



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

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

May 5, 2026

In Reply Refer To:
HSST-1/B-385

Eric Mastin
Pro-Cast Products
27417 3rd Street
Highland, CA, 92346

Dear Mr. Mastin:

We received your initial correspondence on January 17, 2024, requesting issuance of a Federal-aid reimbursement eligibility letter under the Federal-aid highway program for the roadside safety system, device, design, product, or hardware (collectively “device”) described below. On June 6, 2024, we received a complete set of files needed to complete our review. We write to inform you that the device Pro-Cast 20’ Rigid TL3- MASH Barrier (free-standing with and without spacers; and pinned with Spacers) is eligible for Federal-aid reimbursement. This letter is assigned Federal Highway Administration (FHWA) control number B-385.

ELIGIBILITY LETTERS

The FHWA issues Federal-aid reimbursement eligibility letters for new roadside safety devices that are crash tested in accordance with the industry standard of the American Association of State Highway and Transportation Officials (AASHTO) Manual for Assessing Safety Hardware (MASH).

FHWA, the Department of Transportation, and the United States (government) do not regulate roadside safety devices, crash test facilities, or the manufacturing industry. Issuance of eligibility letters is discretionary and provided only as a service to the states. FHWA may, at its discretion, decline to issue, revise, or rescind an eligibility letter. Eligibility letters are only issued by the FHWA Office of Safety.

Eligibility letters are issued only as notice to the states that a device is eligible for reimbursement under the Federal-aid highway program. They do not establish approval or certification for any other purpose. Issuance of an eligibility letter is not a prerequisite or requirement for state transportation agencies seeking to use Federal-aid funds for roadside safety devices. State agencies may use a device for which an eligibility letter has not been issued and seek Federal-aid reimbursement.

FEDERAL-AID REIMBURSEMENT

The request for issuance of this letter certified the device was crash tested in accordance with the industry standard of AASHTO's MASH. This eligibility letter is based on that certification and the material offered in support of its issuance. The device described below is eligible for reimbursement under the Federal-aid highway program.

Name of system: Pro-Cast 20' Rigid TL-3MASH Barrier (free-standing with and without spacers; and pinned with Spacers)

Type of system: Longitudinal Barrier

Test Level: Test Level 3

Testing conducted by: Applus IDIADA KARCO Engineering

Date of request: January 17, 2024

The device and as-tested condition(s) is described as follows:

The Pro-Cast 20' Rigid TL-3 MASH Barrier is a temporary concrete F-shape profile longitudinal barrier designed to shield roadside hazards. The 20' Freestanding Barriers are 20.0 ft. (6.1 m) long, 2.0 ft (0.6 m). wide, and 2.7 ft. (0.8 m) high.

Each 20.0 ft. (6.1 m) barrier required a minimum 28-day compressive strength of 4,000 psi (27.6 MPa). The concrete barrier utilized steel reinforcement composed of ASTM A36 Grade 60 rebar and consisted of four (4) #5 loops, eight (8) #5 angled loops, six (6) #5 longitudinal bars down the length of the barrier, and twenty-two (22) #4 vertical bars. In addition, each barrier also had #5 reinforcement bars at each 4.0 in. (102 mm) diameter lifting thru-hole and an assortment of #5 rebar reinforcing the stake opening. The complete section reinforcement details are shown in Appendix C: Manufacturer Documents.

The barrier sections were connected to one another with ASTM A36 0.75 in. (19 mm) steel loops embedded in each barrier which were then interlocked with a 1.25" (32 mm) diameter by 24.5 in. (622 mm) long solid steel pins.

The barriers were set on an asphalt slab 6.0 in. (152 mm) thick. A total of ten (10) freestanding barriers were used. The barrier system allows for installation of a barrier limiting and protection spacer constructed of 24.0 in. (610 mm) high by 3.0 in. (76 mm) wide by 0.375 in. (10 mm) uniform density plastic with a minimum compressive strength of 6000 psi (41.4 MPa). If utilized, the spacers are placed on the ends of each barrier on the traffic side of the interconnecting pins. The spacer sits flush with the barrier if utilized.

The Pro-Cast 20' Rigid TL-3 barrier was tested in three (3) configurations:

- 1) Freestanding with no spacers
- 2) Freestanding with spacers
- 3) Pinned to asphalt with no spacers

Information about the device, including material such as the eligibility request, crash test reports, drawings, or images are included in one or more attachment(s) to this letter.

Eligibility letter B-385 is inapplicable to devices, optional equipment, alternate materials, or other features that were not crash tested in accordance with AASHTO's MASH.

This letter is issued only for the subject device as crash tested under AASHTO's MASH. Later modification(s) of the device are not eligible for Federal-aid reimbursement under this letter. Notice of later modification(s) should be given to transportation agencies, facility owners, and operators (collectively "agencies").

Agencies should be provided appropriate information about the device's design, installation, maintenance, materials, and mechanical properties.

Issuance of this letter is discretionary, and it may be revised or rescinded at FHWA's discretion. This letter is not a determination of compliance with the Build America Buy America Act, the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) or ownership of any intellectual property rights.

This eligibility letter is not a determination by the government that a crash involving the subject device will result in any particular outcome. It is limited to only the device's eligibility for Federal-aid reimbursement.

INTELLECTUAL PROPERTY

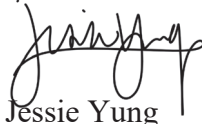
Issuance of this eligibility letter does not convey property rights of any sort nor any exclusive privilege. This letter is not authorization or consent by the government for the use, manufacture, or sale of any patented or proprietary system, device, design, product, or hardware for which the requester is not the patent owner. Eligibility letters are not an expression of any view, position, or determination by the government as to the validity, scope, or ownership of any intellectual property rights to a specific device. These letters do not grant, impute, suggest, or otherwise establish any ownership, distribution, or licensing rights to the requester. The government expresses no opinion about the intellectual property rights relating to any device for which this or any other eligibility letter is issued.

PUBLIC DISCLOSURE

To prevent any misunderstanding, and as discussed above, this Federal-aid eligibility letter is assigned FHWA control number B-385. It should only be reproduced in full with its attachment(s). This Federal-aid eligibility letter and the material offered by the requester supporting its issuance is public information. All eligibility letters and supporting material are subject to public disclosure under the Freedom of Information Act (FOIA). Eligibility letters are available to the public at https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/.

If you have any questions please contact Paul LaFleur at Paul.LaFleur@dot.gov.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jessie Yung', with a stylized flourish at the end.

Jessie Yung
Director, Office of Safety Technologies
Office of Safety

Enclosures

Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

Submitter	Date of Request:	March 08, 2024	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Eric Mastin	
	Company:	Pro-Cast Products	
	Address:	27417 3rd St, Highland, CA, 92346	
	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 (Roadside, Median, Bridge Railings)	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	Pro-Cast 20' Rigid TL-3 MASH Barrier	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:	Eric Mastin	Same as Submitter <input type="checkbox"/>
Company Name:	Pro-Cast Products	Same as Submitter <input type="checkbox"/>
Address:	27417 3rd St, Highland, CA, 92346	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.		
Pro-Cast Products is the manufacturer and marketer of device.		
Applus IDIADA KARCO Engineering, LLC (IDIADA KARCO) is an independent research and testing laboratory having no affiliation with any other entity. IDIADA KARCO is actively Involved In data acquisition and compliance/certification testing for a variety of government agencies and equipment manufacturers. The principals and staff of IDIADA KARCO have no past or present financial, contractual or organizational interest in any company or entity directly or indirectly related to the products that KARCO tests. If any financial interest should arise, other than receiving fees for testing, reporting, etc., with respect to any project, the company will provide, In writing, a full and immediate disclosure to the FHWA.		

PRODUCT DESCRIPTION

- New Hardware or Significant Modification
 Modification to Existing Hardware

The Pro-Cast 20' Rigid TL-3 MASH Barrier is a temporary concrete F-shape profile longitudinal barrier designed to shield roadside hazards. The 20' Freestanding Barriers are 20.0 ft. (6.1 m) long, 2.0 ft (0.6 m). wide, and 2.7 ft. (0.8 m) high.

Each 20.0 ft. (6.1 m) barrier required a minimum 28-day compressive strength of 4,000 psi (27.6 MPa). The concrete barrier utilized steel reinforcement composed of ASTM A36 Grade 60 rebar and consisted of four (4) #5 loops, eight (8) #5 angled loops, six (6) #5 longitudinal bars down the length of the barrier, and twenty-two (22) #4 vertical bars. In addition, each barrier also had #5 reinforcement bars at each 4.0 in. (102 mm) diameter lifting thru-hole and an assortment of #5 rebar reinforcing the stake opening. The complete section reinforcement details are shown in Appendix C: Manufacturer Documents.

The barrier sections were connected to one another with ASTM A36 0.75 in. (19 mm) steel loops embedded in each barrier which were then interlocked with a 1.25" (32 mm) diameter by 24.5 in. (622 mm) long solid steel pins.


The barriers were set on an asphalt slab 6.0 in. (152 mm) thick. A total of ten (10) freestanding barriers were used. The barrier system allows for installation of a barrier limiting and protection spacer constructed of 24.0 in. (610 mm) high by 3.0 in. (76 mm) wide by 0.375 in. (10 mm) uniform density plastic with a minimum compressive strength of 6000 psi (41.4 MPa). If utilized, the spacers are placed on the ends of each barrier on the traffic side of the interconnecting pins. The spacer sits flush with the barrier if utilized.

The Pro-Cast 20' Rigid TL-3 barrier was tested in three (3) configurations:

- 1) Freestanding with no spacers
- 2) Freestanding with spacers
- 3) Pinned to asphalt with no spacers

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:	Alex Beltran	
Engineer Signature:		Digitally signed by Alex Beltran DN: cn=Alex Beltran, o=IDIADA KARCO, ou=Lab, email=Alex.Beltran@idiada.com, c=US Date: 2024.03.05 17:08:54 -08'00'
Address:	9270 Holly Rd, Adelanto, CA 92301	Same as Submitter <input type="checkbox"/>
Country:	United States of America	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)	<p>The Pro-Cast 20' Rigid TL-3 Barrier was tested in 3 different configurations. Freestanding with spacers installed at each joint (Report TR-43203-01-NC), freestanding with no spacers installed at joints (Report TR-P43202-01-NC), and pinned to the asphalt (Report P43222-01). For all three tested configurations, per MASH 2016 a 1100C test vehicle approached the test article at a nominal speed of 62 mph (100 km/h) and angle of 25 deg.</p> <p>For the configuration with spacers (TR-P43203-01-NC) the vehicle was set to impact 80.4 in. upstream from joint 4-5. The concrete barrier was impacted at a velocity of 63.19 mph (101.70 km/h) and an angle of 25.2 deg. The barrier redirected the vehicle without allowing it to penetrate, underride, or override the installation. The occupant compartment was not penetrated and the maximum deformation into the occupant compartment was not exceeded.</p> <p>For the configuration with no spacers (TR-P43202-01-NC) the vehicle was set to impact 80.4 in. upstream from joint 4-5. The concrete barrier was impacted at a velocity of 62.26 mph (100.19 km/h) and an angle of 25.2 deg. The barrier redirected the vehicle without allowing it to penetrate, underride, or override the installation. The occupant compartment was not penetrated and the maximum deformation into the occupant compartment was not exceeded.</p> <p>For the pinned configuration (TR-P43222-01-NC) the vehicle was set to impact 42 in. upstream from joint 4-5. The concrete barrier was impacted at a velocity of 65.74 mph (105.80 km/h) and an angle of 25.4 deg. The barrier redirected the vehicle without allowing it to penetrate, underride, or override the installation. The occupant compartment was not penetrated and the maximum deformation into the occupant compartment was not exceeded.</p> <p>The Pro-Cast 20' Rigid TL-3 MASH Barrier met all the requirements for MASH Test 3-10.</p>	PASS

Required Test Number	Narrative Description	Evaluation Results
3-11 (2270P)	<p>The Pro-Cast 20' Rigid TL-3 Barrier was tested in 3 different configurations. Freestanding with spacers installed at each joint (Report TR-43201-01-NC), freestanding with no spacers installed at joints (Report TR-P43198-01-NC), and pinned to the asphalt (Report P43223-01-NC). For all three tested configurations, per MASH 2016 a 2270P test vehicle approached the test article at a nominal speed of 62 mph (100 km/h) and angle of 25 deg.</p> <p>For the configuration with spacers (TR-P43201-01-NC) the vehicle was set to impact 93.6 in. upstream from joint 4-5. The concrete barrier was impacted at a velocity of 62.39 mph (100.41 km/h) and an angle of 25.7 deg. The barrier redirected the vehicle without allowing it to penetrate, underride, or override the installation. The occupant compartment was not penetrated and the maximum deformation into the occupant compartment was not exceeded.</p> <p>For the configuration with no spacers (TR-P43198-01-NC) the vehicle was set to impact 93.6 in. upstream from joint 4-5. The concrete barrier was impacted at a velocity of 60.60 mph (97.5 km/h) and an angle of 25.2 deg. The barrier redirected the vehicle without allowing it to penetrate, underride, or override the installation. The occupant compartment was not penetrated and the maximum deformation into the occupant compartment was not exceeded.</p> <p>For the pinned configuration (TR-P43223-01-NC) the vehicle was set to impact 48 in. upstream from joint 4-5. The concrete barrier was impacted at a velocity of 63.71 mph (102.53 km/h) and an angle of 25.0 deg. The barrier redirected the vehicle without allowing it to penetrate, underride, or override the installation. The occupant compartment was not penetrated and the maximum deformation into the occupant compartment was not exceeded.</p> <p>The Pro-Cast 20' Rigid TL-3 MASH Barrier met all the requirements for MASH Test 3-11.</p>	PASS
3-20 (1100C)		Non-Critical, not conducted
3-21 (2270P)		Non-Critical, 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:	Applus IDIADA KARCO Engineering, LLC.	
Laboratory Signature:		Digitally signed by Alex Beltran DN: cn=Alex Beltran, o=IDIADA KARCO, ou=Lab, email=Alex.Beltran@idiada.com, c=US Date: 2024.03.05 17:09:10 -08'00'
Address:	9270 Holly Road, Adelanto, CA,92301	Same as Submitter <input type="checkbox"/>
Country:	United States of America	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	TL 371: April 27, 2022 - April 27, 2025	

Submitter Signature*:  Eric W. Mastin
Digitally signed by Eric W. Mastin
Date: 2024.03.08 14:51:16 -08'00'

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	

MASH 2016 Test 3-10 Summary



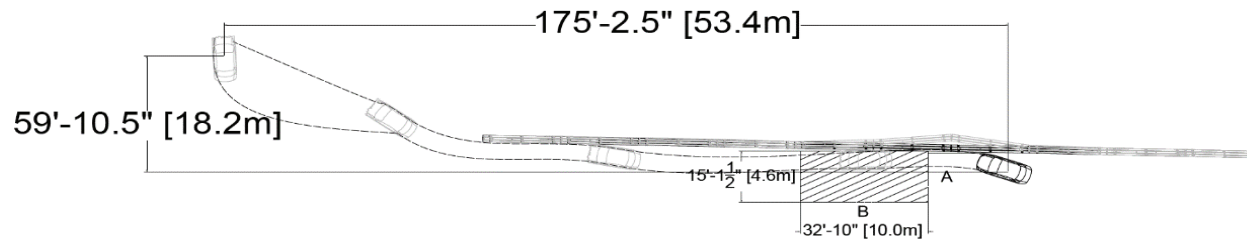
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0.440 seconds



GENERAL INFORMATION

Test Agency..... Applus IDIADA
 Test Number..... P43202-01
 Test Designation..... 3-10
 Test Date..... 09/11/23

TEST ARTICLE

Name / Model..... Pro-Cast 20' Rigid TL-3
 MASH Barrier no spacers
 Type..... Freestanding Longitudinal barrier
 Installation Length..... 200.0 ft. (61.0 m)
 Module Length..... 20.0 ft. (6.1 m)
 Road Surface..... Clean, Dry, Asphalt

TEST VEHICLE

Type / Designation..... 1100C
 Year, Make, and Model..... 2017 Kia Rio
 Curb Mass..... 2,565.0 lbs (1,163.5 kg)
 Test Inertial Mass..... 2,469.1 lbs (1,120.0 kg)
 Gross Static Mass..... 2,602.5 lbs (1,180.5 kg)

Impact Conditions

Impact Velocity..... 62.26 mph (100.19 km/h)
 Impact Angle..... 25.2°
 Location / Orientation..... Plan Critical Impact Point 80.4
 in. [Actual 82.8 in.] from joint 4-
 5
 Impact Severity..... 58.0 kip-ft (78.6 KiloJoules)
 Minimum Impact Severity..... 51.0 kip-ft (69.7 KiloJoules)

Exit Conditions

Exit Velocity..... 47.0 mph (68.9 km/h)
 Exit Angle..... 8.9°
 Final Vehicle Position..... 59.9 ft. (18.2 m) toward the driver side from CIP
 175.1 ft. (53.4 m) Downstream from CIP

Exit Box Criteria Met..... Yes
 Vehicle Snagging..... Satisfactory
 Vehicle Pocketing..... Satisfactory
 Vehicle Stability..... Satisfactory
 Maximum Roll Angle..... -10.2°
 Maximum Pitch Angle..... -8.5°
 Maximum Yaw Angle..... -31.9°

Occupant Risk

Longitudinal OIV..... 16.4 ft/s (5.0 m/s)
 Lateral OIV..... 23.3 ft/s (7.1 m/s)
 Longitudinal RA..... -2.7 g
 Lateral RA..... -7.4 g
 THIV..... 28.2 ft/s (8.6 m/s)
 PHD..... 7.9 g
 ASI..... 1.93

Test Article Deflections

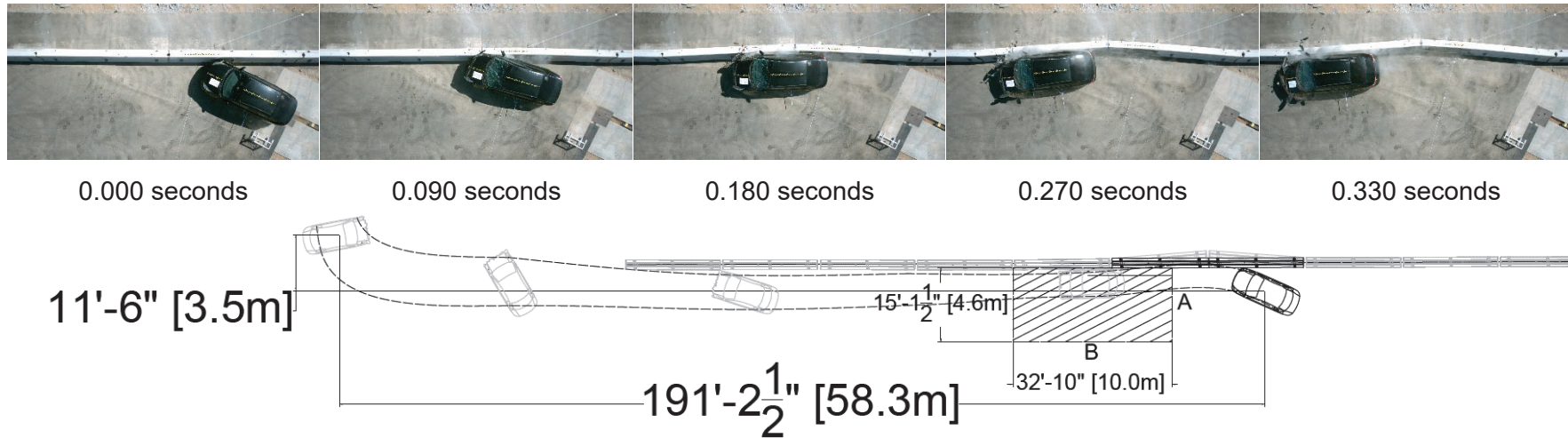
Static..... 1.6 ft. (0.5 m)
 Dynamic..... 1.6 ft. (0.5 m)
 Working Width..... 2.3 ft (0.7 m)
 Debris Field..... None

Vehicle Damage

Vehicle Damage Scale..... 1-FR-5
 CDC..... 01FRHW6
 Maximum Intrusion..... 2.1 in. (52 mm) Passenger
 Side front panel

Figure 2 Summary of Test 3-10

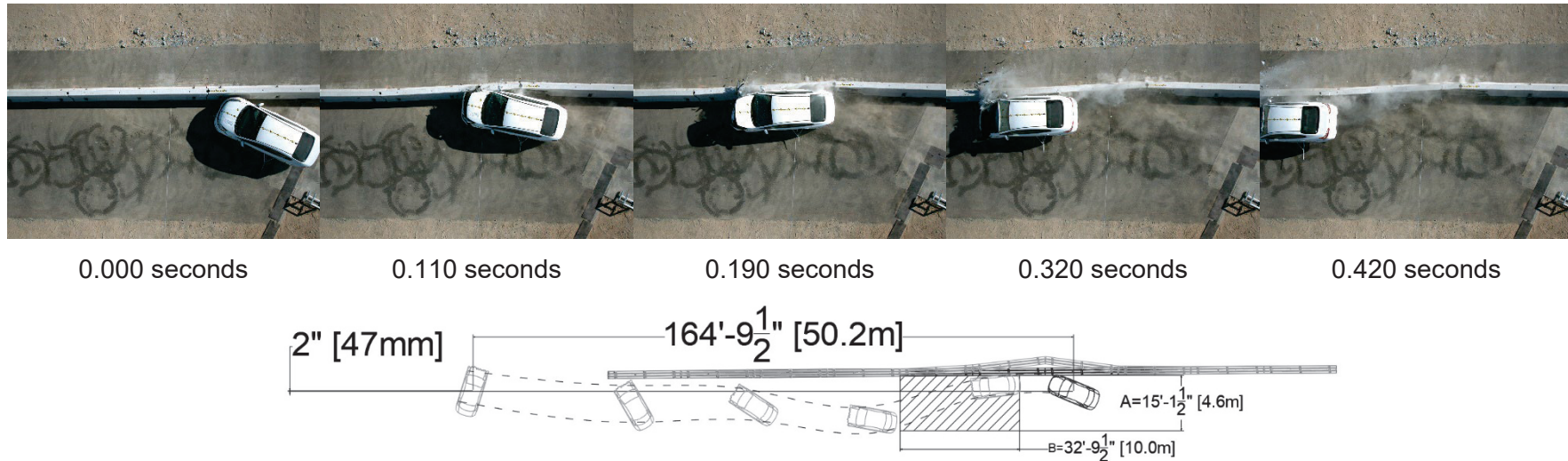
MASH 2016 Test 3-10 Summary



<p>GENERAL INFORMATION</p> <p>Test Agency..... Applus IDIADA Test Number..... P43203-01 Test Designation..... 3-10 Test Date..... 09/28/23</p> <p>TEST ARTICLE</p> <p>Name / Model..... Pro-Cast 20' Rigid TL-3 MASH Barrier with spacers Type..... Freestanding Longitudinal barrier Installation Length..... 200.0 ft. (61.0 m) Module Length..... 20.0 ft. (6.1 m) Road Surface..... Clean, Dry, Asphalt</p> <p>TEST VEHICLE</p> <p>Type / Designation..... 1100C Year, Make, and Model..... 2017 Kia Rio Curb Mass..... 2,528.7 lbs (1,147.0 kg) Test Inertial Mass..... 2,427.2 lbs (1,101.0 kg) Gross Static Mass..... 2,590.4 lbs (1,175.0 kg)</p>	<p>Impact Conditions</p> <p>Impact Velocity..... 63.19 mph (101.70 km/h) Impact Angle..... 25.2° Location / Orientation..... Plan Critical Impact Point 80.4 in. [Actual 90.9 in.] from joint 4-5</p> <p>Impact Severity..... 58.7 kip-ft (79.6 KiloJoules) Minimum Impact Severity..... 51.0 kip-ft (69.7 KiloJoules)</p> <p>Exit Conditions</p> <p>Exit Velocity..... 52.0 mph (83.7 km/h) Exit Angle..... 4.5° Final Vehicle Position..... 11.5 ft. (3.5 m) toward the driver side from critical impact point 191.2 ft. (58.3 m) Downstream from critical impact point</p> <p>Exit Box Criteria Met..... Yes Vehicle Snagging..... Satisfactory Vehicle Pocketing..... Satisfactory Vehicle Stability..... Satisfactory Maximum Roll Angle..... -12.4 ° Maximum Pitch Angle..... 23.4 ° Maximum Yaw Angle..... 38.4 °</p>	<p>Occupant Risk</p> <p>Longitudinal OIV..... 18.0 ft/s (5.5 m/s) Lateral OIV..... 23.0 ft/s (7.0 m/s) Longitudinal RA..... -3.3 g Lateral RA..... -11.6 g THIV..... 29.2 ft/s (8.9 m/s) PHD..... 11.8 g ASI..... 1.94</p> <p>Test Article Deflections</p> <p>Static..... 1.6 ft. (0.5 m) Dynamic..... 1.6 ft. (0.5 m) Working Width..... 3.6 ft. (1.1 m) Debris Field..... None</p> <p>Vehicle Damage</p> <p>Vehicle Damage Scale..... 12-FD-5 CDC..... 12FDAW6 Maximum Intrusion..... 2.1 in. (52 mm) Passenger Side Toepan</p>
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Figure 2 Summary of Test 3-10

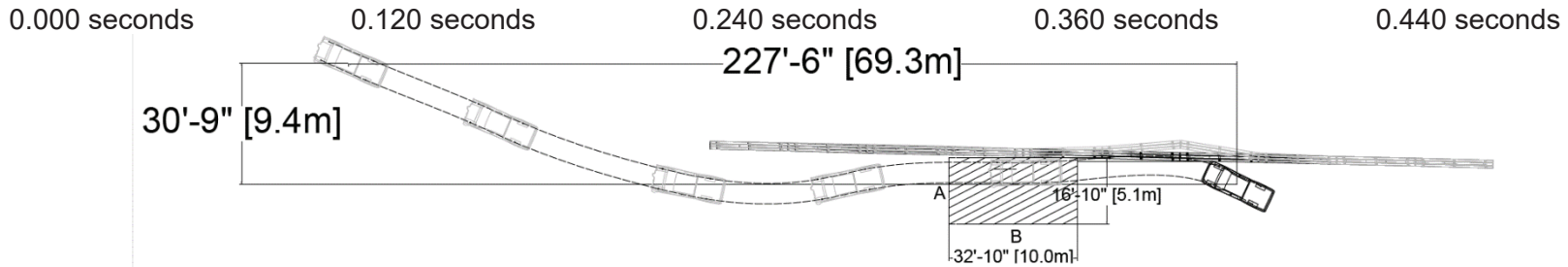
MASH 2016 Test 3-10 Summary



GENERAL INFORMATION	Impact Conditions	Occupant Risk
Test Agency..... Applus IDIADA	Impact Velocity..... 65.74 mph (105.80 km/h)	Longitudinal OIV..... 21.0 ft/s (6.4 m/s)
Test Number..... P43222-01	Impact Angle..... 25.4°	Lateral OIV..... 24.9 ft/s (7.6 m/s)
Test Designation..... 3-10	Location / Orientation..... Plan Critical Impact Point 42.0 in. [Actual 45.6 in.] upstream from joint 4-5	Longitudinal RA..... -7.1 g
Test Date..... 10/30/23	Impact Severity..... 65.2 kip-ft (88.4 KiloJoules)	Lateral RA..... -15.8 g
	Minimum Impact Severity..... 51.0 kip-ft (69.7 KiloJoules)	THIV..... 33.5 ft/s (10.2 m/s)
TEST ARTICLE	Exit Conditions	PHD..... 16.0 g
Name / Model..... Pro-Cast 20' Rigid TL-3 MASH Barrier no spacers	Exit Velocity..... 50.40 mph (81.11 km/h)	ASI..... 2.05
Type..... Pinned Longitudinal barrier	Exit Angle..... 3.0°	Test Article Deflections
Installation Length..... 200.0 ft. (61 m)	Final Vehicle Position..... 2.0 in. (47 mm) toward the dr. side from CIP	Static..... 0.7 ft. (0.2 m)
Module Length..... 20.0 ft. (6.1 m)		Dynamic..... 0.7 ft. (0.2 m)
Road Surface..... Clean, Dry, Asphalt		Working Width..... 2.5 ft (0.8 m)
TEST VEHICLE		Debris Field (longitudinal). 0.0 ft. (0 m)
Type / Designation..... 1100C		Debris Field (lateral)..... 0.0 ft. (0 m)
Year, Make, and Model..... 2017 Kia Rio	Exit Box Criteria Met..... Yes	Vehicle Damage
Curb Mass..... 2,548.5 lbs (1,156.0 kg)	Vehicle Snagging..... Satisfactory	Vehicle Damage Scale..... 12-FD-3
Test Inertial Mass..... 2,451.5 lbs (1,112.0 kg)	Vehicle Pocketing..... Satisfactory	CDC..... 12FDAW2
Gross Static Mass..... 2,614.6 lbs (1,186.0 kg)	Vehicle Stability..... Satisfactory	Maximum Intrusion..... 2.2 in. (56 mm) Passenger Side toe pan
	Maximum Roll Angle..... 9.7 °	
	Maximum Pitch Angle..... -10.2 °	
	Maximum Yaw Angle..... -38.0 °	

Figure 2 Summary of Test 3-10

MASH 2016 Test 3-11 Summary



GENERAL INFORMATION

Test Agency..... Applus IDIADA
 Test Number..... P43198-01
 Test Designation..... 3-11
 Test Date..... 09/05/23

TEST ARTICLE

Name / Model..... Pro-Cast 20' Rigid TL-3
 MASH Barrier no spacers
 Type..... Freestanding Longitudinal barrier
 Installation Length..... 200.0 ft. (61.0 m)
 Module Length..... 20.0 ft. (6.1 m)
 Road Surface..... Clean, Dry, Asphalt

TEST VEHICLE

Type / Designation..... 2270P
 Year, Make, and Model..... 2017 Ram 1500
 Curb Mass..... 5,191.8 lbs (2,355.0 kg)
 Test Inertial Mass..... 5,016.5 lbs (2,275.5 kg)
 Gross Static Mass..... 5,016.5 lbs (2,275.5 kg)

Impact Conditions

Impact Velocity..... 60.6 mph (97.5 km/h)
 Impact Angle..... 25.2°
 Location / Orientation..... 104.6 in. (2.68 m) upstream
 from joint 4-5

Impact Severity..... 111.7 kip-ft (151.4 KiloJoules)
 Minimum Impact Severity.. 106.0 kip-ft (144.0 KiloJoules)

Exit Conditions

Exit Velocity..... 48.30 mph (77.73 km/h)
 Exit Angle..... 4.4°
 Final Vehicle Position..... 30.7 ft. (9.4 m) toward passenger side
 from CIP
 227.5 ft. (69.3 m) downstream CIP

Exit Box Criteria Met..... Yes
 Vehicle Snagging..... Satisfactory
 Vehicle Pocketing..... Satisfactory
 Vehicle Stability..... Satisfactory
 Maximum Roll Angle..... 33.5°
 Maximum Pitch Angle..... -11.1°
 Maximum Yaw Angle..... -31.8°

Occupant Risk

Longitudinal OV..... 17.4 ft/s (5.3 m/s)
 Lateral OV..... 21.7 ft/s (6.6 m/s)
 Longitudinal RA..... -5.4 g
 Lateral RA..... -9.7 g
 THIV..... 27.6 ft/s (8.4 m/s)
 PHD..... 10.2 g
 ASI..... 1.44

Test Article Deflections

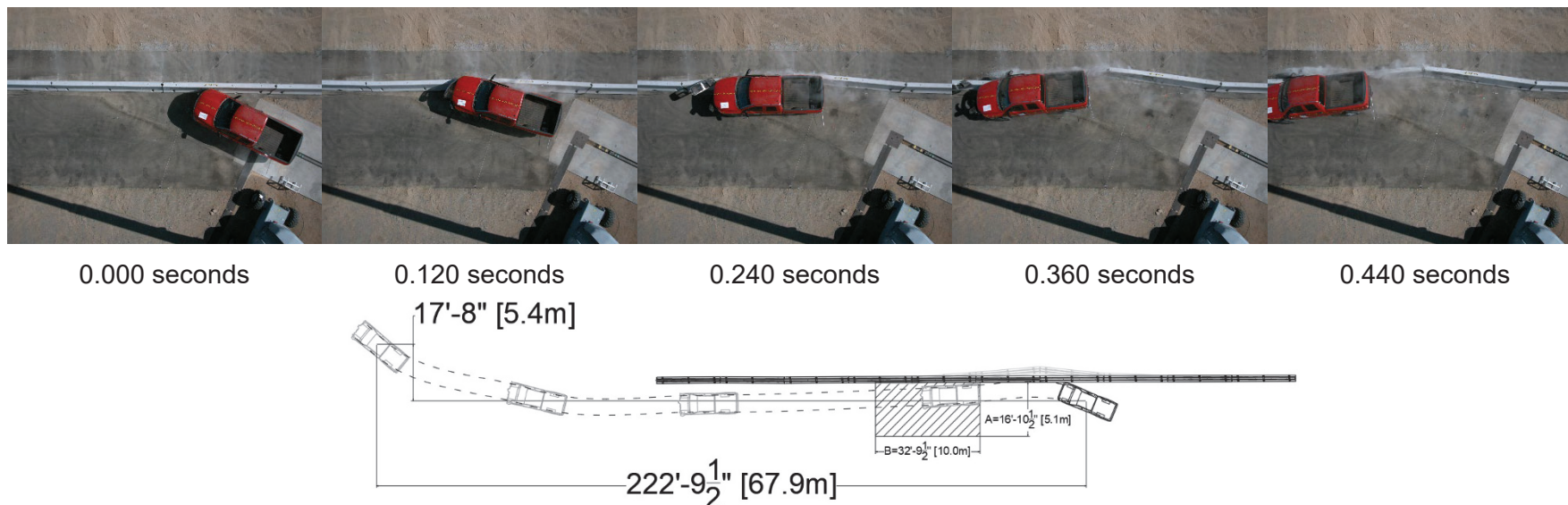
Static..... 3.0 ft. (0.9 m)
 Dynamic..... 3.0 ft. (0.9 m)
 Working Width..... 4.6 ft. (1.4 m)
 Debris Field (longitudinal) 1.8 ft. (0.5 m)
 Debris Field (lateral)..... 2.1 ft. (0.6 m)

Vehicle Damage

Vehicle Damage Scale.. 1-FR-2
 CDC..... 01FRMW3
 Maximum Intrusion..... 3.7 in. (94 mm) Passenger
 Side Toepan

Figure 2 Summary of Test 3-11

MASH 2016 Test 3-11 Summary



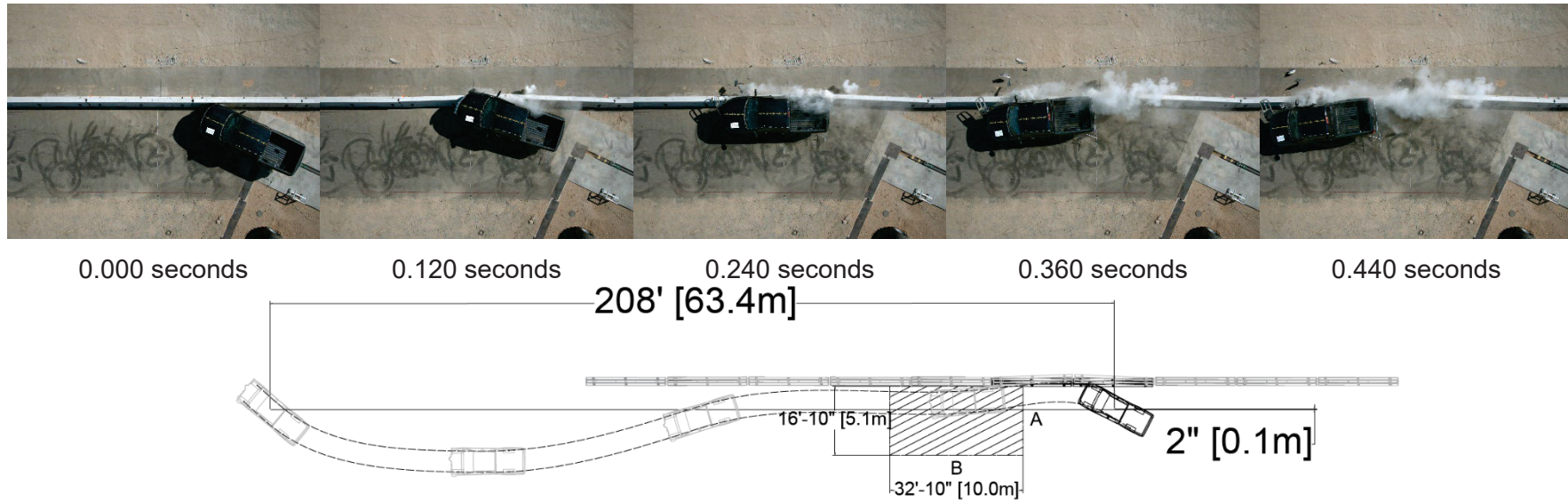
GENERAL INFORMATION	
Test Agency.....	Applus IDIADA
Test Number.....	P43201-01
Test Designation.....	3-11
Test Date.....	09/12/23
TEST ARTICLE	
Name / Model.....	Pro-Cast 20' Rigid TL-3 MASH Barrier with spacers
Type.....	Freestanding Longitudinal barrier
Installation Length.....	200.0 ft. (61.0 m)
Module Length.....	20.0 ft. (6.1 m)
Road Surface.....	Clean, Dry, Asphalt
TEST VEHICLE	
Type / Designation.....	2270P
Year, Make, and Model.....	2018 Ram 1500
Curb Mass.....	4,932.8 lbs (2,237.5 kg)
Test Inertial Mass.....	5,015.4 lbs (2,275.0 kg)
Gross Static Mass.....	5,015.4 lbs (2,275.0 kg)

Impact Conditions	
Impact Velocity.....	62.39 mph (100.41 km/h)
Impact Angle.....	25.7°
Location / Orientation.....	Plan Critical Impact Point 93.6 in. [Actual 91.2 in.] from joint 4- 5
Impact Severity.....	122.7 kip-ft (166.4 KiloJoules)
Minimum Impact Severity.....	106.0 kip-ft (144.0 KiloJoules)
Exit Conditions	
Exit Velocity.....	51.6 mph (83.0 km/h)
Exit Angle.....	7.3°
Final Vehicle Position.....	17.7 ft. (5.4 m) Towards field Side 222.8 ft. (67.9 m) dw stream from CIP
Exit Box Criteria Met.....	Yes
Vehicle Snagging.....	Satisfactory
Vehicle Pocketing.....	Satisfactory
Vehicle Stability.....	Satisfactory
Maximum Roll Angle.....	15.7°
Maximum Pitch Angle.....	-14.0°
Maximum Yaw Angle.....	-33.1°

Occupant Risk	
Longitudinal OIV.....	14.1 ft/s (4.3 m/s)
Lateral OIV.....	20.3 ft/s (6.2 m/s)
Longitudinal RA.....	-5.1 g
Lateral RA.....	-7.0 g
THIV.....	24.9 ft/s (7.6 m/s)
PHD.....	7.0 g
ASI.....	1.26
Test Article Deflections	
Static.....	2.8 ft. (0.9 m)
Dynamic.....	2.8 ft. (0.9 m)
Working Width.....	4.8 ft. (1.4 m)
Debris Field.....	None
Vehicle Damage	
Vehicle Damage Scale.....	12-FD-3
CDC.....	12FDAN1
Maximum Intrusion.....	3.7 in. (94 mm) Passenger Side Toepan

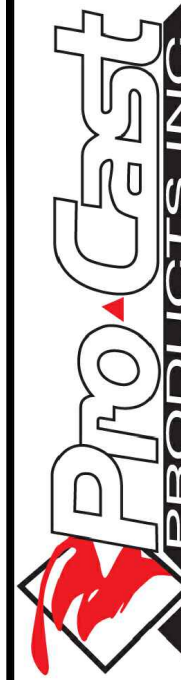
Figure 2 Summary of Test 3-11

MASH 2016 Test 3-11 Summary



<p>GENERAL INFORMATION</p> <p>Test Agency..... Applus IDIADA Test Number..... P43223-01 Test Designation..... 3-11 Test Date..... 10/12/23</p> <p>TEST ARTICLE</p> <p>Name / Model..... Pro-Cast 20' Rigid TL-3 MASH Barrier no spacers Type..... Pinned Longitudinal barrier Installation Length..... 200.0 ft. (61.0 m) Module Length..... 20.0 ft. (6.1 m) Road Surface..... Clean, Dry, Asphalt</p> <p>TEST VEHICLE</p> <p>Type / Designation..... 2270P Year, Make, and Model..... 2018 Ram 1500 Curb Mass..... 5,185.2 lbs (2,352.0 kg) Test Inertial Mass..... 5,037.5 lbs (2,285.0 kg) Gross Static Mass..... 5,037.5 lbs (2,285.0 kg)</p>	<p>Impact Conditions</p> <p>Impact Velocity..... 63.71 mph (102.53 km/h) Impact Angle..... 25.0° Location / Orientation..... Plan Critical Impact Point 48.0 in. [Actual 44.9 in.] upstream from joint 4-5</p> <p>Impact Severity..... 122.1 kip-ft (165.5 KiloJoules) Minimum Impact Severity..... 106.0 kip-ft (144.0 KiloJoules)</p> <p>Exit Conditions</p> <p>Exit Velocity..... 50.76 mph (81.69 km/h) Exit Angle..... 8.2° Final Vehicle Position..... 2.0 in. (0.1 m) Towards the driver Side 208.0 ft. (63.4 m) downstream from CIP</p> <p>Exit Box Criteria Met..... Yes Vehicle Snagging..... Satisfactory Vehicle Pocketing..... Satisfactory Vehicle Stability..... Satisfactory Maximum Roll Angle..... 6.5 ° Maximum Pitch Angle..... -10.2 ° Maximum Yaw Angle..... 53.1 °</p>	<p>Occupant Risk</p> <p>Longitudinal OIV..... 18.4 ft/s (5.6 m/s) Lateral OIV..... 17.4 ft/s (5.3 m/s) Longitudinal RA..... -4.5 g Lateral RA..... -7.3 g THIV..... 27.2 ft/s (8.3 m/s) PHD..... 7.8 g ASI..... 1.20</p> <p>Test Article Deflections</p> <p>Static..... 0.6 ft. (0.2 m) Dynamic..... 0.6 ft. (0.2 m) Working Width..... 2.3 ft (0.7 m) Debris Field (longitudinal). 1.2 ft. (0.4 m) Debris Field (lateral)..... 4.2 ft. (1.3 m)</p> <p>Vehicle Damage</p> <p>Vehicle Damage Scale..... 01-FR-3 CDC..... 01FRAN6 Maximum Intrusion..... 7.0 in. (177 mm) Passenger Side Toepan</p>
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Figure 2 Summary of Test 3-11



PO Box 602, Highland, CA 92346
 909-793-7602 phone 909-793-1283 fax
 www.procastproducts.com

PROJECT NAME:

**F-TYPE
 BARRIER**

OWNER/CLIENT:

DRAWN BY:	JPL	01/10/2023
REVISED BY:	JPL	09/12/2023
CHECKED BY:	EM	09/12/2023
SUBMITTED:		
APPROVED:		

REVISION:

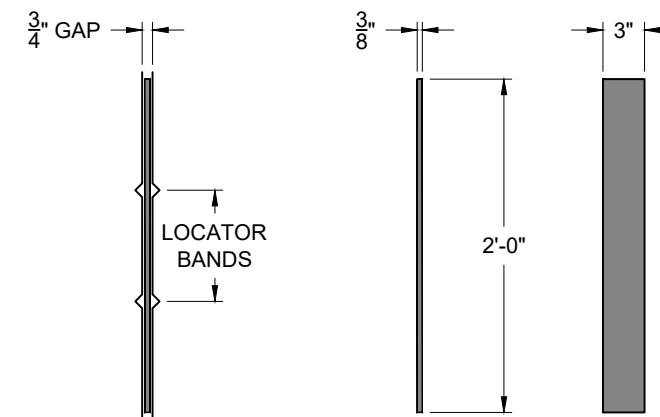
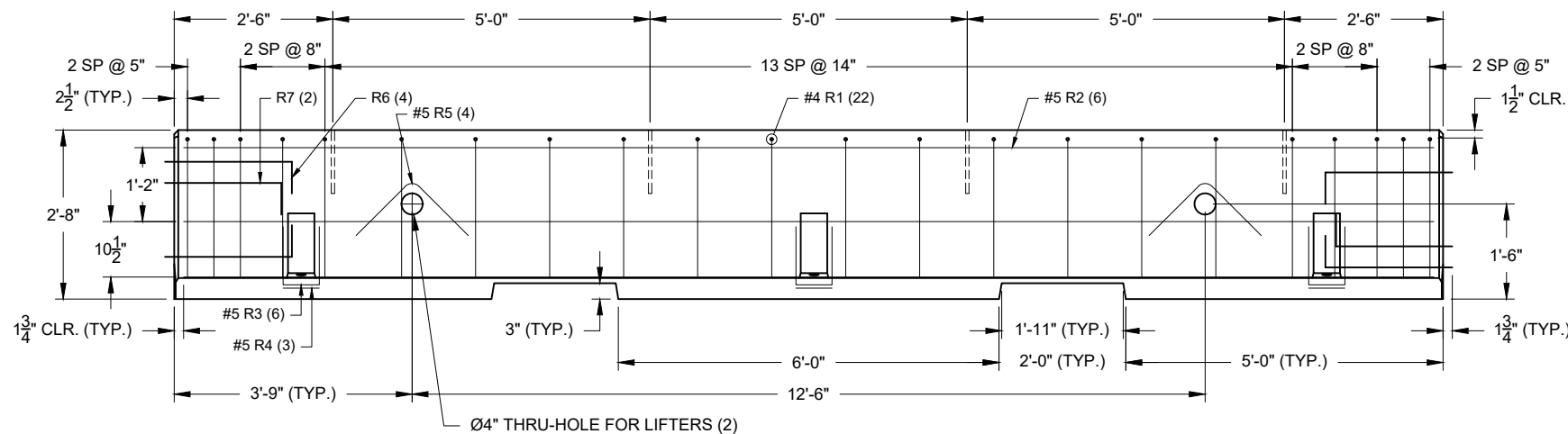
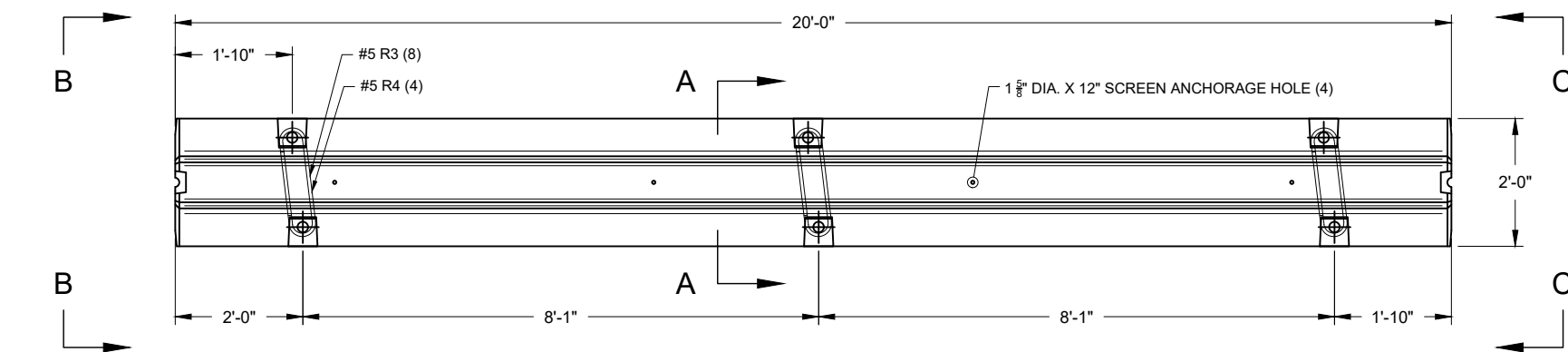
PROJECT NO.

SHEET TITLE:

**20' & 10' TEMP.
 BARRIER DETAIL**

SHEET NO.

TB2

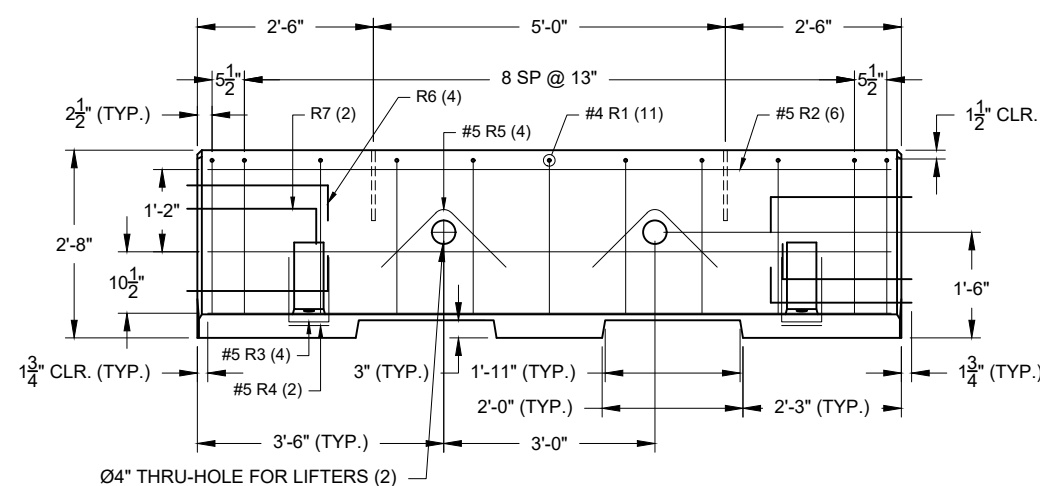
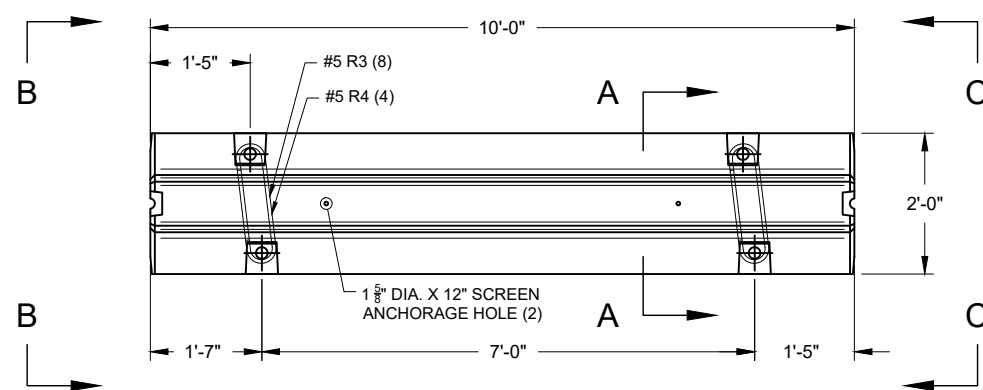


SPACER DETAIL

*SEE NOTE 5

NOTES:

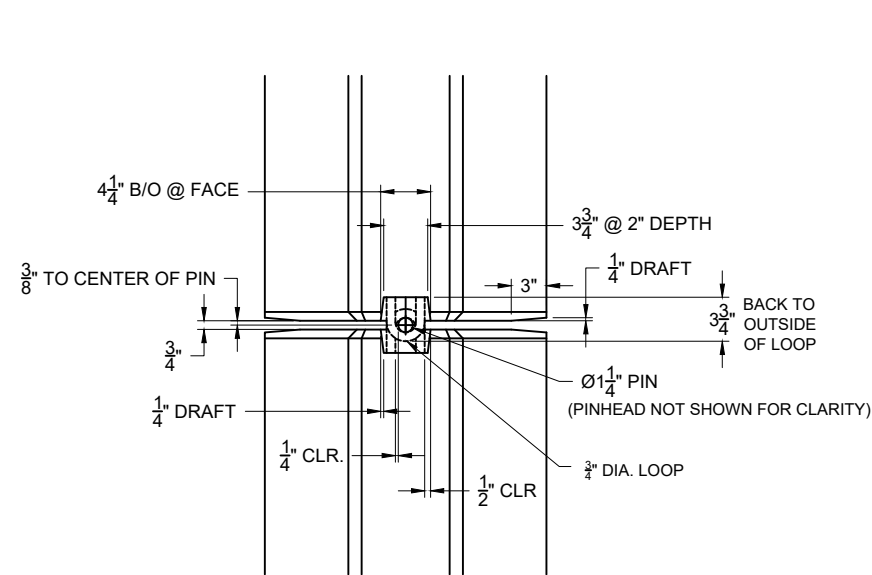
1. MINIMUM CONCRETE STRENGTH 4000-PSI (27.6MPa) IN 28 DAYS
2. REINFORCING DEFORMED BARS COMPLYING WITH ASTM A706/A706M GRADE 60. WELDED WIRE REINFORCEMENT MAY BE USED ON AN EQUIVALENT AREA BASIS AND SHALL COMPLY WITH ASTM A1064/A1064M
3. STEEL BAR LOOPS COMPLYING WITH ASTM A36/A36M
4. CONNECTING PINS ARE ROUND BARS COMPLYING WITH ASTM A36/A36M A MINIMUM LENGTH OF 26" INCHES AND HAVE A HEAD OF 3" INCH DIAMETER
5. SPACER OF UNIFORM DENSITY PLASTIC, METAL, OR OTHER SUITABLE MATERIAL MAY BE USED PROVIDED THE MATERIAL HAS A MINIMUM COMPRESSIVE STRENGTH OF 6000-PSI (41.4MPa)
6. DESIGN MEETS THE REQUIREMENT OF MASH TL-3
7. IDENTIFICATION WILL INCLUDE MANUFACTURER'S NAME, MONTH AND YEAR. IF REQUIRED LOT NUMBERS MAY BE INCLUDED



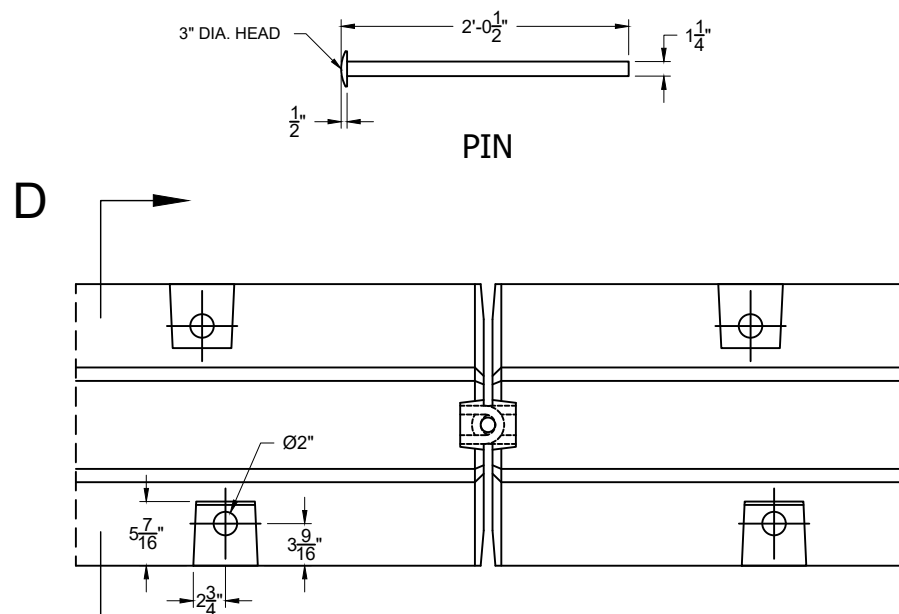
20' & 10' TEMPORARY BARRIER DETAIL

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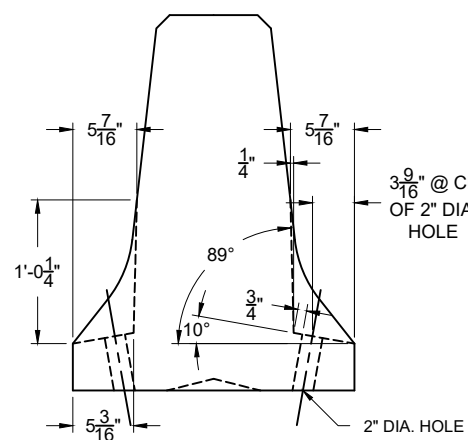
Submitted for Approval: 09/12/2023



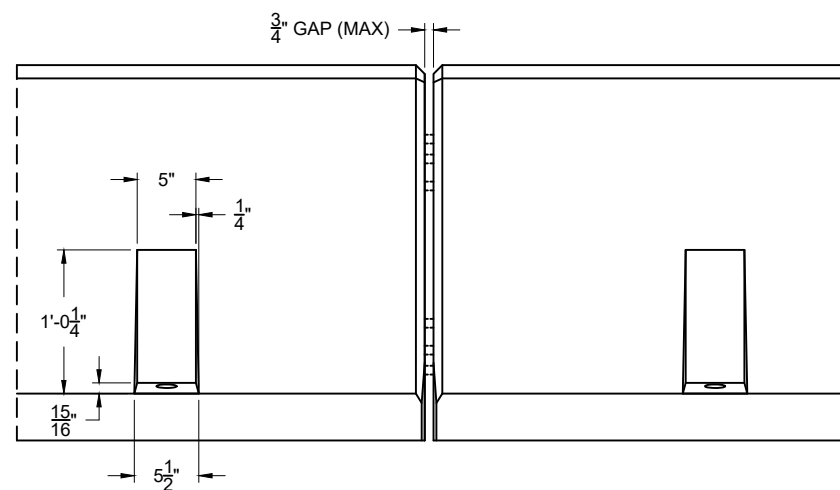
PLAN VIEW



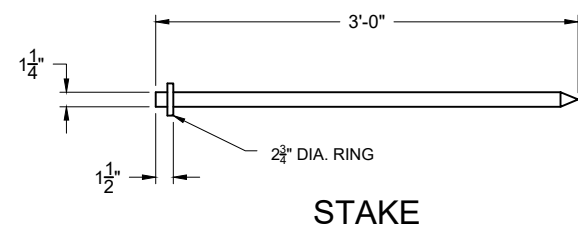
CONNECTION PLAN VIEW



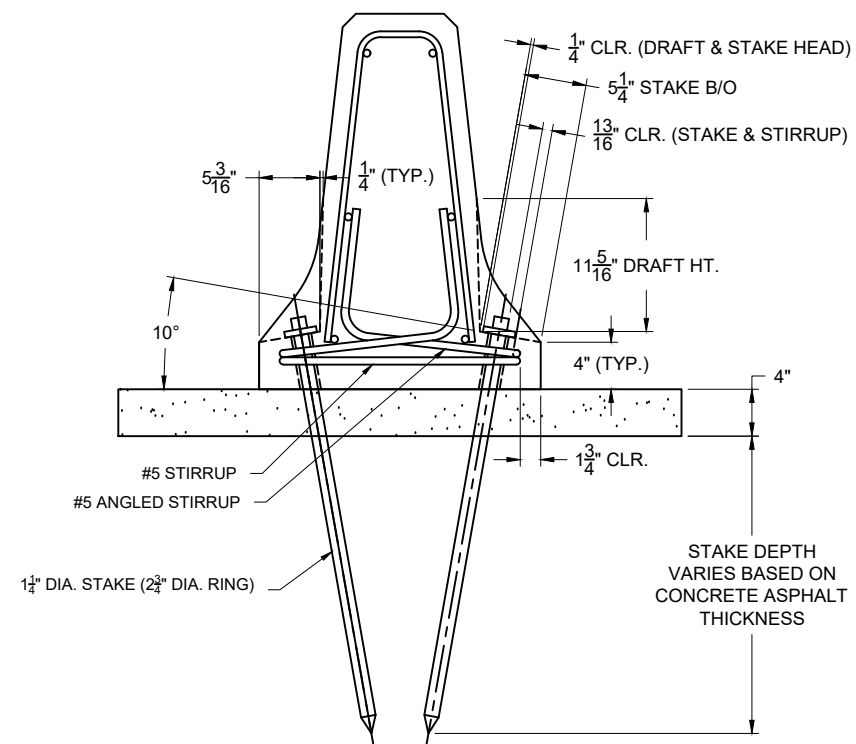
SECTION D-D



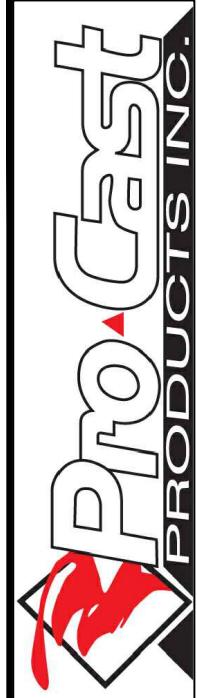
CONNECTION ELEVATION



STAKE



STAKE DEPTH
VARIES BASED ON
CONCRETE ASPHALT
THICKNESS



PO Box 602, Highland, CA 92346
909-793-7602 phone 909-793-1283 fax
www.procastproducts.com

PROJECT NAME:

**F-TYPE
BARRIER**

OWNER/CLIENT:

DRAWN BY:	JPL	01/10/2023
REVISED BY:	JPL	09/12/2023
CHECKED BY:	EM	09/12/2023
SUBMITTED:		
APPROVED:		

REVISION:

PROJECT NO.

SHEET TITLE:

**STAKE HOLE
DETAIL**

SHEET NO.

TB3

TEMPORARY BARRIER - STAKE HOLE DETAIL

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Submitted for Approval: 09/12/2023