



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

November 19, 2019

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

In Reply Refer To:
HSST-1/B-325

Mr. Ben Powell
180 Ram Forest Rd.
Stouffville, Ontario, Canada

Dear Mr. Powell:

This letter is in response to your April 12, 2019 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-325 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:

- FLUX Barrier

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: FLUX Barrier
Type of system: Longitudinal Barrier
Test Level: MASH Test Level 3 (TL3)
Testing conducted by: TamTI
Date of request: April 12, 2019

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-325 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".

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:	April 12, 2019	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Ben Powell	
	Company:	Northern Infrastructure Products	
	Address:	180 Ram Forest Rd. Stouffville, Ontario	
	Country:	Canada	
	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	Flux 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:	Ben Powell	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	Northern Infrastructure Products	Same as Submitter <input checked="" type="checkbox"/>
Address:	180 Ram Forest Rd. Stouffville, Ontario	Same as Submitter <input checked="" type="checkbox"/>
Country:	Canada	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.

Texas A&M Transportation Institute (TTI) was contracted by Northern Infrastructure Products to perform full-scale crash testing of their Flux Barrier. There are no shared financial interests in the Flux Barrier between Northern Infrastructure Products and Texas A&M Transportation Institute (TTI), other than the costs involved in the actual crash testing and the reports thereof for this submission to FHWA.

PRODUCT DESCRIPTION

- New Hardware or Significant Modification
 Modification to Existing Hardware

The test installation consisted of a total of 165 proprietary repositionable concrete barriers (Flux Barrier). The total length of the barrier installation was approximately 562-ft 4-inches (171.40 m). The barriers were installed on a 6-inch thick concrete apron.

Each of the Flux Barrier barrier segments was constructed of precast concrete with steel reinforcement. Each measured 39 $\frac{3}{8}$ inches (1000 mm) long (face-to-face), 34 inches (864 mm) tall, and 18 inches (457 mm) wide at the base. Two connecting pin hinge bars were integrally cast in and continuous through each segment. Each bar was bent to offset by approximately 1 inch (25 mm) such that the upstream bar ends nested between the downstream bar ends on the adjacent segment.

The barrier segments were set on the concrete apron and joined via the hinge pins with any slack removed during installation. There were no bolts, pins, or adhesives securing the barriers to the concrete apron.

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:	Nathan D. Schulz	
Engineer Signature:	Nathan D. Schulz	Digitally signed by Nathan D. Schulz Date: 2019.04.11 11:42:54 -05'00'
Address:	3135 TAMU, College Station, Texas 77843-3135	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)	<p>The results of the test conducted on November 13, 2018 are found in TTI Test Report No. 690902-PCL4&5.</p> <p>A 2009 Kia Rio, traveling at an impact speed of 62.4 mi/h (100.4 km/h), contacted the Flux Barrier at an impact angle of 24.8 degrees.</p> <p>The Flux Barrier contained and redirected the 1100C vehicle. The vehicle did not penetrate, underide, or override the installation. Maximum dynamic deflection during the test was 41.2 inches (1047 mm). No detached elements, fragments, or other debris was present to penetrate or to show potential for penetrating the occupant compartment, or to present hazard to others in the area.</p> <p>No occupant compartment deformation or intrusion occurred.</p> <p>The 1100C vehicle remained upright during and after the collision event. Maximum roll and pitch angles were 8° and 4°, respectively.</p> <p>Occupant risk factors were within the limits of MASH.</p>	PASS
3-11 (2270P)	<p>The results of the test conducted on November 8, 2018 are found in TTI Test Report No. 690902-PCL4&5.</p> <p>A 2012 RAM 1500 pickup truck, traveling at an impact speed of 62.5 mi/h (100.6 km/h), contacted the Flux Barrier at an impact angle of 25.0 degrees.</p> <p>The Flux Barrier contained and redirected the 2270P vehicle. The vehicle did not penetrate, underide, or override the installation. Maximum dynamic deflection during the test was 62.7 inches (1593 mm). No detached elements, fragments, or other debris was present to penetrate or to show potential for penetrating the occupant compartment, or to present hazard to others in the area.</p> <p>No occupant compartment deformation or intrusion occurred.</p> <p>The 2270P vehicle remained upright during and after the collision event. Maximum roll and pitch angles were 14° and 5°, respectively.</p> <p>Occupant risk factors were within the preferred limits of MASH.</p>	PASS
3-20 (1100C)	Test 3-20 is not applicable for this type of system. (i.e. not a Transition)	Non-Relevant Test, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-21 (2270P)	Test 3-21 is not applicable for this type of system. (i.e. not a Transition)	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:	Texas A&M Transportation Institute	
Laboratory Signature:	Digitally signed by Darrell L. Kuhn 'Date: 2019.04.11 18:09:18 -05'00 	
Address:	3135 TAMU, College Station, Texas 77843-3135	Same as Submitter <input type="checkbox"/>
Country:	USA	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	ISO 17025 Laboratory, A2LA Testing Certificate No. 2821.01 Valid to April 30, 2019	

Submitter Signature*: **Ben Powell** Digitally signed by Ben Powell
DN: cn=Ben Powell, o=Powell Contracting,
ou, email=ben@powell.ca, c=CA
Date: 2019.04.15 08:56:16 -0400

Submit Form

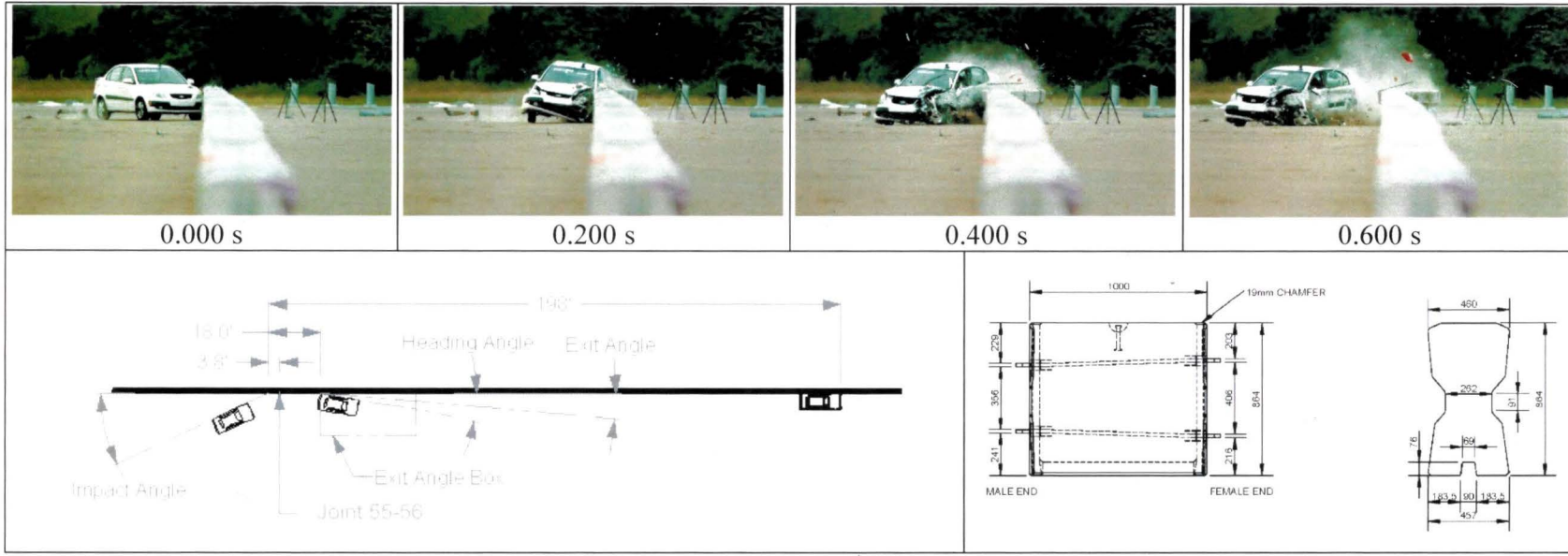
ATTACHMENTS

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.

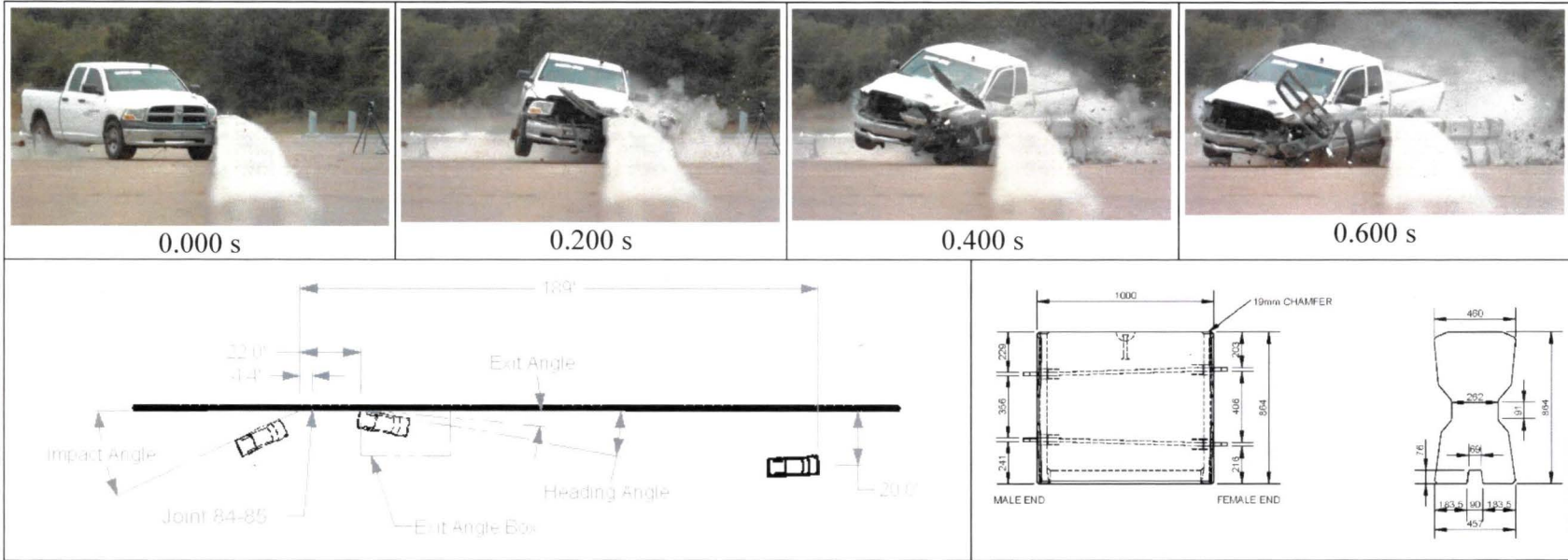
FHWA Official Business Only:

Eligibility Letter		Key Words
Number	Date	



<p>General Information</p> <p>Test Agency..... Texas A&M Transportation Institute (TTI) Test Standard Test No..... MASH Test 3-10 TTI Test No. 690902-PCL4 Test Date 2018-11-13</p> <p>Test Article</p> <p>Type Portable Concrete Barrier Name..... Flux Barrier Installation Length..... 562.3 ft (171.4 m) Material or Key Elements ... 165 concrete barrier segments; each nominally 39.37 inches (1000 mm) long x 34 inches (864 mm) tall, pinned end-to-end</p> <p>Soil Type and Condition Placed on Concrete Surface, Damp</p> <p>Test Vehicle</p> <p>Type/Designation..... 1100C Make and Model 2009 Kia Rio Curb..... 2460 lb (1116 kg) Test Inertial..... 2451 lb (1112 kg) Dummy 165 lb (75 kg) Gross Static..... 2616 lb (1187 kg)</p>	<p>Impact Conditions</p> <p>Speed 62.4 mi/h (100.4 km/h) Angle..... 24.8° Location/Orientation 3.8 ft (1.2 m) upstream of centerline of joint between barrier segments 55-56</p> <p>Impact Severity..... 56 kip-ft (76 kJ)</p> <p>Exit Conditions</p> <p>Speed 39.8 mi/h (64.1 km/h) Trajectory/Heading Angle. 12.7° / 25.1°</p> <p>Occupant Risk Values</p> <p>Longitudinal OIV..... 22.3 ft/s (6.8 m/s) Lateral OIV 24.9 ft/s (7.6 m/s) Longitudinal Ridedown 11.7 g Lateral Ridedown 16.6 g THIV..... 34.7 km/h PHD 17.5 g ASI 1.92</p> <p>Max. 0.050-s Average</p> <p>Longitudinal -10.8 g Lateral..... 13.1 g Vertical..... 4.1 g</p>	<p>Post-Impact Trajectory</p> <p>Stopping Distance 198 ft (60 m) dwnstrm</p> <p>Vehicle Stability</p> <p>Maximum Yaw Angle..... 49° Maximum Pitch Angle..... 4° Maximum Roll Angle 8° Vehicle Snagging No Vehicle Pocketing..... No</p> <p>Test Article Deflections</p> <p>Dynamic..... 41.2 inches (1047 mm) Permanent 39.0 inches (991 mm) Working Width..... 59.2 inches (1504 mm) Height of Working Width..... 34.0 inches (864 mm)</p> <p>Vehicle Damage</p> <p>VDS 11LFQ5 CDC 11FLEW4 Max. Exterior Deformation..... 10 inches (254 mm) OCDI..... LF0000000 Max. Occupant Compartment Deformation None</p>
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Figure 5.6. Summary of Results for MASH Test 3-10 on Flux Barrier.



General Information

Test Agency..... Texas A&M Transportation Institute (TTI)
 Test Standard Test No..... MASH Test 3-11
 TTI Test No. 690902-PCL5
 Test Date 2018-11-08

Test Article

Type Portable Concrete Barrier
 Name..... Flux Barrier
 Installation Length..... 562.3 ft (171.4 m)
 Material or Key Elements... 165 concrete barrier segments; each nominally 39.37 inches (1000 mm) long x 34 inches (864 mm) tall, pinned end-to-end

Soil Type and Condition Placed on Concrete Surface, Damp

Test Vehicle

Type/Designation..... 2270P
 Make and Model 2012 RAM 1500 Pickup
 Curb..... 4890 lb (2218 kg)
 Test Inertial..... 5009 lb (2272 kg)
 Dummy 165 lb (75 kg)
 Gross Static..... 5174 lb (2347 kg)

Impact Conditions

Speed 62.5 mi/h (100.6 km/h)
 Angle..... 25.0°
 Location/Orientation 4.4 ft (1.4 m) upstream of centerline of joint between barrier segments 84-85

Impact Severity..... 117 kip-ft (158 kJ)

Exit Conditions

Speed 38.4 mi/h (61.8 km/h)
 Trajectory/Heading Angle. 23.0° / 42.4°

Occupant Risk Values

Longitudinal OIV..... 18.4 ft/s (5.6 m/s)
 Lateral OIV 19.4 ft/s (5.9 m/s)
 Longitudinal Ridedown 7.7 g
 Lateral Ridedown 7.5 g
 THIV..... 29.0 km/h
 PHD 7.9 g
 ASI..... 1.15

Max. 0.050-s Average

Longitudinal..... -6.9 g
 Lateral..... 8.6 g
 Vertical..... 1.8 g

Post-Impact Trajectory

Stopping Distance 189 ft (58 m) downstrm
 20 ft (6 m) twd traffic

Vehicle Stability

Maximum Yaw Angle..... 52°
 Maximum Pitch Angle..... 5°
 Maximum Roll Angle..... 14°
 Vehicle Snagging No
 Vehicle Pocketing..... No

Test Article Deflections

Dynamic..... 62.7 inches (1593 mm)
 Permanent..... 61.5 inches (1562 mm)
 Working Width..... 80.7 inches (2050 mm)
 Height of Working Width..... 34.0 inches (864 mm)

Vehicle Damage

VDS..... 11LFQ5
 CDC 11FLEW4
 Max. Exterior Deformation..... 18.0 inches (457 mm)
 OCDI..... LF0000000
 Max. Occupant Compartment Deformation None

Figure 6.6. Summary of Results for MASH Test 3-11 on Flux Barrier.

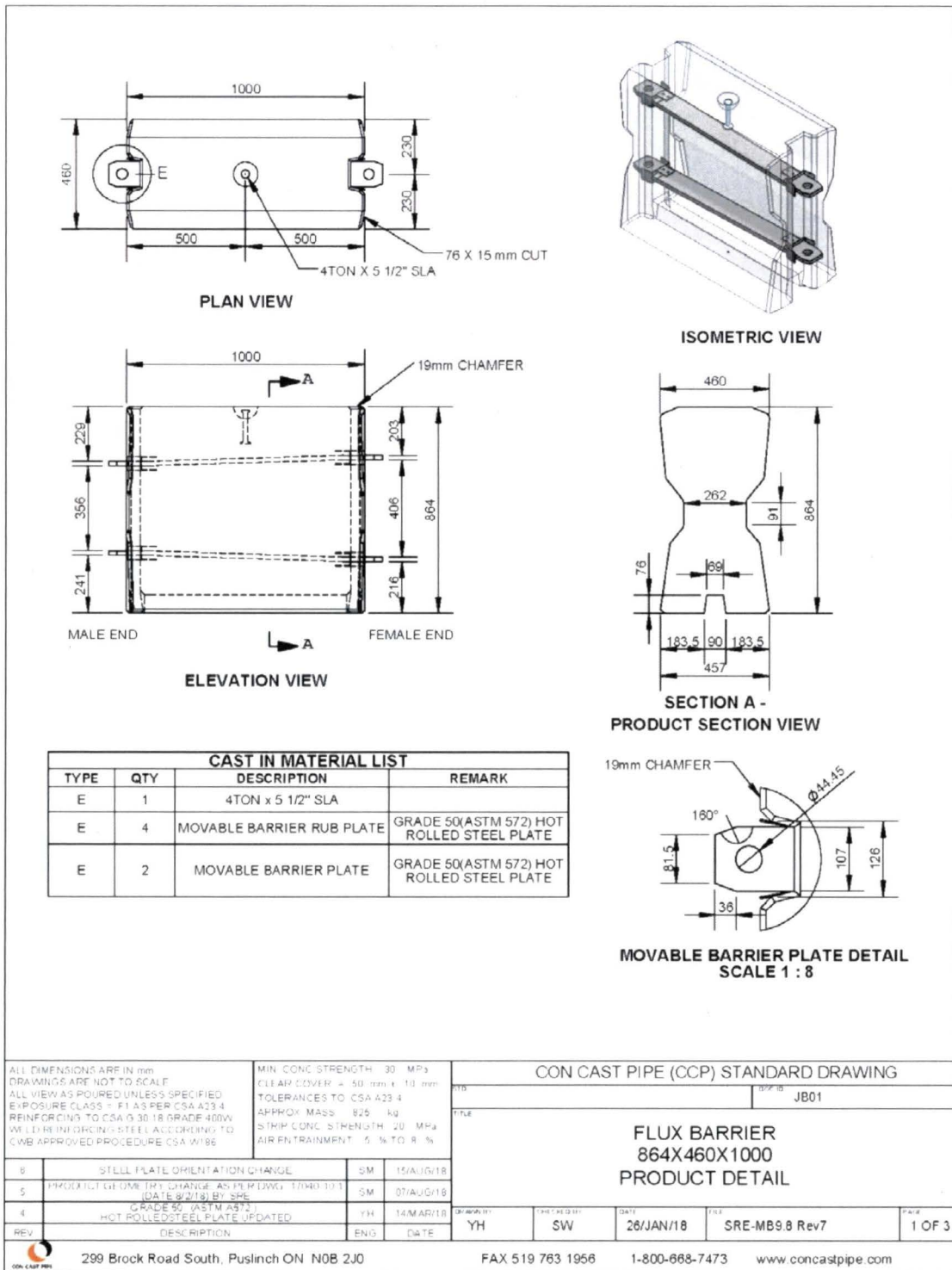


Figure 2.1. Details of the Flux Barrier.