August 14, 2020

U.S. Department of Transportation
Federal Highway Administration

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

In Reply Refer To:
HSST-1/B-346

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-346 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:

- HDOT 42" Tall Aesthetic Concrete Bridge Rail

Scope of this Letter

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

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

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

Eligibility for Reimbursement

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

Name of system: HDOT 42" Tall Aesthetic Concrete Bridge Rail
Type of system: Longitudinal Barrier
Test Level: MASH Test Level 3 (TL 3)
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-346 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.

- If the subject device is a patented product it may be considered to be 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,

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	◉ New ○ 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
	◉ Physical Crash Testing ○ Engineering Analysis	HDOT 42'' Tall Aesthetic Concrete Bridge Rail	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 ☒
Company Name:	State of Hawaii, Department of Transportation	Same as Submitter ☒
Address:	601 Kamokila Boulevard, Room 611, Kapolei, HI 96707	Same as Submitter ☒
Country:	USA	Same as Submitter ☒

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 Hawaii Department of Transportation (HDOT) 42-in. tall aesthetic concrete bridge rail had a total length of 88 ft and measured 42 in. tall and 10 in. wide. The barrier had a vertical front face with aesthetic recessed panels spaced 12 in. apart, measuring 6 in. wide and 14 in. tall with a 3-in. top-edge radius. Three ½-in. tall x ½-in. deep V-shaped horizontal bevel cuts were etched into each face, 8, 15, and 35 in. above the tarmac. The top edge of the barrier on each side was chamfered at a 45-degree angle, measuring ¾ in. wide. The barrier system consisted of five distinct segments separated with ½-in. wide expansion joints. Expansion joints were spaced 22 ft apart, and the upstream expansion joint between segment nos. 1 and 2 was located 10 ft – 11¾ in. from the upstream end of the barrier system. The spacing between the expansion joints was limited to 22 ft, which was the smallest rail segment length between joints noted by HDOT. Larger rail segment lengths between expansion joints were considered less critical. Filler and sealant compounds were used to fill the gap between segments at expansion joints. The concrete mix for the bridge rail sections required a minimum 28-day compressive strength of 4,000 psi.

Steel reinforcement consisted of ASTM A615 Gr. 60 rebar. Eight No. 5 longitudinal rebars were located 2-15/16 in. from the outer surface of each segment, with four on each side. The longitudinal rebar were 259½ in. long for the longer barrier segments, 127¾ in. long for the shorter barrier segments, and were located 2⅛, 14⅛, 26⅛, and 38⅛ in. above the tarmac. Vertical stirrups were also provided using No. 5 rebar, which were spaced on 12-in. centers on the back-side face and on 6-in. centers on the traffic-side face. Vertical reinforcement bars were anchored to an existing concrete tarmac on both the traffic-side and backside faces to a depth of 8 in. and epoxied with Hilti HIT RE-500 V3 in order to develop the full tensile strength of the bar. All rebar had a 2-in. concrete clear cover.

The barrier was constructed to be consistent with a 2-in. deep wearing surface. To represent the wearing surface, the tarmac was milled to a width of 16 in. and depth of 2 in. The barrier system was constructed with a 44-in. height relative to the milled depth and 2 in. of low-strength concrete fill was added to the front side of the barrier to produce a rail height of 42 in. on the traffic-side face, while keeping the overall height of the rail consistent with construction on a bridge deck as in the HDOT standard plans. No concrete fill was added to the back side of the barrier.

At each expansion joint, shear continuity was maintained using a pin-and-receiver casting, 12-in. long x 1¼-in. diameter, Schedule 80 PVC pipe with a 1¼-in. diameter along the vertical centerline of one barrier segment. Four No. 8 smooth rebar pins were inserted into each PVC tube, which were subsequently cast into adjacent concrete barrier segments. The pins were spaced 10-11/16 in. apart, and the top pin was located 6 in. from the top surface along the midplane of the barrier.

Note, HDOT's 42-in. tall, Aesthetic Concrete Bridge Rail was fabricated for evaluation of the length of need (LON) of the interior barrier segments of the bridge rail. Therefore, the crashworthiness of the end segments and the transition buttresses were not evaluated in this testing program. It is recommended that end sections and buttresses be designed with similar or greater capacity to the bridge rail.

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 Faller	
Engineer Signature:	Ronald K. Faller 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 08:53:24 -05'00'	
Address:	130 Whittier Research Center, 2200 Vine Street, Lincoln, NE 68583-0853	Same as Submitter ☐
Country:	USA	Same as Submitter ☐

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
	Lab test no.: H42BR-1 Date of test: July 17, 2019 Crash test report no.: TRP-03-424-20 A 2,421-lb small car with a simulated occupant seated in the front passenger seat, impacted the HDOT 42-in. Tall Aesthetic Concrete Bridge Rail at a speed of 63.2 mph and an angle of 24.9 degrees, resulting in an impact severity of 57.4 kip-ft. Impact location was 47.1 in. upstream from the expansion joint between barrier nos.3 and 4. At 0.170 sec after impact, the vehicle became parallel to the system with a speed of 44.3 mph. At 0.274 sec the vehicle exited the system at a speed of 42.8 mph and an angle of 5.6 degrees. The vehicle was successfully contained and smoothly redirected.	
3-10 (1100C)	Exterior vehicle damage was moderate and the interior occupant compartment deformations were moderate, with a maximum of 4.7 in., consequently not violating the limits established by MASH 2016. Damage to the concrete bridge rail was minimal, consisting of contact marks and concrete gouging on the front face of the barrier. The maximum lateral dynamic barrier deflection, including tipping of the barrier along the top surface, was 0.2 in. at barrier no. 3. The working width of the the system was found to be 10.2 in. All vehicle decelerations, occupant compartment deformations, 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.	PASS

Required Test Number	Narrative Description	Evaluation Results
3-11 (2270P)	Lab test no.: H42BR-2 Date of test: August 19, 2019 Crash test report no.: TRP-03-424-20 A 5,007-lb quad cab pickup with a simulated occupant seated in the front passenger seat, impacted the HDOT 42-in. Tall Aesthetic Concrete Bridge Rail at a speed of 62.7 mph and an angle of 25.1 degrees, resulting in an impact severity of 118.5 kip-ft. Impact occurred 48.9 in. upstream from the expansion joint between barrier nos. 2 and 3. At 0.194 sec after impact, the vehicle became parallel to the system with a speed of 47.5 mph. At 0.366 sec, the vehicle exited the system at a speed of 46.3 mph and an angle of 7.8 degrees. The vehicle was successfully contained and smoothly redirected. Exterior vehicle damage was moderate and the interior occupant compartment deformations were moderate, with a maximum of 5.5 in., consequently not violating the the limits established in MASH 2016. Damage to the barrier was minimal consisting of contact marks and concrete spalling on the front face of the barrier. The maximum lateral dynamic barrier deflection, including tipping of the barrier along the top surface, was 0.5 in. at barrier no. 3. The working width of the system was found to be 10.5 inches. All vehicle decelerations, occupant compartment deformations, 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.	PASS
3-20 (1100C)	Test no. 3-20 is not applicable for this type of system.	Non-Relevant Test, not conducted
3-21 (2270P)	Test no. 3-21 is not applicable for this type of system.	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:	Midwest Roadside Safety Facility	
Laboratory Signature:	Karla Lechtenberg DN: cn=Karla Lechtenberg, o=MwRSF, ou, email=kpolivka2@unl.edu, c=US Digitally signed by Karla Lechtenberg Date: 2020.04.17 10:00:36 -05'00'	
Address:	130 Whittier Research Center, 2200 Vine Street, Lincoln, NE 68583-0853	Same as Submitter ☐
Country:	USA	Same as Submitter ☐
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

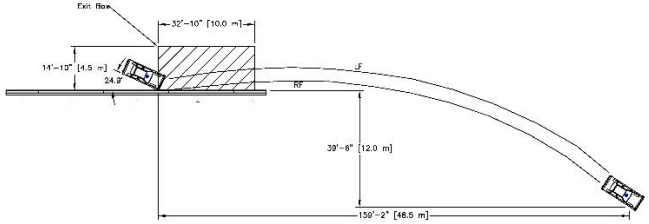
Attach to this form:

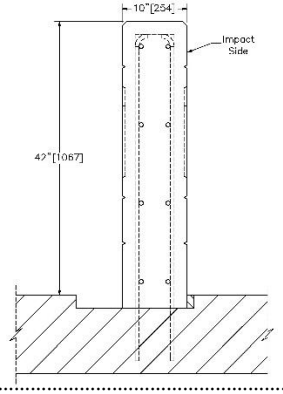
1) Additional disclosures of related financial interest as indicated above.
2) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
3) A drawing or drawings of the device(s) that conform to the Task Force-13 Drawing Specifications [Hardware 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		
Number	Date	Key Words

0.000 sec 0.050 sec 0.100 sec 0.150 sec 0.250 sec

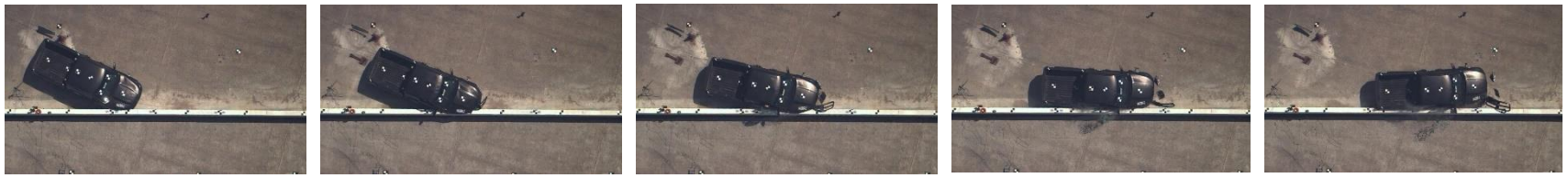


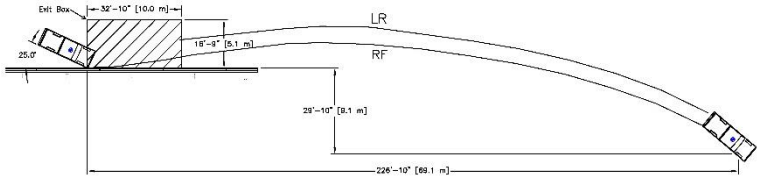


- Test Agency ..... MwRSF
- Test Number H42BR-1
- Date ..... July 17, 2019
- MASH 2016 Test Designation No. 3-10
- Test Article ..... HDOT 42-in. Tall, Aesthetic Concrete Bridge Rail
- Total Length ..... 88 ft
- Key Component – 22-ft Concrete Parapet
  - Length ..... 22 ft
  - Height ..... 42 in.
  - Width ..... 10 in.
- Key Component – 11-ft Concrete Parapet
  - Length ..... 11 ft
  - Height ..... 42 in.
  - Width ..... 10 in.
- Vehicle Make /Model ..... 2009 Kia Rio
  - Curb ..... 2,498 lb
  - Test Inertial ..... 2,421 lb
  - Gross Static ..... 2,584 lb
- Impact Conditions
  - Speed ..... 63.2 mph
  - Angle ..... 24.9 deg.
  - Impact Location ..... 47.1 in. U.S. from expansion gap between barrier nos. 3 and 4
- Impact Severity ..... 57.4 kip-ft > 51.1 kip-ft limit from MASH 2016
- Exit Conditions
  - Speed ..... 42.8 mph
  - Angle ..... 5.6 deg.
- Exit Box Criterion ..... Pass
- Vehicle Stability ..... Satisfactory
- Vehicle Stopping Distance ..... 159 ft – 2 in. downstream, 39 ft – 6 in. behind barrier
- Vehicle Damage ..... Moderate
  - VDS [13] 1-RFQ-4
  - CDC [14] 01RFEW3
  - Maximum Interior Deformation ..... 4.7 in.
- Test Article Damage ..... Minimal
- Maximum Test Article Deflections
  - Permanent Set ..... 0.1 in.
  - Dynamic ..... 0.2 in.
  - Working Width ..... 10.2 in.
- Transducer Data

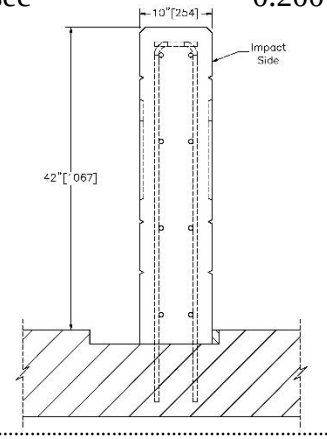
Evaluation Criteria		Transducer		MASH 2016 Limit
		SLICE-1 (primary)	SLICE-2	
OIV ft/s	Longitudinal	−24.54	−24.03	±40
	Lateral	−31.41	−30.61	±40
ORA g's	Longitudinal	−4.01	−3.55	±20.49
	Lateral	−12.15	−13.20	±20.49
MAX ANGULAR DISP. deg.	Roll	4.8	3.2	±75
	Pitch	−4.3	−3.4	±75
	Yaw	−33.3	−33.1	not required
THIV – ft/s		36.43	33.92	not required
PHD – g's		12.79	13.57	not required
ASI		2.45	2.37	not required

Figure 45. Summary of Test Results and Sequential Photographs, Test No. H42BR-1





- Test Agency ..... MwRSF
- Test Number H42BR-2
- Date ..... August 19, 2019
- MASH 2016 Test Designation No. 3-11
- Test Article ..... HDOT 42-in. Tall, Aesthetic Concrete Bridge Rail
- Total Length ..... 88 ft
- Key Component – 22-ft Concrete Parapet
  - Length ..... 22 ft
  - Height ..... 42 in.
  - Width ..... 10 in.
- Key Component – 11-ft Concrete Parapet
  - Length ..... 11 ft
  - Height ..... 42 in.
  - Width ..... 10 in.
- Vehicle Make /Model ..... 2014 Dodge Ram 1500
  - Curb ..... 5,230 lb
  - Test Inertial ..... 5,007 lb
  - Gross Static ..... 5,170 lb
- Impact Conditions
  - Speed ..... 62.7 mph
  - Angle ..... 25.1 deg.
  - Impact Location ..... 48.9 in. U.S. from expansion gap between barrier nos. 2 and 3
- Impact Severity ..... 118.5 kip-ft > 105.6 kip-ft limit from MASH 2016
- Exit Conditions
  - Speed ..... 46.3 mph
  - Angle ..... 7.8 deg.
- Exit Box Criterion ..... Pass
- Vehicle Stability ..... Satisfactory
- Vehicle Stopping Distance ..... 226 ft – 10 in. downstream, 29 ft – 10 in. behind barrier
- Vehicle Damage ..... Moderate
  - VDS [13] 1-RFQ-4
  - CDC [14] 01RFEW3
  - Maximum Interior Deformation ..... 5.5 in.

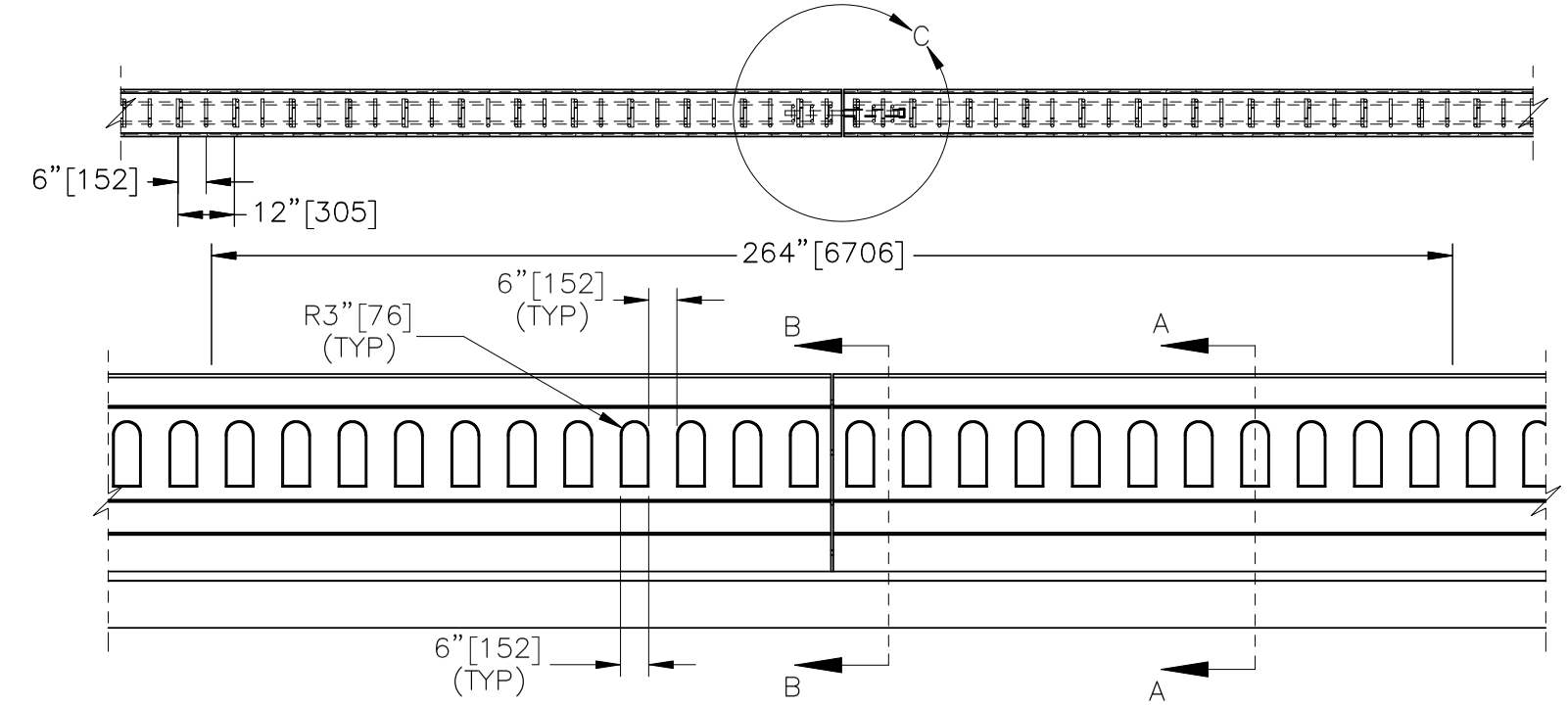


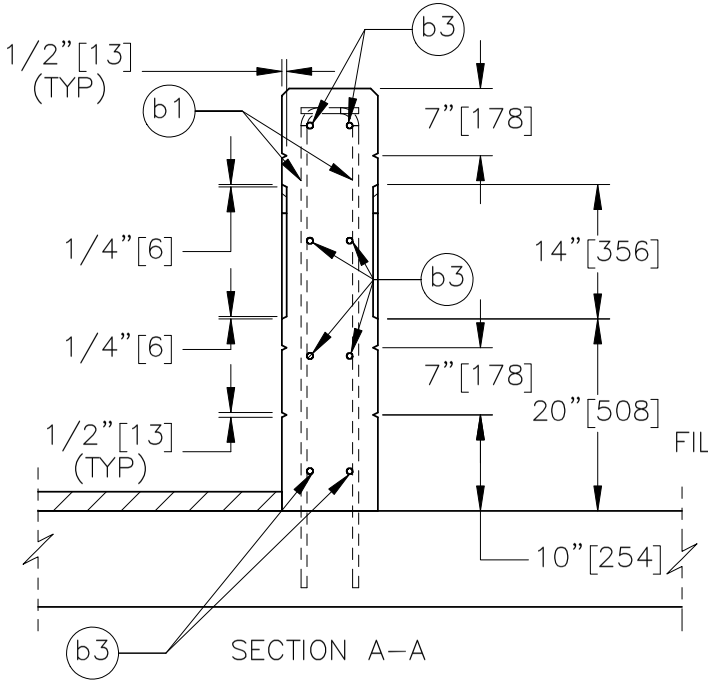
- Test Article Damage ..... Minimal
- Maximum Test Article Deflections
  - Permanent Set ..... 0.2 in.
  - Dynamic ..... 0.5 in.
  - Working Width ..... 10.5 in.
- Transducer Data

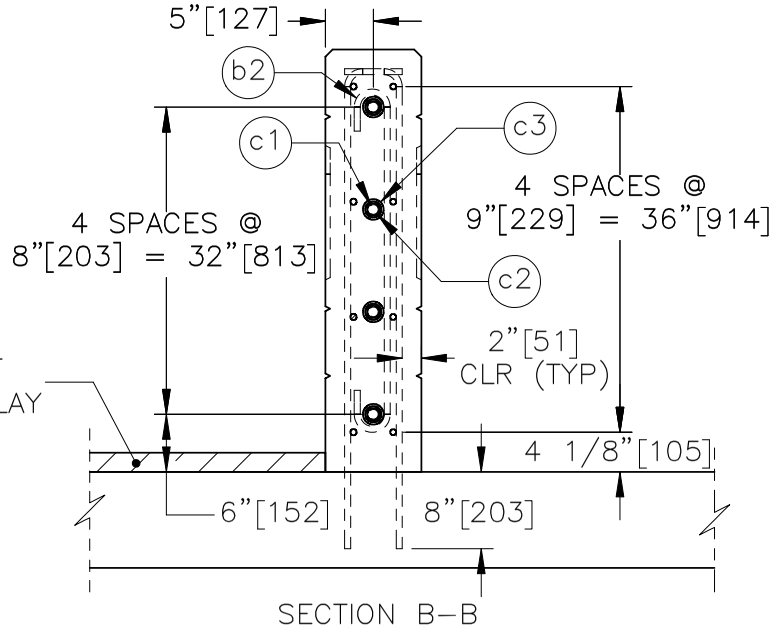
Evaluation Criteria		Transducer		MASH 2016 Limit
		SLICE-1 (primary)	SLICE-2	
OIV ft/s	Longitudinal	−20.88	−21.45	±40
	Lateral	−23.95	−26.92	±40
ORA g's	Longitudinal	−6.02	−6.03	±20.49
	Lateral	−8.04	−6.41	±20.49
MAX ANGULAR DISP. deg.	Roll	14.1	10.7	±75
	Pitch	−3.1	−4.9	±75
	Yaw	−40.9	−41.1	not required
THIV – ft/s		31.58	33.92	not required
PHD – g's		8.47	7.19	not required
ASI		1.70	1.87	not required

Figure 64. Summary of Test Results and Sequential Photographs, Test No. H42BR-2

HAWAII 42" AESTHETIC CONCRETE BRIDGE RAIL







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SHEET NO.	DATE:
1 of 5	4/20/2020

INTENDED USE

The Hawaii 42” [1067] Aesthetic Concrete Bridge Rail is non-proprietary concrete bridge rail that is anchored to a concrete bridge deck with a 2-in. [51] thick concrete or asphalt finishing surface applied on the traffic-side face of the bridge rail. This bridge rail has aesthetic recessed panels on the traffic-side and back-side surfaces. These aesthetic recessed panels measure 6 in. [152] wide, 14 in. [356] tall, and ½ in. [13] deep with an inclination angle of 60 degrees. Expansion joints using smooth dowels are typically located at 22-ft [6706] intervals in the bridge rail. End sections measuring 3 ft – 6 in. [1067] long are placed at the end of the bridge rail adjacent to an end buttress structure and should have similar or greater capacity as the bridge rail. The concrete used for the Hawaii 42” [1067] Bridge rail should have a minimum nominal compressive strength of 4,000 psi [27.6 MPa]. The Hawaii 42” [1067] Aesthetic Concrete Bridge Rail should be used in location where a maximum dynamic deflection of 0.5 in. [12] at the top of the barrier or less is acceptable and where a working width of 10.5 in. [266] is provided. The Hawaii 42” [1067] Aesthetic Concrete Bridge Rail should be used with the Modified Hawaii Thrie Beam Approach Guardrail Transition when transitioning to 31” [787] tall strong-post, W-beam guardrail such as Midwest Guardrail System (SGR20). The Hawaii 42” [1067] Aesthetic Concrete 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 = 264” [6706]

DESIGNATOR	COMPONENT	NUMBER
c1	1” [25] Dia. Smooth 24” [610] Long Rebar	3
c2	1 1/4" [32] Dia. PVC Pipe	3
c3	1 1/4” [32] PVC Cap	3
---	Concrete, Minimum 4,000 psi f’c	-
---	See Bill of Bars	-

ELIGIBILITY

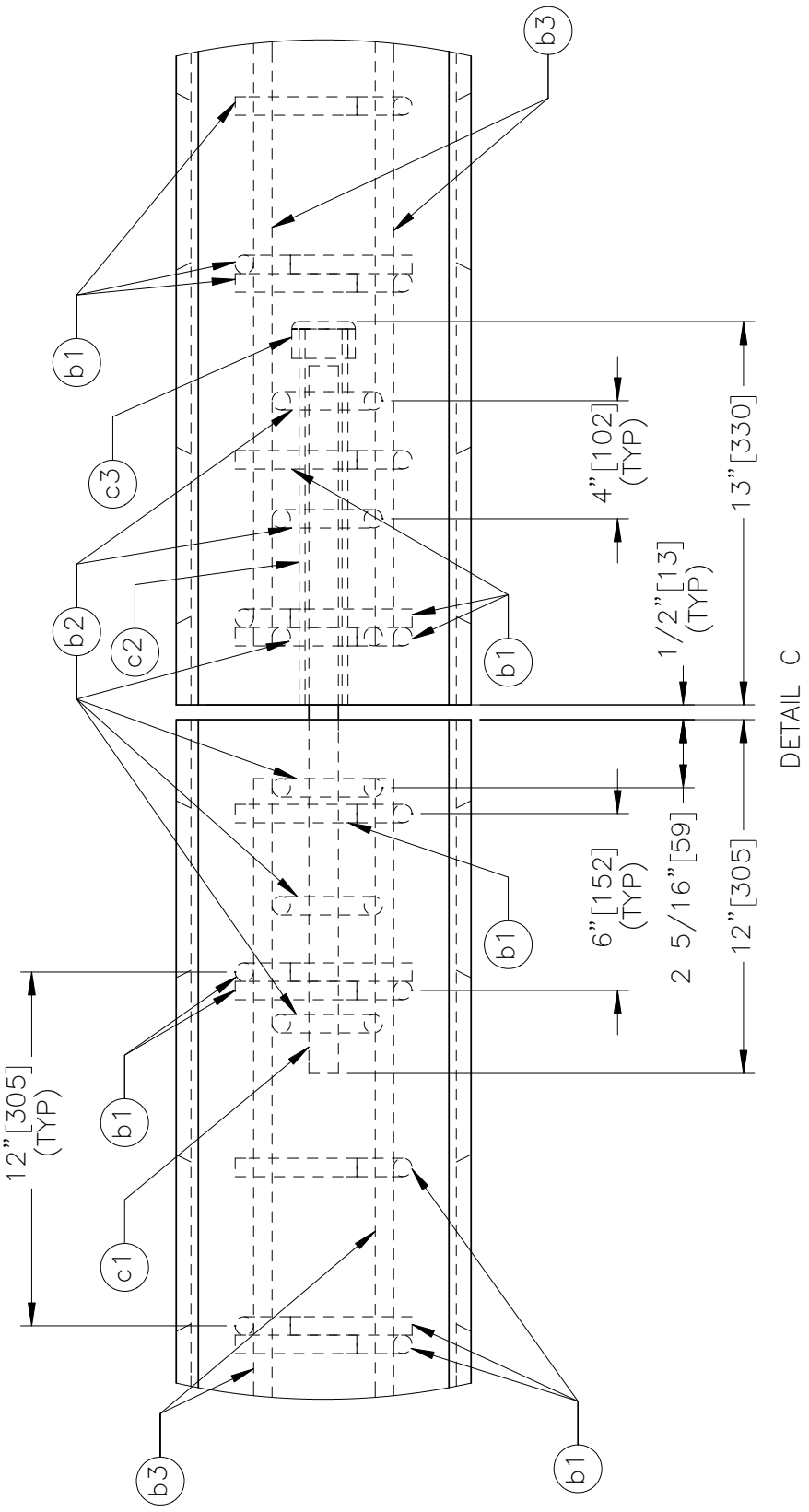
Eligibility will be pursued.

REFERENCES

Bielenberg, R. W., Dowler, N.T., Faller, R. K., and Urbank, E. L., *Crash Testing and Evaluation of the HDOT 42-in. Tall, Aesthetic Concrete Bridge Rail: MASH Test Designation Nos. 3-10 and 3-11*, Report to Hawaii Department of Transportation, Transportation Report No. TRP-03-424-20, Midwest Roadside Safety Facility, University of Nebraska-Lincoln, January 2020.

CONTACT INFORMATION

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



NOTE: SMOOTH DOWELS ARE CAST IN PLACE ON ONE SIDE OF THE EXPANSION JOINT, AND INSERTED INTO PLASTIC SLEEVES, WHICH ARE CAST INTO THE BARRIER ON THE OTHER SIDE OF THE EXPANSION JOINT.

HAWAII 42" AESTHETIC CONCRETE BRIDGE RAIL

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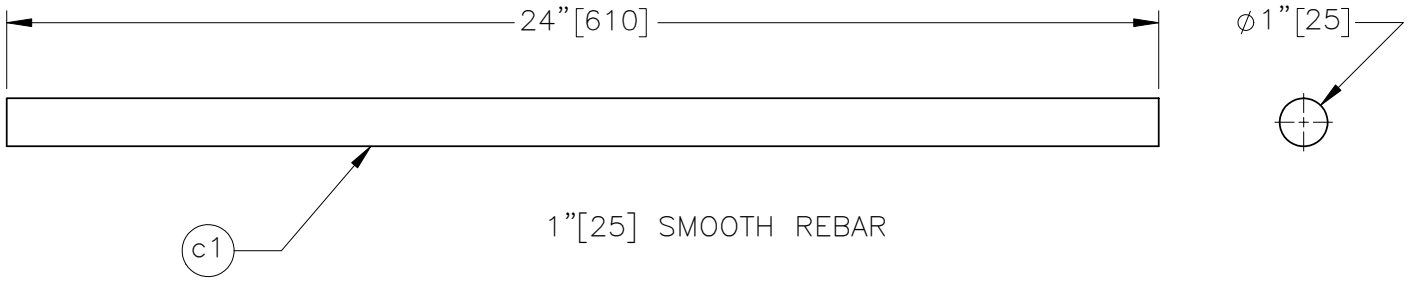
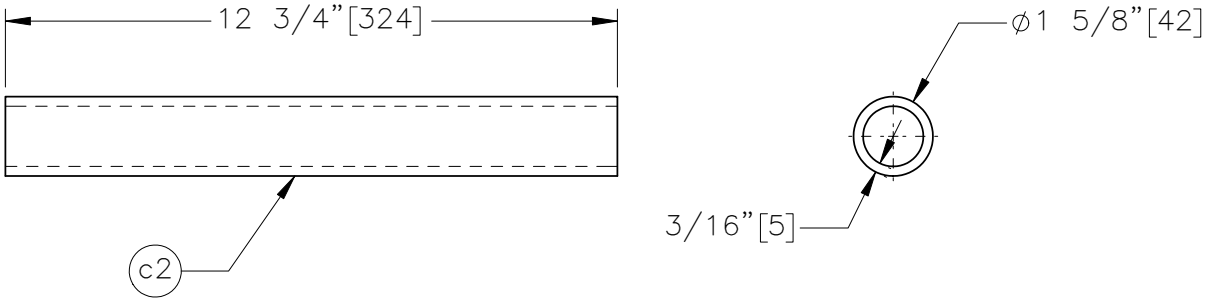
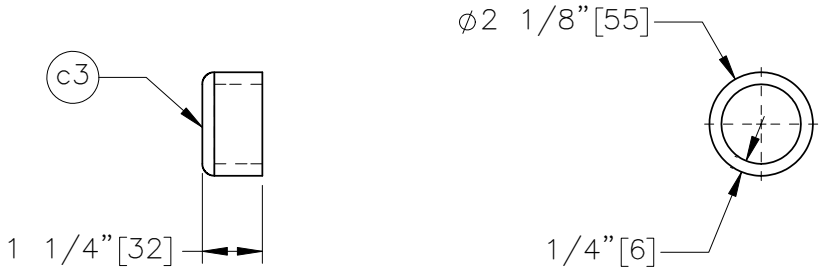
SHEET NO.	DATE:
3 of 5	4/20/2020



1"[25] SMOOTH REBAR



1 1/4"[32] DIA. PVC PIPE



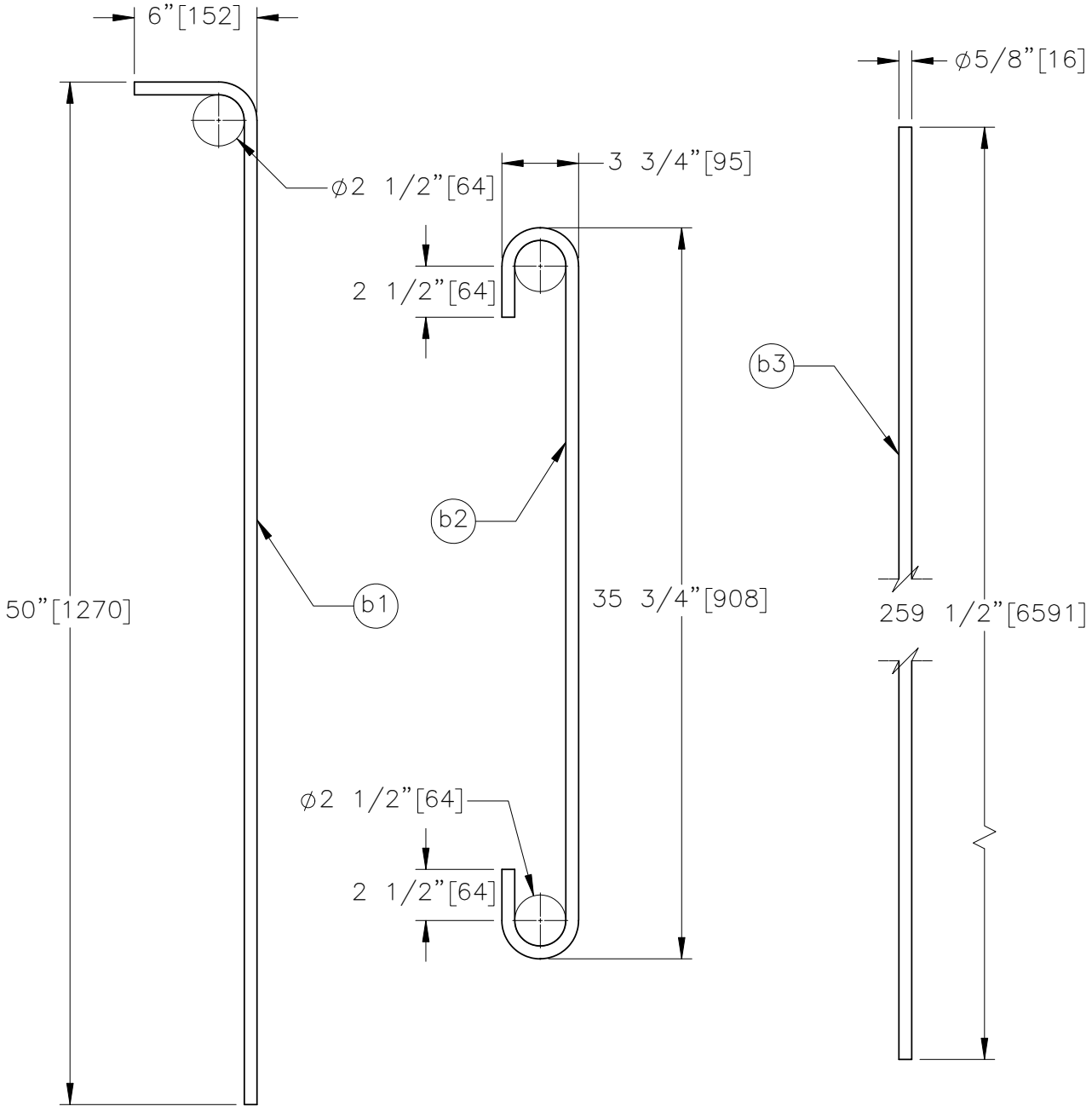
1 1/4"[32] PVC CAP

HAWAII 42" AESTHETIC CONCRETE BRIDGE RAIL

XXX##

SHEET NO.	DATE:
4 of 5	4/20/2020

BILL OF BARS				
Part No.	Bar No.	No.	Unbent Length	Material
b1	#5	68	54 3/4" [1391]	ASTM A615 Gr. 60
b2	#5	6	46 7/8" [1191]	ASTM A615 Gr. 60
b3	#5	8	259 1/2" [3245]	ASTM A615 Gr. 60



HAWAII 42" AESTHETIC CONCRETE BRIDGE RAIL

XXX##

SHEET NO.	DATE:
5 of 5	4/20/2020