

December 7, 2020



U.S. Department
of Transportation
**Federal Highway
Administration**

1200 New Jersey Ave., SE
Washington, D.C. 20590

In Reply Refer To:
HSST-1/B-351

Shawn Yu, Standards Engineer
Colorado Department of Transportation
2829 W. Howard Place, Room 309p
Denver, CO 80204

Dear Mr. Yu:

This letter is in response to your October 12, 2020 request for the Federal Highway Administration (FHWA) to review a roadside safety device, hardware, or system for eligibility for reimbursement under the Federal-aid highway program. This FHWA letter of eligibility is assigned FHWA control number B-351 and is valid until a subsequent letter is issued by FHWA that expressly references this device.

Decision

The following device is eligible within the length-of-need, with details provided in the form which is attached as an integral part of this letter:

- Colorado Type 10 Bridge Rail

Scope of this Letter

To be found eligible for Federal-aid funding, new roadside safety devices should meet the crash test and evaluation criteria contained in the American Association of State Highway and Transportation Officials' (AASHTO) Manual for Assessing Safety Hardware (MASH). However, the FHWA, the Department of Transportation, and the United States Government do not regulate the manufacture of roadside safety devices. Eligibility for reimbursement under the Federal-aid highway program does not establish approval, certification or endorsement of the device for any particular purpose or use.

This letter is not a determination by the FHWA, the Department of Transportation, or the United States Government that a vehicle crash involving the device will result in any particular outcome, nor is it a guarantee of the in-service performance of this device. Proper manufacturing, installation, and maintenance are required in order for this device to function as tested.

This finding of eligibility is limited to the crashworthiness of the system and does not cover other structural features, nor conformity with the Manual on Uniform Traffic Control Devices.

Eligibility for Reimbursement

Based solely on a review of crash test results and certifications submitted by the manufacturer, and the crash test laboratory, FHWA agrees that the device described herein meets the crash test and evaluation criteria of the AASHTO's MASH. Therefore, the device is eligible for reimbursement under the Federal-aid highway program if installed under the range of tested conditions.

Name of system: Colorado Type 10 Bridge Rail
Type of system: Longitudinal Barrier
Test Level: TL4
Testing conducted by: Texas A&M Transportation Institute
Date of request: October 12, 2020

FHWA concurs with the recommendation of the accredited crash testing laboratory on the attached form.

Full Description of the Eligible Device

The device and supporting documentation, including reports of the crash tests or other testing done, videos of any crash testing, and/or drawings of the device, are described in the attached form.

Notice

This eligibility letter is issued for the subject device as tested. Modifications made to the device are not covered by this letter. Any modifications to this device should be submitted to the user (i.e., state DOT) as per their requirements.

You are expected to supply potential users with sufficient information on design, installation and maintenance requirements to ensure proper performance.

You are expected to certify to potential users that the hardware furnished has the same chemistry, mechanical properties, and geometry as that submitted for review, and that it will meet the test and evaluation criteria of AASHTO's MASH.

Issuance of this letter does not convey property rights of any sort or any exclusive privilege. This letter is based on the premise that information and reports submitted by you are accurate and correct. We reserve the right to modify or revoke this letter if: (1) there are any inaccuracies in the information submitted in support of your request for this letter, (2) the qualification testing was flawed, (3) in-service performance or other information reveals safety problems, (4) the system is significantly different from the version that was crash tested, or (5) any other information indicates that the letter was issued in error or otherwise does not reflect full and complete information about the crashworthiness of the system.

Standard Provisions

- To prevent misunderstanding by others, this letter of eligibility designated as FHWA control number B-351 shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed upon request.
- This letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder.
- This FHWA eligibility letter is not an expression of any Agency view, position, or determination of validity, scope, or ownership of any intellectual property rights to a specific device or design. Further, this letter does not impute any distribution or licensing rights to the requester. This FHWA eligibility letter determination is made based solely on the crash-testing information submitted by the requester. The FHWA reserves the right to review and revoke an earlier eligibility determination after receipt of subsequent information related to crash testing.

Sincerely,

A handwritten signature in blue ink that reads "Michael S. Griffith". The signature is written in a cursive style with a large initial "M" and "G".

Michael S. Griffith
Director, Office of Safety Technologies
Office of Safety

Enclosures

Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

| | | | |
|------------------|--|--|---|
| Submitter | Date of Request: | October 12, 2020 | <input checked="" type="radio"/> New <input type="radio"/> Resubmission |
| | Name: | Roger Bligh | |
| | Company: | Texas A&M Transportation Institute | |
| | Address: | 1254 Avenue A, Bldg 7091, Bryan, Texas 77807 | |
| | Country: | U.S.A. | |
| To: | Michael S. Griffith, Director FHWA, Office of Safety Technologies | | |

I request the following devices be considered eligible for reimbursement under the Federal-aid highway program.

Device & Testing Criterion - Enter from right to left starting with Test Level

| System Type | Submission Type | Device Name / Variant | Testing Criterion | Test Level |
|--------------------------------|---|------------------------------|-------------------|------------|
| 'B': Rigid/Semi-Rigid Barriers | <input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis | Colorado Type 10 Bridge Rail | AASHTO MASH | TL4 |

By submitting this request for review and evaluation by the Federal Highway Administration, I certify that the product(s) was (were) tested in conformity with the AASHTO Manual for Assessing Safety Hardware and that the evaluation results meet the appropriate evaluation criteria in the MASH.

Individual or Organization responsible for the product:

| | | |
|---------------|---|--|
| Contact Name: | Shawn Yu, Standards Engineer | Same as Submitter <input type="checkbox"/> |
| Company Name: | Colorado Department of Transportation | Same as Submitter <input type="checkbox"/> |
| Address: | 2829 W. Howard Pl., Room 309p, Denver, CO 80204 | Same as Submitter <input type="checkbox"/> |
| Country: | U.S.A. | Same as Submitter <input type="checkbox"/> |

Enter below all disclosures of financial interests as required by the FHWA 'Federal-Aid Reimbursement Eligibility Process for Safety Hardware Devices' document.

Texas A&M Transportation Institute (TTI) was contracted by Colorado Department of Transportation to perform full-scale crash testing of the Colorado Type 10 Bridge Rail. There are no shared financial interests in the Colorado Type 10 Bridge Rail by TTI, or between Colorado Department of Transportation and TTI, other than costs involved in the actual crash tests and reports for this submission to FHWA.

609761-01-3.4.5

PRODUCT DESCRIPTION

New Hardware or Significant Modification
 Modification to Existing Hardware

The Type 10 Bridge Rail installation consists of two tubular steel rails attached to steel posts mounted on a concrete parapet. The concrete parapet is 18 inches wide at the bottom, tapering up on the traffic side to a top width of 16¾ inches. In the tested configurations, a 3-inch thick lift of asphalt covered the bottom 3 inches of the concrete parapet, which extends 10 inches above grade. W6x20 steel posts are mounted on top of the concrete parapet at a 10 ft spacing. Two HSS6x6x¼ steel rails are attached to the posts at heights of 25 inches and 40 inches above the road surface. The rails are spliced using 5¼-inch square, 5/16-inch thick, 36-inch long fabricated steel tubular sections with a 6 inch distance between the adjacent rail sections.

CRASH TESTING

By signature below, the Engineer affiliated with the testing laboratory, agrees in support of this submission that all of the critical and relevant crash tests for this device listed above were conducted to meet the MASH test criteria. The Engineer has determined that no other crash tests are necessary to determine the device meets the MASH criteria.

| | | |
|---------------------|--|--|
| Engineer Name: | Roger Bligh | |
| Engineer Signature: | Roger Bligh | Digitally signed by Roger Bligh Date: 2020.10.09 13:43:03 -05'00' |
| Address: | 1254 Avenue A, Bldg 7091, Bryan, Texas 77807 | Same as Submitter <input checked="" type="checkbox"/> |
| Country: | U.S.A. | Same as Submitter <input checked="" type="checkbox"/> |

A brief description of each crash test and its result:

| Required Test Number | Narrative Description | Evaluation Results |
|----------------------|---|--------------------|
| 4-10 (1100C) | The results of test 609761-01-5 conducted on May 15, 2020 are found in TTIR report No. 609761-01-3-5. The Type 10 bridge rail successfully contained and redirected the 1100C vehicle. The vehicle did not penetrate, underide, or override the installation. No detached elements, fragments, or other debris were present to penetrate or show potential for penetrating the occupant compartment, or to present undue hazard to others in the area. Maximum dynamic lateral deflection of the rail during the test was 2.2 inches. The vehicle remained upright during and after the collision event. Maximum roll and pitch angles were 7° and 4°, respectively. Occupant risk indices (occupant impact velocity and ridedown accelerations) were below the preferred values of MASH. Maximum occupant compartment deformation was 4.0 inches in the kick panel area. The test satisfied all relevant MASH criteria. | PASS |

| Required Test Number | Narrative Description | Evaluation Results |
|----------------------|---|----------------------------------|
| 4-11 (2270P) | <p>The results of test 609761-01-4 conducted on May 13, 2020 are found in TTIReport No. 609761-01-3-5. The Type 10 bridge rail successfully contained and redirected the 2270P vehicle. The vehicle did not penetrate, underride, or override the installation. No detached elements, fragments, or other debris were present to penetrate or show potential for penetrating the occupant compartment, or to present undue hazard to others in the area.</p> <p>Maximum dynamic lateral deflection of the rail during the test was 6.0 inches. The vehicle remained upright during and after the collision event. Maximum roll and pitch angles were 50° and 15°, respectively. Occupant risk indices (occupant impact velocity and ridedown accelerations) were below the preferred values of MASH. Maximum occupant compartment deformation was 3.0 inches in the firewall area. The test satisfied all relevant MASH criteria.</p> | PASS |
| 4-12 (10000S) | <p>The results of test 609761-01-3 conducted on May 11, 2020 are found in TTIReport No. 609761-01-3-5. The Type 10 bridge rail successfully contained and redirected the 10000S vehicle. The vehicle did not penetrate, underride, or override the installation. No detached elements, fragments, or other debris were present to penetrate or show potential for penetrating the occupant compartment, or to present undue hazard to others in the area.</p> <p>Maximum dynamic lateral deflection of the rail during the test was 2.9 inches. The vehicle remained upright during and after the collision event. Maximum occupant compartment deformation was 5.75 inches in the floor pan. The test satisfied all relevant MASH criteria.</p> | PASS |
| 4-20 (1100C) | MASH2016 Test Designation 4-20 evaluates transitions. The Colorado DOT Type 10 bridge rail is not a transition; therefore, this test is not relevant. | Non-Relevant Test, not conducted |
| 4-21 (2270P) | MASH2016 Test Designation 4-21 evaluates transitions. The Colorado DOT Type 10 bridge rail is not a transition; therefore, this test is not relevant. | Non-Relevant Test, not conducted |
| 4-22 (10000S) | MASH2016 Test Designation 4-22 evaluates transitions. The Colorado DOT Type 10 bridge rail is not a transition; therefore, this test is not relevant. | Non-Relevant Test, not conducted |

Full Scale Crash Testing was done in compliance with MASH by the following accredited crash test laboratory (cite the laboratory's accreditation status as noted in the crash test reports.):

| | | |
|--|---|--|
| Laboratory Name: | Texas A&M Transportation Insitute | |
| Laboratory Signature: | Digitally signed by Darrell L. Kuhn 'Date: 2020.10.09 17:33:30 -05'00'  | |
| Address: | 1254 Avenue A, Bldg 7091, Bryan, Texas 77807 | Same as Submitter <input type="checkbox"/> |
| Country: | U.S.A. | Same as Submitter <input type="checkbox"/> |
| Accreditation Certificate Number and Dates of current Accreditation period : | ISO 17025-2017 Laboratory A2LA Certificate Number: 2821.01 Valid To: April 30, 2021 | |

Submitter Signature*: **Roger Bligh**  Digitally signed by Roger Bligh
Date: 2020.10.09 13:43:28 -05'00'

Submit Form

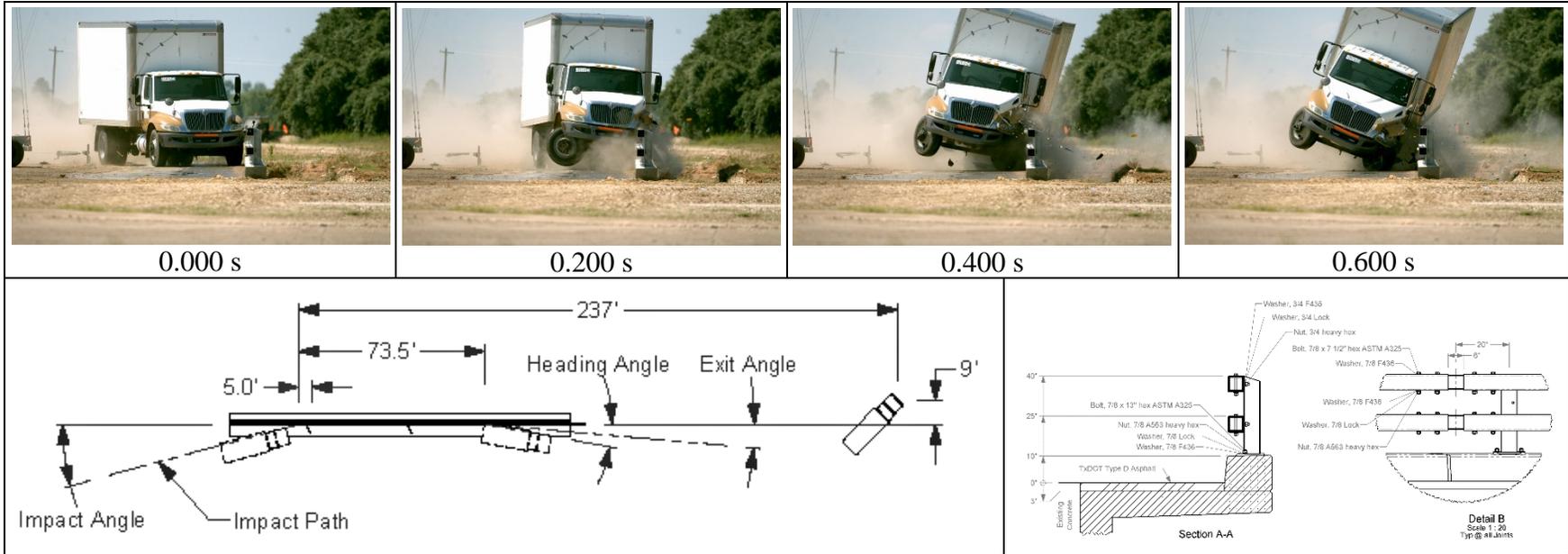
ATTACHMENTS

Attach to this form:

- 1) Additional disclosures of related financial interest as indicated above.
- 2) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
- 3) A drawing or drawings of the device(s) that conform to the Task Force-13 Drawing Specifications [[Hardware Guide Drawing Standards](#)]. For proprietary products, a single isometric line drawing is usually acceptable to illustrate the product, with detailed specifications, intended use, and contact information provided on the reverse. Additional drawings (not in TF-13 format) showing details that are relevant to understanding the dimensions and performance of the device should also be submitted to facilitate our review.

FHWA Official Business Only:

| Eligibility Letter | | |
|--------------------|------|-----------|
| Number | Date | Key Words |
| | | |



General Information

Test Agency..... Texas A&M Transportation Institute (TTI)
 Test Standard Test No..... MASH Test 4-12
 TTI Test No. 609761-01-3
 Test Date..... 2020-05-11

Test Article

Type..... Longitudinal Barrier—Bridge Rail
 Name..... Type 10 Bridge Rail
 Installation Length..... 139 ft 6 inches
 Material or Key Elements... Bridge rail with two 6"x6"x1/4" tubular steel rails attached to W6x20 steel posts mounted on a concrete parapet

Soil Type and Condition..... Concrete bridge deck

Test Vehicle

Type/Designation..... 10000S
 Make and Model..... 2009 International 4300
 Curb..... 13,740 lb
 Test Inertial..... 22,480 lb
 Dummy..... No dummy
 Gross Static..... 22,480 lb

Impact Conditions

Speed..... 57.6 mi/h
 Angle..... 15.4°
 Location/Orientation..... 5 ft upstream of post 4

Impact Severity..... 176 kip-ft

Exit Conditions

Speed..... Out of view
 Trajectory/Heading Angle... Along bridge rail

Occupant Risk Values

Longitudinal OIV..... 5.6 ft/s
 Lateral OIV..... 13.1 ft/s
 Longitudinal Ridedown..... 2.0 g
 Lateral Ridedown..... 9.2 g
 THIV..... 4.4 m/s
 ASI..... 0.6
 Max. 0.050-s Average
 Longitudinal..... -1.5 g
 Lateral..... 4.6 g
 Vertical..... -2.8 g

Post-Impact Trajectory

Stopping Distance..... 237 ft downstream
 9 ft twd field side

Vehicle Stability

Maximum Yaw Angle..... 25°
 Maximum Pitch Angle..... 7°
 Maximum Roll Angle..... 24°
 Vehicle Snagging..... No
 Vehicle Pocketing..... No

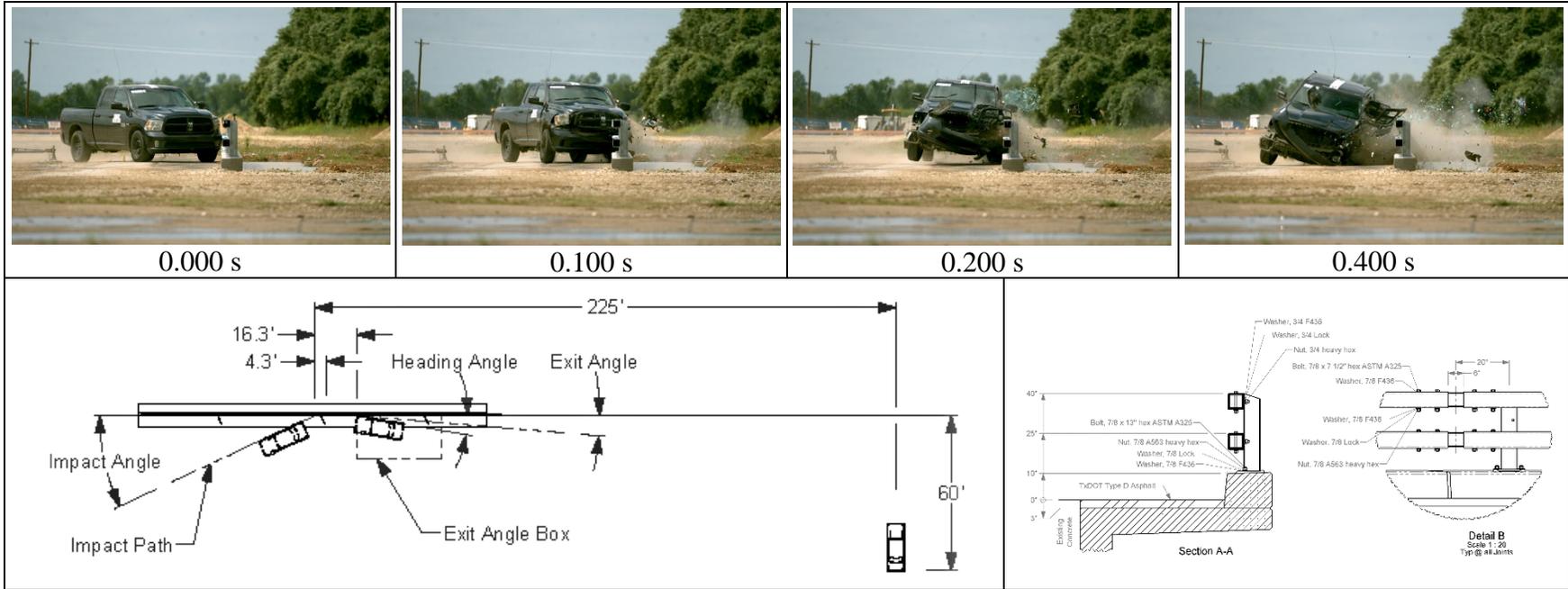
Test Article Deflections

Dynamic..... 2.9 inches
 Permanent..... 2.5 inches
 Working Width..... 62.9 inches
 Height of Working Width..... 154.5 inches

Vehicle Damage

VDS..... NA
 CDC..... 11FLEW4
 Max. Exterior Deformation..... 14.0 inches
 OCDI..... NA
 Max. Occupant Compartment Deformation..... 5.75 inches

Figure 5.7. Summary of Results for MASH Test 4-12 on Type 10 Bridge Rail.



General Information

Test Agency Texas A&M Transportation Institute (TTI)
 Test Standard Test No. MASH Test 4-11
 TTI Test No. 609761-01-4
 Test Date 2020-05-13

Test Article

Type Longitudinal Barrier—Bridge Rail
 Name Type 10 Bridge Rail
 Installation Length 139 ft 6 inches
 Material or Key Elements ... Bridge rail with two 6"x6"x1/4" tubular steel rails attached to W6x20 steel posts mounted on a concrete parapet

Soil Type and Condition

..... Concrete bridge deck, dry

Test Vehicle

Type/Designation 2270P
 Make and Model 2014 RAM 1500 Pickup
 Curb 4941 lb
 Test Inertial 5061 lb
 Dummy 165 lb
 Gross Static 5226 lb

Impact Conditions

Speed 61.3
 Angle 24.5°
 Location/Orientation 4.3 ft upstream of post 8

Impact Severity

..... 109 kip-ft

Exit Conditions

Speed 47.2 mi/h
 Trajectory/Heading Angle... 7.0°/6.5°

Occupant Risk Values

Longitudinal OIV 17.7 ft/s
 Lateral OIV 26.2 ft/s
 Longitudinal Ridedown 4.4 g
 Lateral Ridedown 13.2 g
 THIV 9.8 m/s
 ASI 1.8
 Max. 0.050-s Average
 Longitudinal -9.3 g
 Lateral 13.3 g
 Vertical 3.1 g

Post-Impact Trajectory

Stopping Distance 225 ft downstream
 60 ft twd traffic

Vehicle Stability

Maximum Yaw Angle 113°
 Maximum Pitch Angle 15°
 Maximum Roll Angle 50°
 Vehicle Snagging No
 Vehicle Pocketing No

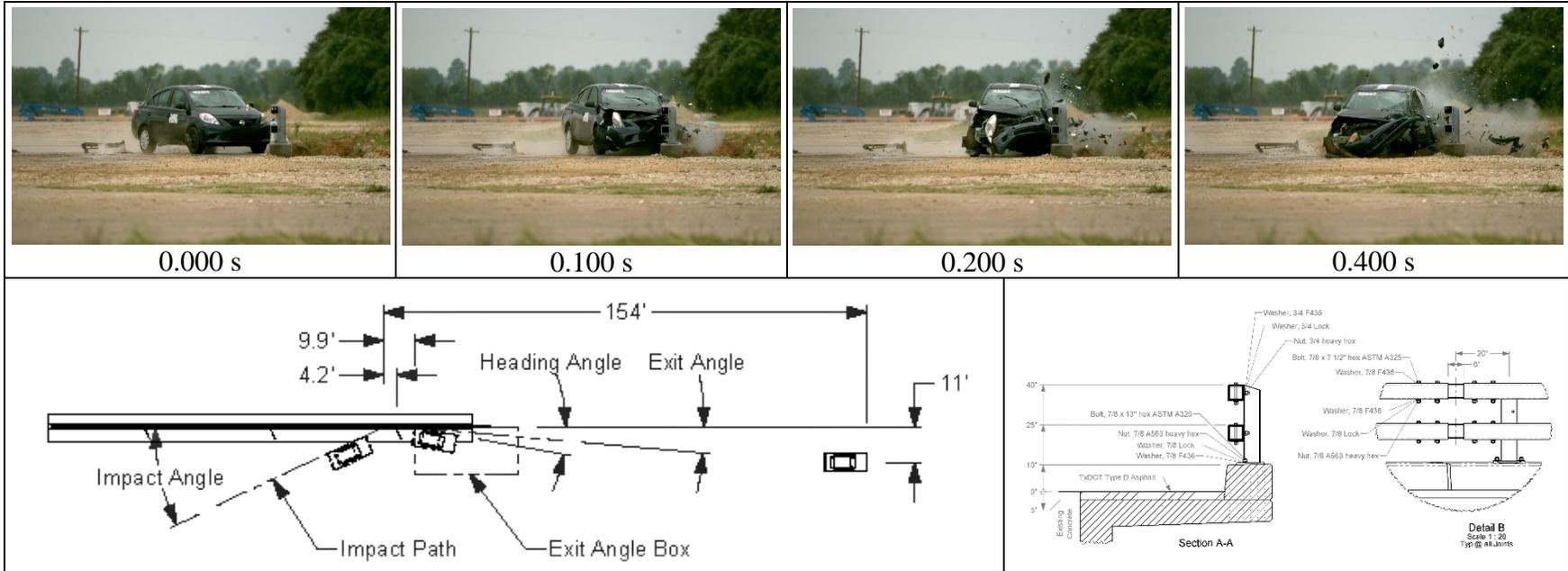
Test Article Deflections

Dynamic 6.0 inches
 Permanent 0.5 inch
 Working Width 19.3 inches
 Height of Working Width 37.8 inches

Vehicle Damage

VDS 11LFQ6
 CDC 11FLEW5
 Max. Exterior Deformation 14.0 inches
 OCDI LF0010000
 Max. Occupant Compartment Deformation 3.0 inches

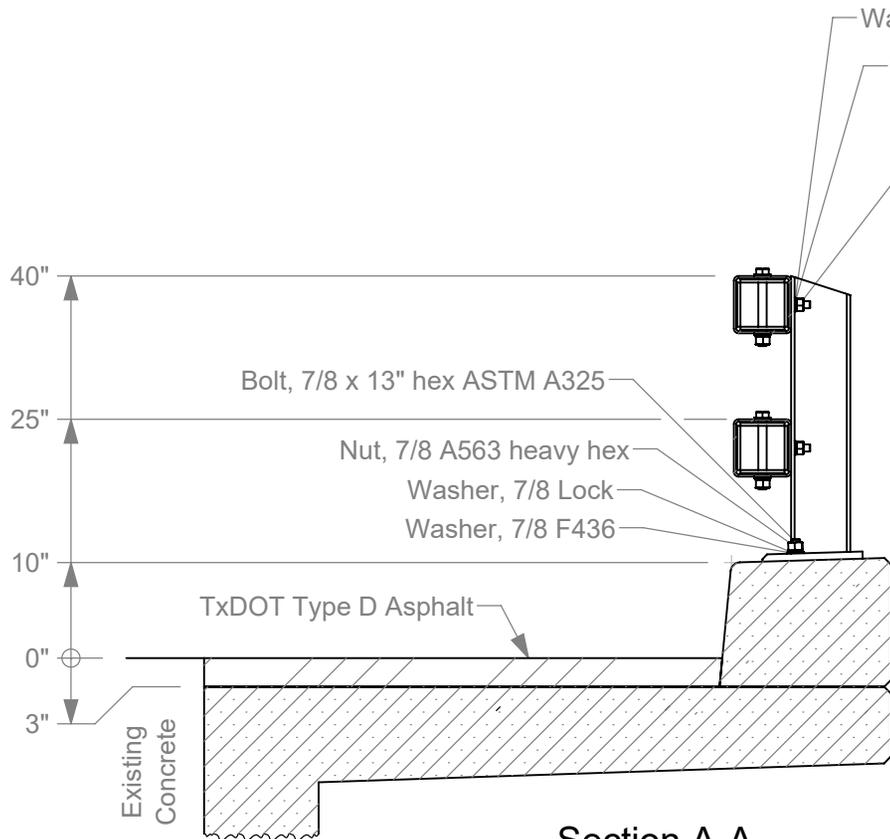
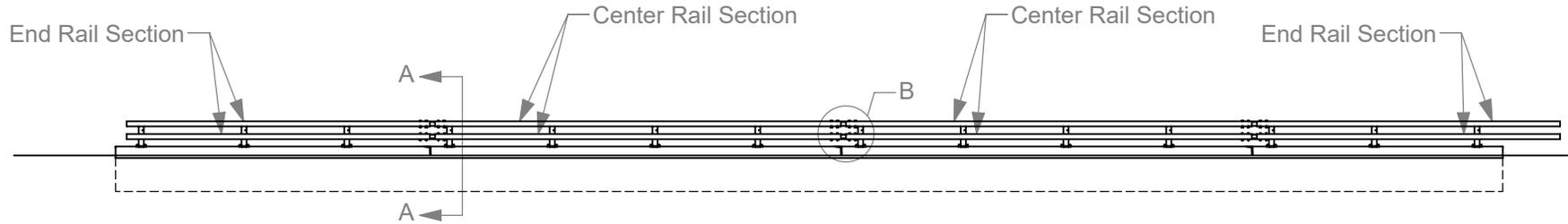
Figure 6.6. Summary of Results for MASH Test 4-11 on Type 10 Bridge Rail.



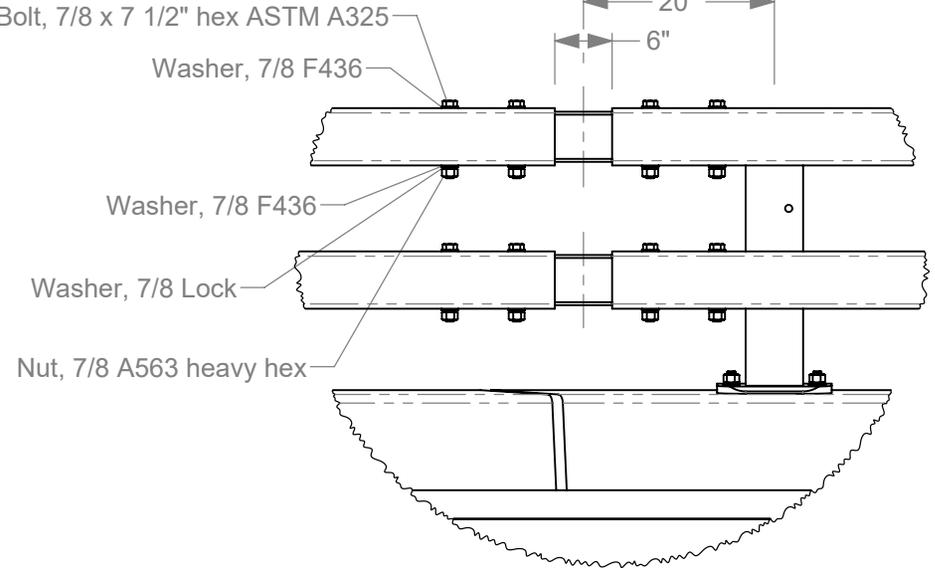
| | | |
|--|--|---|
| <p>General Information</p> <p>Test Agency Texas A&M Transportation Institute (TTI)</p> <p>Test Standard Test No. MASH Test 4-10</p> <p>TTI Test No. 609761-01-5</p> <p>Test Date 2020-05-15</p> <p>Test Article</p> <p>Type Longitudinal Barrier—Bridge Rail</p> <p>Name Type 10 Bridge Rail</p> <p>Installation Length 139 ft 6 inches</p> <p>Material or Key Elements ... Bridge rail with two 6"x6"x1/4" tubular steel rails attached to W6x20 steel posts mounted on a concrete parapet</p> <p>Soil Type and Condition Concrete bridge deck, dry</p> <p>Test Vehicle</p> <p>Type/Designation 1100C</p> <p>Make and Model 2014 Nissan Versa</p> <p>Curb 2413 lb</p> <p>Test Inertial 2431 lb</p> <p>Dummy 165 lb</p> <p>Gross Static 2596 lb</p> | <p>Impact Conditions</p> <p>Speed 62.9 mi/h</p> <p>Angle 25.2°</p> <p>Location/Orientation 3.2 ft upstream of rail joint between posts 11 and 12</p> <p>Impact Severity 58 kip-ft</p> <p>Exit Conditions</p> <p>Speed 46.8 mi/h</p> <p>Trajectory/Heading Angle... 5.9°/3.5°</p> <p>Occupant Risk Values</p> <p>Longitudinal OIV 26.6 ft/s</p> <p>Lateral OIV 29.9 ft/s</p> <p>Longitudinal Ridedown 3.6 g</p> <p>Lateral Ridedown 6.9 g</p> <p>THIV 12.3 m/s</p> <p>ASI 2.6</p> <p>Max. 0.050-s Average</p> <p>Longitudinal -15.3 g</p> <p>Lateral 19.2 g</p> <p>Vertical 3.3 g</p> | <p>Post-Impact Trajectory</p> <p>Stopping Distance 154 ft downstream 11 ft twd traffic</p> <p>Vehicle Stability</p> <p>Maximum Yaw Angle 36</p> <p>Maximum Pitch Angle 4</p> <p>Maximum Roll Angle 5</p> <p>Vehicle Snagging No</p> <p>Vehicle Pocketing No</p> <p>Test Article Deflections</p> <p>Dynamic 2.2 inches</p> <p>Permanent None measurable</p> <p>Working Width 18.0 inches</p> <p>Height of Working Width 10 inches</p> <p>Vehicle Damage</p> <p>VDS 11LFQ6</p> <p>CDC 11FLEW5</p> <p>Max. Exterior Deformation 9.0 inches</p> <p>OCDI LF0010000</p> <p>Max. Occupant Compartment Deformation 4.0 inches</p> |
|--|--|---|

Figure 7.6. Summary of Results for MASH Test 4-10 on Type 10 Bridge Rail.

Elevation View



Section A-A
Scale 1 : 20



Detail B
Scale 1 : 20
Typ @ all Joints

- 1a.** All rail components, including Rails, Posts, and Hardware, shall be galvanized.
- 1b.** Bolts with Lock Washers shall be tightened to snug only.

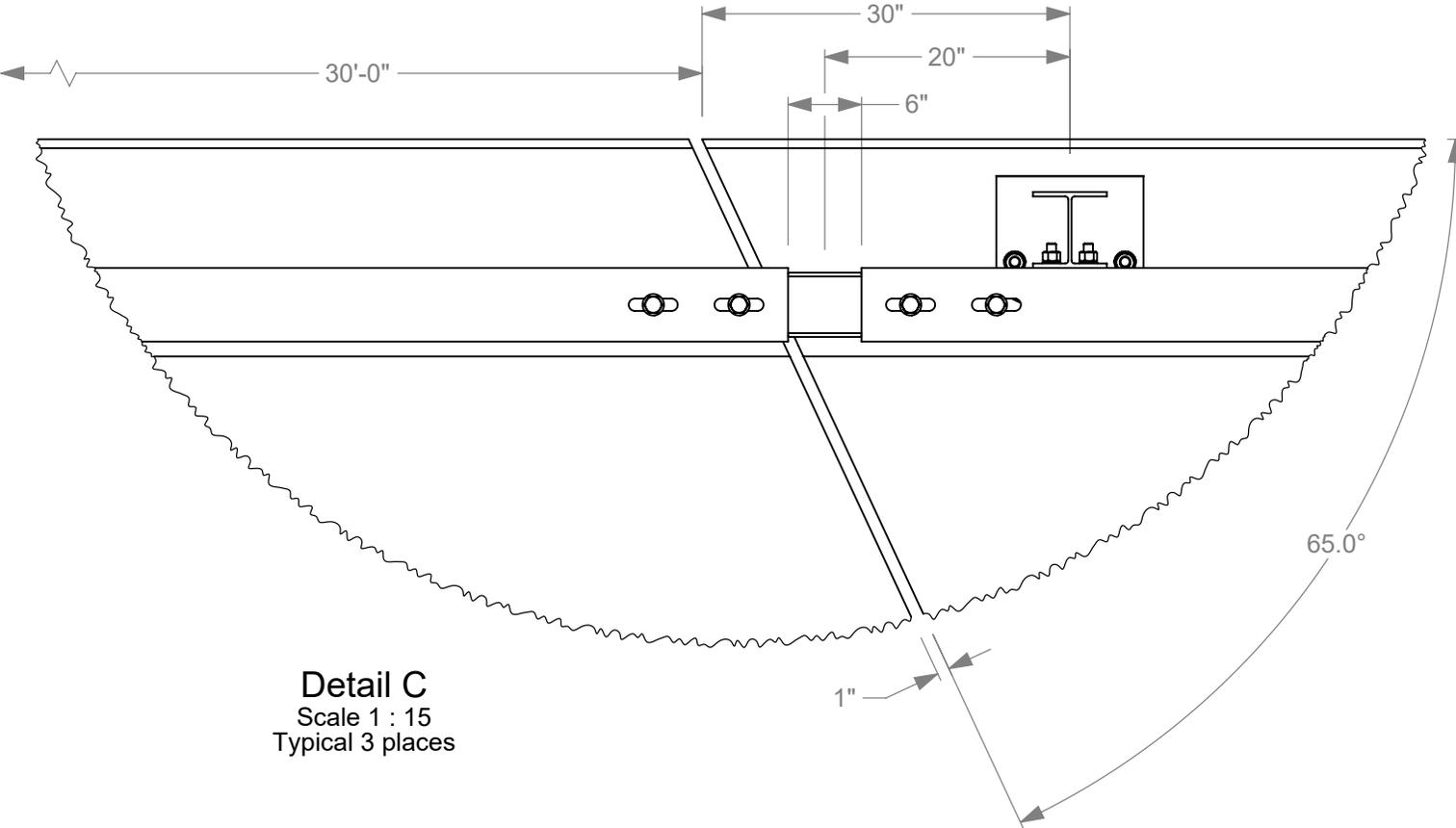
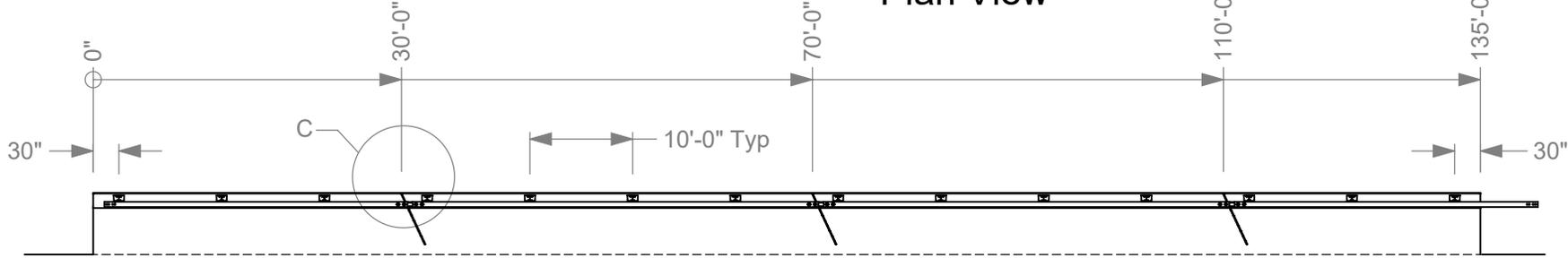


Roadside Safety and
Physical Security Division -
Proving Ground

Project #609761 3-5 Colorado Type 10 TL-4 Bridge Rail 2020-02-11

Drawn by GES Scale 1:200 Sheet 1 of 8 Elevation View

Plan View

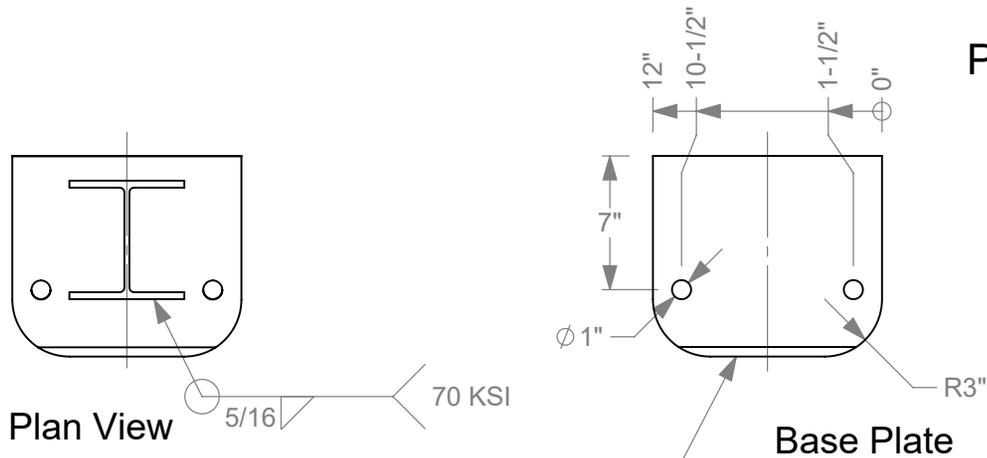


Detail C
Scale 1 : 15
Typical 3 places



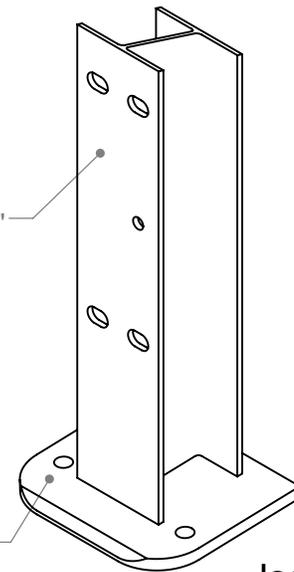
Roadside Safety and
Physical Security Division -
Proving Ground

| | | |
|---|------------|------------------------|
| Project #609761 3-5 Colorado Type 10 TL-4 Bridge Rail | | 2020-02-11 |
| Drawn by GES | Scale 1:10 | Sheet 2 of 8 Plan View |



Post Details

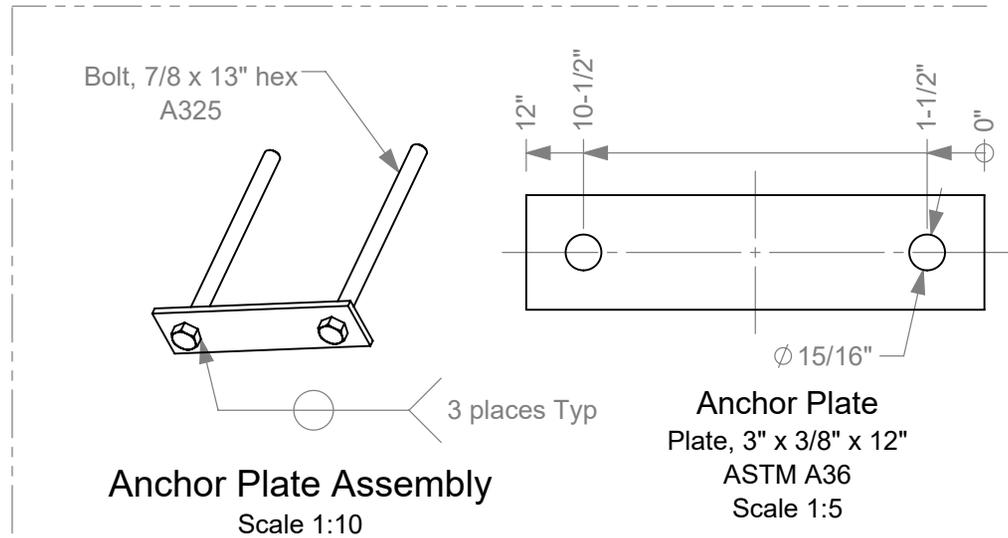
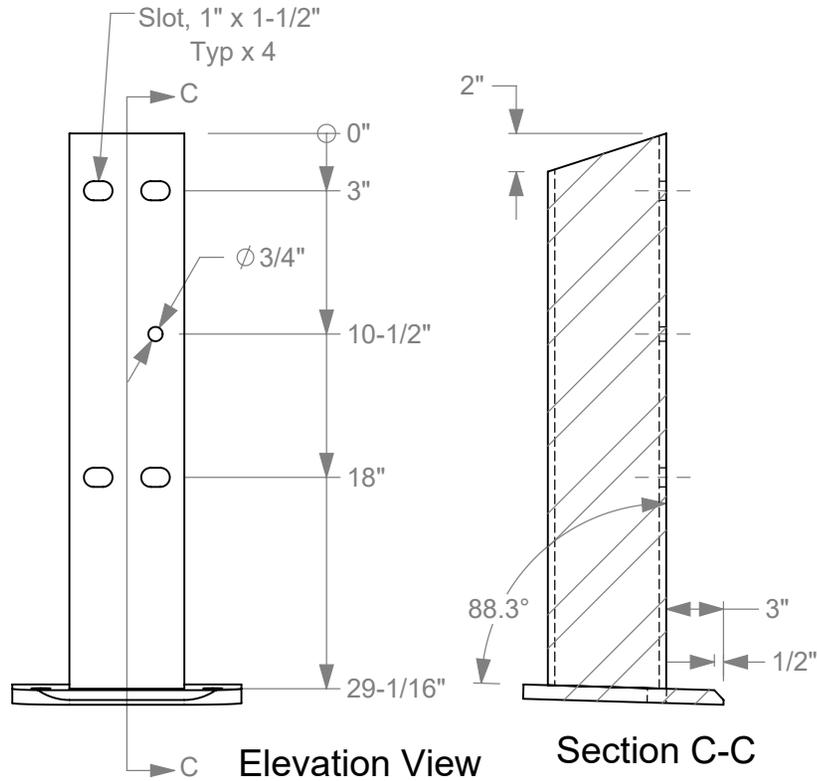
W6x20 x 29 1/16"
ASTM A992



Isometric View

Plate, 12" x 3/4" x 10 1/2"
ASTM A572 Grade 50

Chamfer top edge,
1/2" each way



- 3a. All welding must be performed by certified welders using industry standard practices.
- 3b. Galvanize all components after fabrication is complete.



Roadside Safety and
Physical Security Division -
Proving Ground

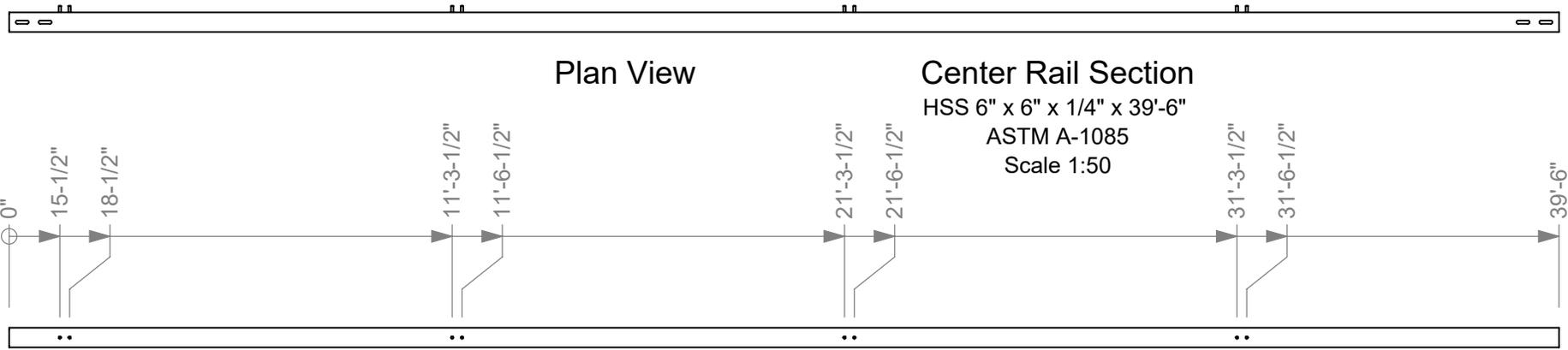
Project #609761 3-5 Colorado Type 10 TL-4 Bridge Rail 2020-02-11

Drawn by GES

Scale 1:10

Sheet 3 of 8 Post Details

Rail Details



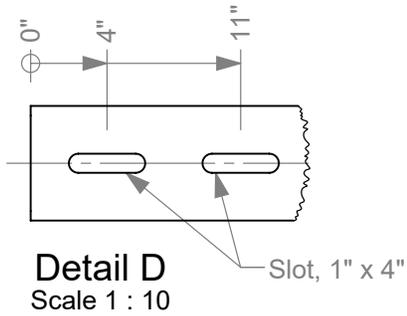
Plan View

Center Rail Section

HSS 6" x 6" x 1/4" x 39'-6"
ASTM A-1085
Scale 1:50

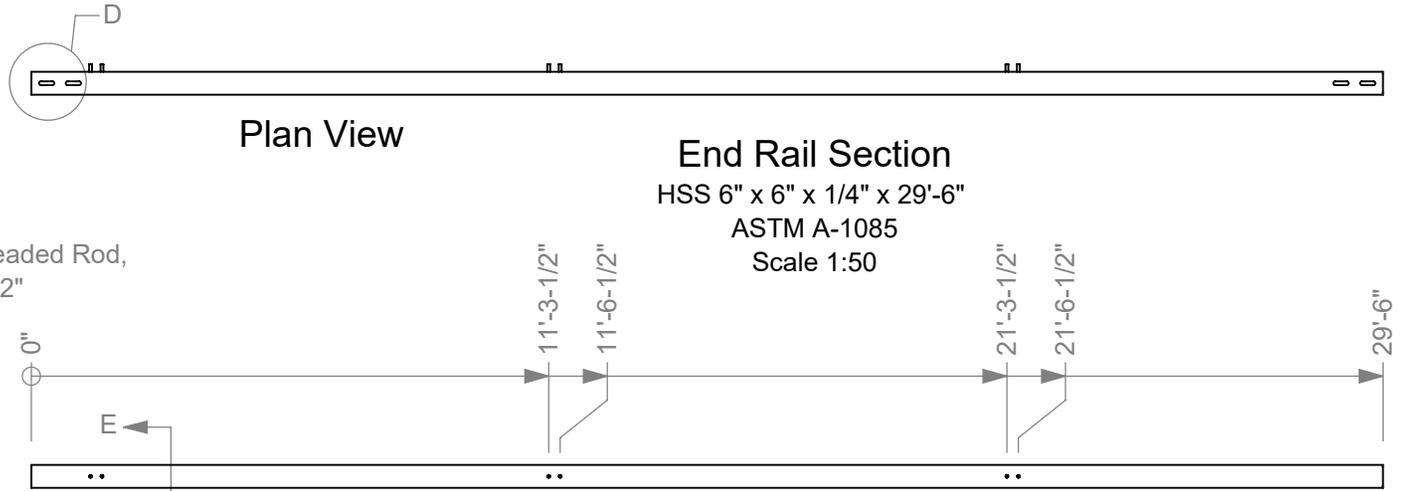
Elevation View

Field Side



Detail D
Scale 1 : 10

Slot, 1" x 4"



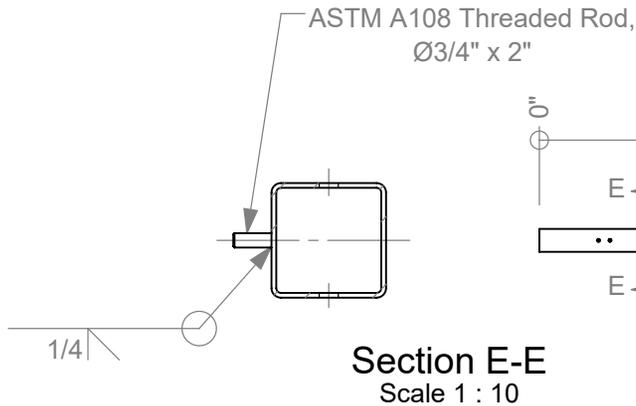
Plan View

End Rail Section

HSS 6" x 6" x 1/4" x 29'-6"
ASTM A-1085
Scale 1:50

Elevation View

Field Side



Section E-E
Scale 1 : 10

ASTM A108 Threaded Rod,
Ø3/4" x 2"

1/4"

- 4a. All welding must be performed by certified welders using industry standard practices.
- 4b. Galvanize all components after fabrication is complete.
- 4c. Detail D is typical both Rail Sections, both ends. Section E-E is typical both Rail Sections.



Roadside Safety and
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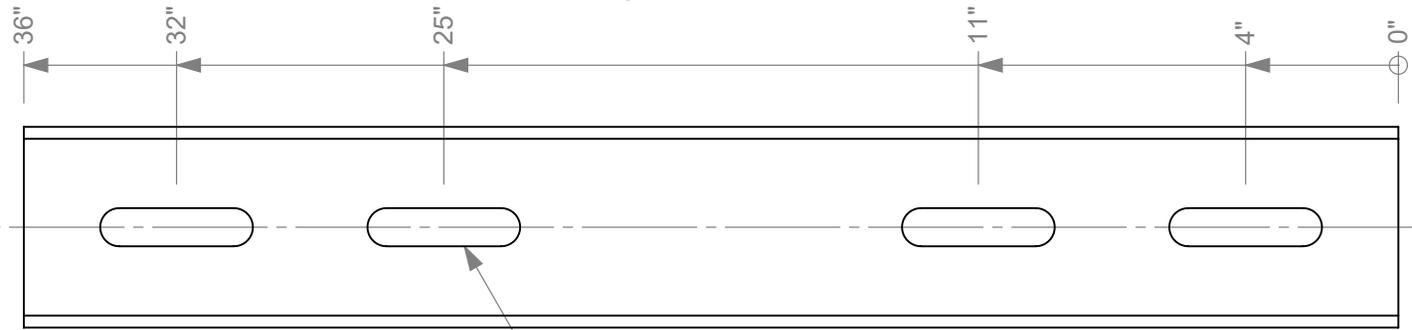
Project #609761 3-5 Colorado Type 10 TL-4 Bridge Rail 2020-02-11

Drawn by GES

Scale 1:50

Sheet 4 of 8 Rail Details

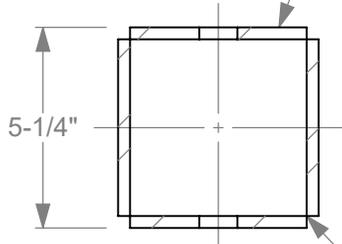
Rail Splice Details



Plan View

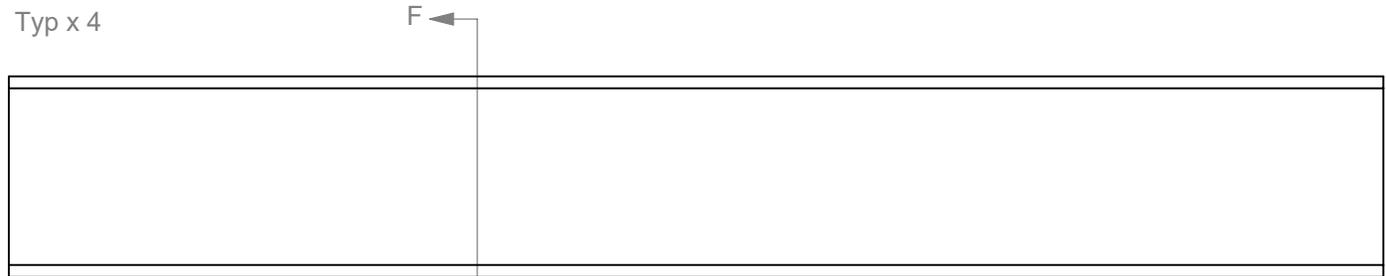
Plate, 4 5/8" x 5/16" x 36"
ASTM A572 Grade 50
Typ x 4

See previous sheet for Slot dimensions.

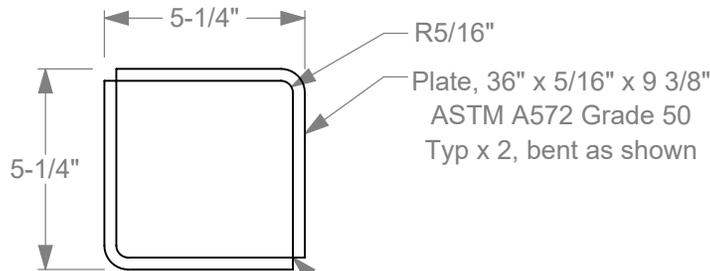


Section F-F

1/4" ∇ Typ 70 KSI



Elevation View

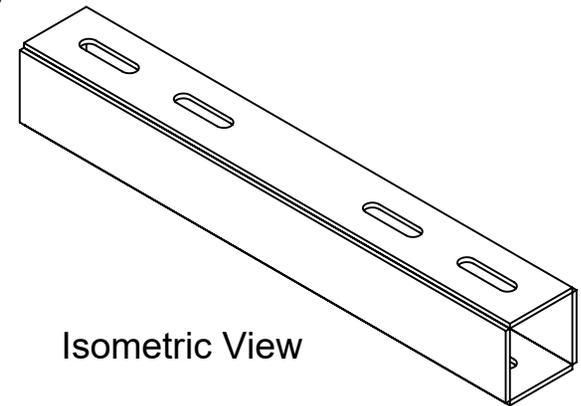


Alternate Fabrication Option*

Slots now shown

1/4" ∇ Typ 70 KSI

R5/16"
Plate, 36" x 5/16" x 9 3/8"
ASTM A572 Grade 50
Typ x 2, bent as shown



Isometric View

*After fabrication this sheet will be edited to show only the fabrication method used.

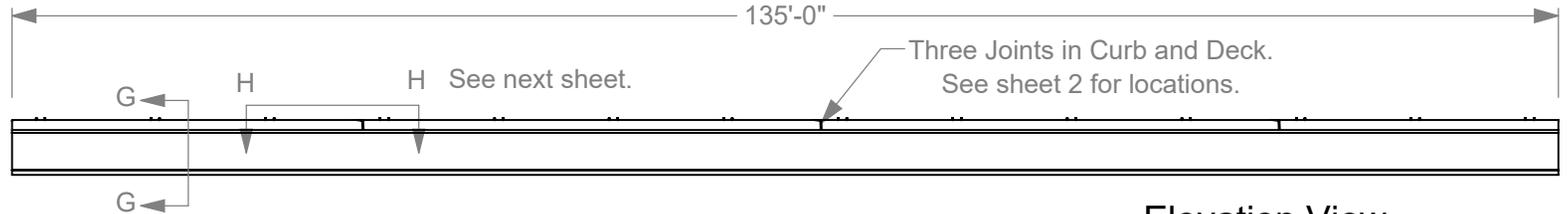


Roadside Safety and
Physical Security Division -
Proving Ground

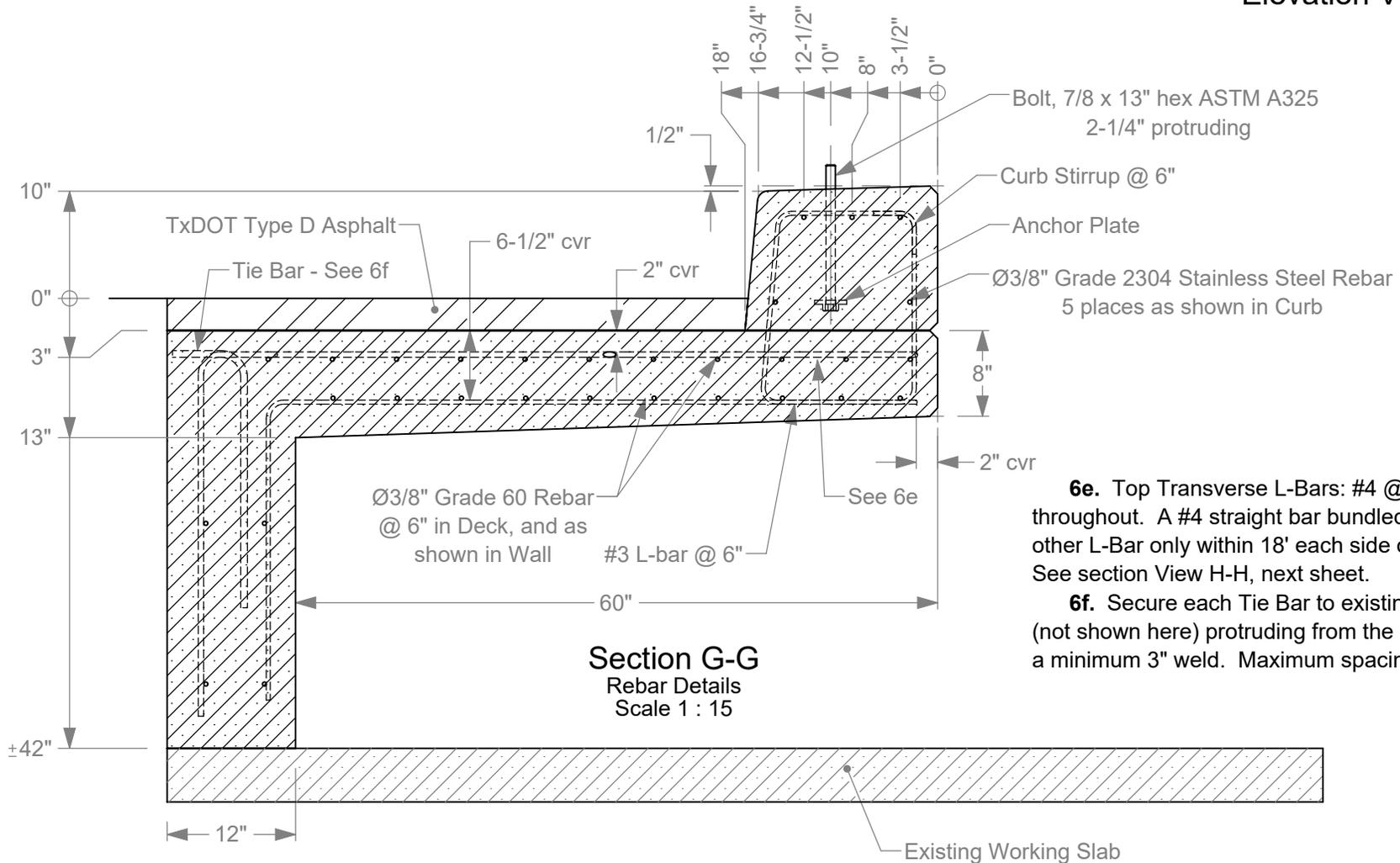
Project #609761 3-5 Colorado Type 10 TL-4 Bridge Rail 2020-02-11

Drawn by GES Scale 1:5 Sheet 5 of 8 Rail Splice Details

Concrete Details
Elevation View



Elevation View



Section G-G
Rebar Details
Scale 1 : 15

6e. Top Transverse L-Bars: #4 @ 7" throughout. A #4 straight bar bundled with every other L-Bar only within 18' each side of joint. See section View H-H, next sheet.

6f. Secure each Tie Bar to existing rebar (not shown here) protruding from the runway with a minimum 3" weld. Maximum spacing is 18".

- 6a.** Concrete is 4500 psi for Deck and Curb.
- 6b.** Minimum rebar lap is 22" for #3 stainless steel bars, and 18-3/4" for #5 bars.
- 6c.** All rebar dimensions are to center of bar unless otherwise indicated by "cvr" (cover).
- 6d.** R1" fillet traffic side top edge of Curb. Chamfer 3/4" field side edges of Deck and Curb as shown.

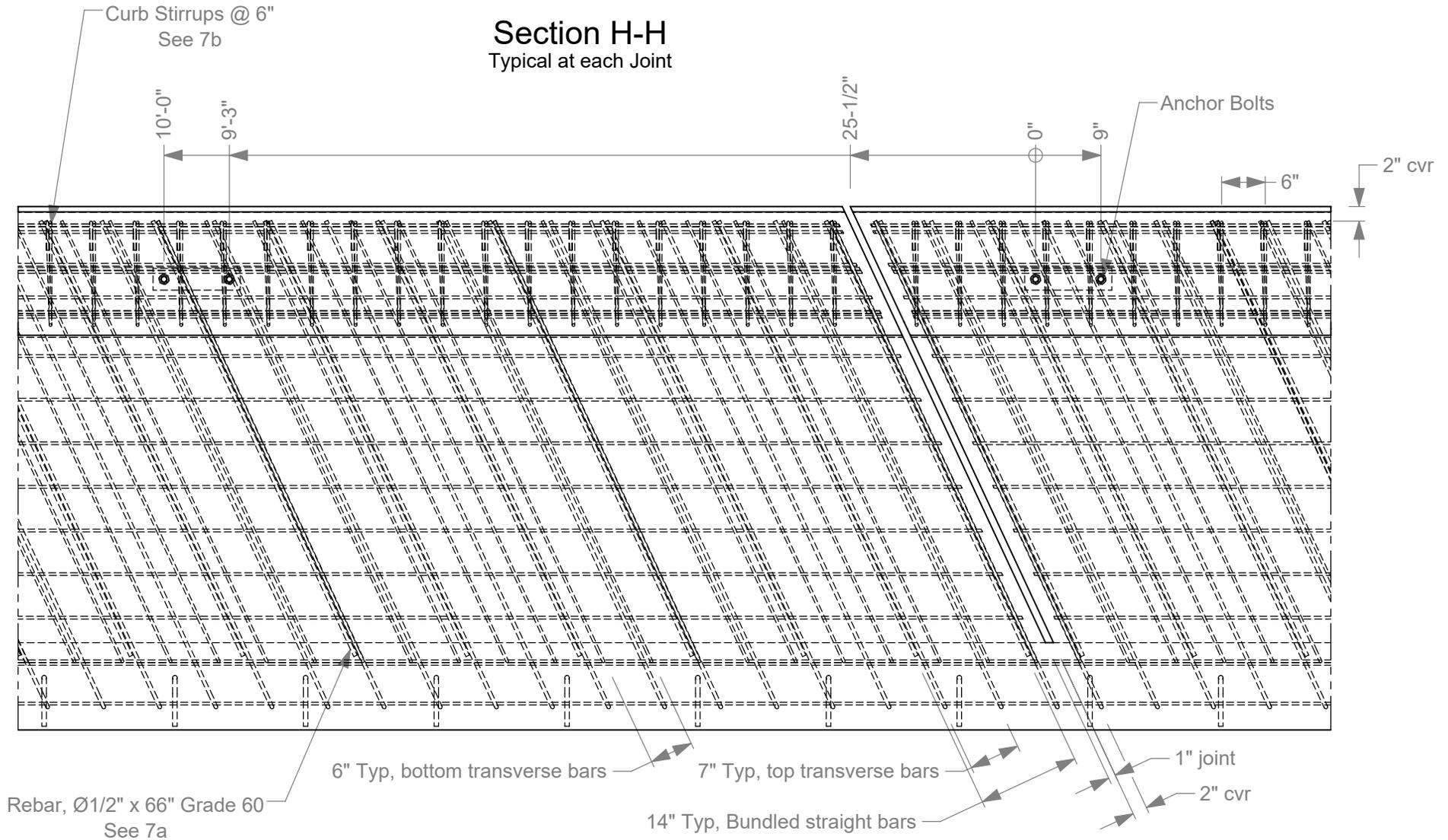


Roadside Safety and
Physical Security Division -
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Drawn by GES Scale 1:200 Sheet 6 of 8 Concrete Details

Section H-H Typical at each Joint



7a. Ø1/2" straight bars bundled with every other top transverse L-bar for 18' each side of each joint.

7b. Adjust spacing of Stirrups as needed to avoid interference with Anchor Bolts.

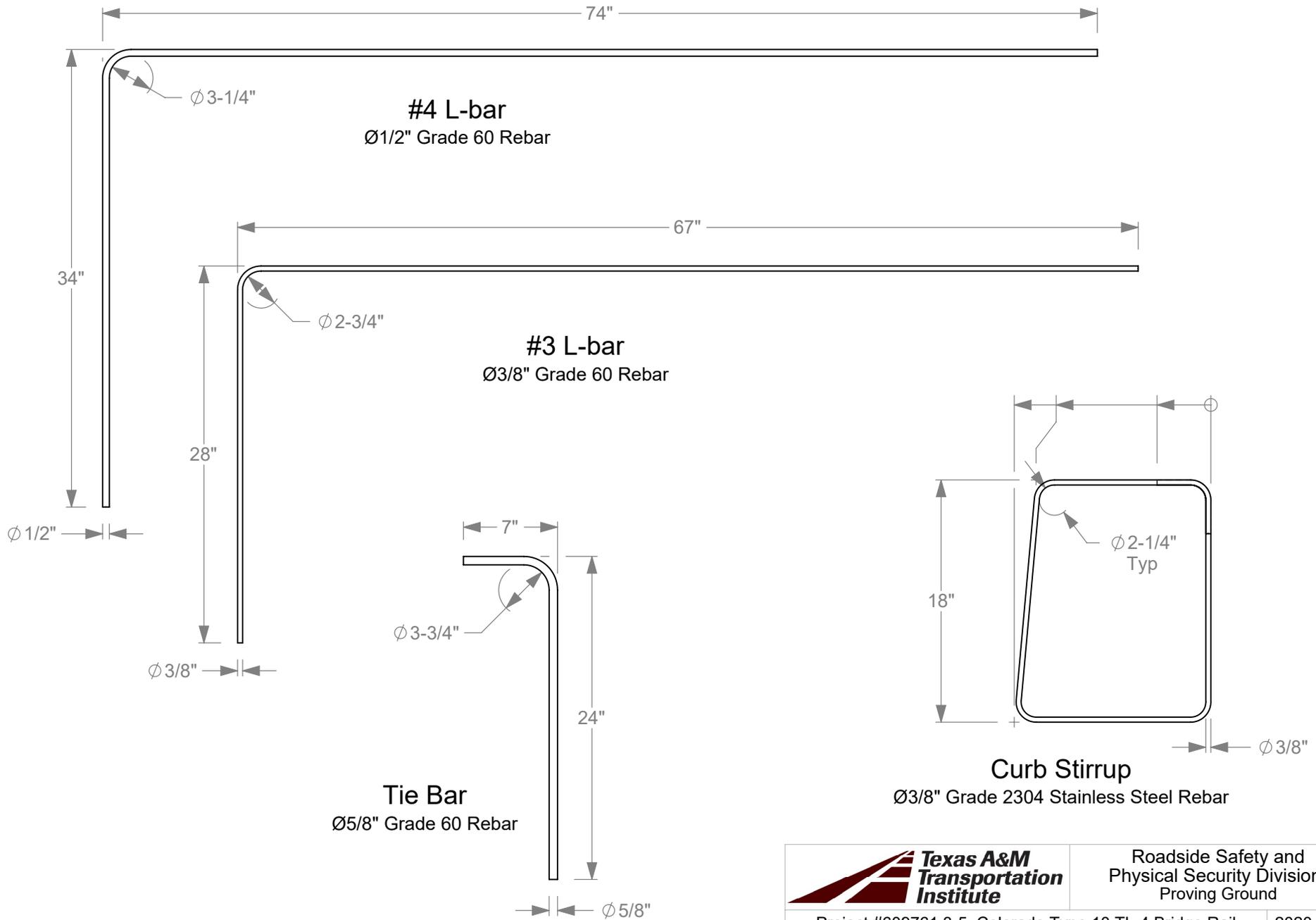


Roadside Safety and
Physical Security Division -
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Drawn by GES Scale 1:20 Sheet 7 of 8 Section H

Rebar Details



Roadside Safety and
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