



U.S. Department  
of Transportation

**Federal Highway  
Administration**

February 27, 2020

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

In Reply Refer To:  
HSST-1/B-333

Mr. Louis Ruzzi  
Pennsylvania Department of Transportation.  
400 North St., 7<sup>th</sup> floor  
Harrisburg, Pennsylvania 17120  
USA

Dear Mr. Ruzzi:

This letter is in response to your September 18, 2019 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-333 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:

- PennDOT PA Type 10M Bridge Barrier

### **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: PennDOT PA Type 10M Bridge Barrier  
Type of system: Bridge Barrier  
Test Level: MASH Test Level 4 (TL4)  
Testing conducted by: Texas A&M Transportation Institute  
Date of request: September 18, 2019

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**

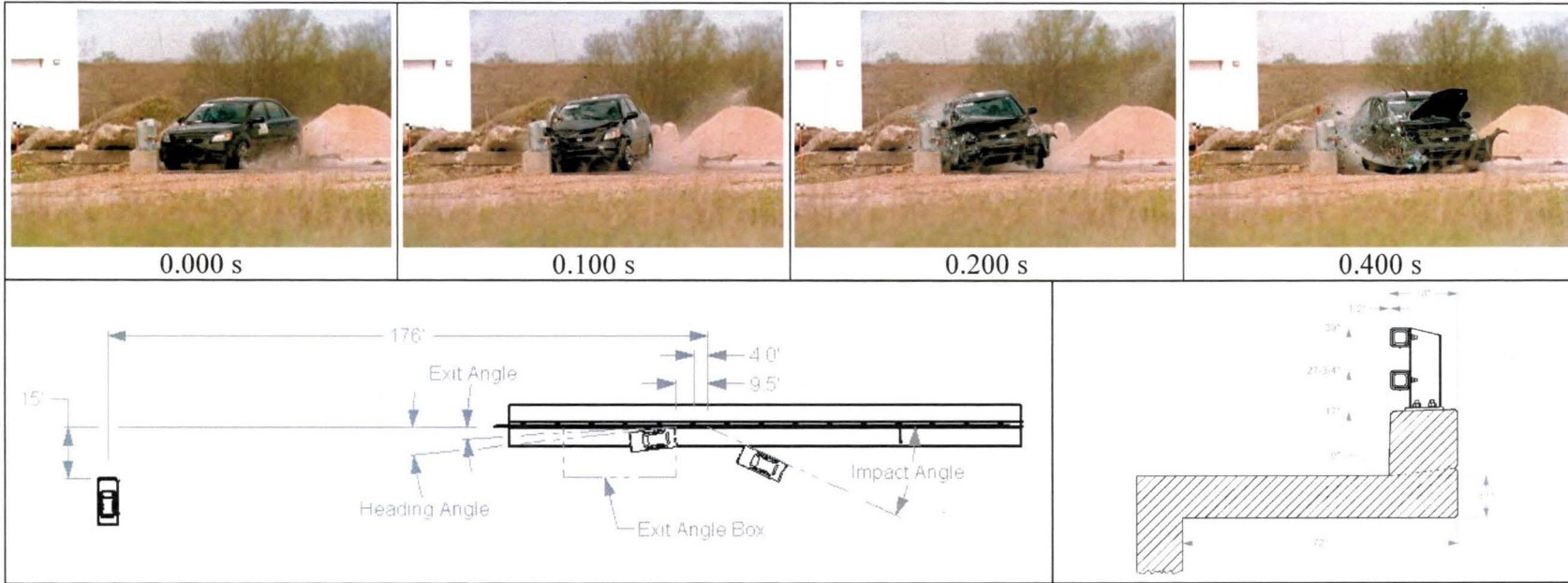
- To prevent misunderstanding by others, this letter of eligibility designated as FHWA control number B-333 shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed upon request.
- 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,



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

Enclosures



**General Information**

Test Agency..... Texas A&M Transportation Institute (TTI)  
 Test Standard Test No..... MASH Test 4-10  
 TTI Test No. .... 611101-1  
 Test Date ..... 2019-03-29

**Test Article**

Type ..... Bridge Rail  
 Name ..... PennDOT PA Type 10M Bridge Barrier  
 Installation Length..... 149 ft-10 inches  
 Material or Key Elements ... 17-inch tall x 18-inch thick reinforced concrete parapet with two HSS 5x5x3/8 rails at 27 3/4 inches and 39 inches to top

**Soil Type and Condition**

..... Reinforced concrete bridge deck, Damp

**Test Vehicle**

Type/Designation ..... 1100C  
 Make and Model ..... 2010 Kia Rio  
 Curb..... 2477 lb  
 Test Inertial..... 2467 lb  
 Dummy ..... 165 lb  
 Gross Static ..... 2632 lb

**Impact Conditions**

Speed ..... 62.5 mi/h  
 Angle ..... 24.8°  
 Location/Orientation ..... 4.0 ft upstream of edge of post 10

**Impact Severity**

..... 57 kip-ft

**Exit Conditions**

Speed ..... 50.9 mi/h  
 Trajectory/Heading Angle... 7.0° / 8.4°

**Occupant Risk Values**

Longitudinal OIV ..... 20.0 ft/s  
 Lateral OIV..... 34.1 ft/s  
 Longitudinal Ridedown ..... 4.0 g  
 Lateral Ridedown ..... 10.6 g  
 THIV ..... 43.4 km/h  
 PHD ..... 10.6 g  
 ASI..... 2.80

**Max. 0.050-s Average**

Longitudinal ..... -11.3 g  
 Lateral..... -21.0 g  
 Vertical..... 2.6 g

**Post-Impact Trajectory**

Stopping Distance..... 176 ft downstream  
 15 ft toward traffic

**Vehicle Stability**

Maximum Yaw Angle ..... 47°  
 Maximum Pitch Angle ..... 5°  
 Maximum Roll Angle ..... 15°  
 Vehicle Snagging ..... No  
 Vehicle Pocketing ..... No

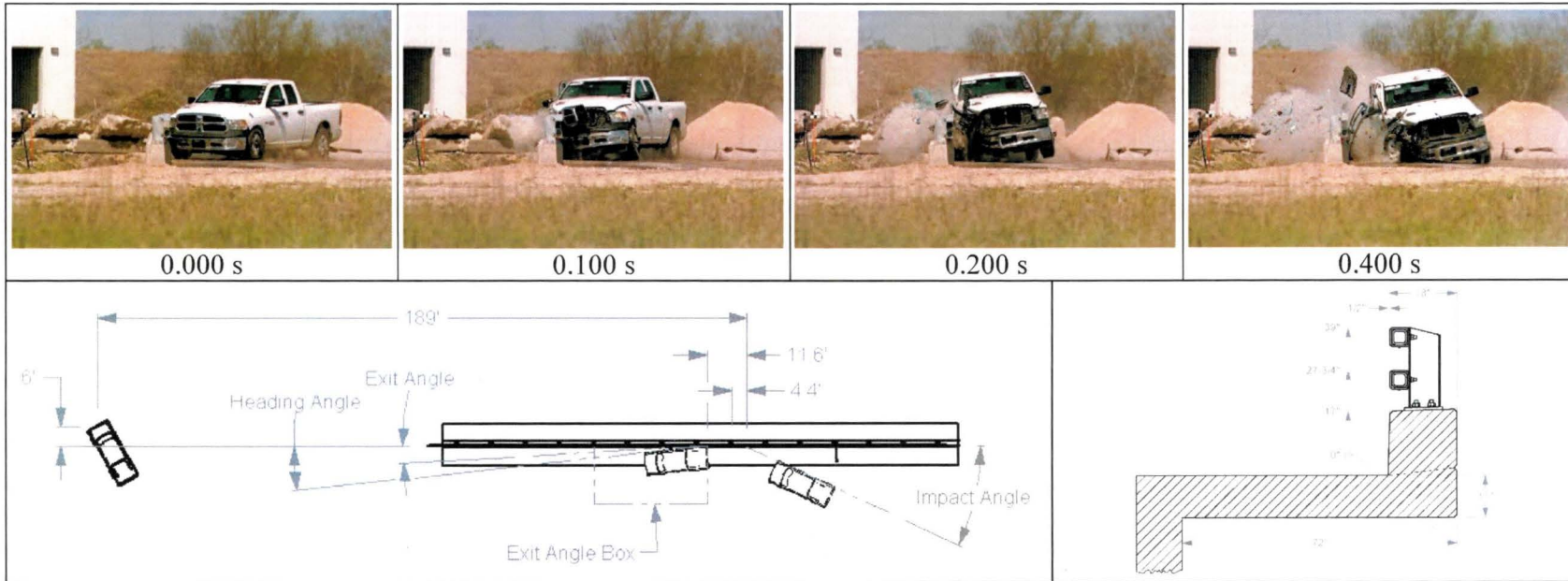
**Test Article Deflections**

Dynamic..... 0.4 inch  
 Permanent ..... None  
 Working Width..... 18.0 inches  
 Height of Working Width ..... 17.0 inches

**Vehicle Damage**

VDS ..... 01RFQ5  
 CDC..... 01FREW4  
 Max. Exterior Deformation..... 6.0 inches  
 OCDI..... RF0100200  
 Max. Occupant Compartment Deformation..... 2.5 inches

**Figure 5.6. Summary of Results for MASH Test 4-10 on PennDOT PA Type 10M Bridge Barrier.**



**General Information**

Test Agency..... Texas A&M Transportation Institute (TTI)  
 Test Standard Test No..... MASH Test 4-11  
 TTI Test No. .... 611101-2  
 Test Date ..... 2019-03-27

**Test Article**

Type ..... Bridge Rail  
 Name ..... PennDOT PA Type 10M Bridge Barrier  
 Installation Length..... 149 ft-10 inches  
 Material or Key Elements ... 17-inch tall x 18-inch thick reinforced concrete parapet with two HSS 5x5x $\frac{3}{8}$  rails at 27 $\frac{3}{4}$  inches and 39 inches to top

**Soil Type and Condition** .....

Reinforced concrete bridge deck, Damp

**Test Vehicle**

Type/Designation..... 2270P  
 Make and Model ..... 2014 RAM 1500 Pickup  
 Curb..... 4893 lb  
 Test Inertial..... 5032 lb  
 Dummy ..... 165 lb  
 Gross Static ..... 5197 lb

**Impact Conditions**

Speed ..... 61.8 mi/h  
 Angle ..... 25.9°  
 Location/Orientation..... 4.4 upstream of edge of post 7

**Impact Severity**.....

123 kip-ft

**Exit Conditions**

Speed ..... 49.0 mi/h  
 Trajectory/Heading Angle... 7.9°/4.8°

**Occupant Risk Values**

Longitudinal OIV ..... 20.3 ft/s  
 Lateral OIV..... 28.9 ft/s  
 Longitudinal Ridedown ..... 4.0 g  
 Lateral Ridedown ..... 9.6 g  
 THIV ..... 38.9 km/h  
 PHD ..... 9.6 g  
 ASI..... 1.86

**Max. 0.050-s Average**

Longitudinal ..... -9.4 g  
 Lateral..... -14.7 g  
 Vertical..... 2.3 g

**Post-Impact Trajectory**

Stopping Distance..... 189 ft downstream  
 6 ft toward field side

**Vehicle Stability**

Maximum Yaw Angle ..... 39°  
 Maximum Pitch Angle ..... 7°  
 Maximum Roll Angle ..... 19°  
 Vehicle Snagging ..... No  
 Vehicle Pocketing ..... No

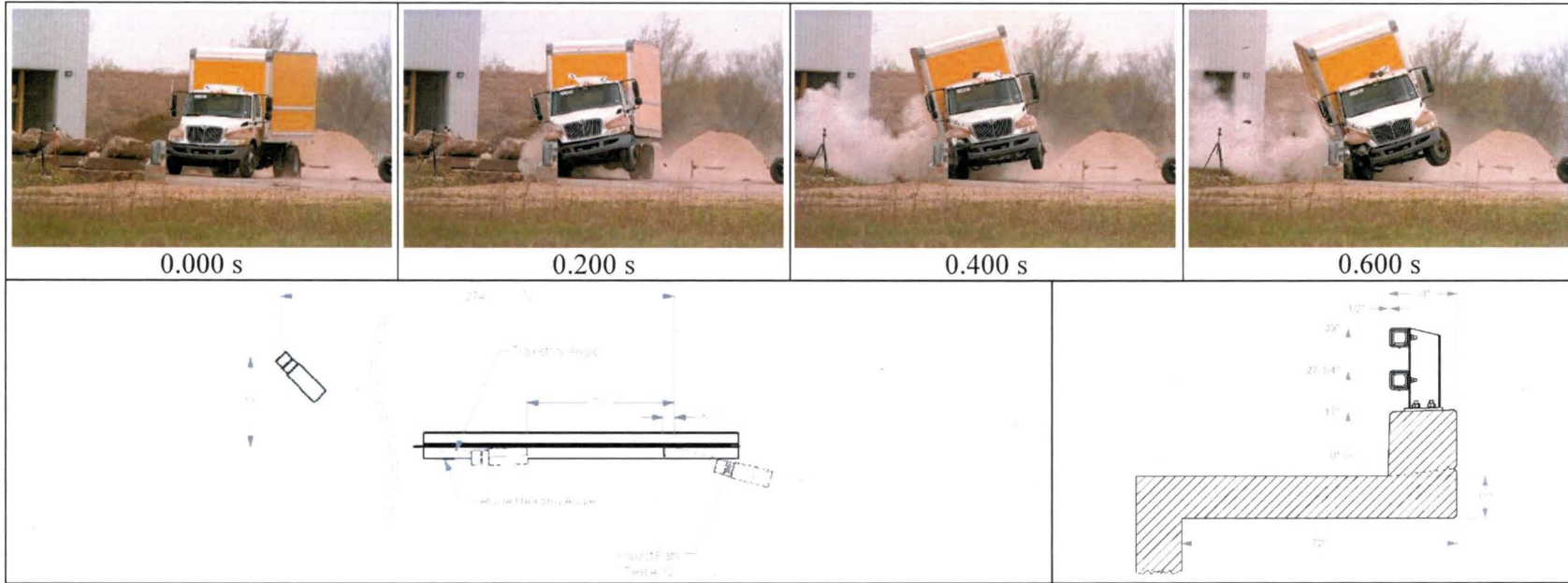
**Test Article Deflections**

Dynamic..... 1.9 inches  
 Permanent ..... None  
 Working Width..... 18.0 inches  
 Height of Working Width ..... 17.0 inches

**Vehicle Damage**

VDS ..... 01RFQ5  
 CDC..... 01RFEW4  
 Max. Exterior Deformation..... 11.5 inches  
 OCDI..... RF0113200  
 Max. Occupant Compartment Deformation..... 8.0 inches

**Figure 6.6. Summary of Results for MASH Test 4-11 on PennDOT PA Type 10M Bridge Barrier.**



**General Information**

Test Agency ..... Texas A&M Transportation Institute (TTI)  
 Test Standard Test No. .... MASH Test 4-12  
 TTI Test No. .... 611101-3  
 Test Date ..... 2019-03-25

**Test Article**

Type ..... Bridge Rail  
 Name ..... PennDOT PA Type 10M Bridge Barrier  
 Installation Length ..... 149 ft-10 inches  
 Material or Key Elements ... 17-inch tall x 18-inch thick reinforced concrete parapet with two HSS 5x5x3/4 rails at 27 3/4 inches and 39 inches to top

**Soil Type and Condition** .....

Reinforced concrete bridge deck, Damp

**Test Vehicle**

Type/Designation ..... 10000S  
 Make and Model ..... 2011 International 4300 SUT  
 Curb ..... 14,290 lb  
 Test Inertial ..... 22,340 lb  
 Dummy ..... No Dummy  
 Gross Static ..... 22,340 lb

**Impact Conditions**

Speed ..... 55.9 mi/h  
 Angle ..... 14.3°  
 Location/Orientation ..... 5.2 ft upstream of edge of post 4

**Impact Severity** .....

142 kip-ft  
**Exit Conditions**  
 Speed ..... 48.6 mi/h  
 Trajectory/Heading Angle... 0° / 0°

**Occupant Risk Values**

Longitudinal OIV ..... 6.9 ft/s  
 Lateral OIV ..... 12.8 ft/s  
 Longitudinal Ridedown ..... 2.5 g  
 Lateral Ridedown ..... 6.7 g  
 THIV ..... 16.2 km/h  
 PHD ..... 6.8 g  
 ASI ..... 0.35  
 Max. 0.050-s Average  
 Longitudinal ..... -1.9 g  
 Lateral ..... -3.3 g  
 Vertical ..... -3.7 g

**Post-Impact Trajectory**

Stopping Distance ..... 274 ft downstream  
 43 ft twd field side

**Vehicle Stability**

Maximum Yaw Angle ..... 18°  
 Maximum Pitch Angle ..... 5°  
 Maximum Roll Angle ..... 25°  
 Vehicle Snagging ..... No  
 Vehicle Pocketing ..... No

**Test Article Deflections**

Dynamic ..... Not obtainable  
 Permanent ..... 0.5 inch  
 Working Width ..... 55.2 inches  
 Height of Working Width ..... 145.8 inches

**Vehicle Damage**

VDS ..... N/A  
 CDC ..... 01FREW4  
 Max. Exterior Deformation ..... 14.0 inches  
 OCDI ..... N/A  
 Max. Occupant Compartment Deformation ..... 2.75 inches

**Figure 7.6. Summary of Results for MASH Test 4-12 on PennDOT PA Type 10M Bridge Barrier.**

## Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

<b>Submitter</b>	Date of Request:	September 18, 2019	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Louis J. Ruzzi, P.E.	
	Company:	Pennsylvania Department of Transportation	
	Address:	400 North St., 7th Floor, Harrisburg, Pennsylvania 17120	
	Country:	USA	
	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 (Roadside, Median, Bridge Railings)	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	PennDOT PA Type 10M Bridge Barrier	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:	Louis J. Ruzzi, P.E.	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	Pennsylvania Department of Transportation	Same as Submitter <input checked="" type="checkbox"/>
Address:	400 North St., 7th Floor, Harrisburg, Pennsylvania 17120	Same as Submitter <input checked="" type="checkbox"/>
Country:	USA	Same as Submitter <input checked="" 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 Gannett Fleming, Inc. to perform full-scale crash testing of the PennDOT PA Type 10M Bridge Barrier. There are no shared financial interests in the PennDOT PA Type 10M Bridge Barrier by TTI, or between PennDOT and TTI, or between Gannett Fleming, Inc. and TTI other than the costs involved in the actual crash tests and reports for this submission to FHWA.

## PRODUCT DESCRIPTION

<input checked="" type="radio"/> New Hardware or Significant Modification	<input type="radio"/> Modification to Existing Hardware	
<p>The test installation for the PennDOT PA Type 10M Bridge Barrier was 149 ft-10 inches long, and consisted of a reinforced concrete deck and barrier, with steel rails supported by steel posts anchored to the top of the barrier. The deck was cantilevered 72 inches, with the field side of the 18-inch wide barrier flush with the field side of the deck. The barrier was 17 inches tall, and the heights to the top of the two steel rails, measured from the top of the deck, were 27.75 inches and 39 inches. There were 15 posts, spaced at 10 ft, beginning at 44 inches from the downstream end. Post 1 was located 74 inches from the upstream end of the barrier and deck. There were three joints in the barrier: one between posts 3 and 4, the second between posts 6 and 7, and the third between posts 9 and 10. The joint between posts 3 and 4 was cast in both the barrier and deck. The other two joints were only in the barrier. Five sections of double steel tubular rail were installed on the posts. Their splices were located 20 inches (for the top rail) and 30 inches (for the bottom rail) upstream of the centerlines of posts 4, 7, 10, and 13.</p>		
<h3>CRASH TESTING</h3>		
<p>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.</p>		

Engineer Name:	D. Lance Bullard, Jr. P.E.	
Engineer Signature:	<b>D. Lance Bullard, Jr.</b>	Digitally signed by D. Lance Bullard, Jr. Date: 2019.09.18 13:59:22 -05'00'
Address:	TTI, TAMU 3135, College Station, TX 77843-3135	Same as Submitter <input type="checkbox"/>
Country:	USA	Same as Submitter <input type="checkbox"/>

A brief description of each crash test and its result:



Required Test Number	Narrative Description	Evaluation Results
4-10 (1100C)	<p>TTI Crash Test Report No. 611101-01 contains the results of this 4-10 test that was conducted on March 29, 2019. The target CIP for MASH Test 4-10 was 3.6 ft ±1 ft upstream of the flange edge of post 10 (near the lower rail splice).</p> <p>The PennDOT PA Type 10M Bridge Barrier system contained and redirected the 1100C vehicle. The vehicle did not penetrate, underide, or override the installation. The dynamic deflection of the bridge rail during the test was 0.4 inch.</p> <p>No detached elements, fragments, or other debris were present to penetrate or show potential for penetrating the occupant compartment, or to present hazard to others in the area.</p> <p>Maximum occupant compartment deformation was 2.5 inches in the right front floor pan.</p> <p>The 1100C vehicle remained upright during and after the collision event. Maximum roll and pitch angles were 15° and 5°, respectively.</p> <p>Occupant risk factors were within the allowable limits of MASH. Longitudinal OIV was 20.0 ft/s, and lateral OIV was 34.1 ft/s. Longitudinal occupant ridedown acceleration was 4.0 g, and lateral occupant ridedown acceleration was 10.6 g.</p>	PASS

Required Test Number	Narrative Description	Evaluation Results
4-11 (2270P)	<p>TTI Crash Test Report No. 611101-02 contains the results of this 4-11 test that was conducted on March 27, 2019. The target CIP for MASH Test 4-11 was 4.3 ft ±1 ft upstream of the flange edge of post 7 (near the lower rail splice).</p> <p>The PennDOT PA Type 10M Bridge Barrier contained and redirected the 2270P vehicle. The vehicle did not penetrate, underride, or override the installation. The dynamic deflection of the bridge rail during the test was 1.9 inches.</p> <p>No detached elements, fragments, or other debris were present to penetrate or show potential for penetrating the occupant compartment, or to present hazard to others in the area.</p> <p>Maximum occupant compartment deformation was 8.0 inches in the lateral area across the cab at hip height.</p> <p>The 2270P vehicle remained upright during and after the collision event. Maximum roll and pitch angles were 19° and 7°, respectively.</p> <p>Occupant risk factors were within the preferred limits of MASH. Longitudinal OIV was 20.3 ft/s, and lateral OIV was 28.9 ft/s. Longitudinal occupant ridedown acceleration was 4.0 g, and lateral occupant ridedown acceleration was 9.6 g.</p>	PASS

4-12 (10000S)	<p>TTI Crash Test Report No. 611101-03 contains the results of this 4-12 test that was conducted on March 25, 2019. The target CIP for MASH Test 4-12 was 5 ft ±1 ft upstream of the flange edge of post 4 (near the lower rail splice).</p> <p>The PennDOT PA Type 10M Bridge Barrier contained and redirected the 10000S vehicle. The vehicle did not penetrate, underide, or override the installation. Maximum dynamic deflection during the test was not obtainable during the test, however, maximum permanent deformation was 0.5 inch.</p> <p>No detached elements, fragments, or other debris were present to penetrate or show potential for penetrating the occupant compartment, or to present hazard to others in the area.</p> <p>Maximum occupant compartment deformation was 2.75 inches in the right front floor pan.</p> <p>The 10000S vehicle remained upright during and after the collision event.</p>	PASS
4-20 (1100C)	This Optional Test was not performed. This request is only for a stand alone bridge rail system, and not for a Transition between two different barrier systems. Therefore, Test 4-20 is Non-Relevant.	Non-Relevant Test, not conducted
4-21 (2270P)	This Optional Test was not performed. This request is only for a stand alone bridge rail system, and not for a Transition between two different barrier systems. Therefore, Test 4-21 is Non-Relevant.	Non-Relevant Test, not conducted
4-22 (10000S)	This Optional Test was not performed. This request is only for a stand alone bridge rail system, and not for a Transition between two different barrier systems. Therefore, Test 4-22 is Non-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 Institute	
Laboratory Signature:	<b>Bill Griffith</b>	Digitally signed by Bill Griffith Date: 2019.09.27 09:24:16 -05'00'
Address:	TTI, TAMU 3135, College Station, TX 77843-3135	Same as Submitter <input type="checkbox"/>
Country:	USA	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\*:

*James S. Kery* 9/30/2019

**Submit Form**

### ATTACHMENTS

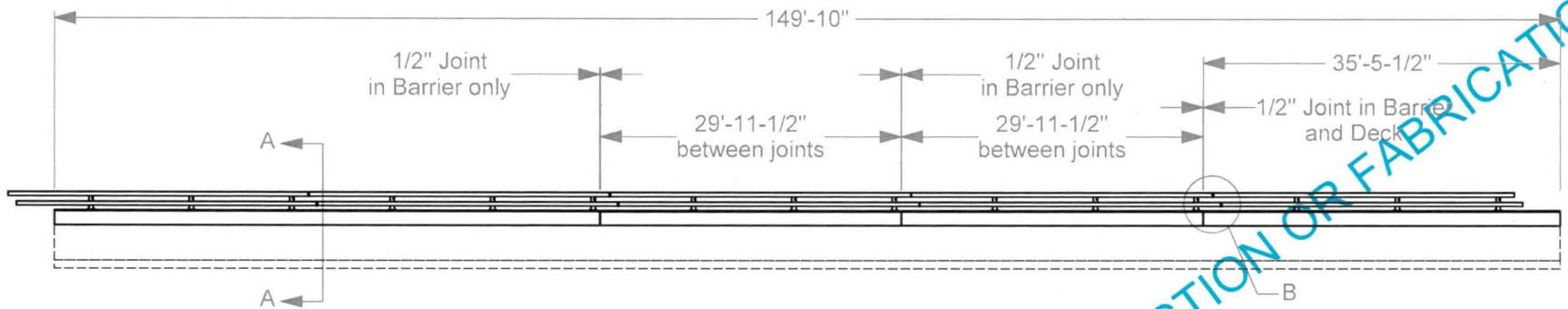
Attach to this form:

- 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		Key Words
Number	Date	

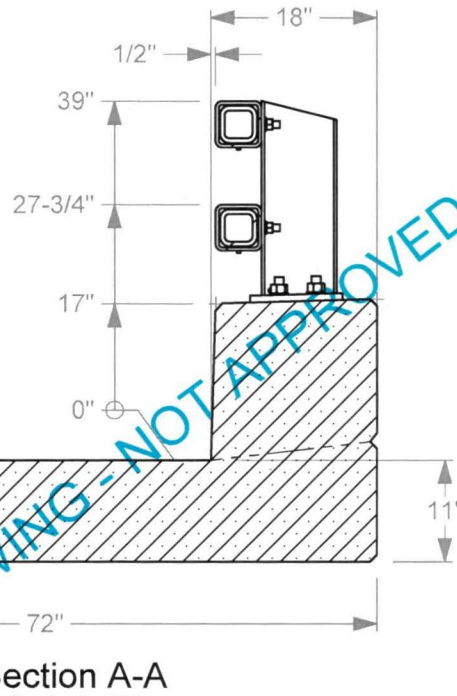
# Elevation View



**APPROVED**

*Thomas P Maciocia*

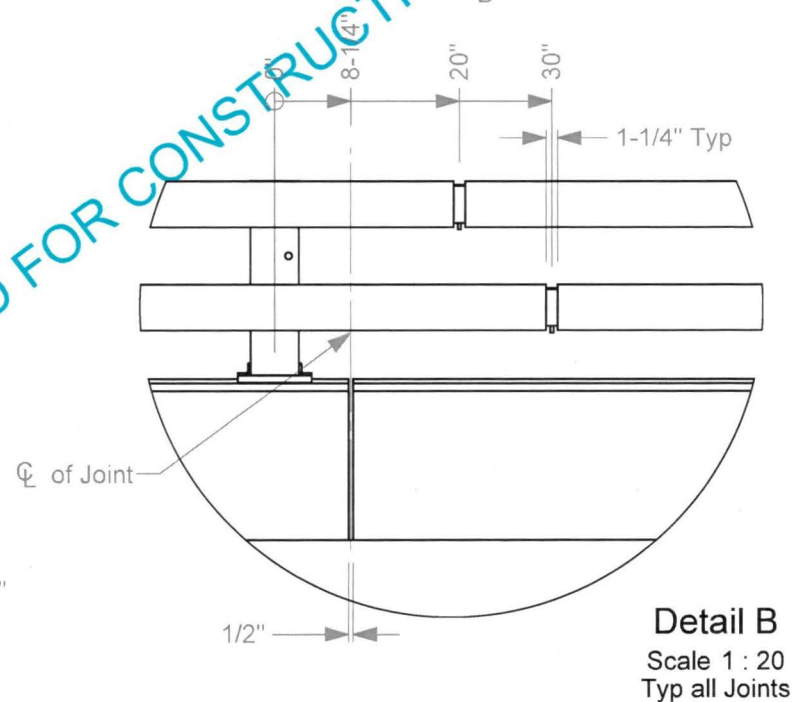
10/30/2018



**Section A-A**

Scale 1 : 20

See following sheets for details not shown here.



**Detail B**

Scale 1 : 20

Typ all Joints

1a. All steel components, including hardware and fabricated components, shall be galvanized.

1b. Threads not shown on Bolts, Threaded Rods, etc. for clarity.



Roadside Safety and Physical Security Division - Proving Ground

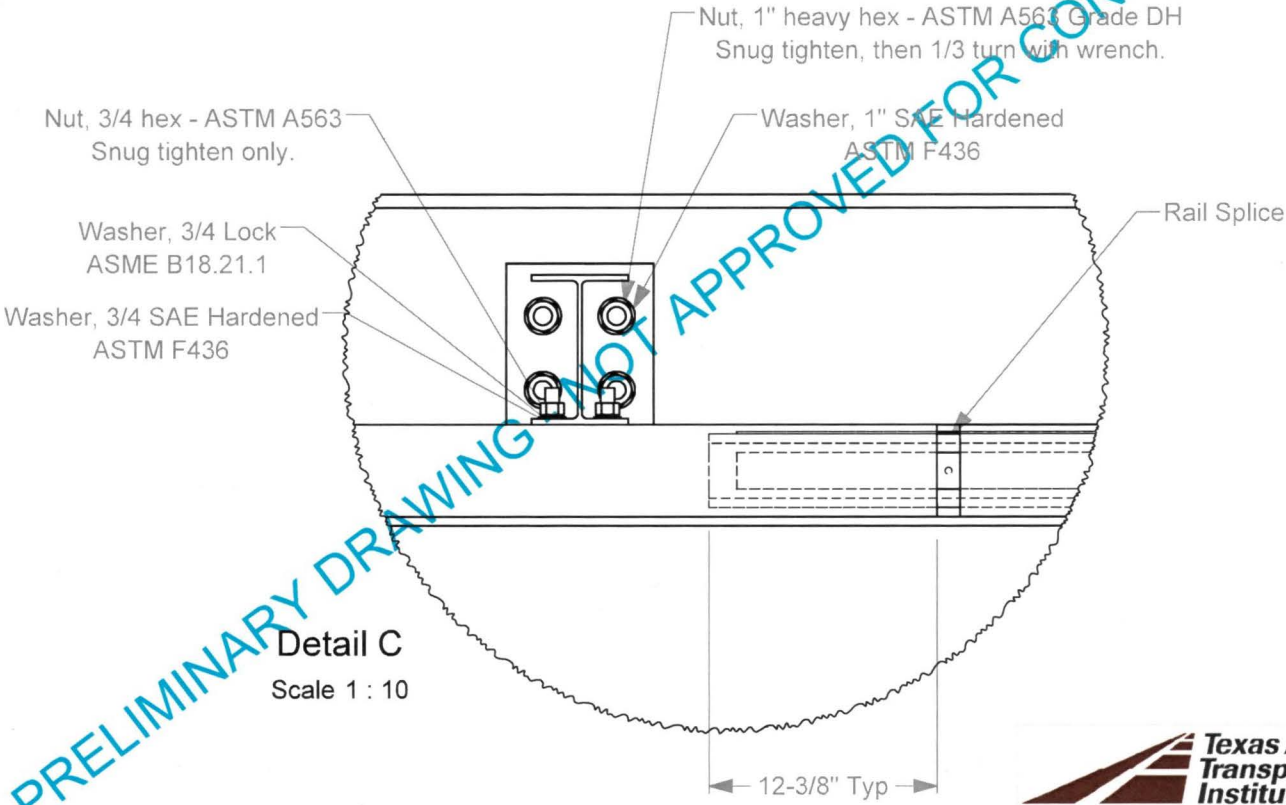
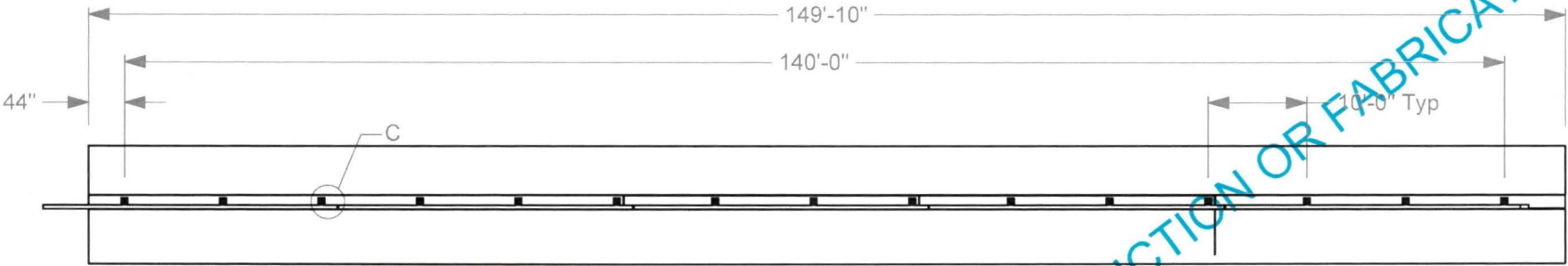
Project # PA Type 10M Bridge Barrier

2018-10-26

Drawn by GES Scale 1:200

Sheet 1 of 9 Elevation View

Plan View



PRELIMINARY DRAWING NOT APPROVED FOR CONSTRUCTION OR FABRICATION



Roadside Safety and  
Physical Security Division -  
Proving Ground

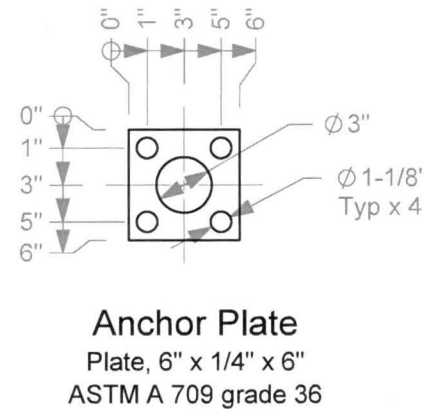
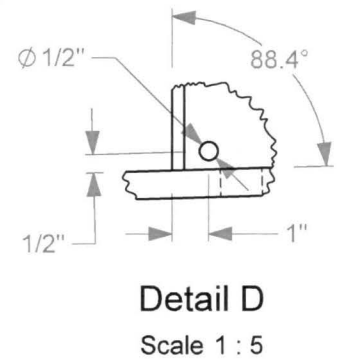
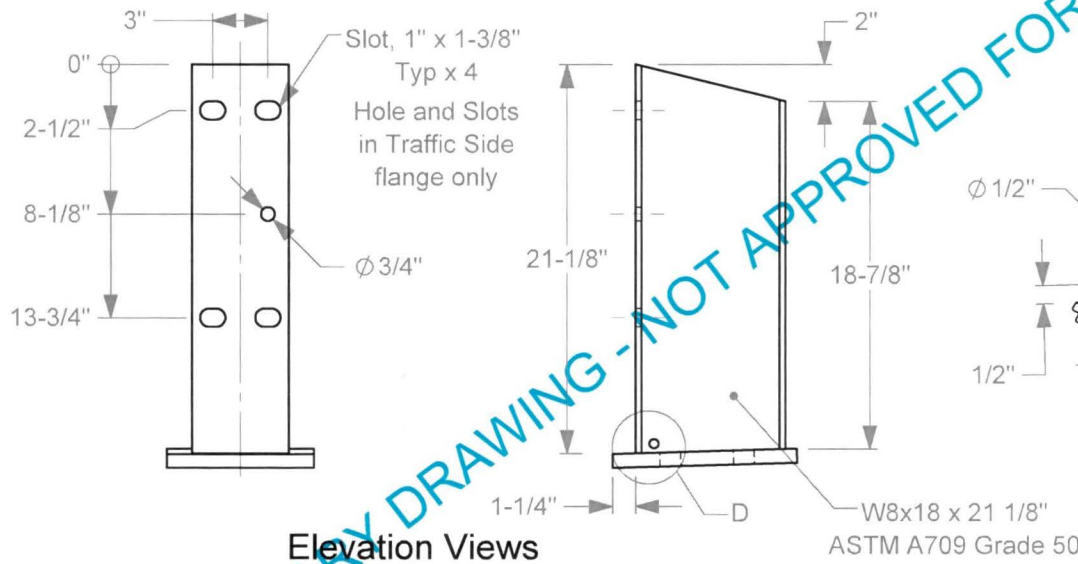
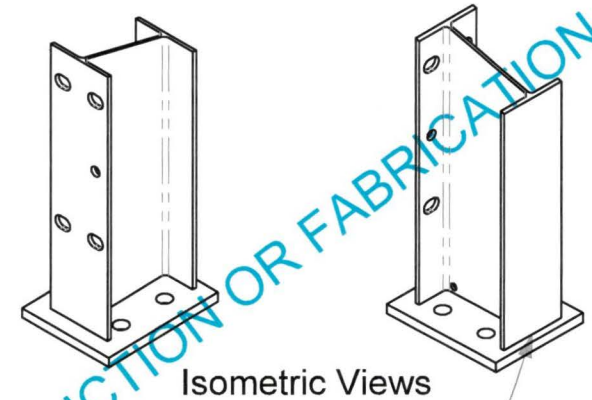
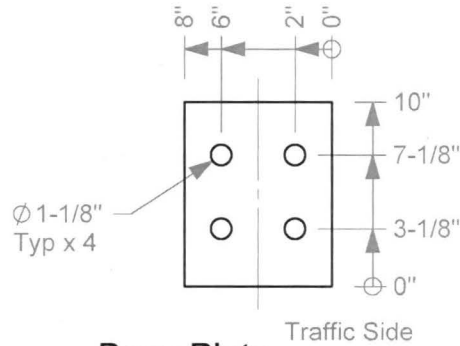
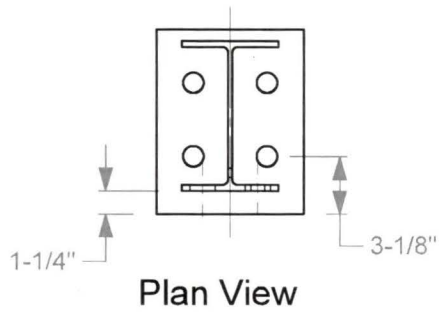
Project # PA Type 10M Bridge Barrier

2018-10-26

Drawn by GES Scale 1:200

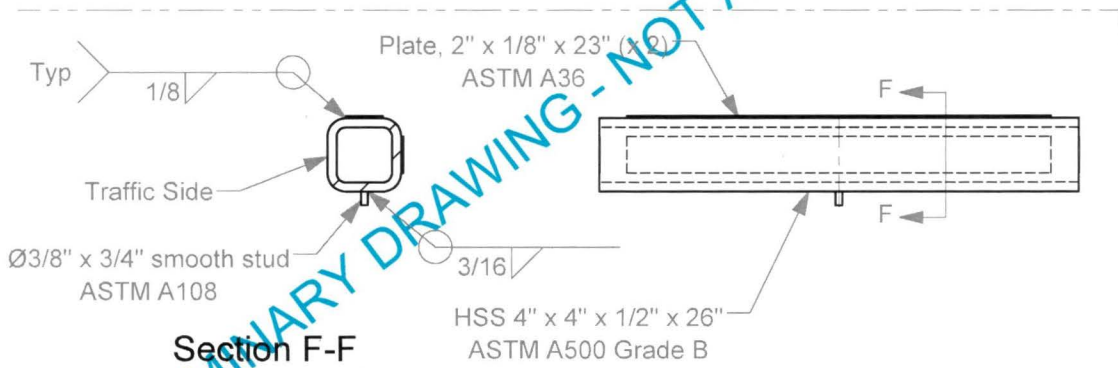
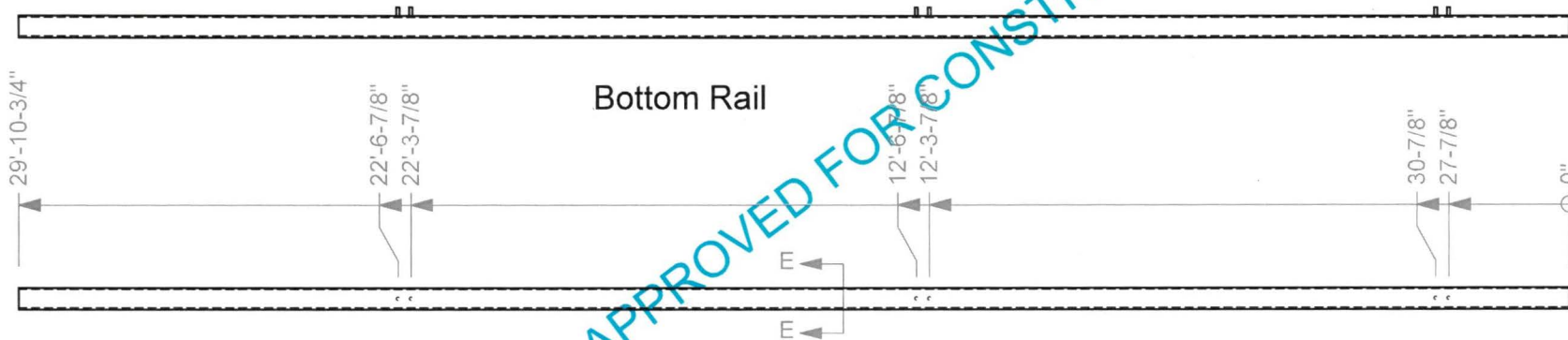
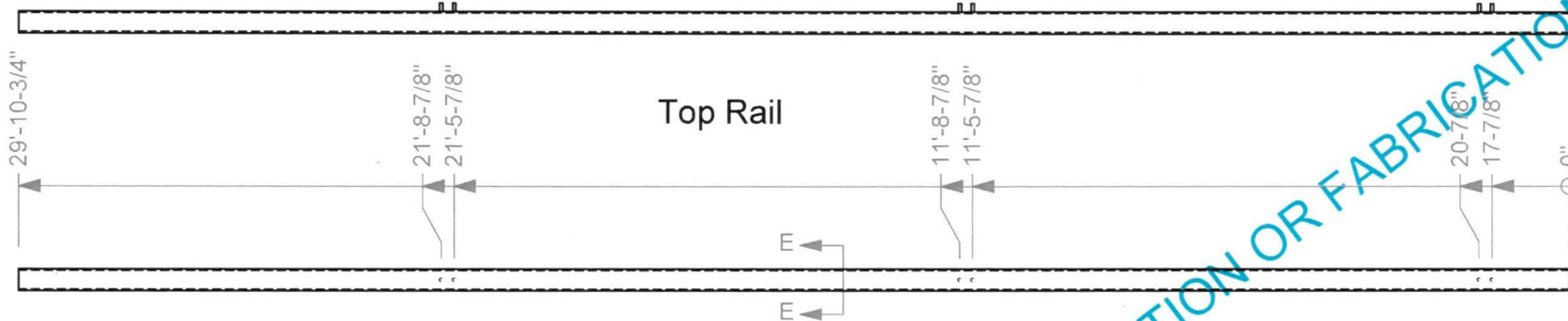
Sheet 2 of 9 Plan View

### Post Details



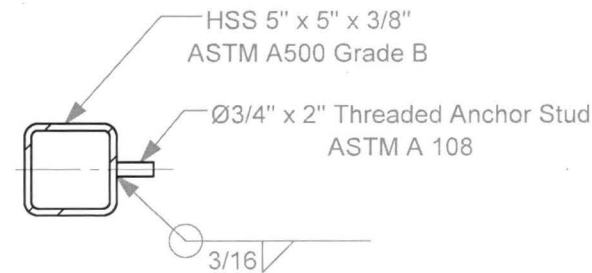
- 3a. Mill to Bear is defined as follows: A minimum of 25% of the Post web and compression flange end area must fit within 1/32" of the Base Plate, with no gap more than 0.040" for the remaining 75% of the end area.
- 3b. Galvanize all components after fabrication is complete.
- 3c. All welding must be performed by certified welders using industry standard practices.

# Rail Details



**Section F-F**  
Scale 1 : 10

**Rail Splice**



**Section E-E**  
Typ Top and Bottom Rails  
Scale 1 : 10

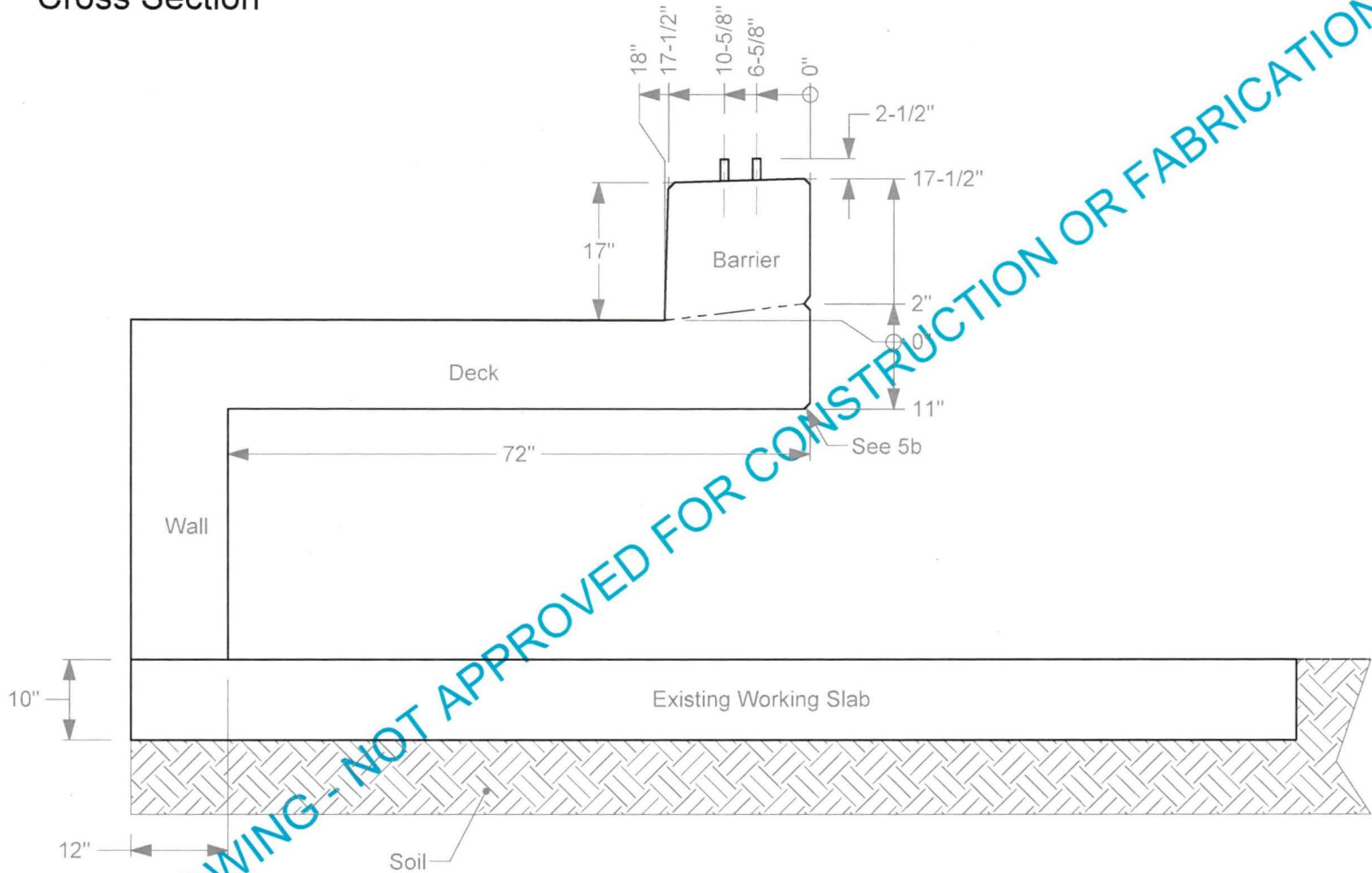
- 4a. All welding must be performed by certified welders using industry standard practices.
- 4b. Galvanize all components after fabrication is complete.



Roadside Safety and  
Physical Security Division -  
Proving Ground



# Cross Section



- 5a. Note 1/2" slope at top of Barrier and 1/2" slope on traffic face.
- 5b. Chamfer 3/4" each way at back of Deck, and top and back of Barrier, five places total.
- 5c. Rake finish construction joint between Barrier and Deck.
- 5d. The concrete strength shall be as follows: Working Slab and Moment Slab: minimum 3000 psi. Wall and Deck: 4000 psi. Barrier 3500 psi.



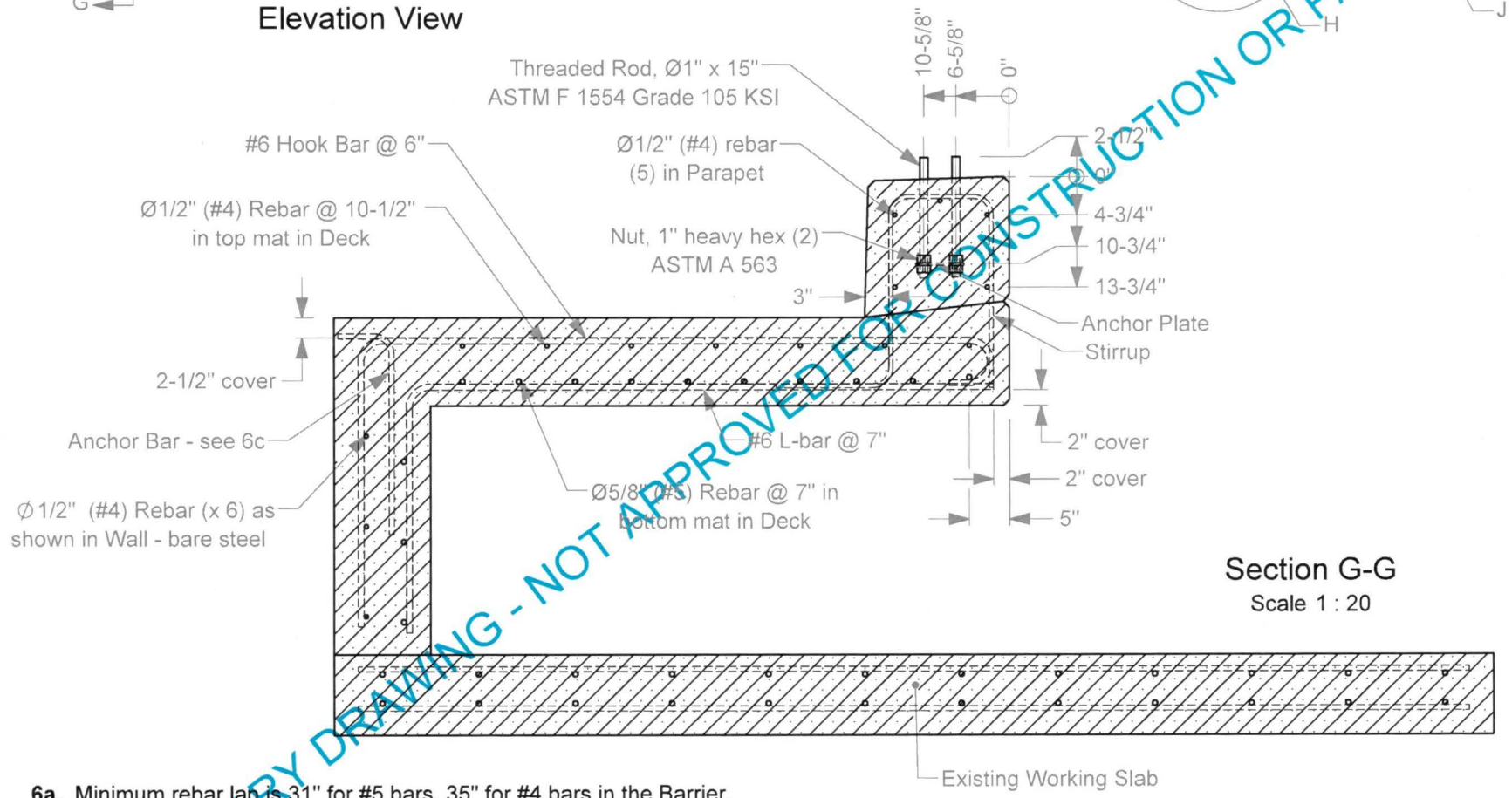
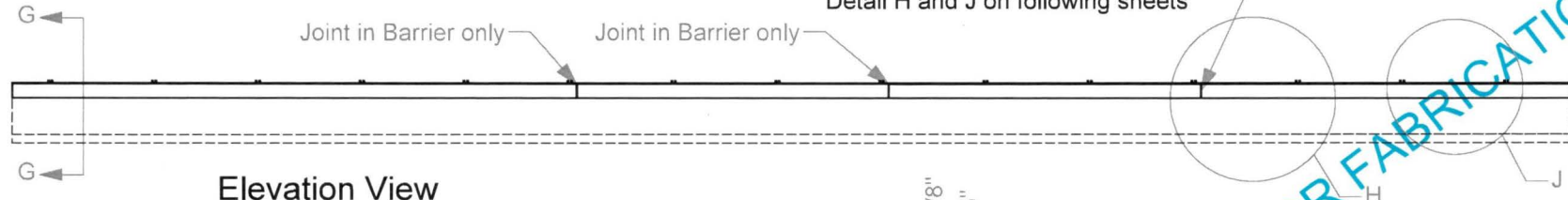
Roadside Safety and  
Physical Security Division -  
Proving Ground

Project # PA Type 10M Bridge Barrier 2018-10-26  
 Drawn by GES Scale 1:20 Sheet 5 of 9 Cross Section

# Rebar Placement

Detail H and J on following sheets

Joint in Barrier and Deck



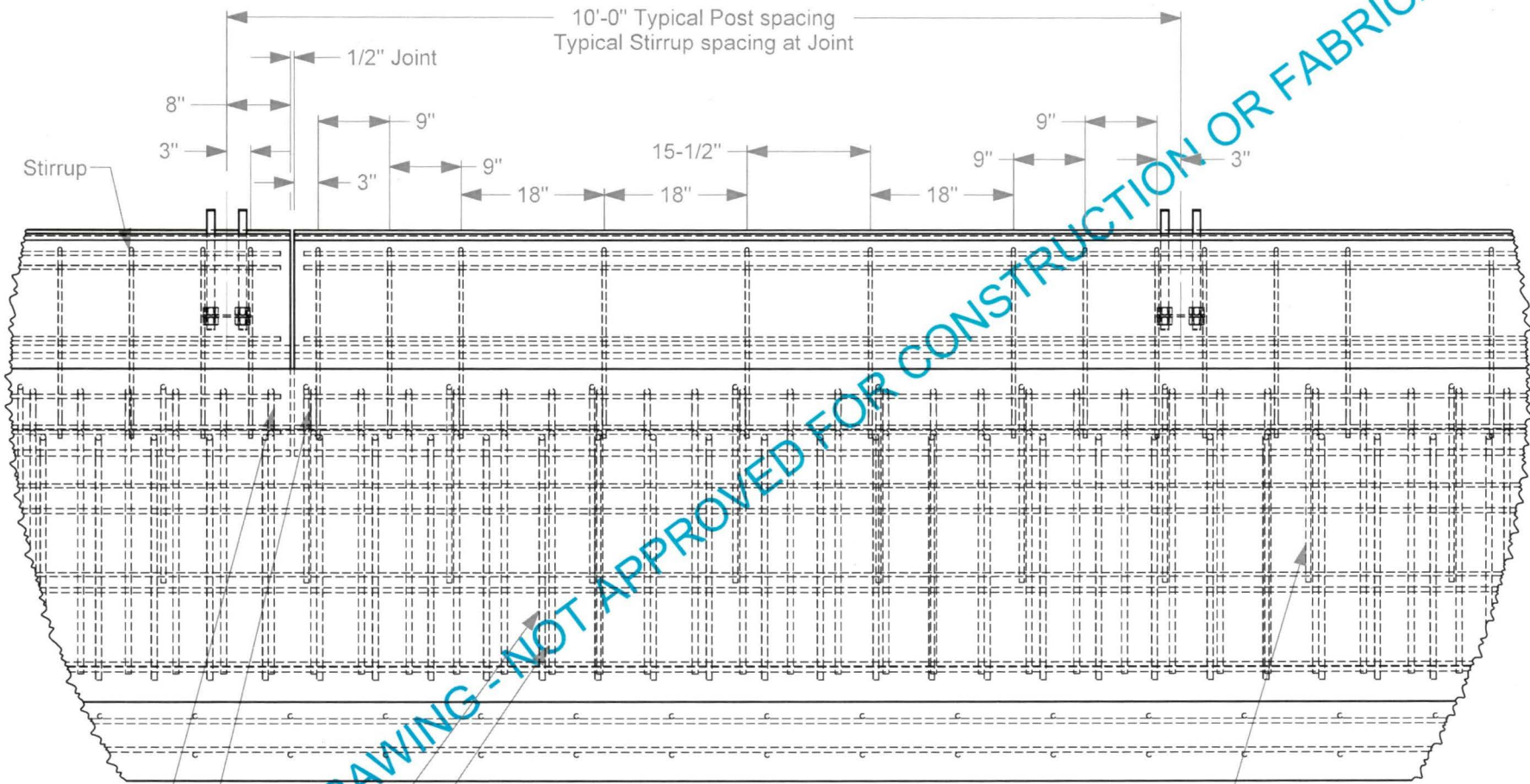
- 6a. Minimum rebar lap is 31" for #5 bars, 35" for #4 bars in the Barrier, and 25" for all other #4 bars.
- 6b. All rebar is grade 60, and epoxy coated unless otherwise indicated.
- 6c. The Anchor Bars weld to existing rebar (not shown here) protruding from the runway. Minimum 3" weld, bars at maximum 18" spacing.
- 6d. Rebar placement dimensions are to centerline unless otherwise indicated by "cover" or "cvr".



Roadside Safety and  
Physical Security Division -  
Proving Ground

Project # PA Type 10M Bridge Barrier 2018-10-26  
 Drawn by GES Scale 1:200 Sheet 6 of 9 Rebar Placement

T:\1-ProjectFiles\Gannett Fleming PennDOT-Work Order 4-Bullard\Drafting, GF-4\2018-10-10\10M Drawing



PRELIMINARY DRAWING - NOT APPROVED FOR CONSTRUCTION OR FABRICATION

**Detail H**  
Stirrup and Anchor Bolt spacing typical at all Joints.

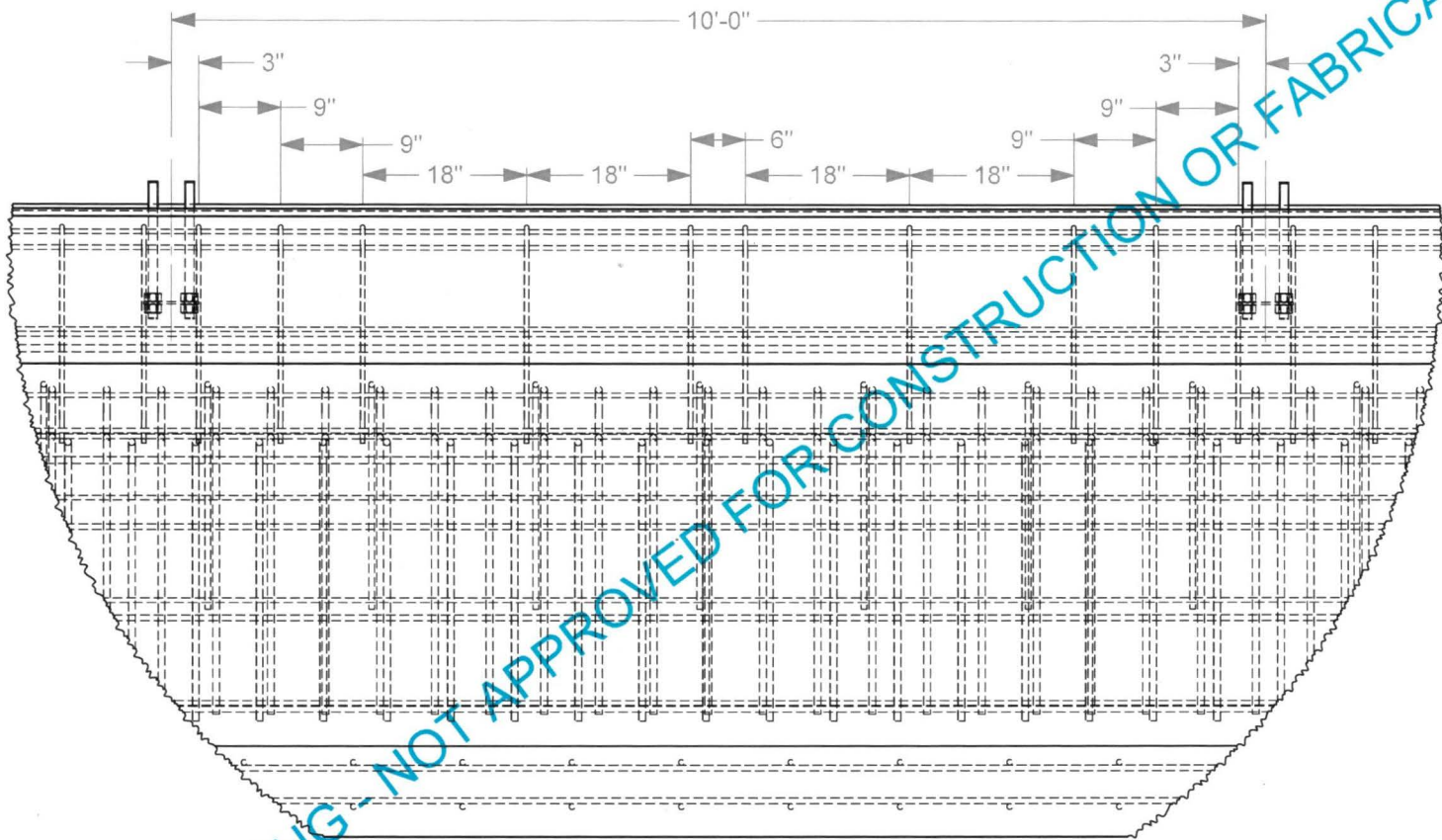
7d. Rebar placement dimensions are to centerline unless otherwise indicated by "cover" or "cvt".



Roadside Safety and Physical Security Division - Proving Ground

Project # PA Type 10M Bridge Barrier 2018-10-26  
 Drawn by GES Scale 1:20 Sheet 7 of 9 Detail H

T:\1-ProjectFiles\Gannet Fleming PennDOT-Work Order 4-Bullard\Drafting, GF-4\2018-10-10\10M Drawing



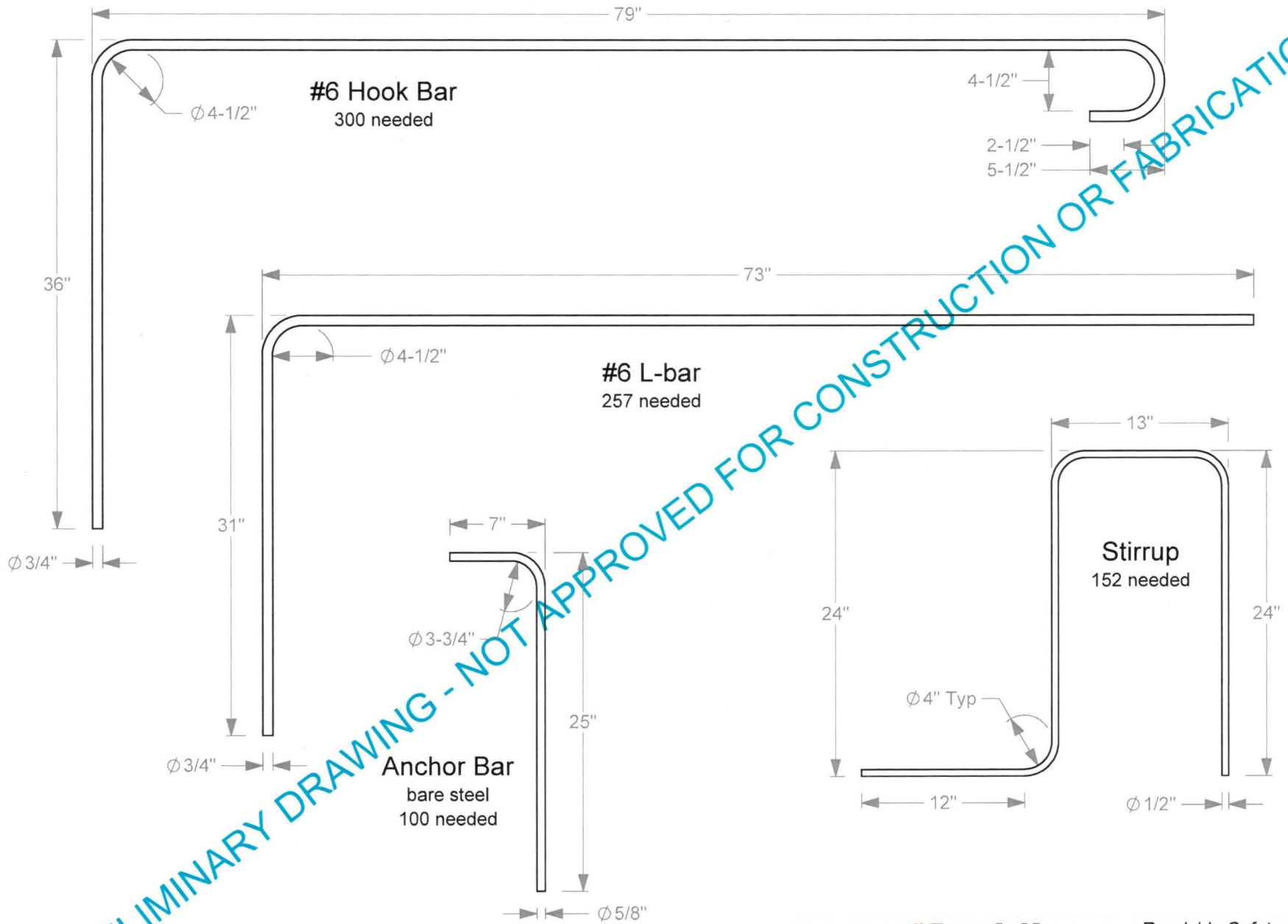
Detail J  
 Typical rebar spacing not at Joint.

86. Rebar placement dimensions are to centerline unless otherwise indicated by "cover" or "cvr".



Roadside Safety and  
 Physical Security Division -  
 Proving Ground

Project # PA Type 10M Bridge Barrier 2018-10-26  
 Drawn by GES Scale 1:20 Sheet 8 of 9 Detail J



PRELIMINARY DRAWING - NOT APPROVED FOR CONSTRUCTION OR FABRICATION

9a. All rebar is grade 60, and epoxy coated unless otherwise indicated.



Roadside Safety and  
Physical Security Division -  
Proving Ground

Project # PA Type 10M Bridge Barrier 2018-10-26  
 Drawn by GES Scale 1:10 Sheet 9 of 9 Rebar Bends