



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

August 14, 2020

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

In Reply Refer To:
HSST-1/B-347

Mr. James Fu
State of Hawaii, Department of Transportation
601 Kamokila Boulevard, Room 611,
Kapolei, HI 96707
USA

Dear Mr. Fu:

This letter is in response to your March 31, 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-347 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:

- Modified Hawaii Thrie Beam Approach Guardrail 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: Modified Hawaii Thrie Beam Approach Guardrail Transition

Type of system: Longitudinal Barrier Transition

Test Level: MASH Test Level 3 (TL3)

Testing conducted by: Midwest Roadside Safety Facility

Date of request: March 31, 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-347 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:	March 31, 2020	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	James Fu, S.E.	
	Company:	State of Hawaii, Department of Transportation	
	Address:	601 Kamokila Boulevard, Room 611, Kapolei, HI 96707	
	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	Modified Hawaii Thrie Beam Approach Guardrail 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:	James Fu, S.E.	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	State of Hawaii, Department of Transportation	Same as Submitter <input checked="" type="checkbox"/>
Address:	601 Kamokila Boulevard, Room 611, Kapolei, HI 96707	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.

The Midwest Roadside Safety Facility (MwRSF) and its employees were asked to perform crash testing and evaluate the device named herein for the Hawaii Department of Transportation.

MwRSF's financial interests are as follows:

- (i) No compensation, including wages, salaries, commissions, professional fees, or fees for business referrals;
- (ii) Consulting relationships consist of answering design and implementation questions;
- (iii) Research funding or other forms of research support include continued funding for roadside safety research projects with MwRSF;
- (iv) No patents, copyrights, or other intellectual property interests for this system;
- (v) No licenses or contractual relationships for this system; and
- (vi) No business ownership and investment interests for this system.

PRODUCT DESCRIPTION

- New Hardware or Significant Modification
 Modification to Existing Hardware

The modified Hawaii Department of Transportation (HDOT) Thrie Beam Approach Guardrail Transition (AGT) test installation was approximately 83 ft long and consisted of a concrete parapet, transition, a thrie beam AGT, Midwest Guardrail System (MGS), and a guardrail anchorage system. At the downstream end of the test installation, there existed an 8-ft long version of HDOT's Type D2 End Post. Since the downstream half of the end post was not expected to interact with the test vehicles, the length of the end post was reduced from its standard 18-ft length to reduce installation costs. The test installation end post was 34 in. tall, 18 in. wide, and was reinforced with a combination of longitudinal and lateral steel rebar. The vertical steel bars of the end post were anchored directly to the non-reinforced existing concrete tarmac using a chemical epoxy with a minimum bond strength of 1,450 psi. The upstream end of the end post was sloped vertically with a 2-in. x 12-in. taper. The face of the end post was recessed 4 in. at the location of the guardrail terminal connector so that the face of the thrie beam was nearly flush with the face of the end post concrete parapet. The concrete mix for the end post concrete parapet required a minimum 28-day compressive strength of 4,000 psi.

HDOT's AGT consisted of 12 ft - 6 in. of nested thrie beam rail supported by W6x15 posts at various post spacings. The upstream end of the AGT incorporated the previously MASH-tested MGS upstream stiffness transition to connect the AGT to the adjacent MGS. All guardrail segments had a top mounting height of 31 inches. Blockouts within the AGT consisted of rectangular HSS steel tubes. The W6x15 posts were 7 ft long, while the W6x8.5/W6x9 posts were 6 ft long. To ensure the width of the blockouts matched the width of the posts, 6-in. wide blockouts were used with W6x15 posts, and 4-in. wide blockouts were used with W6x8.5/W6x9 posts.

A 6-in. tall concrete curb was placed below the AGT with its front face flush with the face of the guardrail. The curb began at the upstream end of the concrete end post and extended 176¼ in. upstream. The curb was terminated with a vertical taper measuring 4 in. vertically by 36 in. longitudinally prior to extending below the asymmetrical W-to-thrie transition segment. A 4-in. x 12-in. vertical taper was applied to the downstream end of the curb adjacent to the concrete end post to mitigate wheel snag on the end post.

Approximately 37 ft - 6 in. of MGS extended from the upstream end of the AGT. This MGS region of the test installation utilized plastic blockouts manufactured by Mondo Polymer Technologies.

A guardrail anchorage system typically utilized as a trailing end terminal was utilized to anchor the upstream end of the test installation. The guardrail anchorage system was originally designed to simulate the strength of other crashworthy end terminals. The anchorage system consisted of timber posts, foundation tubes, anchor cables, bearing plates, rail brackets, and channel struts, which closely resembled the hardware used in the Modified Breakaway Cable Terminal (BCT) system. The guardrail anchorage system has been MASH TL-3 crash tested as a downstream trailing end terminal.

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:	Ronald K. Faller	
Engineer Signature:	 <small>ou=Midwest Roadside Safety Facility, email=rfaller1@unl.edu, c=US Digitally signed by Ronald K. Faller DN: cn=Ronald K. Faller, o=University of Nebraska-Lincoln, Date: 2020.04.17 08:53:55 -05'00'</small>	
Address:	130 Whittier Research Center, 2200 Vine Street, Lincoln, NE 68583-0853	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
3-10 (1100C)	Test no. 3-10 is not applicable for this type of system.	Non-Relevant Test, not conducted
3-11 (2270P)	Test no. 3-11 is not applicable for this type of system.	Non-Relevant Test, not conducted
3-20 (1100C)	<p>Lab test no.: HWTT-1 Date of test: July 1, 2019 Crash test report no.: TRP-03-425-20</p> <p>A 2,407-lb passenger car with a simulated occupant seated in the drivers seat, impacted the modified HDOT thrie beam approach guardrail transition (AGT) a speed of 61.8 mph and angle of 25.2 degrees. Impact location was 64.9 in. upstream from the end of the Type D2 End Post. At 0.176 sec after impact, the vehicle became parallel to the system with a speed of 39.0 mph. At 0.344 sec, the vehicle exited the system with a speed of 37.2 mph and an angle of 12.8 degrees. The vehicle was successfully contained and smoothly redirected.</p> <p>Exterior vehicle damage was moderate and the interior occupant compartment deformations were moderate, with a maximum of 3.5 in., consequently not violating the limits established in MASH 2016. Damage to the barrier was minimal, consisting of contact marks and kinks of the thrie beam sections, contact marks on the front face of the concrete end post, and minor spalling of the concrete. The maximum lateral permanent set of the barrier system was 1.4 inches. The maximum lateral dynamic barrier deflection was 2.6 inches. at post no. 18. The working width of the system was 20.0 inches. All vehicle decelerations, occupant ridedown accelerations (ORAs), and occupant impact velocities (OIVs) fell within the recommended safety limits established in MASH 2016. The test vehicle showed no tendency for rollover and did not penetrate or ride over the barrier.</p>	PASS

Required Test Number	Narrative Description	Evaluation Results
3-21 (2270P)	<p>Lab test no.: HWTT-2 Date of test: July 19, 2019 Crash test report no.: TRP-03-425-20</p> <p>A 5,000-lb pickup truck with a simulated occupant seating in the driver's seat, impacted the system at a speed of 63.0 mph and an angle of 25.2 degrees. Impact location was 89.7 in. upstream from the end of the Type D2 End Post. At 0.184 sec after impact, the vehicle became parallel to the system with a speed of 42.4 mph. At 0.368 sec, the vehicle exited the system with a speed of 41.0 mph and an angle of 11.1 degrees. The vehicle was successfully contained and smoothly redirected.</p> <p>Exterior vehicle damage was moderate and the interior occupant compartment deformations were moderate, with a maximum interior occupant compartment deformation of 6.5 in., consequently not violating the limits established by MASH 2016. Damage to the barrier was moderate, consisting of contact marks, post deflection, rail kinking, and gouging and spalling to the concrete parapet and curb. The maximum lateral permanent set of the barrier system was 6.2 in. The maximum lateral dynamic barrier deflection was 9 in. at post no. 18. The working width of the system was 23 inches. All vehicle decelerations, occupant ridedown accelerations (ORAs), and occupant impact velocities (OIVs) fell within the recommended safety limits established in MASH 2016. The test vehicle showed no tendency for rollover and did not penetrate or ride over the barrier.</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:	Midwest Roadside Safety Facility	
Laboratory Signature:	Karla Lechtenberg <small>DN: cn=Karla Lechtenberg, o=MwRSF, ou, email=kpolivka2@unl.edu, c=US Digitally signed by Karla Lechtenberg Date: 2020.04.17 10:01:04 -05'00'</small>	
Address:	130 Whittier Research Center, 2200 Vine Street, Lincoln, NE 68583-0853	Same as Submitter <input type="checkbox"/>
Country:	USA	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	A2LA Certificate Number: 2937.01, Valid to November 30, 2019 (Currently, valid to November 30, 2021)	

Submitter Signature*:



Submit Form

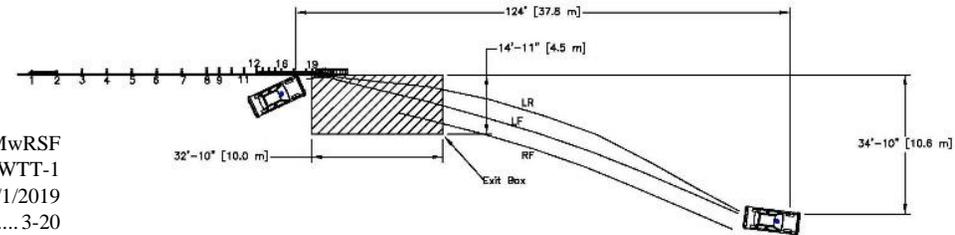
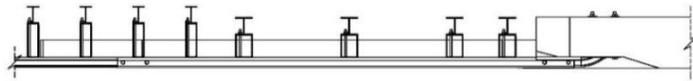
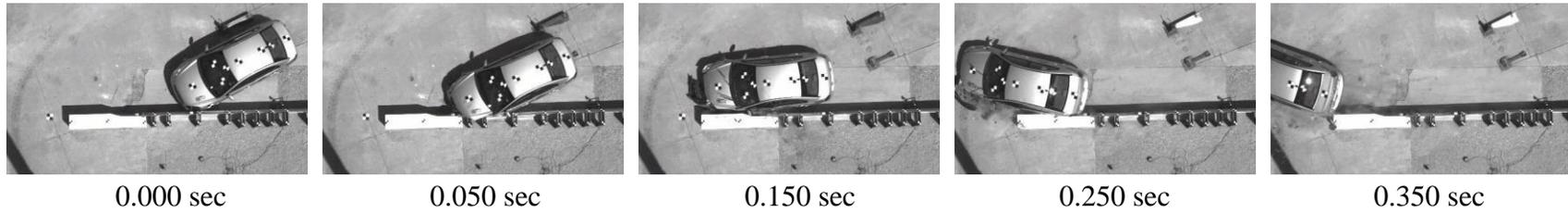
ATTACHMENTS

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	



- Test Agency MwRSF
- Test Number..... HWTT-1
- Date 7/1/2019
- MASH 2016 Test Designation No..... 3-20
- Test Article..... Modified HDOT AGT to Type D2 End Post
- Total Length 79 ft – 2 in.
- Key Component – Thrie beam Guardrail
 - Thickness..... 12 ga.
 - Mounting Height 31 in.
- Key Component – ASTM A992 W6x15 Steel Post
 - Length 78 in.
 - Embedment Depth..... 49 in.
 - Spacing..... 37½ in.
- Key Component – Type D2 End Post (Concrete Parapet)
 - Length 96 in.
 - Width..... 18 in.
 - Height..... 34 in.
- Soil Type Crushed Limestone
- Vehicle Make /Model..... Hyundai Accent
 - Curb..... 2,475 lb
 - Test Inertial..... 2,407 lb
 - Gross Static..... 2,571 lb
- Impact Conditions
 - Speed 61.8 mph
 - Angle 25.2 deg.
 - Impact Location..... 64.9 in. upstream from parapet
- Impact Severity 55.7 kip-ft > 51 kip-ft limit from MASH 2016
- Exit Conditions
 - Speed 37.2 mph
 - Angle 12.8 deg.
- Exit Box Criterion Pass
- Vehicle Stability Satisfactory
- Vehicle Stopping Distance 124 ft downstream and 34 ft – 10 in. in front

- Vehicle Damage..... Moderate
 - VDS [19] 10-LFQ-5
 - CDC [20]..... 10-LFEW-3
 - Maximum Interior Deformation 3½ in.
- Test Article Damage Minimal
- Maximum Test Article Deflections
 - Permanent Set 1.4 in.
 - Dynamic 2.6 in.
 - Working Width..... 20.0 in.
- Transducer Data

Evaluation Criteria		Transducer		MASH 2016 Limit
		SLICE-1 (primary)	SLICE-2 (backup)	
OIV ft/s	Longitudinal	-30.34	-30.85	±40
	Lateral	34.36	32.49	±40
ORA g's	Longitudinal	-8.41	-5.78	±20.49
	Lateral	5.94	6.77	±20.49
MAX ANGULAR DISP. deg.	Roll	-17.4	-13.2	±75
	Pitch	-6.5	-9.0	±75
	Yaw	57.6	56.7	not required
THIV – ft/s		0.11	0.12	not required
PHD – g's		39.49	39.12	not required
ASI		2.64	2.53	not required

Figure 67. Summary of Test Results and Sequential Photographs, Test No. HWTT-1



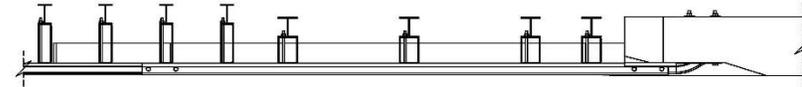
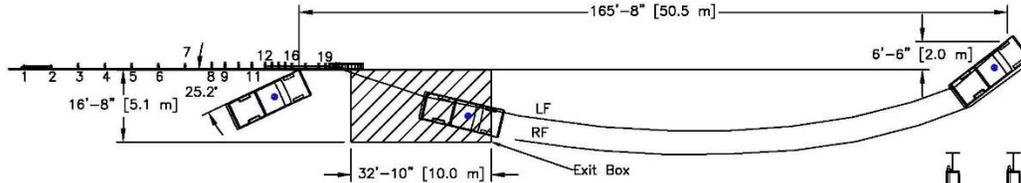
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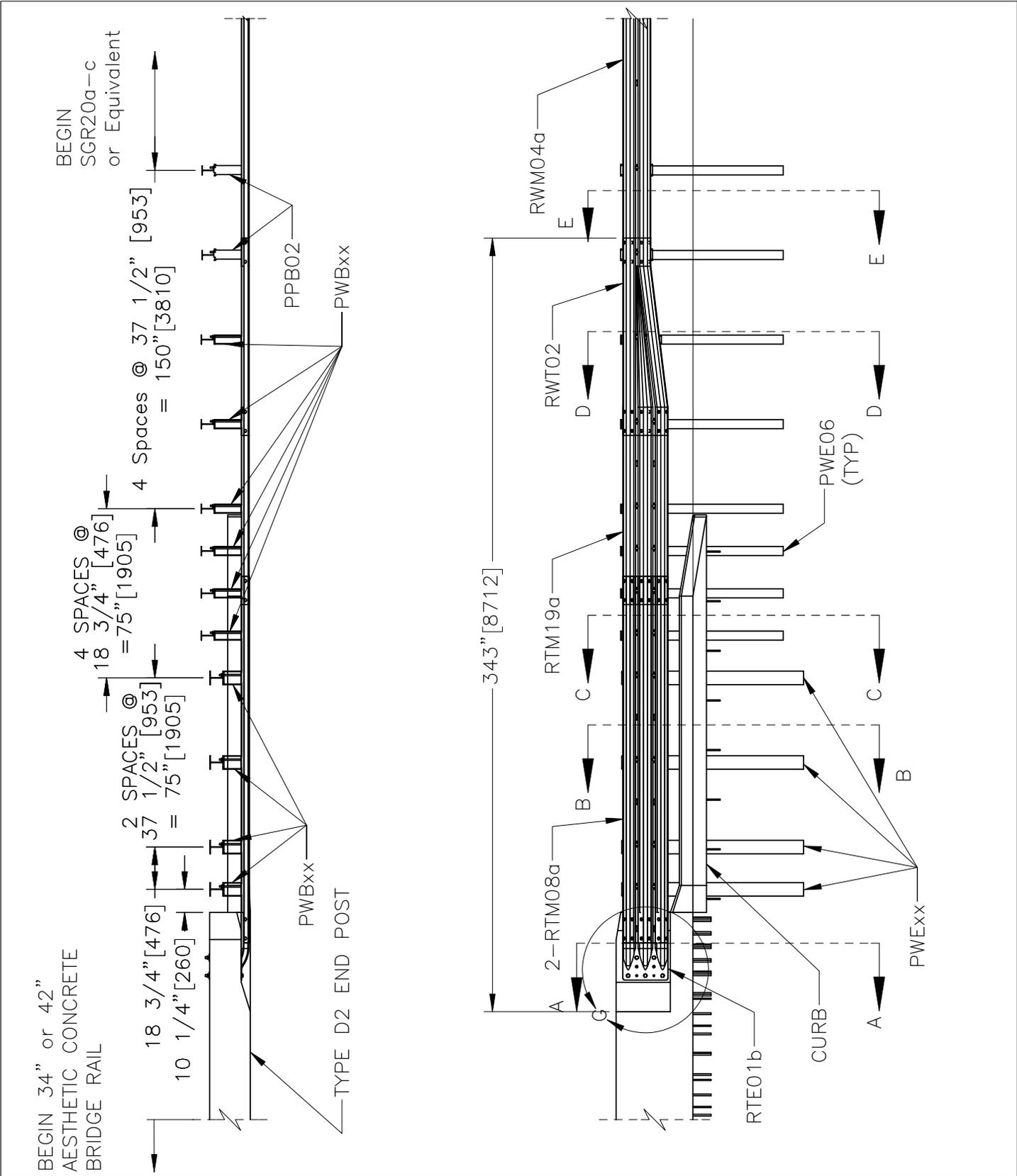


- Test Agency MwRSF
- Test Number..... HWTT-2
- Date..... 7/19/2019
- MASH 2016 Test Designation No..... 3-21
- Test Article..... Modified HDOT AGT with Type D2 End Post
- Total Length 79 ft – 2 in.
- Key Component – Thrie beam Guardrail
 - Thickness..... 12 ga.
 - Mounting Height 31 in.
- Key Component – ASTM A992 W6x15 Steel Post
 - Length 78 in.
 - Embedment Depth..... 49 in.
 - Spacing..... 37½ in.
- Key Component – Type D2 End Post (Concrete Buttress)
 - Length 96 in.
 - Width..... 18 in.
 - Height..... 34 in.
- Soil Type Crushed Limestone
- Vehicle Make /Model..... Dodge Ram 1500
 - Curb..... 4,953 lb
 - Test Inertial..... 5,000 lb
 - Gross Static..... 5,160 lb
- Impact Conditions
 - Speed 63.0 mph
 - Angle 25.2 deg.
 - Impact Location..... 89.7 in. upstream from concrete parapet
- Impact Severity 120.6 kip-ft > 106 kip-ft limit from MASH 2016
- Exit Conditions
 - Speed 41.0 mph
 - Angle 11.1 deg.
- Exit Box Criterion..... Pass
- Vehicle Stability..... Satisfactory
- Vehicle Stopping Distance 165 ft 8 in. downstream and 6 ft 6 in. behind

- Vehicle Damage..... Moderate
 - VDS [19] 10-LFQ-5
 - CDC [20]..... 11-LFEW-4
 - Maximum Interior Deformation 6.5 in.
- Test Article Damage Moderate
- Maximum Test Article Deflections
 - Permanent Set 6.2 in.
 - Dynamic 9.0 in.
 - Working Width..... 23.0 in.
- Transducer Data

Evaluation Criteria		Transducer		MASH 2016 Limit
		SLICE-2 (primary)	SLICE-1 (backup)	
OIV ft/s	Longitudinal	-23.47	-24.67	±40
	Lateral	26.73	25.90	±40
ORA g's	Longitudinal	-13.77	-11.47	±20.49
	Lateral	9.90	11.35	±20.49
MAX ANGULAR DISP. deg.	Roll	-23.0	-27.2	±75
	Pitch	-9.1	-6.9	±75
	Yaw	40.3	41.3	not required
THIV – ft/s		34.49	34.00	not required
PHD – g's		16.64	16.37	not required
ASI		1.58	1.50	not required

Figure 80. Summary of Test Results and Sequential Photographs, Test No. HWTT-2



MODIFIED HAWAII THRIE-BEAM APPROACH GUARDRAIL TRANSITION

XXX##

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DATE:
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INTENDED USE

The Modified Hawaii Thrie Beam Approach Guardrail Transition is a non-proprietary system. It is intended to be used when the 31" [787] tall strong-post, W-beam guardrail such as Midwest Guardrail System (SGR20) is placed adjacent to the Hawaii 34" [864] Aesthetic Concrete Bridge Rail or the Hawaii 42" [1067] Aesthetic Concrete Bridge Rail. A 6-in. [152] tall concrete curb was placed below the AGT with its front face flush with the face of the guardrail. The curb began at the upstream end of the Type D2 End Post and extended 176¼ in. [4477] upstream. The curb was terminated with a vertical taper measuring 4 in. [102] vertically by 36 in. [914] longitudinally prior to extending below the asymmetrical W-to-thrie transition segment. A 4-in. x 12-in. [102 x 305] vertical taper was applied to the downstream end of the curb adjacent to the concrete end post to mitigate wheel snag on the Type D2 End Post.

The Modified Hawaii Thrie Beam Approach Guardrail Transition should be used in locations where a maximum dynamic deflection of 9.0 in. [229] or less is acceptable and where a working width of 23.0 in. [584] is provided. The Hawaii Thrie Beam AGT to Bridge Rail has been crash tested under Test Level 3 (TL-3) conditions and deemed crashworthy according to the Manual for Assessing Safety Hardware, Second Edition (MASH 2016) performance criteria.

COMPONENTS

Unit Length = 35'-5" [10795]

DESIGNATOR	COMPONENT	NUMBER
FBB01	5/8"-11 UNC [M16x2], 1.25" [32] Long Guardrail Bolt	20
FBB02	5/8"-11 UNC [M16x2], 2" [51] Long Guardrail Bolt	24
FBB03	5/8"-11 UNC [M16x2], 10" [254] Long Guardrail Bolt	8
FBB06	5/8"-11 UNC [M16x2], 14" [356] Long Guardrail bolt	13
FBX22b	7/8"-9 UNC [M22x2.5], 16" [406] Long Heavy Hex Bolt	5
FNX16b	5/8"-11 UNC [M16x2] Heavy Hex Nut	64
FNX22b	7/8"-9 UNC [M22x2.5] Heavy Hex Nut	5
FWC16a	5/8" [16] Dia. Plain USS Washer	24
FWR10	3"x3"x1/4" [76x76x6] Square Washer Plate	5
PPB02	Composite Recycled Blockout	2
PWBxx	17.5" [445] Long, 12"x4"x0.25" [305x102x6] Steel Blockout	6
PWBxx	17.5" [445] Long, 8"x6"x0.25" [203x152x6] Steel Blockout	4
PWE06	W6x8.5 or W6x9 [W152x12.6 or 13.4], 72" [1,829] Long Steel Post	8
PWExx	W6x15 [W152x22.5], 78" [1,981] Long Steel Post	4
RET01b	Thrie Beam Terminal Connector	1
RTM08a	12'-6" [3,810] Thrie Beam Section	2
RTM19a	6'-3" [1,905] Thrie Beam Section	1
RWM04a	12'-6" [3,810] W-Beam Section	1
RWT02	6'-3" [1,905] Asymmetrical W- to Thrie Beam Transition	1
---	Concrete, Minimum 4,000 psi f'c	-
---	See Bill of Bars	-

ELIGIBILITY

Eligibility will be pursued.

MODIFIED HAWAII THRIE-BEAM APPROACH GUARDRAIL TRANSITION

XXX##

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REFERENCES

Rosenbaugh, S. K., Hovde, S. E., Faller, R. K., and Urbank, E. L., *Crash Testing and Evaluation of the Hawaii Thrie Beam Approach Guardrail Transition: MASH Test Nos. 3-20 and 3-21*, Report to Hawaii Department of Transportation, Transportation Report No. TRP-03-425-20, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, March 2020.

CONTACT INFORMATION

Hawaii Department of Transportation
Aliiimoku Building
869 Punchbowl St.
Honolulu, HI 96813

MODIFIED HAWAII THRIE-BEAM APPROACH GUARDRAIL TRANSITION

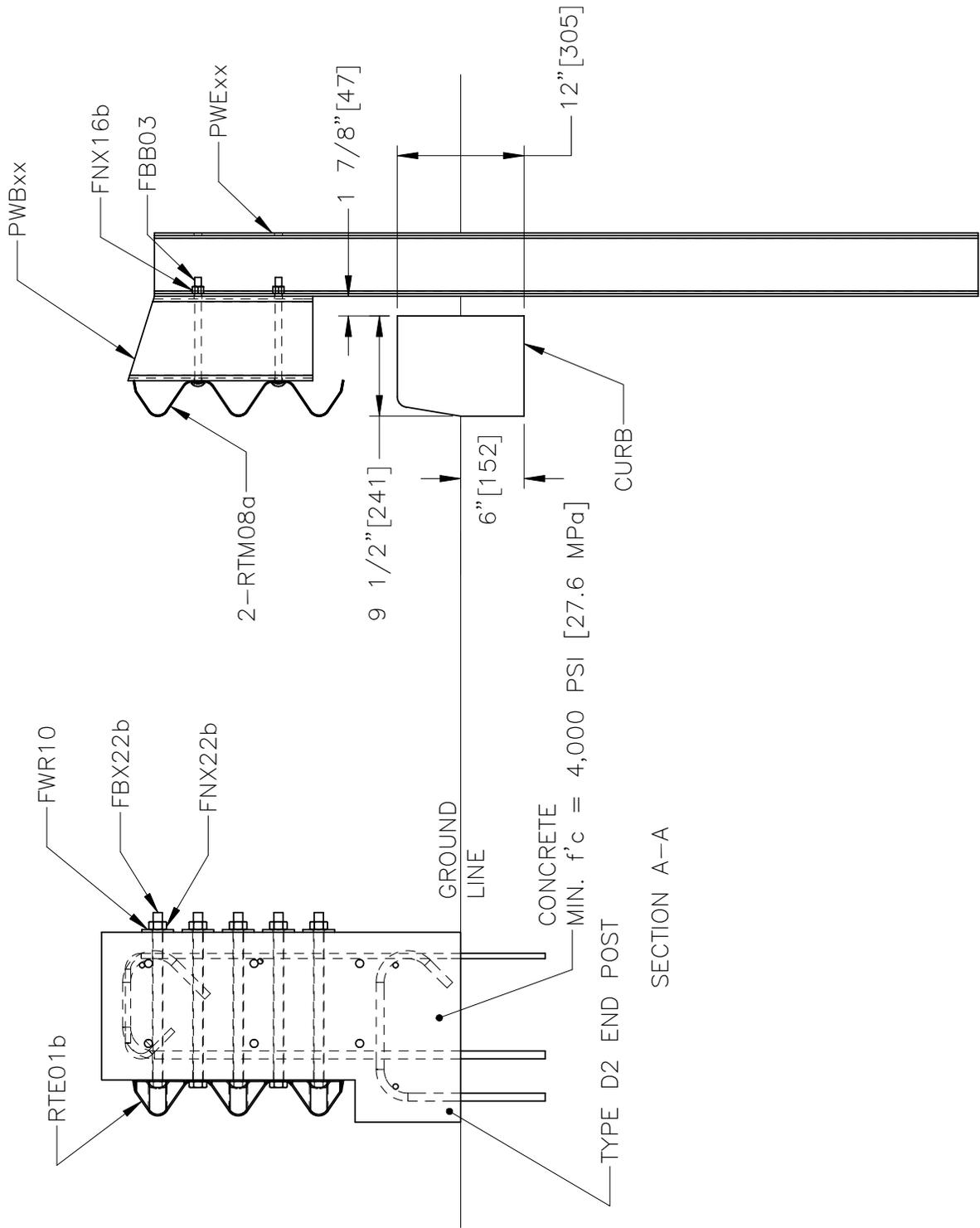
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MODIFIED HAWAII THRIE-BEAM APPROACH GUARDRAIL TRANSITION

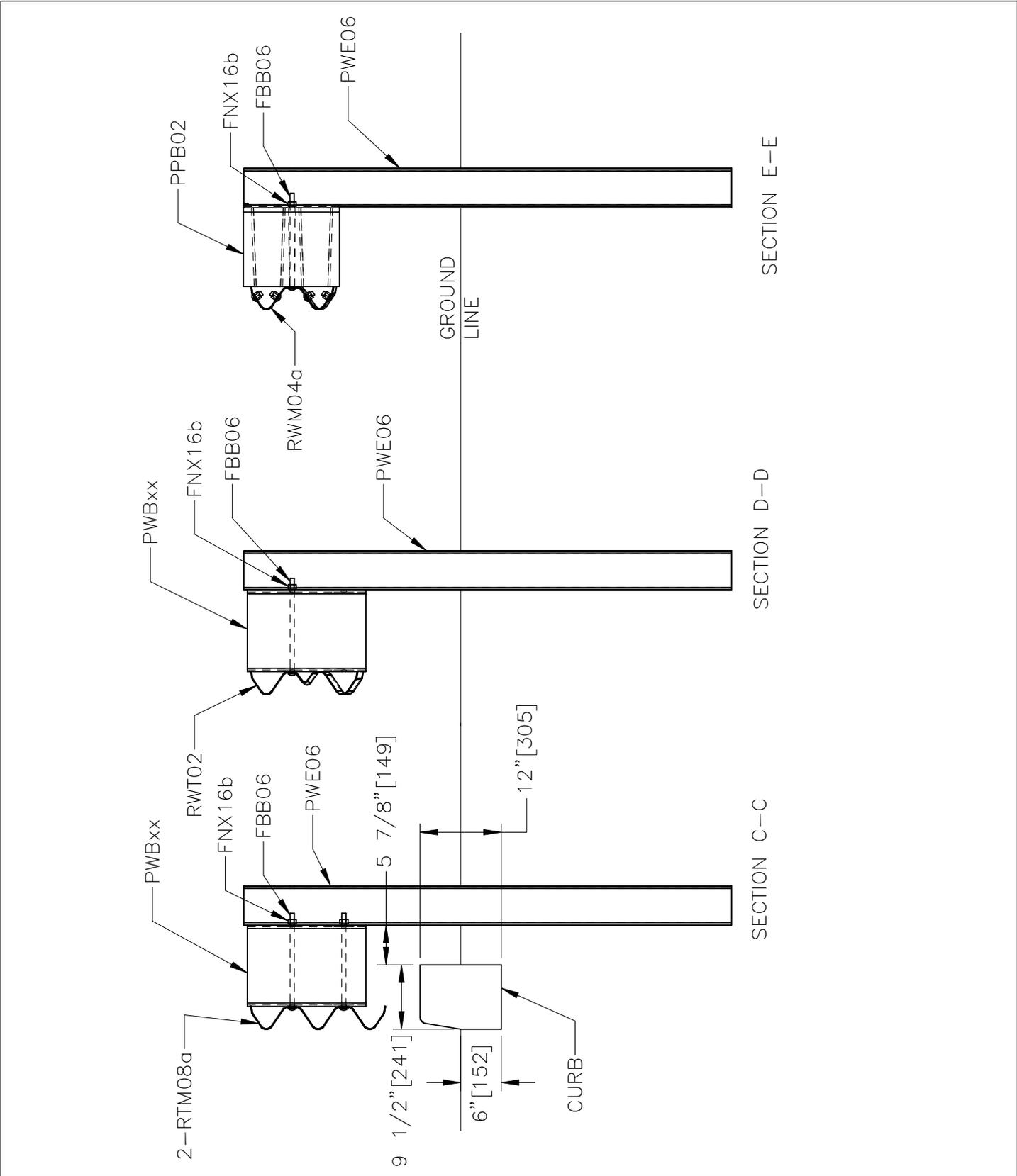
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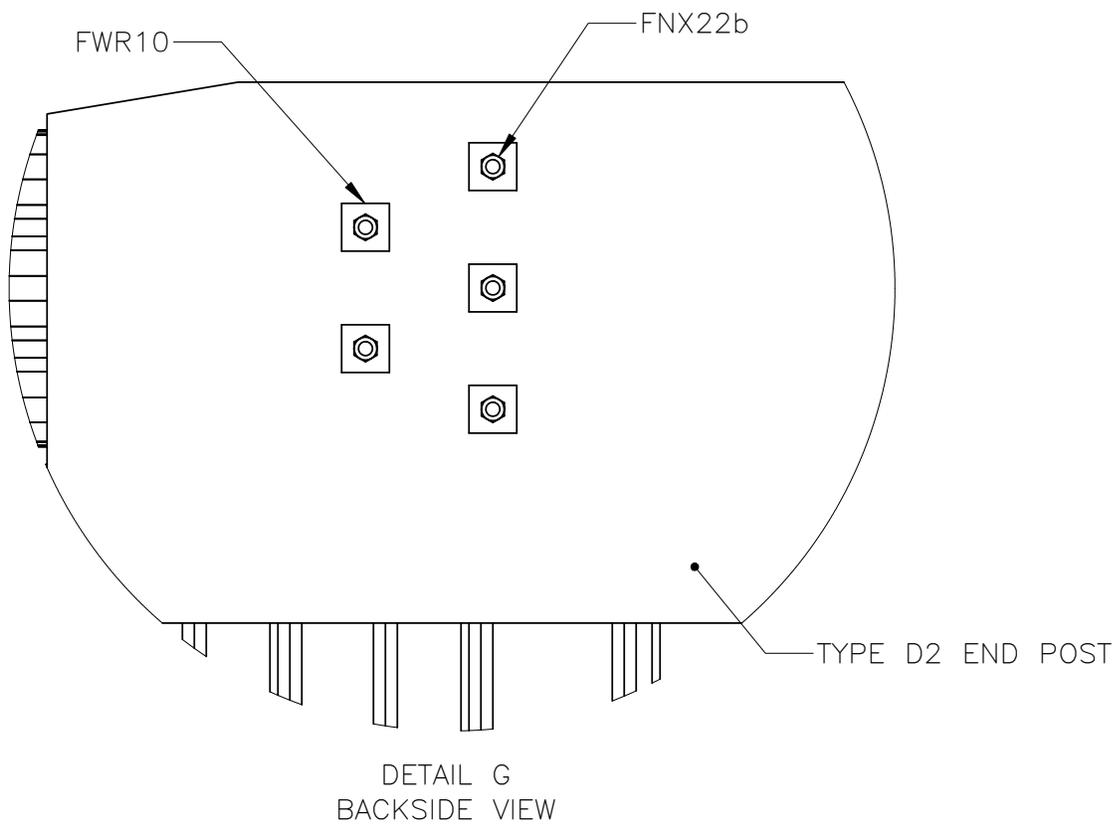
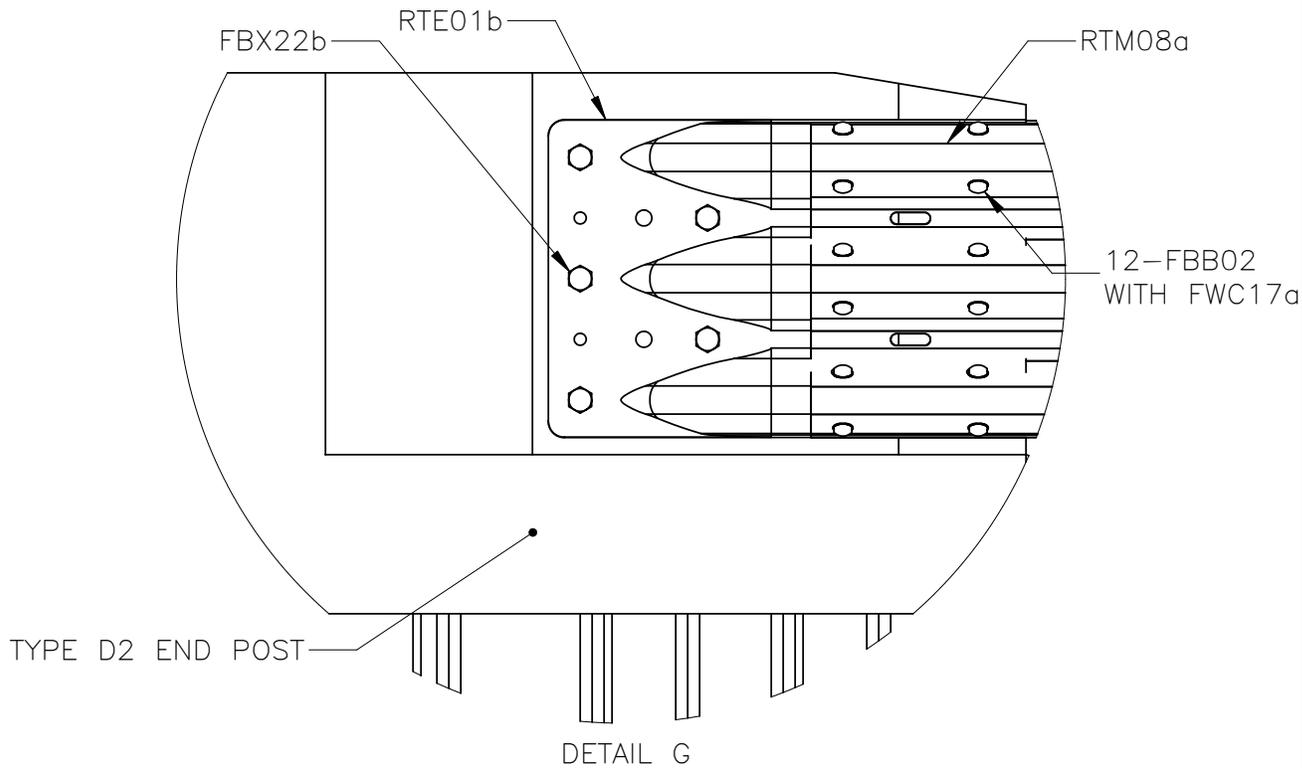


MODIFIED HAWAII THRIE-BEAM APPROACH GUARDRAIL TRANSITION

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DATE:
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MODIFIED HAWAII THRIE-BEAM APPROACH GUARDRAIL TRANSITION

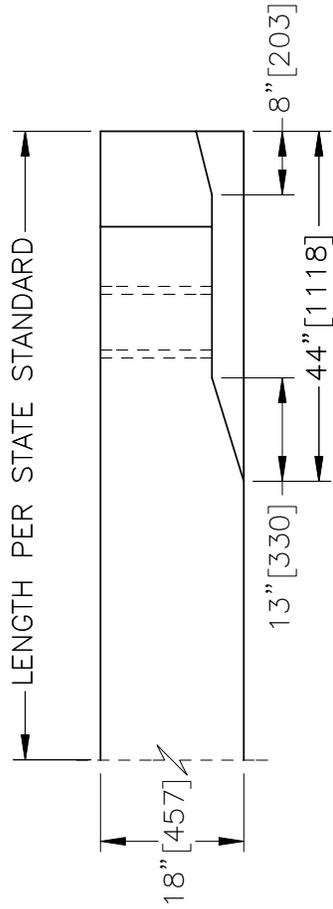
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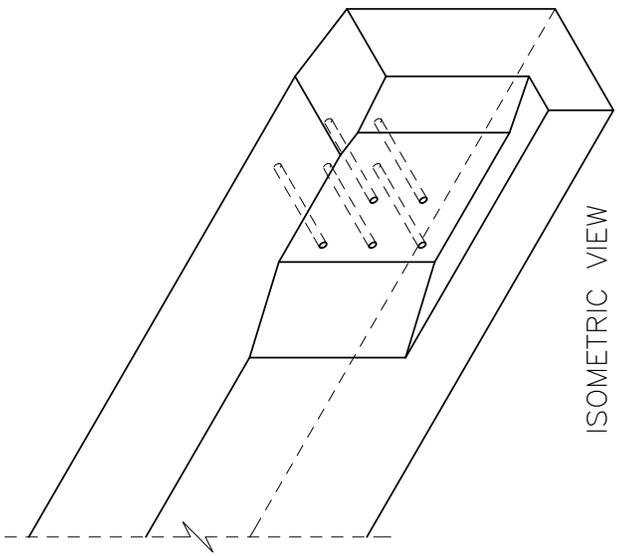
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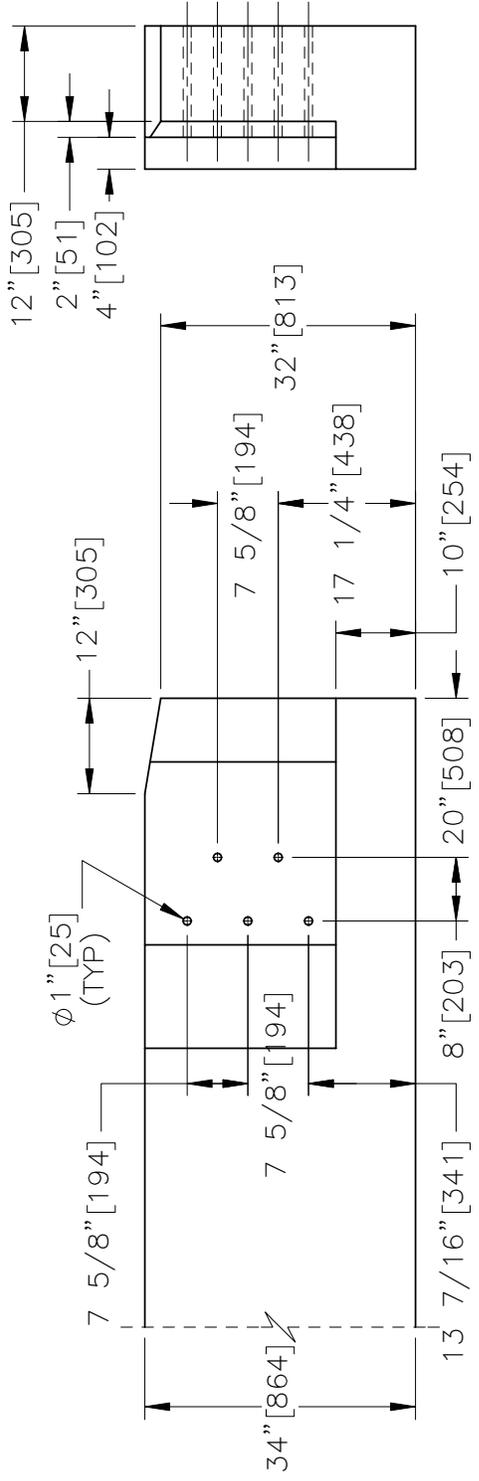
4/22/2020



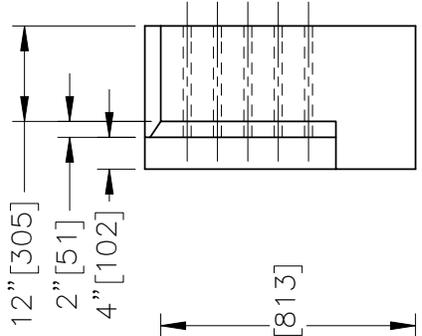
PLAN VIEW



ISOMETRIC VIEW



ELEVATION VIEW



PROFILE VIEW

TYPE D2 END POST

MODIFIED HAWAII THRIE-BEAM APPROACH GUARDRAIL TRANSITION

XXX##

SHEET NO.
7 of 7

DATE:
4/22/2020

NOTE: (1) TYPE D2 END POST REQUIRED LENGTH AND REINFORCEMENT AS PER STATE STANDARDS.