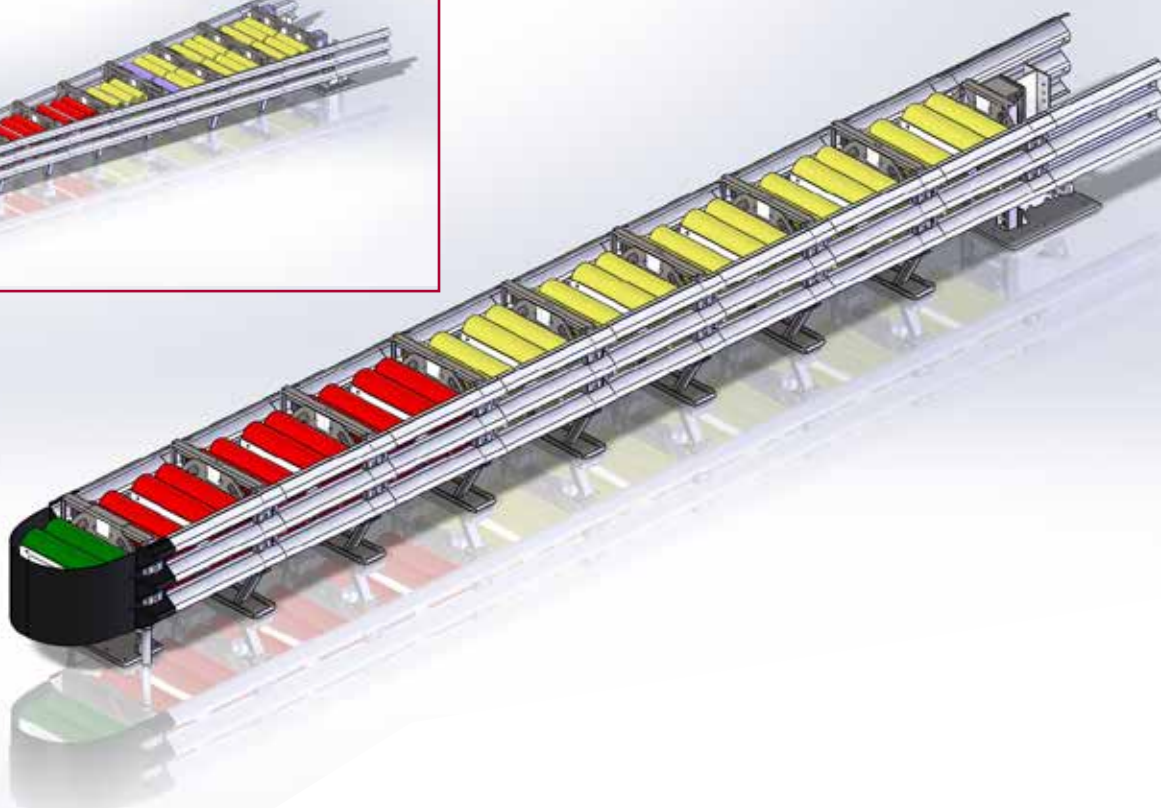
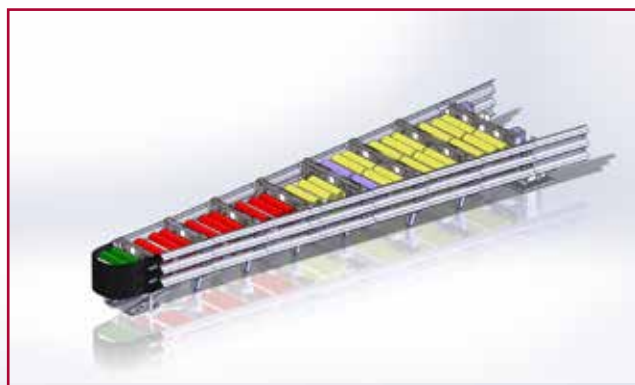


## UNIVERSAL TAU-II-R®

NCHRP 350 TL-3 Redirective, Non-Gating, Reusable Crash Cushion

TAU-II-R INSTALLATION Rev E ECN 60449

**\*\*This manual must be used in conjunction with the Universal TAU-II Installation Manual**





Installation and Maintenance  
Manual Supplement

**UNIVERSAL TAU-II-R®**

Redirective, Non-Gating, Reusable Crash Cushion

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## Preface

The Universal TAU-II-R (TAU-II-R) incorporates the latest roadside safety technologies and engineering processes.

As with any roadside safety device, the TAU-II-R must be installed in accordance with the manufacturer's specifications to ensure proper performance. Thoroughly review and understand the installation instructions and product limitations before starting the installation. Do not start the installation without proper plans and the tools required.

## System Overview

The TAU-II-R System is designed and constructed to provide acceptable structural adequacy, minimal occupant risk and safe vehicle trajectory as set forth in the National Cooperative Highway Research Program Report 350 (NCHRP Report 350) for redirective, non-gating crash cushions.

The Universal TAU-II-R System is designed to shield the ends of median barriers and other fixed objects likely to be struck head on by absorbing and dissipating the kinetic energy of impacting vehicles. The TAU-II-R Systems utilize reusable Energy Absorbing Elements (EAEs). The EAEs can be reused after multiple impacts to absorb the kinetic energy of the impacting vehicles. The TAU-II-R System was designed to be easily converted from a standard Universal TAU-II System simply by replacing the standard Type A & B Energy Absorbing Cartridges with the EAEs and nose assembly.

## Before Installation

Placement and use of the TAU-II-R System should be accomplished in accordance with the guidelines and recommendations set forth in the AASHTO Roadside Design Guide, FHWA memoranda and other state and local standards.

Depending on the application and circumstances at the job site, installation and assembly of a Test Level 3 System should take a two person crew less than 3 hours.

The structure of the TAU-II-R System is exactly the same as a standard Universal TAU-II System. Assembly of the TAU-II-R System shall be accomplished by following Steps 1 through 7 and Step 10 in the Universal TAU-II Installation Manual. Assembly of the Nose Cover and installation of the EAEs shall be accomplished by following these supplement assembly instructions.

Before starting the assembly, one shall be familiar with basic elements that make up the TAU-II-R System.

## Limitations and Warnings

The TAU-II-R System has been rigorously tested and evaluated per the recommendations in NCHRP Report 350 guidelines for crash cushions. The impact conditions recommended in NCHRP Report 350 are intended to address in-service collisions.

When properly installed and maintained, the System is capable of stopping, containing, and redirecting impacting vehicles in a predictable and safe manner under NCHRP Report 350 impact conditions. Vehicle impacts that vary from the NCHRP Report 350 impact conditions for non-gating, redirective impact attenuators may result significantly different than those experienced in testing.

Vehicle impact characteristics different than or in excess of those encountered in NCHRP Report 350 testing (speed and angle) may result in System performance that may not meet NCHRP Report 350 evaluation criteria.

*If you need additional information, or have questions about the TAU-II-R System, please call the BSI Customer Service Department at +1 (888) 800-3691 [U.S. toll free] or +1 (402) 829-6800.*

## Preparation

Before installing the TAU-II-R System, ensure that all materials required for the system are on site and have been identified.

## Additional Tools

- 9/16" (17 mm) Socket

**Note:** The required tools listed are in addition to those listed in the Universal TAU-II Manual. The tools list is a general recommendation. Depending on the specific characteristics of the job site, more or less tools may be necessary.



Universal TAU-II-R System



## STANDARD LIMITED WARRANTY

Lindsay Transportation Solutions, Inc. "LTS" ( formerly Barrier Systems ) has tested the impact performance of its barriers and crash cushion systems, and other highway safety hardware under controlled conditions, however, LTS does not represent nor warrant that the results of those controlled conditions would necessarily avoid injury to persons or property. LTS EXPRESSLY DISCLAIMS ANY WARRANTY OR LIABILITY FOR CLAIMS ARISING BY REASONS OF DEATH OR PERSONAL INJURY OR DAMAGE TO PROPERTY RESULTING FROM ANY IMPACT, COLLISION OR HARMFUL CONTACT WITH THE PRODUCTS OR NEARBY HAZARDS OR OBJECTS BY ANY VEHICLE, OBJECTS OR PERSONS.

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Any claim by the Buyer with reference to Products sold hereunder for any cause shall be deemed waived by the Buyer unless LTS is notified in writing, in the case of defects apparent on visual inspection, within ninety (90) days from the delivery date, or, in the case of defects not apparent on visual inspection, within twelve (12) months from the said delivery date. Products claimed to be defective may be returned prepaid to LTS' plant for inspection in accordance with return shipping instructions that LTS shall furnish to the Buyer forthwith upon receipt of the Buyer's notice of claim. If the claim is established, LTS will reimburse that Buyer for all carriage costs incurred hereunder.

The forgoing warranty benefits shall not apply to (i) any Products that have been subject to improper storage, accident, misuse or unauthorized alterations, or that have not been installed, operated and maintained in accordance with approved procedures and (ii) any components manufactured by the Buyer.

## System Configuration Chart - TAU-II-R Crash Cushion

|                              | 30 mph*<br>[50 km/h] | 35+ mph*<br>[60 km/h] | 44 mph<br>[70 km/h] Test Level -2 | 50 mph*<br>[80 km/h] | 55+ mph*<br>[90 km/h] |
|------------------------------|----------------------|-----------------------|-----------------------------------|----------------------|-----------------------|
| <b>Up to 30"</b><br>[700 mm] |                      |                       |                                   |                      |                       |
| <b>36"</b><br>[900 mm]       |                      |                       |                                   |                      |                       |
| <b>42"</b><br>[1060 mm]      |                      |                       |                                   |                      |                       |
| <b>48"</b><br>[1220 mm]      |                      |                       |                                   |                      |                       |
| <b>54"</b><br>[1370 mm]      |                      |                       |                                   |                      |                       |
| <b>60"</b><br>[1520 mm]      |                      |                       | X                                 | X                    | X                     |
| <b>66"</b><br>[1680 mm]      |                      |                       | X                                 | X                    | X                     |
| <b>72"</b><br>[1830 mm]      |                      |                       | X                                 | X                    | X                     |
| <b>78"</b><br>[1980 mm]      |                      |                       | X                                 | X                    | X                     |
| <b>84"</b><br>[2130 mm]      |                      |                       | X                                 | X                    | X                     |
| <b>90"</b><br>[2290 mm]      |                      |                       | X                                 | X                    | X                     |
| <b>96"</b><br>[2440 mm]      |                      |                       | X                                 | X                    | X                     |
| <b>102"</b><br>[2600 mm]     |                      |                       |                                   |                      |                       |

BACKSTOP WIDTH

### Legend:

- Type 1 Element (QTY.2)
- Type 2 Element (QTY.2)
- Type 3 Element (QTY.2)
- Type 1 Element (QTY.1)
- Type 2 Element (QTY.1)
- Type 1s Element (QTY.1)
- Type 2s Element (QTY.1)
- Empty/No Element
- X Lateral Support Cables Required
- Double Slider Panels
- Single Slider Panel
- Leg Adapter Required
- Single X Bulkhead (XL)
- Double X Bulkhead (XXL)
- Triple X Bulkhead (XXXL)
- Parallel Diaphragm
- Transition Wing Assembly Required
- 36" Adapter Assembly Required
- Wide Nose Piece and Type 3n Element

\* Speed Capacity rounded down to nearest 5 mph level. Contact Customer Service for further information.



|                              | 60+ mph*<br>[100 km/h] Test Level - 3 | 65 mph<br>[105 km/h] | 70 mph<br>[110 km/h] |
|------------------------------|---------------------------------------|----------------------|----------------------|
| <b>Up to 30"</b><br>[700 mm] |                                       |                      |                      |
| <b>36"</b><br>[900 mm]       |                                       |                      |                      |
| <b>42"</b><br>[1060 mm]      |                                       |                      |                      |
| <b>48"</b><br>[1220 mm]      |                                       |                      |                      |
| <b>54"</b><br>[1370 mm]      |                                       |                      |                      |
| <b>60"</b><br>[1520 mm]      | X                                     | X                    | X                    |
| <b>66"</b><br>[1680 mm]      | X                                     | X                    | X                    |
| <b>72"</b><br>[1830 mm]      | X                                     | X                    | X                    |
| <b>78"</b><br>[1980 mm]      | X                                     | X                    | X                    |
| <b>84"</b><br>[2130 mm]      | X                                     | X                    | X                    |
| <b>90"</b><br>[2290 mm]      | X                                     | X                    | X                    |
| <b>96"</b><br>[2440 mm]      | X                                     | X                    | X                    |
| <b>102"</b><br>[2600 mm]     |                                       |                      | X                    |

**Call or email BSI Customer Service:**

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or

+1 (402) 829-6800

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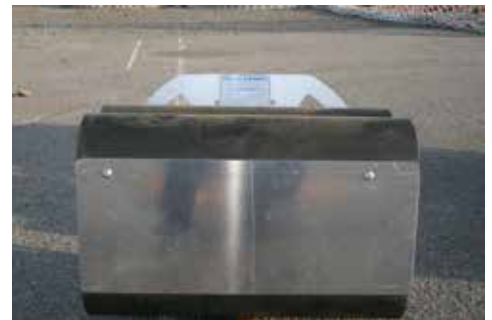
## Parts Identification



**Wide Nose Kit**  
**K001034 - (Ylw) K001029 (Blk)**



**Type 1 Element (QTY Varies)**  
**BSI-1012069-00**



**Type 2 Element (QTY Varies)**  
**BSI-1012070-00**



**Type 3 Element (QTY Varies)**  
**BSI-1012071-00**



**Type 3n Element (QTY 1)**  
**BSI-1110009-00**



**Type 1s Element (QTY Varies)**  
**BSI-1109042-00**



**Type 2s Element (QTY Varies)**  
**BSI-11070116-00**



**EAE Mounting HW kit (QTY Varies)**  
**BSI-1107131-KT**



**Compact Backstop Mounting Kit**  
**(QTY 1) BSI-1108015-KT**



**PCB Backstop Mount Kit (QTY 1)**  
**BSI-1108017-KT**



**Flush Mount Backstop Mount Kit**  
**(QTY 1) BSI-1108018-KT**



**Wide Flange Backstop Mount Kit**  
**(QTY Varies) BSI-1108016-KT**



## Bill of Materials

| Part Number                                        | Description      | Quantity |
|----------------------------------------------------|------------------|----------|
| Wide Nose Kit - K001034 (Ylw), K001029 (Blk)       |                  |          |
| B050443                                            | Nose Piece (Ylw) | 2        |
| 4002143                                            | Rivets           | 14       |
| 4002144                                            | Washer           | 14       |
| EAE Mounting Hardware Kit - BSI-1107131-KT         |                  |          |
| 2001763                                            | M10 x 110mm Bolt | 2        |
| 2000443                                            | M10 Washer       | 4        |
| 2001754                                            | M10 Lock Washer  | 2        |
| 2001612                                            | M10 Nut          | 2        |
| Compact Backstop Mounting Kit - BSI-1108015-KT     |                  |          |
| BSI-1107130-00                                     | Mounting Bar     | 1        |
| 2001761                                            | M10 x 120mm Bolt | 2        |
| 2000443                                            | M10 Washer       | 4        |
| 2001754                                            | M10 Lock Washer  | 2        |
| 2001612                                            | M10 Nut          | 2        |
| PCB Backstop Mounting Kit - BSI-1108017-KT         |                  |          |
| BSI-1110040-00                                     | Mounting Bracket | 1        |
| 2001439                                            | M10 x 40mm Bolt  | 2        |
| 2000443                                            | M10 Washer       | 4        |
| 2001754                                            | M10 Lock Washer  | 2        |
| 2001612                                            | M10 Nut          | 2        |
| Flush Mount Backstop Mounting Kit - BSI-1108018-KT |                  |          |
| BSI-1108007-00                                     | Mounting Bracket | 1        |
| 2001439                                            | M10 x 40mm Bolt  | 2        |
| 2000443                                            | M10 Washers      | 4        |
| 2001754                                            | M10 Lock Washer  | 2        |
| Wide Flange Backstop Mounting Kit - BSI-1108016-KT |                  |          |
| BSI-1108019-00                                     | Mounting Bar     | 1        |
| 2001761                                            | M10 x 140mm Bolt | 2        |
| 2000443                                            | M10 Washer       | 4        |
| 2001754                                            | M10 Lock Washer  | 2        |
| 2001612                                            | M10 Nut          | 2        |

**Note:** Assembly of the Universal TAU-II-R structure shall be accomplished by following Steps 1 through 7 and Step 10 in the Universal TAU-II Installation Manual. Assembly of the Nose Cover and installation of the Energy Absorbing Elements shall be accomplished by following the steps in this manual. Additionally, if retrofitting an existing Universal TAU-II System, remove all the energy absorbing cartridges (EACs) and the front nose cover.

## STEP 1 – NOSE ASSEMBLY

Components required:

- (1) Wide Nose Kit - K001034
  - (2) - Nose Piece
  - (14) - Rivets
  - (14) - Washers
- (4) Tow Hooks - BSI-1110013-00

- 1a. Attach the Nose Cover and left or right Slider Panel to the Front Support. A two-part nose piece is used for all TAU-II-R Systems. The Nose Cover and Slider Panel are held together with tow hooks designed to aid in the system restoration after design impacts. Push the bolt through the Nose Cover, Slider Panel and Front Support. Install the washer and hand tighten the nut.

**Note:** A two-part nose piece overlaps across the width of the system. Adjust to the desired profile and align the holes. Using the supplied pop rivets and washers, rivet two columns of holes. The overlapping nose pieces should be riveted together with the two columns of rivets as far apart as possible. Ensure that there is enough room to fit a Type 3n EAE behind the nose cover. It may be beneficial to attach the left and right nose pieces to the system, then wrap and rivet the two sections together once the Type 3n element is installed.

- 1b. Ensure that the tow hooks are used as they are different from the Slider Bolts used on the rest of the system.
- 1c. Repeat the process with the other side of the Nose Cover.

## Notes:

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**Installing One Side of Nose Cover**



**Installing Tow Hooks on Nose Cover**

## STEP 2 – TORQUE BOLTS

Before installation of the EAEs, ensure that all Slider Panels are lapped properly. For the system to telescope properly, the forward most sliding panel **MUST** be on the outside.

Before applying torque to the Slider Bolts, ensure that the system bays are fully extended. The Energy Absorbing Elements will not fit properly if the bays are not fully extended. Pull the Slider Panels of each bay until fully extended, working from the back of the system, near the backstop, toward the nose assembly.

Torque all of the Slider Bolts to 20 ft-lbs (27 N-m). Torque the bolts holding the nose cover (Tow Hooks) to 200 ft-lbs (270 N-m). Do not over tighten.

***Hint:*** To ensure proper nesting of the panels, it may be necessary to over tighten the slider bolts (up to 200 ft-lbs) and then back off and torque the bolts to the specified value.



**System Fully Extended and Panels Properly Lapped**



**Applying Torque to Slider Bolts**

## STEP 3 – INSTALLING ENERGY ABSORBING ELEMENTS [EAEs]

Components Required:

Energy Absorbing Elements (Quantities and types varies)

EAE Mounting Hardware Kit -

BSI-1107131-KT (Quantity varies)

(2) - M10 x 110mm Bolts

(4) - Washers

(2) - Lock Washers

(2) - Nuts

**The speed rating and width of the system being assembled must be determined prior to installing the EAEs. Once the speed and width have been determined, reference the TAU-II-R configuration chart and identify the correct system to ensure proper placement of the EAEs.**

The Energy Absorbing Elements are identified with a label adhered to the backing plate as Type 1, Type 1s, Type 2, Type 2s, Type 3 or Type 3n.

3a. Begin installing the EAEs starting at the nose assembly. For ease of installation, the EAEs are intended to rest on the bottom tab of each Bulkhead. The backing plate of the EAE will then pass through two additional tabs near the middle of each bulkhead.

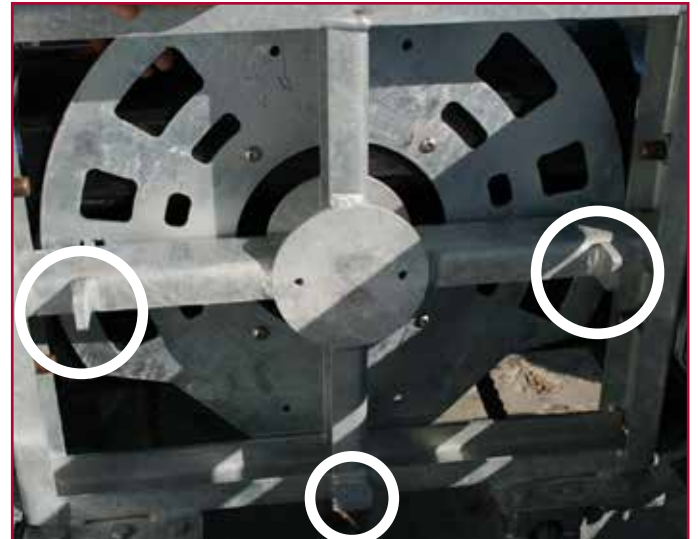
3b. Begin with the element directly behind the nose cover; this element will always be a Type 3n. The EAEs are secured using two bolts near the top of the backing plate of each element by bolting two elements of adjacent bays together. There is no torque requirement for these bolts.

Continue by installing the remaining EAEs except for the element that attaches to the backstop.

**Note: Refer to the TAU-II-R System Configuration Chart for proper configuration of the Energy Absorbing Elements.**



Identification Label on EAEs



Tabs on Bulkhead



Securing the EAEs



## BACKSTOP ATTACHMENT

Installing the EAE(s) to the backstop is accomplished in a different manner for each backstop design. Determine what type of backstop is present and proceed to install the element(s) to the corresponding backstop as follows:

### COMPACT BACKSTOP

Components Required:

- (1) Type 2 Energy Absorbing Element - BSI-1012070-00
- (1) Compact Backstop Mount Kit - BSI-1108015-KT
  - (1) - Mounting Bar
  - (2) - M10 x 120mm Bolts
  - (4) - Washers
  - (2) - Lock Washers
  - (2) - Nuts

1. For ease of installation, the EAE is intended to rest on the two tabs near the bottom of the backstop. Insert the EAE and rest it on these tabs.
2. Pull the EAE flush with the frame of the backstop. Insert the EAE Mounting Bar as shown through the back of the backstop. Secure the EAE to the backstop by passing two bolts through backing plate of the EAE and the Mounting Bar. There is no torque requirement for these bolts.

**Once all EAEs are installed and secure, proceed to Step 10, Tension Cables, of the Universal TAU-II Installation Manual.**



**Tabs at the Bottom of Compact Backstop**



**Mounting Bar used to Secure Element**



**Bolting EAE to Compact Backstop**



## PCB BACKSTOP

Components Required:

(1) Type 2 Energy Absorbing Element - BSI-1012070-00

(1) PCB Backstop Mounting Kit - BSI-1108017-KT

(1) - Mounting Bracket

(2) - M10 x 40mm Bolts

(4) - Washers

(2) - Lock Washers

(2) - Nuts

1. Begin by removing the four (4) bolts that attach the pipe panel mounts to the backstop.
2. Slide the PCB Mounting Bracket over the PCB Backstop as shown on the right.
3. Secure the mounting bracket to the backstop using the bolts that were previously removed. Pass the bolts through the Pipe Panel Mounts, the mounting bracket and the backstop. Ensure that all four (4) bolts are used. Once the bracket is secure, proceed to install the EAE.



**Removing Bolts from Pipe Panel Mounts**



**Sliding PCB Bracket over Backstop**



**Securing PCB Bracket**

4. For ease of installation, the EAE is intended to rest on the two tabs near the bottom of the backstop. Insert the EAE and rest it on these tabs. Pull the EAE flush with the frame of the backstop and secure the EAE using two bolts.

**Once all EAEs are installed and secure, proceed to Step 10, Tension Cables, of the Universal TAU-II Installation Manual.**



**Inserting EAE**



**Securing EAE**

## FLUSH MOUNT BACKSTOP

Components Required:

- (1) Type 2 Energy Absorbing Element - BSI-1012070-00
- (1) Flush Mount Backstop Mounting Kit-BSI-1108018-KT
- (1) - Mounting Bracket
  - (2) - M10 x 40mm Bolts
  - (4) - Washers
  - (2) - Lock Washers

1. Begin by removing the top four (4) bolts that hold the backstop frame together.

2. Slide the Flush Mount Mounting Bracket over the backstop as shown on the right.

3. Secure the mounting bracket to the backstop using the bolts that were previously removed. Ensure that all four (4) bolts are used. Once the bracket is secure, proceed to install the EAE.



**Removing Bolts from Flush Mount Backstop**



**Sliding Bracket Over Backstop**



**Securing Flush Mount Bracket**

4. For ease of installation, the EAE is intended to rest on the two tabs near the bottom of the backstop. Insert the EAE and rest it on these tabs. Pull the EAE flush with the frame of the backstop and secure the EAE using two bolts. The holes on the bracket are tapped, therefore, there is no need for the use of nuts.

**Once all EAEs are installed and secure, proceed to Step 10, Tension Cables, of the Universal TAU-II Installation Manual.**



**Inserting EAE**



**Securing EAE**



## WIDE FLANGE BACKSTOP

Components Required:

Type 2 Energy Absorbing Element - BSI-1012070-00  
(Quantity varies)

(2) Wide Flange Backstop Mounting Kit  
BSI-1108016-KT

- (1) - Mounting Bar
- (2) - M10 x 140mm Bolts
- (4) - Washers
- (2) - Lock Washers
- (2) - Nuts

1. For ease of installation, each EAE is intended to rest on the tabs near the bottom of the backstop. Insert the EAE and rest it on these tabs. Depending on the system, more than one EAE may be required in the last bay at the backstop. Reference the Universal TAU-II-R System Configuration Chart for proper EAE configurations.
2. Pull the EAE flush with the frame of the backstop. Secure the EAE(s) to the backstop using the EAE Mounting Bar and two bolts. If an additional EAE is required at the backstop repeat the process for the additional EAE.

**Once all EAEs are installed and secure, proceed to Step 10, Tension Cables, of the Universal TAU-II Installation Manual.**



**Using Mounting Bar to Attach EAEs**



**Mounting Bar**



**EAEs Secured with Mounting Bars**



## TRANSITION FROM A ONE ELEMENT BAY TO A TWO ELEMENT BAY WIDE SYSTEMS ONLY

Components Required:

Energy Absorbing Elements (Quantity and type varies)

Wide Flange Backstop Mounting Kit -

BSI-1108017-KT (Quantity varies)

(1) - Mounting Bar

(2) - M10 x 140mm Bolts

(4) - Washers

(2) - Lock Washers

(2) - Nuts

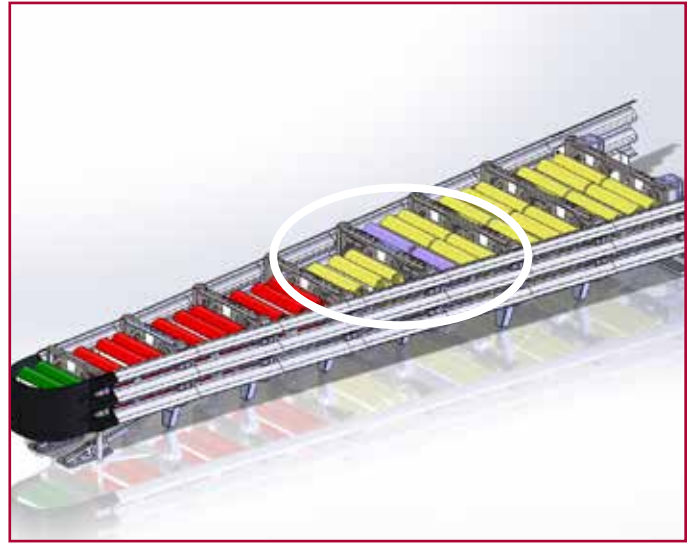
1. Begin by removing the EAC locator tabs on the side where two EAEs will attach to (the side closest to the backstop). If these tabs are not removed the EAEs will not fit properly.
2. Insert the EAE closest to the front of the system and let it rest on the tabs near the bottom of the bulkhead.

Pull the EAE flush with the bulkhead and hold in place.

**Note:** It may be useful to hold the EAE in place using a C-Clamp.

3. Insert the next EAE in the following bay, the side where the EAC locator tabs were removed, and secure it in place using the mounting bar and bolts while holding the front bay EAE flush against the bulkhead. The two EAEs should now be held together, as shown to the right. Ensure that the mounting bar sits on top of the backing plate of the forward facing EAE as shown in the photo.

**Note:** It may be useful to use a C-Clamp to hold the first elements flush against the bulkhead while securing the EAEs with the mounting bracket.



One Element Bay to Two Element Bay



Removing EAC Locator Tabs



Inserting EAE on the Backside

EAE Secured with Mounting Bracket

4. Insert the third EAE, secure it in place using a second mounting bracket in a similar fashion as the previous step.



**Securing EAEs Using Mounting Bracket**



**EAEs Secured with Mounting Brackets**

5. Finally, secure the first EAE by using a third mounting bar. Ensure that the mounting bar sits on the outside of the backing plates of the EAEs as shown to the right.

**Once all EAEs are installed and secure, proceed to Step 10, Tension Cables, of the Universal TAU-II Installation Manual.**



**Final Mounting Bracket Attached**

## RELEVANT INFORMATION

For System Torque Chart, Anchoring Foundation Options, and Transitions, please reference the Appendices in the Universal TAU-II Installation Manual.



**Fully Assembled Parallel System**



**Fully Assembled Wide System**

## FINAL INSPECTION CHECKLIST

| Inspection Date | Inspection By: | Item                                                                                                                                                                                                                                       |
|-----------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                | All front anchor plate and backstop anchor bolts are in place and epoxy has cured.                                                                                                                                                         |
|                 |                | Clevis pin, mounted to the front cable anchor, is installed with handle portion of the pin on the inside of the anchor assembly and is firmly tightened. (This may be different depending on the type of foundation, i.e. asphalt or PCC). |
|                 |                | All cable guides are securely fastened.                                                                                                                                                                                                    |
|                 |                | System cables tightened to meet torque specifications.                                                                                                                                                                                     |
|                 |                | Pipe panel mounts are positioned properly, flat end facing back, cut out facing forward.                                                                                                                                                   |
|                 |                | Sliding panels are installed properly to allow for stacking.                                                                                                                                                                               |
|                 |                | Sliding panels should not have no more than a 3/4" (19mm) gap between stacked panels.                                                                                                                                                      |
|                 |                | Nose cover is properly installed using special tow hooks.                                                                                                                                                                                  |
|                 |                | Torque Sliding Bolt assemblies to specifications.<br>DO NOT OVER TIGHTEN.                                                                                                                                                                  |
|                 |                | Energy Absorbing Elements (EAEs) are installed and bolted in proper configuration. Reference the Universal TAU-II-R configuration chart.                                                                                                   |
|                 |                | Asphalt adapter installed on both sides of portable concrete barrier when applicable.                                                                                                                                                      |
|                 |                | Torque all fasteners to meet specifications.                                                                                                                                                                                               |



## TAU-II-R MAINTENANCE & REPAIR

The Universal TAU-II-R system was designed to offer low maintenance and a high degree of reusability. The system has also demonstrated self restoration capability after some impacts. The system is based on the original TAU-II and it incorporates reusable energy absorbing elements. The majority of the system can be reused after multiple impacts.

### Life Expectancy

#### Environment

Depending on the environmental conditions, an energy absorbing element (EAE) will sustain its mechanical properties for several years. In a typical highway environment, an unhampered EAE is expected to sustain for a minimum of 10 years from the date of installation when properly maintained.

#### Impacts

Impact conditions that affect the reusability and self restoration characteristics include:

1. Weight and speed of the impacting vehicle.
2. Angle and location of the impact.
3. The time lapse between incidents.
4. Extreme environmental conditions, such as, temperature and humidity.

The Universal TAU-II-R has demonstrated that it will partially or self restore after some, but not all impacts. The system must be thoroughly inspected after all impacts and fully restored to its original form to ensure proper impact performance for subsequent events.

### Inspections

Inspections should be determined by impact history and volume of traffic and may be prescribed by local highway authorities or maintenance divisions. Drive-by inspections are recommended at least monthly. Hands-on inspections are recommended at least yearly. Post-impact inspections are recommended after every impact.

## TAU-II-R MAINTENANCE & REPAIR

### Inspection - Drive-By

The frequency of drive-by inspections is dependent on the traffic volume and the impact history of the system. Drive-by inspections are recommended at least monthly.

1. The inspector should be moving at a speed that is sufficiently slow enough to detect impact or environmental damage (debris). If any damage or significant debris is observed, a hands-on inspection is warranted.
2. Make sure that all of the energy absorbing elements are present and that there is no debris lodged underneath the system. If energy absorbing elements are missing or out of position, a hands on inspection is necessary.
3. If delineation has been applied to the nose cover, ensure that it is still properly attached and visible. If it is not properly attached or becoming disconnected, a hands on inspection is warranted.
4. If the main support cables appear loose or are sagging, a hands-on inspection should be made.
5. If the system appears to have been impacted in any way, (visible scrapes, paint marks, etc.) a hands-on inspection should be made.

**Note:** It is important to keep a logbook of all drive – by inspections for each installed system. Record the date of the inspection and observed condition of the system.



1. Look for tire or paint marks on the front and sides of the system. In addition, look for any bent or dislodged panels.
2. Look for debris (pieces of tire, garbage, etc.) underneath the system.
3. Look for sagging cables.

**Warning:** Debris, snow, or ice may accumulate in and around the system over time and may affect the performance of the Universal TAU-II-R. A hands-on inspection is needed if any debris is observed. Failure to conduct a hands-on inspection to remove the debris or other material could affect the performance of the system.

## TAU-II-R MAINTENANCE & REPAIR

### Inspection - Hands-On

The frequency of hands-on inspections is dependent on the traffic volume and the impact history of the system. Hands-on inspections are recommended at least yearly.

1. Appropriate traffic control shall be deployed in accordance with local standards.
2. Check that all the Diaphragms are straight and that the Slider Bolts used to connect the side panels to the Diaphragms are straight. Check that the tightness of the Slider Bolts is 20 ft – lbs (27 N-m).
3. Check below the system and in the spaces between the Diaphragms and the Energy Absorbing Elements (EAEs) to remove any debris that may have accumulated.

**Warning:** Debris, snow, or ice may accumulate in and around the system over time and may affect the performance of the Universal TAU-II-R. A hands-on inspection is needed if any debris is observed. Failure to conduct a hands-on inspection to remove the debris or other material could affect the performance of the system.

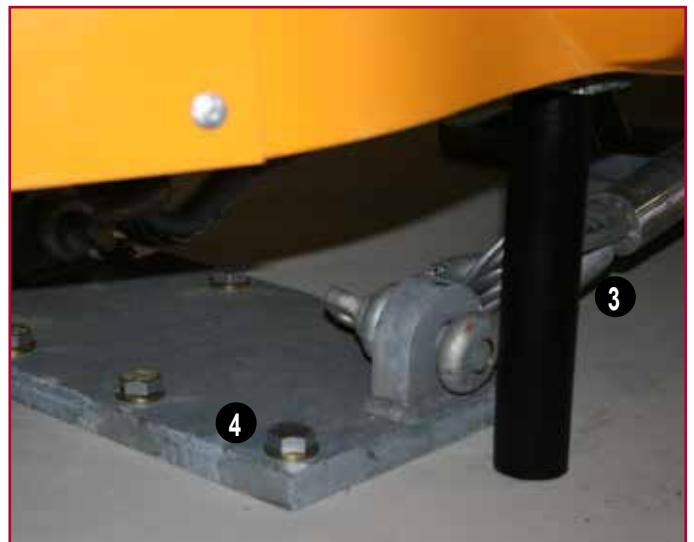
4. Check the tightness of the anchor bolts on the Front Anchor Plate as well as the anchor bolts at the base of the unit.

#### Concrete Foundation Installation:

Tighten to 120 ft – lbs (160 N-m)

#### Asphalt Foundation Installation:

Tighten to 5 ft – lbs (8 N-m)



## TAU-II-R MAINTENANCE & REPAIR

### Inspection - Hands-On (Continued)

5. Check the nut on the end of the cables at the backstop. Adjust the torque if necessary.

#### Concrete Foundation Installation:

Tighten to 500 ft – lbs (680 N-m)

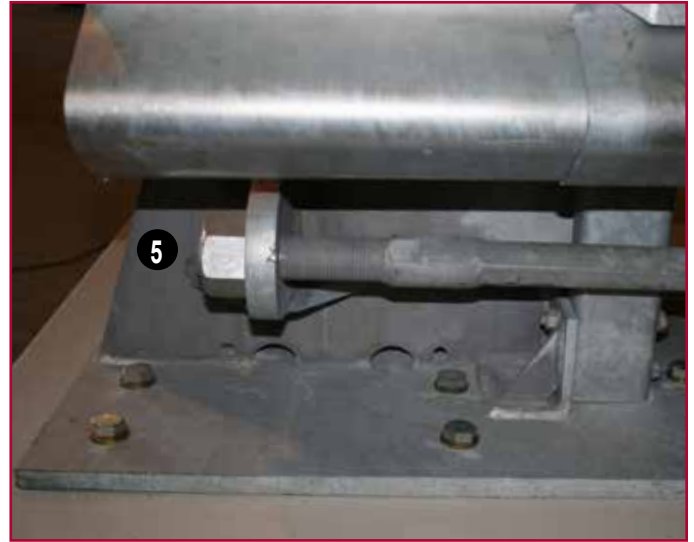
#### Asphalt Foundation Installation:

Tighten to 120 ft – lbs (160 N-m)

6. Check the condition and placement of all the EAEs. Ensure that all EAEs are in good condition and that they are positioned properly. Inspect and evaluate the condition of the EAEs.

The following criteria shall be considered when evaluating an EAE:

- The EAEs may experience wear from contact with the system cable running along the bottom of the system. Damage and material wearing caused by the cable is acceptable and will not affect the energy absorbing capacity of the elements.





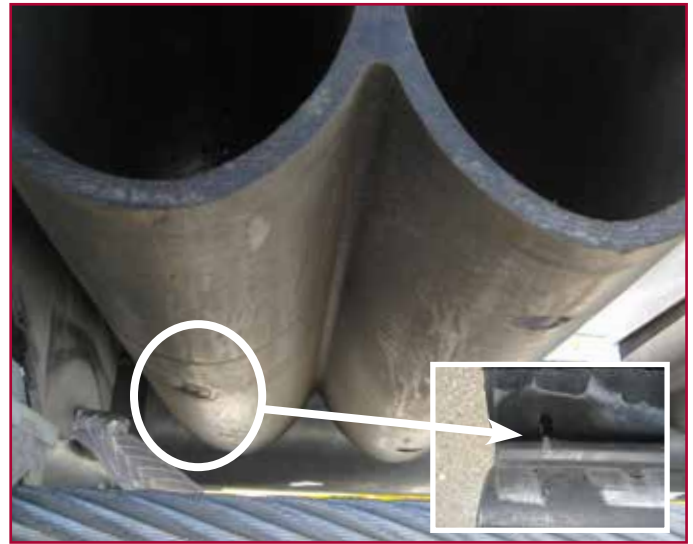
## TAU-II-R MAINTENANCE & REPAIR

### Inspection - Hands-On (Continued)

- The EAEs may experience minor superficial damage by the EAC locator tabs located near the bottom of each bulkhead. Damage caused by these tabs is acceptable and will not affect the energy absorbing capacity of the elements.
- Minor damage may be experienced from contact with the hardware on the backing plates of the EAEs. This damage is acceptable and will not affect the energy absorbing capacity of the elements.
- The EAEs may experience cracking after numerous severe impacts. Any EAE with visible cracks greater than 1" (25mm) and that penetrate the entire thickness of the material shall be replaced immediately.

Remove and replace all damaged elements. If an element's condition is questionable, a photo of the element can be forwarded to Lindsay Transportation Solutions for evaluation. If you need assistance determining an element's condition, contact Lindsay Transportation Solutions Customer Service:

U.S. Toll Free: +1 (888) 800-3691  
 Phone: +1 (402) 829-6800  
 Email: [info@barriersystemsinc.com](mailto:info@barriersystemsinc.com)



## TAU-II-R MAINTENANCE & REPAIR

### Inspection - Hands-On (Continued)

#### Configuration Chart for proper placement of the EAEs.

7. Check that the EAEs are securely bolted. Check that the torque of the Tow Hooks holding the Nose Cover is 200 ft – lbs (270 N-m).

**Note:** It is important to keep a log book of all hands-on inspections for each installed system. Record the date of inspection, the observed condition of the system and any replaced items.

**Note:** Replacement parts may be obtained from your local distributor. If you need assistance contacting your local distributor, contact Lindsay Transportation Solutions Customer Service:

U.S. Toll Free: +1 (888) 800-3691

Phone: +1 (402) 829-6800

Email: [info@barriersystemsinc.com](mailto:info@barriersystemsinc.com)



## TAU-II-R MAINTENANCE & REPAIR

### Post Impact Inspection - Repair

After an impact, the system must be thoroughly inspected to determine which parts can be reused and which parts need to be replaced. The system must be repaired to its original condition to operate as designed during the next impact. Once the system has been fully extended to its original length, the reusable Energy Absorbing Elements restore to their original capacity.

**WARNING:** A system that has been impacted can store energy in the Energy Absorbing Elements and may spring back unexpectedly causing possible serious injury. Use caution when disassembling and restoring damaged systems.

1. Appropriate traffic control shall be deployed in accordance with local standards.
2. Asphalt Systems:  
Pay close attention to the foundation anchors. If the anchors have moved or if there are any cracks around the anchoring area, the foundation may need to be re-compacted or the system may need to be repositioned in a more stable area.
3. If the system has sustained a frontal impact, attach a suitable chain or sling to the special Tow Hooks attached to the Front Support and pull the system out in a controlled manner with a heavy truck. Attach the chain as shown in the pictures. Extend the system to its original length (For system lengths, see Appendix C in the Universal TAU-II Installation Manual). It is important that the system bays be fully extended in order for the Energy Absorbing



## TAU-II-R MAINTENANCE & REPAIR

### Post Impact Inspection - Repair (Continued)

Elements to restore to their original shape. Ensure that the gap between the elements does not exceed the values in the table below, if it does, those elements need to be replaced or accelerated (see note below). The gap should be measured from bolt to bolt.

| Element | Gap (cm) | Gap (in) |
|---------|----------|----------|
| Type 1  | 15       | 5-7/8    |
| Type 2  | 13       | 5-1/8    |
| Type 3  | 13       | 5-1/8    |

A gap larger than what is specified may indicate that an EAE has not yet fully restored to its original form. The EAEs shall be removed and replaced with new or fully restored EAEs. Because of the special rebound control features of the EAE, after an impact, some EAEs may take longer to regain their original form, in which case, it may be necessary to cycle EAEs, by replacing elements that have not fully restored with ones from inventory that have already been fully restored.

**Note:** Most elements will fully restore within 24 to 72 hours after full compression and restoration of the system. To help accelerate the full expansion of the elements, the elements may be placed under direct sun exposure, be exposed to ambient heat, or, in cold climates, be placed indoors.

**WARNING:** Stand a safe distance from the pulling operation until the system is fully extended in case the chain breaks or becomes disconnected.

4. Inspect the main cables. Create slack in the cables by backing off the nut on the threaded end. Loosen the bolt to the end of thread. Inspect the cables for damage to ensure that they have not been kinked, pinched, or frayed. Replace any cable if strands of wire are broken or severely kinked.
5. Inspect the condition of all Energy Absorbing Elements. Ensure that all EAEs are in good condition and that they are positioned properly. Inspect and evaluate the condition of the EAEs.





## TAU-II-R MAINTENANCE & REPAIR

### Post Impact Inspection - Repair (Continued)

**Note:** The EAE evaluation criterion is outlined in the previous section, “Hands on Inspection,” on pages 25-28.

Remove and replace all damaged elements. If an element's condition is questionable, a photo of the element can be forwarded to Lindsay Transportation Solutions for evaluation. If you need assistance determining an element's condition, contact Lindsay Transportation Solutions Customer Service:

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Email: [info@barriersystemsinc.com](mailto:info@barriersystemsinc.com)

**Refer to the Universal TAU-II-R System Configuration Chart** for proper placement of the EAEs. Check that the EAEs are securely bolted.

6. Inspect the End, Side and Transition Panels. If a panel is only slightly damaged, it may be possible to use a hammer or appropriate device to bend the panel back to its original shape. If the damage cannot be repaired so that the panel will slide smoothly over an adjacent panel, it must be replaced. Slider Panels can easily and quickly be replaced by simply removing the adjacent Slider Bolt Assemblies.
7. Inspect all of the Slider Bolts. Ensure that the Slider Bolts are straight and properly aligned with the Slider Panels. Replace any damaged parts in the Slider Bolt Assemblies. (Do not attempt to straighten a bent Slider Bolt.)
8. Inspect the Diaphragms. A bent or damaged diaphragm that cannot be straightened to its original shape must be replaced.

9. Inspect the Front Cable Anchor. The area around the anchor bolts should not be disturbed. Remove and replace any damaged bolts.

#### **Concrete Foundation Installation:**

Re-torque nuts to 120 ft – lbs (160 N-m)

#### **Asphalt Foundation Installation:**

Re-torque nuts to 5 ft – lbs (8 N-m)

10. Inspect for damaged bolts that attach to the PCB Backstop or Compact Backstop. As with the Front Cable Anchor, remove and replace any damaged bolts.
11. If the Pipe Panel Mounts are deformed they should be replaced.
12. Inspect the Nose Cover to see if it has been damaged or torn. Replace the Nose Cover if there is any damage and add proper delineation as necessary.
13. Once all necessary components have been replaced, repaired or restored, re-torque all necessary bolts and nuts on the system. Please refer to the System Torque Chart in the Universal TAU-II Installation Manual.

## Revisions

| REVISIONS  |       |               |          |                         |
|------------|-------|---------------|----------|-------------------------|
| DATE       | ECN   | PUBLISHED ECN | REVISION | DESCRIPTION OF CHANGE   |
| 04/16/2021 | 60449 | 60449         |          | Initial Techpub release |

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Lindsay Transportation Solutions Sales and Services, Inc

180 River Road • Rio Vista, CA 94571 • +1 (888) 800-3691 [U.S. toll free] or +1 (402) 829-6800 • [www.barrriersystemsinc.com](http://www.barrriersystemsinc.com)  
Installation manual details for the TAU-II-R System are subject to change without notice to reflect improvements and upgrades.  
Additional information is available from Lindsay Transportation Solutions Sales and Service © Lindsay Transportation Solutions

TAU-II-R INSTALLATION Rev E ECN 60449