Mr. Brian Smith  
Trinity Highway Products, LLC  
2525 North Stemmons Freeway  
Dallas, Texas 75207  

Dear Mr. Smith:  

This letter is in response to your request for the Federal Highway Administration (FHWA) to review a roadside safety system for eligibility for reimbursement under the Federal-aid highway program.  

Name of system: Trinity SOFT-STOP Terminal for line posts with 8” wood offset blocks and a 1-foot offset from tangent (flare rate of 50:1).  

Type of system: W-Beam Guardrail Terminal  
Test Level: MASH Test Level 3 (TL-3)  
Testing conducted by: Original testing by Texas Transportation Institute  
Task Force 13 Designator: SEW22  
Date of request: August 18, 2012  
Date initially acknowledged: August 23, 2012  
Date of completed package: August 28, 2012  

Decision:  
The following device is eligible, with details provided in the form which is attached as an integral part of this letter:  
- Trinity SOFT-STOP Terminal for line posts with 8” wood offset blocks and a 1-foot offset from tangent (50:1 flare rate)  

Based on a review of previous crash tests submitted by the manufacturer certifying the device described herein meets the crash test and evaluation criteria of the American Association of State Highway and Transportation Officials’ Manual for Assessing Safety Hardware (MASH), the device is eligible for reimbursement under the Federal-aid highway program. Eligibility for reimbursement under the Federal-aid highway program does not establish approval or endorsement by the FHWA for any particular purpose or use.  

The FHWA, the Department of Transportation, and the United States Government do not endorse products or services and the issuance of a reimbursement eligibility letter is not an endorsement of any product or service.
Requirements
To be found eligible for Federal-aid funding, roadside safety devices should meet the crash test 
and evaluation criteria contained in the American Association of State Highway and 
Transportation Officials’ Manual for Assessing Safety Hardware (MASH).

Description
The device and supporting documentation are described in the attached form.

Summary and Standard Provisions
Therefore, the system described and detailed in the attached form is eligible for reimbursement 
and may be installed under the range of conditions tested.

Please note the following standard provisions that apply to FHWA eligibility letters:

• This letter provides a AASHTO/ARTBA/AGC Task Force 13 designator that 
  should be used for the purpose of the creation of a new and/or the update of existing 
  Task Force 13 drawing for posting on the on-line ‘Guide to Standardized Highway 
  Barrier Hardware’ currently referenced in AASHTO Roadside Design Guide.
• This finding of eligibility does not cover other structural features of the systems, 
  nor conformity with the Manual on Uniform Traffic Control Devices.
• Any changes that may influence system conformance with MASH will require a 
  new reimbursement eligibility letter.
• Should the FHWA discover that the qualification testing was flawed, that in-service 
  performance reveals safety problems, or that the system is significantly different 
  from the version that was crash tested, we reserve the right to modify or revoke this 
  letter.
• You are expected to supply potential users with sufficient information on design 
  and installation 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 the MASH.
• To prevent misunderstanding by others, this letter of eligibility is designated as 
  number CC-115A and 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 at our office 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. The FHWA does not become involved in issues concerning patent law. 
  Patent issues, if any, are to be resolved by the applicant.
The Trinity SOFT-STOP Terminal is a patented product and considered proprietary. If proprietary systems are specified by a highway agency for use on Federal-aid projects: (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with the existing highway facilities or that no equally suitable alternative exists; or (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411.

Sincerely yours,

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

Enclosures
Request for Federal Aid Reimbursement Eligibility
Of Highway Safety Hardware

Date of Request: August 16, 2012
Name: Don Gripne
Company: TRINITY HIGHWAY PRODUCTS, LLC
Address: 2525 STEM MONS FRE EWAY, DALLAS, TX 75207

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.

System Type | Device Name / Variant | Testing Criterion | Test Level
--- | --- | --- | ---
'CC': Crash Cushions, Attenuators, & T | TRINITY SOFT-STOP TERMINAL | AASHTO MASH | TL3

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 test / evaluation results meet the appropriate evaluation criteria in the MASH.

Identification of the individual or organization responsible for the product:

Contact Name: BRIAN SMITH
Company Name: TRINITY HIGHWAY PRODUCTS, LLC
Address 1: 2525 STEM MONS FRE EWAY
Address 2:
City/State/Zip: DALLAS/TX/75207
Country: USA

PRODUCT DESCRIPTION

Modification to Existing Hardware Non-Significant - Effect is positive or Inconsequential


This request is to modify the as-tested article as per CC-115 to include 8-inch wood block out for both line posts and post no 2 within the Trinity Soft Stop Terminal system. This modification also includes an offset 1-foot from tangent of the Trinity Soft Stop Terminal system as a flare rate of 50:1.

This modification is considered Non-significant, Effect is Positive or Inconsequential.
<table>
<thead>
<tr>
<th>Required Test Number</th>
<th>Narrative Description</th>
<th>Evaluation Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-30 (1100C)</td>
<td>As per TTI Crash Report 2009, an IIOOC (24251b) passenger car impacting the terminal end-on at a nominal impact speed and angle of 62 mi/h and 0 degree, respectively, with the quarter point of the vehicle aligned with the center line of the nose of the terminal. This test is primarily intended to evaluate occupant risk and vehicle trajectory criteria. The SOFT -STOP slowed and redirected the II OOC vehicle. No occupant compartment deformation occurred. The II OOC vehicle remained upright during and after the collision event. Maximum roll was 25 degrees, and maximum pitch was 7 degrees. Occupant risk factors were within the limits specified for MASH test 3-30. The vehicle subsequently came to rest 27 feet downstream of impact and 34 feet toward traffic lanes. The SOFT-STOP performed acceptably according to the evaluation criteria of MASH test 3-30.</td>
<td>WAIVER REQUEST</td>
</tr>
<tr>
<td>3-31 (2270P)</td>
<td>As per TTI Crash Report 2009, A 2270P (5000 lb) pickup truck impacting the terminal end-on at a nominal impact speed and angle of 62 mi/h and 0 degree, respectively, with the center line of the vehicle aligned with the center line of the nose of the terminal. This test is primarily intended to evaluate occupant risk and vehicle trajectory criteria. The SOFT-STOP brought the 2270P vehicle to a controlled stop. No occupant compartment deformation occurred. The 2270P vehicle remained upright during and after the collision event. Maximum roll was 4 degrees, and maximum pitch was -3 degrees. Occupant risk factors were within the limits specified for MASH test 3-31. The 2270P vehicle came to rest within the installation. The SOFT-STOP performed acceptably according to the evaluation criteria of MASH test 3-31.</td>
<td>WAIVER REQUEST</td>
</tr>
<tr>
<td>3-32 (1100C)</td>
<td>As per TTI Crash Report 2009, an IIOOC (24251b) passenger car impacting the terminal end-on at a nominal impact speed and angle of 62 mph and 5/15 degrees, respectively, with the center line of the vehicle aligned with the center line of the nose of the terminal. This test is primarily intended to evaluate occupant risk and vehicle trajectory criteria. The SOFT -STOP slowed and stopped the IIOOC vehicle. No occupant compartment deformation occurred. The II OOC vehicle remained upright during and after the collision event. Maximum roll was 28 degrees, and maximum pitch was -26 degrees. Occupant risk factors were within the limits specified for MASH test 3-32. The vehicle subsequently came to rest with the front of the vehicle adjacent to post 4 of the terminal, with most of the vehicle toward the field side. The SOFT -STOP performed acceptably according to the evaluation criteria of MASH test 3-32.</td>
<td>WAIVER REQUEST</td>
</tr>
<tr>
<td>3-33 (2270P)</td>
<td>As per TTI Crash Report 2009, the 2000P vehicle, traveling at an impact speed of 62.7 mi/h, impacted the nose of the Vertical Squisher end-on at an impact angle of 16.3 degrees. At 0.044 s after impact, the head of the terminal began to move along the rail, and at 0.093 s, the 2000P vehicle began to redirect toward the field side. The front right tire contacted the terminal at 0.207 s. The vehicle began to travel parallel with the guardrail at 0.285 s, at a speed of 48.2 mi/h (77.6 km/h). At 0.372 s, the 2000P vehicle overrode the terminal and lost contact with the guardrail and was traveling at an exit speed and angle of 51.7 mi/h (83.2 km/h) and 1.8 degrees, respectively. After completely exiting the installation, the 2000P vehicle partially traversed a steep mound of soil and came to rest on its right side 242 ft downstream and 30 ft toward the field side.</td>
<td>WAIVER REQUEST</td>
</tr>
</tbody>
</table>
# CRASH TESTING

A brief description of each crash test and its result:

<table>
<thead>
<tr>
<th>Required Test Number</th>
<th>Narrative Description</th>
<th>Evaluation Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-34 (1100C)</td>
<td>As per TTI Crash Report 2009, an 1100C (24251 lb) passenger car impacting the terminal at a nominal impact speed and angle of 62 mi/h and 15 degrees, respectively, with the corner of the vehicle bumper aligned with the critical impact point (CIP) of the length of need (LON) of the terminal. This test is primarily intended to evaluate occupant risk and vehicle trajectory criteria. The SOFT-STOP contained and redirected the 1100C vehicle. The vehicle did not penetrate or override the installation. Maximum dynamic deflection was 1.96 feet and the head fed through 6.2 feet of w-beam rail element. Maximum occupant compartment deformation was 1.0 inch inward in the area of the Instrument panel on the left side. The 1100C vehicle remained upright during and after the collision event. Maximum roll was 10 degrees, and maximum pitch was -4 degrees. Occupant risk factors were within the limits specified for MASH test 3-34. The vehicle subsequently came to rest 15 feet toward traffic lanes in front of post 8. The SOFT-STOP performed acceptably according to the evaluation criteria of MASH test 3-34.</td>
<td>WAIVER REQUEES</td>
</tr>
<tr>
<td>3-35 (2270P)</td>
<td>As per TTI Crash Report 2009, a 2270P (5000 lb) pickup truck impacting the terminal at a nominal impact speed and angle of 62 mi/h and 25 degrees, respectively, with the corner of the vehicle bumper aligned with the beginning of the LON of the terminal. This test is primarily intended to evaluate structural adequacy and vehicle trajectory criteria. The SOFT-STOP contained and redirected the 2270P. The vehicle did not under ride or override the installation. Although the w-beam rail anchorage released late in the impact event, the vehicle did not penetrate the installation. While the vehicle was in contact with the w-beam, the maximum dynamic deflection was 1.04 feet. However, the upstream anchor released and as the vehicle lost contact with the w-beam, the w-beam continued to deflect, reaching a maximum displacement of 11.6 feet. The kick panel of the left side was deformed inward 0.4 inch. The 2270P vehicle remained upright during and after the collision event. Maximum roll was -30 degrees, and maximum pitch was -12 degrees. Occupant risk factors were within the preferred limits specified for MASH test 3-31. The 2270P vehicle exited within the exit box. The SOFT-STOP performed acceptably according to the evaluation criteria of MASH test 3-35.</td>
<td>WAIVER REQUEES</td>
</tr>
<tr>
<td>3-36 (2270P)</td>
<td>As per TTI Crash Report 2009, a 2270P (5000 lb) pickup truck impacting the terminal at a nominal impact speed and angle of 62 mi/h and 25 degrees, respectively, with the corner of the vehicle bumper aligned with the CIP with respect to the transition to the stiff barrier or backup structure. As a w-beam guardrail terminal, the SOFT-STOP will never be attached directly to a backup structure, and the transition to a stiff barrier is basically at Post 3. Therefore, Trinity feels that Test 3-36 is irrelevant and was therefore not conducted. Eligibility Letter CC-115 indicated that MASH test 3-36 may be waived because the SOFT-STOP will not be connected to any stiffer device than W-beam guardrail.</td>
<td>WAIVER REQUEES</td>
</tr>
</tbody>
</table>
As per TII Crash Report 2009, a 2270P (5000 lb) pickup truck impacting the terminal at a nominal impact speed and angle of 62 mi/h and 25 degrees, respectively, mid-point between the nose and the end of the terminal in the reverse direction. This test is intended to evaluate the performance of a terminal for a "reverse" hit. However, researchers at TII believe that the reverse direction impact would be more critical for the II OOC (2425 lb) passenger car than for the 2270P pickup. Therefore, an II OOC (2425 lb) passenger car was used in Test 3-37. Eligibility Letter CC-115 indicated that the substitution of the II OOC vehicle to evaluate the reverse direction impact was appropriate.

As per TII Crash Report 2009, a 1500A (3307 lb) passenger car impacting the terminal end-on at a nominal impact speed and angle of 62 mi/h and 0 degree, respectively, with the center line of the vehicle aligned with the center line of the nose of the terminal. This test is primarily intended to evaluate the performance of the staged attenuator/terminal when impacted by a mid-size vehicle. The SOFT-STOP is not a staged device. Therefore Test 3-38 was not conducted. However, as per Appendix G of MASH, calculations based on Test 3-31 have been performed to predict the occupant risk values for the 1500A (3307 lb) vehicle. The results of these calculations (shown on the enclosed document) predict that in crash testing with the 1500A (3307 lb) vehicle, the SOFT-STOP Terminal, would perform acceptably according to the Test Level 3 (TL-3) evaluation criteria set out in the MASH guidelines for terminals. Eligibility Letter CC-115 indicates that test 3-38 is not necessary because the SOFT-STOP is not a staged device and that manufacturers calculations predict crash worthy performance with the 1500A vehicle.

3-40 (1100C) Does not apply to non-gating/energy absorbing devices.
3-41 (2270P) Does not apply to non-gating/energy absorbing devices.
3-42 (1100C) Does not apply to non-gating/energy absorbing devices.
3-43 (2270P) Does not apply to non-gating/energy absorbing devices.
3-44 (2270P) Does not apply to non-gating/energy absorbing devices.
3-45 (1500A) Does not apply to non-gating/energy absorbing devices.

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.):

<table>
<thead>
<tr>
<th>Laboratory Name:</th>
<th>Texas Transportation Institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory Contact:</td>
<td>Dean Alberson</td>
</tr>
<tr>
<td>Address:</td>
<td>3135 TAMU, College Station, TX. 77843-3135</td>
</tr>
<tr>
<td>Country:</td>
<td>USA</td>
</tr>
<tr>
<td>Accreditation Certificate Number and Date:</td>
<td>Mechanical 2821.01, Current date April 30, 2013</td>
</tr>
</tbody>
</table>

ATTACHMENTS

Attach to this form:
1) A copy of the Test Data Summary Sheet for each test conducted in support of this request.
2) 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 key to understanding the performance of the device should also be submitted to facilitate our
review.

FHWA Official Business Only:

<table>
<thead>
<tr>
<th>Eligibility Letter</th>
<th>AASHTO TF13</th>
<th>Key Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Date</td>
<td>Designator</td>
</tr>
<tr>
<td>CC-115A</td>
<td>August 31, 2012</td>
<td>SEW22</td>
</tr>
</tbody>
</table>
General Information
Test Agency: Texas Transportation Institute
Test No.: 220513-2-15
Date: 2008-09-01

Test Article
Type: Terminal
Name: Vertical Squisher
Installation Length: 147 ft-9 inches
Material or Key Elements: Tensioned 12-gauge W-beam guardrail terminal

Soil Type and Condition: Standard Soil, Damp
Test Vehicle
Type/Designation: 2000P
Make and Model: 1997 Chevrolet C2500 Pickup
Curb: 4683
Test Inertial: 4594
Dummy: No dummy
Gross Static: 4594

Impact Conditions
Speed: 62.6 mph
Location: 0.4 degrees
Exit Conditions
Speed: N/A
Orientation: End-on

Impact Velocity
Longitudinal: 21.3 ft/s
Lateral: 2.6 ft/s
Ridedown Accelerations
Longitudinal: -8.1 g's
Lateral: 6.6 g's
THIV: 23.6 km/h
PHD: 8.3 g's
Max. 0.050-s Average
Longitudinal: 6.2 g's
Lateral: 3.3 g's
Vertical: -2.8 g's

Occupant Risk Values
Maximum Yaw Angle: 150 degrees
Maximum Pitch Angle: 10 degrees
Maximum Roll Angle: 18 degrees

Post-Impact Trajectory
Stopping Distance: 48.1 ft downstream
16 ft behind

Vehicle Stability
Maximum Yaw Angle: 150 degrees
Maximum Pitch Angle: 10 degrees
Maximum Roll Angle: 18 degrees

Test Article Deflections
Dynamic: 30.0 ft
Permanent: 30.0 ft
Working Width: 22.2 ft

Vehicle Damage
VDS: 12FC2
CDC: 12FCW2
Max. Exterior Deformation: 17.7 inches
Max. Occupant Compartment Deformation: 0

OCDI: FS0000000

Figure 24. Summary of results for NCHRP Report 350 test 3-31 on the Vertical Squisher.
Figure 38. Summary of results for NCHRP Report 350 test 3-33 on the Vertical Squisher.
General Information
Test Agency: Texas Transportation Institute
Test No: 220513-2-16
Date: 2008-09-23

Test Article
Type: Terminal
Name: Vertical Squisher
Installation Length: 147 ft 9 inches
Material or Key Elements: Tensioned 12-gauge W-beam guardrail terminal

Soil Type and Condition: Standard Soil, Dry

Test Vehicle
Type/Designation: 820C
Make and Model: 1995 Chevrolet Metro
Curb: 1823 lb
Test Inertial: 170 lb
Dummy: 170 lb
Gross Static: 1993 lb

Impact Conditions
Speed: 61.7 mi/h
Angle: 13.6 degrees
Location/Orientation
Exit Conditions
Speed: 23.0 mi/h
Angle: 81.1 degrees
Occupant Risk Values
Impact Velocity
Longitudinal: 21.3 ft/s
Lateral: 18.4 ft/s
Ride-Down Accelerations
Longitudinal: 14.1 g's
Lateral: 10.5 g's
THIV: 27.6 km/h
PHD: 17.3 g's
Max. 0.050-s Average
Longitudinal: 10.1 g's
Lateral: 6.6 g's
Vertical: -2.2 g's

Post-Impact Trajectory
Stopping Distance: 43.75 ft downstream

Vehicle Stability
Maximum Yaw Angle: -172 degrees
Maximum Pitch Angle: 5 degrees
Maximum Roll Angle: 6 degrees

Test Article Deflections
Dynamic: 1.49 ft
Permanent: 1.47 ft
Working Width: 2.19 ft

Vehicle Damage
VDS: 11LFQ4
CDC: 11FLEW3
Max. Exterior Deformation: 13.4 inches
Max. Occupant Compartment Deformation: 8.5 inches
OCDI: LF0021000

Figure 31. Summary of results for NCHRP Report 350 test 3-34 on the Vertical Squisher.
Figure 17. Summary of results for NCHRP Report 350 test 3-35 on the Vertical Squisher.
<table>
<thead>
<tr>
<th>General Information</th>
<th>Impact Conditions</th>
<th>Post-Impact Trajectory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Agency ..........</td>
<td>Speed .............</td>
<td>Stopping Distance ........</td>
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<td>Texas Transportation Institute</td>
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<td>Location/Orientation</td>
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<tr>
<td>220513-2-9</td>
<td>Post 3/reverse</td>
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<tr>
<td>Date .................</td>
<td>Exit Conditions</td>
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<tr>
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<td>Test Article ..........</td>
<td>Angle .............</td>
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<tr>
<td>Terminal</td>
<td>Maximum Yaw Angle</td>
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<tr>
<td>Vertical Squisher</td>
<td>-79 degrees</td>
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<tr>
<td>Type ..................</td>
<td>Maximum Pitch Angle</td>
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<td>Terminal</td>
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<tr>
<td>Name ..................</td>
<td>Maximum Roll Angle</td>
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<tr>
<td>Vertical Squisher</td>
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<td>2.9 ft</td>
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<td>14.1 ft/s</td>
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<td>2000 Chevrolet Geo</td>
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<td>Soil Type and Condition</td>
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<td>Standard Soil, Moist</td>
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<td>Impact Velocity</td>
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<td>Ridedown Accelerations</td>
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<td>42.2 km/h</td>
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<td>Maximum Roll Angle</td>
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<tr>
<td>2.9 ft</td>
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Figure 10. Summary of results for NCHRP Report 350 modified test 3-39 on the Vertical Squisher.
APPENDIX A. DETAILED DRAWINGS OF VERTICAL SQUISHER FOR TEST 220513-2-9
PLAN VIEW

NOTE: -4' OFFSET FROM POST 1 TO POST 6
-ALL MEASUREMENTS ARE TO THE BACKSIDE OF RAIL AT THE POST

SLOTTED W-BEAM GUARD RAIL

FLARE STARTS AT POST 6

POST 1 POST 2 POST 3 POST 4 POST 5 POST 6 POST 7 POST 8

31"

POST DETAIL C
SQUISHER DETAIL D
PLATE DETAIL E
MODIFIED CRP POST DETAIL A

ELEVATION VIEW SOUTH TERMINAL

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TXAS TRANSPORTATION INSTITUTE
COLLEGE STATION, TEXAS 77843

Revision | Project No. | Date | Drawn By | Scale
--- | --- | --- | --- | ---
1 | 220513 | 01/08 | JB | 1:200
2 | 02/19/08 | JB | | 1:200
3 | 02/22/08 | JB | | 1:200
4 | VERTICAL SQUISHER 9 | | | 1:200
12" BLOCKOUT DETAIL F
SQUISHER DETAIL D

PLAN VIEW

W-BEAM GUARDRAIL
SLOTTED W-BEAM GUARDRAIL

ELEVATION VIEW
REAR TERMINAL

The Texas A&M University System
MODIFIED CRP
WITH 15° OFFSET
DETAIL A

ANCHOR ASSEMBLY
W/ 15° OFFSET
DETAIL A-A
ELEVATION VIEW

PLAN VIEW
ROD DETAIL A-A-5

5/16" X 2 1/2" HEX BOLT WITH HEX NUT AND FLAT WASHER

KEEPER PLATE
DETAIL A-A-6

26 GAUGE
POSTS 2 THROUGH 28
SYTP-W6X8.5
DETAIL B

POSTS 1 AND 29
SYTP-W6X8.5
POST 1 DETAIL C
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NOTE:
- ALL COMPONENTS ARE 6.35 THK. (1/4")

ELEVATION VIEW

PLAN VIEW

SQUIsher DETAIL D

END VIEW
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Texas Transportation Institute
College Station, Texas 77843

Sheet No. 9 of 12

The Texas A&M University System

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Dec 18, 2010 - 7:53am
PLATE DETAIL E

NOTE:

- USE 2–3/4" GR. 5 BOLTS
- 1/2" THK. PLATE IS NOTCHED TO RECEIVE A BOLT
- WELDS ARE ON BOTH SIDES OF PLATE
SLOTTED W-BEAM GUARDRAIL

W-BEAM GUARDRAIL
ARTBA RWM04a
COLD FORMED CHANNEL (1/4" PLATE)

SEE DETAIL I

3/4" X 2" SLOT

SEE DETAIL J

STRUT SIDE VIEW

DETALLE H

STRUT PLATE DETAIL I

THK. 1/4"

STRUT END VIEW

DETALLE J
NOTE: -POSTS 1-8, 26 ARE SYTP POSTS
-POSTS 9-25 ARE STD. LINE POSTS
-RAIL DROPS FROM 31° AT POST 9 TO
273/8" AT POST 11.
-POST 2 ATTACHED TO RAIL WITH
COUNTERSUNK BOLT & FLANGE PROTECTOR.
-RAIL ATTACHED TO POSTS 3-26 WITH STD.
BUTTON HEAD BOLT.

NOTE: -4' OFFSET FROM POST 1 TO POST 9
-ALL MEASUREMENTS ARE TO THE
FIELDSIDE OF GUARDRAIL AT POST
-NO BLOCKOUTS POSTS 1, 2 & 27.

FLARE STARTS AT POST 9 & HEIGHT TRANSITIONS FROM 27-5/8 INCHES TO
31 INCHES BETWEEN POSTS 9 AND 11
GUARDRAIL DETAIL J TYP.
GUARDRAIL DETAIL L

NOTE: -POSTS 1-8, 26 ARE SYTP POSTS
-POSTS 9-25 ARE STD. LINE POSTS
-RAIL DROPS FROM 31° AT POST 9 TO
273/8" AT POST 11.
-POST 2 ATTACHED TO RAIL WITH
COUNTERSUNK BOLT & FLANGE PROTECTOR.
-RAIL ATTACHED TO POSTS 3-26 WITH STD.
BUTTON HEAD BOLT.
NOTE: 
- 4' OFFSET FROM POST 1 TO POST 9.
- ALL MEASUREMENTS ARE TO THE
  FIELDside OF GUARDRAIL AT POST.
- NO BLOCKOUT AT POSTS 1 & 2.
- RAIL DROPS FROM 31" AT POST 9
  TO 27½" AT POST 11.
8" BLOCKOUT DETAIL G
ET PLUS DETAIL M

PLAN VIEW
DOWNSTREAM TERMINAL

POST 20
POST 21
POST 22
POST 23
POST 24
POST 25
POST 26
POST 27

[Diagram showing layout of posts and details]

ELEVATION VIEW
DOWNSTREAM TERMINAL

NOTE: -NO BLOCKOUT AT POST 27

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Sheet No.

VERTICAL SQUISHER 14-17

Dec. 19, 2011 - 1/14/11
MODIFIED CRP WITH 15° OFFSET DETAIL A

STANDARD CRP WITH 20° OFFSET DETAIL A-1
ANCHOR ASSEMBLY
WITH 15° OFFSET
DETAIL A-A

A-36 STEEL PLATE WASHER
DETAIL A-A-1
A-36 STEEL FLANGE PLATE
DETAIL A-A-2

KEEPER PLATE
DETAIL A-A-3

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Sheet No. 6 of 18
5/16" HEX BOLT A-307 OR EQUIVALENT

NOTE: WASHERS ARE UNDER THE HEAD AND THE NUT

1/2" THK. A36 STL. PLATE

CRP SIDE PLATE
DETAIL A-A-5
6"x2" COLD ROLLED CHANNEL A36 STEEL

DETAIL E-C

DETAIL E-D
7"x2" COLD ROLLED CHANNEL DETAIL E-E
A36 STEEL

STRAP DETAIL E-F
A36 STEEL

GUSSET DETAIL E-G
A36 STEEL

STRAP DETAIL E-H
A36 STEEL

7/8" THK

1/4" THK

3/4" THK

1/4" THK

1/4" THK

3/8" Holes

1" TYP.

VERTICAL SQUISHER 14-17

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Project No. Date Drawn By
220513-2 08/09/23 NDE

Scale

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A36 STEEL
THROAT DETAIL E-J
A36 STEEL

TOP OF THROAT DETAIL E-K
A36 STEEL

BOTTOM OF THROAT DETAIL E-L
A36 STEEL

NOTE: -1/4" BEVEL FOR WELDING ON DETAILS E-J, E-K, E-L

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Revisions:
1. Project No. 220515-2 08/09/23 NDE

Sheet No. 12 of 18

Dec 18, 2018 - 2 Hzp
A-36 STEEL PLATE
DETAIL F

NOTE: USE 2-2 1/2"x3/4" GR. 5 BOLTS
1/2" THK. PLATE IS NOTCHED TO RECEIVE STUD

8" WOOD BLOCKOUT TYP.
(AASHTO-AGC-ARTBA# PDB01)
DETAIL G

ASSEMBLY DETAIL F-A

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NOTE: 
- UPSTREAM END ATTACHED TO CRP POST DETAIL A WITH A 9"x3/8" A307 HEX HEAD BOLT. 
- DOWNSTREAM END ATTACHED TO POST 1 WITH A 1 1/2"x3/8" A307 HEX HEAD BOLT.
SLOTTED W-BEAM GUARDRAIL 12 GA.  
(AASHTO M-180, CLASS A, TYPE 2)  
DETAIL I

W-BEAM GUARDRAIL 12 GA.  
(AASHTO-AGC-ARTBA# RWM04a)  
DETAIL J

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CLEVELAND CITY FORGE GALVANIZED CLEVIS PART#CL25

7/8"HEAVY HEX NUT

AASHTO-AGC-ARTBA# FCA (EXCEPT L=55½")

ET PLUS DETAIL M

CABLE FOR TRAPEZOIDAL ANCHOR DETAIL N