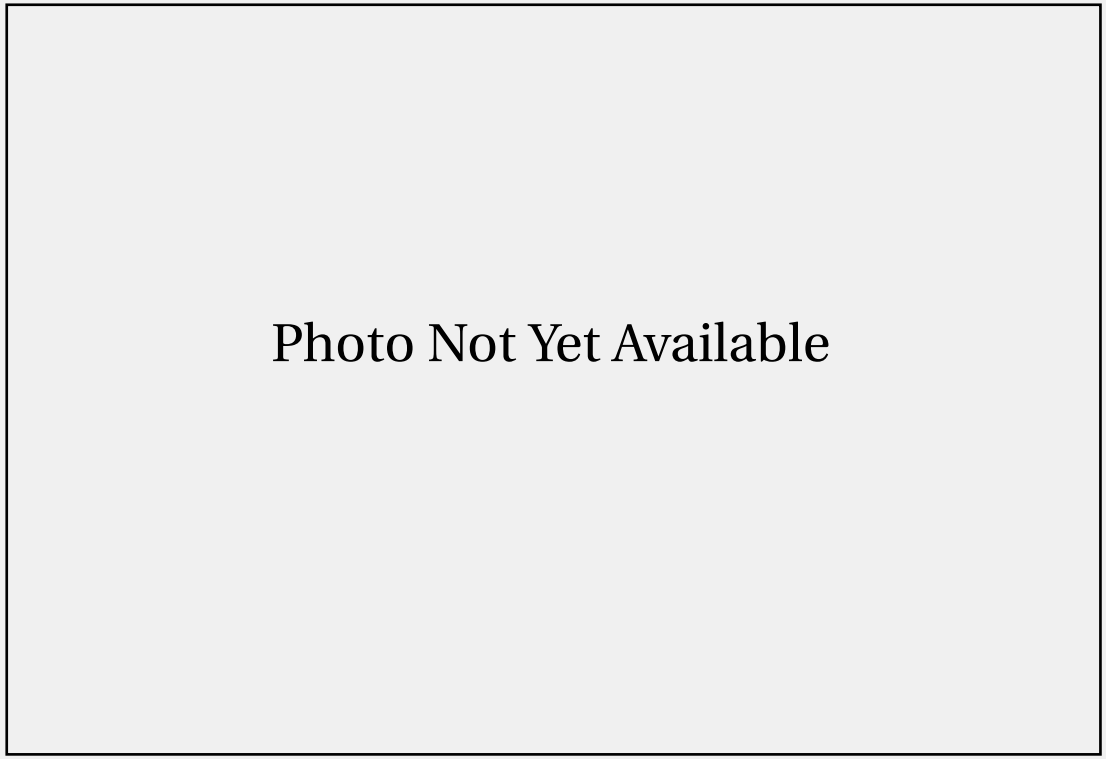
**Height:**
27"

**Cost per linear foot:**
$__

**Test level:**
TL-3

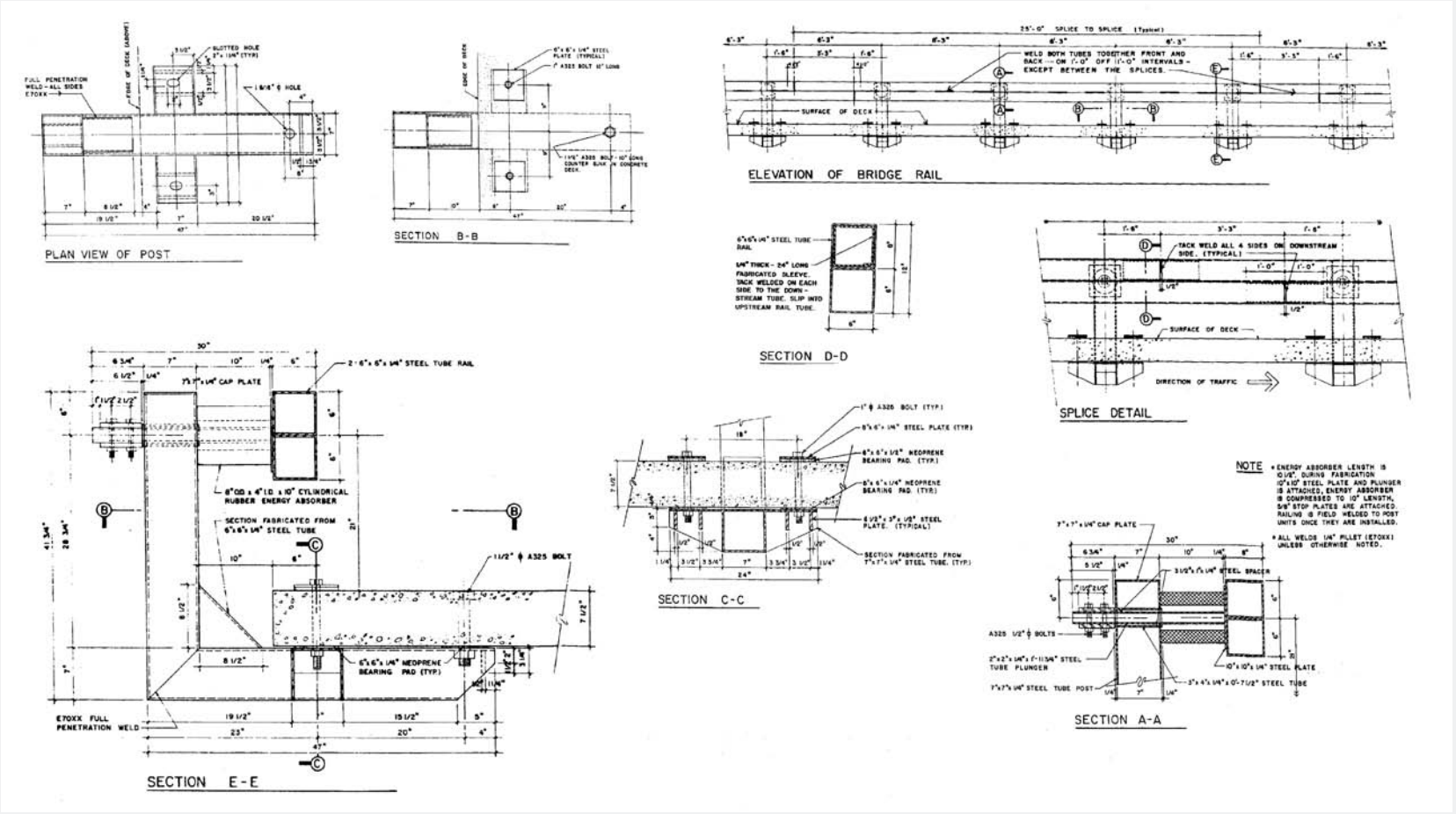
**Utilized in:**
Texas

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



# 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

Height:
36"

Cost per linear foot:
$__

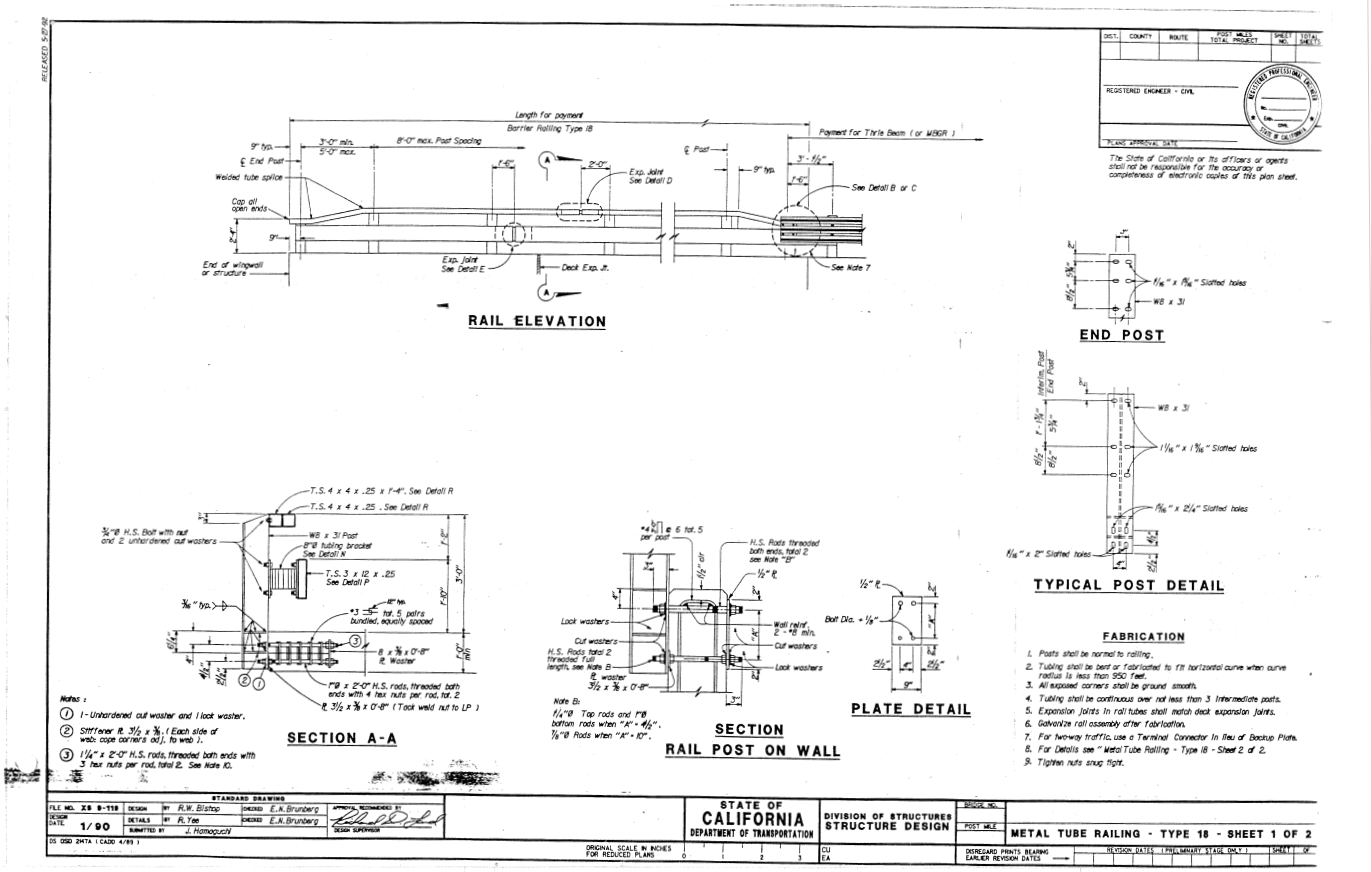
Test level:
TL-2

Utilized in:
California

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

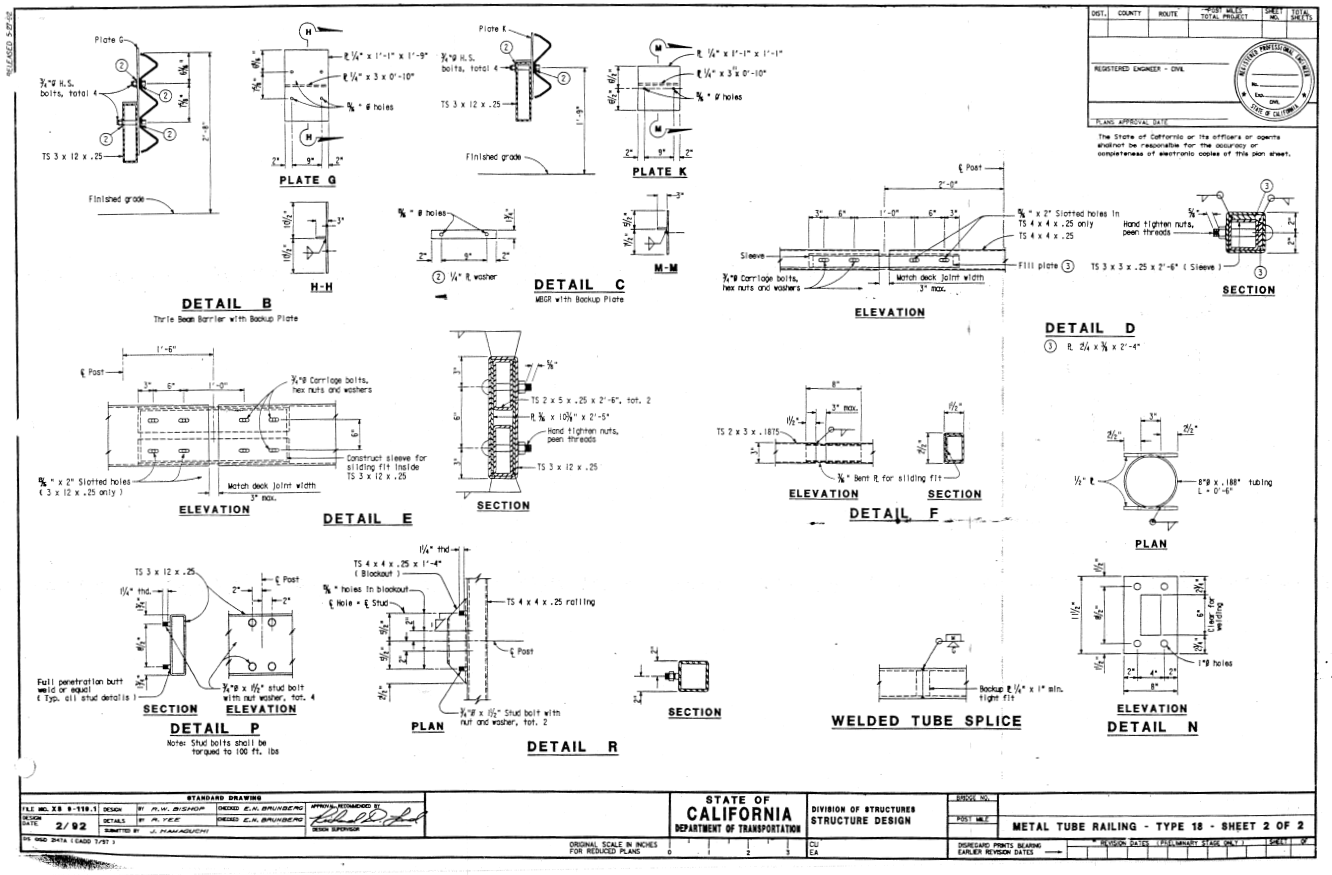
# Steel Tube Bridge Rail Attached to Side of Deck

## California Type 18



# Steel Tube Bridge Rail Attached to Side of Deck

## California Type 18



# Steel Tube Bridge Rail Attached to Side of Deck

## California Side Mount Type 115 Rail

Height:
30"

Cost per linear foot:
$__

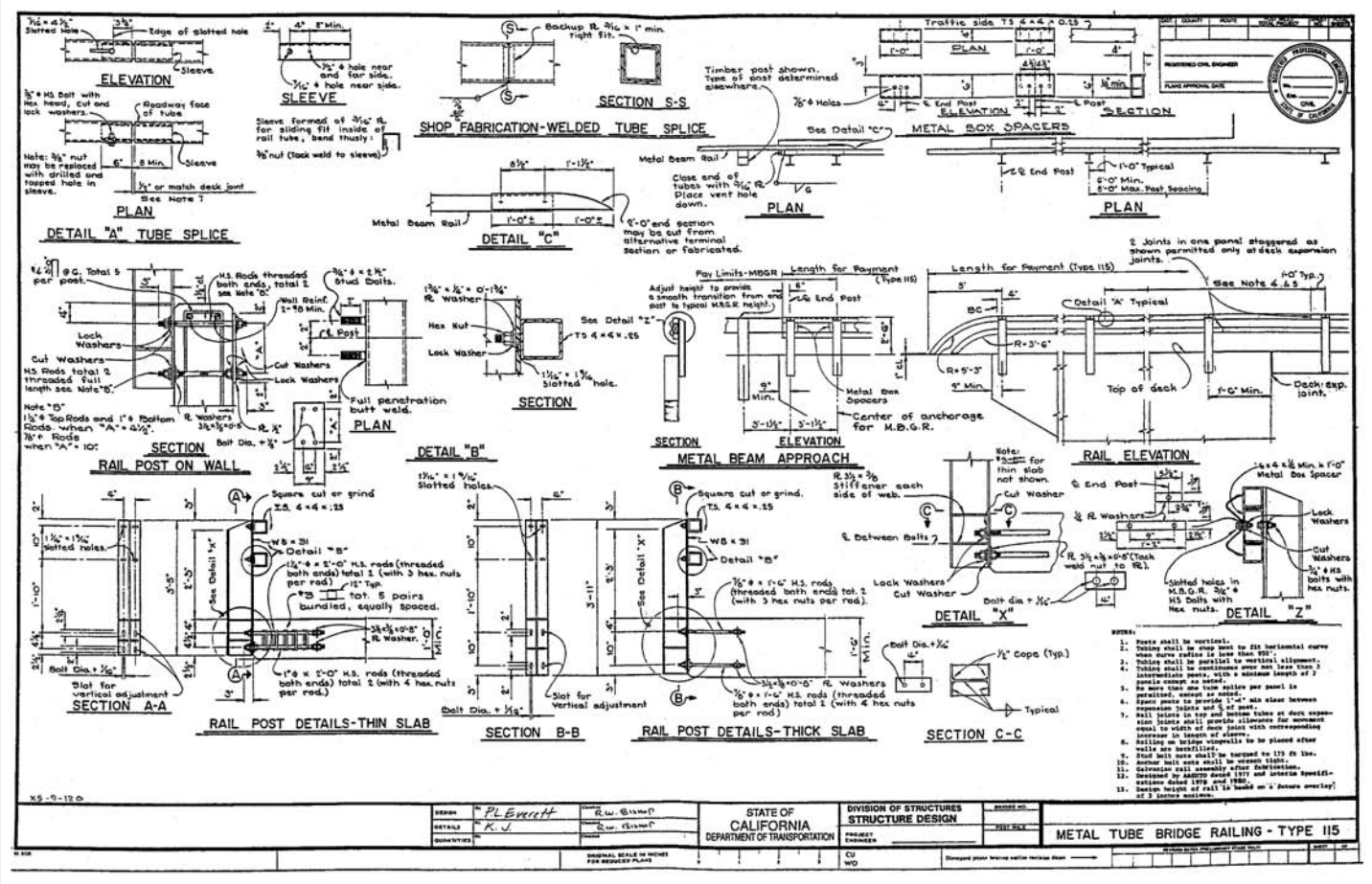
Test level:
TL-2

Utilized in:
California

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

# Steel Tube Bridge Rail Attached to Side of Deck

## California Side Mount Type 115 Rail



# Steel Tube Bridge Rail Attached to Side of Deck

## California Type 116 Rail

Height:
42"

Cost per linear foot:
$__

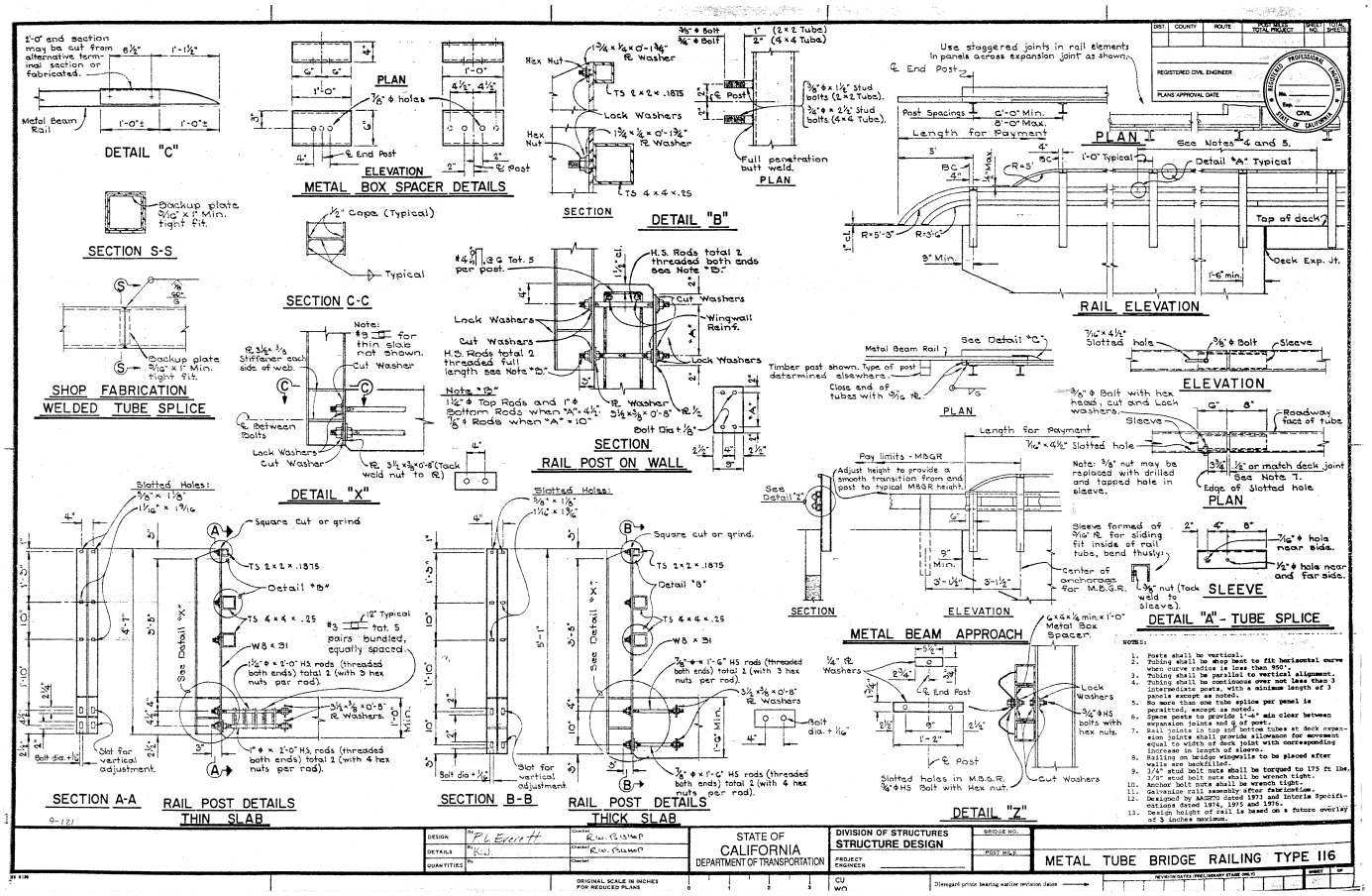
Test level:
TL-2

Utilized in:
California

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

# Steel Tube Bridge Rail Attached to Side of Deck

## California Type 116 Rail



# Steel Tube Bridge Rail attached to Side of Deck

## California Type 117 Rail

Height:
54"

Cost per linear foot:
$__

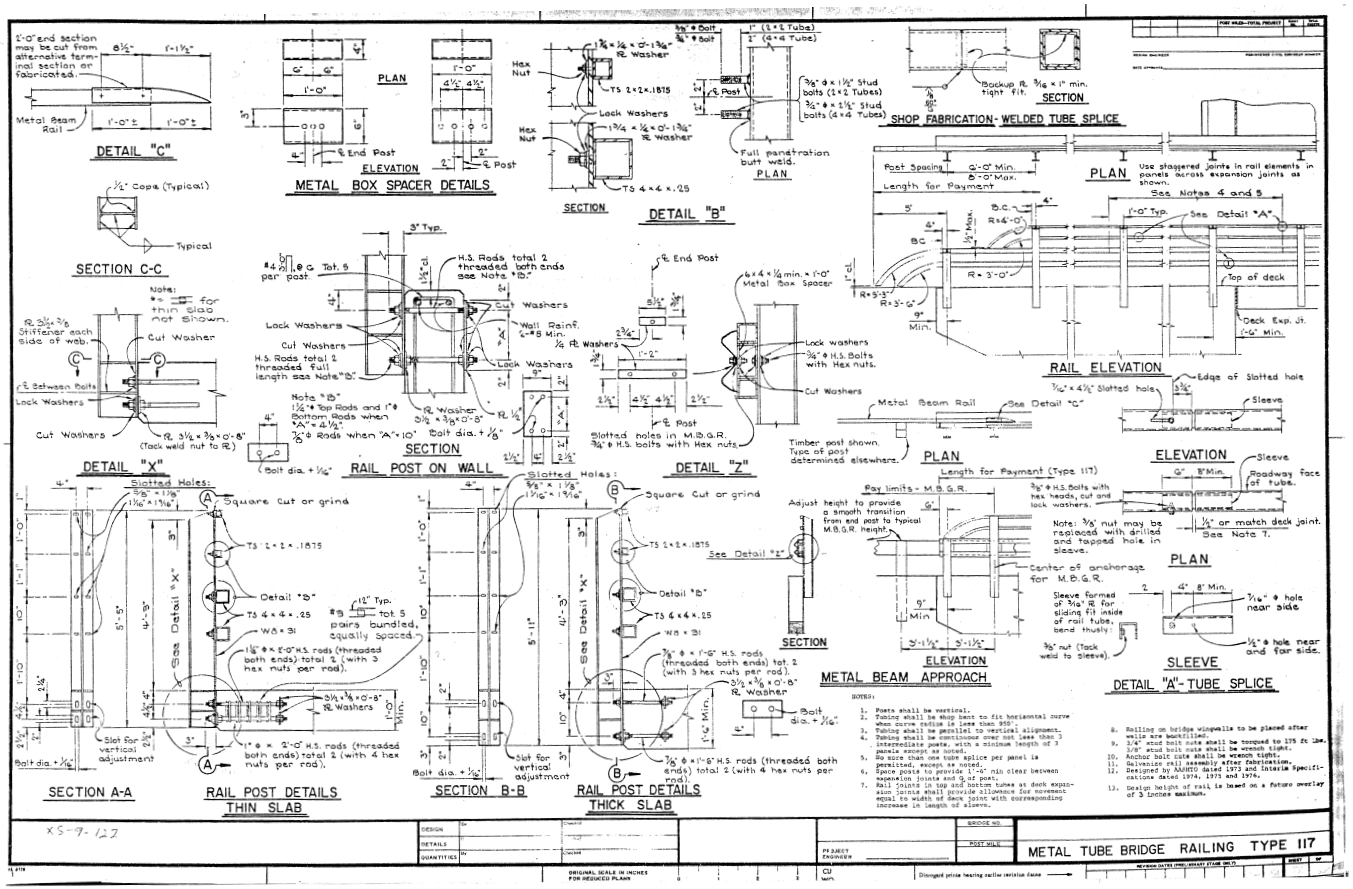
Test level:
TL-2

Utilized in:
California

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

# Steel Tube Bridge Rail Attached to Side of Deck

## California Type 117 Rail



# Steel Tube Bridge Rail Attached to Side of Deck

## Illinois 2399 - Type Side Mount

Height:
32"

Cost per linear foot:
$75

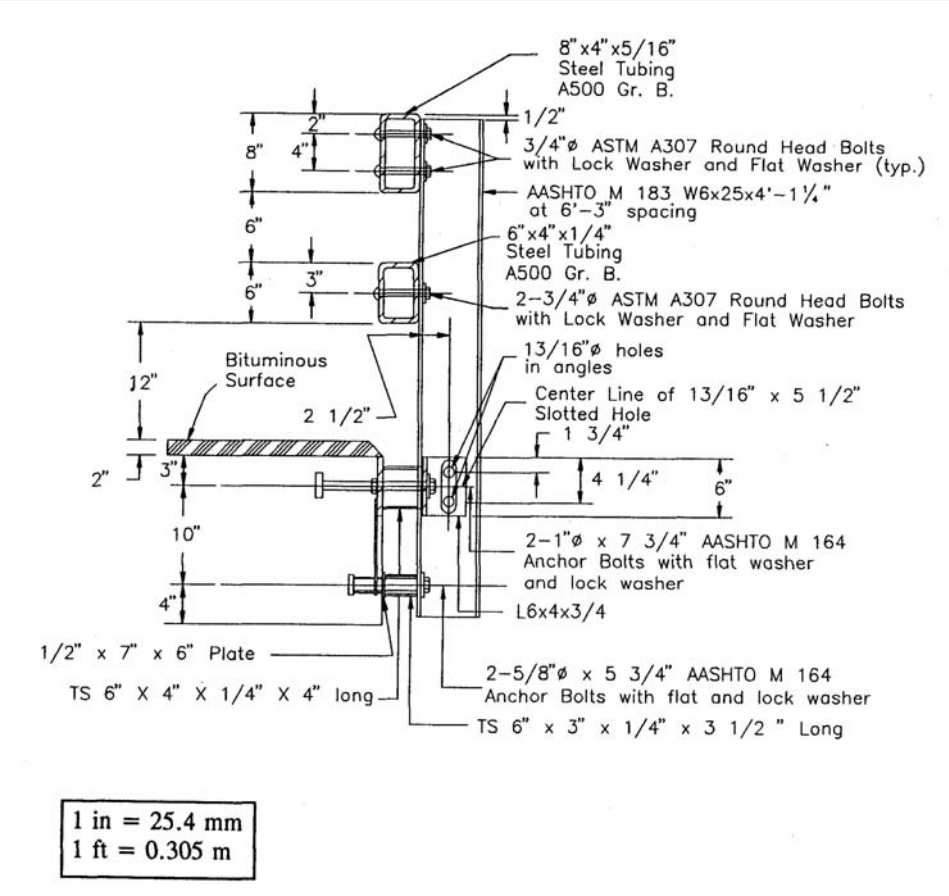
Test level:
TL-4

Utilized in:
Illinois

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

# Steel Tube Bridge Rail Attached to Side of Deck

## Illinois 2399 - Type Side Mount



# Steel Tube Bridge Rail, Attached to Side of Deck

## Oregon 2-Tube Side Mount

Height:
32"

Cost per linear foot:
$77

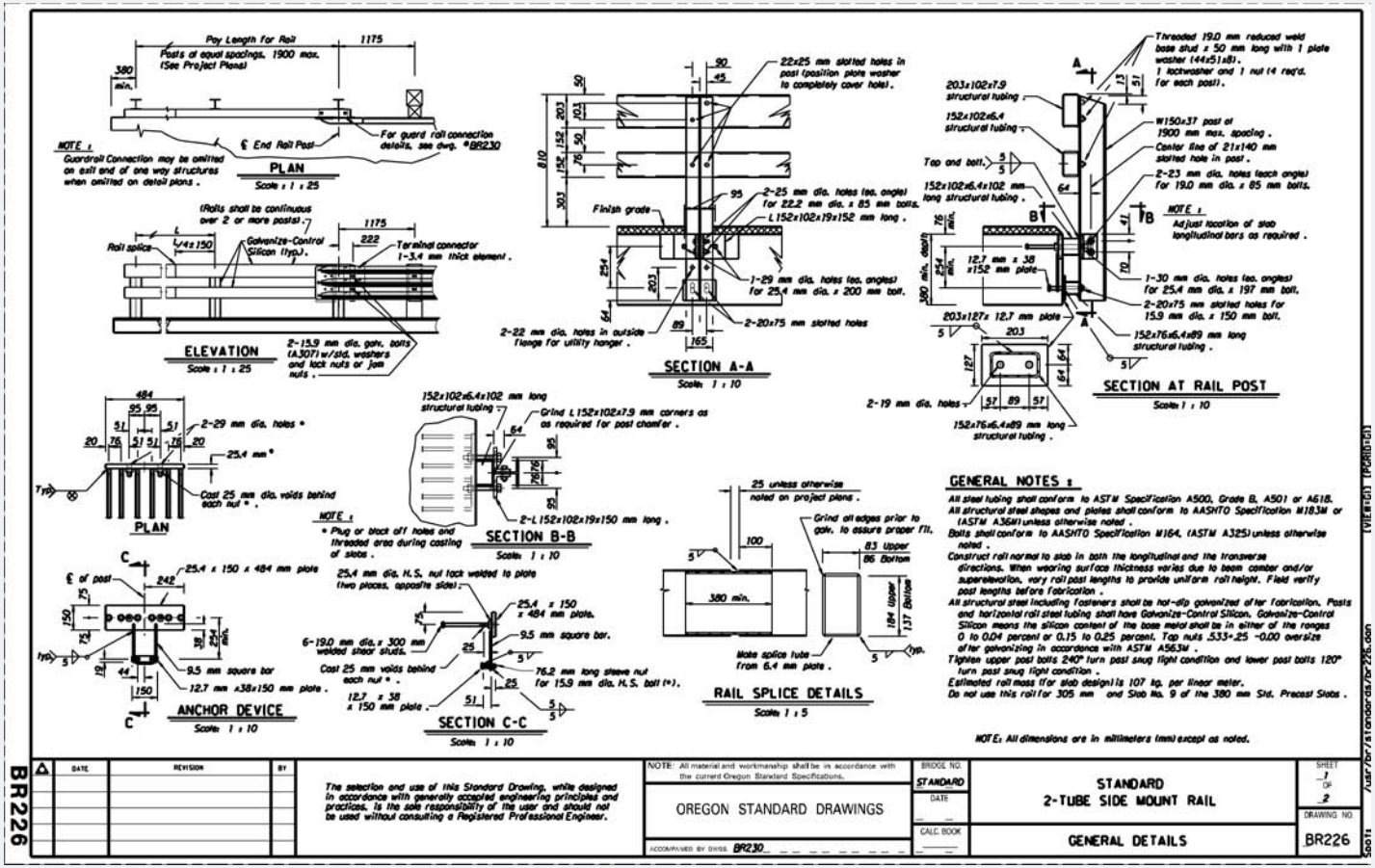
Test level:
TL-4

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

# Steel Tube Bridge Rail, Attached to Side of Deck

## Oregon 2-Tube Side Mount



# Steel Tube Bridge Rail Attached to Top of Deck

## Texas Type 421 Aesthetic Rail

Height:
32"

Cost per linear foot:
$__

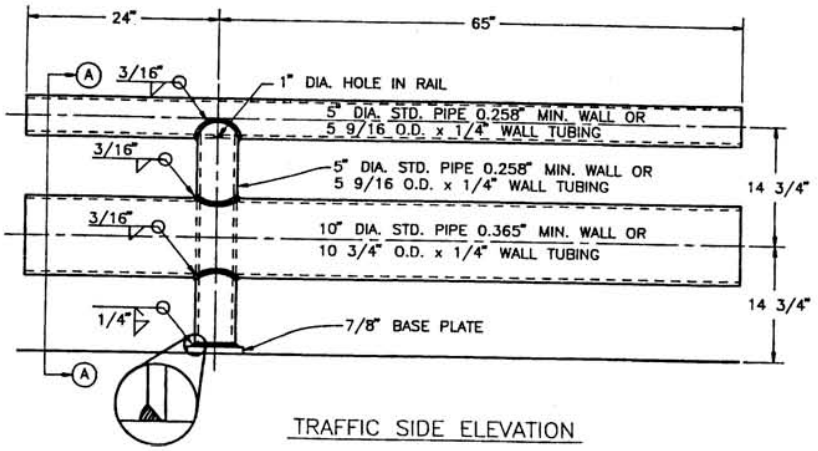
Test level:
TL-2

Utilized in:
Texas

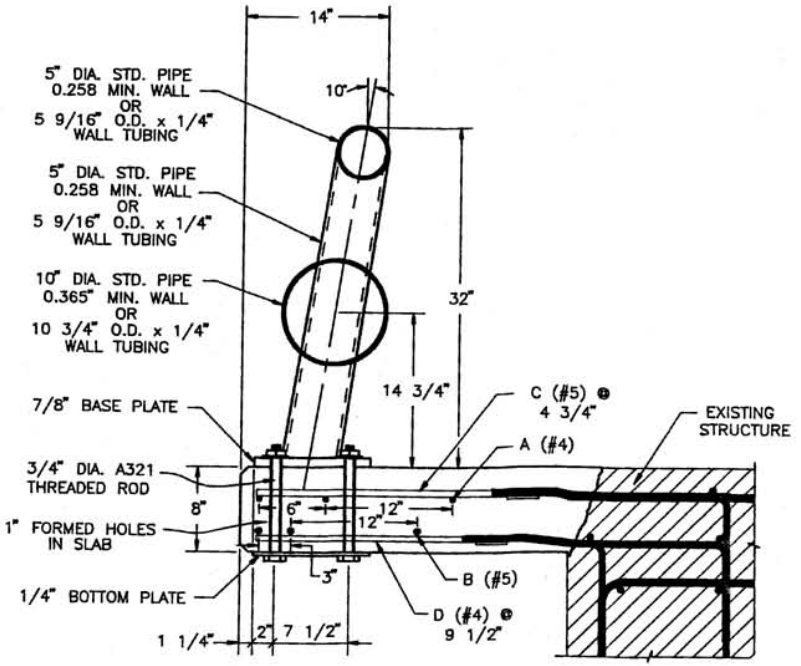
Contact:
Mark Bloschock
Texas DOT Bridge Division
RA118
125 E. 11th Street
Austin, TX 78701-2483
(512) 416-2178

# Steel Tube Bridge Rail Attached to Top of Deck

## Texas Type 421 Aesthetic Rail




TRAFFIC SIDE ELEVATION




Cross section of T421 bridge rail.

# Steel Tube Bridge Rail Attached to Top of Deck

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

Height:
27"

Cost per linear foot:
$__

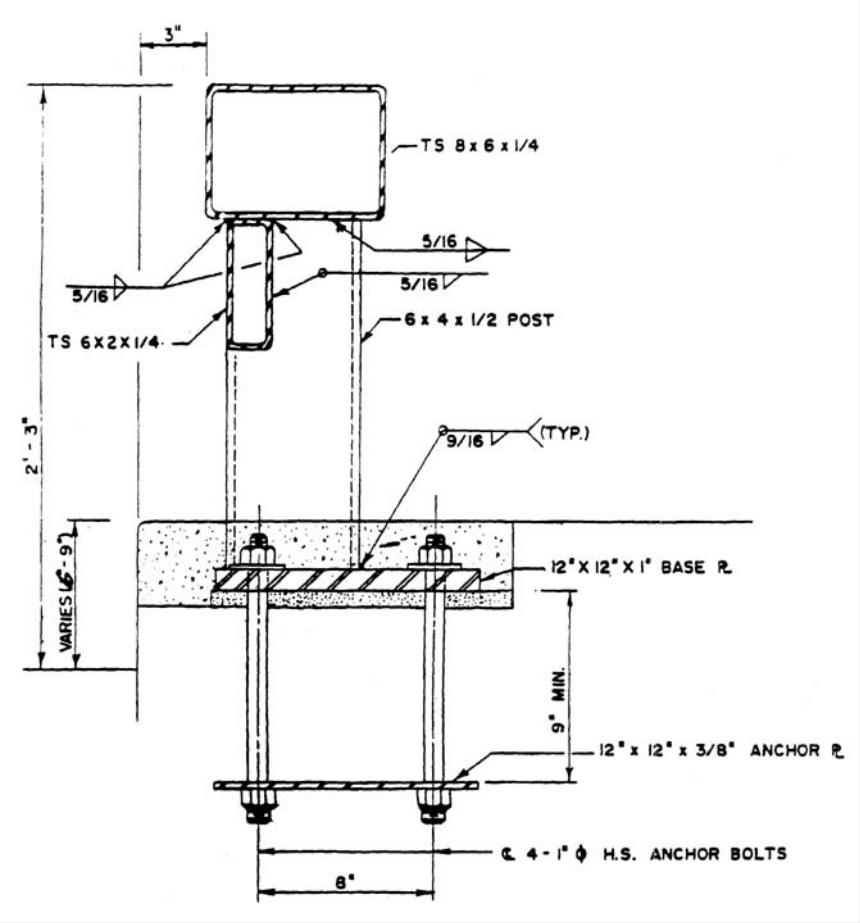
Test level:
TL-2

Utilized in:
Washington, DC

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

# Steel Tube Bridge Rail Attached to Top of Deck

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



# Steel Tube Bridge Rail Attached to Parapet

## Alaska Rail - Curb Mounted

Height:
32"

Cost per linear foot:
$90

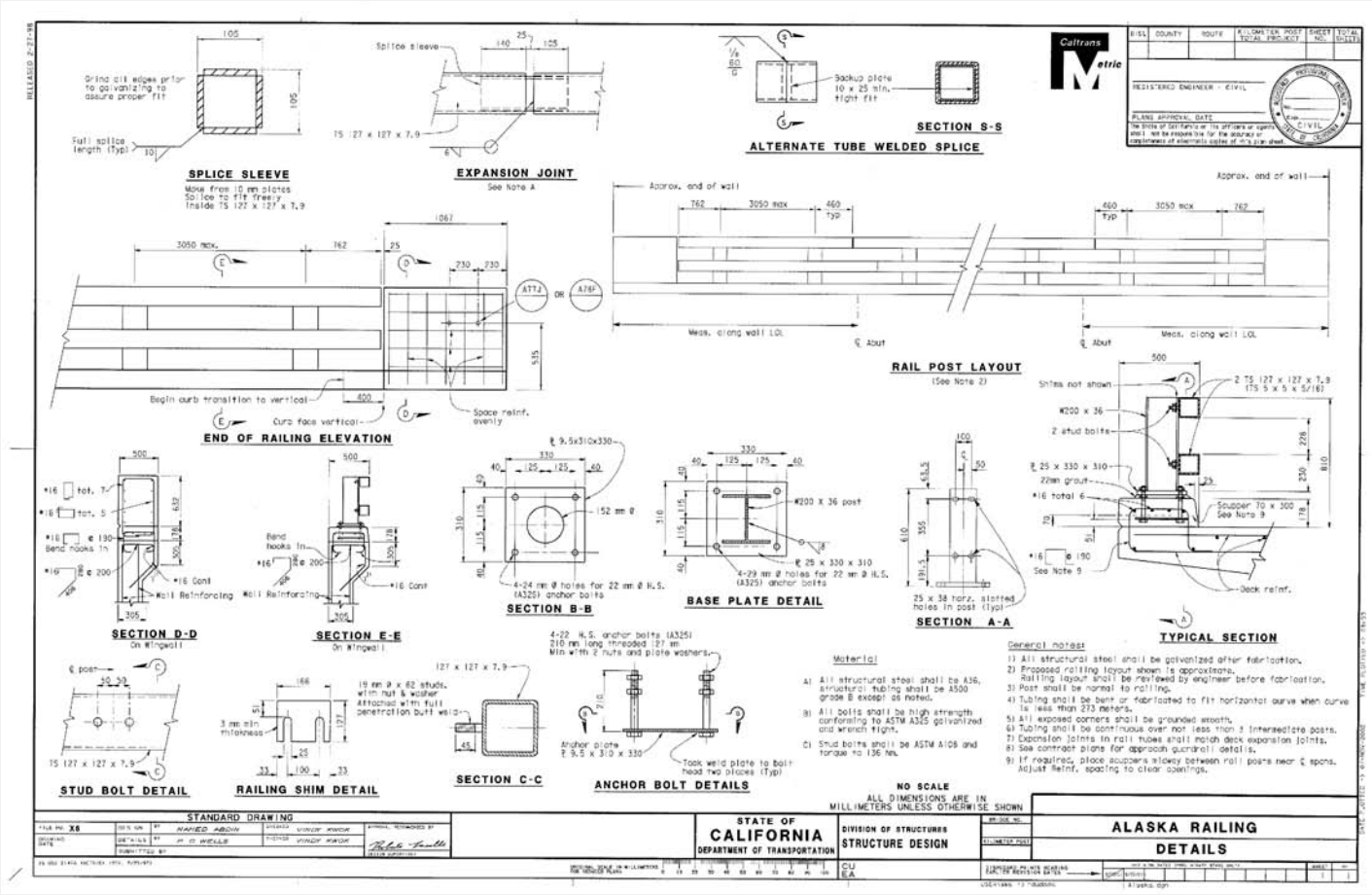
Test level:
TL-4

Utilized in:
Alaska

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

# Steel Tube Bridge Rail Attached to Parapet

## Alaska Rail - Curb Mount



# Steel Tube Bridge Rail Attached to Parapet

## California Type 9 (AASHTO BR2)

Height:
27"

Cost per linear foot:
$__

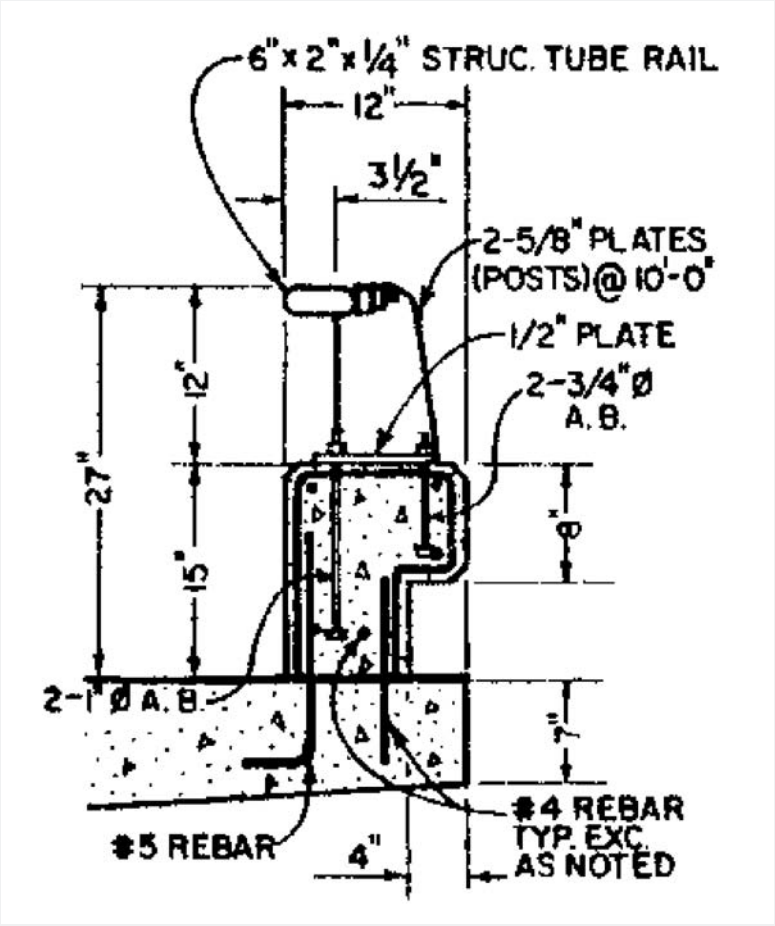
Test level:
TL-2

Utilized in:
California

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

# Steel Tube Bridge Rail Attached to Parapet

## California Type 9 (AASHTO BR2)



# Steel Tube Bridge Rail Attached to Parapet

## California ST-10 Rail

Height:
33"

Cost per linear foot:
$120

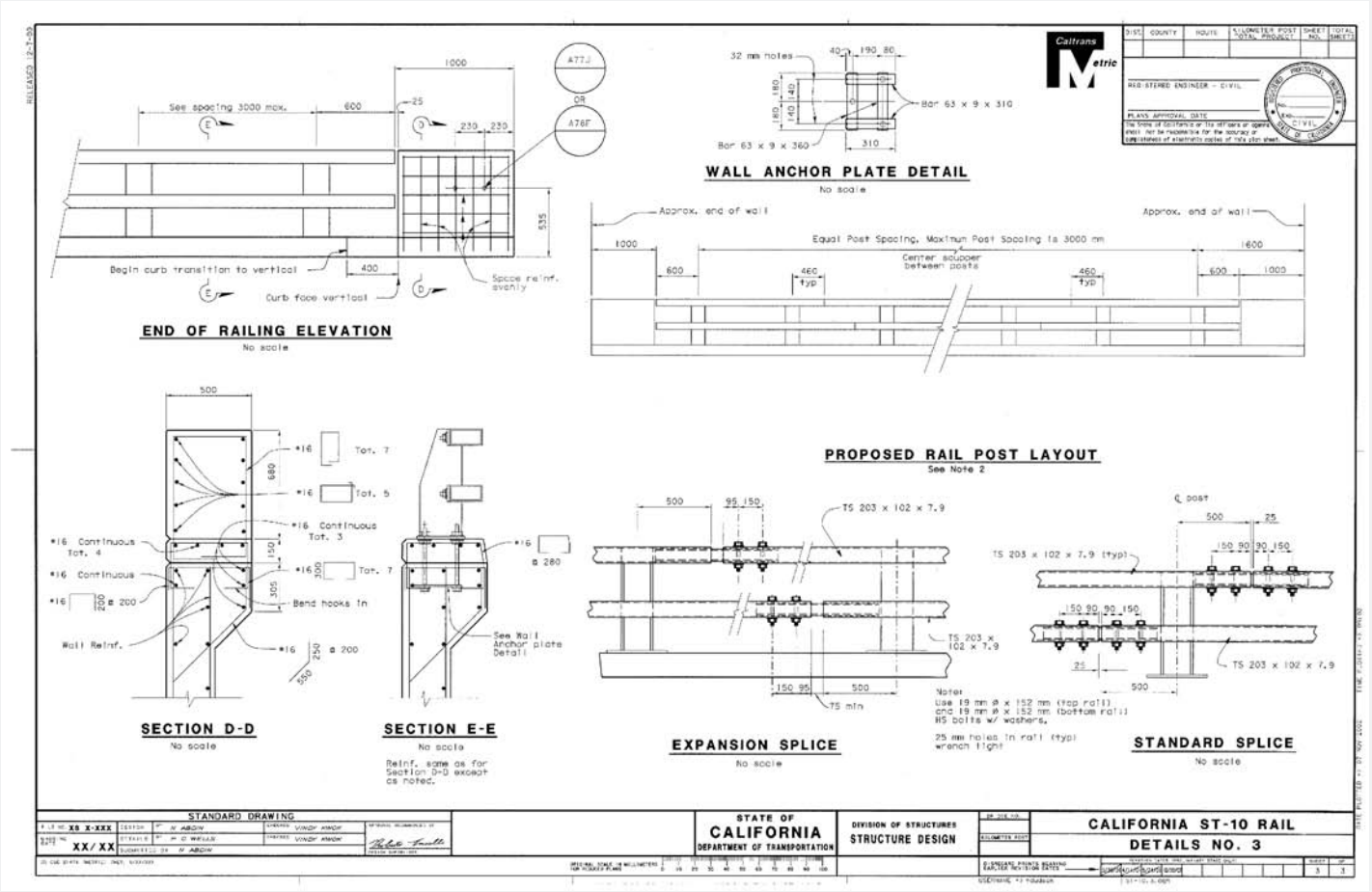
Test level:
TL-4

Utilized in:
California

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

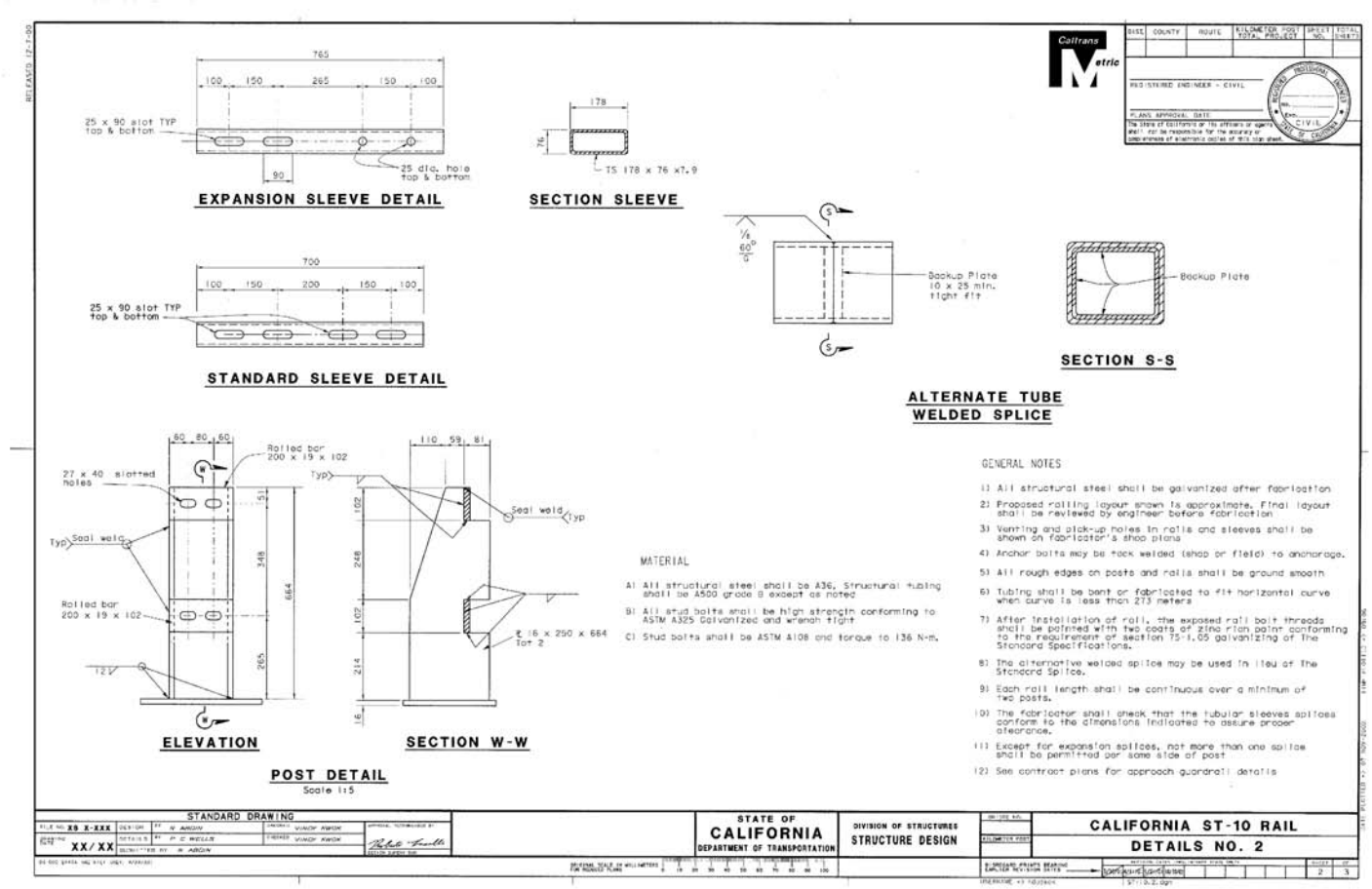
# Steel Tube Bridge Rail Attached to Parapet

## California ST-10 Rail



# Steel Tube Bridge Rail Attached to Parapet

## California ST-10 Rail



# Steel Tube Bridge Rail Attached to Parapet

## 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.

# Steel Tube Bridge Rail Attached to Parapet

## Minnesota Combination Bridge Rail, Design #3

Height:
36"

Cost per linear foot:
$75

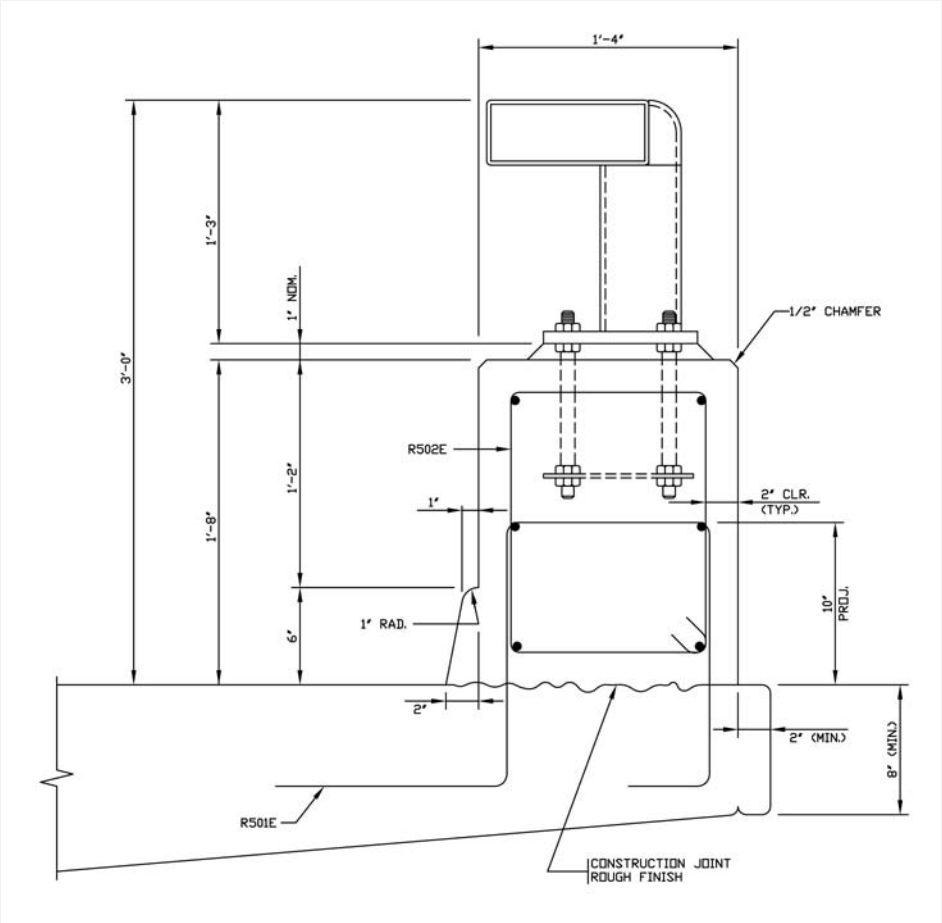
Test level:
TL-4

Utilized in:
Minnesota

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

# Steel Tube Bridge Rail Attached to Parapet

## Minnesota Combination Bridge Rail, Design #3



Section 3

# Steel Tube Bridge Rail Attached to Parapet

## Type C202

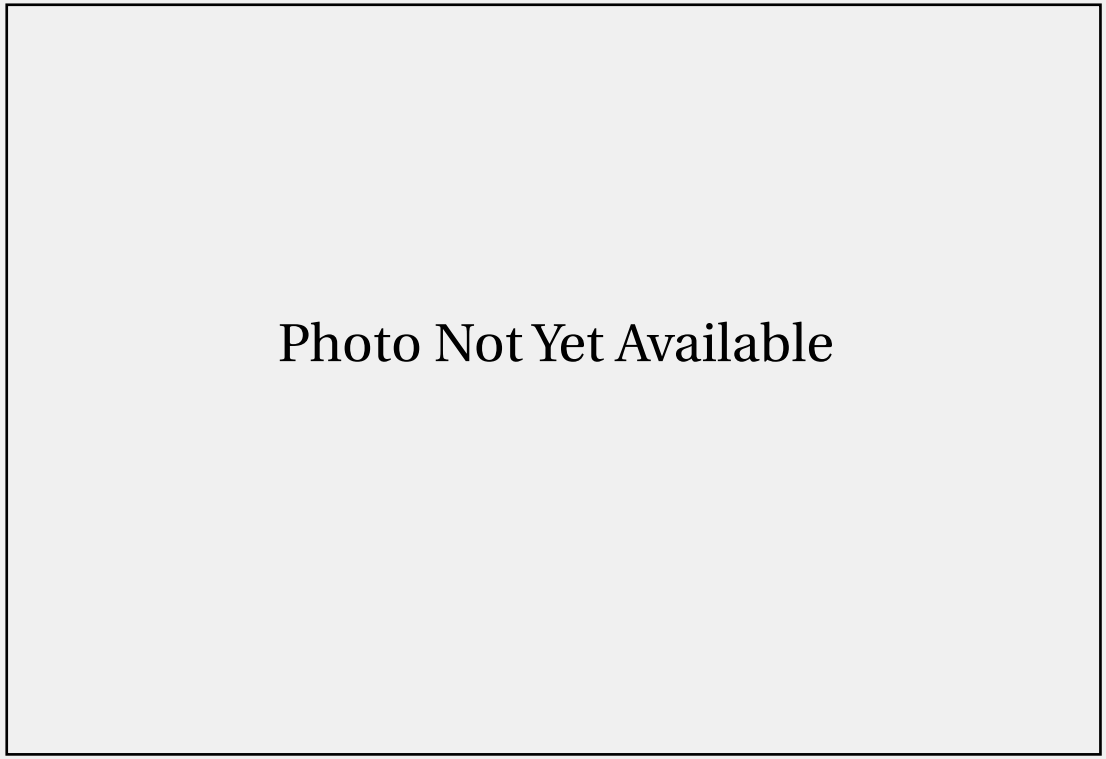
Height:
54"

Cost per linear foot:
$__

Test level:
TL-5

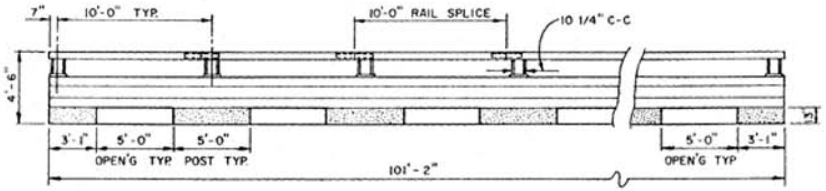
Utilized in:
Texas

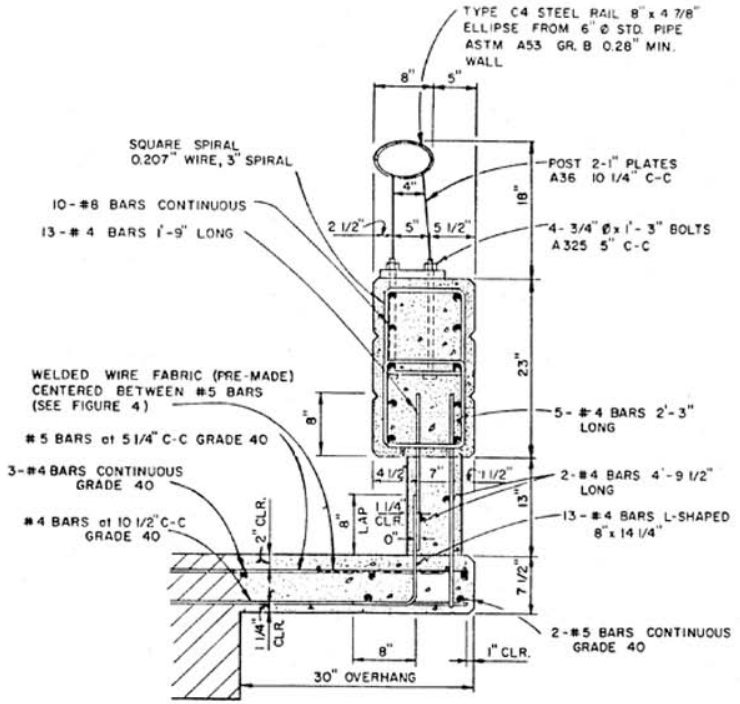
Contact:
Mark Bloschock
Texas DOT Bridge Division
RA118
125 E. 11th Street
Austin, TX 78701-2483
(512) 416-2178



# Steel Tube Bridge Rail Attached to Parapet

## Type C202




Cross Section of the Modified C202 Bridge Rail.

# Curb Mounted Steel Tube Bridge Rail

## George Washington Parkway Steel Bridge Rail

Height:
42"

Cost per linear foot:
$200

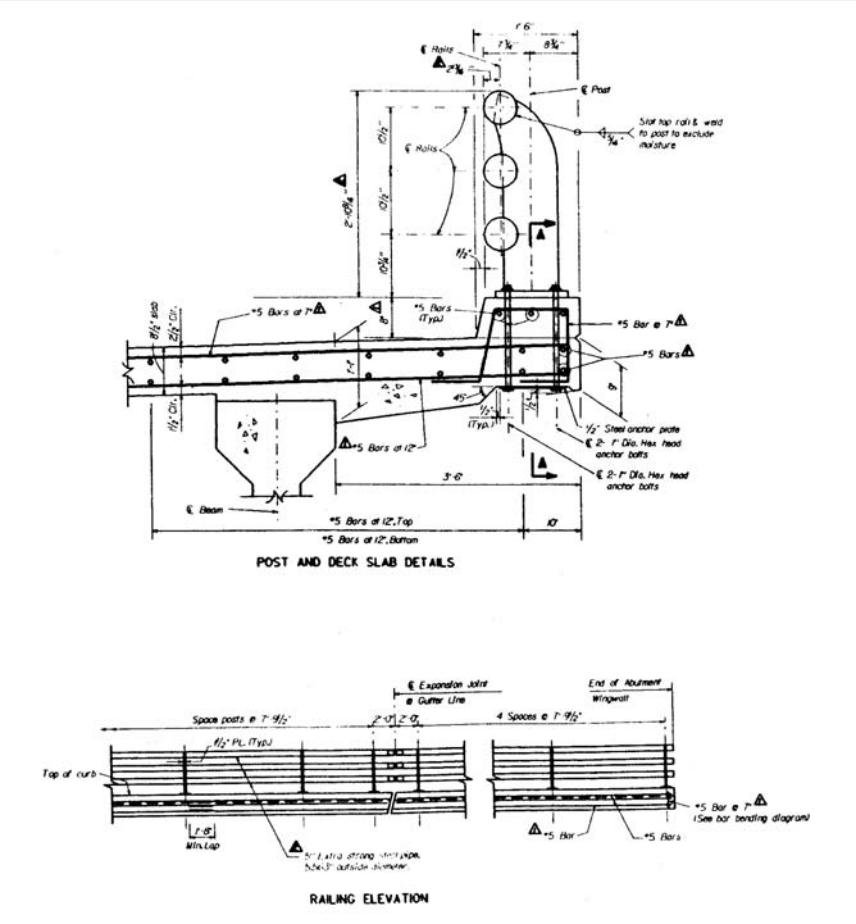
Test level:
TL-3

Utilized in:
George Washington Parkway, Virginia

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

# Curb Mounted Steel Tube Bridge Rail

## George Washington Parkway Steel Bridge Rail



# Curb Mounted Steel Tube Bridge Rail

## Illinois 2399 - Curb Mount

Height:
32"

Cost per linear foot:
$75

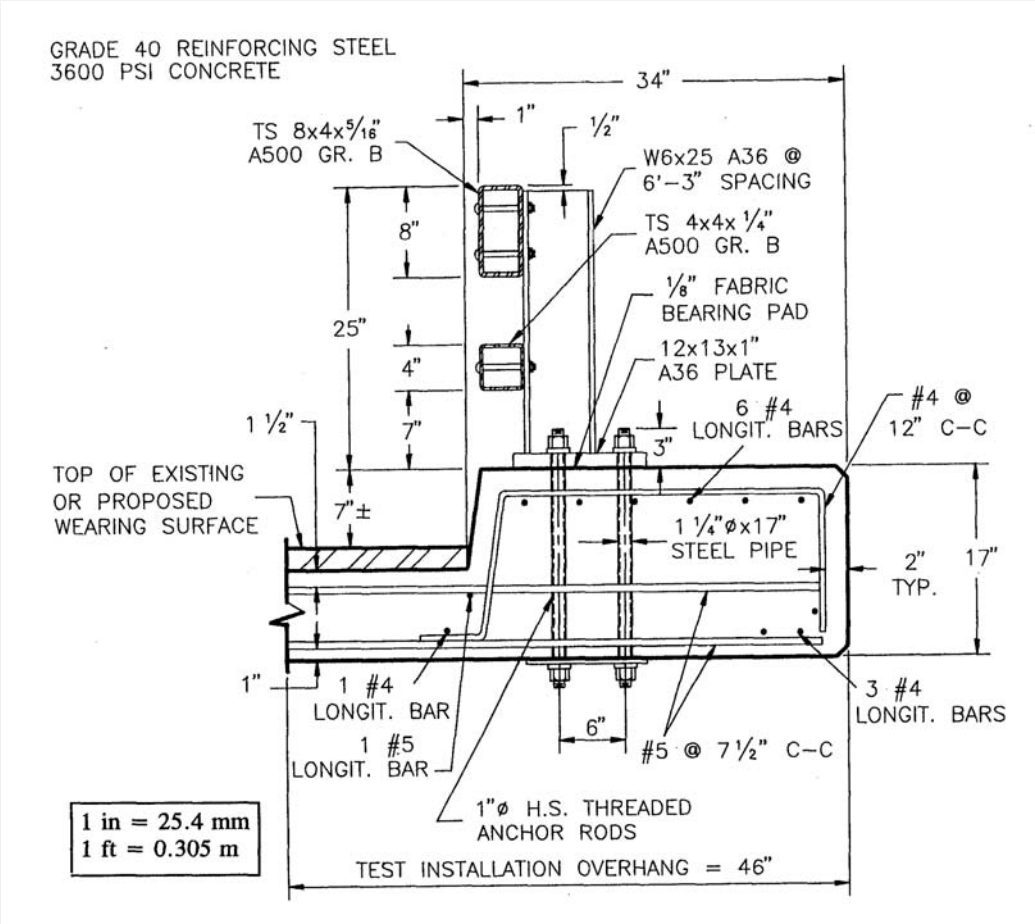
Test level:
TL-4

Utilized in:
Illinois

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

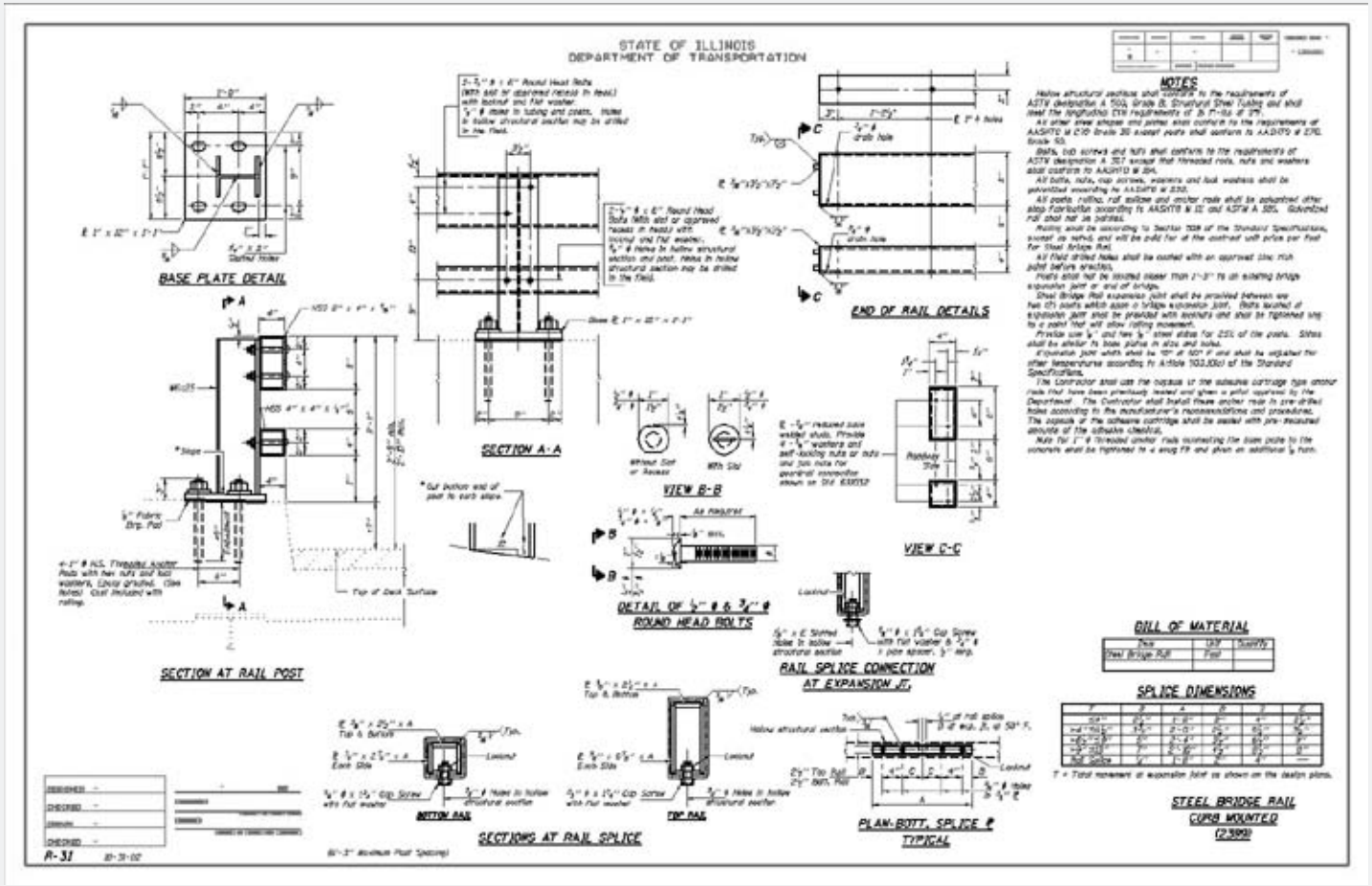
# Curb Mounted Steel Tube Bridge Rail

## Illinois 2399 - Curb Mount



# Curb Mounted Steel Tube Bridge Rail

## Illinois 2399 - Curb Mount



# Steel Tube Bridge Rail Attached to Curb

## 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.

# Curb Mounted Steel Tube Bridge Rail

## 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.

# Curb Mounted Steel Tube Bridge Rail

## NETC 2-Rail Curb-Mounted Railing

**Height:**
34"

**Cost per linear foot:**
$__

**Test level:**
TL-4

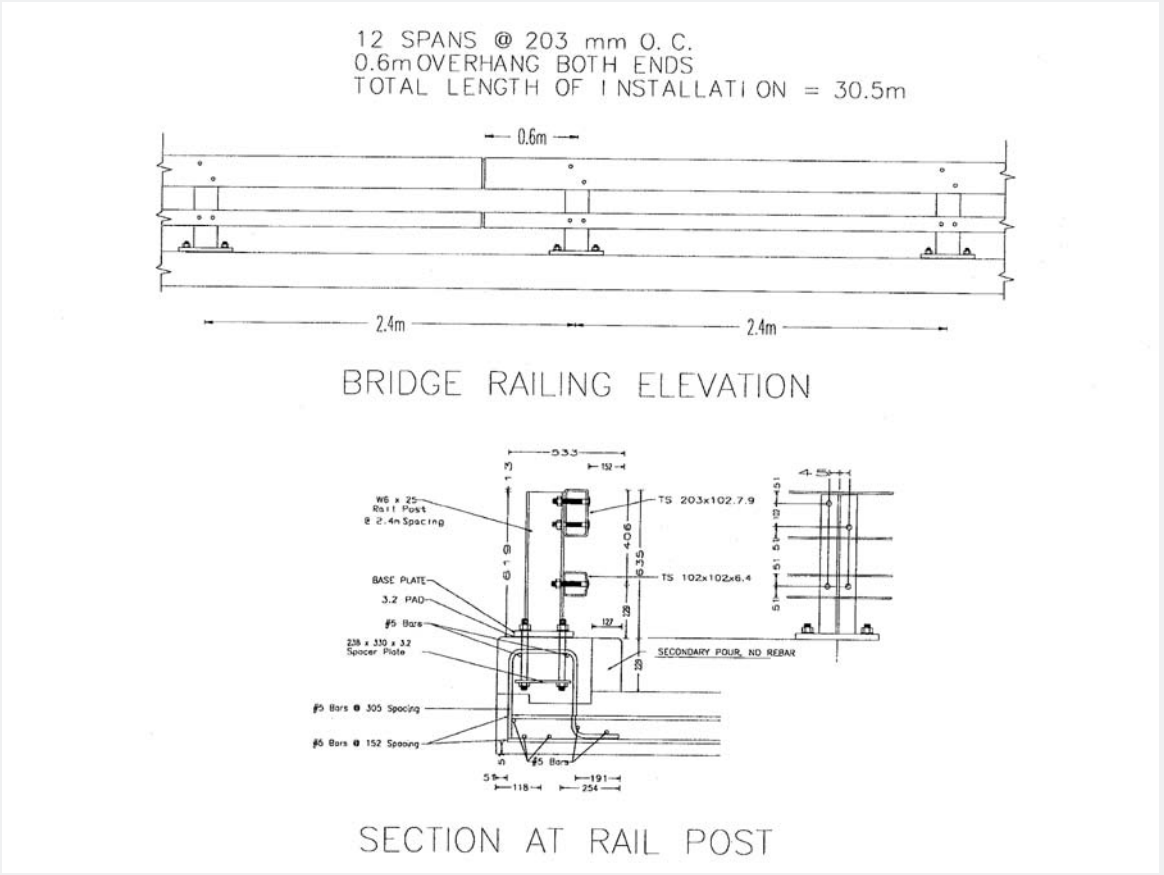
**Utilized in:**
Nebraska

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

Photo Not Yet Available

# Curb Mounted Steel Tube Bridge Rail

## NETC 2-Rail Curb-Mounted Railing



# Curb Mounted Steel Tube Bridge Rail

## Two-Rail Barrier

Height:
32"

Cost per linear foot:
$243

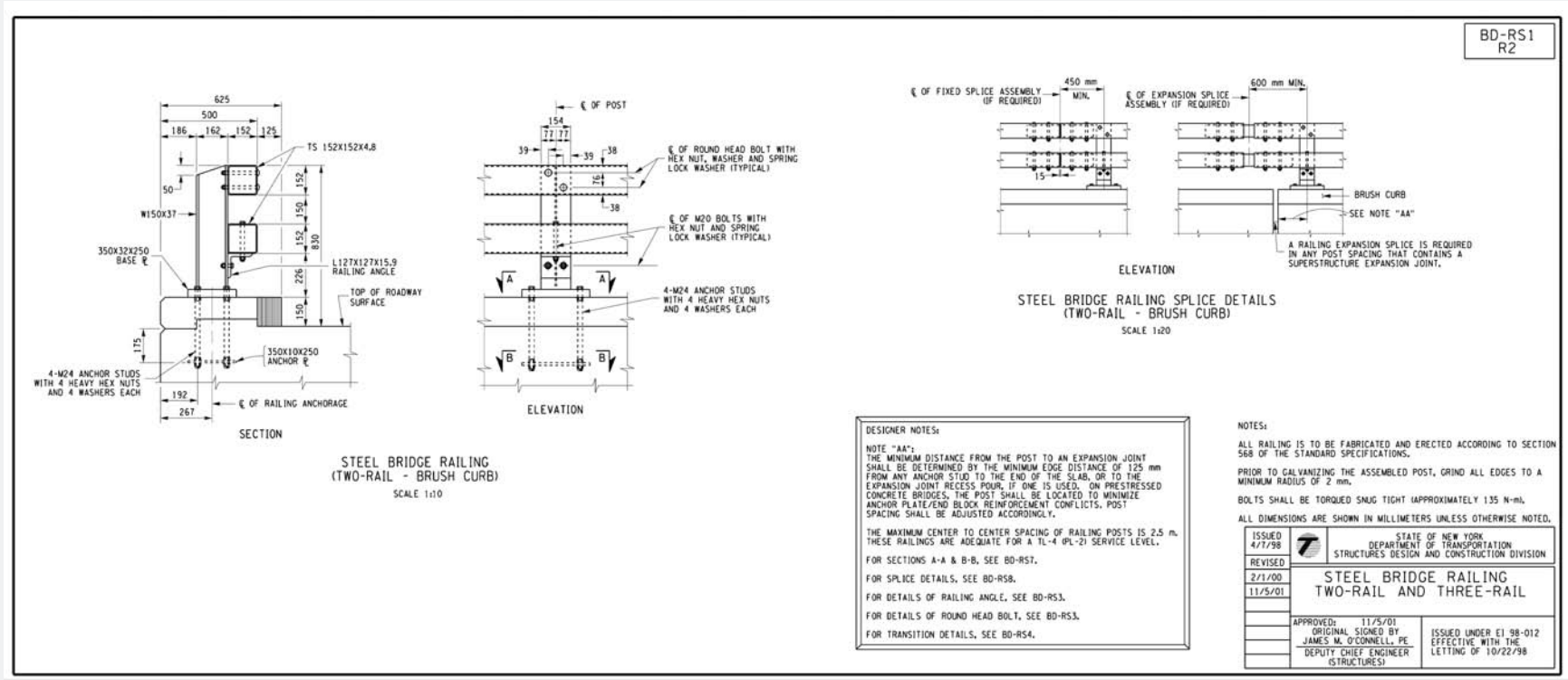
Test level:
TL-4

Utilized in:
New York

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

# Curb Mounted Steel Tube Bridge Rail

## Two-Rail Barrier



# Curb Mounted Steel Tube Bridge Rail

## Three-Rail Barrier Top Deck Flush Mount

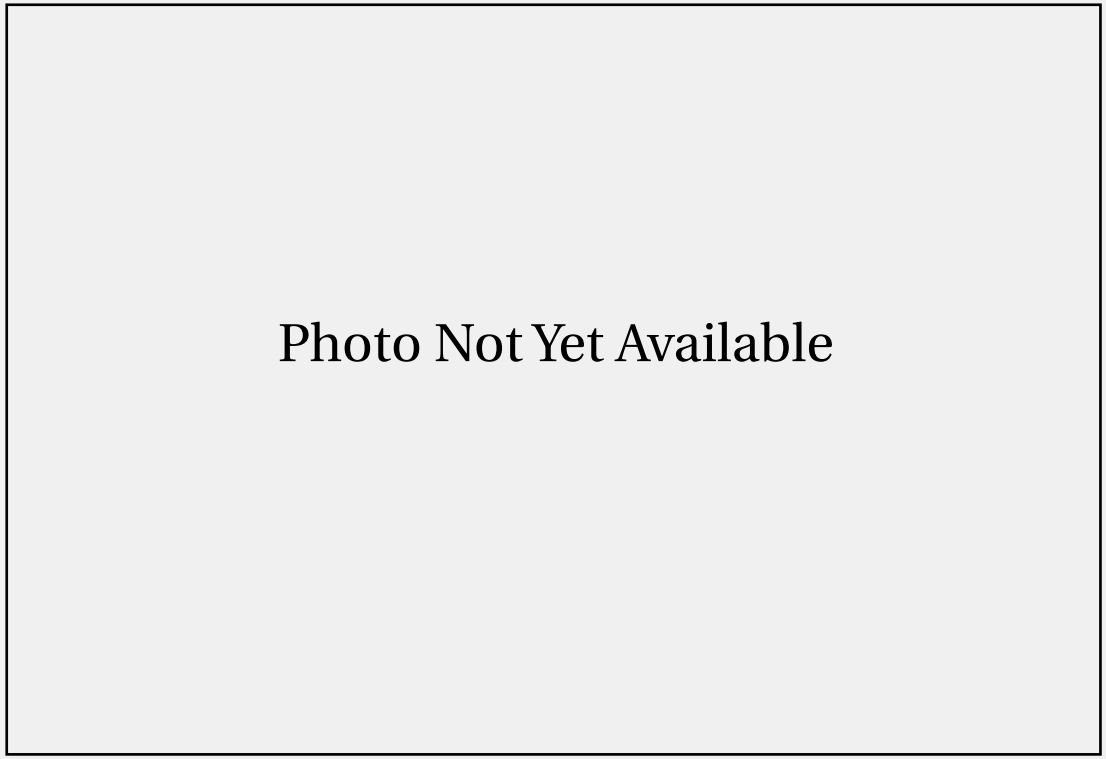
**Height:**
32"

**Cost per linear foot:**
$515

**Test level:**
TL-4

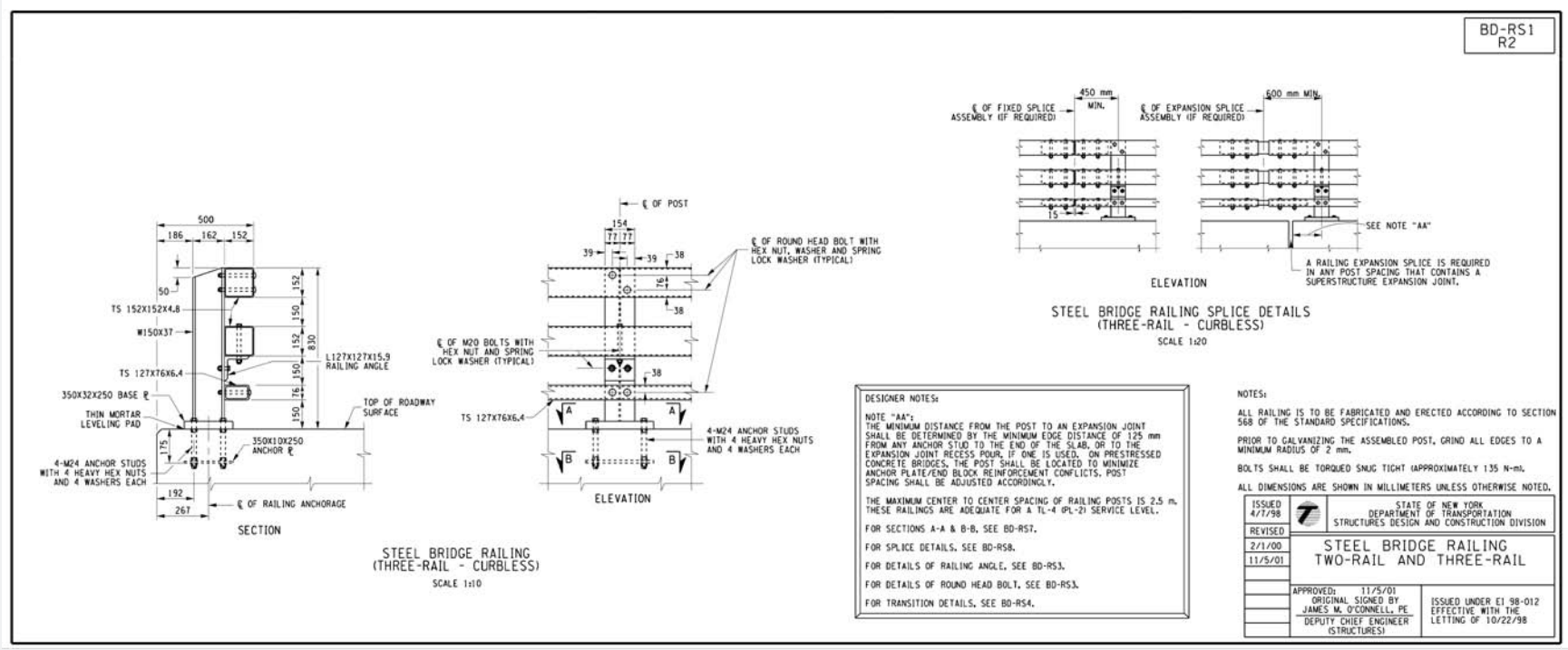
**Utilized in:**
New York

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



# Curb Mounted Steel Tube Bridge Rail

## Three-Rail Barrier



# Curb Mounted Steel Tube Bridge Rail

## Four-Rail Barrier

Height:
42"

Cost per linear foot:
$515

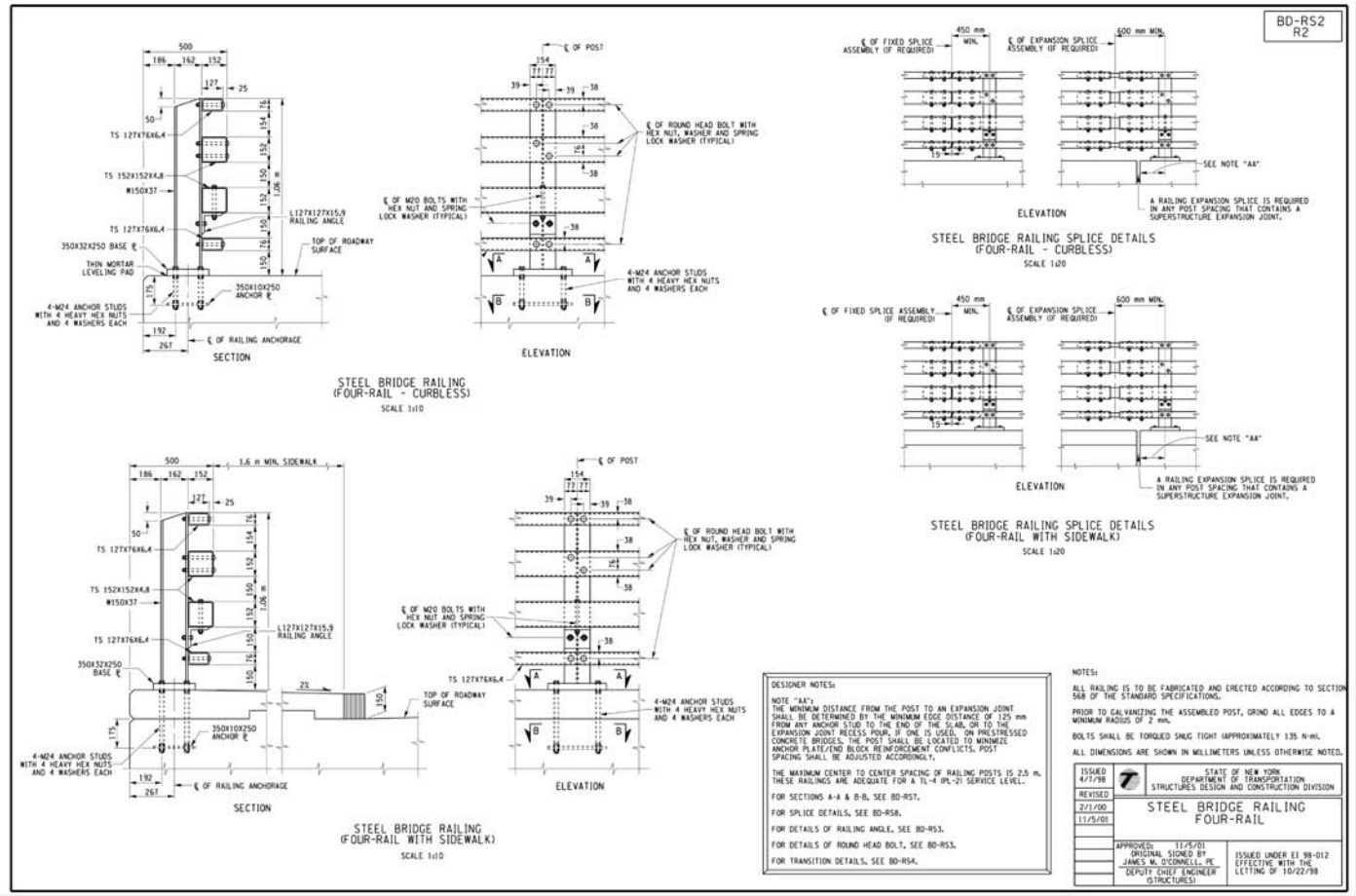
Test level:
TL-4

Utilized in:
New York

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

# Curb Mounted Steel Tube Bridge Rail

## Four-Rail Barrier



# Curb Mounted Steel Tube Bridge Rail

## Five-Rail Barrier

Height:
56"

Cost per linear foot:
$382

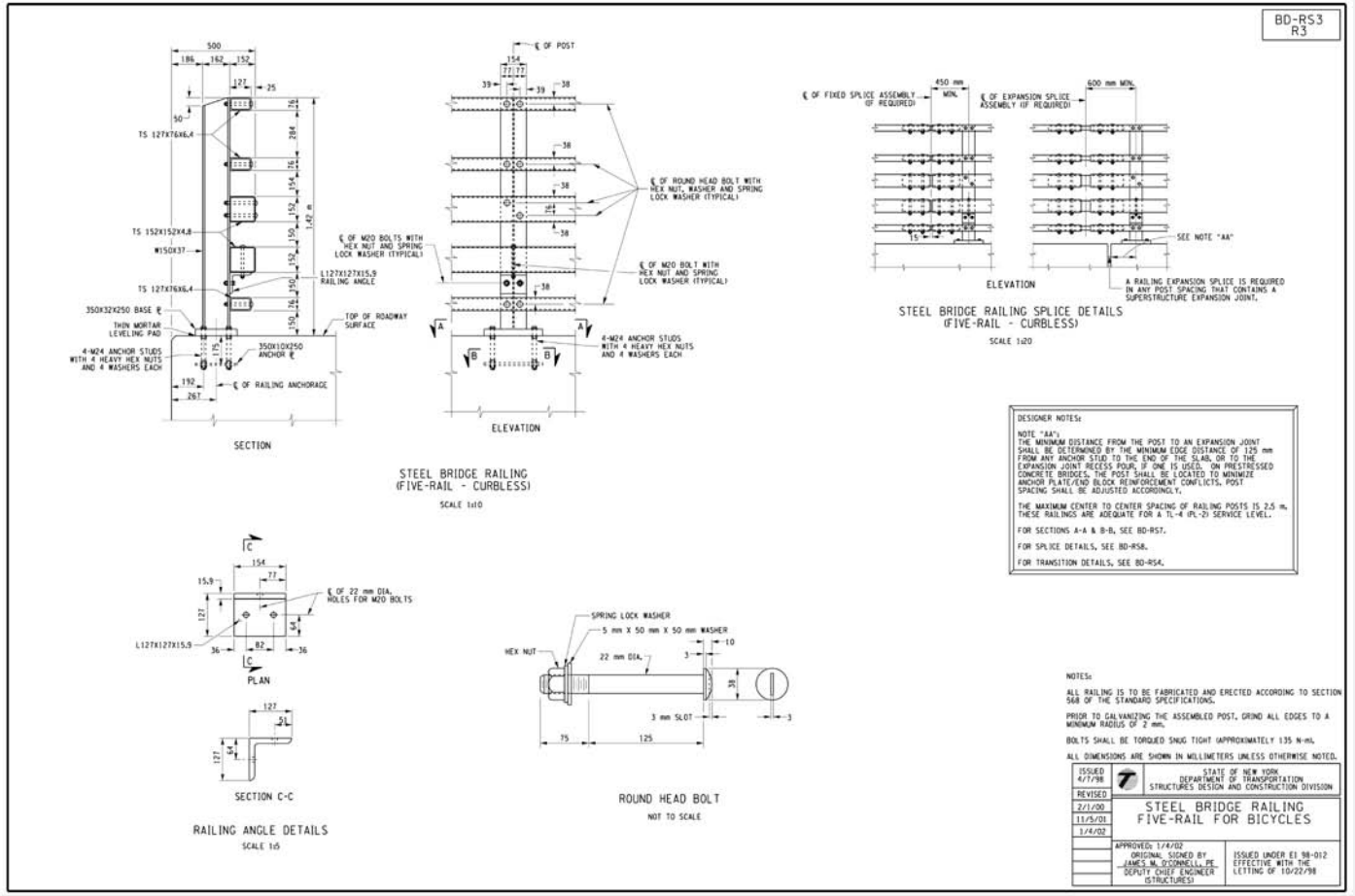
Test level:
TL-4

Utilized in:
New York

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

# Curb Mounted Steel Tube Bridge Rail

## Five-Rail Barrier



# Steel Tube Bridge Rail, Attached to Curb

## Oregon 2-Tube Curb Mount

Height:
32"

Cost per linear foot:
$90

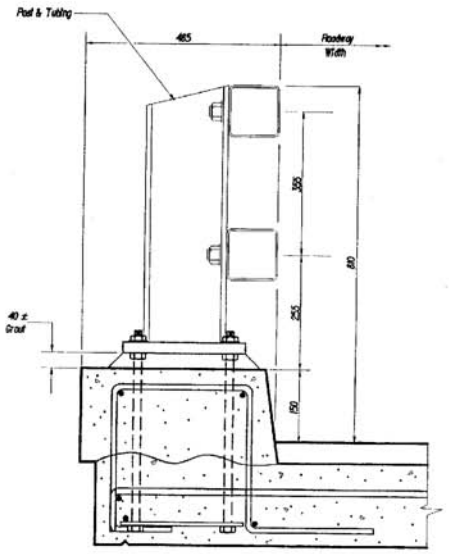
Test level:
TL-2

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

# Steel Tube Bridge Rail, Attached to Curb

## Oregon 2-Tube Curb Mount




CURB MOUNT-POST DETAIL

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

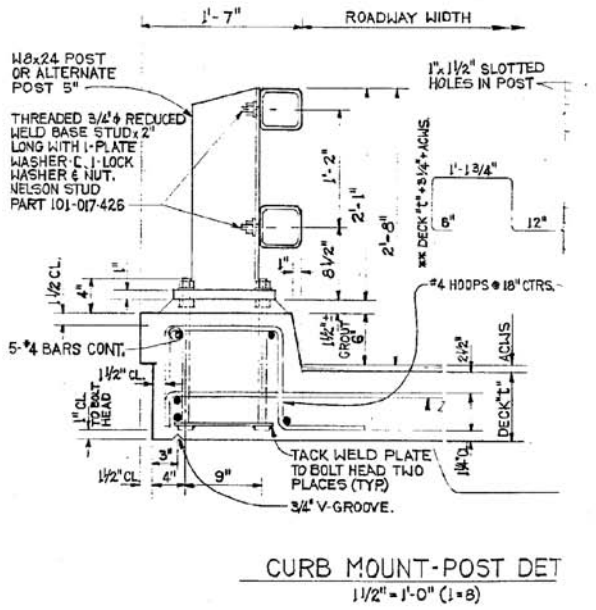



FIGURE D.5 Oregon 2-Tube Curb Mounted Bridge Railing

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

# Steel Tube Bridge Rail, Attached to Curb

## Oregon 3-Tube Curb Mount

Height:
42"

Cost per linear foot:
$80

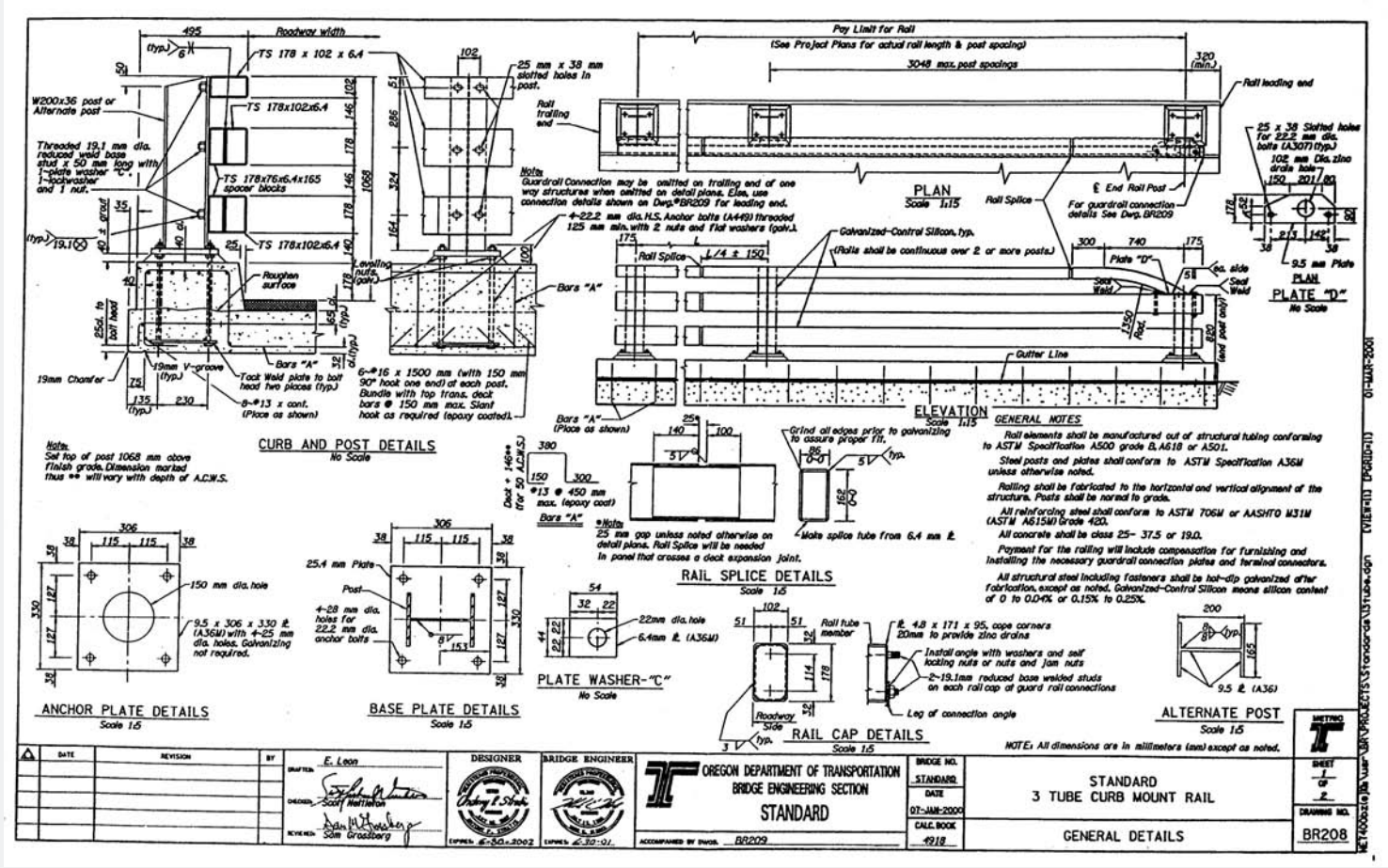
Test level:
TL-4

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

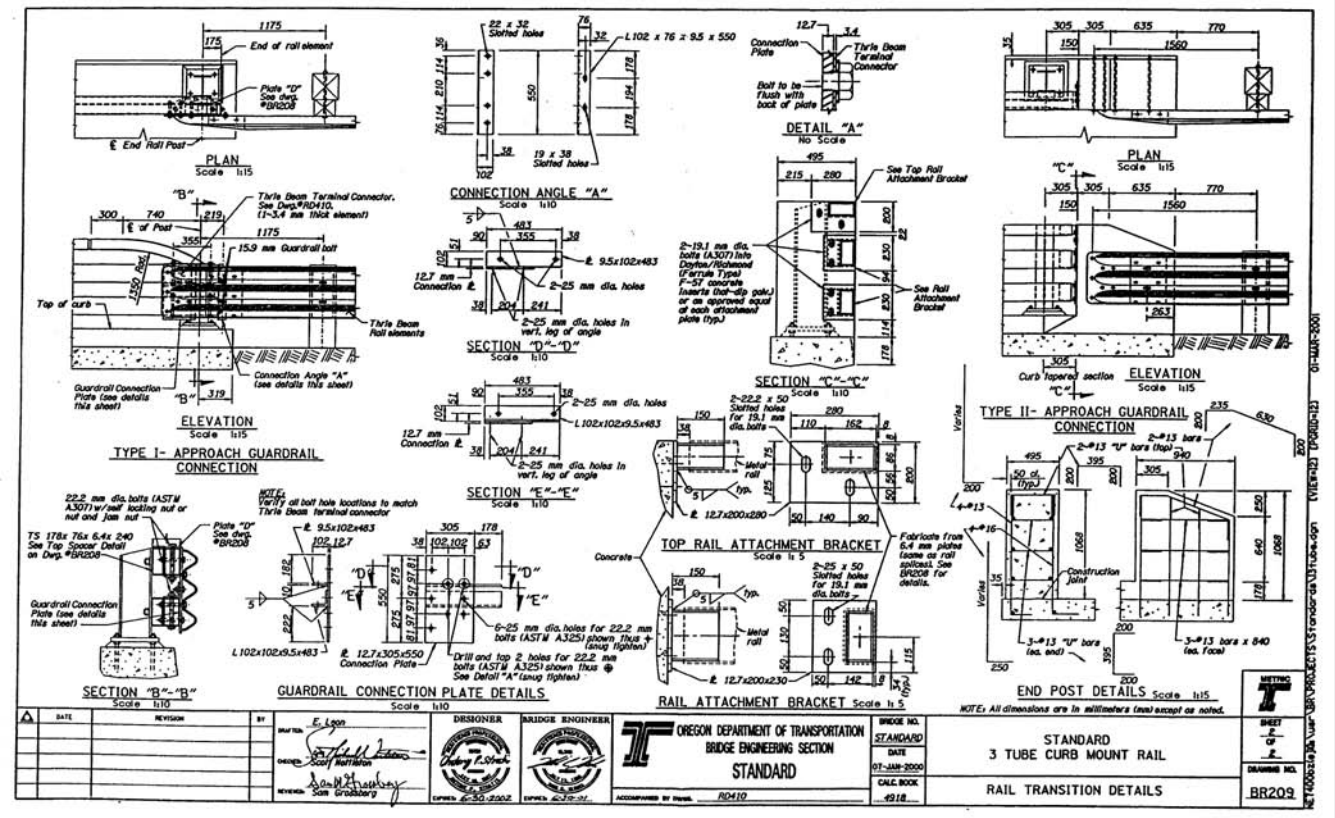
# Steel Tube Bridge Rail, Attached to Curb

## Oregon 3-Tube Curb Mount



# Steel Tube Bridge Rail, Attached to Curb

## Oregon 3-Tube Curb Mount



# Steel Tube Bridge Rail, Attached to Curb

## Wyoming 2-Tube Steel Railing

Height:
32"

Cost per linear foot:
$55

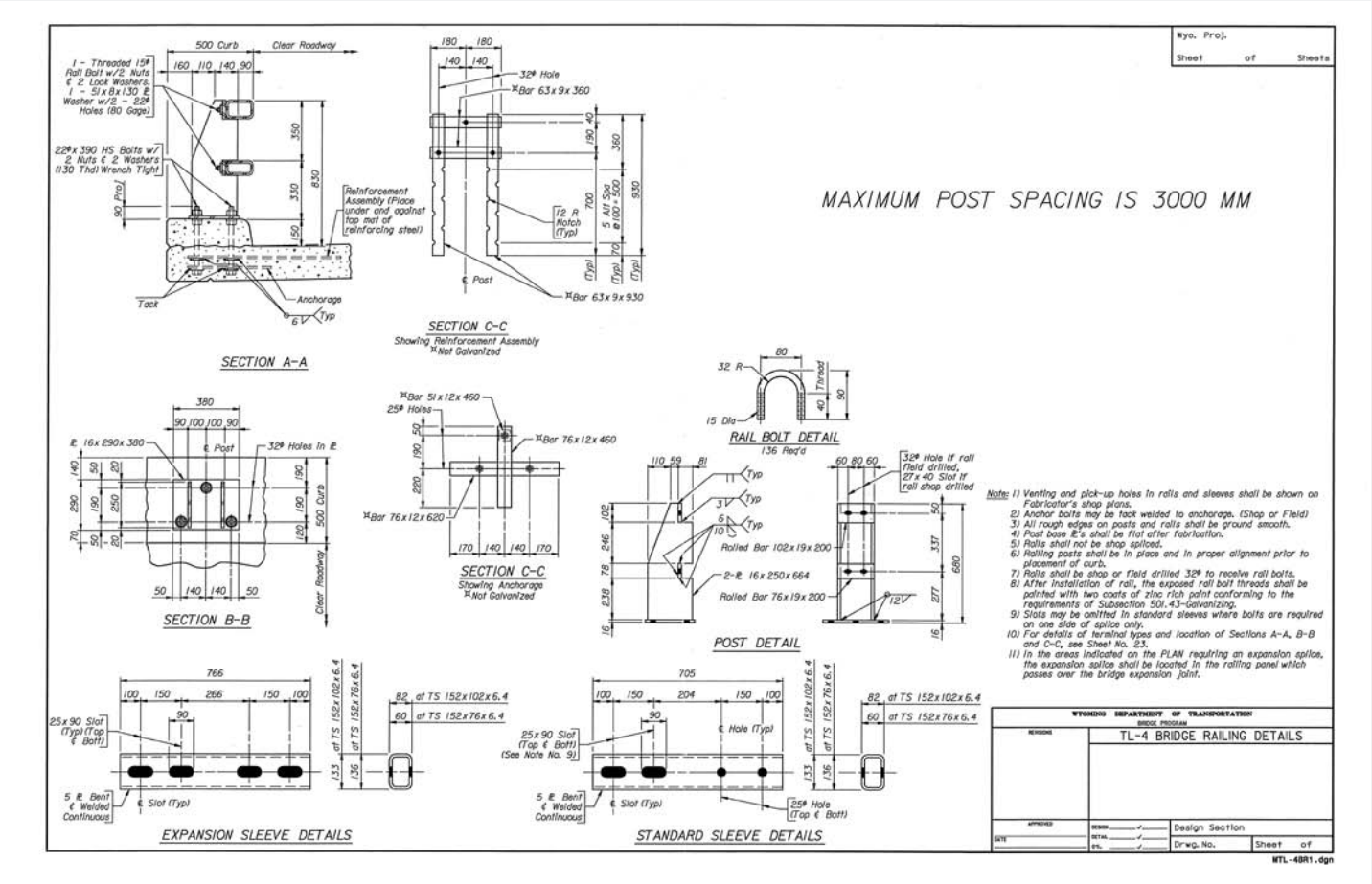
Test level:
TL-4

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

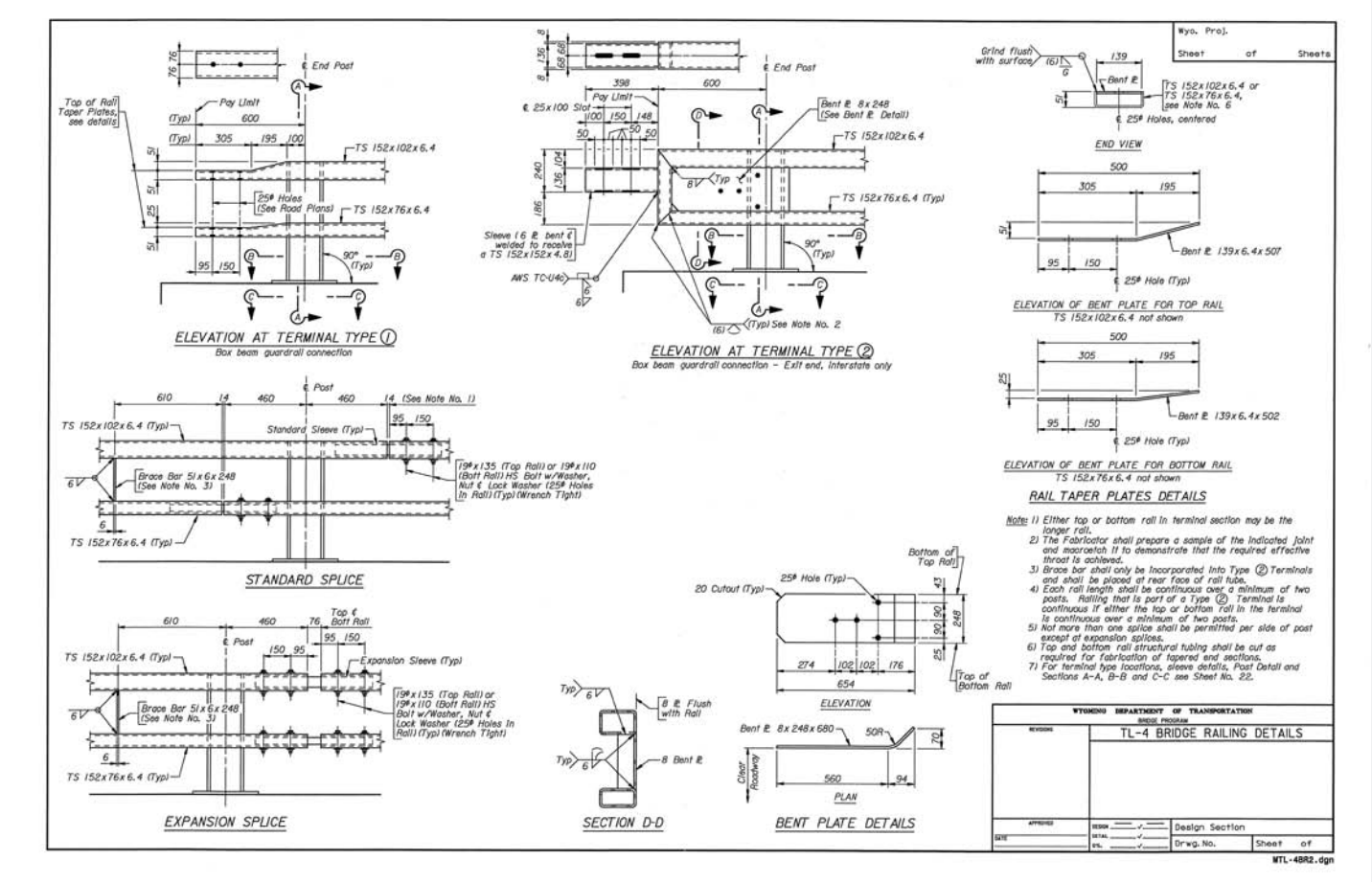
# Steel Tube Bridge Rail, Attached to Curb

## Wyoming 2-Tube Steel Railing



# Steel Tube Bridge Rail, Attached to Curb

## Wyoming 2-Tube Steel Railing



# Steel Tube Bridge Rail, Attached to Curb

## Wyoming 2-Tube, Curb-Mounted

Height:
29"

Cost per linear foot:
$53

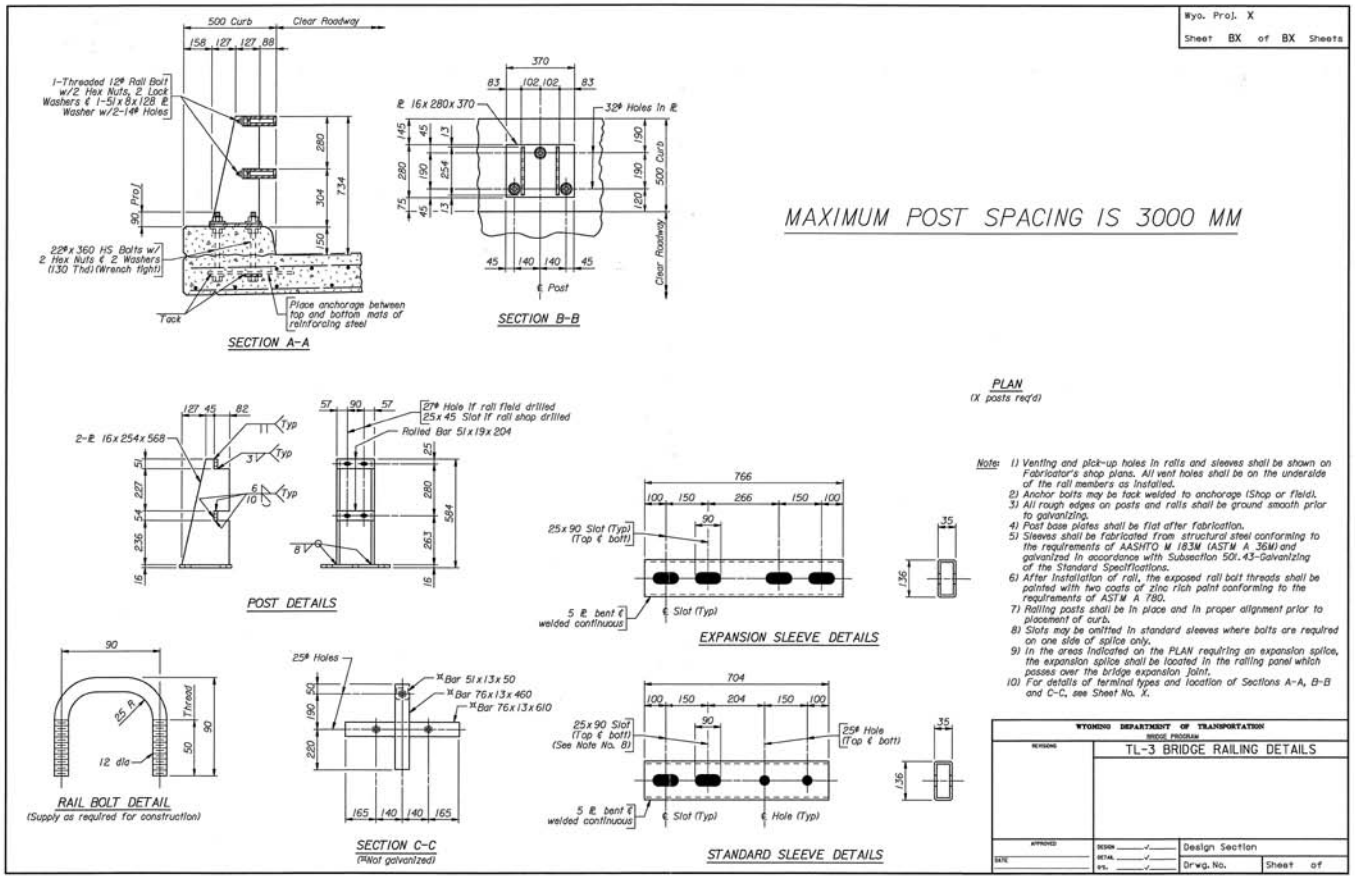
Test level:
TL-3

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

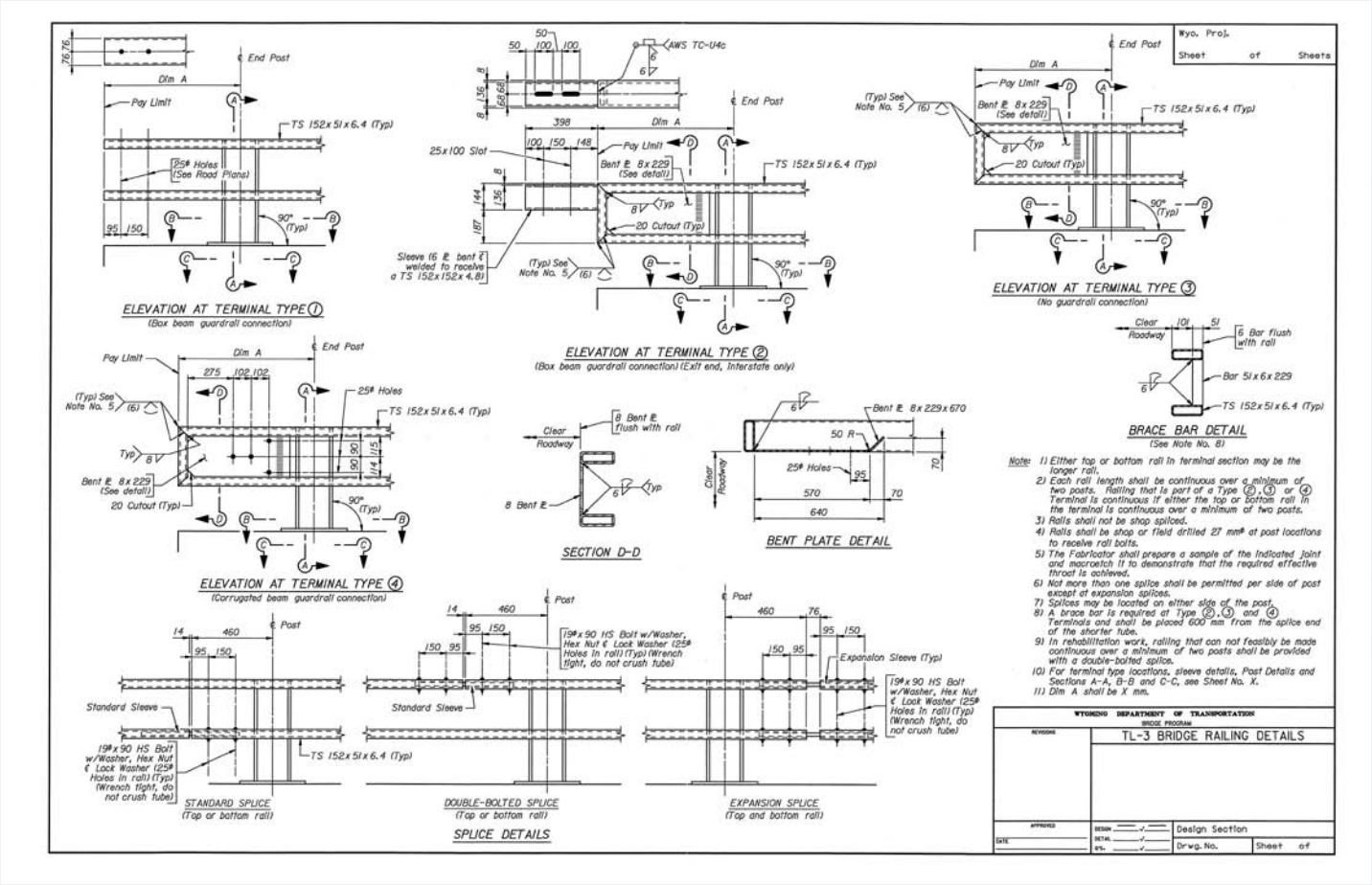
# Steel Tube Bridge Rail, Attached to Curb

## Wyoming 2-Tube, Curb-Mounted



# Steel Tube Bridge Rail, Attached to Curb

## 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 |

Section 4

# Vertical Concrete Parapet

## 32" New Jersey Shape Concrete Barrier

Height:
32"

Cost per linear foot:
$47

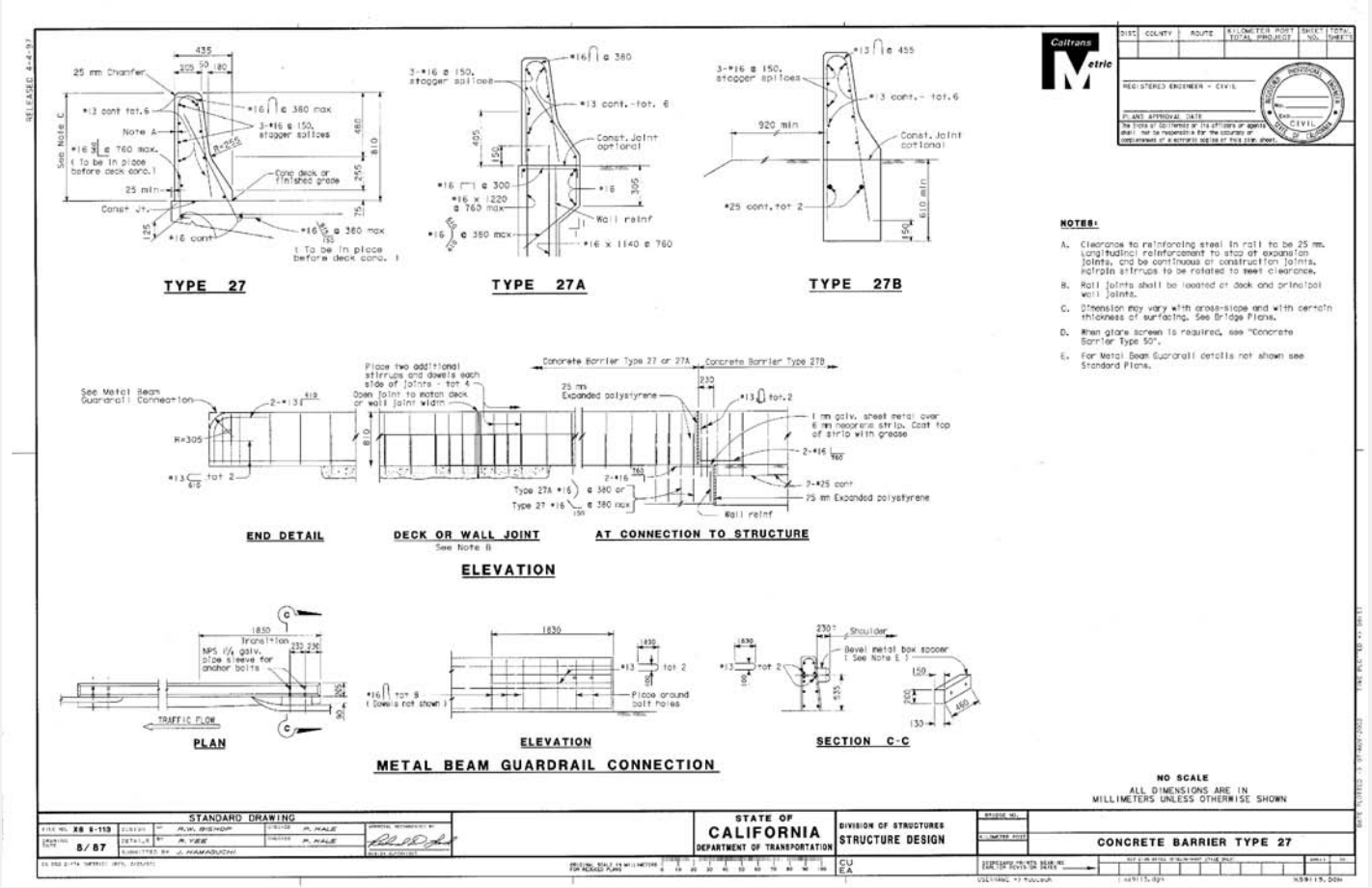
Test level:
TL-4

Utilized in:
California

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

# Vertical Concrete Parapet

## 32" New Jersey Shape Concrete Barrier



# Aluminum Tube Bridge Rail

## Type 80 and 80 SW Concrete Barrier

Height:
32"

Cost per linear foot:
$150

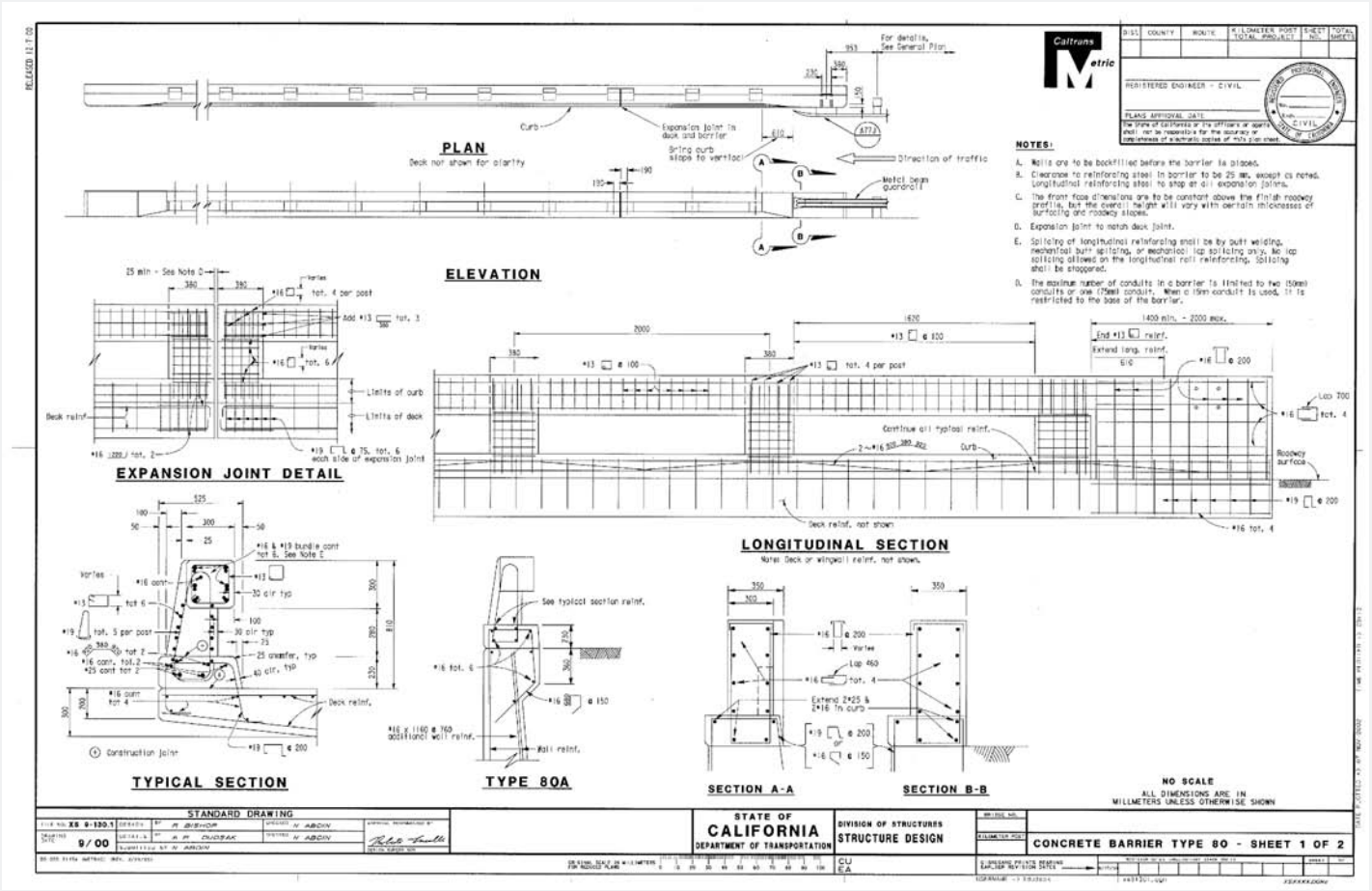
Test level:
TL-4

Utilized in:
California

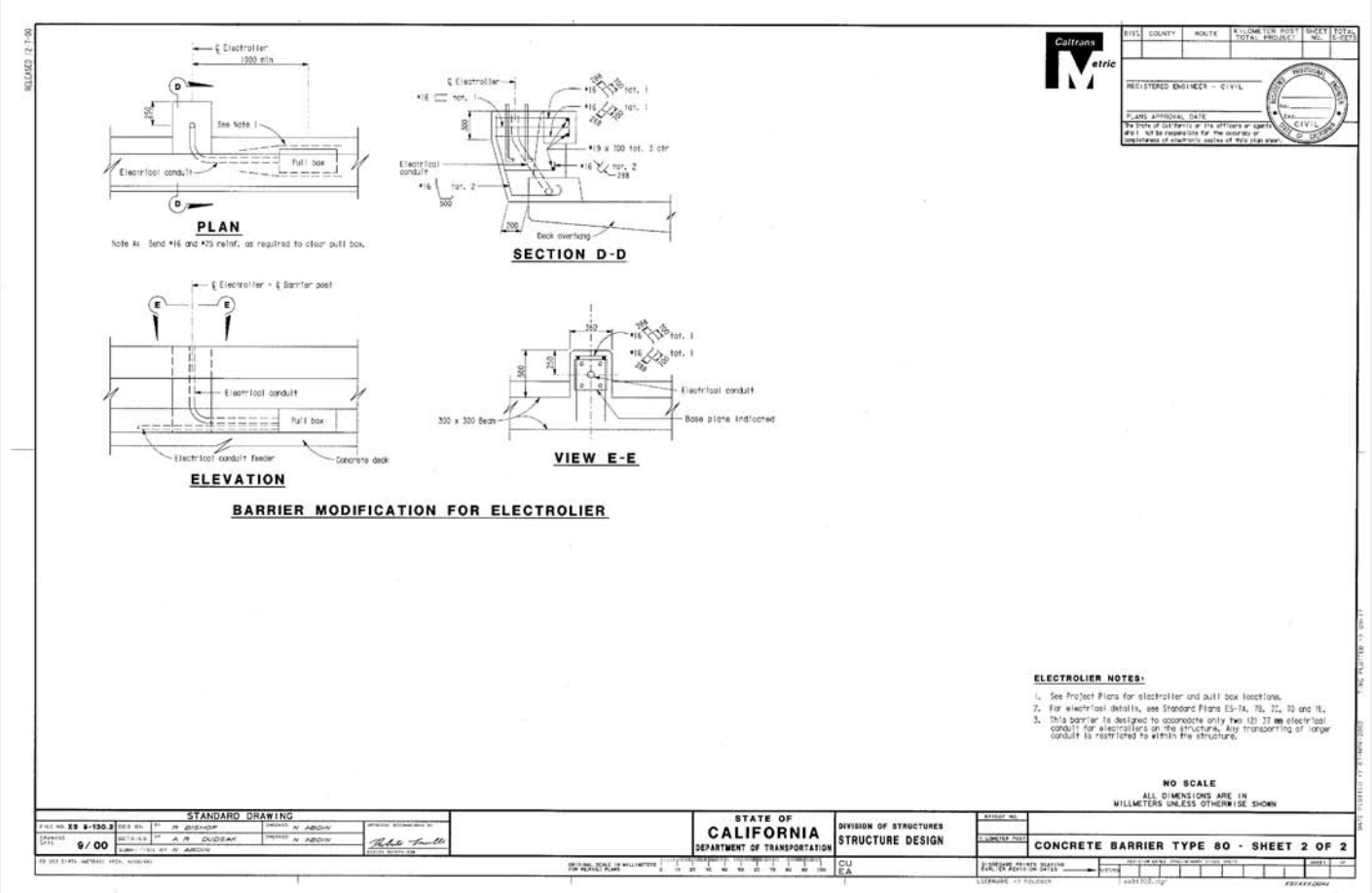
Contact:
Nahed Abdin
California Dept
of Transportation
1801 30th Street, FM1-2/9I
Sacramento, CA 95816
(916) 227-8805

# Aluminum Tube Bridge Rail

## Type 80 and 80 SW Concrete Barrier

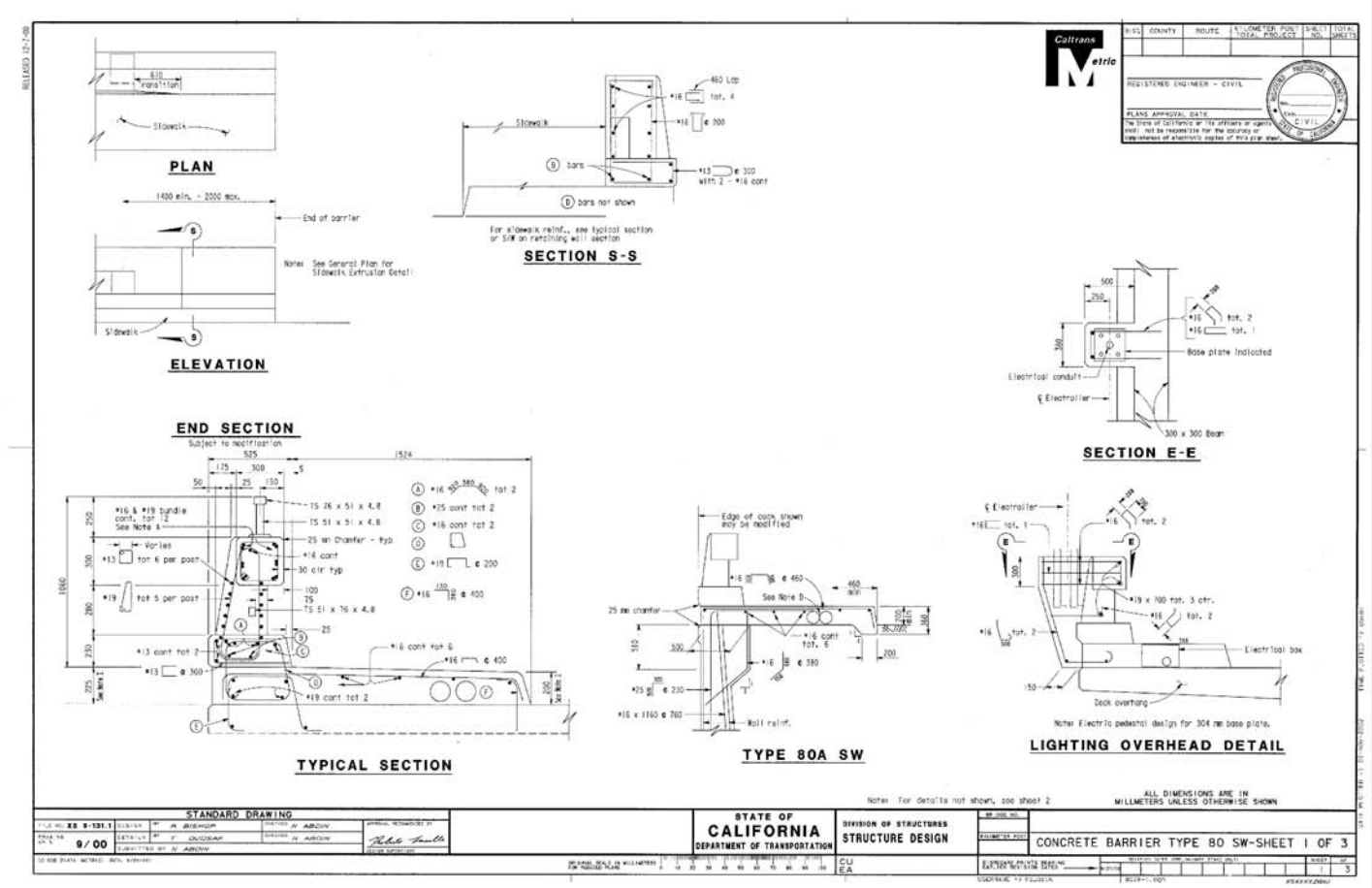


## Type 80 and 80 SW Concrete Barrier

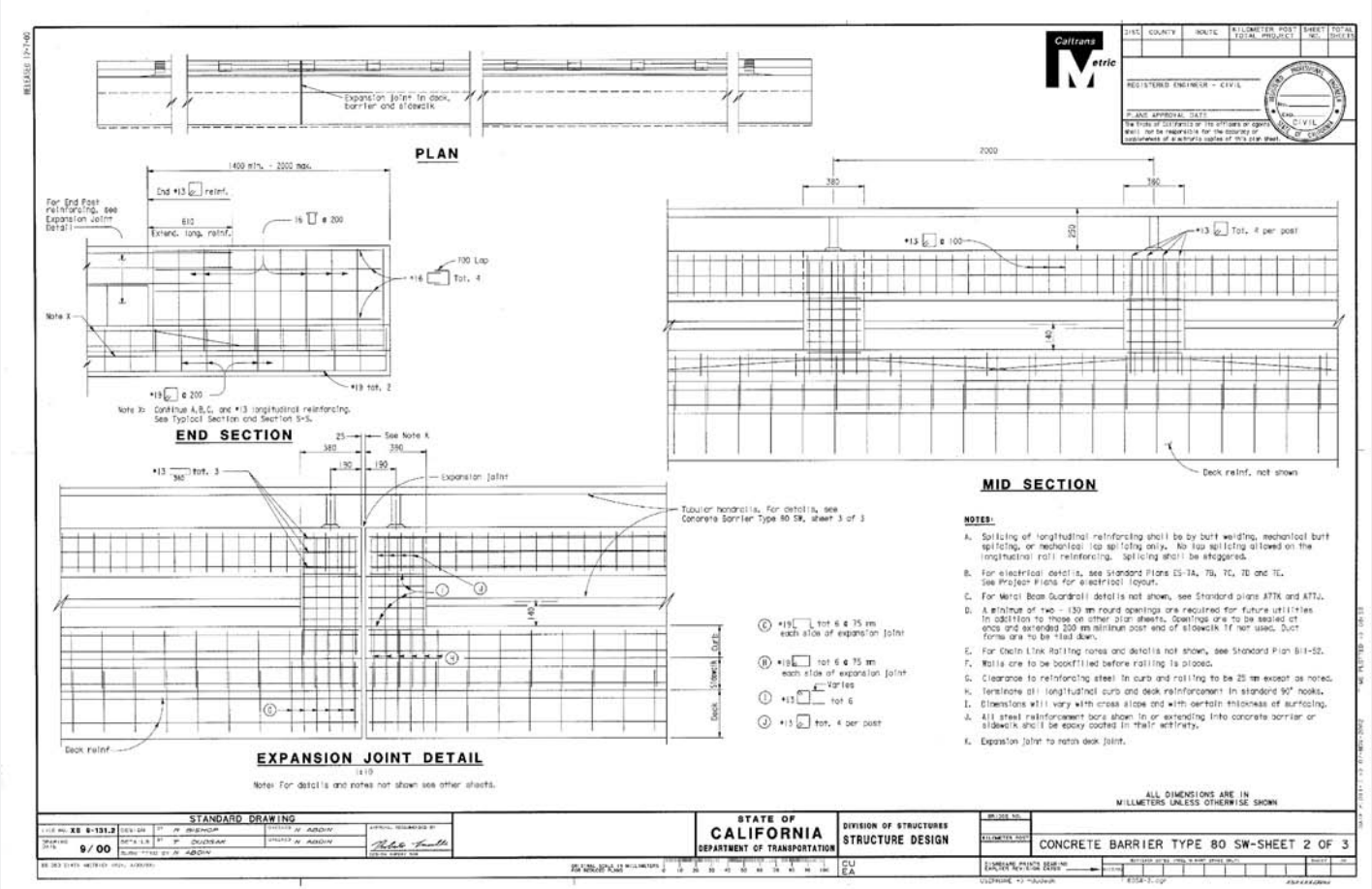


# Aluminum Tube Bridge Rail

## Type 80 and 80 SW Concrete Barrier

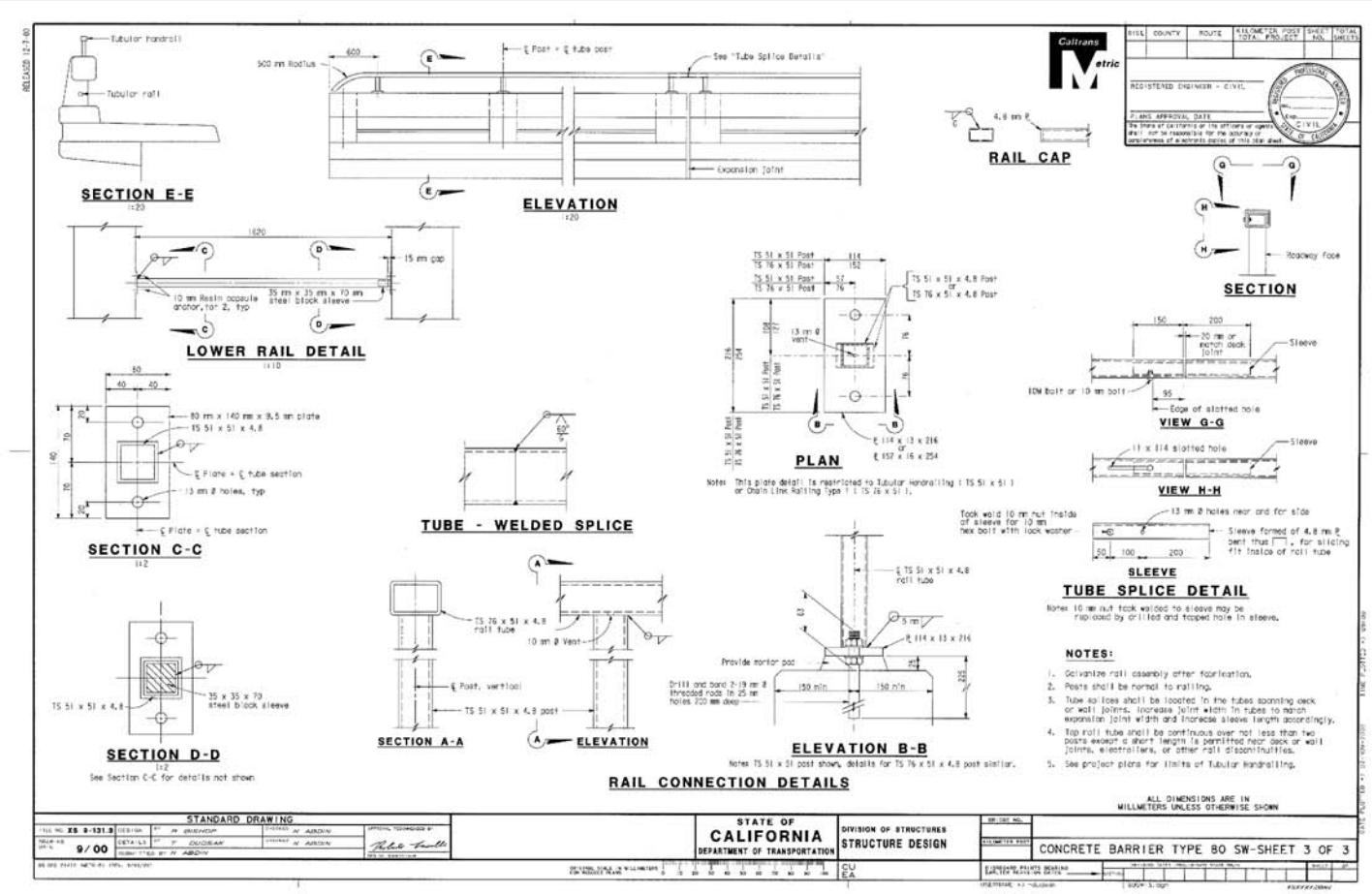


## Type 80 and 80 SW Concrete Barrier



# Aluminum Tube Bridge Rail

## Type 80 and 80 SW Concrete Barrier



# Vertical Concrete Parapet

## Baltimore Washington Parkway Stone Rail

Height:
32"

Cost per linear foot:
$300

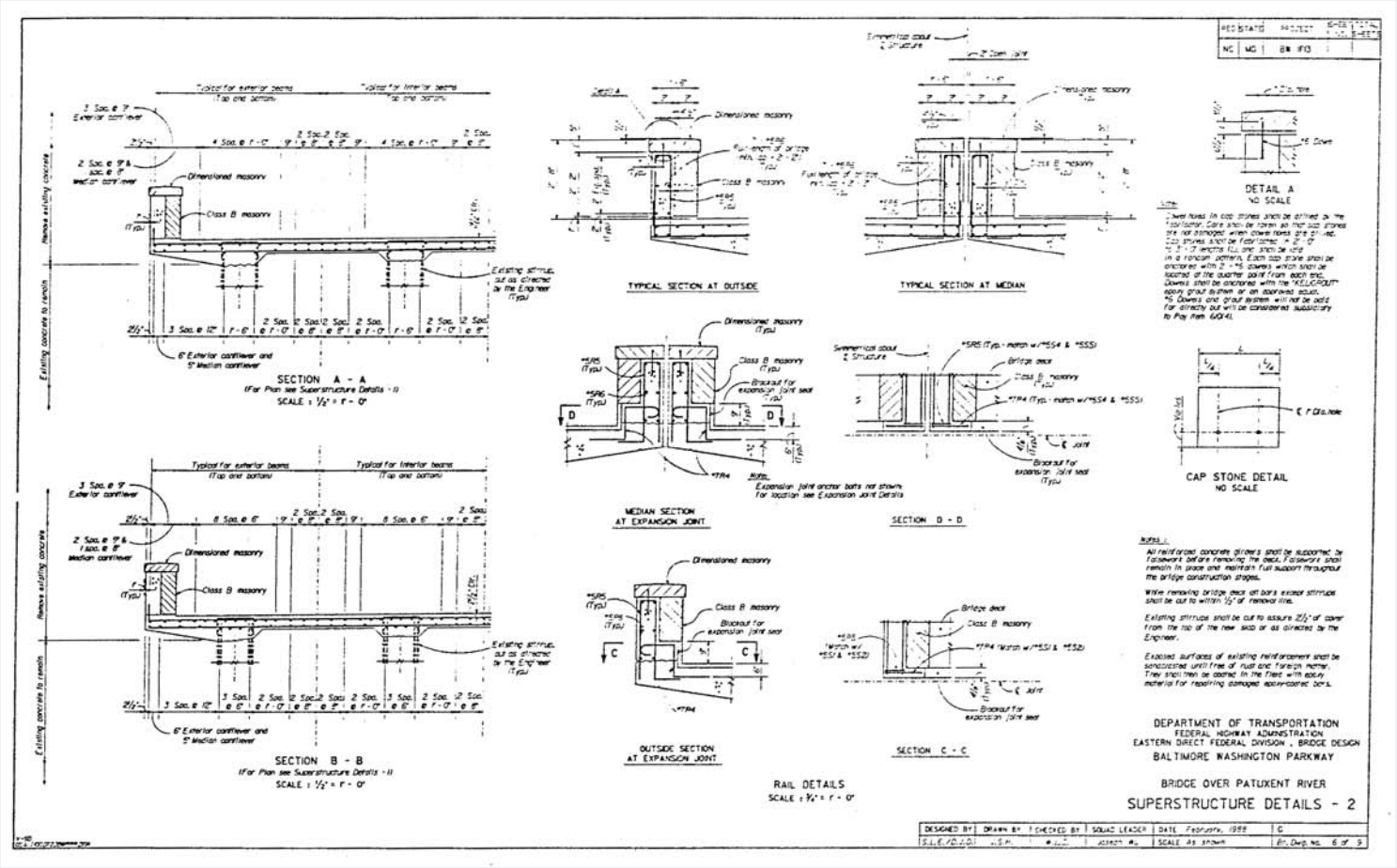
Test level:
TL-3

Utilized in:
Baltimore Washington Parkway, Maryland

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

# Vertical Concrete Parapet

## Baltimore Washington Parkway Stone Rail



# Vertical Concrete Parapet

## Federal Lands Modified Kansas Corral Bridge Rail

Height:
27"

Cost per linear foot:
$90

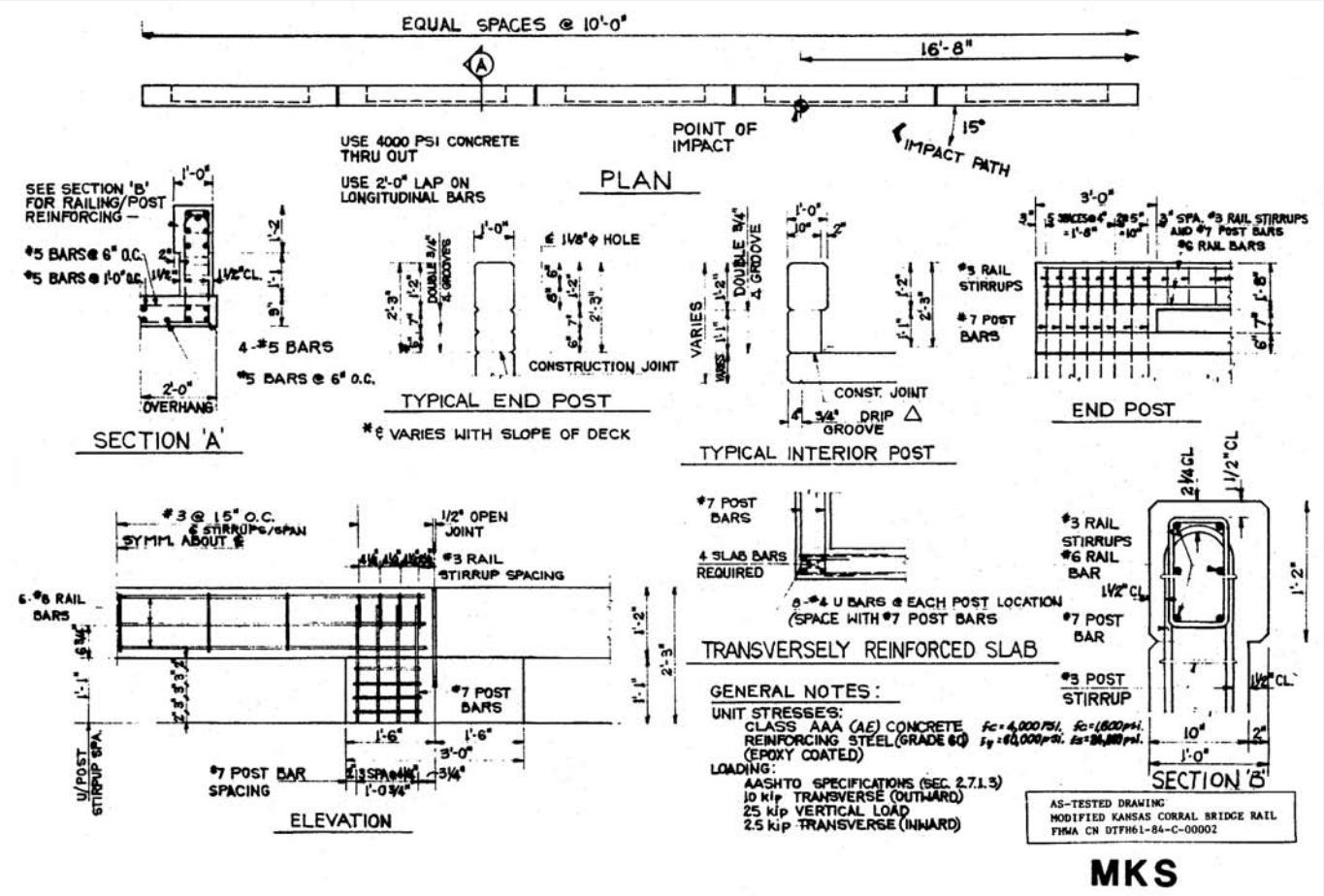
Test level:
TL-2

Utilized in:
Federal Lands

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

# Vertical Concrete Parapet

## Federal Lands Modified Kansas Corral Bridge Rail



# Vertical Concrete Parapet

## Natchez Trace Concrete Bridge Rail

Height:
32.5"

Cost per linear foot:
$90

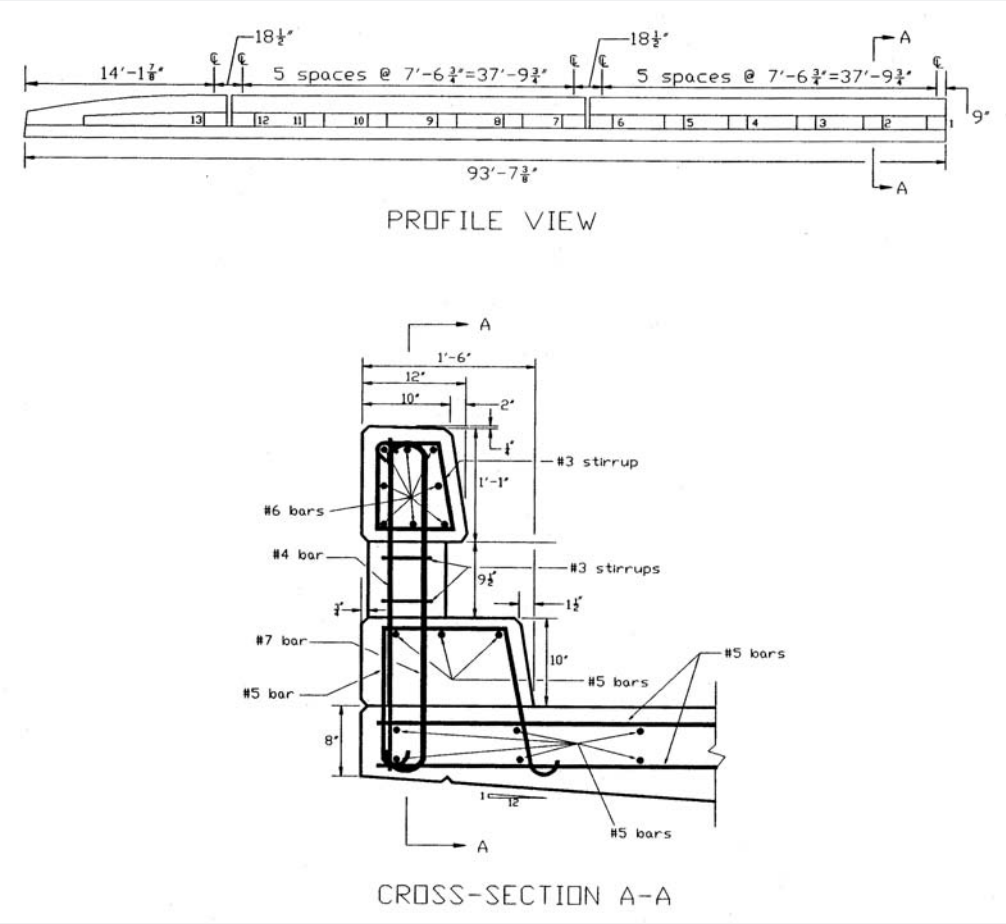
Test level:
TL-3

Utilized in:
Federal Lands

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

# Vertical Concrete Parapet

## Natchez Trace Concrete Bridge Rail



# Vertical Concrete Parapet

## New Jersey Barrier

Height:
32"

Cost per linear foot:
$34

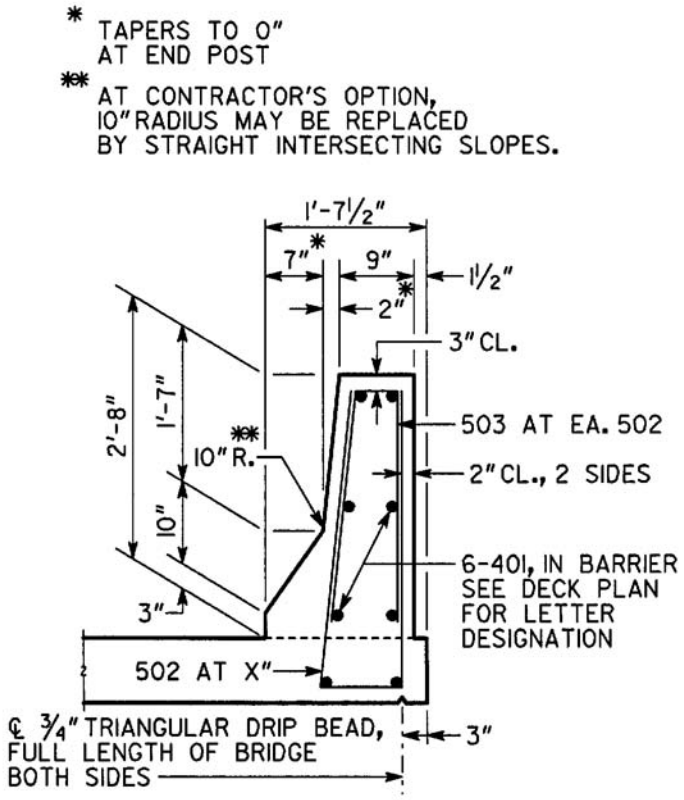
Test level:
TL-4

Utilized in:
Georgia

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

# Vertical Concrete Parapet

## New Jersey Barrier




New Jersey Concrete Barrier

# Vertical Concrete Parapet

## Vertical Parapet with Single-Pipe Aluminum Handrail

Height:
42"

Cost per linear foot:
$80

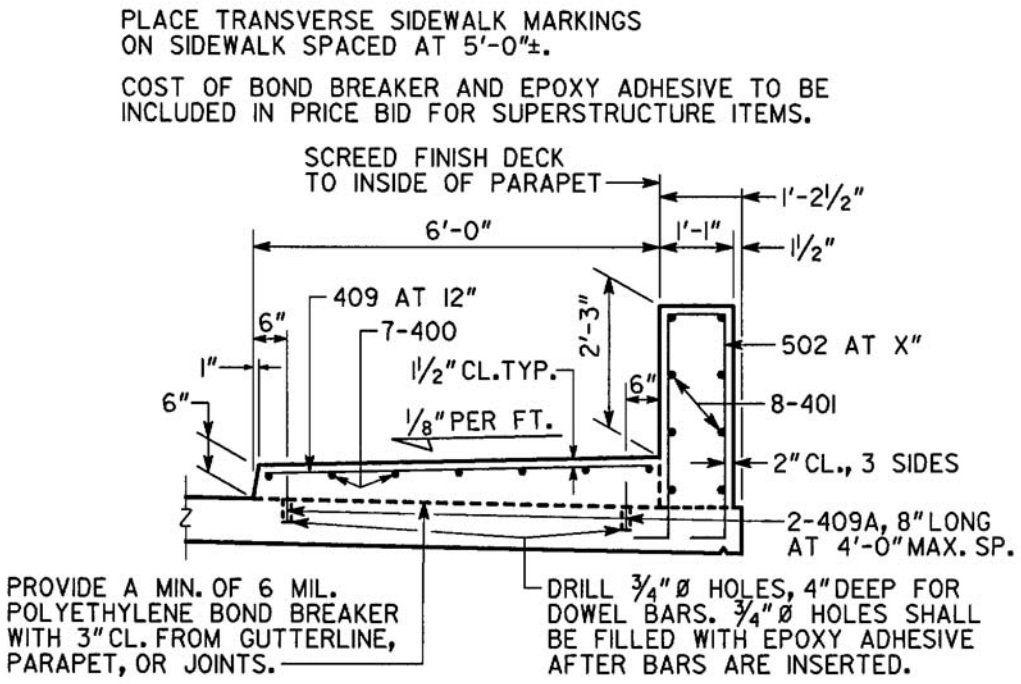
Test level:
TL-4

Utilized in:
Georgia

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

# Vertical Concrete Parapet

## Vertical Parapet with Single-Pipe Aluminum Handrail




2'-3" Vertical Parapet and Sidewalk
(Used With 1'-3" Single Pipe Aluminum Hand Rail)

# Vertical Concrete Parapet

## Vertical Parapet with Two-Pipe Aluminum Handrail

Height:
42"

Cost per linear foot:
$90

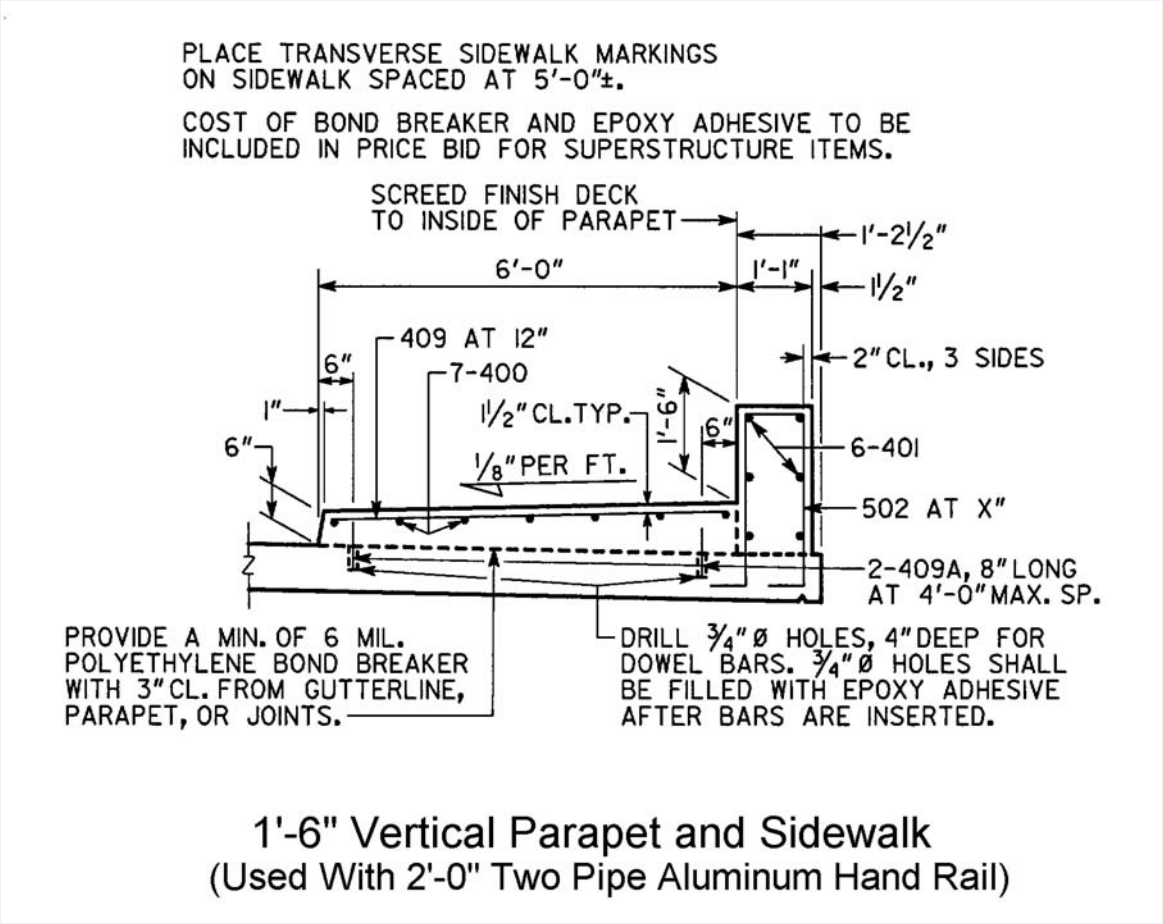
Test level:
TL-2

Utilized in:
Georgia

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

# Vertical Concrete Parapet

## Vertical Parapet with Two-Pipe Aluminum Handrail




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

# Vertical Concrete Parapet

## Vertical Parapet with Security Fence

Height:
34"

Cost per linear foot:
$55

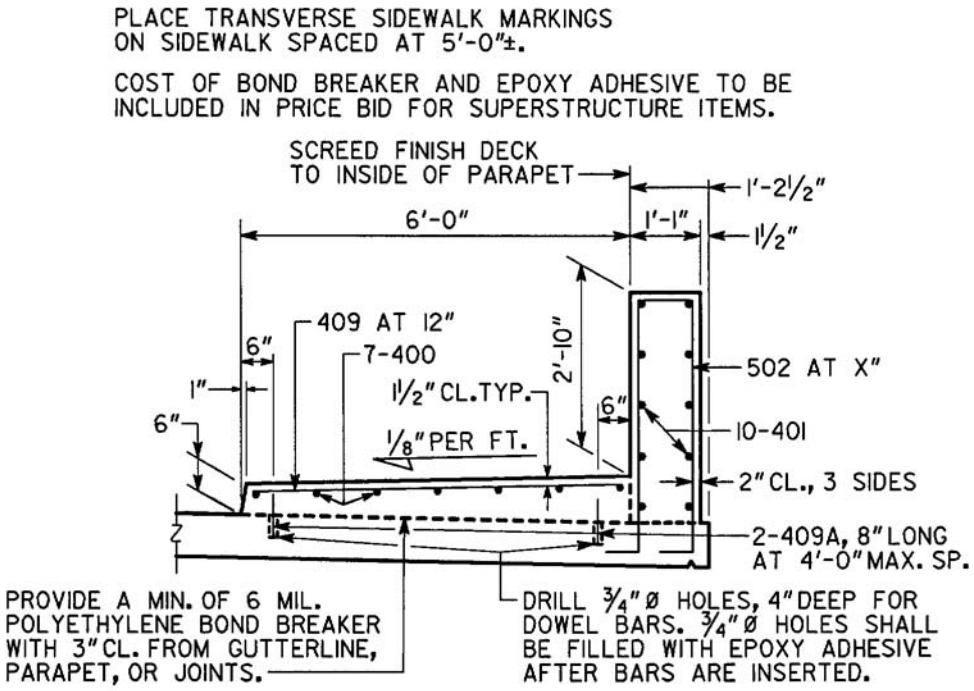
Test level:
TL-4

Utilized in:
Georgia

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

# Vertical Concrete Parapet

## Vertical Parapet with Security Fence



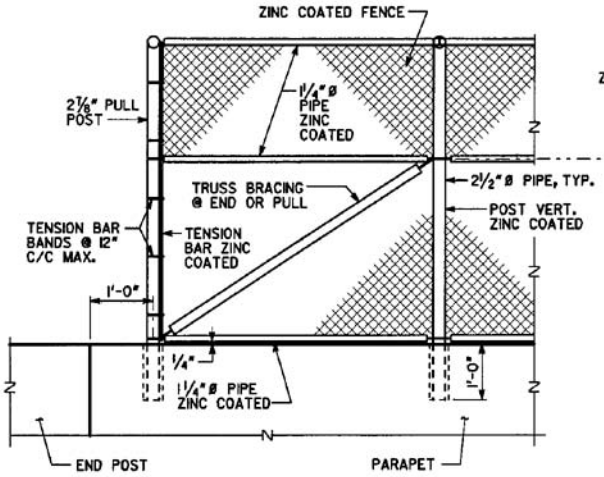

2'-10" Vertical Parapet and Sidewalk
(Used With Security Fence)

# Vertical Concrete Parapet

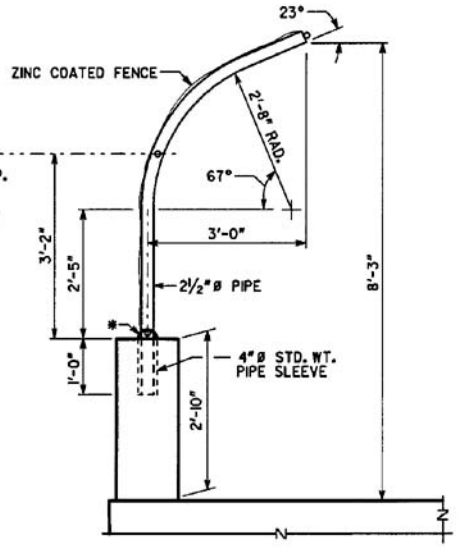
## Vertical Parapet with Security Fence

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".




FENCE ELEVATION




FENCE POST DETAIL

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

# Vertical Concrete Parapet

## Iowa Concrete Open Railing

Height:
29"

Cost per linear foot:
$36

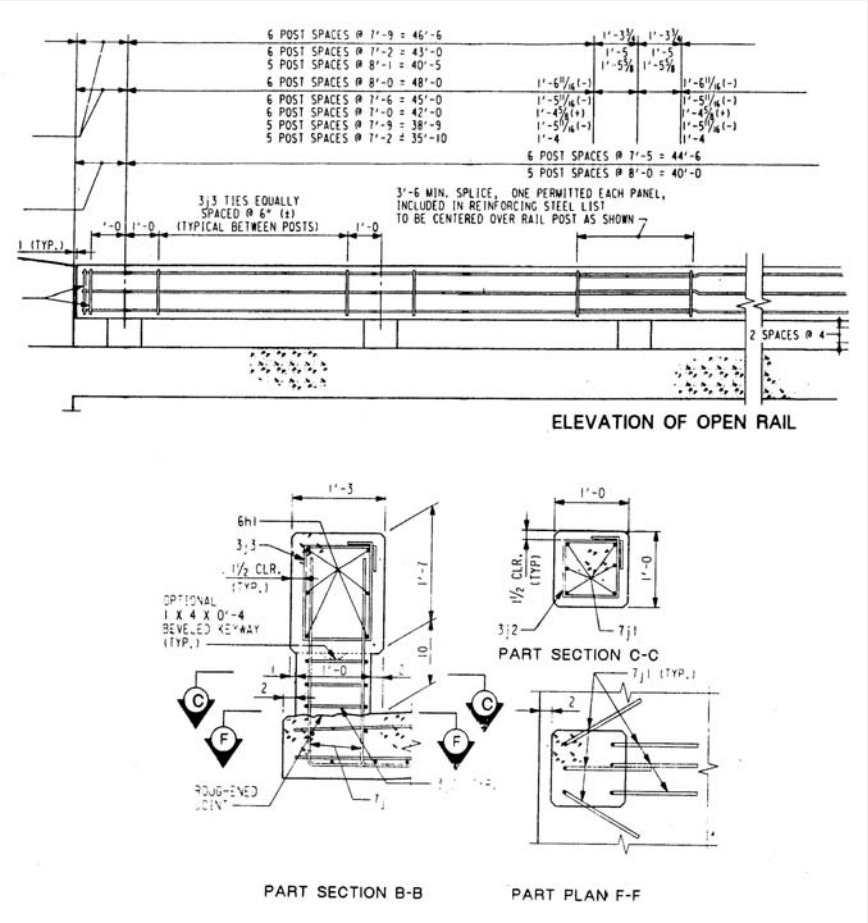
Test level:
TL-2

Utilized in:
Iowa

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

# Vertical Concrete Parapet

## Iowa Concrete Open Railing



# Vertical Concrete Parapet

## Iowa Concrete Block Railing Retrofit

Height:
34"

Cost per linear foot:
$40

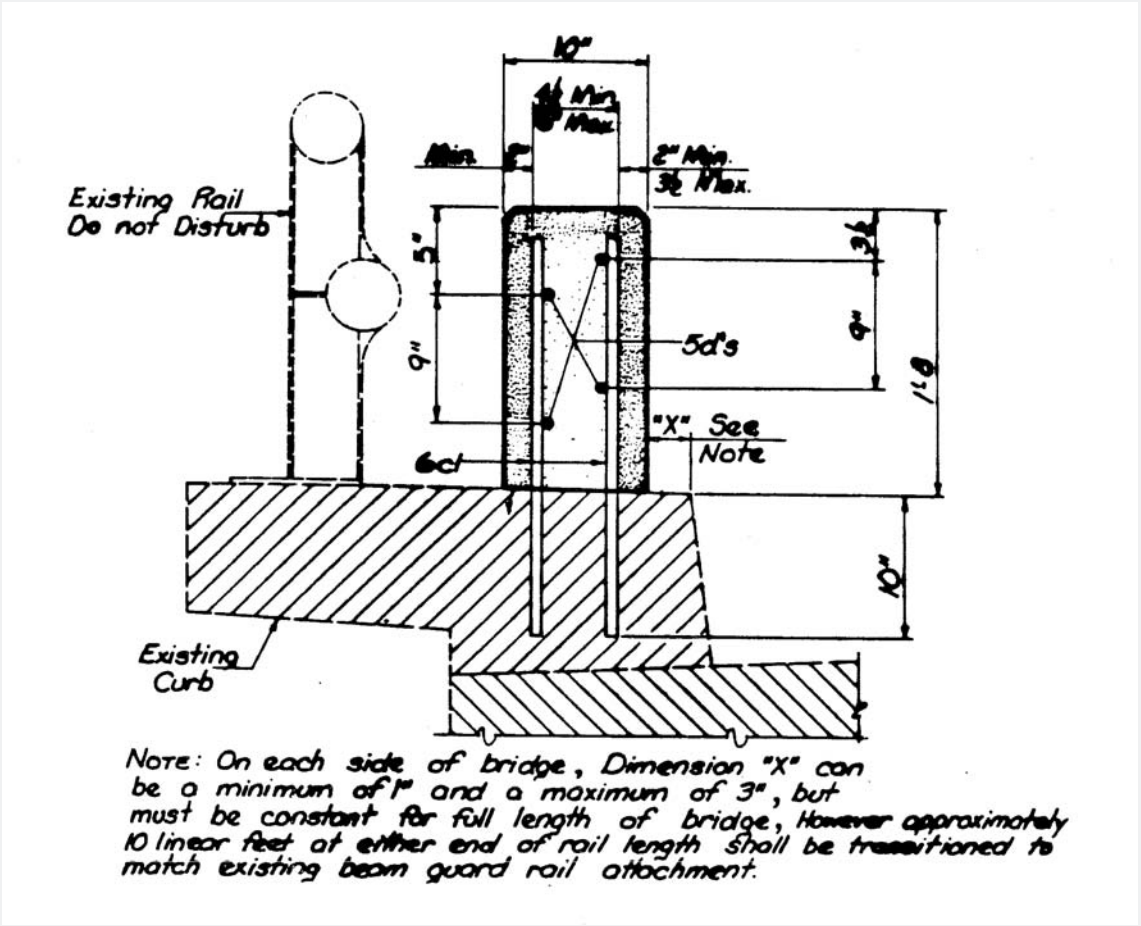
Test level:
TL-4

Utilized in:
Iowa

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

# Vertical Concrete Parapet

## Iowa Concrete Block Railing Retrofit



# Vertical Concrete Parapet

## Modified Kansas Corral Rail

Height:
27"

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

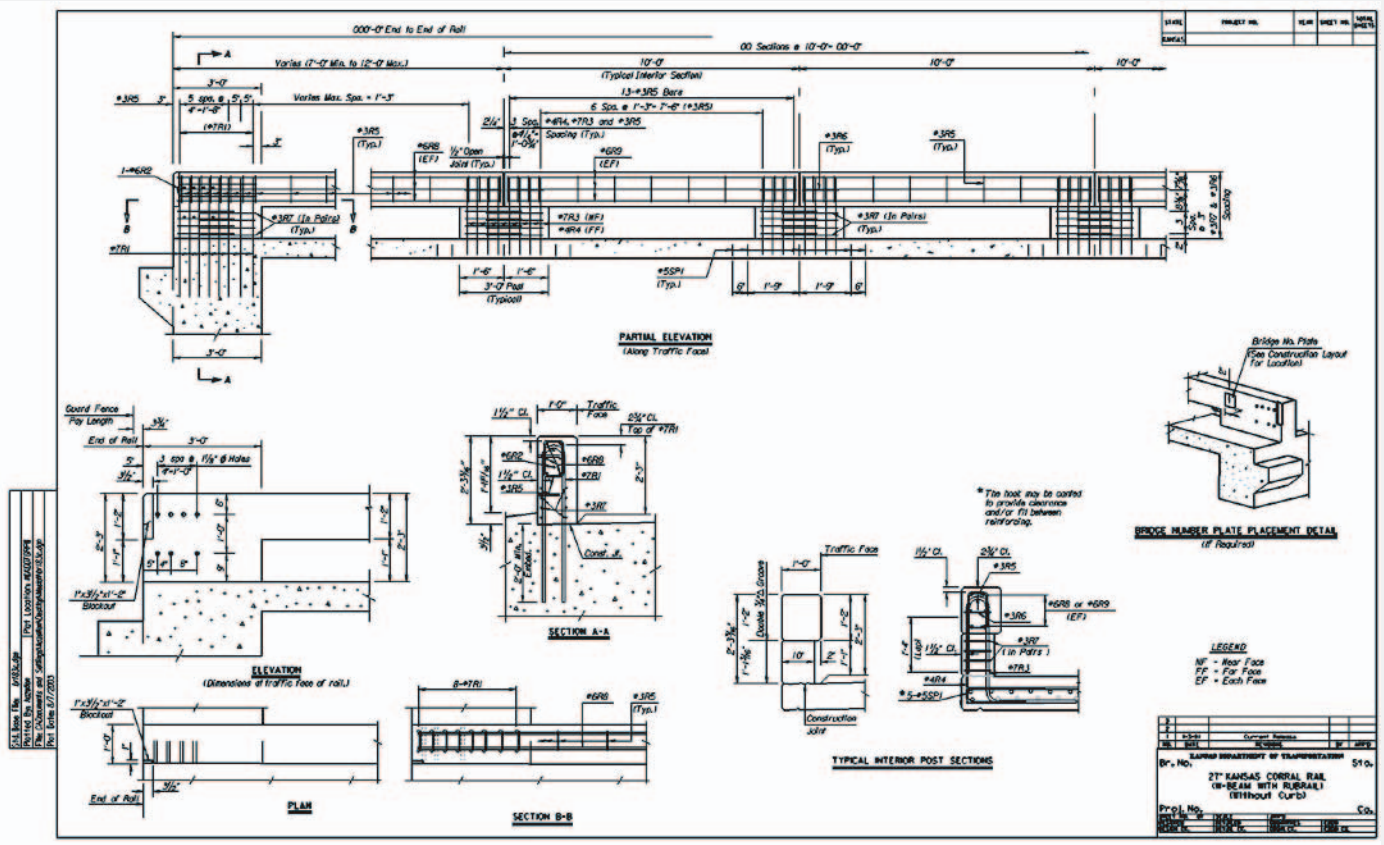
Test level:
TL-2

Utilized in:
Kansas

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

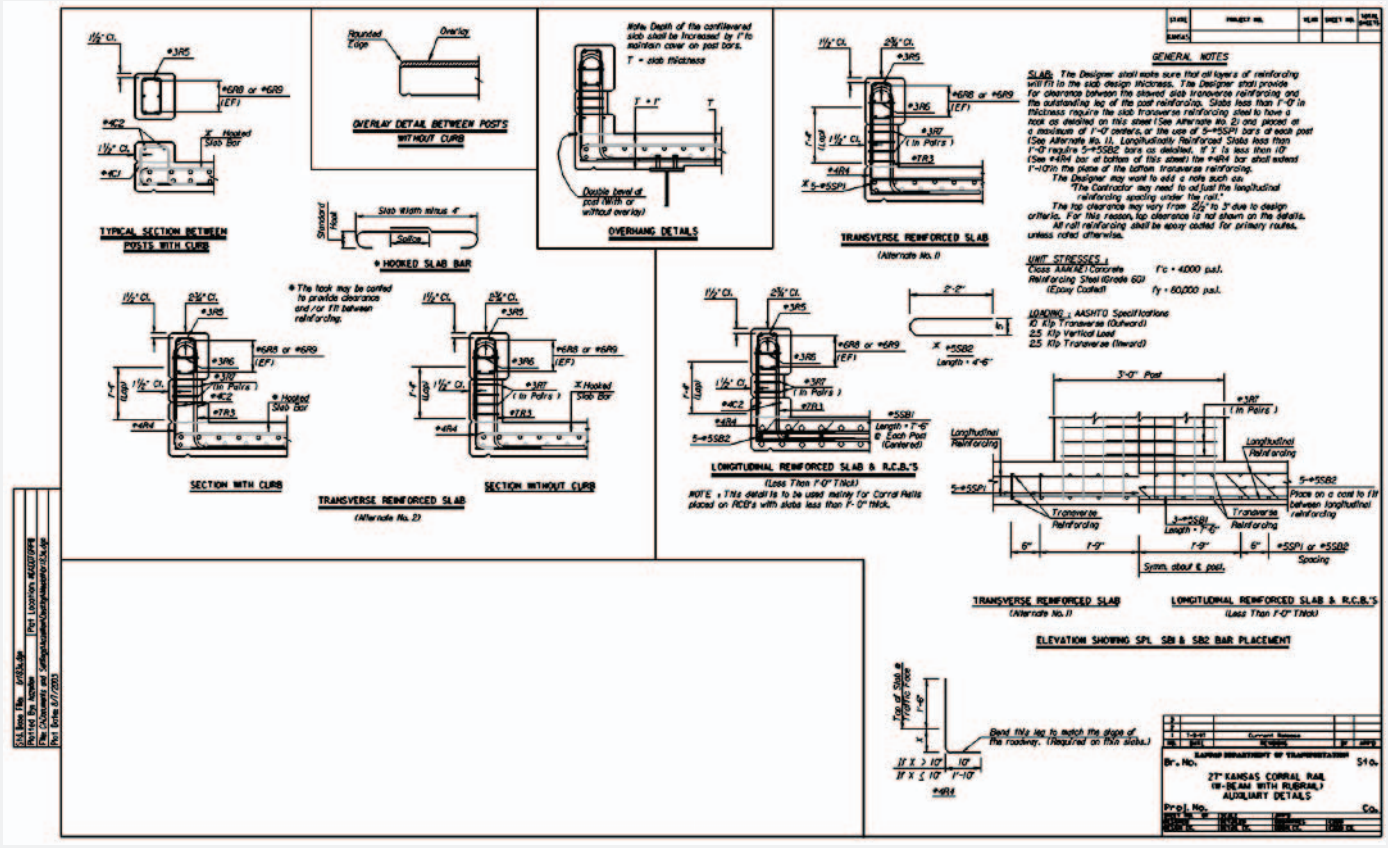
# Vertical Concrete Parapet

## Modified Kansas Corral Rail



# Vertical Concrete Parapet

## Modified Kansas Corral Rail



# Vertical Concrete Parapet

## Kansas 32" Corral Rail

Height:
32"

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

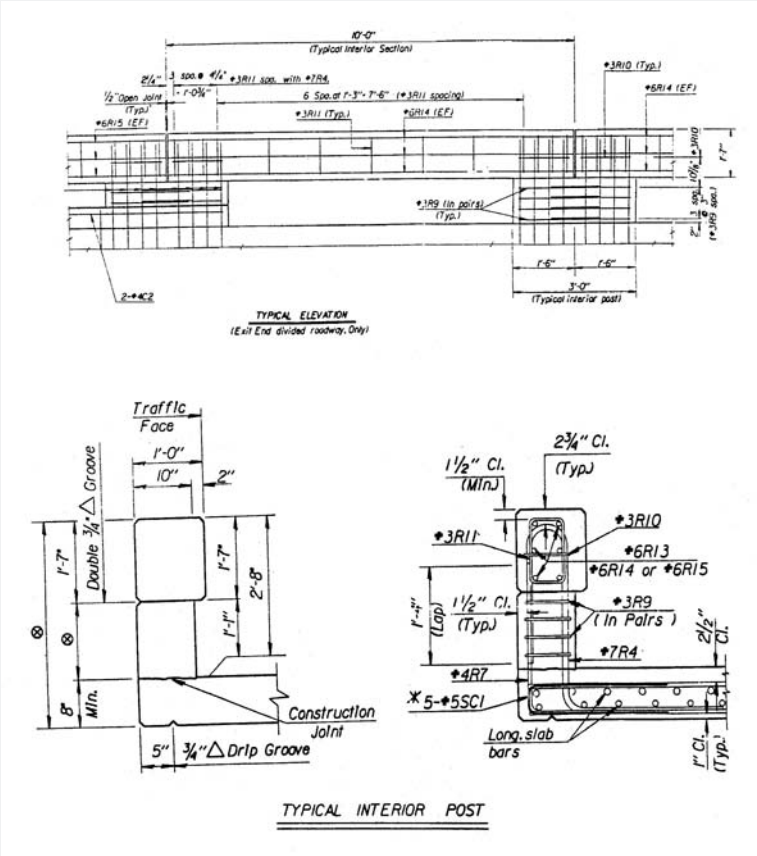
Test level:
TL-4

Utilized in:
Kansas

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

# Vertical Concrete Parapet

## Kansas 32" Corral Rail




TYPICAL INTERIOR POST

# Vertical Concrete Parapet

## 42" Single Slope Concrete Barrier

Height:
42"

Cost per linear foot:
$70-75

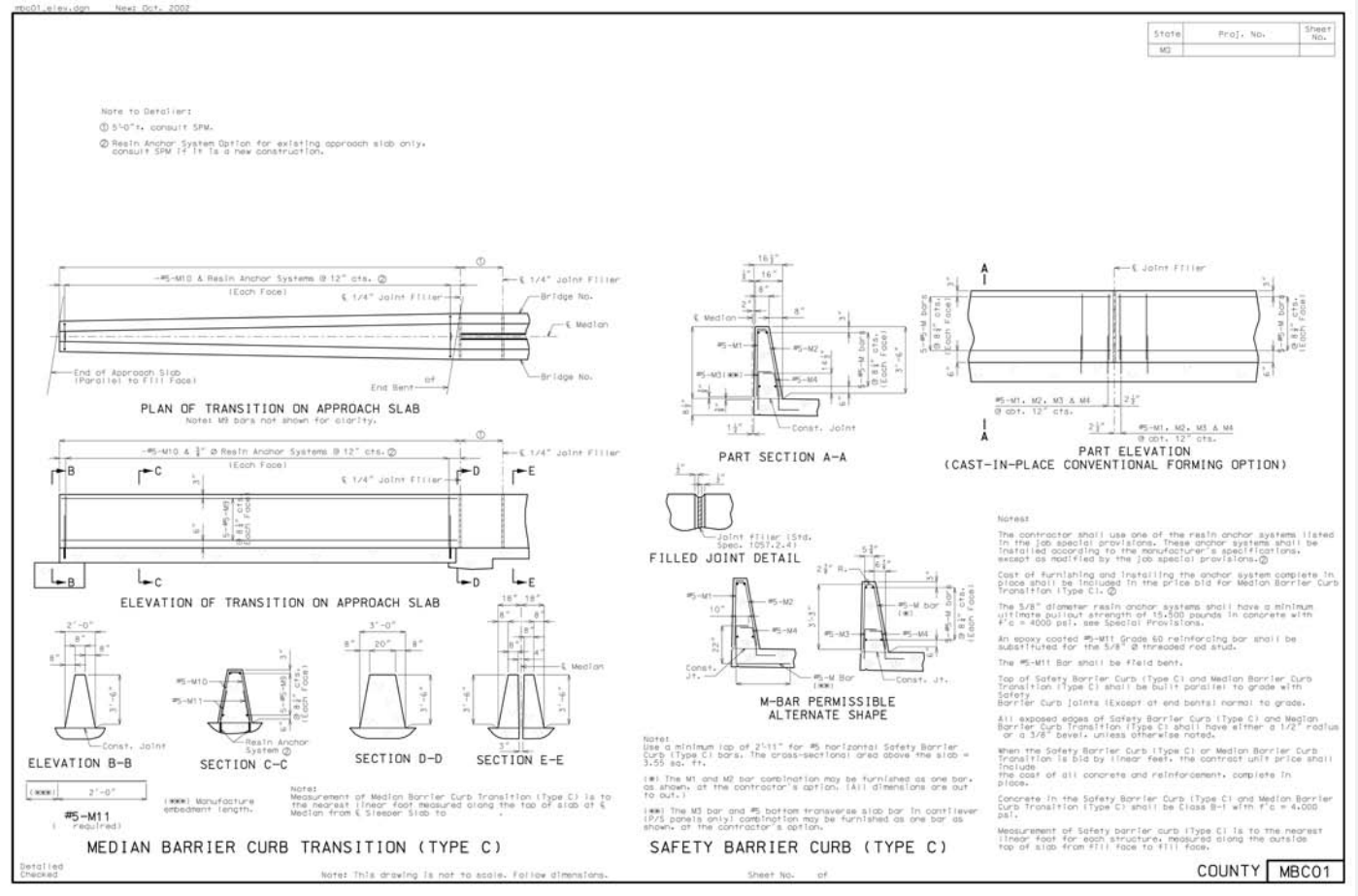
Test level:
TL-5

Utilized in:
Missouri

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

# Vertical Concrete Parapet

## 42" Single Slope Concrete Barrier



# Vertical Concrete Parapet

## Concrete Beam and Post

Height:
29"

Cost per linear foot:
$__

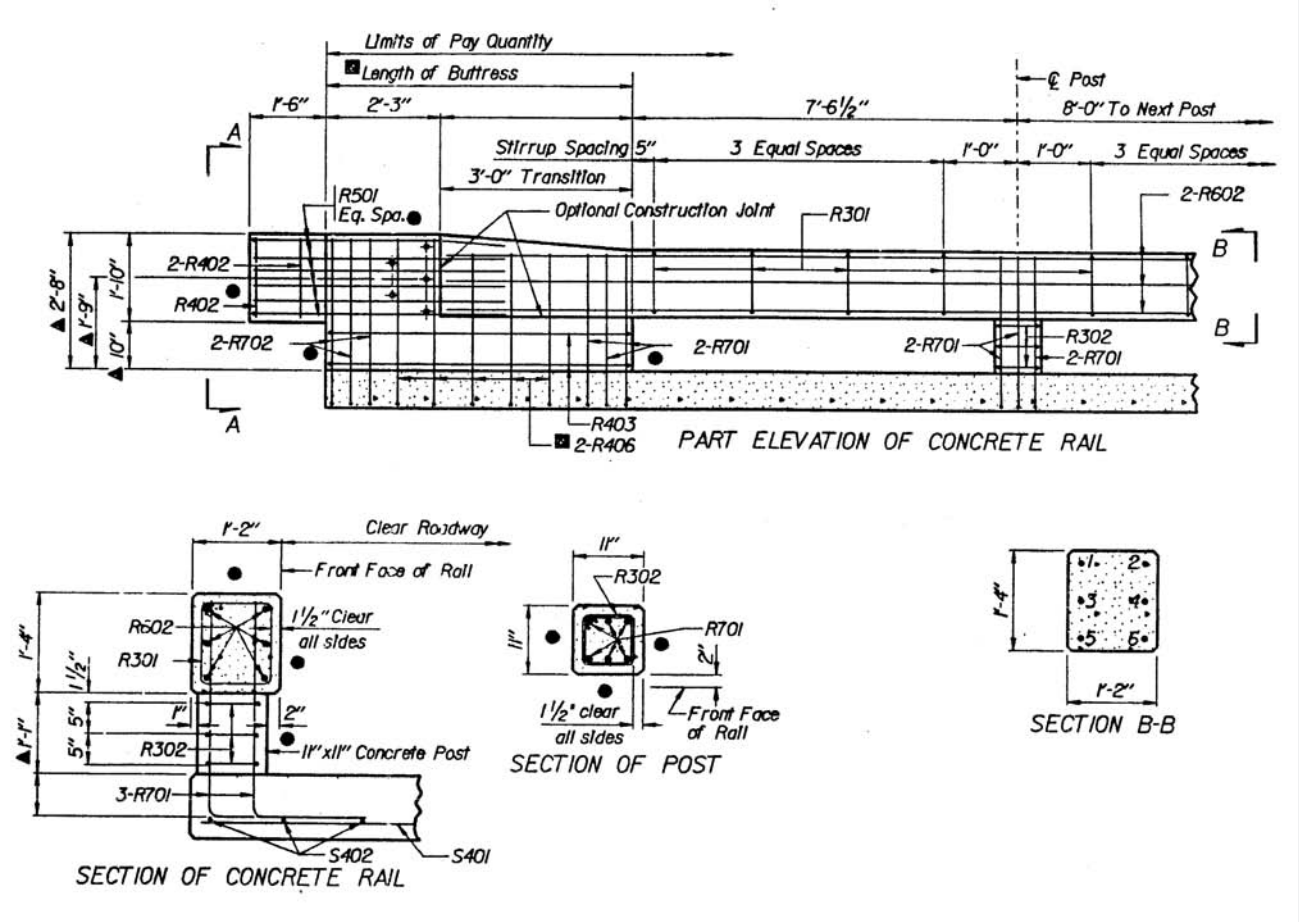
Test level:
TL-2

Utilized in:
Nebraska

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

# Vertical Concrete Parapet

## Concrete Beam and Post



# Vertical Concrete Parapet

## Nebraska Open Concrete Bridge Rail

Height:
29"

Cost per linear foot:
$__

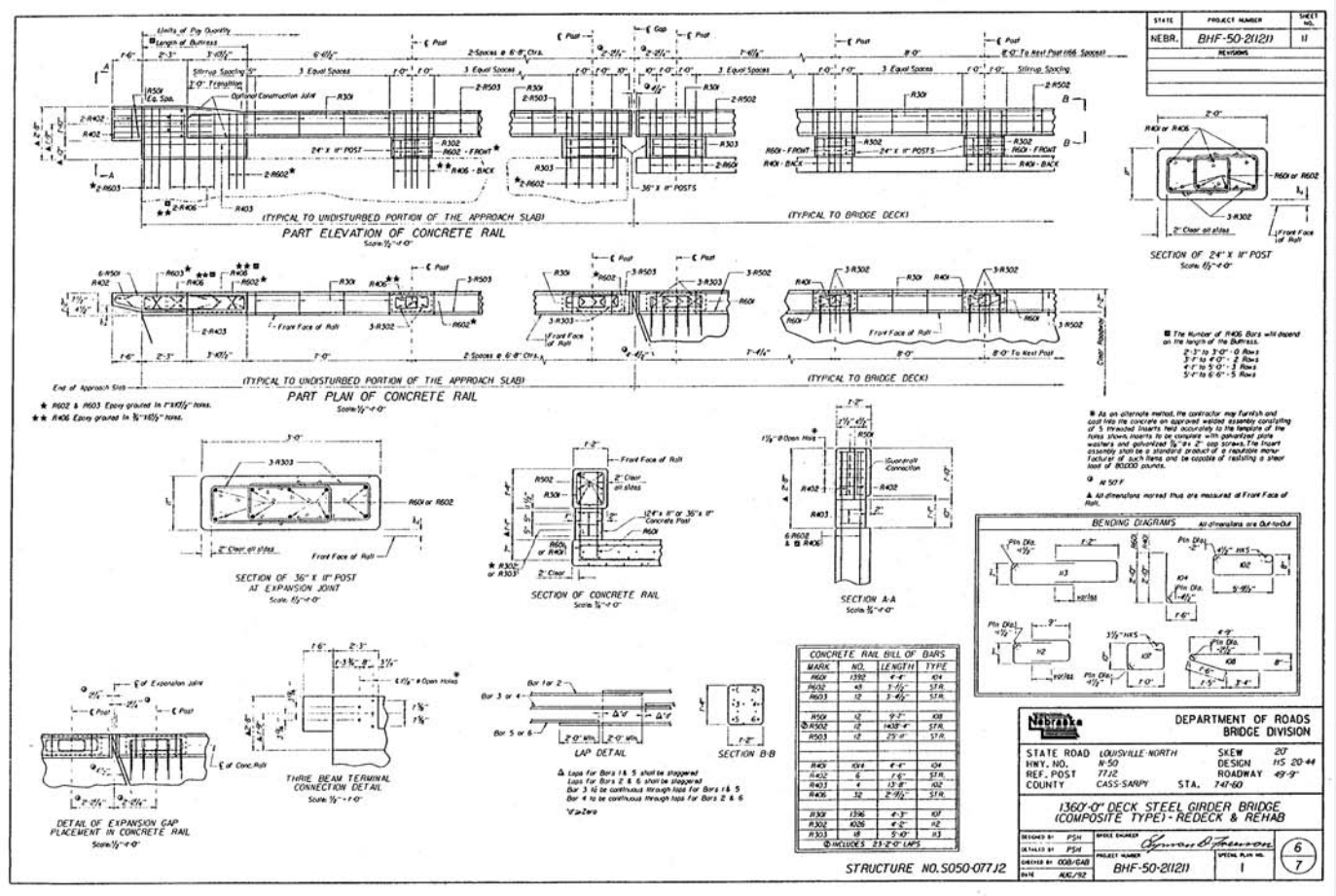
Test level:
TL-4

Utilized in:
Nebraska

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

# Vertical Concrete Parapet

## Nebraska Open Concrete Bridge Rail



# Vertical Concrete Parapet

## TR1 Modified Bridge Rail

Height:
29"

Cost per linear foot:
$35

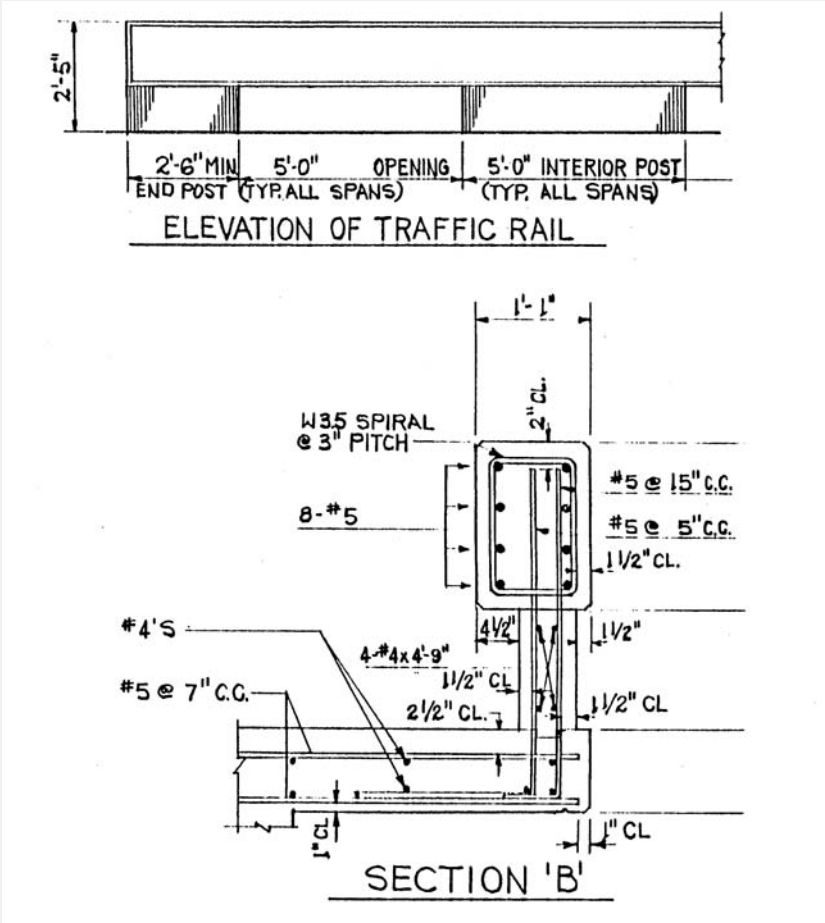
Test level:
TL-2

Utilized in:
Oklahoma

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

# Vertical Concrete Parapet

## TR1 Modified Bridge Rail



# Vertical Concrete Parapet

## Parapet Flush Mount

Height:
54"

Cost per linear foot:
$92

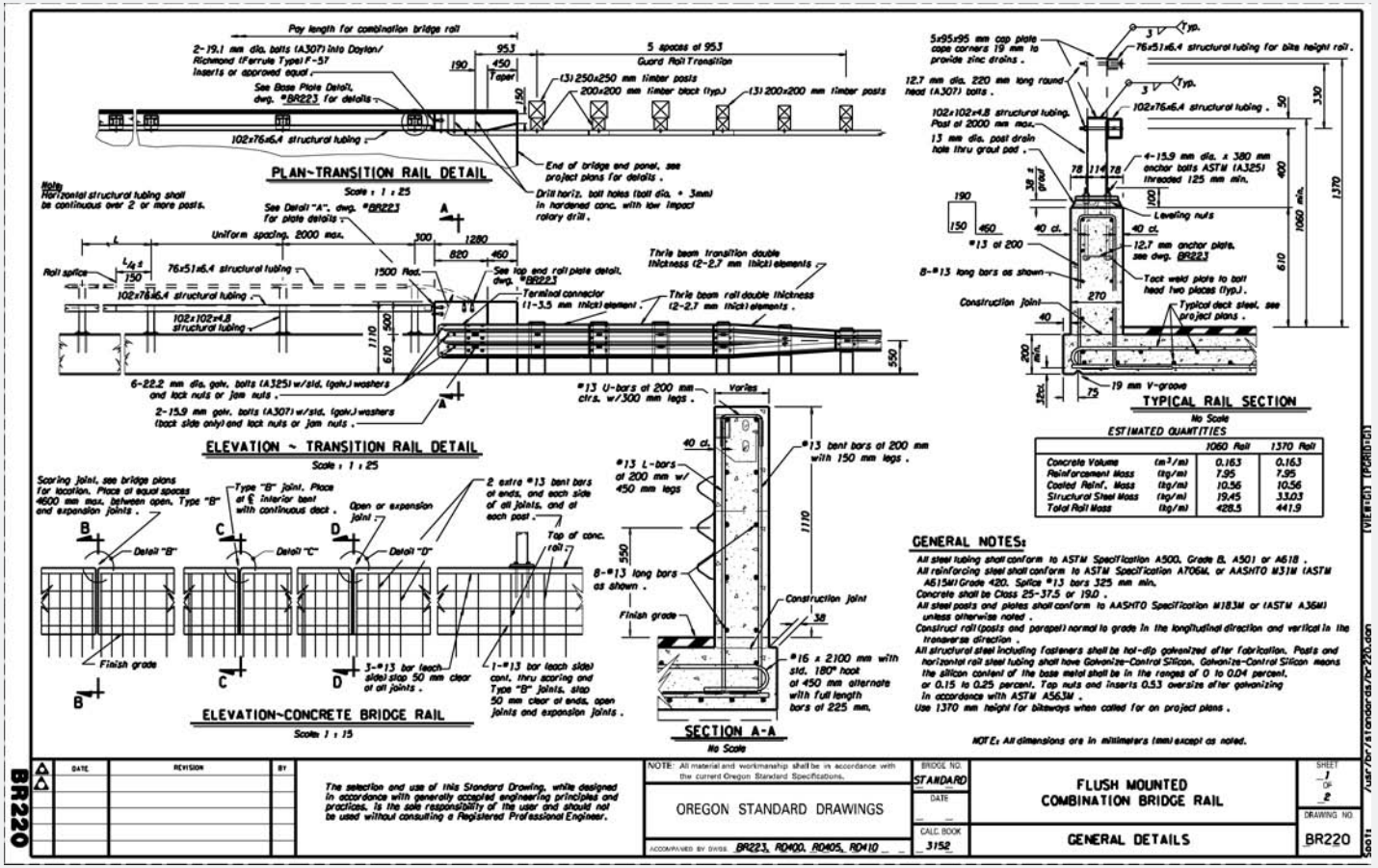
Test level:
TL-4

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



# Vertical Concrete Parapet

## Parapet Sidewalk Mount

Height:
54"

Cost per linear foot:
$92

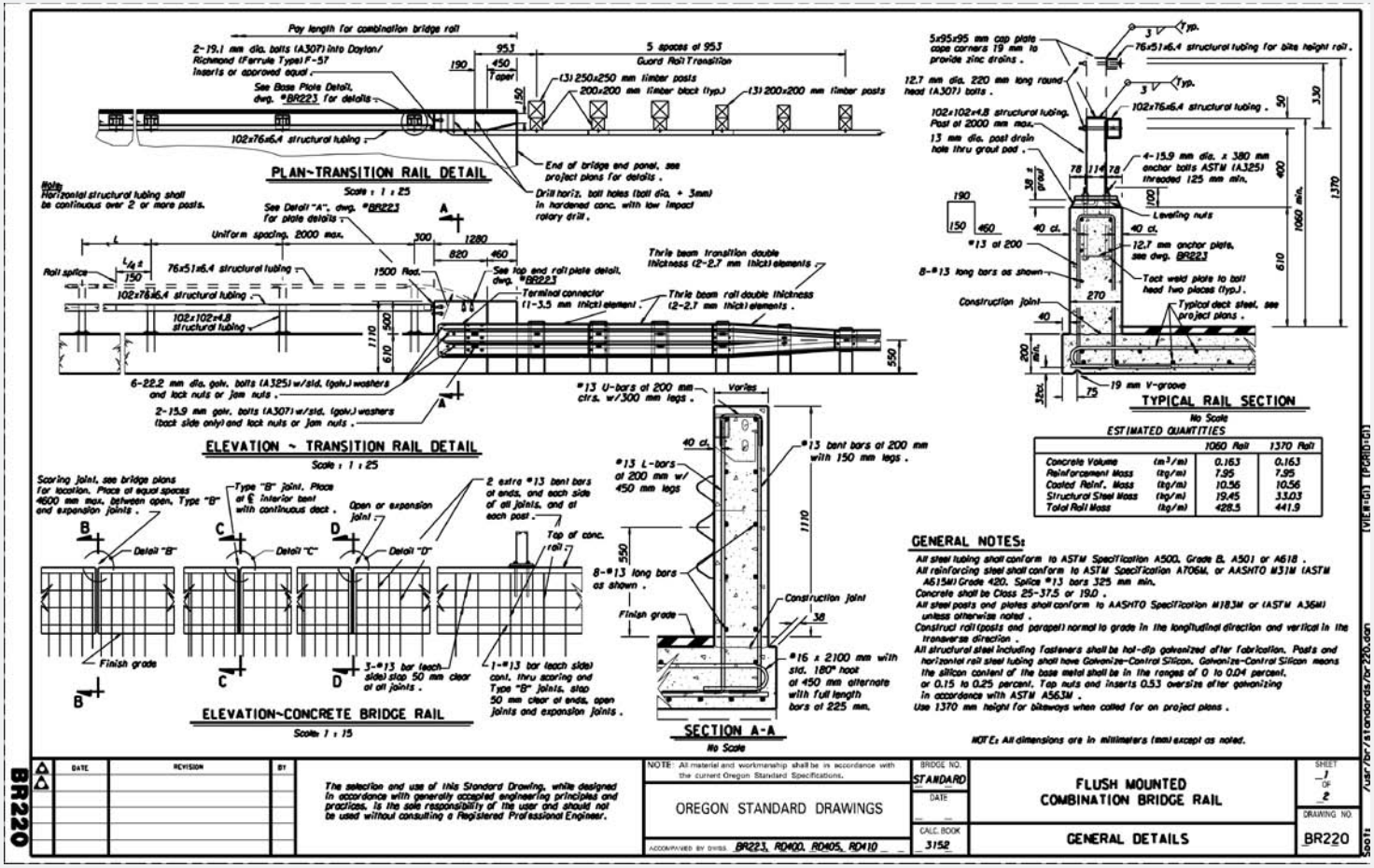
Test level:
TL-4

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

# Vertical Concrete Parapet

## Parapet Sidewalk Mount



# New Jersey Barrier with Rail

## Type T501SW

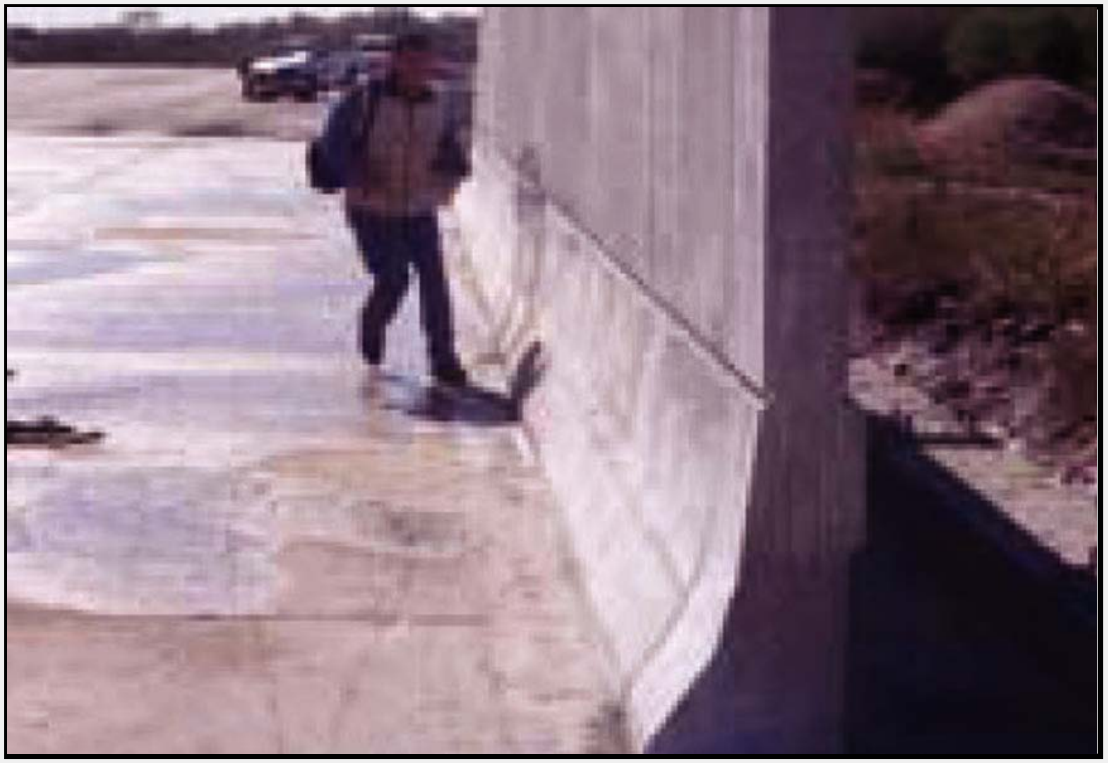
Height:
72"

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



# New Jersey Barrier with Rail

## Type T501SW

Plans Not Yet Available.

# Vertical Concrete Parapet

## Type C411

Height:
42"

Cost per linear foot:
$75

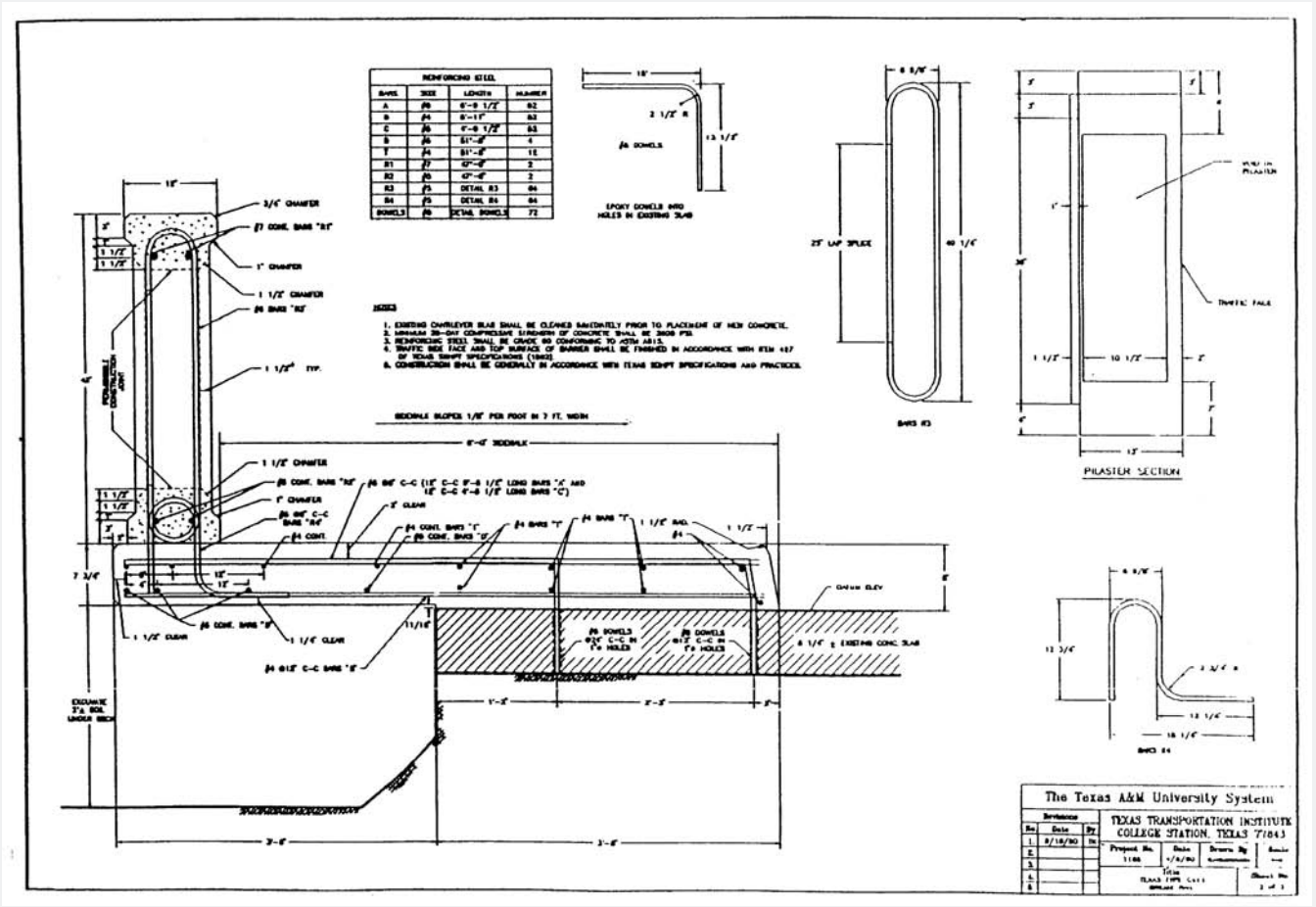
Test level:
TL-2

Utilized in:
Texas

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

# Vertical Concrete Parapet

## Type C411



# Vertical Concrete Parapet

## Type T203

Height:
27"

Cost per linear foot:
$38

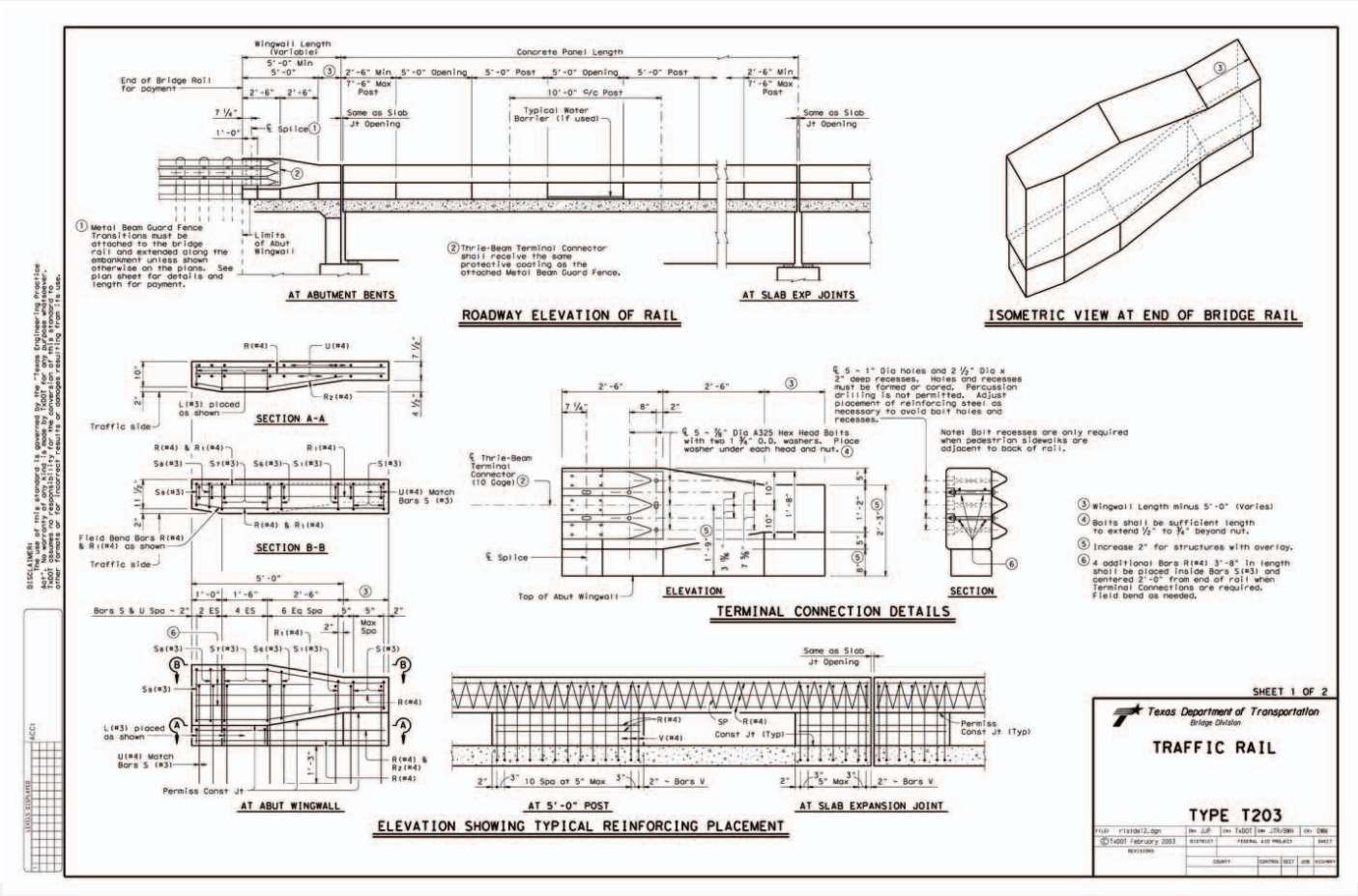
Test level:
TL-3

Utilized in:
Texas

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

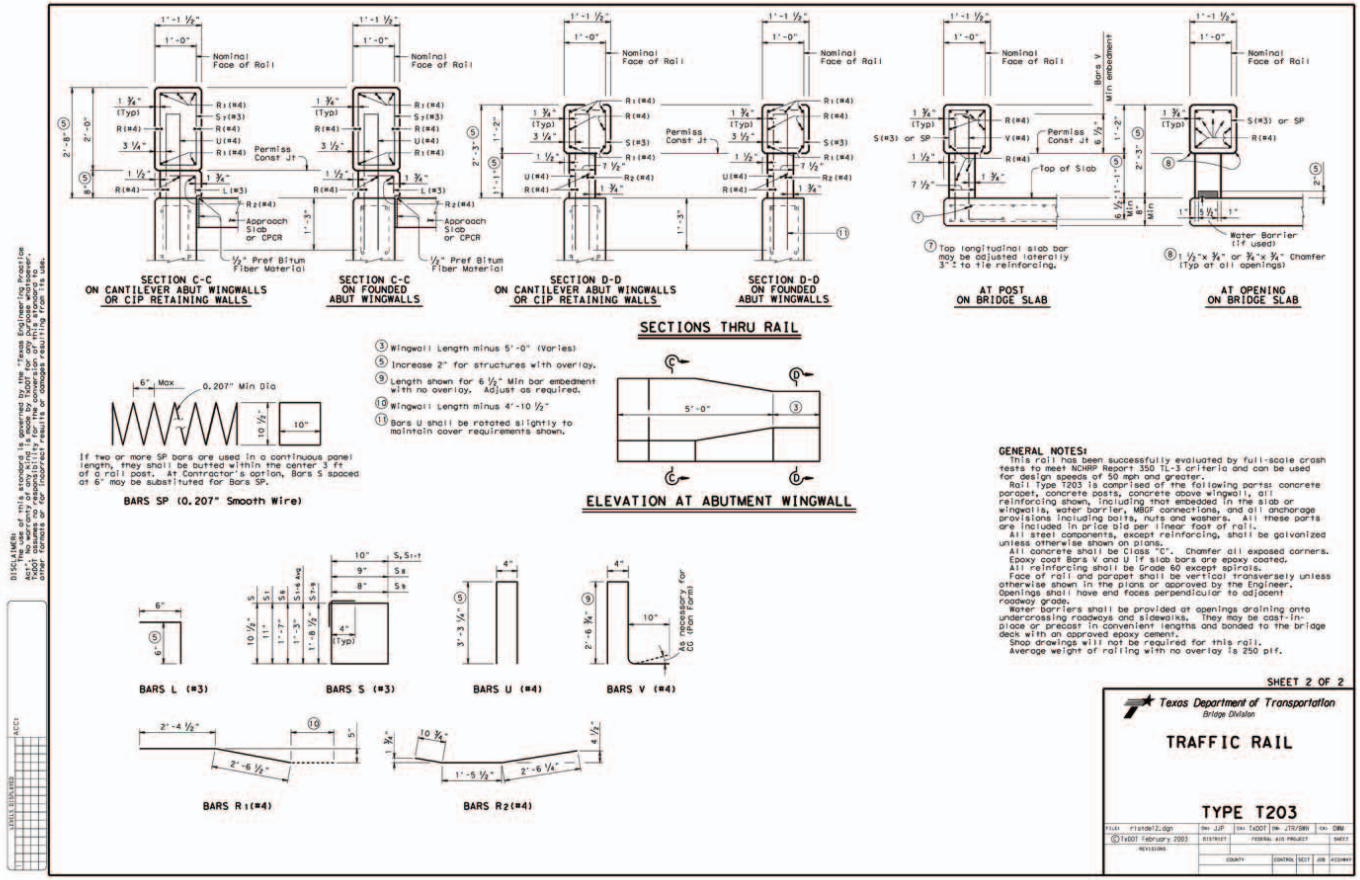
# Vertical Concrete Parapet

## Type T203



# Vertical Concrete Parapet

## Type T203



# Vertical Concrete Parapet

## Texas Type T411 Aesthetic Rail

Height:
32"

Cost per linear foot:
$75

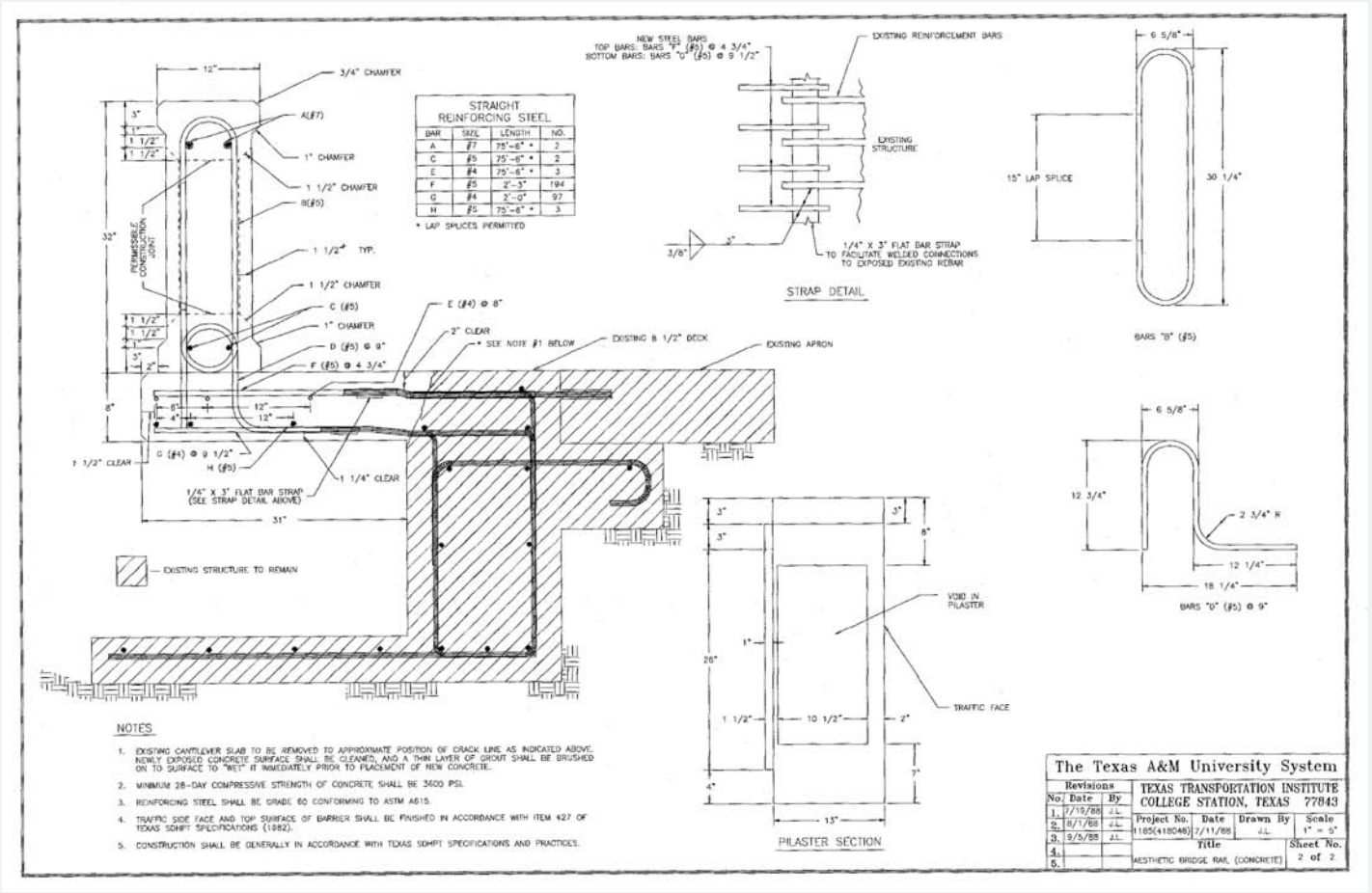
Test level:
TL-2

Utilized in:
Texas

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

# Vertical Concrete Parapet

## Texas Type T411 Aesthetic Rail



# Vertical Concrete Parapet

## Texas TT Rail

Height:
90"

Cost per linear foot:
$250

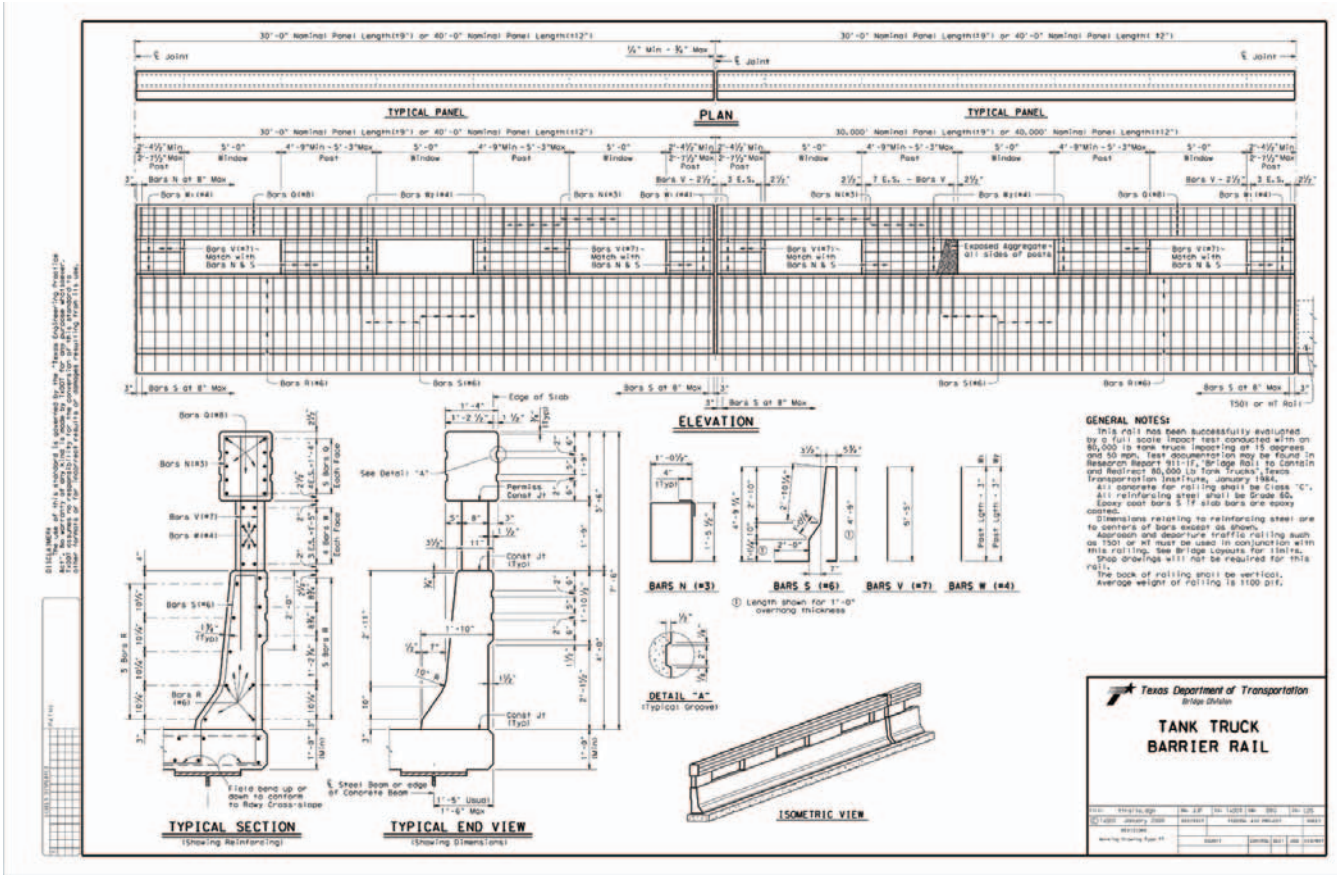
Test level:
TL-6

Utilized in:
Texas

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

# Vertical Concrete Parapet

## Texas TT Rail



# Vertical Concrete Parapet

## NJ Barrier

Height:
32"

Cost per linear foot:
$50-55

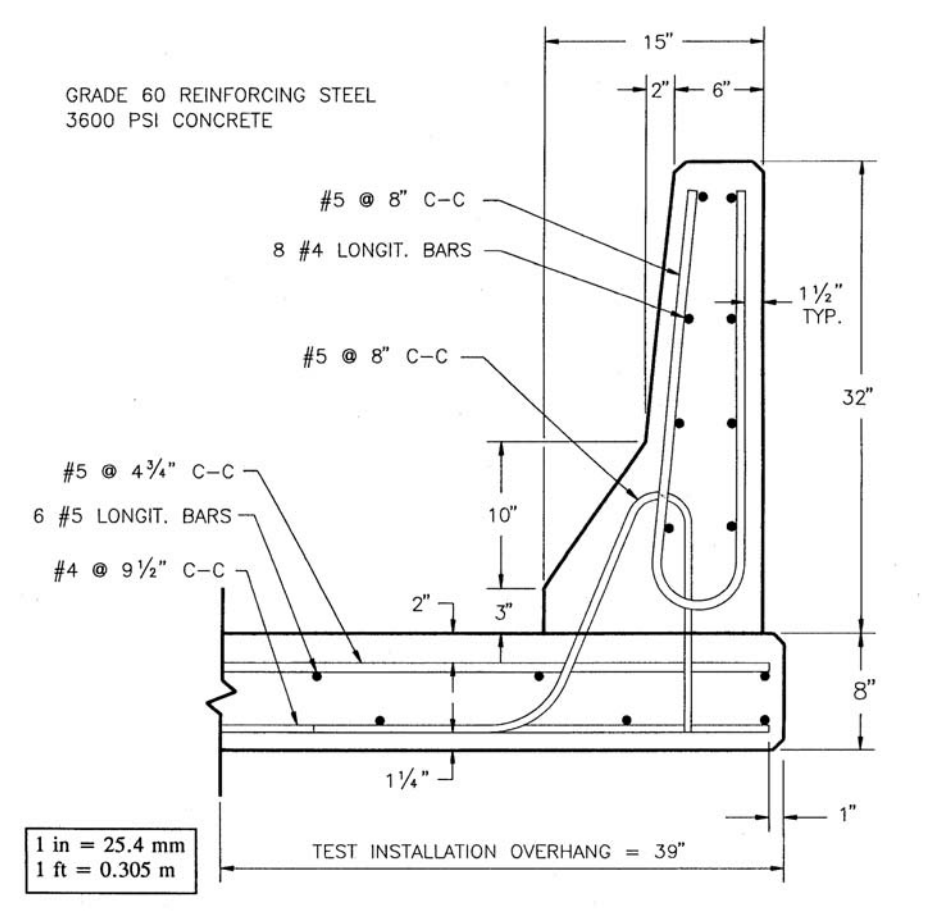
Test level:
TL-4

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

# Vertical Concrete Parapet

## NJ Barrier



# Vertical Concrete Parapet with Aluminum Tube Bridge Rail

## New Jersey Concrete Barrier

Height:
32"

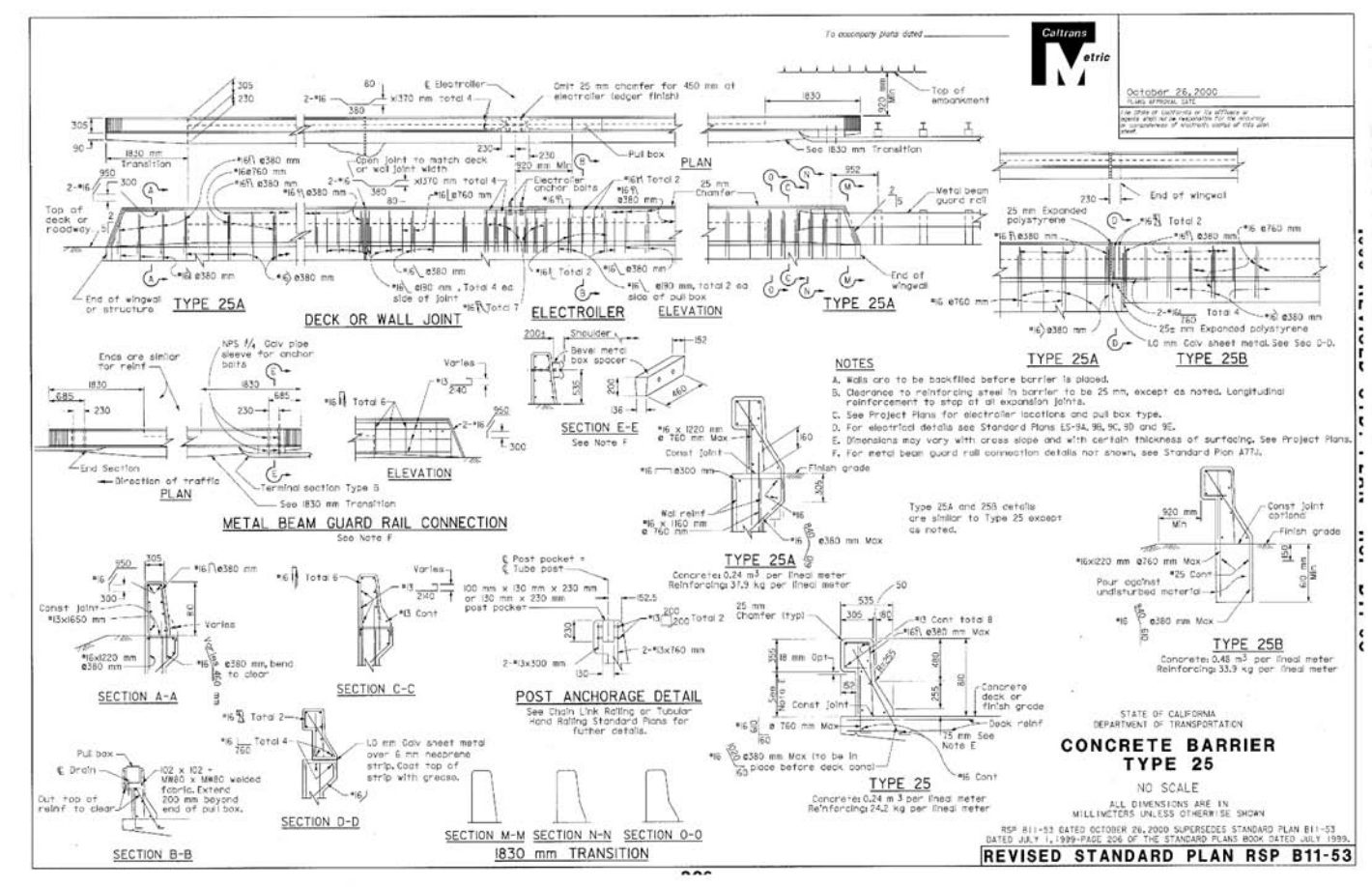
Cost per linear foot:
$50

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

## New Jersey Concrete Barrier



# Vertical Concrete Parapet with Aluminum Tube Bridge Rail

## Type 26 Concrete Barrier with Sidewalk

Height:
36"

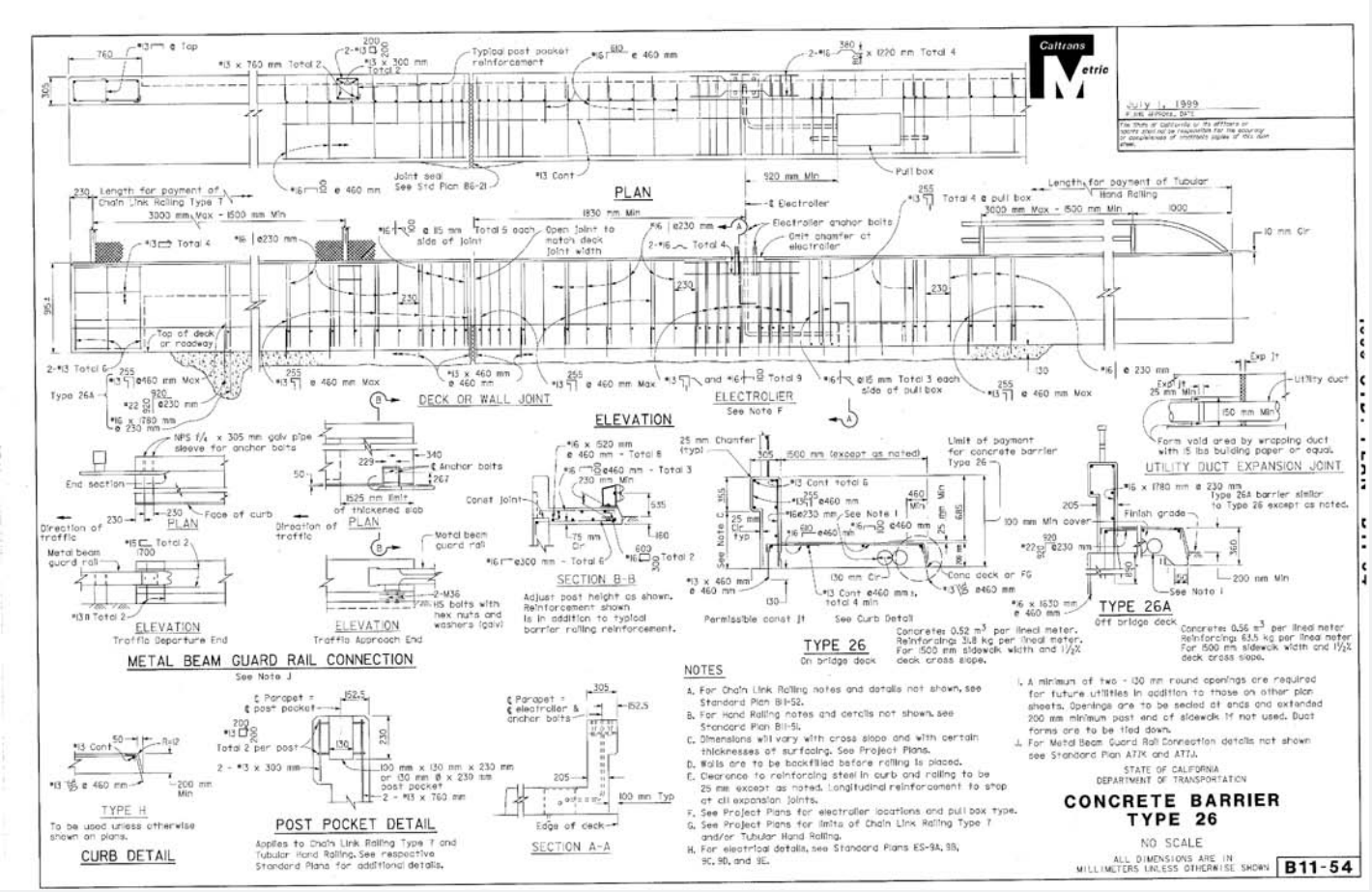
Cost per linear foot:
$90

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

## Type 26 Concrete Barrier with Sidewalk



# Vertical Concrete Parapet with Aluminum Tube Bridge Rail

## Type 732 Concrete Barrier

Height:
32"

Cost per linear foot:
$70

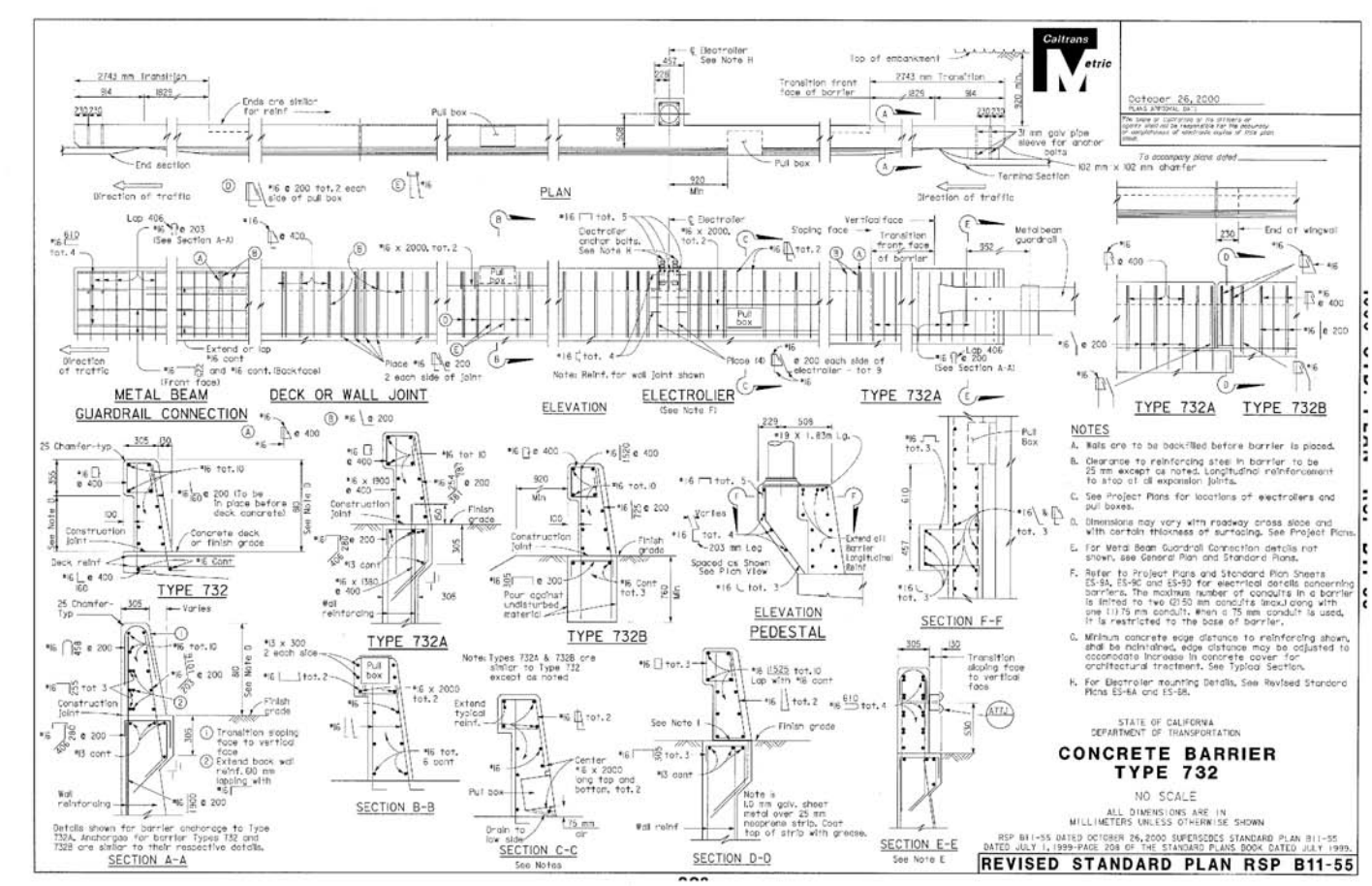
Test level:
TL-4

Utilized in:
California

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

# Vertical Concrete Parapet with Aluminum Tube Bridge Rail

## Type 732 Concrete Barrier



# Vertical Concrete Parapet with Aluminum Tube Bridge Rail

## Type 736 Concrete Barrier

Height:
36"

Cost per linear foot:
$70

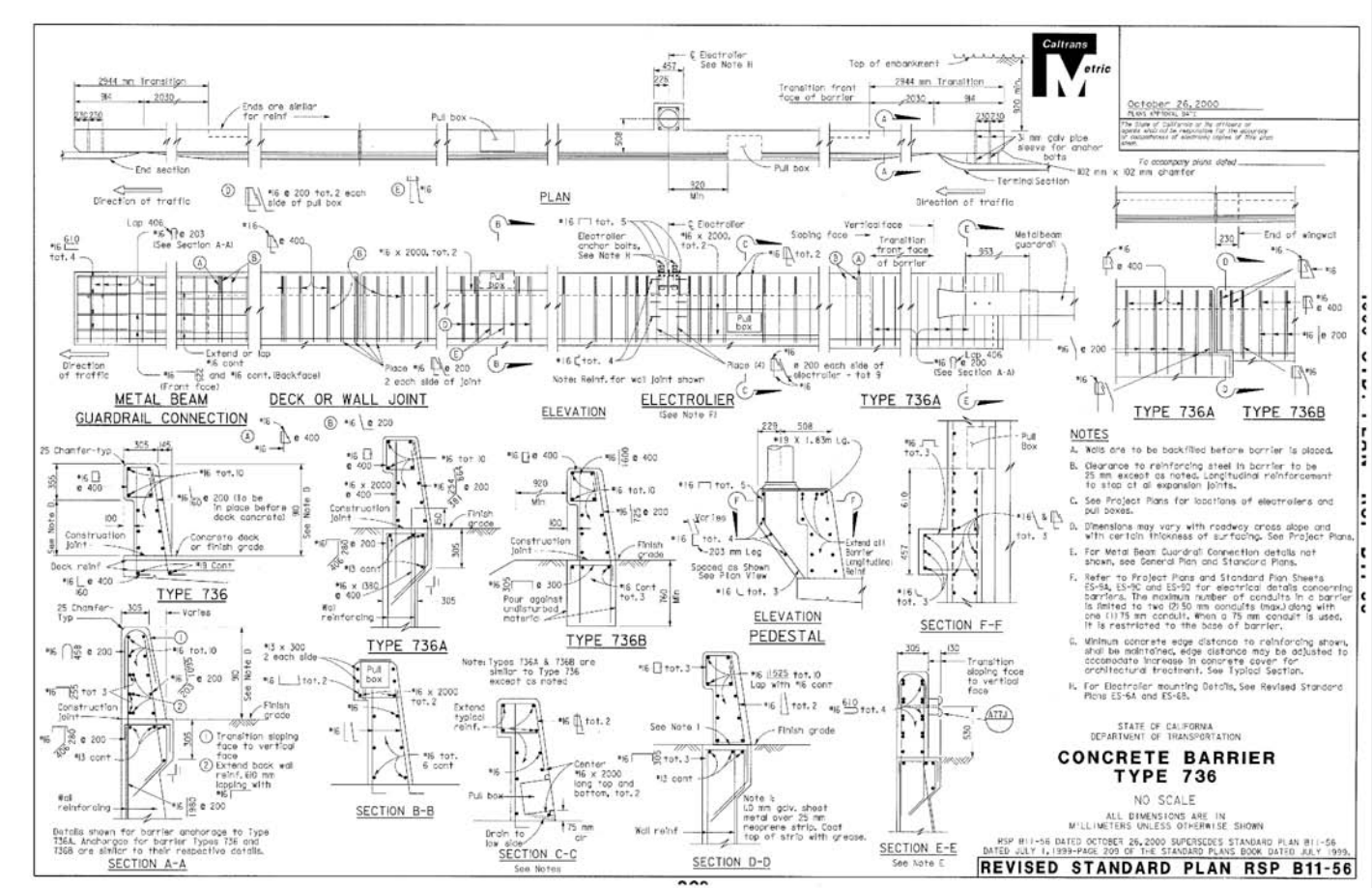
Test level:
TL-4

Utilized in:
California

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

# Vertical Concrete Parapet with Aluminum Tube Bridge Rail

## Type 736 Concrete Barrier



# Vertical Concrete Parapet with Aluminum Tube Bridge Rail

## Type 742 Concrete Barrier

Height:
42"

Cost per linear foot:
$85

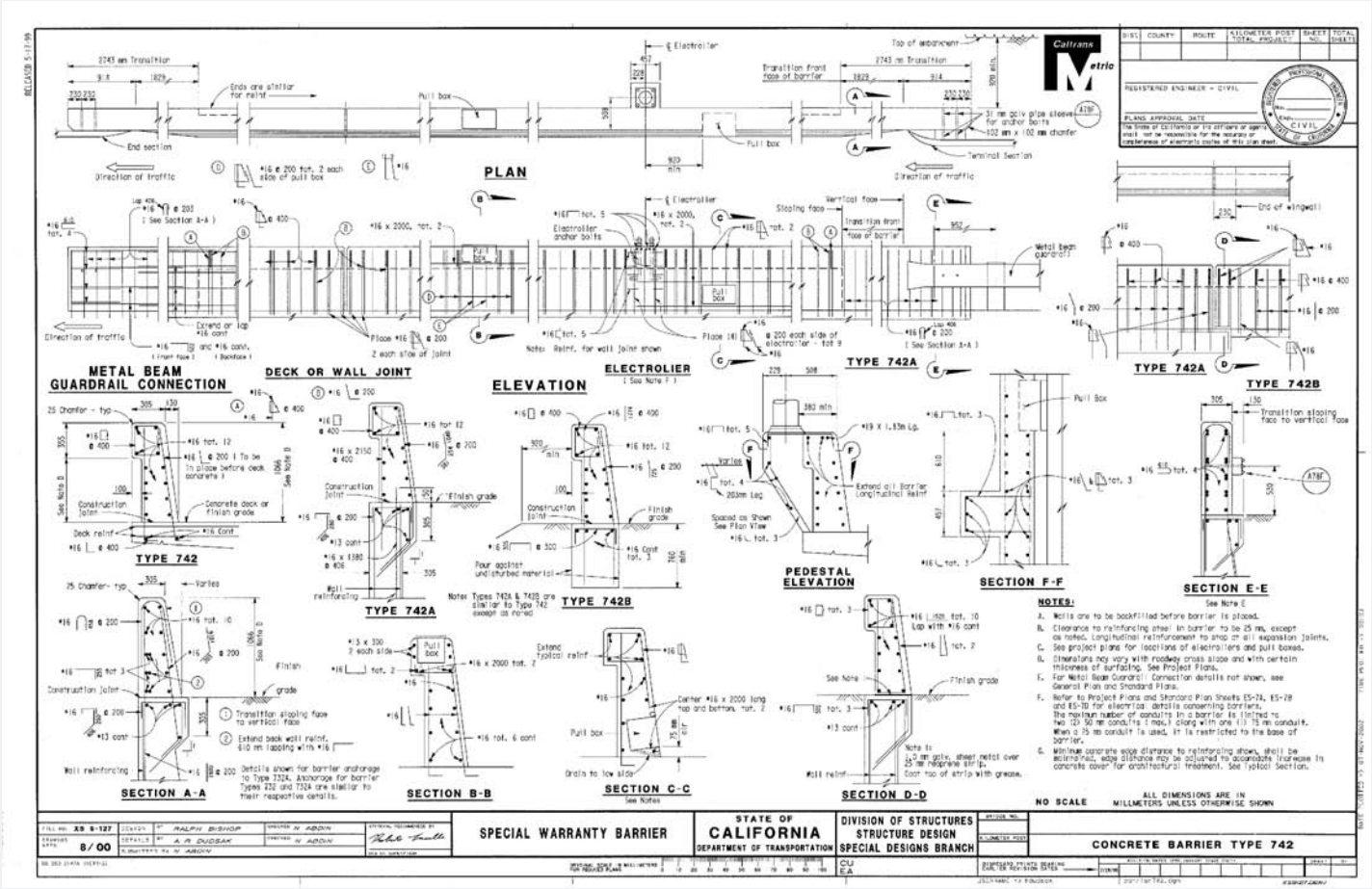
Test level:
TL-5

Utilized in:
California

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

# Vertical Concrete Parapet with Aluminum Tube Bridge Rail

## Type 742 Concrete Barrier



# Aluminum Tube Bridge Rail

## LB Foster Precast NJ Shape, Bolted Down

Height:
34"

Cost per linear foot:
$__

Test level:
TL-4

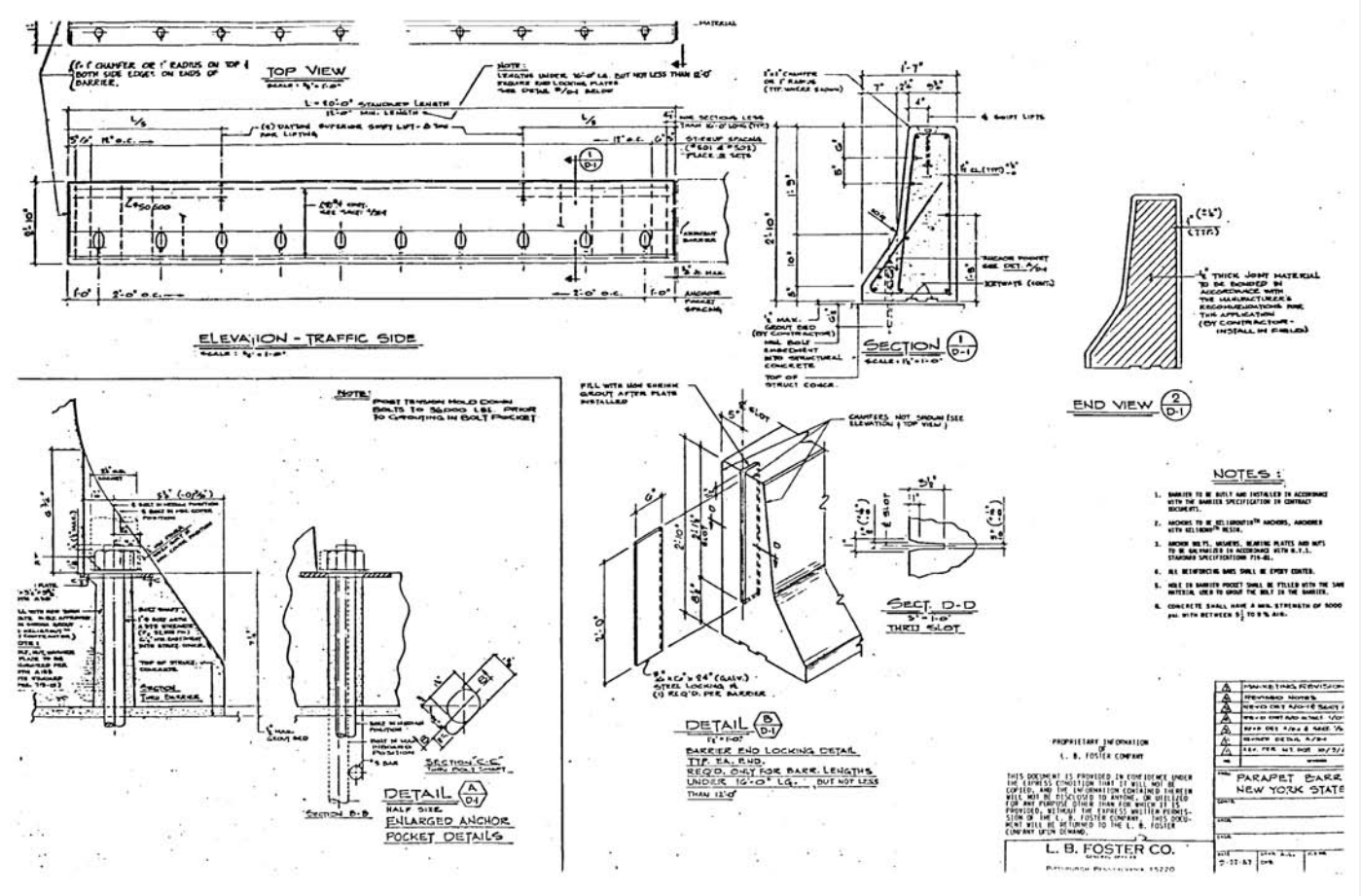
Utilized in:
New Jersey

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

Photo Not Yet Available

# Aluminum Tube Bridge Rail

## LB Foster Precast NJ Shape, Bolted Down



# Aluminum Tube Bridge Rail

## California Type 20

Height:
39"

Cost per linear foot:
$__

Test level:
TL-3

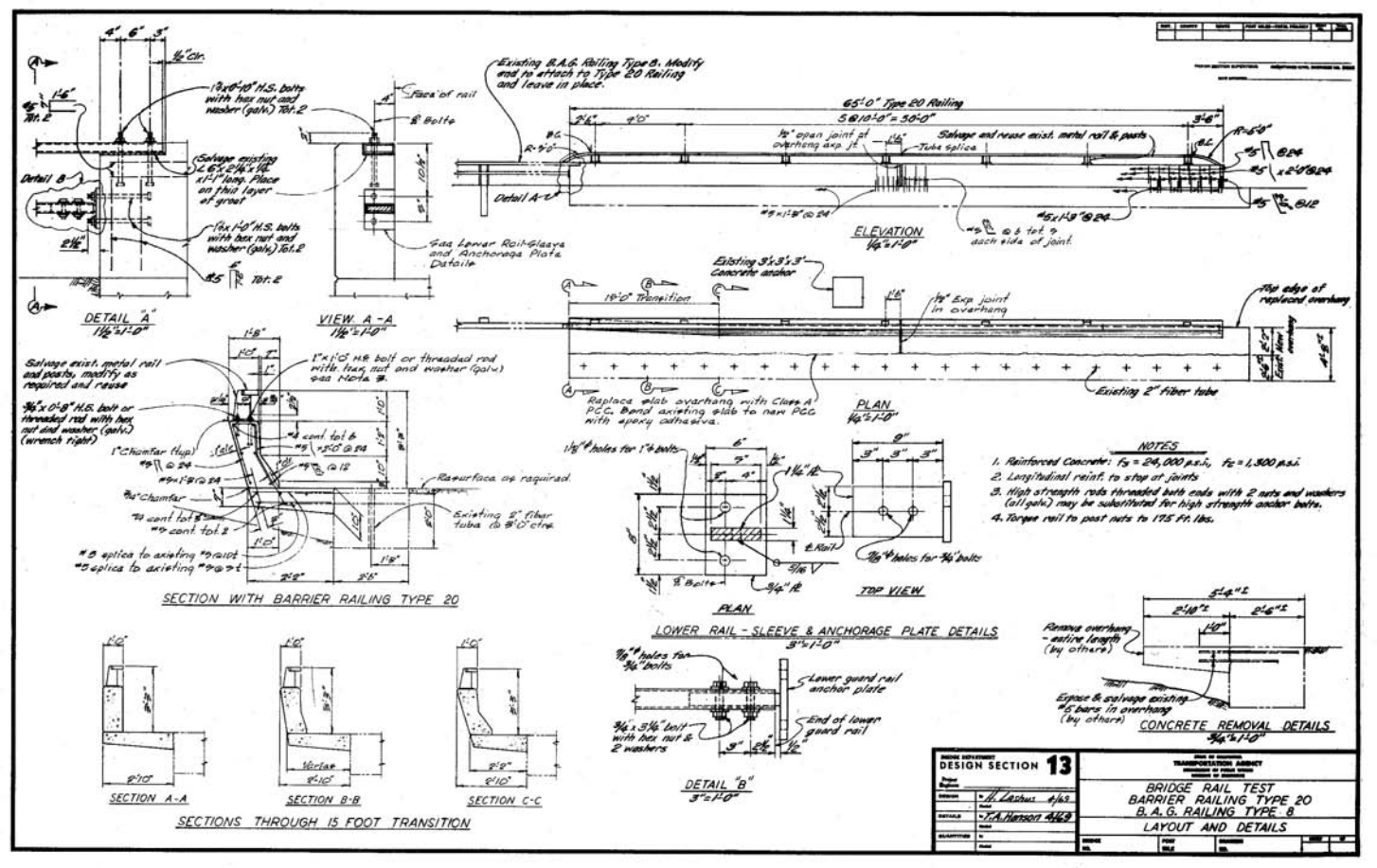
Utilized in:
California

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

**Photo Not Yet Available.**

# Aluminum Tube Bridge Rail

## California Type 20



# New Jersey Barrier with Rail

## New Jersey Barrier with 22" Steel Bicycle Rail

**Height:**
54"

**Cost per linear foot:**
$68

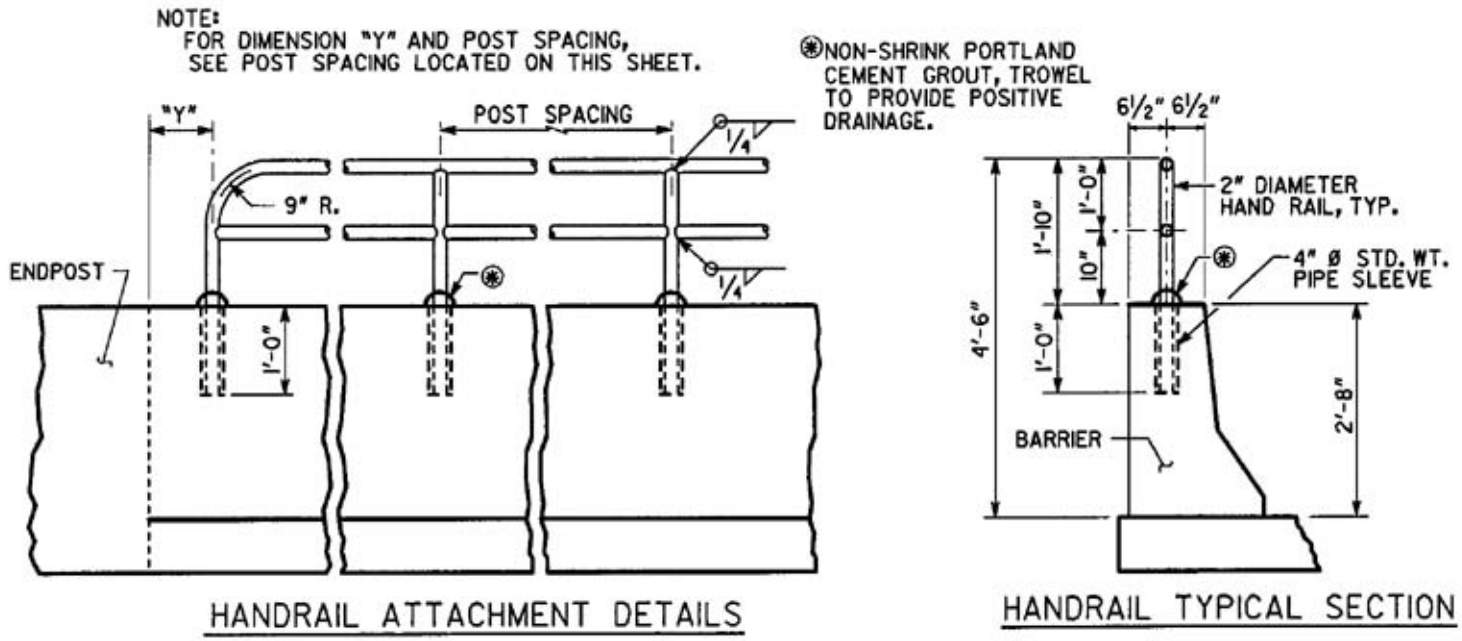
**Test level:**
TL-4

**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 Rail

## 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

# New Jersey Barrier with Rail

## Bicycle Rail Attachment to Safety Shape Concrete Rail

Height:
54.5"

Cost per linear foot:
$75

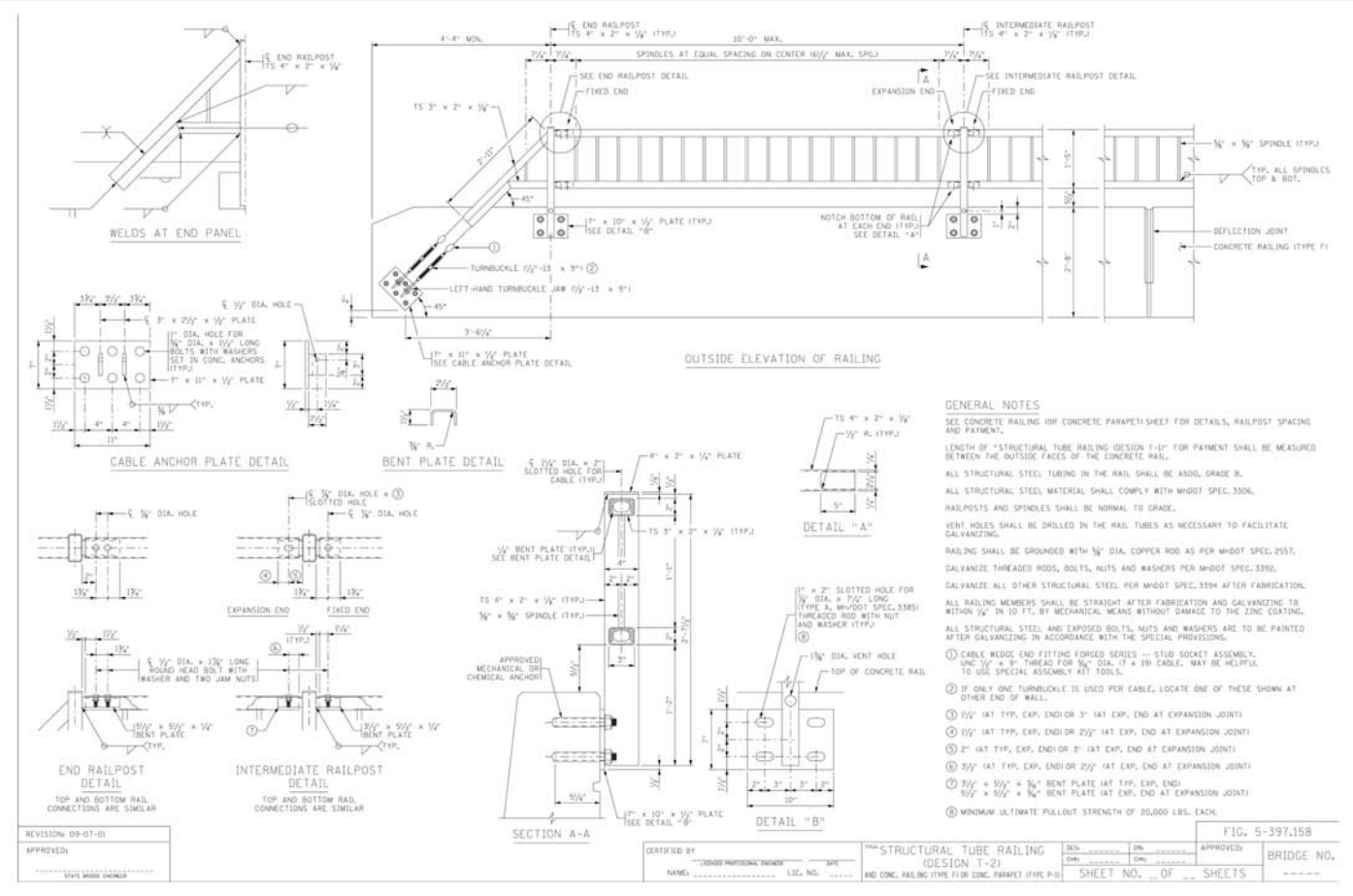
Test level:
TL-4

Utilized in:
Minnesota

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

# New Jersey Barrier with Rail

## Bicycle Rail Attachment to Safety Shape Concrete Rail



# New Jersey Barrier with Rail

## New Jersey Safety Shape Parapet

Height:
39"

Cost per linear foot:
$__

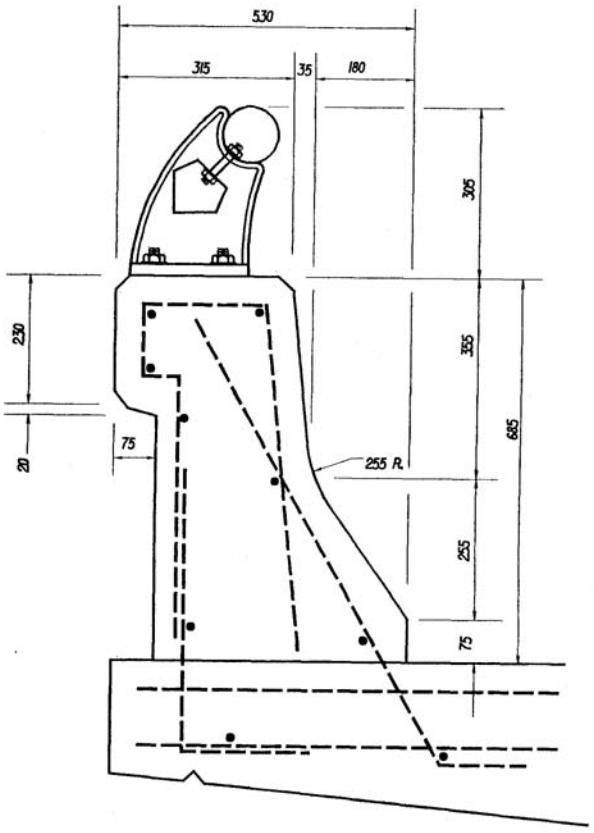
Test level:
TL-4

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 Barrier with Rail

## New Jersey Safety Shape Parapet




| | | | |
|---|---|---|---|
| Rail Height | | | 990 mm |
| Test Vehicle | 868-kg Car | 2111-kg Car | 18,160-kg Bus |
| Impact Speed km/h | 98 | 99 | 95 |
| Impact Angle Degrees | 19.3 | 24.9 | 16.4 |

All Dimensions Shown Are mm unless Otherwise Noted.

# New Jersey Barrier with Rail

## Type HT

Height:
50"

Cost per linear foot:
$95

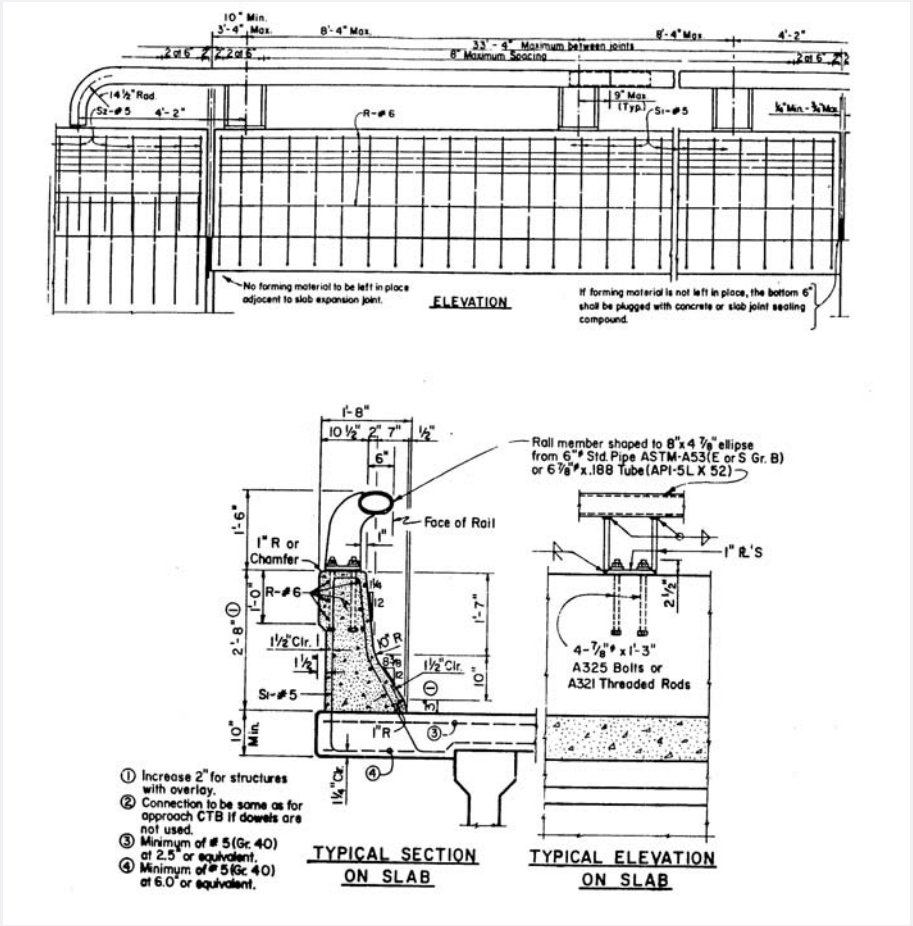
Test level:
TL-5

Utilized in:
Texas

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

# New Jersey Barrier with Rail

## 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

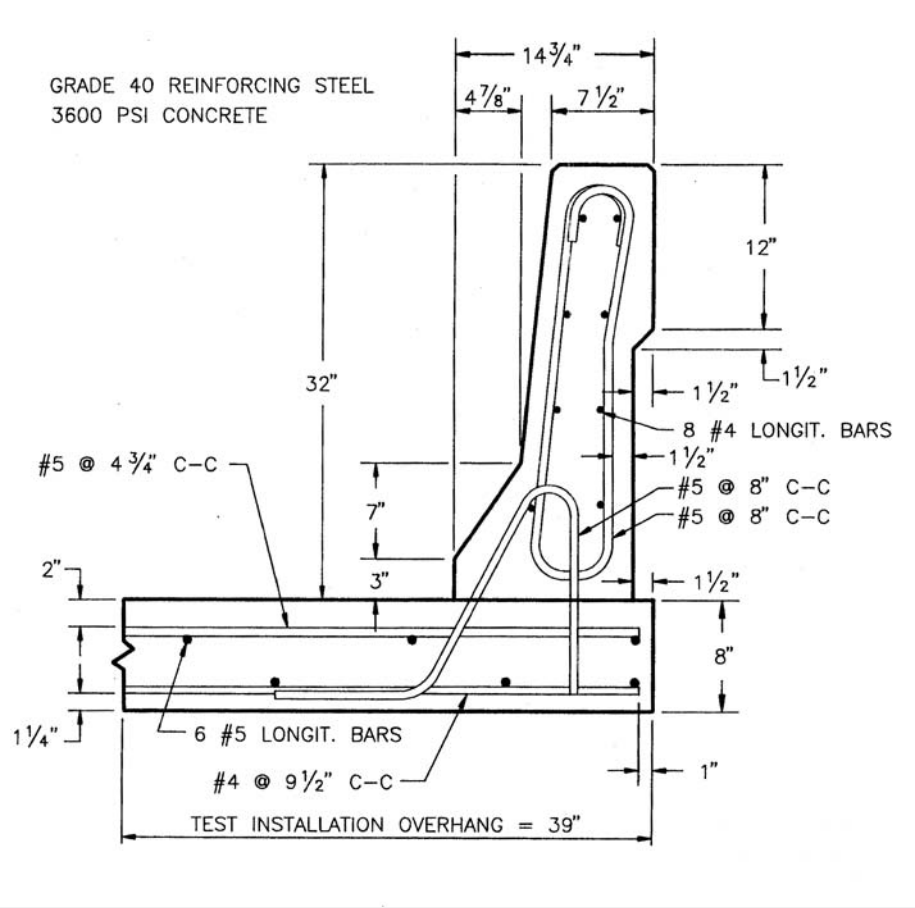
Test level:
TL-4

Utilized in:
Florida

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

# F-Shape Concrete Barrier/Single Slope

## 32" F-Shape



# F-Shape Concrete Barrier/Single Slope

## 42" F-Shape

Height:
42"

Cost per linear foot:
$45

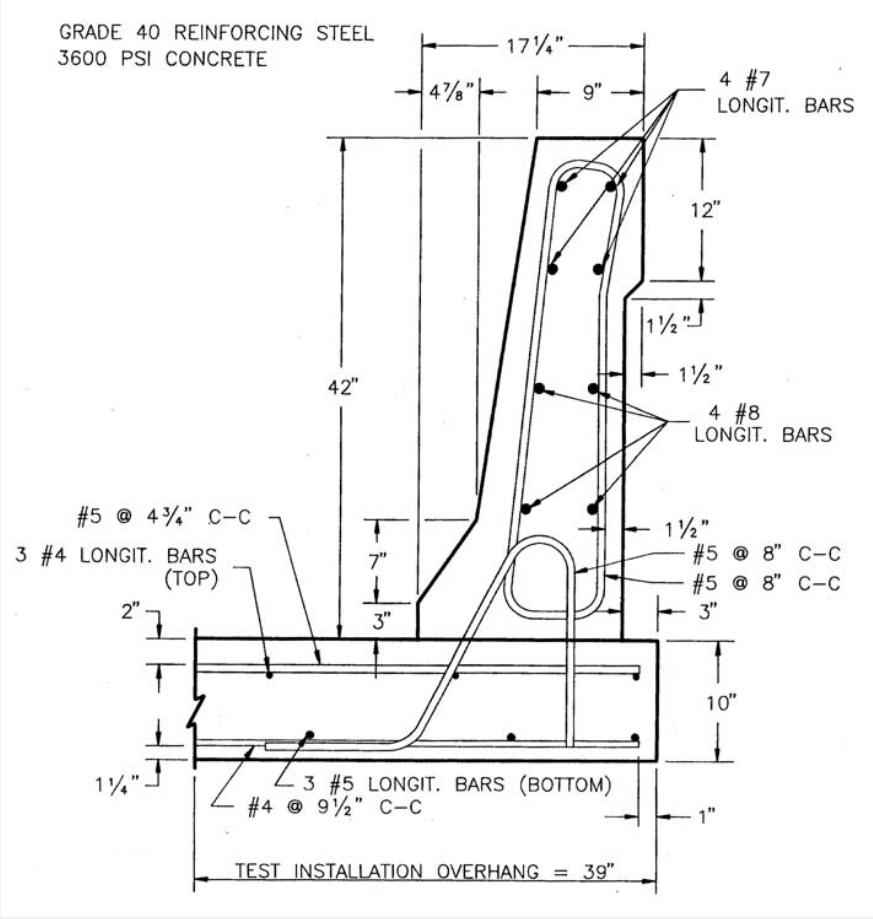
Test level:
TL-5

Utilized in:
Florida

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

# F-Shape Concrete Barrier/Single Slope

## 42" F-Shape



# F-Shape Concrete Barrier/Single Slope

## Soundwall/F-Shape

Height:
8'

Cost per linear foot:
$200

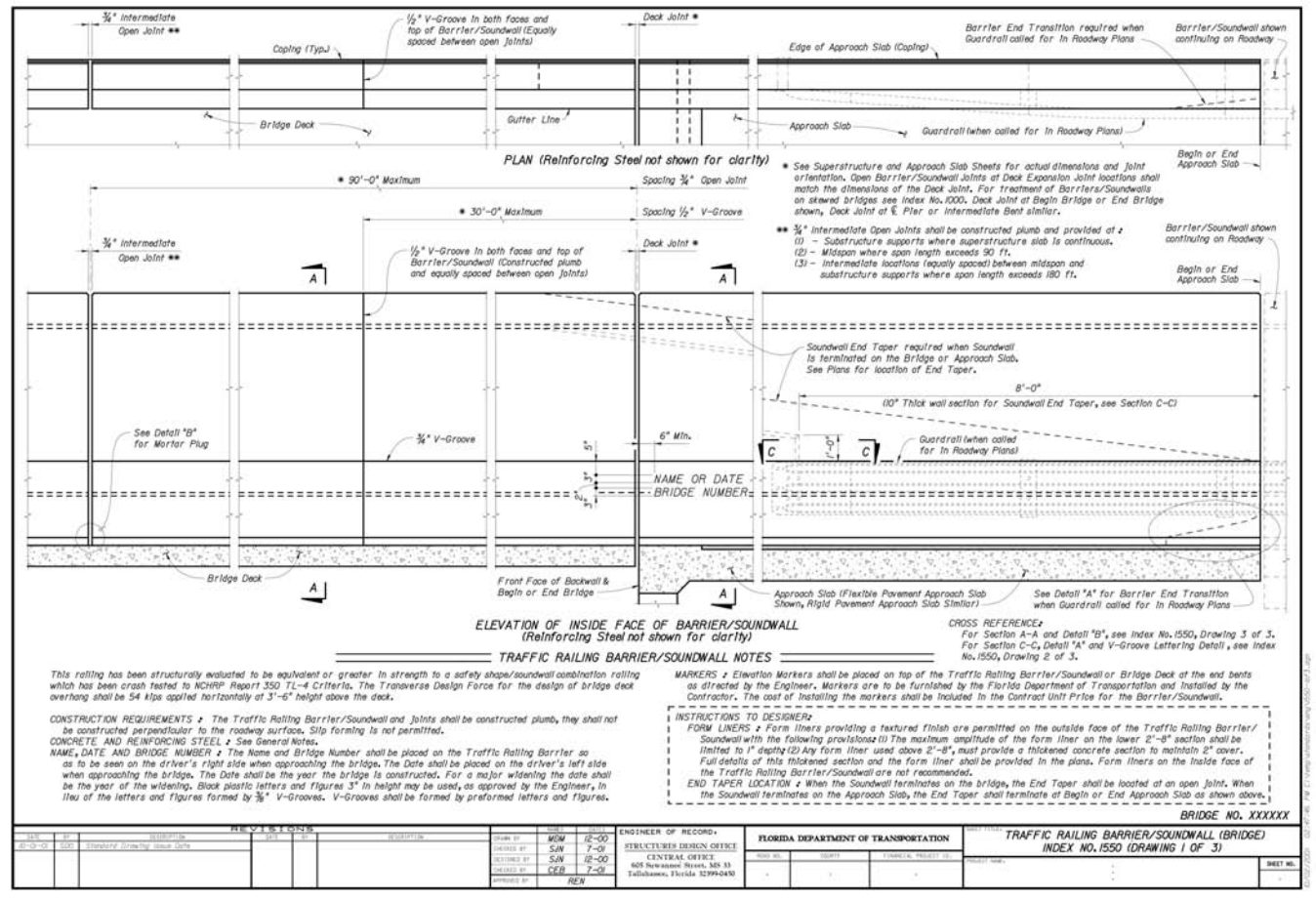
Test level:
TL-4

Utilized in:
Florida

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

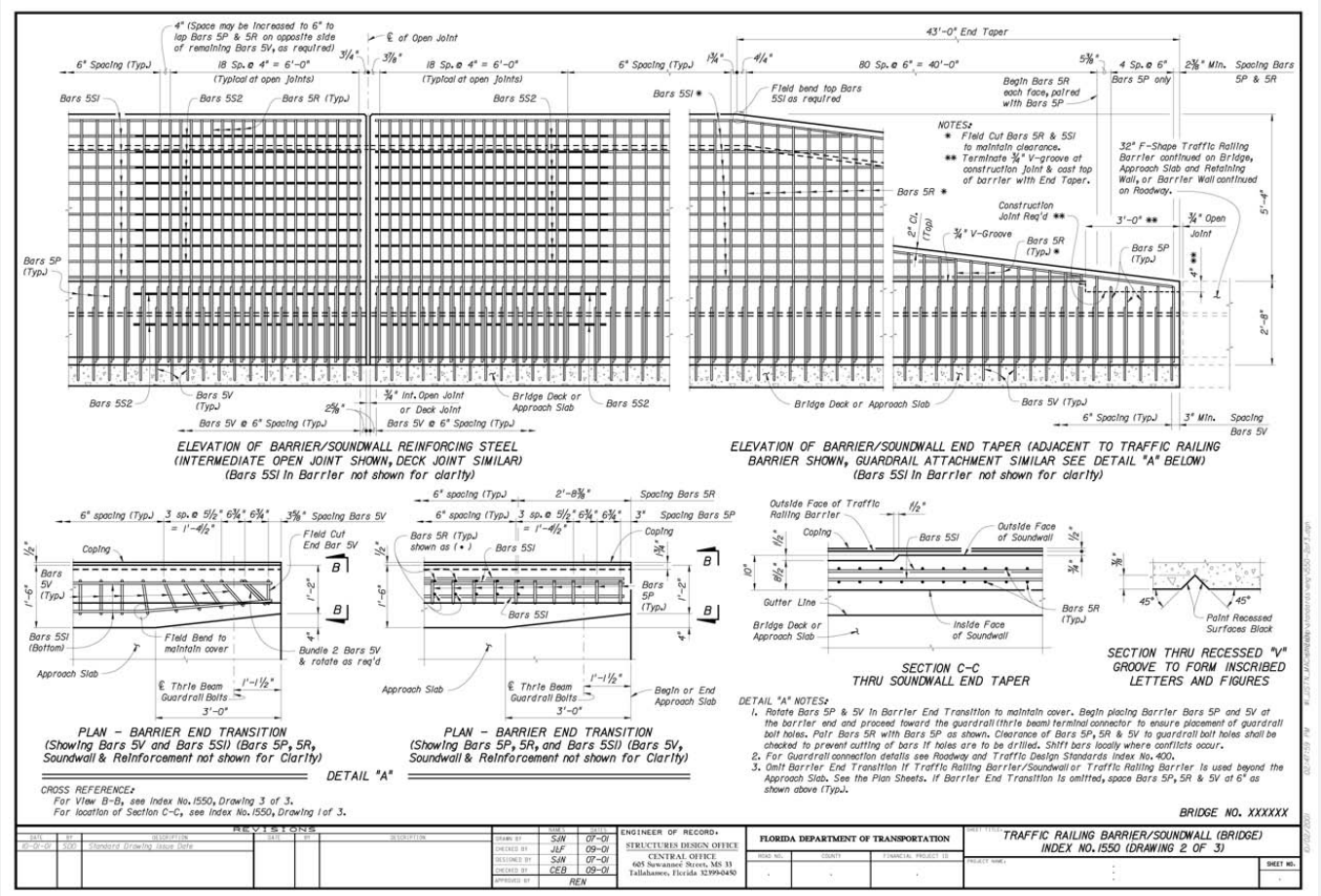
# F-Shape Concrete Barrier/Single Slope

## Soundwall/ F-Shape



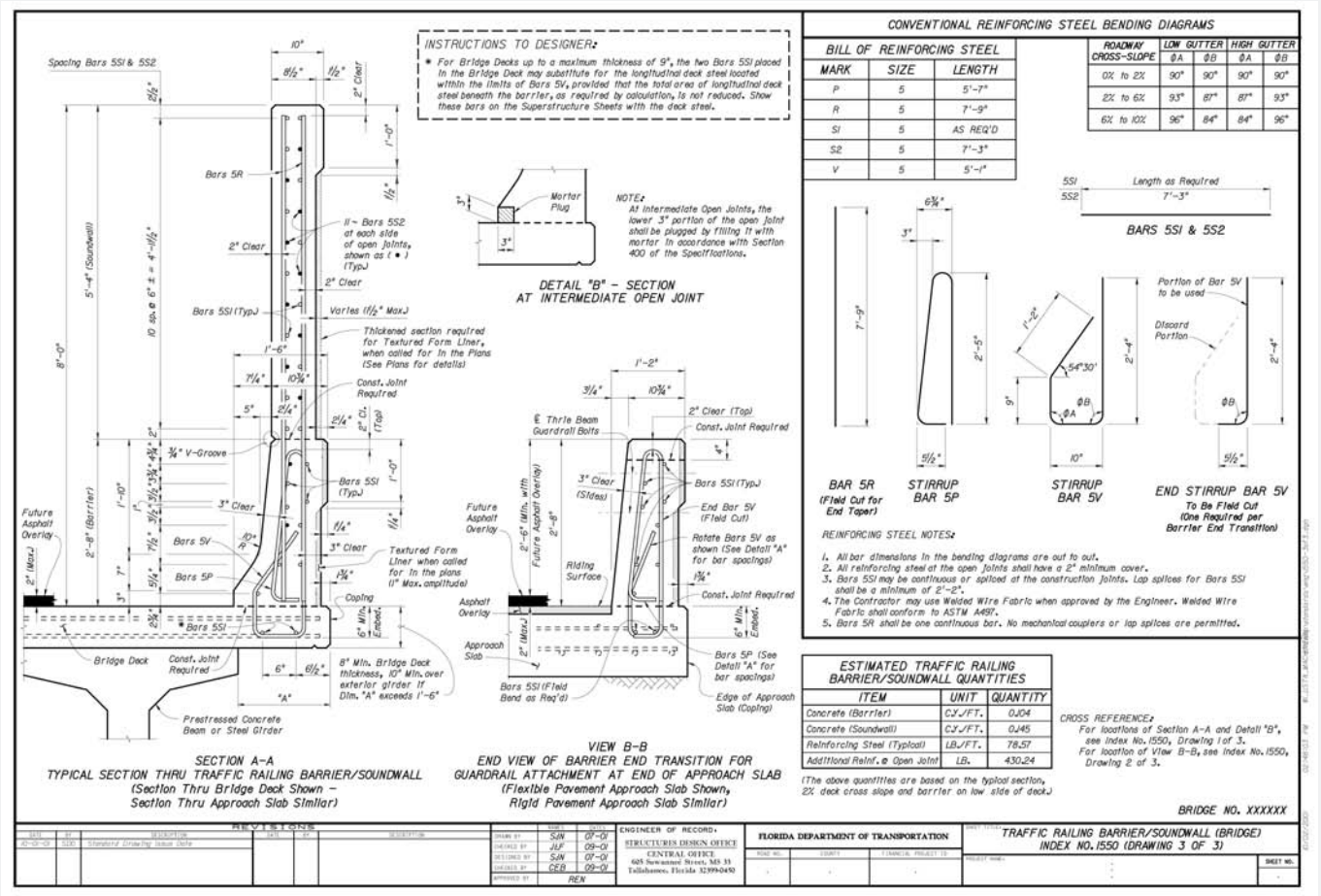
# F-Shape Concrete Barrier/Single Slope

## Soundwall/ F-Shape



# F-Shape Concrete Barrier/Single Slope

## Soundwall/ F-Shape



# F-Shape Concrete Barrier/Single Slope

## Vertical Face Guide, 34" Retrofit

Height:
34"

Cost per linear foot:
$40

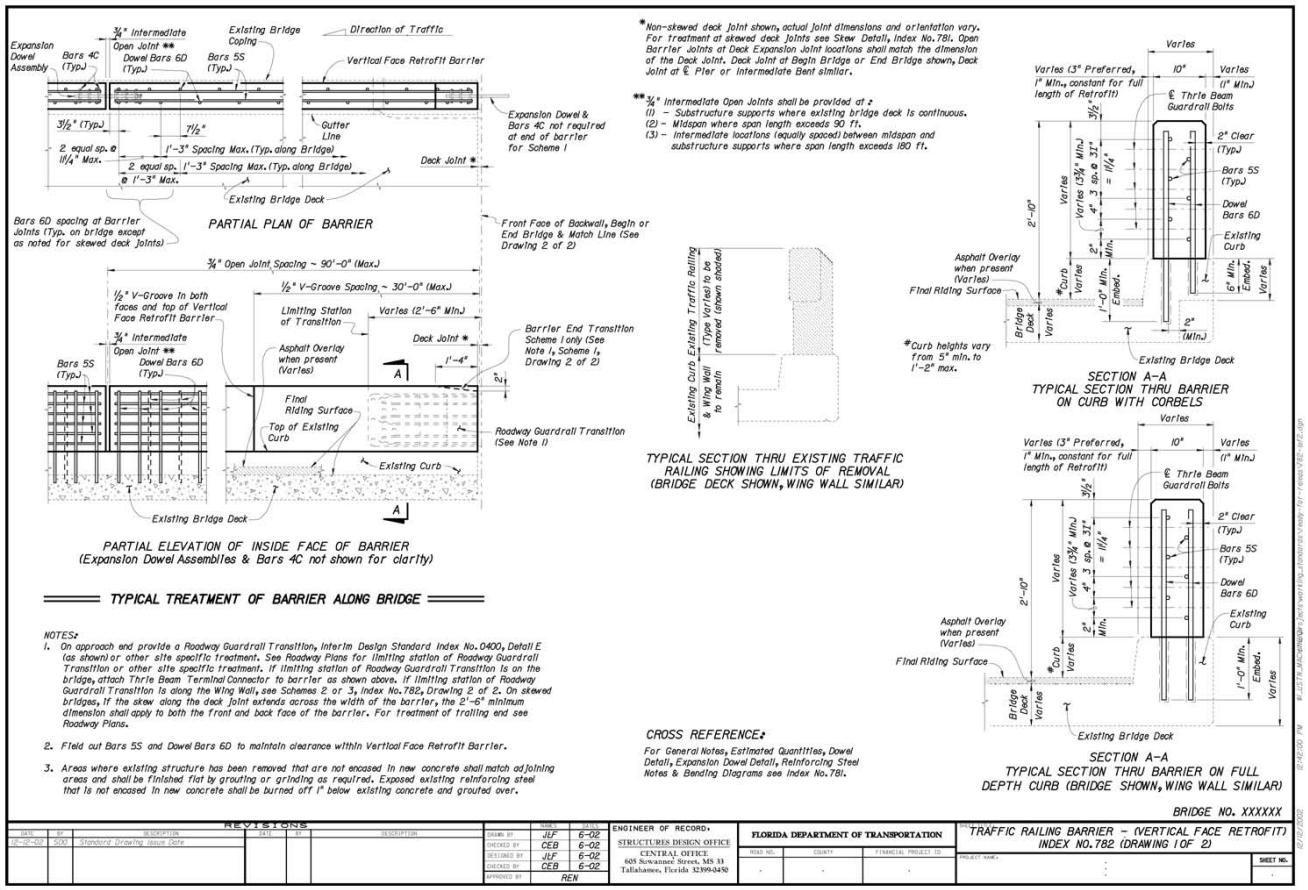
Test level:
TL-4

Utilized in:
Florida

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

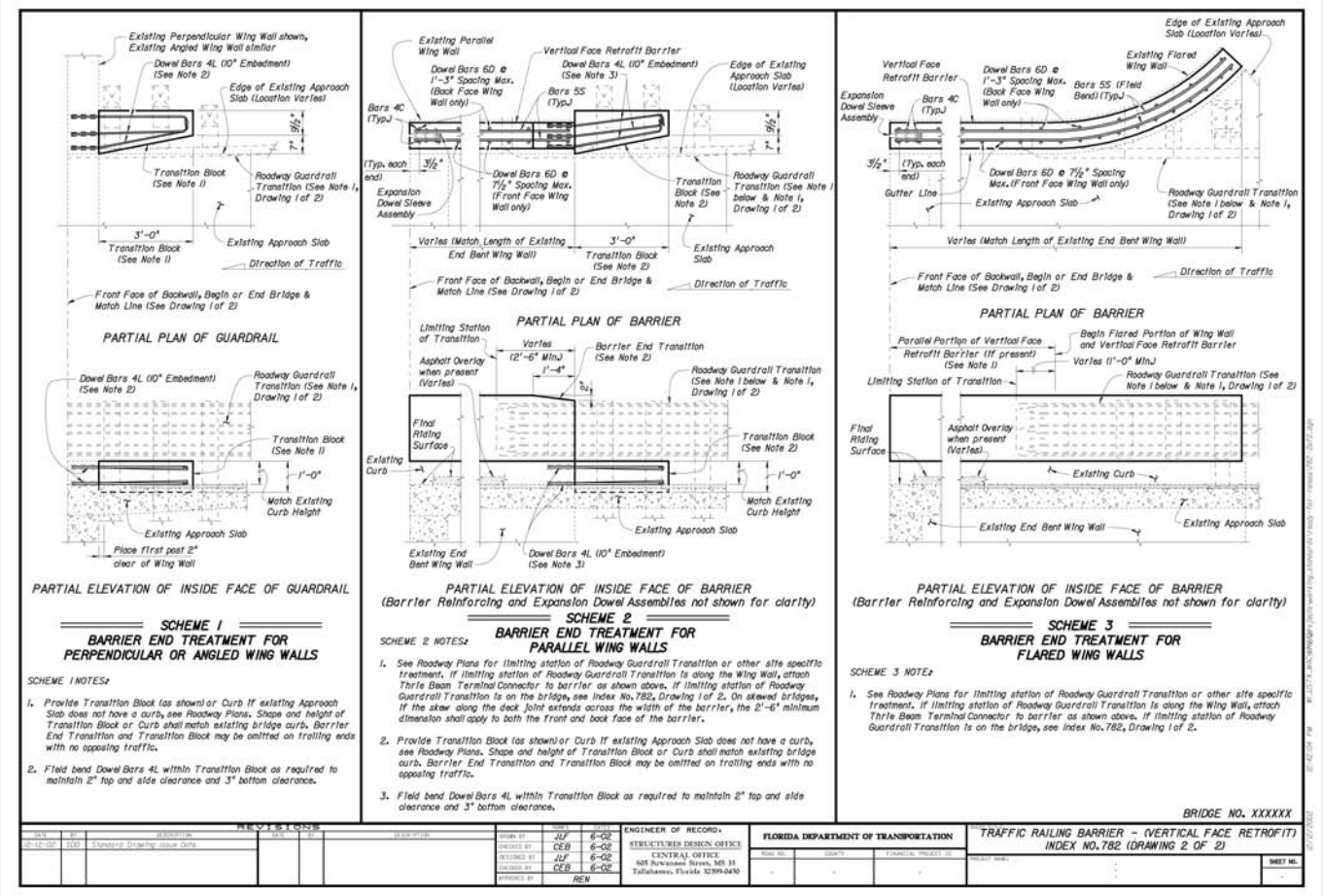
# F-Shape Concrete Barrier/Single Slope

## Vertical Face Guide, 34" Retrofit



# F-Shape Concrete Barrier/Single Slope

## Vertical Face Guide, 34" Retrofit



# F-Shape Concrete Barrier/Single Slope

## Vertical Face Guide, 42" Retrofit

Height:
42"

Cost per linear foot:
$55

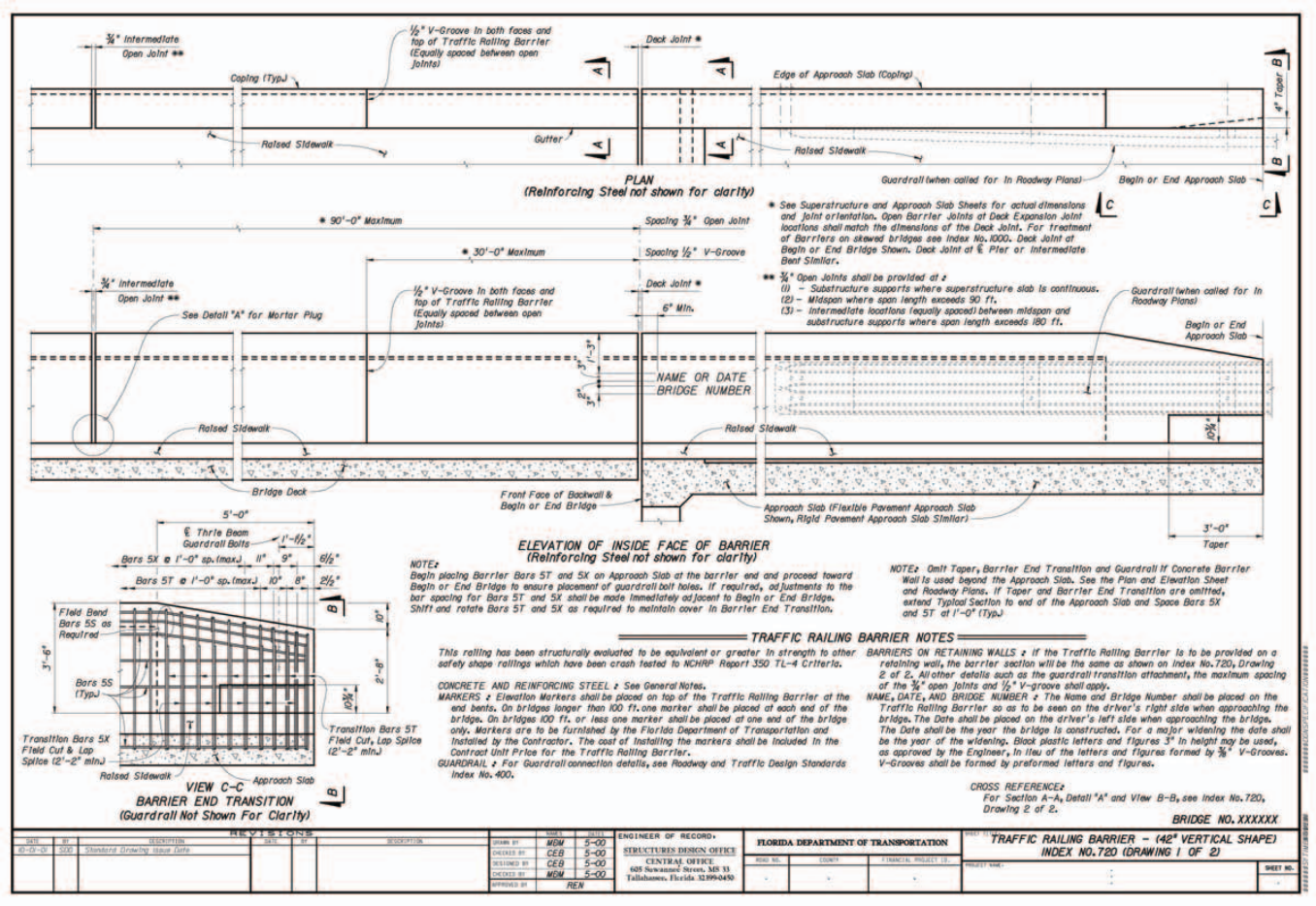
Test level:
TL-4

Utilized in:
Florida

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

# F-Shape Concrete Barrier/Single Slope

## 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 Bridge Rail

## Timber Rail 3 Bridge Rail

Height:
27"

Cost per linear foot:
$__

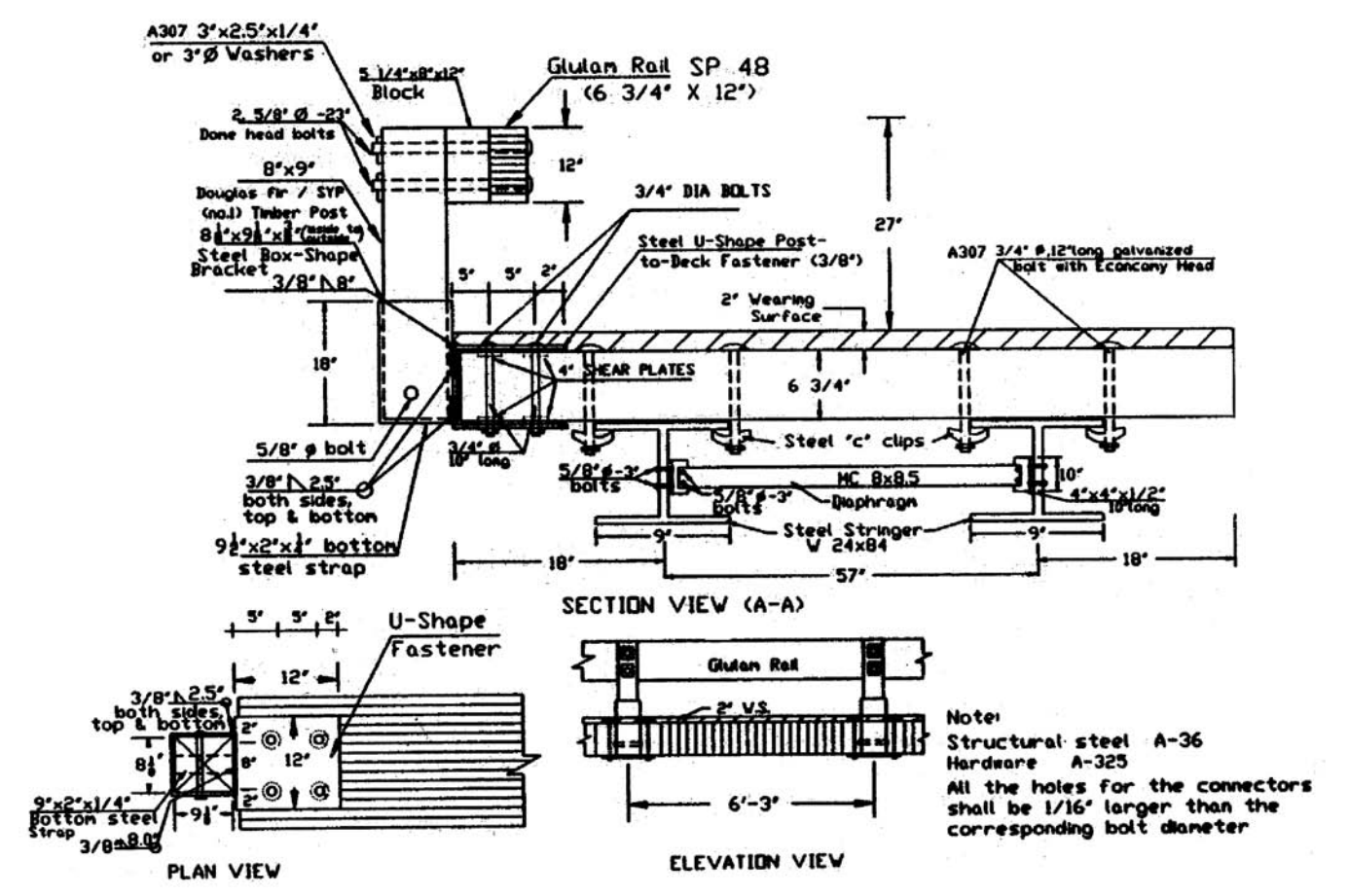
Test level:
TL-3

Utilized in:
__

Contact:
__

# Timber Bridge Rail

## Timber Rail 3 Bridge Rail



# Timber Bridge Rail

## Panel-Lam Timber Vehicle Bridge Rail

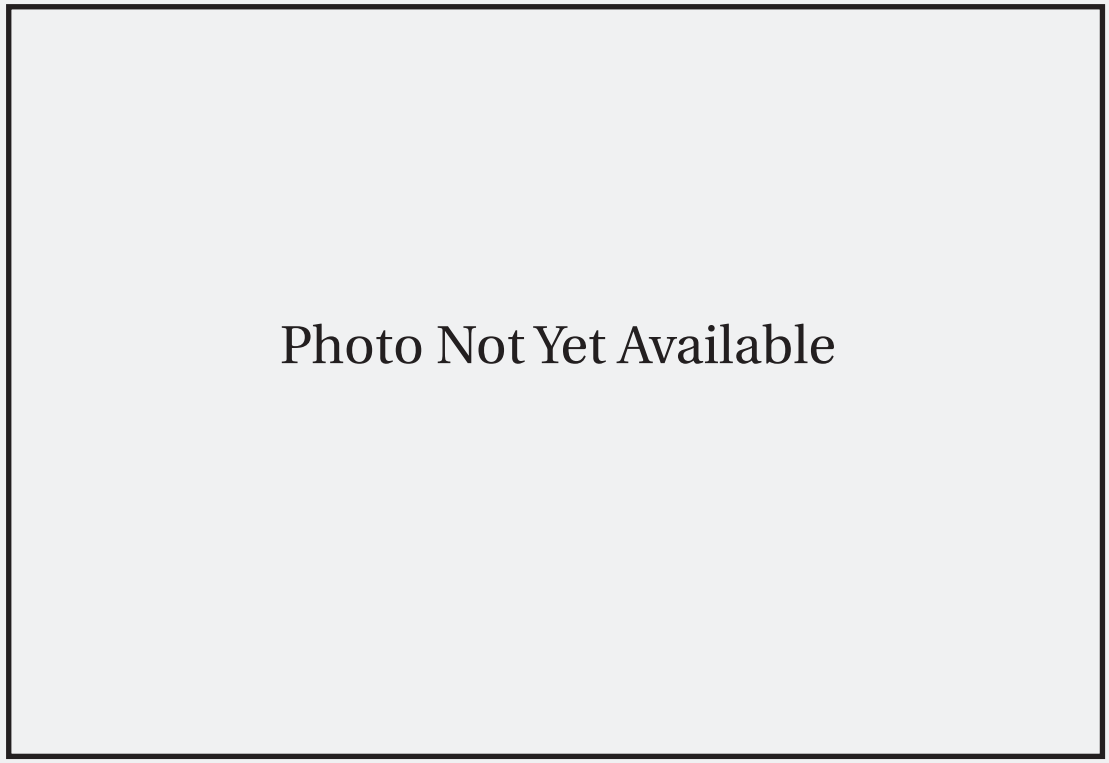
Height:
48"

Cost per linear foot:
$__

Test level:
___

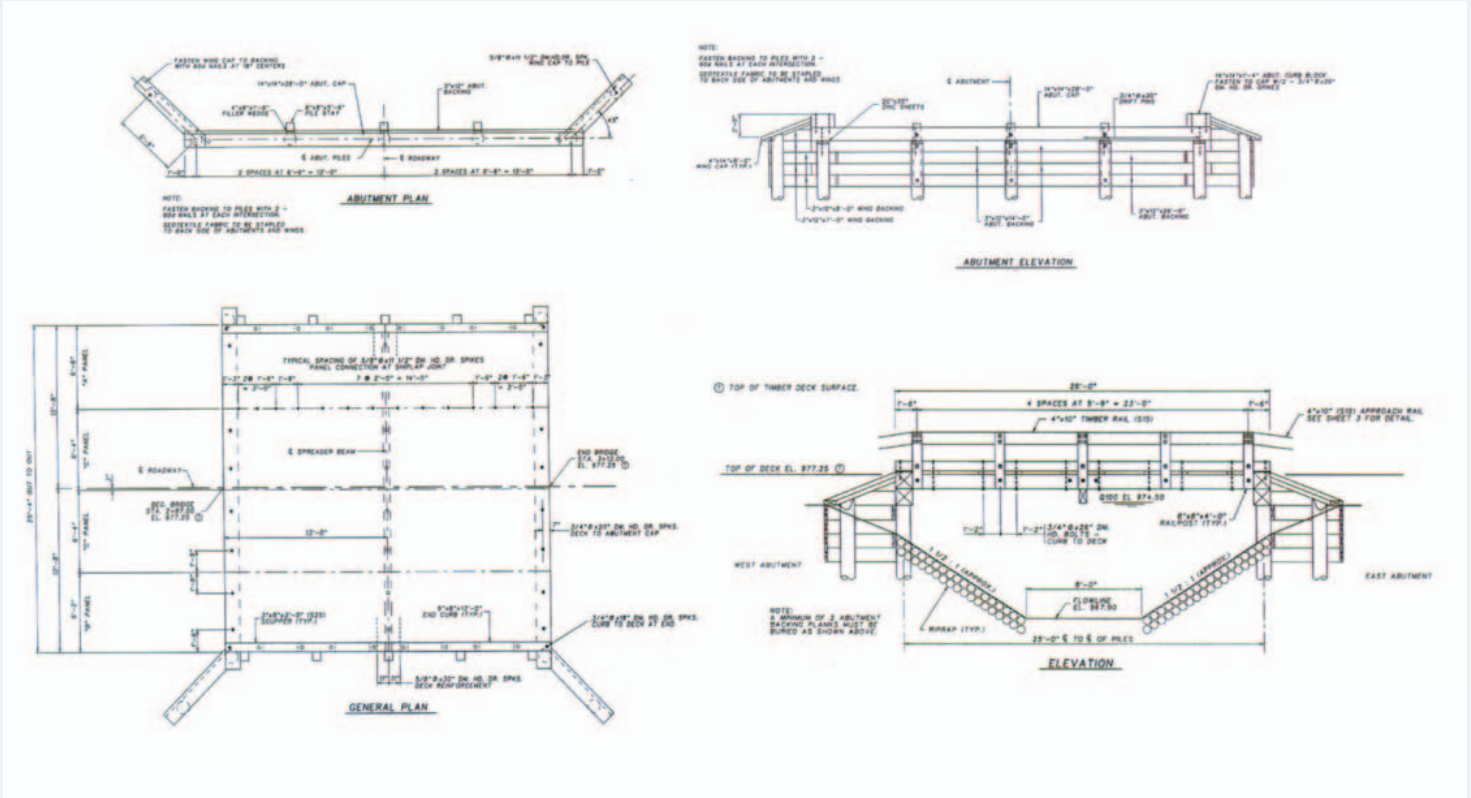
Utilized in:
_____

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



# Timber Bridge Rail

## Panel-Lam Timber Vehicle Bridge Rail



# Timber Bridge Rail

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

Height:
21"

Cost per linear foot:
$__

Test level:
TL-1

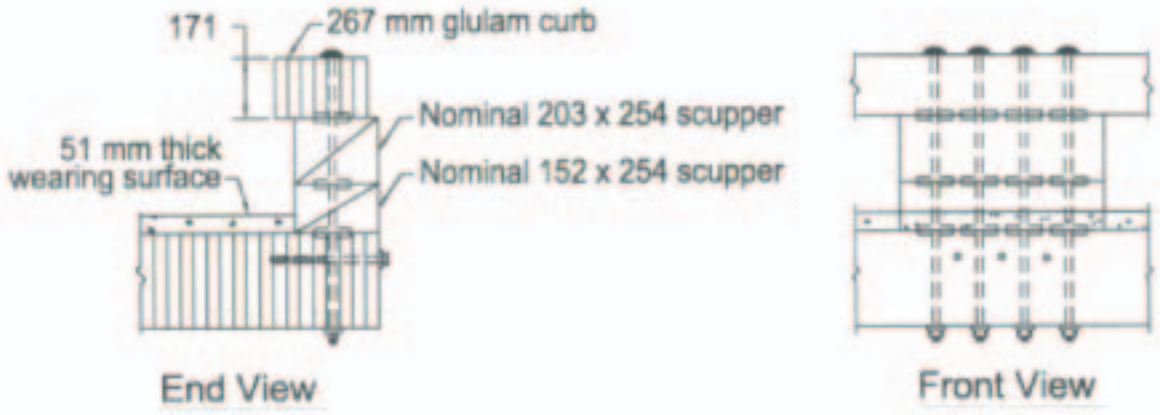
Utilized in:

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

# Timber Bridge Rail

## 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 glulam 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.

# Timber Bridge Rail

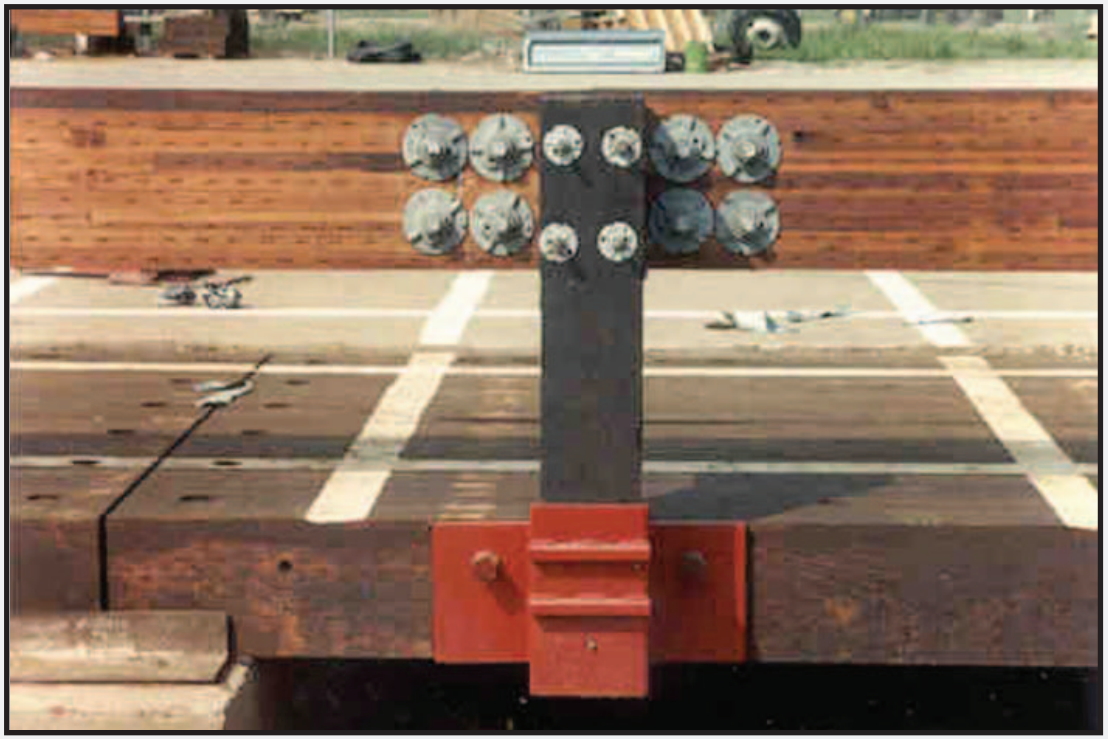
## Glu-Lam Rail with Steel Box Attachment, side mount

Height:
32"

Cost per linear foot:
$__

Test level:
TL-2

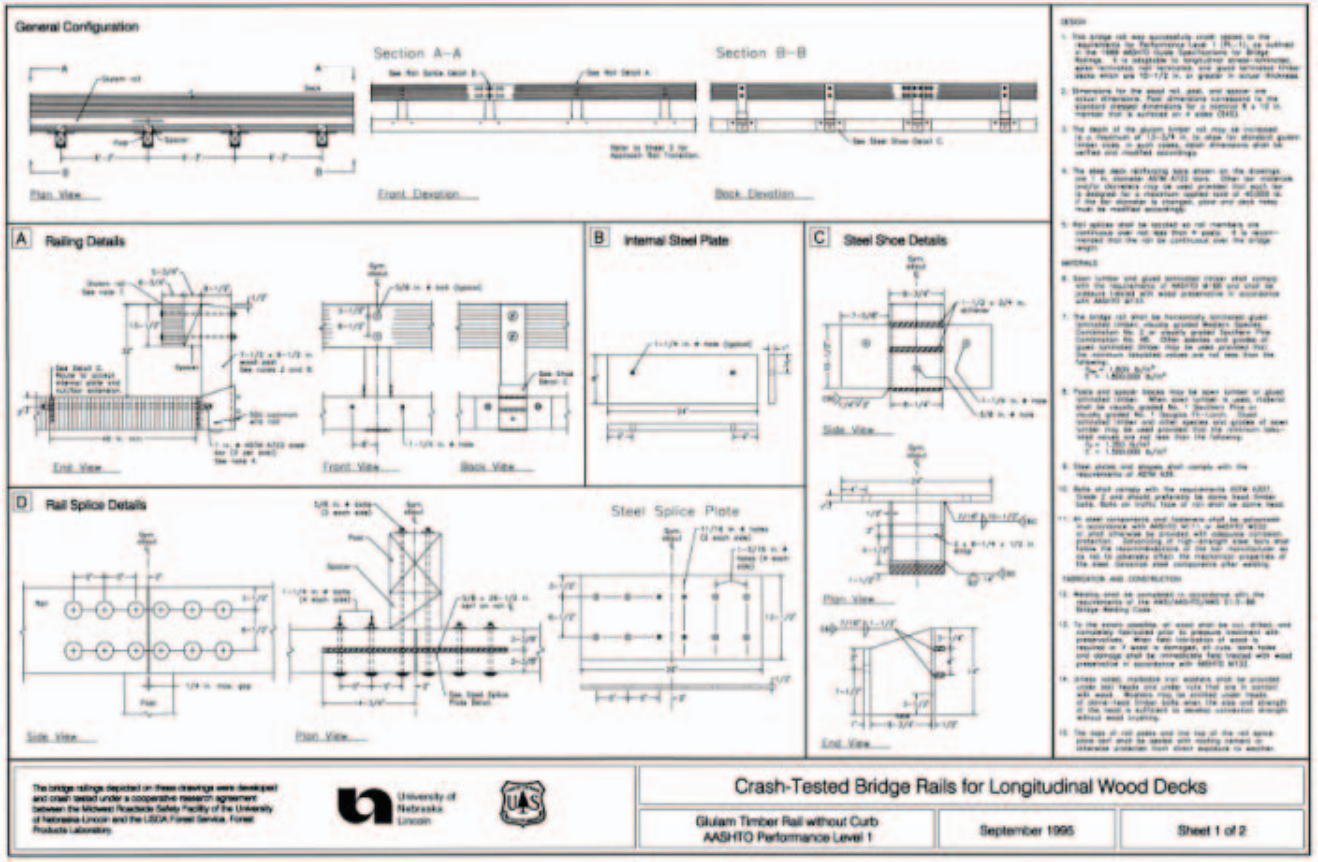
Utilized in:



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

# Timber Bridge Rail

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



# Timber Bridge Rail

## 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

# Timber Bridge Rail

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

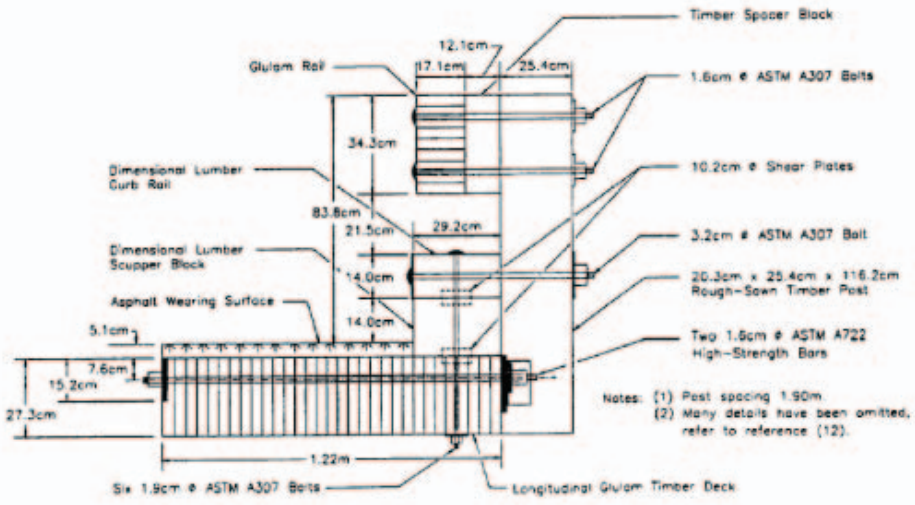
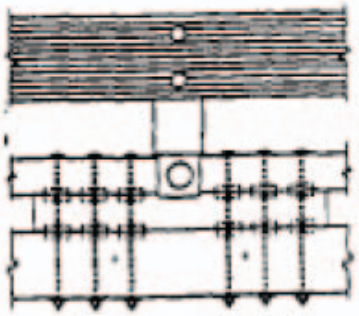



FIGURE 4 Glulam timber with curb bridge railing (GC-8000).



# Timber Bridge Rail

## Timber Curbs for Longitudinal Timber Decks

Height:
12"

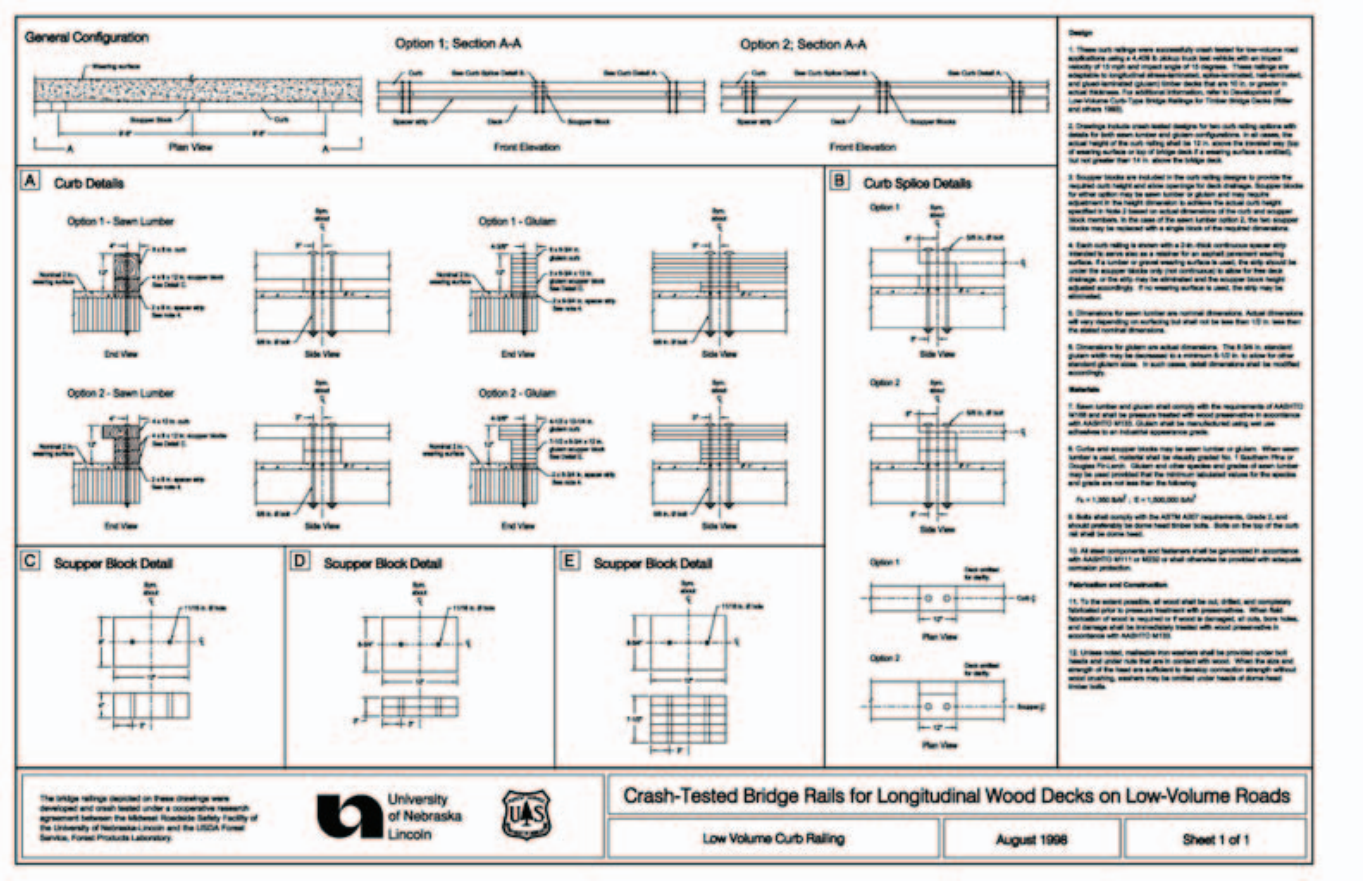
Cost per linear foot:
$__

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



# Timber Bridge Rail

## W-Beam Breakaway Timber Post Railing

Height:
29"

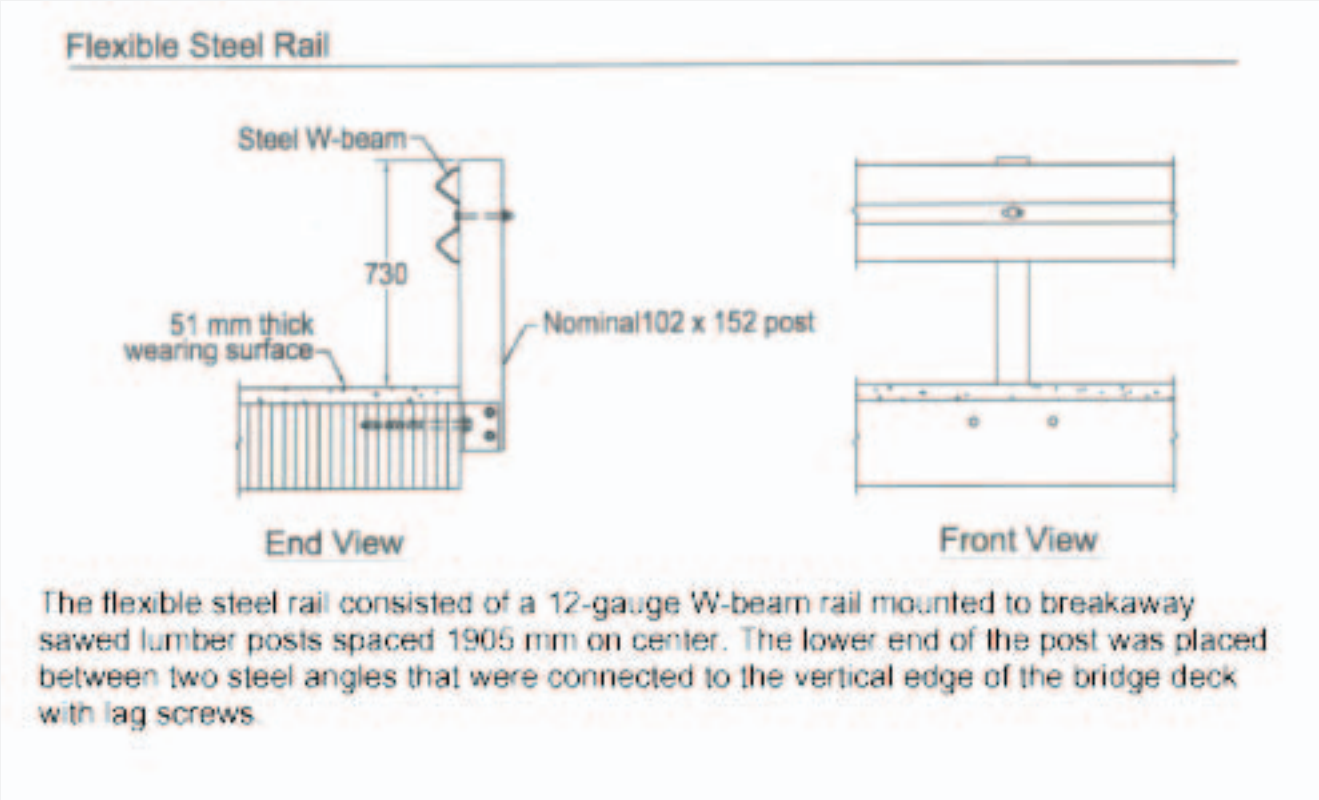
Cost per linear foot:
$__

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




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.

# Timber Bridge Rail

## Steel Thrie-Beam Rail, side mount

Height:
32"

Cost per linear foot:
$__

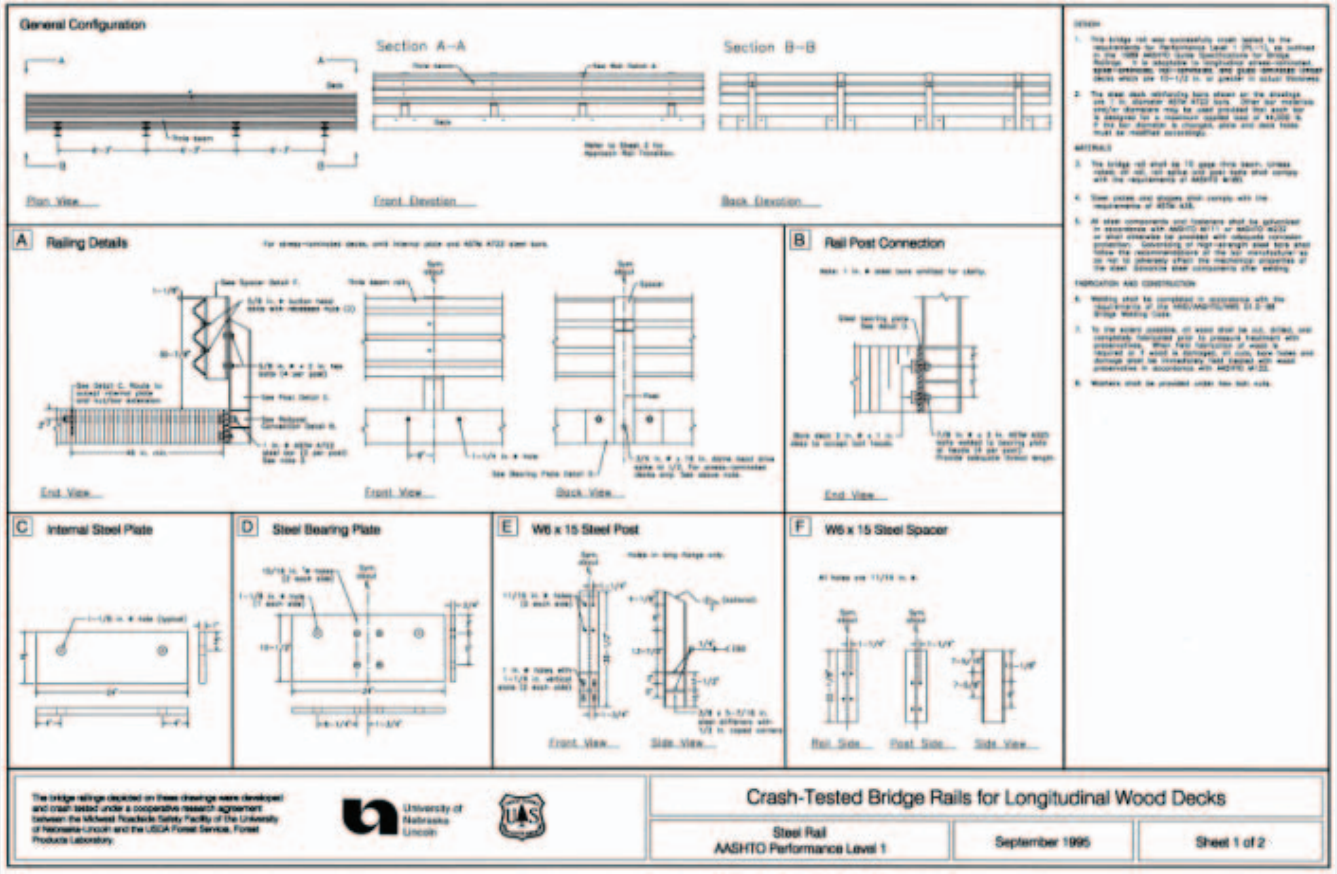
Test level:
TL-2

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

# Timber Bridge Rail

## Steel Thrie-Beam Rail, side mount



# Timber Bridge Rail

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

Height:
33"

Cost per linear foot:
$__

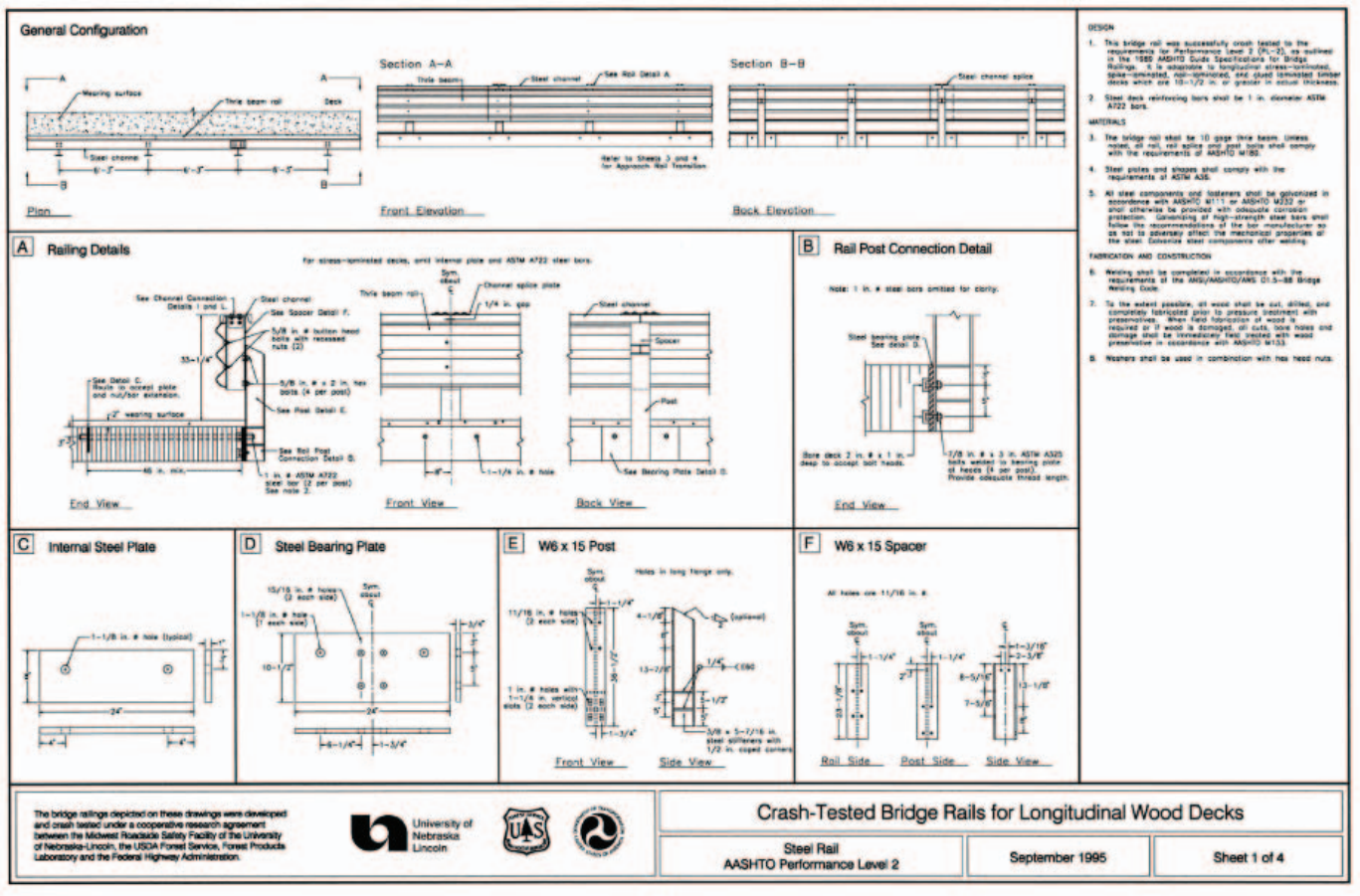
Test level:
TL-4

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

# Timber Bridge Rail

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



# Timber Bridge Rail

## W-Beam Breakaway Steel Post Railing

Height:
41"

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

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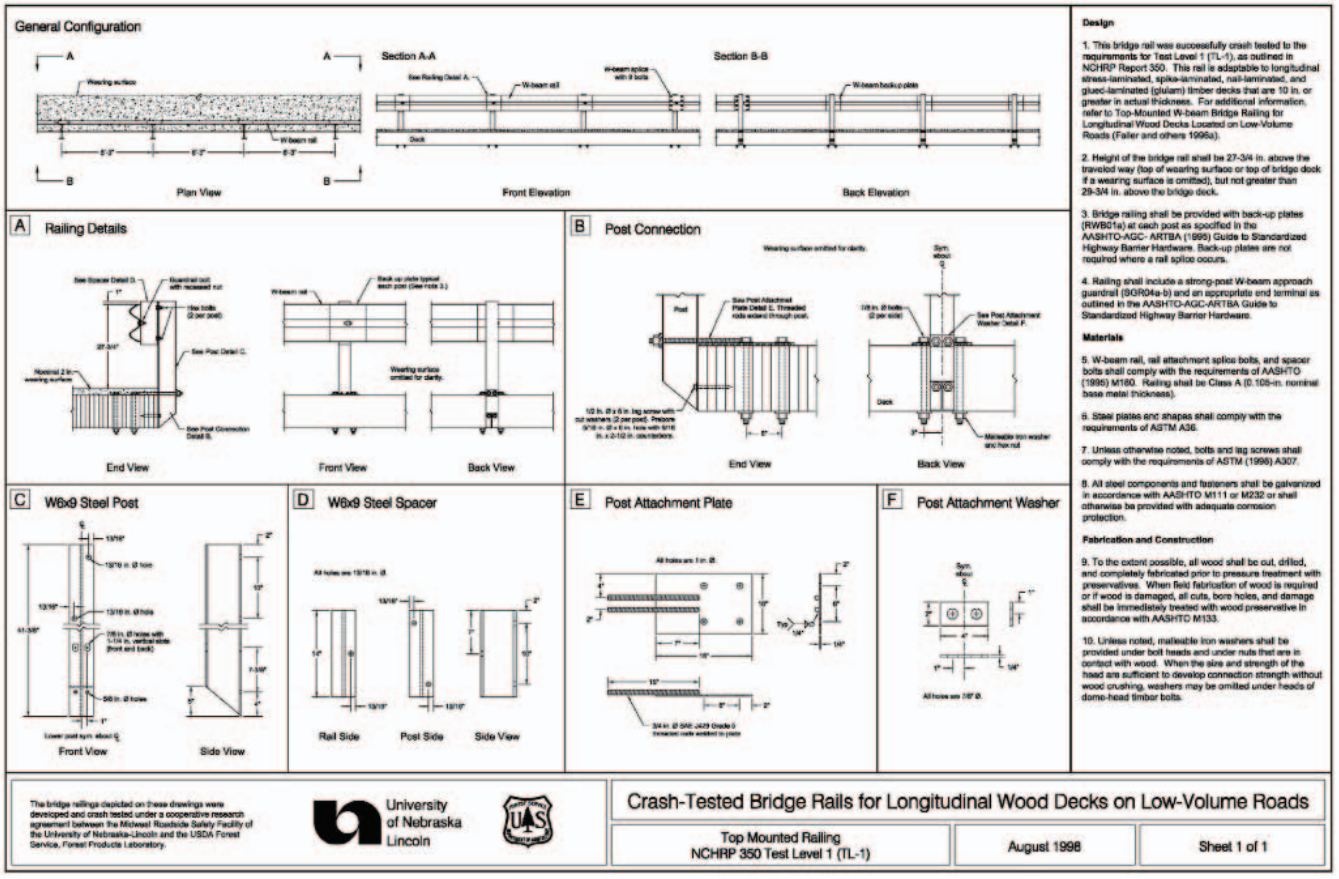

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