



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

June 9, 2020

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

In Reply Refer To:  
HSST-1/B-344

Mr. Forrest Schultz  
Strongstown's B&K Enterprises, Inc.  
260 Route 403 South  
Strongstown, PA 15957  
USA

Dear Mr. Schultz:

This letter is in response to your April 24, 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-344 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:

- JJ Hook Retrofit V4

### **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: JJ Hook Retrofit V4  
Type of system: Longitudinal Barrier  
Test Level: MASH Test Level 3 (TL3)  
Testing conducted by: Texas A&M Transportation Institute  
Date of request: April 24, 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-344 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,



Michael S. Griffith  
Director, Office of Safety Technologies  
Office of Safety

Enclosures

## Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

<b>Submitter</b>	Date of Request:	April 24, 2020	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Forrest Schultz	
	Company:	Strongstown's B&KEnterprises, Inc.	
	Address:	260Route 403 South, Strongstown, PA 15957	
	Country:	USA	
To:	Michael S. Griffith, Director FHWA, Office of Safety Technologies		

I request the following devices be considered eligible for reimbursement under the Federal-aid highway program.

**Device & Testing Criterion** - Enter from right to left starting with Test Level

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'B': Rigid/Semi-Rigid Barriers (Roadside, Median, Bridge Railings)	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	JJ Hook Retrofit V4	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:	Forrest Schultz	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	Strongstown's B&KEnterprises, Inc.	Same as Submitter <input checked="" type="checkbox"/>
Address:	260Route 403 South, Strongstown, PA 15957	Same as Submitter <input checked="" type="checkbox"/>
Country:	USA	Same as Submitter <input checked="" type="checkbox"/>
Enter below all disclosures of financial interests as required by the FHWA 'Federal-Aid Reimbursement Eligibility Process for Safety Hardware Devices' document.		
Texas A&M Transportation Institute (TTI) was contracted by the Strongstown's B&KEnterprises, Inc. to perform full-scale crash testing of the JJ Hook Retrofit V4 (Retrofit Anchors and Brackets Bolted to Asphalt for Temporary F-Shape Concrete Barrier). There are no shared financial interests in the JJ Hook Retrofit V4 by TTI, or between the Strongstown's B&KEnterprises, Inc. and TTI, other than costs involved in the actual crash tests and reports for this submission to FHWA.		
690900-SBK-10 & -14		

## PRODUCT DESCRIPTION

Help

- New Hardware or Significant Modification
  Modification to Existing Hardware

The test installation consisted of 16 standard F-Shape profile reinforced concrete barriers, each nominally 12 ft in length (face-to-face), 32-inches tall, and 24-inches wide at the base, tapering to 9-inches wide at the top. "J-J Hooks®" connections were precast in each end of the barrier segments. The total length of the barrier installation was approximately 193 ft 10½ inches, including a nominal 1½-inch gap between the ends of the adjacent barrier segments. All the excess slack was removed from the connections during the installation of the barrier segments. The barriers were placed on a 200-ft long x 8-ft wide x 6-inch thick layer of Texas Department of Transportation (TxDOT) type D asphalt pavement, which was supported by a 12-inch (min) thick layer of Type D, Grade 1 Base compacted to 95 percent of Standard Proctor Density.

The barrier segments were laterally restrained on the asphalt pavement with custom fabricated bent plate anchor brackets. Two brackets were anchored on the field side of each barrier segment.

Each bent plate anchor bracket was secured to the asphalt pavement with one 1-inch diameter x 7¾-inch long ASTM A193 grade B7 zinc-coated threaded rod (coated with a release agent). Each rod was installed in vertical drilled holes 6 inches deep in the asphalt pavement/base and secured with Red Head Epcon A7 Acrylic per the manufacturer's instructions. A single 1-inch diameter hex nut was welded flush with the top of the rods, and 3-inch diameter flat washers were installed under the nuts. There were no bolts or adhesives securing the brackets to the barriers.

The barrier segments also used top connector plates, which bolted to each barrier segment via 1-inch diameter x 5-inch long x 8 UNC threaded wedge anchor socket inserts. A single 1-inch diameter x 2-inch long 8 UNC SAE J429 grade 5 hex bolt and plate washer secured the connector plate to each barrier end.

### 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:	William F. Williams	
Engineer Signature:	<b>William Williams</b>	Digitally signed by William Williams Date: 2020.04.28 09:24:29 -05'00'
Address:	3100 SH 47, Bldg 7091, Bryan TX 77807	Same as Submitter <input type="checkbox"/>
Country:	USA	Same as Submitter <input type="checkbox"/>

A brief description of each crash test and its result:

Help

Required Test Number	Narrative Description	Evaluation Results
3-10 (1100C)	<p>Test 3-10 involves an 1100C vehicle impacting the test article at a target impact speed of 62 mi/h and target angle of 25°. The target CIP for the right corner of the front bumper was 3.6 ft upstream of the joint between segments 6 and 7.</p> <p>The results of the test conducted on October 14, 2019, are found in TTI Test Report No. 690900-SBK-14. The test vehicle was traveling at a speed of 62.8 mi/h as it made contact with the JJ Hook Retrofit V4 3.6 ft upstream of the joint between segments 6 and 7 and at an impact angle of 25.2°. After loss of contact with the barrier, the vehicle came to rest 215 ft downstream of the impact point and 24 ft toward the field side.</p> <p>The JJ Hook Retrofit V4 contained and redirected the 1100C vehicle. The vehicle did not penetrate, underide, or override the installation. The vehicle exited within the exit box criteria defined in MASH.</p> <p>Maximum dynamic deflection of the barrier during the test was 3.3 inches. There was no measurable permanent deformation. Working width was 24.8 inches at the base. No detached elements, fragments, or other debris were present to penetrate, or to show potential for penetrating, the occupant compartment, or to present undue hazard for others in the area.</p> <p>The 1100C vehicle remained upright during and after the collision event. Maximum roll and pitch angles were 15° and 14°, respectively.</p> <p>Longitudinal OIV was 19.4 ft/s and lateral OIV was 29.9 ft/s. Maximum longitudinal occupant ride-down acceleration was 3.9 g, and maximum lateral occupant ride-down acceleration was 8.4 g. Occupant risk factors were within the preferred limits specified in MASH.</p> <p>Maximum exterior crush to the vehicle was 8.0 inches in the side plane in the front plane at the right front corner at bumper height. Maximum occupant compartment deformation was 2.5 inches in the right front floor pan area.</p> <p>The JJ Hook Retrofit V4 performed acceptably for MASH test 3-10.</p>	PASS

Required Test Number	Narrative Description	Evaluation Results
3-11 (2270P)	<p>Test 3-11 involves a 2270P vehicle impacting the test article at a target impact speed of 62 mi/h and target angle of 25°. The target CIP for the right corner of the front bumper was 4.3 ft upstream of the joint between segments 6 and 7..</p> <p>The results of the test conducted on March 11, 2019, are found in TTI Test Report No. 690900-SBK-10. The test vehicle was traveling at a speed of 62.5 mi/h as it made contact with the JJ Hook Retrofit V4 3.9 ft upstream of the joint between segments 6 and 7, and at an impact angle of 24.3°. After loss of contact with the barrier, the vehicle came to rest 215 ft downstream of the impact point and 4 ft toward the field side. The JJ Hook Retrofit V4 contained and redirected the 2270P vehicle. The vehicle did not penetrate, underride, or override the installation. The vehicle exited within the exit box criteria defined in MASH. Maximum dynamic deflection during the test was 8.5 inches. Maximum permanent deformation was 2.5 inches. Working width was 29.4 inches.</p> <p>Although a piece of concrete broke off of one corner of barrier segment #6, it did not penetrate, or show potential for penetrating, the occupant compartment, or to present undue hazard for others in the area.</p> <p>The 2270P vehicle remained upright during and after the collision event. Maximum roll and pitch angles were 16° and 19°, respectively.</p> <p>Longitudinal OIV was 18.4 ft/s and lateral OIV was 21.3 ft/s. Maximum longitudinal occupant ridedown acceleration was 4.2 g and maximum lateral occupant ridedown acceleration was 7.6 g. Occupant risk factors were within the preferred limits specified in MASH.</p> <p>Maximum exterior crush to the vehicle was 13.0 inches in the front plane at the right front corner at bumper height. Maximum occupant compartment deformation was 3.5 inch in the right front firewall area.</p> <p>The JJ Hook Retrofit V4 performed acceptably for MASH test 3-11.</p>	PASS
3-20 (1100C)	This is not a transition.	Non-Relevant Test, not conducted
3-21 (2270P)	This is 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: 2020.04.28 19:00:03 -05'00 	
Address:	3100 SH 47, Bldg 7091, Bryan TX 77807	Same as Submitter <input type="checkbox"/>
Country:	USA	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	ISO 17025-2017 Laboratory A2LA Certificate Number: 2821.01 Valid To: April 30, 2021	

Submitter Signature\*: **Forrest Schultz**  Digitally signed by Forrest Schultz  
Date: 2020.04.30 09:11:27 -04'00

Submit Form

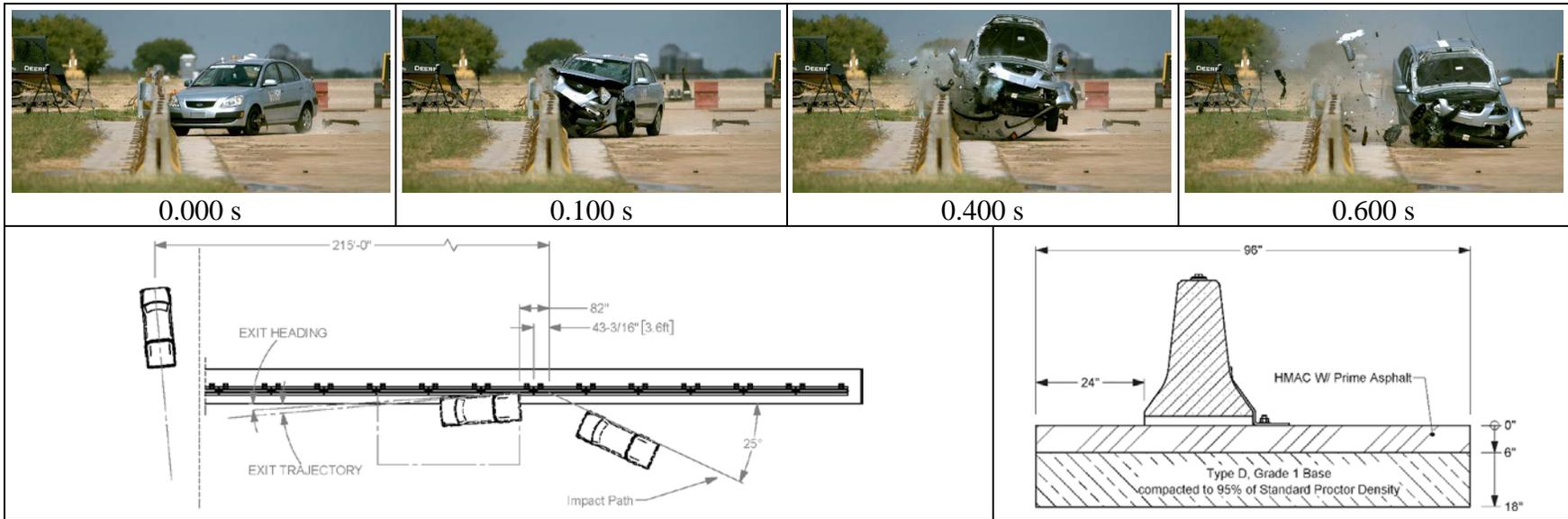
## ATTACHMENTS

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. .... 690900-SBK14  
 Test Date ..... 2019-10-14

**Test Article**

Type ..... F-Shape Temporary Concrete Barrier  
 Name..... TCB anchored to asphalt pavement with SBKE anchors and brackets  
 Installation Length..... 193 ft 10½ inches  
 Material or Key Elements ... 16 F-Shape temporary concrete barriers with J-J Hooks® connections, 12 ft long, 32 inches tall x 24-inches wide at the base, tapering to 9-inches wide at top

**Soil Type and Condition**

..... Restrained on 6-inch layer of asphalt with SBKE anchors and brackets, damp

**Test Vehicle**

Type/Designation..... 1100C  
 Make and Model ..... 2008 Kia Rio  
 Curb..... 2485 lb  
 Test Inertial..... 2455 lb  
 Dummy ..... 165 lb  
 Gross Static ..... 2620 lb

**Impact Conditions**

Speed ..... 62.8 mi/h  
 Angle ..... 25.2°  
 Location/Orientation ..... 3.6 ft upstream of joint 6 and 7

**Impact Severity**

..... 59 kip-ft

**Exit Conditions**

Speed ..... 52.2 mi/h  
 Trajectory/Heading Angle... 5.0° / 3.8°

**Occupant Risk Values**

Longitudinal OIV ..... 19.4 ft/s  
 Lateral OIV..... 29.9 ft/s  
 Longitudinal Ridedown ..... 3.9 g  
 Lateral Ridedown ..... 8.4 g  
 THIV ..... 10.8 m/s  
 ASI..... 2.31  
 Max. 0.050-s Average  
 Longitudinal ..... -10.0 g  
 Lateral..... -16.9 g  
 Vertical..... -4.6 g

**Post-Impact Trajectory**

Stopping Distance..... 215 ft downstream  
 24 ft twd field side

**Vehicle Stability**

Maximum Yaw Angle ..... 32°  
 Maximum Pitch Angle ..... 14°  
 Maximum Roll Angle ..... 15°  
 Vehicle Snagging..... No  
 Vehicle Pocketing ..... No

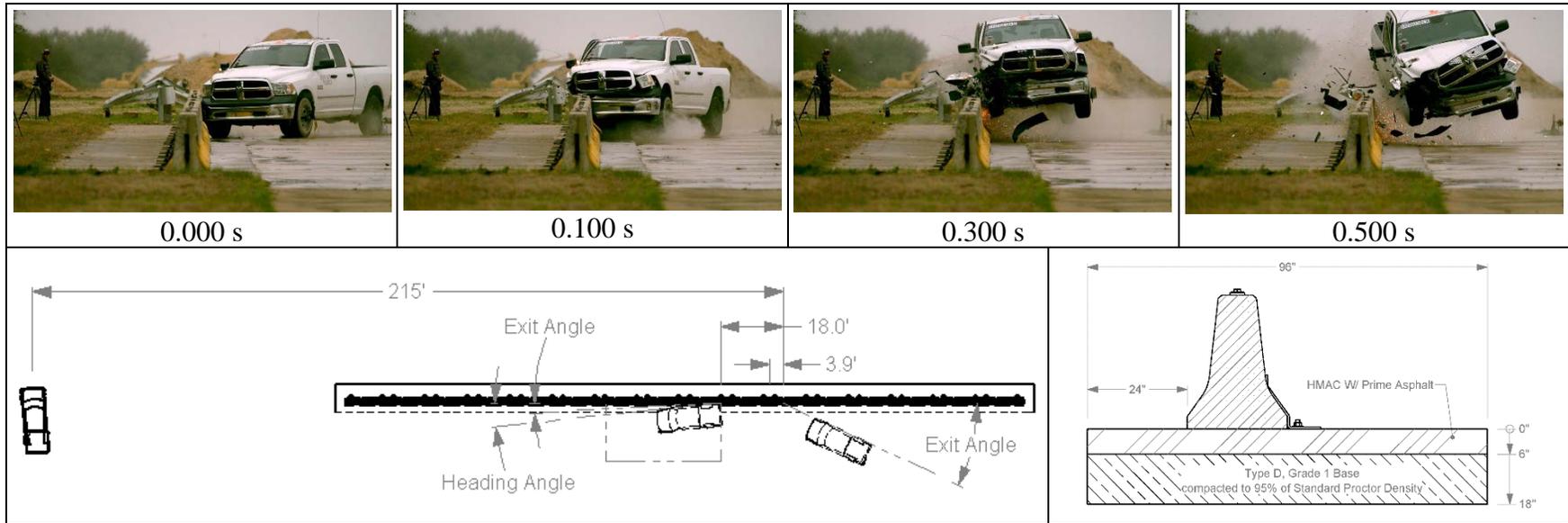
**Test Article Deflections**

Dynamic..... 3.3 inches (at top)  
 Permanent ..... None  
 Working Width..... 24.8 inches  
 Height of Working Width ..... 0 (at base)

**Vehicle Damage**

VDS ..... 01RFQ5  
 CDC..... 01FREW4  
 Max. Exterior Deformation..... 8.0 inches  
 OCDI..... FR0010000  
 Max. Occupant Compartment Deformation..... 2.5 inches

**Figure 5.6. Summary of Results for MASH Test 3-10 on TCB Anchored to Asphalt Pavement with SBKE Anchors and Brackets.**



**General Information**

Test Agency..... Texas A&M Transportation Institute (TTI)  
 Test Standard Test No. .... MASH Test 3-11  
 TTI Test No. .... 690900-SBK10  
 Test Date ..... 2019-03-11

**Test Article**

Type ..... F-shape Temporary Concrete Barrier  
 Name..... TCB bolted with SBKE Anchors  
 Installation Length..... 193 ft 10½ inches  
 Material or Key Elements... 16 F-Shape temporary concrete barriers with J-J Hooks® connections, 12 ft long, 32-inches tall, and 24-inches wide at the base, tapering to 9-inches wide; restrained to asphalt with Strongstown's B&K Enterprise anchors and brackets

**Soil Type and Condition** .....

Restrained on asphalt surface, damp

**Test Vehicle**

Type/Designation..... 2270P  
 Make and Model ..... 2013 RAM 1500 Pickup  
 Curb..... 4986 lb  
 Test Inertial..... 5028 lb  
 Dummy ..... No dummy  
 Gross Static ..... 5028 lb

**Impact Conditions**

Speed ..... 62.5 mi/h  
 Angle ..... 24.3°  
 Location/Orientation ..... 3.9 ft upstream of joint 6-7

**Impact Severity**.....

111 kip-ft

**Exit Conditions**

Speed ..... 53.4 mi/h  
 Trajectory/Heading Angle... 3.4°/3.7°

**Occupant Risk Values**

Longitudinal OIV ..... 18.4 ft/s  
 Lateral OIV ..... 21.3 ft/s  
 Longitudinal Ridedown ..... 4.2 g  
 Lateral Ridedown ..... 7.6 g  
 THIV ..... 30.7 km/h  
 PHD ..... 7.7 g  
 ASI ..... 1.50  
 Max. 0.050-s Average

Longitudinal ..... -8.1 g  
 Lateral..... -11.1 g  
 Vertical..... -5.2 g

**Post-Impact Trajectory**

Stopping Distance..... 215 ft downstream  
 4 ft twd field side

**Vehicle Stability**

Maximum Yaw Angle ..... 32°  
 Maximum Pitch Angle ..... 19°  
 Maximum Roll Angle ..... 16°  
 Vehicle Snagging..... No  
 Vehicle Pocketing ..... No

**Test Article Deflections**

Dynamic at Top..... 8.5 inches twd field  
 Dynamic at Toe..... 2.2 inches twd field  
 Permanent at Toe ..... 2.5 inches twd traffic  
 Working Width..... 29.4 inches (vehicle)  
 Height of Working Width ..... 70.1 inches (vehicle)

**Vehicle Damage**

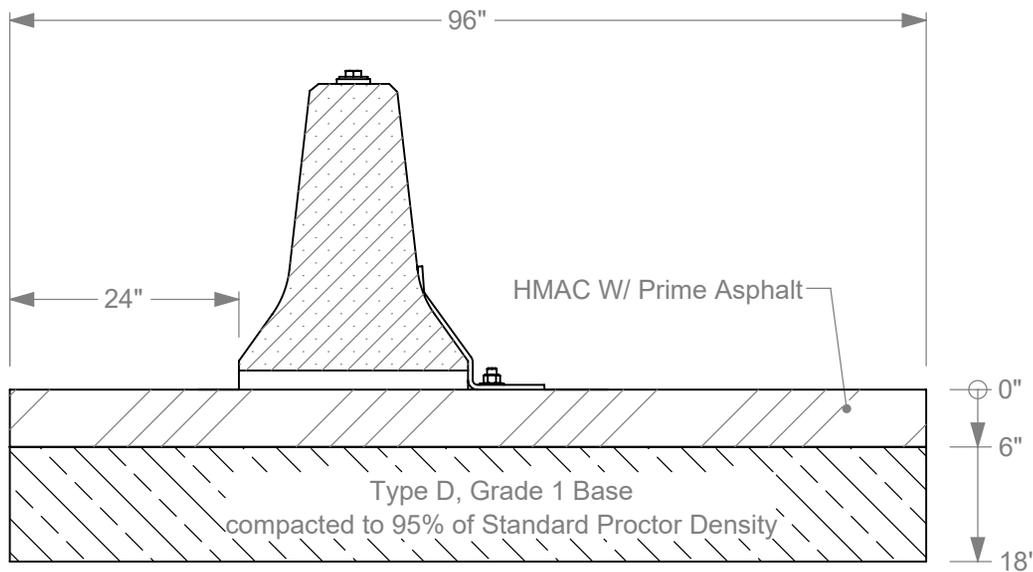
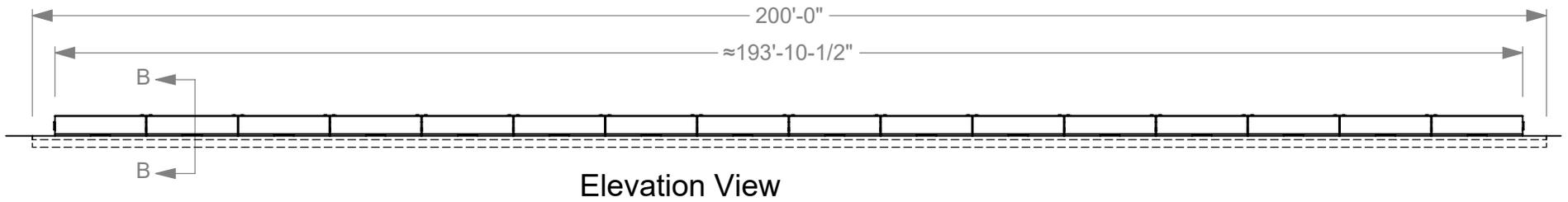
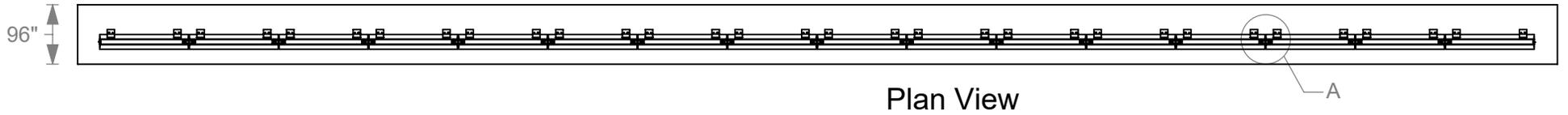
VDS ..... 01RFQ5  
 CDC..... 01FREW4  
 Max. Exterior Deformation..... 13.0 inches  
 OCDI..... RF0020000  
 Max. Occupant Compartment Deformation..... 3.5 inches

**Figure 5.6. Summary of Results for MASH Test 3-11 on Temporary Concrete Barrier with SBKE Anchors and Brackets Anchored to Asphalt.**

# Test Installation

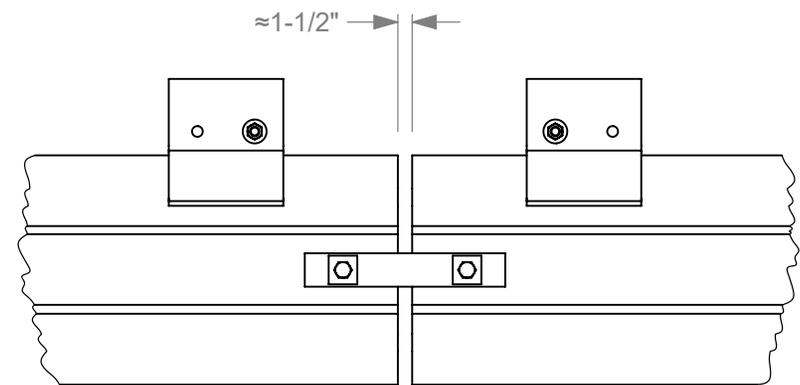
Barrier Numbers

16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1



Section B-B

Scale 1 : 20



Detail A

Scale 1 : 20

1a. See attached sponsor-provided drawings and instructions for all other details.



Roadside Safety and  
Physical Security Division -  
Proving Ground

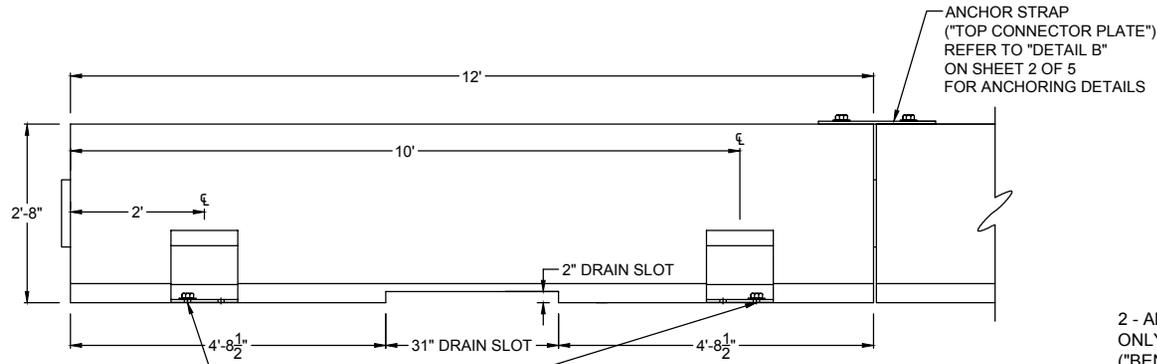
Project #690900-SBK-14 S&K Anchored Barriers on Asphalt 2019-08-29

Drawn by GES

Scale 1:250

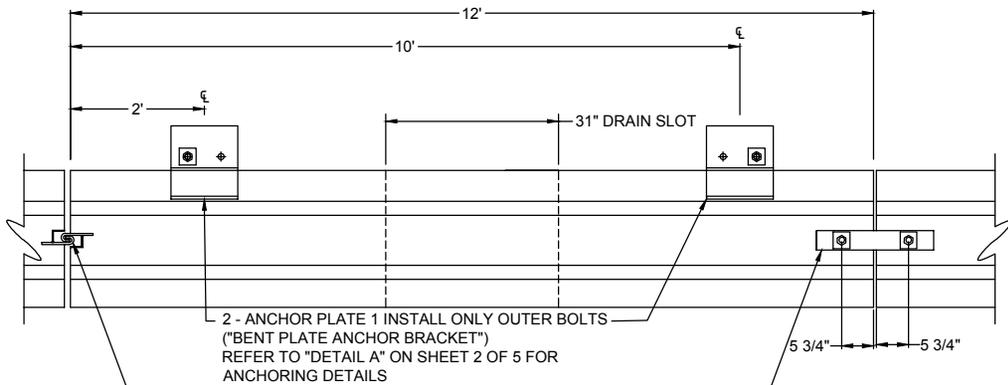
Sheet 1 of 1 Test Installation

# PENNDOT F SHAPE JJ-HOOK



**FRONT VIEW**

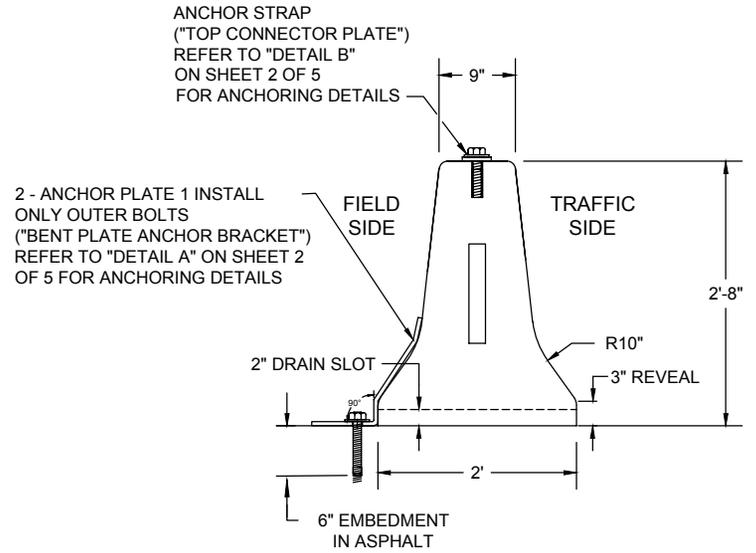
2 - ANCHOR PLATE 1 INSTALL ONLY OUTER BOLTS ("BENT PLATE ANCHOR BRACKET") REFER TO "DETAIL A" ON SHEET 2 OF 5 FOR ANCHORING DETAILS



**PLAN VIEW**

PLACE BARRIER WITH MAXIMUM SPACE BETWEEN THEM (NO SLACK IN HOOKS)

ANCHOR STRAP ("TOP CONNECTOR PLATE") REFER TO "DETAIL B" ON SHEET 2 OF 5 FOR ANCHORING DETAILS



**ELEVATION VIEW**

2 - ANCHOR PLATE 1 INSTALL ONLY OUTER BOLTS ("BENT PLATE ANCHOR BRACKET") REFER TO "DETAIL A" ON SHEET 2 OF 5 FOR ANCHORING DETAILS

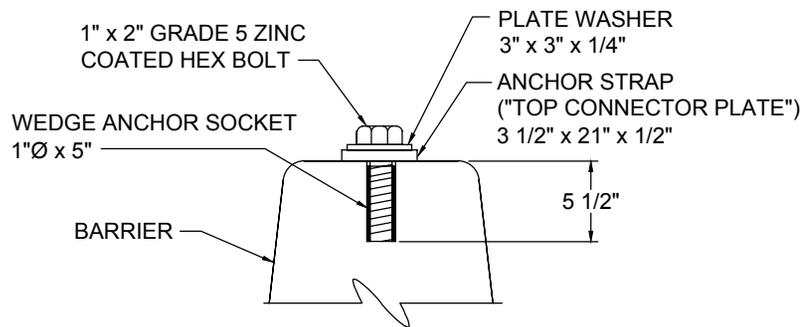
**NOTE: REFER TO SHEET 5 OF 5 FOR GENERAL NOTES, INSTALLATION NOTES AND PARTS LIST**

STRONGSTOWN'S B&K ENTERPRISES, INC.  
280 ROUTE 403 SOUTH, PO BOX 124  
STRONGSTOWN, PA 19957

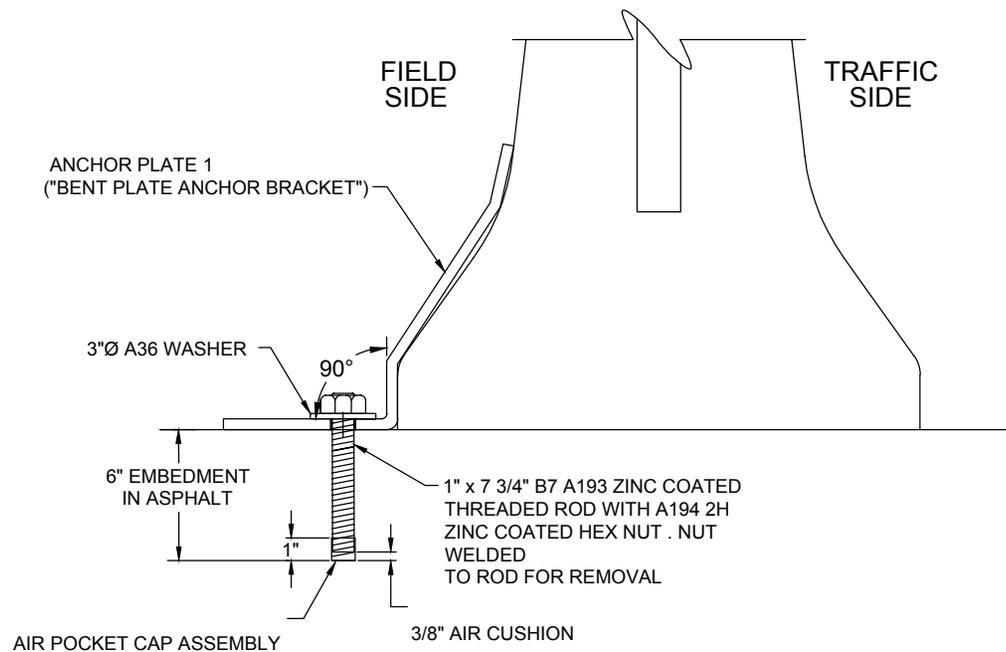
**STRONGSTOWN'S B&K  
JJ HOOK RETRO FIT V3  
FRONT, PLAN & ELEVATION VIEW  
ASPHALT PAVEMENT ANCHORING  
2 PLATE SYSTEM 6" EMBEDMENT**

DRAWING BY: DAVID WAGNER  
DATE: 6-19-17  
REVISED 2-26-19 (WJB)

SHEET: 1 OF 5



**DETAIL B**  
**ANCHOR STRAP**  
**("TOP CONNECTOR PLATE")**  
**ANCHORING DETAIL**



**DETAIL A**  
**ANCHOR PLATE**  
**("BENT PLATE ANCHOR BRACKET")**  
**ANCHORING DETAIL**

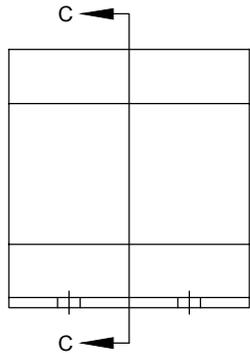
**NOTE: REFER TO SHEET 5 OF 5 FOR GENERAL NOTES, INSTALLATION NOTES AND PARTS LIST**

STRONGSTOWN'S B&K ENTERPRISES, INC.  
 260 ROUTE 403 SOUTH, PO BOX 124  
 STRONGSTOWN, PA 15957

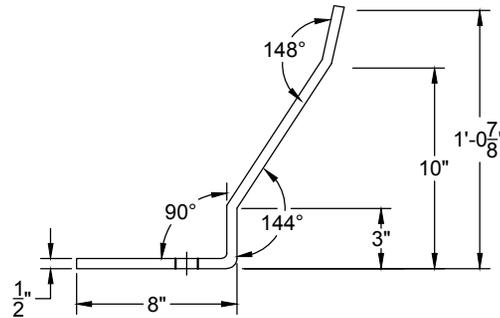
**STRONGSTOWN'S B&K**  
**JJ HOOK RETRO FIT V3**  
**ANCHORING DETAILS**  
**ASPHALT PAVEMENT ANCHORING**  
**2 PLATE SYSTEM 6" EMBEDMENT**

DRAWING BY: DAVID WAGNER  
 DATE: 8-19-17  
 REVISED 2-26-19 (WJB)

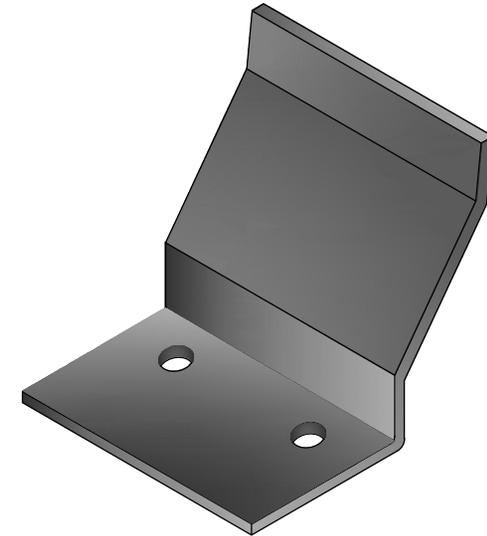
SHEET: 2 OF 5



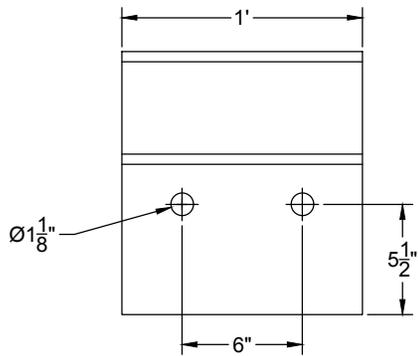
ELEVATION VIEW



SECTION C-C



ISOMETRIC VIEW



PLAN VIEW

**ANCHOR PLATE 1  
("BENT PLATE ANCHOR BRACKET")**

1/2" THICK A36 GRADE STEEL  
SHEARED, LASER OR PLASMA CUT TO SIZE  
ALL ANGLES BENT IN PRESS BRAKE  
ANCHOR HOLES DRILLED, LASER OR PLASMA CUT

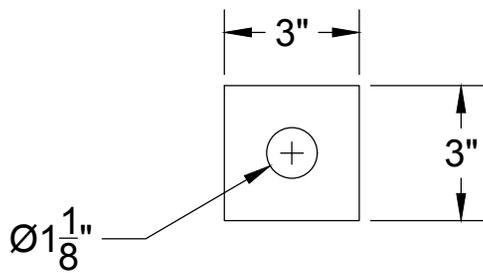
**NOTE: REFER TO SHEET 5 OF 5 FOR GENERAL NOTES,  
INSTALLATION NOTES AND PARTS LIST**

STRONGSTOWN'S B&K ENTERPRISES, INC.  
260 ROUTE 403 SOUTH, PO BOX 124  
STRONGSTOWN, PA 15957

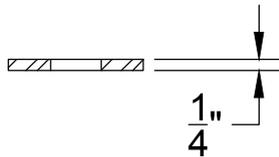
**STRONGSTOWN'S B&K  
JJ HOOK RETRO FIT V3  
ANCHOR CLIP  
("BENT PLATE ANCHOR BRACKET")  
ASPHALT PAVEMENT ANCHORING  
2 PLATE SYSTEM 6" EMBEDMENT**

DRAWING BY: DAVID WAGNER  
DATE: 6-19-17  
REVISED 2-26-19 (WJB)

SHEET: 3 OF 5



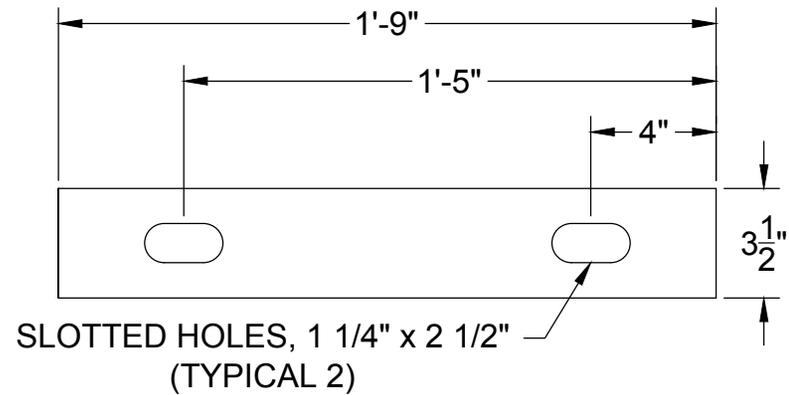
PLAN VIEW



ELEVATION VIEW

**PLATE WASHER**

1/4" THICK A36 GRADE STEEL  
SHEARED, LASER OR PLASMA CUT TO SIZE  
ANCHOR HOLES DRILLED, LASER OR PLASMA CUT



SLOTTED HOLES, 1 1/4" x 2 1/2"  
(TYPICAL 2)

PLAN VIEW



ELEVATION VIEW

**ANCHOR STRAP  
("TOP CONNECTOR PLATE")**

1/2" THICK A36 GRADE STEEL  
SHEARED, LASER OR PLASMA CUT TO SIZE  
SLOTTED HOLES DRILLED, LASER OR PLASMA CUT

**NOTE: REFER TO SHEET 5 OF 5 FOR GENERAL NOTES,  
INSTALLATION NOTES AND PARTS LIST**

STRONGSTOWN'S B&K ENTERPRISES, INC.  
260 ROUTE 403 SOUTH, PO BOX 124  
STRONGSTOWN, PA 15957

**STRONGSTOWN'S B&K  
JJ HOOK RETRO FIT V3  
ANCHOR STRAP  
("TOP CONNECTOR PLATE")  
CONCRETE PAVEMENT ANCHORING  
2 PLATE SYSTEM 6" EMBEDMENT**

DRAWING BY: DAVID WAGNER  
DATE: 6-19-17  
REVISED 2-26-19 (WJB)

SHEET: 4 OF 5

## GENERAL NOTES

1. THIS RETROFIT IS ONLY APPROVED FOR USE WITH STANDARD PRECAST F-SHAPE BARRIER WITH J-J HOOK CONNECTIONS ON EACH END. EACH BARRIER SEGMENT IS TO BE 12 FOOT LONG WITH THE F-SHAPE DIMENSIONING SHOWN ON THIS DRAWING.
2. THE ANCHORING DETAILS ON THIS DRAWING APPLIES TO INSTALLATIONS ON CONCRETE PAVEMENT, CONCRETE PAVEMENT WITH ASPHALT OVERLAY OR ASPHALT PAVEMENT.
3. BARRIER SEGMENTS ARE HORIZONTALLY RESTRAINED ON ASPHALT PAVEMENT USING CUSTOM FABRICATED ANCHOR PLATE 1 ("BENT PLATE ANCHOR BRACKET") AND ANCHOR STRAP ("TOP CONNECTOR PLATE"). BOTH ANCHOR PLATES ARE A36 GRADE STEEL, SHEARED, LASER OR PLASMA CUT TO SIZE WITH HOLES DRILLED, LASER OR PLASMA CUT. ANCHOR PLATE 1 ("BENT PLATE ANCHOR BRACKET") ANGLES ARE BENT IN PRESS BRAKE.
4. BENT PLATE ANCHOR BRACKET CONFORMS TO THE PROFILE OF STANDARD F-SHAPE BARRIER AS SHOWN ON THE DRAWING.
5. BENT PLATE ANCHOR BRACKET IS LOCATED ON THE PROTECTED, NON-TRAFFIC SIDE OF EACH BARRIER SEGMENT. SEE STEP 3 BELOW FOR INSTALLATION NOTES.
6. EACH BENT PLATE ANCHOR BRACKET IS SECURED TO THE ASPHALT PAVEMENT USING ONE, 1 INCH DIAMETER X 7 3/4 INCH LONG ASTM A193 GRADE B7 ZINC COATED RODS, COATED WITH A RELEASE AGENT, INSTALLED IN VERTICALLY DRILLED HOLES 8 INCHES DEEP AND SECURED WITH RED HEAD EPCON A7 ACRYLIC. BENT PLATE ANCHOR BRACKET IS SECURELY TIGHTENED TO THE PAVEMENT USING A 3 INCH DIAMETER A36 FLAT WASHER, AND A 1 INCH DIAMETER A194-2H ZINC COATED HEX NUT ON EACH ROD. THE NUT IS WELDED TO THE ROD FOR REMOVAL.
7. NO BOLTS OR ADHESIVES ARE USED TO SECURE THE BENT PLATE ANCHOR BRACKET TO THE BARRIER. THE PLATE RESTS FLUSH AGAINST THE BARRIER.
8. TOP CONNECTOR PLATE SPANS THE TOP JOINT BETWEEN BARRIER SEGMENTS AND IS BOLTED TO EACH BARRIER SEGMENT USING 1 INCH DIAMETER X 5 INCH LONG X 8 UNC THREADED WEDGE ANCHOR SOCKET INSERT LOCATED 5 3/4 INCHES FROM THE END FACE OF EACH BARRIER SEGMENT. A SINGLE 1 INCH DIAMETER X 2 INCH LONG UNC SAE J429 GRADE 5 ZINC COATED HEX BOLT, EACH WITH A 3 INCH SQUARE X 1/4 INCH THICK PLATE A36 WASHER SECURES TOP CONNECTOR PLATE TO EACH BARRIER END.
9. THE MASH CRASH TESTED "DYNAMIC DEFLECTION" FOR THIS RETROFIT BARRIER IS TBD

## INSTALLATION NOTES

### INSTALLATION OF ANCHOR PLATE 1 ("BENT PLATE ANCHOR BRACKET")

1. PLACE J-J HOOK BARRIERS ("BARRIER(S)") IN THE DESIRED LOCATION.
2. TO ENSURE MAXIMUM DEFLECTION RESISTANCE, THE BARRIER IS TO BE PLACED WITH MAXIMUM SPACE BETWEEN BARRIER SEGMENTS (NO SLACK IN THE J-J HOOK CONNECTIONS).
3. PLACE BENT PLATE ANCHOR BRACKET ON THE PROTECTED NON-TRAFFIC SIDE OF EACH BARRIER SEGMENT. BRACKETS WILL BE LONGITUDINALLY CENTERED AT THE 2 FOOT AND 10 FOOT POINTS ALONG EACH 12 FOOT LONG SEGMENT.
4. BENT PLATE ANCHOR BRACKET SHOULD FOLLOW THE CONTOUR OF THE BARRIER AND BE PLACED TIGHTLY AGAINST THE BARRIER SURFACE.
5. DRILL A 1 1/8 INCH HOLE THROUGH BOTH HOLES IN BENT PLATE ANCHOR BRACKET INTO THE ASPHALT SURFACE TO A DEPTH OF 6 INCHES. THIS CAN BE DONE WITH AN ELECTRIC HAMMER DRILL OR COMPRESSED AIR DRILL. CLEAR DEBRIS FROM ANCHOR HOLE WITH COMPRESSED AIR.
6. FILL BOTH ANCHOR HOLES WITH APPROXIMATELY 3 INCHES OF RED HEAD A7 CONSTRUCTION ADHESIVE. ADHESIVE SHOULD RISE TO THE TOP OF THE DRILL ANCHOR HOLE WHEN ANCHOR ROD IS FULLY INSERTED. RED HEAD A7 CAN BE SUBSTITUTED WITH AN ADHESIVE THAT MEETS OR EXCEEDS THE PROPERTIES OF THE TESTED ADHESIVE.
7. ANCHOR HARDWARE FOR BENT PLATE ANCHOR BRACKET WILL BE 7 3/4 INCHES LONG, 1 INCH DIAMETER ASTM A193 GRADE B7 THREADED ROD. THE THREADED ROD WILL HAVE AN ASTM A194 GRADE 2H NUT WELDED TO THE TOP OF THE THREADED ROD. THE WELDED NUT IS ONLY NECESSARY TO SECURE THE NUT TO THE ANCHOR ROD TO AID IN REMOVAL WHEN BARRIERS ARE REMOVED. ANCHOR ROD AND NUT ARE BOTH ZINC COATED.
8. PLACE AIR POCKET CAP ASSEMBLY ON TO THE BOTTOM OF THE ANCHOR ROD AND COAT THE ANCHOR ROD THREADS WITH KELI SLIP RELEASE AGENT.
9. INSERT THE ANCHOR ROD INTO THE DRILLED ANCHOR HOLE MAKING SURE THAT THE ADHESIVE RISES TO THE TOP OF THE ANCHOR HOLE.
10. REPEAT STEPS 1-8 UNTIL ALL HOLES ARE COMPLETE.
11. TIGHTEN ANCHOR ROD ASSEMBLY AFTER ADHESIVE HAS CURED FOR 1-2 HOURS. ANCHOR ROD ASSEMBLY SHOULD BE HAND TIGHTENED TO NO SPECIFIC TORQUE VALUE.
12. FIELD ADJUSTMENTS MAY BE NECESSARY WHEN LOCATING AND/OR INSTALLING ANCHOR PLATE 1 WHERE PLATE LOCATIONS INTERFERE WITH DRAINAGE INLETS, PAVEMENT JOINTS, VARIATIONS IN PAVEMENT CONTOURS, ETC.

### INSTALLATION OF ANCHOR PLATE 2 ("TOP CONNECTOR PLATE")

1. TOP CONNECTOR PLATE CAN BE INSTALLED IN CONJUNCTION WITH THE INSTALLATION OF BENT PLATE ANCHOR BRACKET. THE ONLY REQUIREMENT PRIOR TO INSTALLATION ON TOP CONNECTOR PLATE IS THAT ALL SLACK IS REMOVED FROM THE J-J HOOK CONNECTORS AS DESCRIBED IN "INSTALLATION OF BENT PLATE ANCHOR BRACKET" STEP 2.
2. IF TOP CONNECTOR PLATE IS BEING INSTALLED FOR THE FIRST TIME ON THE BARRIERS, THE ANCHORS NECESSARY FOR ATTACHING THE PLATE MUST FIRST BE INSTALLED. IF THIS IS A REINSTALLATION, SKIP TO SECTION 8.
3. PLACE TOP CONNECTOR PLATE ON THE TOP OF THE BARRIERS. THE SLOTTED HOLES IN THE TOP CONNECTOR PLATE SHOULD BE AS CLOSE AS POSSIBLE TO AND EQUAL DISTANCE BETWEEN THE JOINTS OF THE BARRIERS.
4. MARK THE SLOTTED HOLES IN TOP CONNECTOR PLATE WITH A CONSTRUCTION CRAYON OR MARKING PAINT.
5. DRILL INTO THE TOP OF THE BARRIERS IN A LOCATION THAT IS CENTERED IN THE MARK(S) THAT WERE MADE IN STEP 4. THE DRILLED HOLE SHOULD BE 1 1/4 INCH IN DIAMETER AND DRILLED TO A DEPTH OF 5 1/2 INCHES. AS IN "INSTALLATION OF BENT ANGLE ANCHOR BRACKET" STEP 5, THIS CAN BE DONE WITH AN ELECTRIC HAMMER DRILL OR COMPRESSED AIR DRILL. CLEAR DEBRIS FROM ANCHOR HOLE WITH COMPRESSED AIR.
6. ANCHOR HARDWARE FOR TOP CONNECTOR PLATE WILL BE A DROP IN WEDGE ANCHOR 1 INCH IN DIAMETER AND 5 INCHES LONG WITH A GRADE 5 ZINC PLATED HEX CAP SCREW 1 INCH IN DIAMETER AND 2 INCHES LONG.
7. INSERT THE DROP IN WEDGE ANCHOR INTO THE DRILLED HOLES MAKING SURE THE ANCHOR IS SEATED AT THE BOTTOM OF THE DRILLED HOLE.
8. ATTACH TOP CONNECTOR PLATE TO THE BARRIER BY INSERTING THE HEX CAP SCREWS THROUGH THE SLOTS IN THE ANCHOR PLATE AND TIGHTENING THEM INTO THE DROP IN WEDGE ANCHORS. HAND TIGHTEN BOTH HEX CAP SCREWS TO NO SPECIFIC TORQUE VALUE.

## ADDITIONAL NOTES

- ★ UPON REMOVAL OF THE BARRIERS AND RETROFIT SYSTEM, SURFACE HOLES WILL BE FILLED WITH A BULLETIN 15 APPROVED NON SHRINK GROUT.



## PARTS LIST

ANCHOR PLATE 1 ("BENT PLATE ANCHOR BRACKET") (PER BRACKET)	
QTY	DESCRIPTION
1	ANCHOR PLATE 1, 1/2 INCH THICK, A36 GRADE STEEL, SHEARED, LASER OR PLASMA CUT TO SIZE, ALL ANGLES BENT IN PRESS BRAKE, ANCHOR HOLES DRILLED, LASER OR PLASMA CUT.
1	THREADED ROD, 1 INCH DIAMETER X 7 3/4 INCH LONG ASTM A193 B7 ZINC COATED.
1	WASHER, 3 INCH DIAMETER A36 FLAT WASHER.
1	HEX NUT, 1 INCH DIAMETER ASTM A194-2H ZINC COATED HEX NUT.
1	AIR POCKET ASSEMBLY, 1 INCH DIAMETER VINYL RUBBER TUBING CAP
1	CONCRETE ANCHORING ADHESIVE, RED HEAD EPCON A7 ACRYLIC.

ANCHOR PLATE 2 ("TOP CONNECTOR PLATE") (PER PLATE)	
QTY	DESCRIPTION
1	ANCHOR PLATE 2, 1/2 INCH THICK, A36 GRADE STEEL, SHEARED, LASER OR PLASMA CUT TO SIZE, ANCHOR HOLES DRILLED, LASER OR PLASMA CUT.
2	WEDGE ANCHOR SOCKET, 1 INCH DIAMETER X 5 INCH LONG X 8 UNC THREADED WEDGE ANCHOR SOCKET INSERT.
2	HEX BOLT, 1 INCH DIAMETER X 2 INCH LONG UNC SAE J429 GRADE 5 ZINC COATED HEX BOLT
2	PLATE WASHER, 3 INCH X 3 INCH X 1/4 INCH THICK, A36 GRADE STEEL, SHEARED, LASER OR PLASMA CUT TO SIZE, ANCHOR HOLES DRILLED, LASER OR PLASMA CUT.

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## STRONGSTOWN'S B&K JJ HOOK RETRO FIT V3 GENERAL NOTES, INSTALLATION AND PARTS LIST ASPHALT PAVEMENT ANCHORING 2 PLATE SYSTEM 6" EMBEDMENT

DRAWING BY: DAVID WAGNER  
DATE: 6-19-17  
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SHEET: 5 OF 5