



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

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

April 28,2020

In Reply Refer To:
HSST-1/B-336

Mr. John Lee
ETI USA, Inc.
14 Ormond Park Road
Glen Head, NY 11545
USA

Dear Mr. Lee:

This letter is in response to your January 15, 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-336 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:

- ETI USA Thrie Beam to ETI Roller Barrier Transition

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: ETI USA Thrie Beam to ETI Roller Barrier Transition
Type of system: Longitudinal Barrier Transition
Test Level: MASH Test Level 3 (TL3)
Testing conducted by: Applus IDIADA KARCO Engineering, LLC.
Date of request: January 15, 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-336 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 cursive script that reads "Michael S. Griffith".

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:	January 15, 2020	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Steven Matsusaka	
	Company:	Applus IDIADA KARCO Engineering, LLC.	
	Address:	9270 Holly Road, Adelanto, CA 92301	
	Country:	United States of America	
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	ETI USA Thrie Beam to ETI Roller Barrier Transition	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 evaluation results meet the appropriate evaluation criteria in the MASH.

Individual or Organization responsible for the product:

Contact Name:	John Lee	Same as Submitter <input type="checkbox"/>
Company Name:	ETI USA, Inc.	Same as Submitter <input type="checkbox"/>
Address:	14 Ormond Park Road, Glen Head, NY 11545	Same as Submitter <input type="checkbox"/>
Country:	United States of America	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.

ETI USA, Inc. and Applus IDIADA Karco Engineering, LLC. share no (\$0.00) financial interests between the two organizations. This includes no (\$0.00) financial interest but not limited to:

- i. Compensation, including wages, salaries, commissions, professional fees, or fees for business referrals (dollar values are not needed);
- ii. Consulting relationships;
- iii. Research funding or other forms of research support;
- iv. Patents, copyrights, and other intellectual property interests;
- v. Licenses or contractual relationships; or
- vi. Business ownership and investment interest.

PRODUCT DESCRIPTION

- New Hardware or Significant Modification
 Modification to Existing Hardware

The as-tested system described herein is a transition from a Thrie-beam approach guardrail to the ETI Roller Barrier. The transition is designed to provide a means to attach the ETI Roller Barrier to a standard W-beam guardrail system. In order to transition from a W-beam guardrail system to the ETI Roller Barrier, the W-beam system is first transitioned to a Thrie-beam approach guardrail which then transitions to the ETI Roller Barrier. The as-tested system consisted of a 50.0 ft. (15.2 m) length of Midwest Guardrail System (MGS) with standard post spacing (SGR20a), a Trailing-End Anchorage System (SEW31) on the upstream end of the MGS, a MGSW-beam to Thrie-beam Transition with Standard Posts (STG03a), 12.5 ft. (3.8 m) of stiffened Thrie-beam approach guardrail, the Thrie-beam to ETI Roller Barrier connector piece, and 78.7 ft. (24.0 m) of ETI Roller Barrier. The total as-tested system length was 178.2 ft. (54.3 m).

The ETI Thrie-beam to Roller Barrier Transition was installed between the downstream end of a stiffened Thrie-beam approach guardrail and the upstream end of an ETI Roller Barrier. The ETI Thrie-beam to Roller Barrier Transition consists of one (1) ETI Roller Barrier line post and one (1) ETI Thrie-beam to Roller Barrier Connector. The ETI Roller Barrier line post consists of two (2) parts: one (1) outer post constructed of 7.2 ft. (2.2 m) long, 140 mm diameter by 4.5 mm wall thickness round steel post and one (1) inner post constructed of 2.3 ft. (0.7 m) long, 125 mm diameter by 4.3 mm wall thickness round steel post. The ETI line posts are installed by inserting the inner post into the outer post and driving the posts into the soil together using the top of the inner post as the driving surface. The line post is spaced 15.13 in. (385 mm) downstream of the last Thrie-beam post and 15.13 in. (385 mm) upstream of the first ETI Roller Barrier post.

The ETI Thrie-beam to Roller Barrier Connector consists of a modified Thrie-beam Type TC end cap connector attached to a steel bracket manufactured by ETI USA. The steel bracket has overall dimensions of 30.5 in. (776 mm) wide by 28.0 in. (710 mm) tall and has flanges at the top and bottom which attach the bracket to the ETI Roller Barrier's upper and lower frame rails. The modified Thrie-beam Type TC end cap connector is attached to the traffic side face of the steel bracket on one end and to the Thrie-beam guard rail on the other.

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:	Steven Matsusaka	
Engineer Signature:	Steven Matsusaka	Digitally signed by Steven Matsusaka DN: cn=Steven Matsusaka, email=steven.matsusaka@idiada.com, c=US Date: 2020.01.16 16:53:19 -08'00'
Address:	9270 Holly Road, Adelanto, CA 92301	Same as Submitter <input checked="" type="checkbox"/>
Country:	United States of America	Same as Submitter <input checked="" type="checkbox"/>

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-10 (1100C)	Test for Longitudinal Barrier LON. Test 3-10 was conducted on the ETI USA Roller Barrier and covered in FHWA Eligibility Letter B-291.	Non-Relevant Test, not conducted
3-11 (2270P)	Test for Longitudinal Barrier LON. Test 3-11 was conducted on the ETI USA Roller Barrier and covered in FHWA Eligibility Letter B-291.	Non-Relevant Test, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-20 (1100C)	Test 20 for a transition section is an optional test to evaluate the occupant risk and post-impact trajectory criteria. Test 3-20 was not conducted.	Non-Relevant Test, not conducted
3-21 (2270P)	<p>Applus IDIADA KARCOTest No. P39240-01. A 2270P test vehicle impacting the barrier at a nominal impact speed and angle of 62 mph and 25°, respectively, with the corner point of the bumper aligned with the Critical Impact Point (CIP). This test is primarily intended to evaluate the performance of a transition between two longitudinal barriers with different lateral stiffnesses.</p> <p>A 2014 RAM 1500 4-door pickup truck with a test inertial mass of 5033.1 lbs (2283.0 kg) impacted the terminal at a velocity of 65.78 mph (105.86 km/h) and an angle of 25.0°, 6.7 ft. (2.0 m) upstream from the first ETI Roller Barrier post.</p> <p>The system contained and redirected the vehicle within the exit box and with a Working Width of 39.3 in. (998 mm). The occupant compartment was not penetrated and deformation limits were not exceeded. The Occupant Impact Velocities (OIV) were 25.3 ft/s (7.7 m/s) and 18.4 ft/s (5.6 m/s) in the x- and y-directions, respectively. The Ridedown Accelerations were -11.9 g and -8.4 g, respectively. The ETI USA Thrie Beam to Roller Barrier Transition met all of the requirements for MASH Test 3-21.</p>	PASS

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:	Applus IDIADA KARCO Engineering, LLC.	
Laboratory Signature:	Steven Matsusaka	DN: cn=Steven Matsusaka, email=steven.matsusaka@idiada.com, c=US Digitally signed by Steven Matsusaka Date: 2020.01.16 16:53:27 -08'00'
Address:	9270 Holly Road, Adelanto, CA 92301	Same as Submitter <input checked="" type="checkbox"/>
Country:	United States of America	Same as Submitter <input checked="" type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	TL-371: July 2019 - July 2022	

SubmitterSignature*: Steven
Matsusaka

Digitally signed by Steven Matsusaka
DN: cn=Steven Matsusaka,
email=steven.matsusaka@idada.com, c=US
Date: 2020.01.16 16:53:45 -0800

Submit Form

ATTACHMENTS

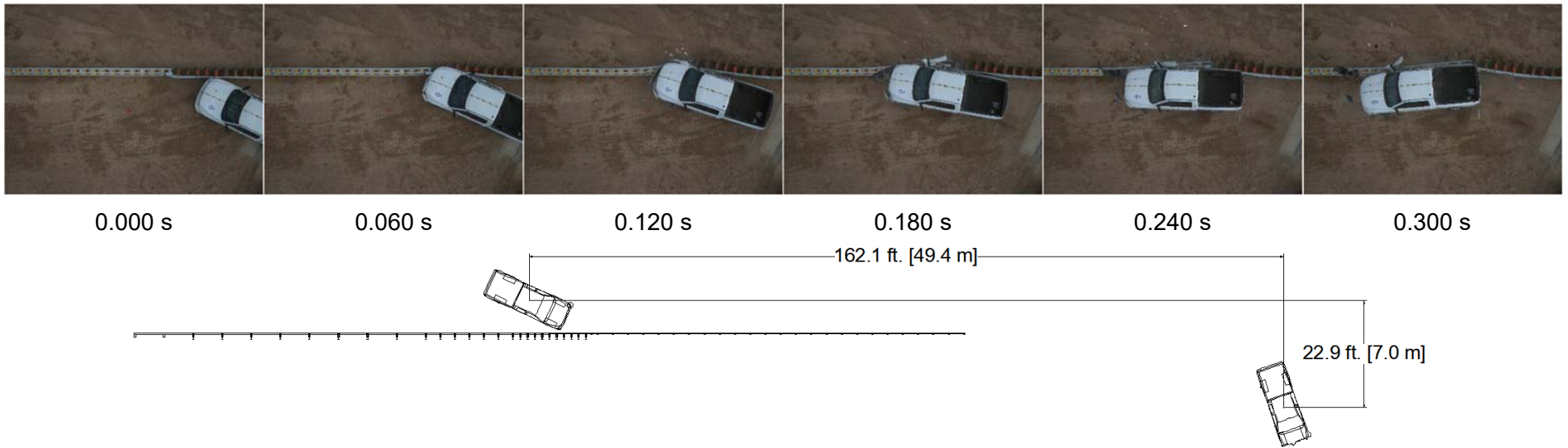
Attach to this form:

- 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

MASH 2016 Test 3-21 Summary



GENERAL INFORMATION

Test Agency: Applus IDIADA KARCO
 IDIADA KARCO Test No.: P39240-01
 Test Designation: 3-21
 Test Date: 9/6/19

TEST ARTICLE

Name / Model: Thrie Beam to ETI Roller Barrier
 Type: Transition
 Installation Length: 178.2 ft. (54.3 m)
 Road Surface: Medium to fine silty sand

TEST VEHICLE

Type / Designation: 2270P
 Year, Make, and Model: 2014 Ram 1500
 Curb Mass: 5,037.5 lbs (2,285.0 kg)
 Test Inertial Mass: 5,033.1 lbs (2,283.0 kg)
 Gross Static Mass: 5,033.1 lbs (2,283.0 kg)

Impact Conditions

Impact Velocity: 65.78 mph (105.86 km/h)
 Impact Angle: 25.0°
 Location / Orientation: 6.7 ft (2.04 m) measured from first ETI Roller Barrier post
 Impact Severity: 130.0 kip-ft (176.3 kJ)

Exit Conditions

Exit Velocity: 39.22 mph (63.12 km/h)
 Exit Angle: 9.4°
 Exit Box Criteria Met: Yes
 Final Vehicle Position: 162.1 ft. (49.4 m) 22.9 ft. (7.0 m) Right
 Vehicle Snagging: Satisfactory
 Vehicle Pocketing: Satisfactory
 Vehicle Stability: Satisfactory
 Maximum Roll Angle: 48.0°
 Maximum Pitch Angle: 49.4°
 Maximum Yaw Angle: 33.9°

Occupant Risk

Longitudinal OIV: 25.3 ft/s (7.7 m/s)
 Lateral OIV: 18.4 ft/s (5.6 m/s)
 Longitudinal RA: -11.9 g
 Lateral RA: -8.4 g
 THIV: 9.4 m/s (30.8 ft/s)
 PHD: 13.8
 ASI: 1.21

Test Article Deflections

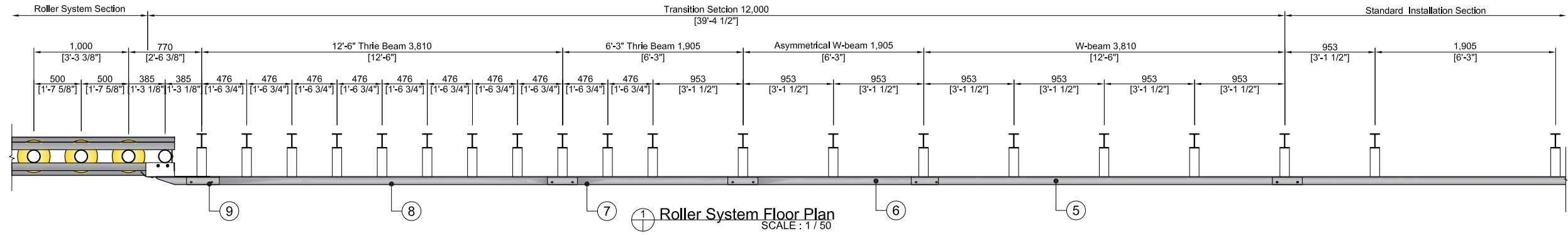
Static: 8.8 in. (224 mm)
 Dynamic: 17.1 in. (434 mm)
 Working Width: 39.3 in. (998 mm)

Vehicle Damage

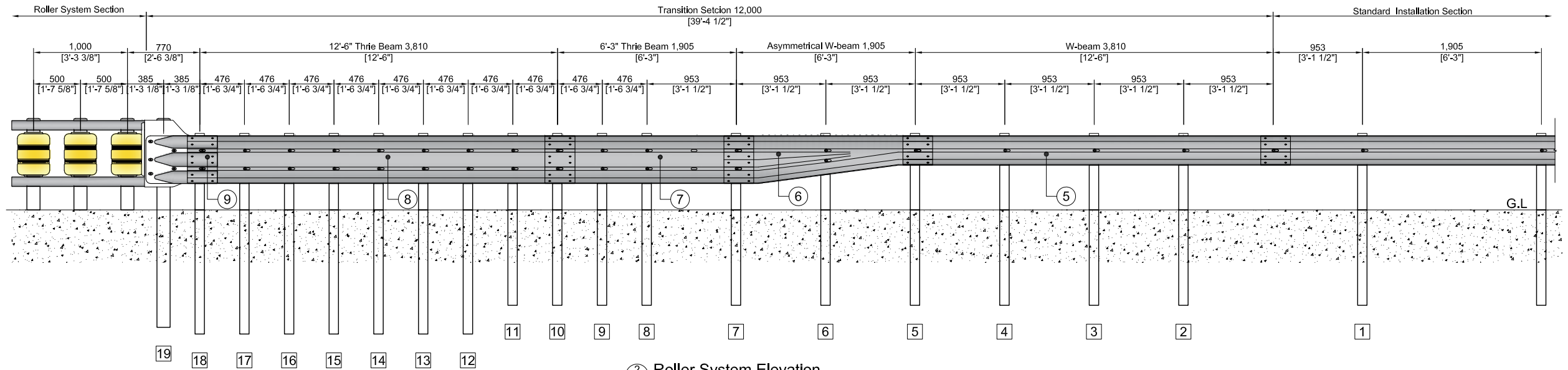
Vehicle Damage Scale: 01-RFQ-4
 CDC: 01FYEK2 and 01LDAS2
 Maximum Intrusion: 3.7 in. (94 mm.)

Figure 2 Summary of Test 3-21

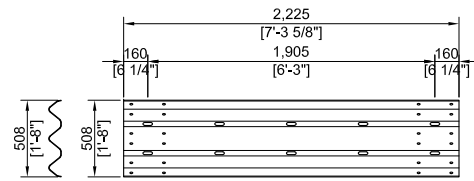
Roller System (MASH Transition-TL3)



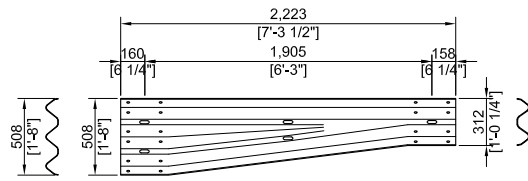
① Roller System Floor Plan
SCALE : 1 / 50



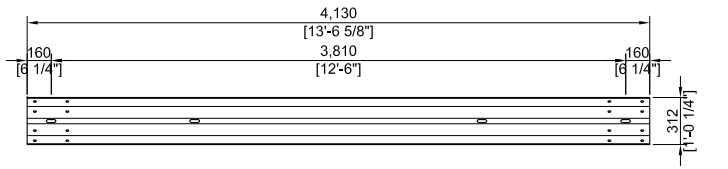
② Roller System Elevation
SCALE : 1 / 50



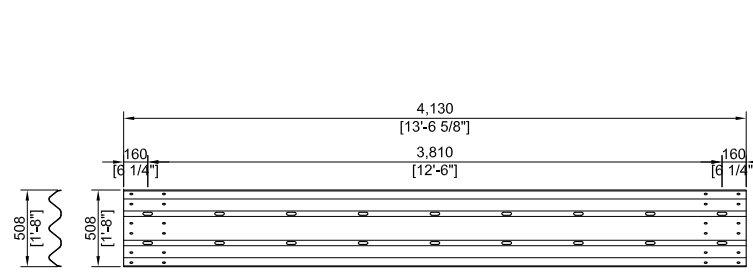
⑦ 6'-3" Thrie Beam



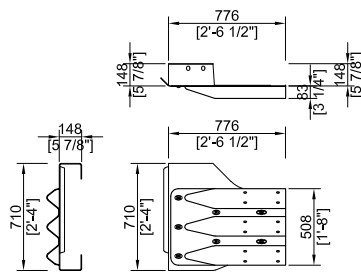
⑥ 6'-3" Asymmetrical W-beam



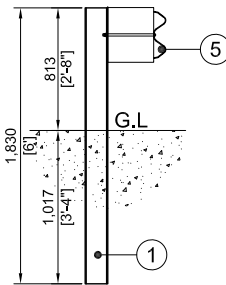
⑤ 12'-6" W-Beam



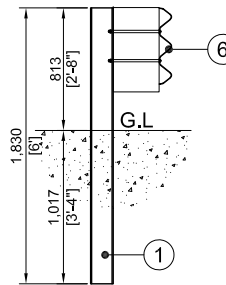
⑧ 12'-6" Thrie Beam



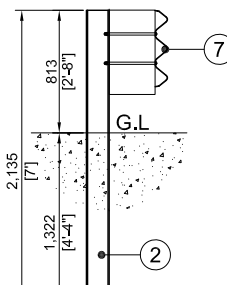
⑨ Connector



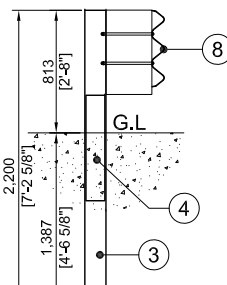
① - ⑤ Section



⑥ - ⑪ Section

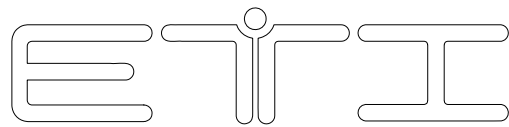


⑫ - ⑱ Section



⑲ Section

NO	Product Name	Measurement	Unit	QTY.	Remark
1	Post-1	150x100x1830L	EA	11	Zinc Hot Dip Galvanizing
2	Post-2	150x100x2135L	EA	7	Zinc Hot Dip Galvanizing
3	Post-3	Ø139.8x2200x4.5T	EA	1	Zinc Hot Dip Galvanizing
4	Inner Post	Ø125x700x4.3T	EA	1	Zinc Hot Dip Galvanizing
5	12'-6" W-Beam	2223x508	EA	1	Zinc Hot Dip Galvanizing
6	6'-3" Asymmetrical W-beam	2223x508	EA	1	Zinc Hot Dip Galvanizing
7	6'-3" Thrie Beam	2225x508	EA	1	Zinc Hot Dip Galvanizing
8	12'-6" Thrie Beam	4130x508	EA	2	Zinc Hot Dip Galvanizing
9	Connector	776x710	EA	1	Zinc Hot Dip Galvanizing



+ 82 - 1800 - 6704
www.etikorea.kr

DRAWING TITLE

MODEL NUMBER

CHECKED BY

DESIGNED BY

DRAWN BY

DATE

NO SCALE

SHEET NO.

DRAWING NO.

REMARK

ETI-Transition-TL3