



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

May 9, 2021

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

In Reply Refer To:
HSST-1/B-357

Mark Ayton
Northern Infrastructure Products
21 Fortecon Drive
Stouffville ON
Canada

Dear Mr. Ayton:

This letter is in response to your January 19, 2021 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-357 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:

- Traffic Barrier with Soundwall System

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: Traffic Barrier with Soundwall System
Type of system: Longitudinal Barrier
Test Level: TL3
Testing conducted by: Texas A&M Transportation Institute (TTI)
Date of request: January 19, 2021

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-357 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: | January 19, 2021 | <input checked="" type="radio"/> New <input type="radio"/> Resubmission |
| | Name: | Mark Ayton | |
| | Company: | Northern Infrastructure Products | |
| | Address: | 21 Fortecon Drive, Stouffville ON | |
| | 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 | Traffic Barrier with Soundwall System | 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: | Mark Ayton | Same as Submitter <input checked="" type="checkbox"/> |
| Company Name: | Northern Infrastructure Products | Same as Submitter <input checked="" type="checkbox"/> |
| Address: | 21 Fortecon Drive, Stouffville ON | 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 the Traffic Barrier with Soundwall System. There are no shared financial interests in the Traffic Barrier with Soundwall System by TTI, or between Northern Infrastructure Products and TTI, other than costs involved in the actual crash tests of the Traffic Barrier with Soundwall System to established MASH protocols and reports for this submission to FHWA.

PRODUCT DESCRIPTION


| | | | |
|--|--|--|--|
| <input checked="" type="radio"/> New Hardware or Significant Modification | <input type="radio"/> Modification to Existing Hardware | | |
| <p>The Traffic Barrier with Soundwall System consisted of five 15-ft (4.562 m) long sections of solid concrete single slope traffic barrier with soundwall panels mounted on top for a total length of 75 ft (22.86 m). The concrete sections of the precast concrete traffic barrier were 3.6 ft (1.1 m) high (of which 3.3 ft (1.0 m) was projecting above the pavement) and 2.1 ft (0.648 m) wide at the base, sloping up on the traffic side towards the field side for a width of 1.5 ft (0.46 m) at the top. Mounted on top of each precast concrete traffic barrier unit between the flanges of the set-back vertical steel posts installed at 15 ft (4.572 m) centers are stacked soundwall panels that were manufactured by Durisol. There were five rows of soundwall panels that consisted of a bottom row with a height of 2 ft (0.61 m) plus four upper rows each 3 ft (0.917 m) high, for a total soundwall panel height of 14 ft (4.278 m). The total overall height of the installation measured from the top of pavement was 17.3 ft (5.278 m). There was no backfill placed on the field side of the traffic barrier, and there was a 4-inch space between the traffic face of the barrier and the runway aprons which was filled with compacted granular base material.</p> | | | |
| <h3>CRASH TESTING</h3> | | | |
| <p>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.</p> | | | |
| Engineer Name: | Nathan D. Schulz | | |
| Engineer Signature: | <div style="display: flex; align-items: center;"> <div style="font-size: 24pt; font-weight: bold; margin-right: 10px;">Nathan D. Schulz</div> <div style="font-size: 10pt;"> Digitally signed by Nathan D. Schulz Date: 2021.01.07 11:13:58 -06'00' </div> </div> | | |
| Address: | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%; padding: 2px;">TTI, TAMU 3135, College Station, TX 77843-3135</td> <td style="width: 30%; padding: 2px;">Same as Submitter <input type="checkbox"/></td> </tr> </table> | TTI, TAMU 3135, College Station, TX 77843-3135 | Same as Submitter <input type="checkbox"/> |
| TTI, TAMU 3135, College Station, TX 77843-3135 | Same as Submitter <input type="checkbox"/> | | |
| Country: | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%; padding: 2px;">USA</td> <td style="width: 30%; padding: 2px;">Same as Submitter <input type="checkbox"/></td> </tr> </table> | USA | Same as Submitter <input type="checkbox"/> |
| 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>TTI Crash Test Report No. 690902-PCL8&9 contains the results of this 3-10 Test that was conducted on April 1, 2020. The target CIP was 3.6 ft (1.1 m) upstream of the center of the joint between barriers 2 and 3.</p> <p>The impact speed and angle were 62.7 mi/h (100.9 km/h) and 24.8°. The actual impact point was 3.4 ft (1.0 m) upstream of the center of the joint between barriers 2 and 3. After loss of contact with the barrier, the vehicle came to rest 195 ft (60 m) downstream of the impact point and 94 ft (29 m) toward the traffic side.</p> <p>The Traffic Barrier with Soundwall System contained and redirected the 1100C vehicle. The vehicle did not penetrate, underride, or override the installation. Maximum dynamic deflection during the test was 1.1 inches (29 mm). No detached elements, fragments, or other debris were present to penetrate or show potential for penetrating the occupant compartment, or present hazard to others in the area. Maximum occupant compartment deformation was 2.0 inches (51 mm) in the left front fire wall area. The 1100C vehicle remained upright during and after the collision event. Maximum roll and pitch angles were 18° and 5°. Occupant risk factors were within the preferred limits of MASH. Longitudinal OIV was 21.3 ft/s (6.5 m/s), and lateral OIV was 28.2 ft/s (8.6 m/s). Maximum longitudinal occupant ridedown acceleration was 5.3 g, and maximum lateral occupant ridedown acceleration was 9.9 g.</p> <p>The Traffic Barrier with Soundwall System performed acceptably for MASH Test 3-10.</p> | PASS |

| Required Test Number | Narrative Description | Evaluation Results |
|----------------------|--|----------------------------------|
| 3-11 (2270P) | <p>TTI Crash Test Report No. 690902-PCL8&9 contains the results of this 3-11 Test that was conducted on March 31, 2020. The target CIP was 4.3 ft (1.3 m) upstream of the center of the joint between barriers 2 and 3.</p> <p>The impact speed and angle were 61.0 mi/h (98.2 km/h) and 24.7°. The actual impact point was 4.3 ft (1.3 m) upstream of the center of the joint between barriers 2 and 3. After loss of contact with the barrier, the vehicle came to rest 180 ft (55 m) downstream of the impact point and 6 ft (1.8 m) toward the field side.</p> <p>The Traffic Barrier with Soundwall System contained and redirected the 2270P vehicle. The vehicle did not penetrate, underride, or override the installation. Maximum dynamic deflection during the test was 5.3 inches (135 mm). No detached elements, fragments, or other debris were present to penetrate or show potential for penetrating the occupant compartment, or present hazard to others in the area. Maximum occupant compartment deformation was 5.0 inches (127 mm) in the right front fire wall area.</p> <p>The 2270P vehicle remained upright during and after the collision event. Maximum roll and pitch angles were 30° and 7°.</p> <p>Occupant risk factors were within the preferred limits of MASH. Longitudinal OIV was 20.3 ft/s (6.2 m/s), and lateral OIV was 25.6 ft/s (7.8 m/s). Maximum longitudinal occupant ridedown acceleration was 5.7 g, and lateral occupant ridedown acceleration was 12.0 g.</p> <p>The Traffic Barrier with Soundwall System performed acceptably for MASH Test 3-11.</p> | PASS |
| 3-20 (1100C) | Test for transition is not applicable for this barrier system. | Non-Relevant Test, not conducted |
| 3-21 (2270P) | Test for transition is not applicable for this barrier 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: | Texas A&M Transportation Institute | |
| Laboratory Signature: | Digitally signed by Darrell L. Kuhn 'Date: 2021.01.14 15:49:21 -06'00'  | |
| Address: | TTI, TAMU 3135, College Station, TX 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 Certificate Number: 2821.01 Valid to: April 30, 2021 | |

Submitter Signature*: **Mark Ayton** Digitally signed by Mark Ayton
Date: 2021.01.19 09:49:18
-05'00'

Submit Form

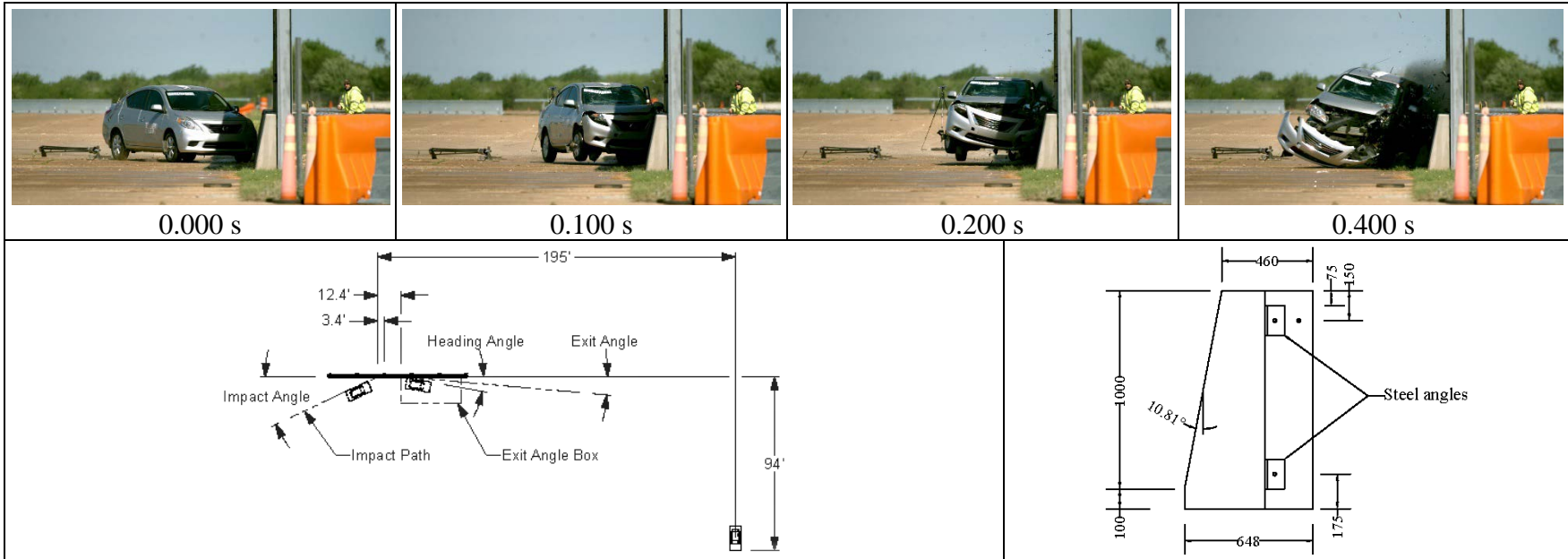
ATTACHMENTS

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 | | |
|--------------------|------|-----------|
| Number | Date | Key Words |
| | | |



General Information

Test Agency Texas A&M Transportation Institute (TTI)
 Test Standard Test No. MASH Test 3-10
 TTI Test No. 690902-PCL8
 Test Date..... 2020-04-01

Test Article

Type Longitudinal Barrier – Soundwall
 Name Proprietary Traffic Barrier with Soundwall
 Installation Length 75 ft (22.86 m)
 Material or Key Elements Five 15 ft (4.562 m) long sections of concrete barrier, 3.3 ft (1 m) above pavement x 2.1 ft (0.648 m) wide at the base x 1.5 ft (0.46 m) at top, with Durisol® soundwall panels. Six W10x33 (W250x49) x 24.8 ft (7.56 m) steel posts at 15 ft (4.57 m)

Soil Type and Condition Concrete footers (2 ft (610 mm) diam. x 8 ft (2438 mm) deep) in native clay soil

Test Vehicle

Type/Designation 1100C
 Make and Model..... 2014 Nissan Versa
 Curb..... 2390 lb (1084 kg)
 Test Inertial 2423 lb (1099 kg)
 Dummy..... 165 lb (75 kg)
 Gross Static..... 2588 lb (1174 kg)

Impact Conditions

Speed62.7 mi/h (100.9 km/h)
 Angle24.8°
 Location/Orientation3.4 ft (1.0 m) upstream of joint 2-3

Impact Severity56 kip-ft (75.9 kJ)

Exit Conditions

Speed48.9 mi/h (78.7 km/h)
 Trajectory/Heading Angle....0.9° / 5.4°

Occupant Risk Values

Longitudinal OIV21.3 ft/s (6.5 m/s)
 Lateral OIV28.2 ft/s (8.6 m/s)
 Longitudinal Ridedown5.3 g
 Lateral Ridedown9.9 g
 THIV11.0 m/s
 ASI.....2.4

Max. 0.050-s Average

Longitudinal.....-11.8 g
 Lateral18.3 g
 Vertical-4.2 g

Post-Impact Trajectory

Stopping Distance 195 ft (60 m) ds
 94 ft (29 m) twd traffic

Vehicle Stability

Maximum Yaw Angle..... 46°
 Maximum Pitch Angle..... 5°
 Maximum Roll Angle..... 18°
 Vehicle Snagging No
 Vehicle Pocketing..... No

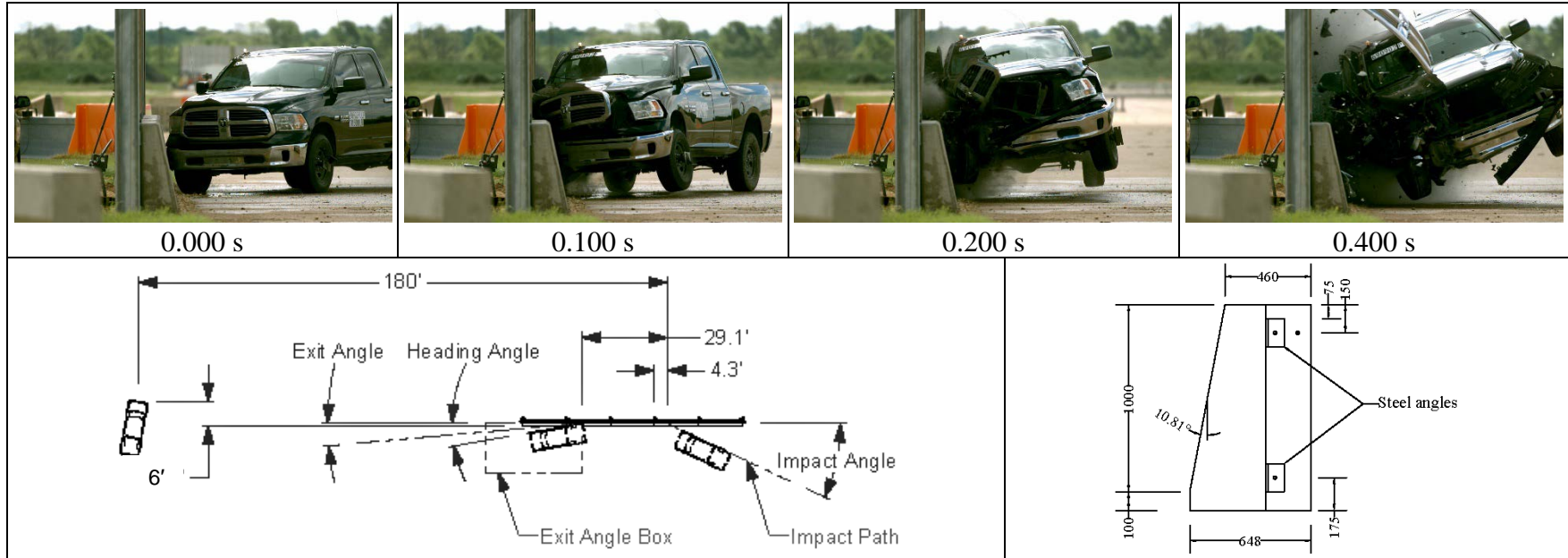
Test Article Deflections

Dynamic..... 1.1 inches (29 mm)
 Permanent..... None
 Working Width 26.6 inches (676 mm)
 Height of Working Width..... 207.6 inches (5278 mm)

Vehicle Damage

VDS 11LFQ6
 CDC..... 11FLEW5
 Max. Exterior Deformation..... 11.0 inches (279 mm)
 OCDI..... LF0020000
 Max. Occupant Compart. Deformation..... 2.0 inches (51 mm)

Figure 5.7. Summary of Results for MASH Test 3-10 on Traffic Barrier with Soundwall System.



General Information

Test Agency Texas A&M Transportation Institute (TTI)
 Test Standard Test No. MASH Test 3-11
 TTI Test No. 690902-PCL9
 Test Date..... 2020-03-31

Test Article

Type Longitudinal Barrier – Soundwall
 Name..... Proprietary Traffic Barrier with Soundwall
 Installation Length..... 75 ft (22.86 m)
 Material or Key Elements... Five 15 ft (4.562 m) long sections of concrete barrier, 3.3 ft (1 m) above pavement x 2.1 ft (0.648 m) wide at the base x 1.5 ft (0.46 m) at top, with Durisol® soundwall panels. Six W10x33 (W250x49) x 24.8 ft (7.56 m) steel posts at 15 ft (4.57 m)

Soil Type and Condition

Concrete footers (2ft (610 mm) diam. x 8 ft (2438 mm) deep) in native clay soil

Test Vehicle

Type/Designation 2270P
 Make and Model..... 2015 RAM 1500 Pickup Truck
 Curb 5019 lb (2277 kg)
 Test Inertial 5051 lb (2291 kg)
 Dummy 165 lb (75 kg)
 Gross Static..... 5216 lb (2366 kg)

Impact Conditions

Speed 61.0 mi/h (98.2 km/h)
 Angle..... 24.7°
 Location/Orientation..... 4.3 ft (1.3 m) upstream of joint 3-4

Impact Severity

110 kip-ft (149 kJ)

Exit Conditions

Speed 47.6 mi/h (76.6 km/h)
 Trajectory/Heading Angle ... 1.1° / 6.1°

Occupant Risk Values

Longitudinal OIV 20.3 ft/s (6.2 m/s)
 Lateral OIV..... 25.6 ft/s (7.8 m/s)
 Longitudinal Ridedown 5.7 g
 Lateral Ridedown..... 12.0 g
 THIV..... 10.1 m/s
 ASI..... 1.7

Max. 0.050-s Average

Longitudinal -10.2 g
 Lateral..... -13.4 g
 Vertical..... -2.9 g

Post-Impact Trajectory

Stopping Distance..... 180 ft (55 m) downstream
 6 ft (1.9 m) twd field side

Vehicle Stability

Maximum Yaw Angle 39°
 Maximum Pitch Angle 7°
 Maximum Roll Angle..... 30°
 Vehicle Snagging..... No
 Vehicle Pocketing No

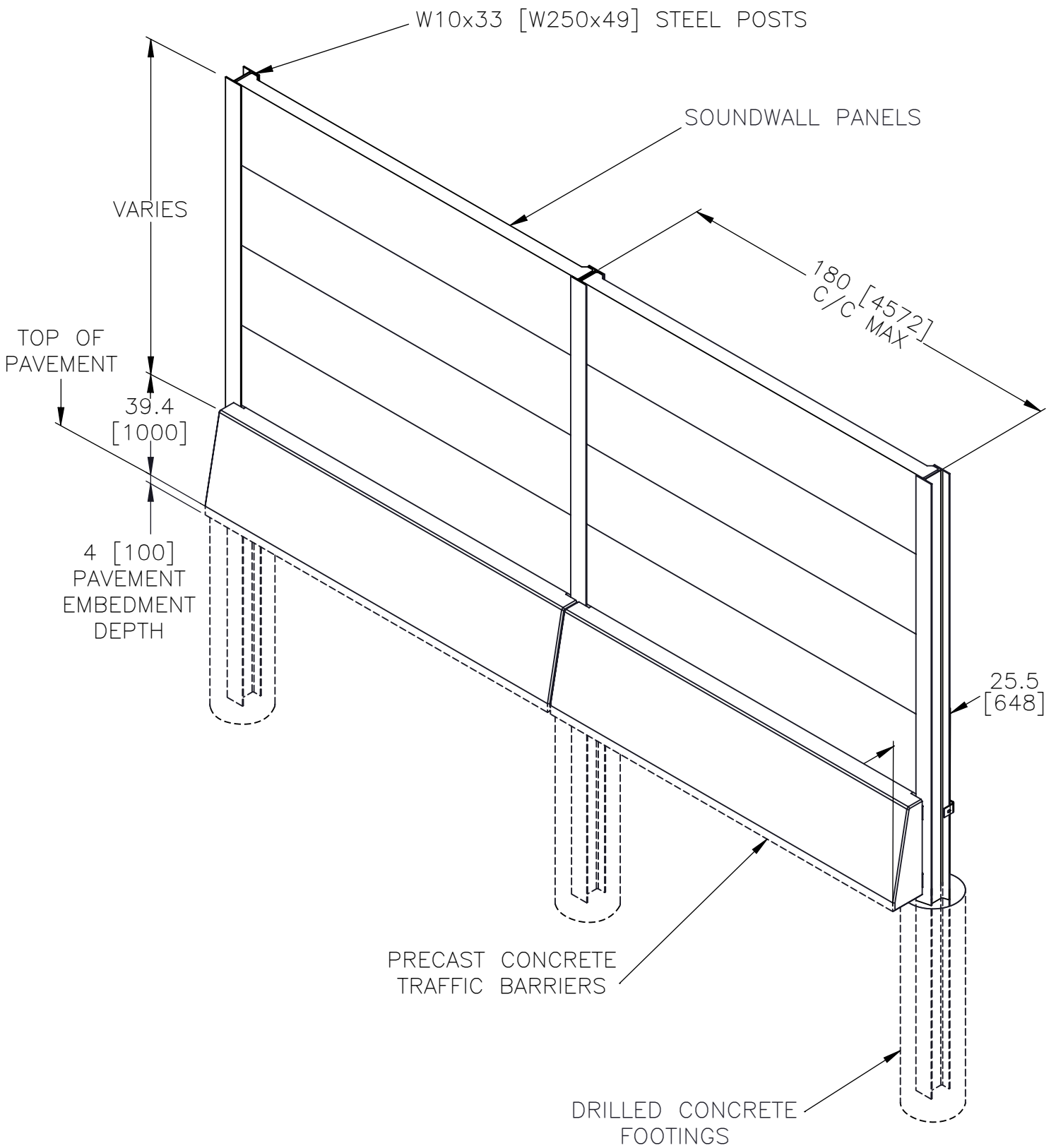
Test Article Deflections

Dynamic..... 5.3 inches (135 mm)
 Permanent None
 Working Width 30.8 inches (782 mm)
 Height of Working Width 207.6 inches (5278 mm)

Vehicle Damage

VDS 01RFQ5
 CDC..... 01FREW4
 Max. Exterior Deformation 16.0 inches (406 mm)
 OCDI..... RF0020000
 Max. Occupant Comp. Deformation 5.0 inches (127 mm)

Figure 6.6. Summary of Results for MASH Test 3-11 on Traffic Barrier with Soundwall System.



Patent Pending

TRAFFIC BARRIER WITH SOUNDWALL SYSTEM, MASH TL-3

Northern Infrastructure Products

SGR72a



SHEET NO.

DATE:

1 of 2

01/26/21

INTENDED USE

The proprietary Traffic Barrier with Soundwall System is a MASH TL-3 system intended for installation along roadsides where a combination traffic barrier with soundwall system is required. The system consists of 15-ft [4.562m] long precast concrete single slope traffic barriers with soundwall panels mounted above. The precast concrete traffic barrier sections are 43.3 in [1100 mm] high (of which 39.4 in [1000 mm] was projecting above the pavement) and 25.5 in [648 mm] wide at the base. Mounted on top of each precast concrete traffic barrier unit between the flanges of the set-back vertical W10x33 [W250x49] steel posts in drilled concrete footings installed at 15 ft [14.572 m] centers are stacked soundwall panels.

The crash tested installation consisted of five precast concrete traffic barriers with an overall length of 75 ft [22.9 m]. There were five rows of soundwall panels that consisted of a bottom row with a height of 2 ft [0.61 m] plus four upper rows each 3 ft [0.917 m] high, for a total soundwall height of 14 ft [4.278 m]. The total overall height of the installation measured from top of pavement was 17.3 ft [5.278 m].

Other than some scuffing on the traffic face of the precast concrete traffic barrier at the impact site, there was no observed damage to the traffic barrier or soundwall panels from MASH crash tests 3-10 or 3-11. Depth and diameter of drilled concrete footings for roadside installations will have to be designed for each site to address local soil conditions and code requirements.

APPROVALS

The proprietary Traffic Barrier with Soundwall System has been fully tested in conformance with MASH, 2016 Test Level 3 and is determined eligible for reimbursement by the FHWA.

FHWA Eligibility Letter: TBD

CONTACT INFORMATION

Northern Infrastructure Products
21 Fortecon Drive
Stouffville, ON
Canada
L4A 2G8

Phone: (905)727-4198
Website: WWW.NORTHERN-IP.COM

TRAFFIC BARRIER WITH SOUNDWALL SYSTEM, MASH TL-3

Northern Infrastructure Products

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