

TAU-M™ & TAU-XR™ Wide Hazard Extension SUPPLEMENTAL INSTALLATION MANUAL

P/N 1832158 Rev A (ECN 62534)



The Lindsay Guide
App is available as a
free download from
the Apple Store® and
Google Play™.



 **LINDSAY™**

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Important For Your Safety

We have provided important safety messages in this manual. **ALWAYS** read and obey all safety messages.


This is the safety alert symbol. 

This symbol alerts you to hazards that can kill or hurt you and others. All safety messages will be preceded by the safety alert symbol and the word “DANGER”, “WARNING”, or “CAUTION”.

These words mean:

 **DANGER** IMMEDIATE HAZARDS THAT WILL RESULT IN SEVERE PERSONAL INJURY OR DEATH.

 **WARNING** Hazards or unsafe practices that **COULD** result in severe personal injury or death.

 **CAUTION** Hazards or unsafe practices that **COULD** result in minor personal injury or product or property damage.

This manual must be available to the person(s) overseeing and/or assembling the crash cushion system at all times. Contact Lindsay Transportation Solutions for additional copies of this manual. If you have questions about any portion of this manual contact Lindsay Transportation Solutions.

Contact Information

Lindsay Transportation Solutions

U.S. Toll Free: (866) 404-5049

or

+1 (707) 374-6800

www.lindsay.com

STANDARD LIMITED WARRANTY

Lindsay Transportation Solutions, LLC (collectively with its parent company Lindsay Corporation and all other subsidiaries and affiliates directly and indirectly owned by Lindsay Corporation, “LTS”) has tested the impact performance of certain of its barriers, crash cushion systems, and other highway safety hardware at an ISO-certified crash testing laboratory under controlled conditions pursuant to the test matrix criteria of NCHRP 350, MASH, or EN1317, as applicable, as designated by the American Association of State Highway and Transportation Officials (“AASHTO”), the Federal Highway Administration, or the European Committee for Standardization. Such tests do not replicate every possible crash scenario and they are not intended to represent the performance of barriers, crash cushion systems, and other highway safety hardware when impacted in every real world impact condition or by every vehicle type. It is widely recognized that there are impact conditions that exceed the performance expectations of all highway safety equipment.

The products with which this limited warranty is provided (the “Products”) are intended to be installed, operated, and maintained in a manner not inconsistent with instructional materials provided by LTS, the AASHTO Roadside Design Guide (as applicable), and state and federal guidelines (as applicable). Selection and proper installation, operation, and maintenance of any highway safety product, including the Products, is the responsibility of the highway authority and state department of transportation.

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, REGARDLESS OF WHETHER THE PRODUCTS WERE INSTALLED IN CONSULTATION WITH LTS OR BY THIRD PARTIES.

LTS warrants that any Product or component part manufactured by LTS will be free from defects in material or workmanship. LTS will replace free of cost any Product or component part manufactured by LTS that contains such a defect.

THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES NOT EXPRESSLY SET FORTH HEREIN, WHETHER EXPRESS OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

LTS, in its sole discretion, may elect to disclaim the foregoing warranty benefits with respect to (i) any Products that have been inspected and determined by LTS, in its sole discretion, (a) to have been subject to improper storage, accident, misuse, or unauthorized alterations, or (b) that have not been installed, operated, and maintained in accordance with approved procedures and guidelines (including but not limited to instructions included in materials provided by LTS and the AASHTO Roadside Design Guide) and (ii) any components manufactured by the Buyer.

LTS’ LIABILITY UNDER THIS WARRANTY IS EXPRESSLY LIMITED TO REPLACEMENT FREE OF COST (IN THE FORM AND UNDER THE TERMS ORIGINALLY SHIPPED), OR TO REPAIR BY LTS, OF PRODUCTS OR PARTS NOT COMPLYING WITH LTS SPECIFICATIONS, OR, AT LTS’ ELECTION, TO THE REPAYMENT OF AN AMOUNT EQUAL TO THE PURCHASE PRICE OF SUCH PRODUCTS OR PARTS, WHETHER SUCH CLAIMS ARE FOR BREACH OF WARRANTY OR NEGLIGENCE. LTS SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, OR SPECIAL LOSSES, DAMAGES, OR EXPENSES OF ANY KIND, INCLUDING, WITHOUT LIMITATION, ANY SUCH LOSSES, DAMAGES, OR EXPENSES ARISING DIRECTLY OR INDIRECTLY FROM THE SALE, HANDLING, OR USE OF THE PRODUCTS FROM ANY OTHER CAUSE RELATING THERETO, OR FROM PERSONAL INJURY OR LOSS OF PROFIT.

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.

W030587 Rev. 11 revised June 7, 2019 (Warranty Entity Updated October 29, 2019)

TAU-M & TAU-XR WIDE HAZARD EXTENSION

Impact Performance Limitations and Warnings

Lindsay Transportation Solutions, LLC (LTS) developed the wide hazard extensions for the TAU-M and TAU-XR crash cushions in accordance with the latest standards defined in the American Association of State Highway and Transportation Officials (AASHTO) Manual for Assessing Safety Hardware (MASH), Second Edition, 2016, for Test Level 3 impacts.

Testing was conducted at Safe Technologies, LLC, under the direction of Holmes Solutions, an ISO-certified crash test laboratory, pursuant to the test criteria for transition sections between redirective crash cushions attached to rigid barriers or other very stiff features outlined in MASH.

According to MASH, testing guidelines cannot include all possible impact conditions that may be experienced in real world environments. The test matrix represents the 85th percentile of impact speeds and impact angles, the 5th and 95th percentile of vehicle weights, and critical impact points that are believed to represent the worst practical conditions.

The TAU-M and TAU-XR Wide Hazard Extensions are intended to be installed, operated, and maintained in a manner consistent with instructional materials provided by LTS, the AASHTO Roadside Design Guide, and applicable state and federal guidelines. Selection and proper installation, operation, and maintenance of any road safety product, including the TAU-M and TAU-XR Wide Hazard Extensions, is the responsibility of the applicable highway authority and state department of transportation.

Impacts that deviate from the MASH test matrix criteria or involve an improperly installed, operated, or maintained TAU-M or TAU-XR Wide Hazard Extension may result in significantly different outcomes than those experienced in testing. For the avoidance of doubt, LTS makes no representations or warranties with respect to the performance of the TAU-M and TAU-XR Wide Hazard Extension (i) in impacts that deviate from the MASH test matrix criteria and/or (ii) if not installed, operated, and maintained as directed in instructional materials provided by LTS, the AASHTO Roadside Design Guide, and applicable state and federal guidelines.

For questions or further information regarding the TAU-M and TAU-XR Wide Hazard Extensions, please call the LTS Customer Service Department at (866) 404-5049 (U.S. toll free) or (707) 374-6800.

TAU-M™ & TAU-XR™ Wide Hazard Extension System Overview

The TAU-M & TAU-XR Wide Hazard Extensions are transitions designed to meet the latest test standards defined in the Manual for Assessing Safety Hardware (MASH), Second Edition, 2016 for Test Level 3 impacts. TAU-M & TAU-XR Wide Hazard Extensions allow the TAU-M and TAU-XR systems to extend in width in order to shield hazards up to 1321mm (52in) wide. The TAU-M & TAU-XR Wide Hazard Extensions consist of 3 individual designs that extend to different width ranges. With each width range the standard TAU-M or TAU-XR End Panels are replaced by double layered thrie beam Transition End Panels that connect the crash cushion to a set of two proprietary posts and blockouts that are placed downstream of the crash cushion at a prescribed distance and width. Varying lengths of thrie beam and quantity of posts attach to the transition end panels and first post set extending the system to varying width ranges. The posts are anchored to a concrete foundation using 6 threaded rods per post (12 threaded rods per post set).

The first design extends to a width within the range of 762mm-965mm (30in - 38in). The design includes the four Transition End Panels and fixed first post and blockout set described above. In addition, a second post and blockout set connected with threaded rods can vary in width to accommodate various widths within the hazard width range. Four (two per side) 1905mm (75in) long standard corrugated thrie beam panels splice to the Transition End Panels, connect to the posts and blockouts, and extend to the hazard.

The second design extends to a width within the range of 965mm-1143mm (38in - 45in). The design includes the four Transition End Panels and fixed first post and blockout set as well as the second post and blockout set connected with threaded rods as described above. In addition, a third post and blockout set connected with 127mm (5in) extensions and threaded rods are included. The two post and blockout sets that are connected with threaded rods can vary in width to accommodate various widths within the hazard width range. Four (two per side) 2858mm (112.5in) long standard corrugated thrie beam panels splice to the Transition End Panels, connect to the posts and blockouts, and extend to the hazard.

The third design extends to a width within the range of 1143mm-1321mm (45in - 52in). The design includes the four Transition End Panels and fixed first post and blockout set as well as the second and third post and blockout set as described above. In addition, a fourth post and blockout set connected with 165mm (6.5in) extensions and threaded rods are included. The three post and blockout sets that are connected with threaded rods can vary in width to accommodate various widths within the hazard width range. Four (two per side) 3810mm (150in) long standard corrugated thrie beam panels splice to the Transition End Panels, connect to the posts and blockouts, and extend to the hazard.

At the end of the extension, the thrie beam panels are transitioned to the hazard. Transitions to vertical, safety shape, or single slope hazard profiles are available and consist of non-proprietary components.

Recommended Tools

NOTE: This list of tools, safety equipment, and traffic control equipment is a general recommendation and should not be considered a comprehensive list. Depending on the specific characteristics of the job site and the complexity of the repair or assembly, more or less tools may be necessary.

NOTE: The required tools listed are necessary to install the TAU-M & TAU-XR Wide Hazard Extension and may not be sufficient to install the TAU-M or TAU-XR system. Refer to the TAU-M installation manual or TAU-XR installation manual for tools necessary to install the TAU-M or TAU-XR crash cushion.

Required Tools

- Tape Measure
- Chalk Line
- Marking Paint
- Rotary Hammer
- Masonry Bit
22mm (7/8in) diameter x 508mm (22in) long
Or sized as indicated by adhesive manufacturer
- Wrenches
1-1/4in
1-1/8in
- Impact Wrench (1/2in drive min)
(pneumatic or electric)
- 1/2 in Drive Sockets
1-1/4in (deep)
1-1/8in (deep)
- 1/2 in Drive Torque Wrench
680N-m (50ft-lbf)
- Compressed Air
- 22 mm (7/8in) Diameter Wire Brush
Or sized as indicated by adhesive manufacturer

Optional Tools

- Ratchet wrench
- Ratchet drive extensions
- Combination wrench
- Electric drill with Rebar Cutter drill bit.

Safety Equipment

- Safety Glasses
- Hearing Protection
- Gloves
- Steel Toe Boots
- Hard Hat
- Safety Vest
- Dust Mask

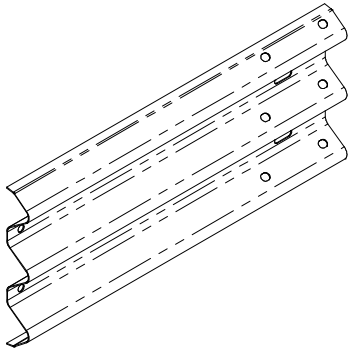
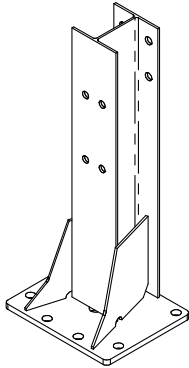
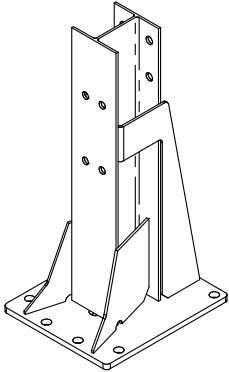
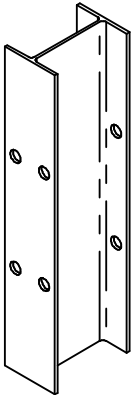
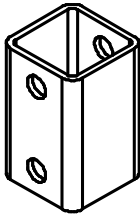
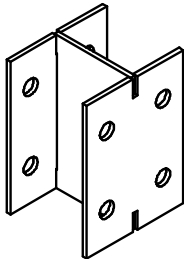
Traffic Control Equipment

- Traffic Control Equipment

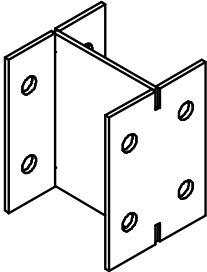
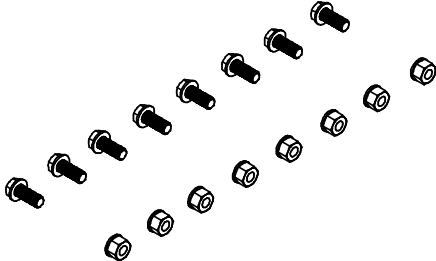
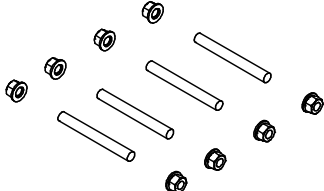
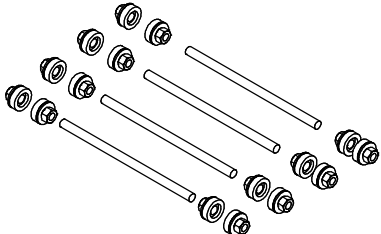
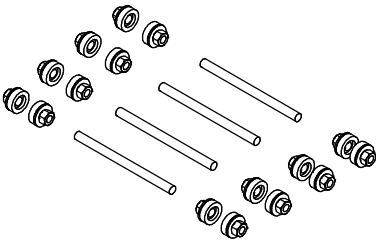
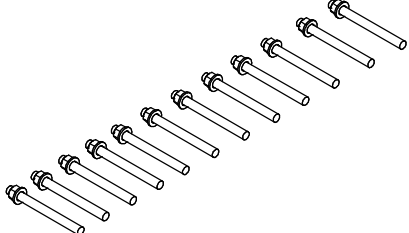
Parts Identification

WARNING

Use only Lindsay Transportation Solutions parts that are specified by Lindsay Transportation Solutions for use with the TAU-M & TAU-XR Wide Hazard Extension. The use of unspecified parts is prohibited and could result in severe personal injury or death.

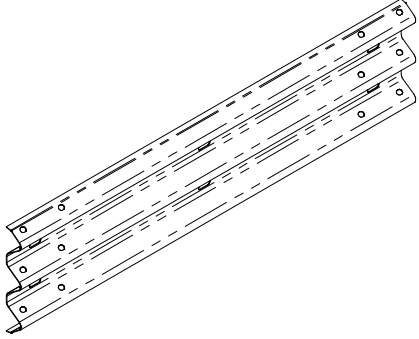
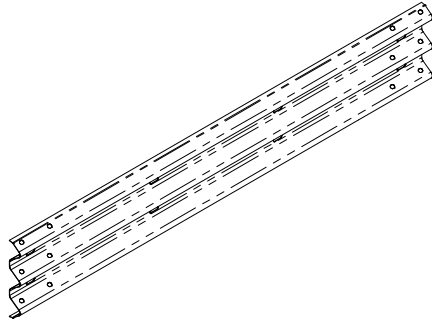
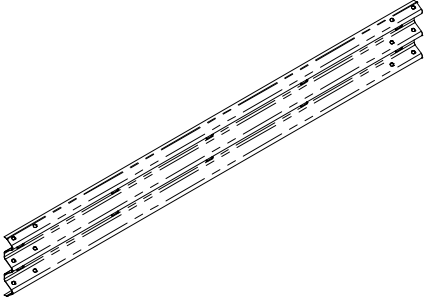
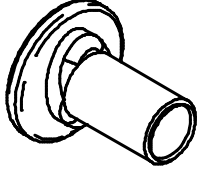
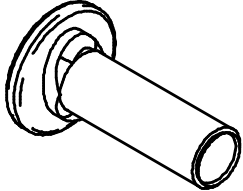
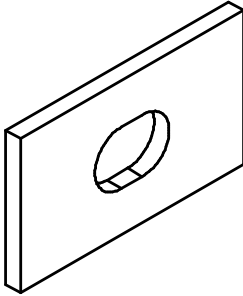

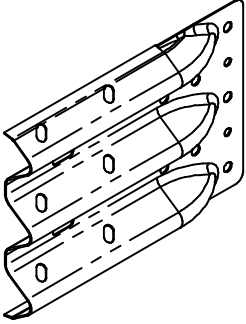
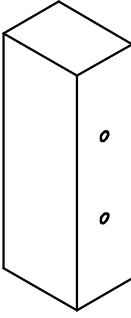
 <p>Transition End Panel 1830055</p>	 <p>Transition Post 1830105</p>	 <p>Braced Transition Post 1830127</p>
 <p>Blockout 1830084</p>	 <p>Post Spacer Tube 1830070</p>	 <p>5in Post Extension 1831307</p>

Parts Identification (Cont.)

 <p>6.5in Post Extension 1831345</p>	 <p>Post Attachment Hardware 1831564</p>	 <p>Post 1 Connector Hardware 1831565</p>
 <p>Post 2/4 Connector Hardware 1831566</p>	 <p>Post 3 Connector Hardware 1831572</p>	 <p>Post Anchor Hardware 1831581</p>

Parts Identification (Cont.)

The following components are non-proprietary industry standard components and may be alternatively sourced. These components must meet AASHTO M180 requirements.

 <p>1905mm (75in), 2 Space Thrie Beam, 12ga 1830066</p>	 <p>2858mm (112.5in), 3 Space Thrie Beam, 12ga 1831424</p>	 <p>3810mm (150in), 4 Space Thrie Beam, 12ga 1830067</p>
 <p>Guardrail Bolt 32mm (1-1/4in) Long 4001115</p>	 <p>Guardrail Bolt 51mm (2in) Long 2001758</p>	 <p>Rectangular Guardrail Washer 4002051</p>
 <p>Recessed Guardrail Nut 4001116</p>	 <p>Thrie Beam Terminal Connector 4002049</p>	 <p>8 in Thrie Beam Blockout 4002050</p>

Parts Identification (Cont.)

Bill of Materials

762mm-965mm (30in - 38in) Wide Hazard Extension - 1831592

Item #	Part #	Description	QTY (per kit)	QTY (Total)
1*	1830066	THRIE BEAM, HALF, 2SPA, 12GA	-	4
2*	1831499	KIT, HDW, THRIE BEAM SPLICE	-	2
2.1*	4001115	GUARDRAIL BOLT 5/8-11 X 1 1/4	12	24
2.2*	4001116	NUT, 5/8-11 GR-2 RECESSED	12	24
3*	1831567	KIT, HDW, EXT THRIE ATCH SET	-	2
3.1*	2001758	GUARDRAIL BOLT 5/8-11 X 2	4	8
3.2*	4002051	GRDRAIL WSHR RECT AASHTO FWR03	4	8
3.3*	4001116	NUT, 5/8-11 GR-2 RECESSED	4	8
4	1830055	THRIE BEAM, END TRANS, 12GA	-	4
5	1830105	WLDMT, TRANSITION POST	-	4
6	1830084	BEAM, W6X9 TRANSITION BLOCKOUT	-	4
7	1830070	TUBE, TRANSITION POST SPACER	-	2
8	1831564	KIT, HDW, EXT POST ATCHMNT SET	-	2
8.1	2000143	C-SCR HH 3/4-10 X 2 GR5 MGAL	8	16
8.2	2001790	WASHER FLAT 3/4 STD GEOMET	16	32
8.3	2001789	NUT HN 3/4-10 GR5 GEOMET	8	16
9	1831565	KIT, HDW, POST 1 CONNECTOR	-	1
9.1	1830071	THREADED ROD, 3/4-10 X 7, B7	4	4
9.2	2001790	WASHER FLAT 3/4 STD GEOMET	8	8
9.3	2001399	NUT HN 3/4-10 HVY A563 HD GALV	8	8
10	1831566	KIT, HDW, POST 2/4 CONNECTOR	-	1
10.1	1830116	THREADED ROD, 3/4-10 X 15, B7	4	4
10.2	1830136	WASHER, SPHERICAL 3/4" SPECIAL	16	16
10.3	2001399	NUT HN 3/4-10 HVY A563 HD GALV	16	16
11	1831581	KIT, HDW, POST ANCHOR SET	-	2
11.1	B011001	THREADED ANCHOR	12	24
11.2	2001380	WSHR 3/4 F436 FLAT RD STRUCT	12	24
11.3	2001399	NUT HN 3/4-10 HVY A563 HD GALV	12	24

Items marked with * are non-proprietary industry standard components and may be alternatively sourced. These components must meet AASHTO M180 requirements.

Items not marked with * must be sourced from Lindsay Transportation Solutions. These components may be purchased separately as part number 1831584.

965mm-1143mm (38in - 45in) Wide Hazard Extension - 1831593

Item #	Part #	Description	QTY (per kit)	QTY (Total)
1*	1831424	THRIE BEAM, 9'-4.5", 3SPA, 12GA	-	4
2*	1831499	KIT, HDW, THRIE BEAM SPLICE	-	2
2.1*	4001115	GUARDRAIL BOLT 5/8-11 X 1 1/4	12	24
2.2*	4001116	NUT, 5/8-11 GR-2 RECESSED	12	24
3*	1831567	KIT, HDW, EXT THRIE ATCH SET	-	3
3.1*	2001758	GUARDRAIL BOLT 5/8-11 X 2	4	12
3.2*	4002051	GRDRAIL WSHR RECT AASHTO FWR03	4	12
3.3*	4001116	NUT, 5/8-11 GR-2 RECESSED	4	12
4	1830055	THRIE BEAM, END TRANS, 12GA	-	4
5	1830105	WLDMT, TRANSITION POST	-	4
6	1830127	WLDMT, TRANSITION POST BRACED	-	2
7	1830084	BEAM, W6X9 TRANSITION BLOCKOUT	-	6
8	1830070	TUBE, TRANSITION POST SPACER	-	2
9	1831307	WLDMT, 5" TRANS POST EXT	-	2
10	1831564	KIT, HDW, EXT POST ATCHMNT SET	-	4
10.1	2000143	C-SCR HH 3/4-10 X 2 GR5 MGAL	8	32
10.2	2001790	WASHER FLAT 3/4 STD GEOMET	16	64
10.3	2001789	NUT HN 3/4-10 GR5 GEOMET	8	32
11	1831565	KIT, HDW, POST 1 CONNECTOR	-	1
11.1	1830071	THREADED ROD, 3/4-10 X 7, B7	4	4
11.2	2001790	WASHER FLAT 3/4 STD GEOMET	8	8
11.3	2001399	NUT HN 3/4-10 HVY A563 HD GALV	8	8
12	1831566	KIT, HDW, POST 2/4 CONNECTOR	-	1
12.1	1830116	THREADED ROD, 3/4-10 X 15, B7	4	4
12.2	1830136	WASHER, SPHERICAL 3/4" SPECIAL	16	16
12.3	2001399	NUT HN 3/4-10 HVY A563 HD GALV	16	16
13	1831572	KIT, HDW, POST 3 CONNECTOR	-	1
13.1	1831306	THREADED ROD, 3/4-10 X 11, B7	4	4
13.2	1830136	WASHER, SPHERICAL 3/4" SPECIAL	16	16
13.3	2001399	NUT HN 3/4-10 HVY A563 HD GALV	16	16
14	1831581	KIT, HDW, POST ANCHOR SET	-	3
14.1	B011001	THREADED ANCHOR	12	36
14.2	2001380	WSHR 3/4 F436 FLAT RD STRUCT	12	36
14.3	2001399	NUT HN 3/4-10 HVY A563 HD GALV	12	36

Items marked with * are non-proprietary industry standard components and may be alternatively sourced. These components must meet AASHTO M180 requirements.

Items not marked with * must be sourced from Lindsay Transportation Solutions. These components may be purchased separately as part number 1831585.

1143mm-1321mm (45in - 52in) Wide Hazard Extension - 1831594

Item #	Part #	Description	QTY (per kit)	QTY (Total)
1*	1830067	THRIE BEAM, 12'-6", 4SPA, 12GA	-	4
2*	1831499	KIT, HDW, THRIE BEAM SPLICE	-	2
2.1*	4001115	GUARDRAIL BOLT 5/8-11 X 1 1/4	12	24
2.2*	4001116	NUT, 5/8-11 GR-2 RECESSED	12	24
3*	1831567	KIT, HDW, EXT THRIE ATCH SET	-	4
3.1*	2001758	GUARDRAIL BOLT 5/8-11 X 2	4	16
3.2*	4002051	GRDRAIL WSHR RECT AASHTO FWR03	4	16
3.3*	4001116	NUT, 5/8-11 GR-2 RECESSED	4	16
4	1830055	THRIE BEAM, END TRANS, 12GA	-	4
5	1830105	WLDMT, TRANSITION POST	-	4
6	1830127	WLDMT, TRANSITION POST BRACED	-	4
7	1830084	BEAM, W6X9 TRANSITION BLOCKOUT	-	8
8	1830070	TUBE, TRANSITION POST SPACER	-	2
9	1831307	WLDMT, 5" TRANS POST EXT	-	2
10	1831345	WLDMT, 6.5" TRANS POST EXT	-	2
11	1831564	KIT, HDW, EXT POST ATCHMNT SET	-	6
11.1	2000143	C-SCR HH 3/4-10 X 2 GR5 MGAL	8	48
11.2	2001790	WASHER FLAT 3/4 STD GEOMET	16	96
11.3	2001789	NUT HN 3/4-10 GR5 GEOMET	8	48
12	1831565	KIT, HDW, POST 1 CONNECTOR	-	1
12.1	1830071	THREADED ROD, 3/4-10 X 7, B7	4	4
12.2	2001790	WASHER FLAT 3/4 STD GEOMET	8	8
12.3	2001399	NUT HN 3/4-10 HVY A563 HD GALV	8	8
13	1831566	KIT, HDW, POST 2/4 CONNECTOR	-	2
13.1	1830116	THREADED ROD, 3/4-10 X 15, B7	4	8
13.2	1830136	WASHER, SPHERICAL 3/4" SPECIAL	16	32
13.3	2001399	NUT HN 3/4-10 HVY A563 HD GALV	16	32
14	1831572	KIT, HDW, POST 3 CONNECTOR	-	1
14.1	1831306	THREADED ROD, 3/4-10 X 11, B7	4	4
14.2	1830136	WASHER, SPHERICAL 3/4" SPECIAL	16	16
14.3	2001399	NUT HN 3/4-10 HVY A563 HD GALV	16	16
15	1831581	KIT, HDW, POST ANCHOR SET	-	4
15.1	B011001	THREADED ANCHOR	12	48
15.2	2001380	WSHR 3/4 F436 FLAT RD STRUCT	12	48
15.3	2001399	NUT HN 3/4-10 HVY A563 HD GALV	12	48

Items marked with * are non-proprietary industry standard components and may be alternatively sourced. These components must meet AASHTO M180 requirements.

Items not marked with * must be sourced from Lindsay Transportation Solutions. These components may be purchased separately as part number 1831586.

Extension Transition with End Shoe - 1831808

Item #	Part #	Description	QTY (per kit)	QTY (Total)
1*	4002049	THRIE-BEAM TERMINAL CONNECTOR	-	2
2*	1831499	KIT, HDW, THRIE BEAM SPLICE	-	2
2.1*	4001115	GUARDRAIL BOLT 5/8-11 X 1 1/4	12	24
2.2*	4001116	NUT, 5/8-11 GR-2 RECESSED	12	24
3*	2001636	WASHER, 5/8 F436 STRUCT	-	10

Items marked with * are non-proprietary industry standard components and may be alternatively sourced. These components must meet AASHTO M180 requirements.

Extension Transition with Half Length Thrie Beam - 1831816

Item #	Part #	Description	QTY (per kit)	QTY (Total)
1*	4002049	THRIE-BEAM TERMINAL CONNECTOR	-	2
2*	1830066	THRIE BEAM, HALF, 2SPA, 12GA	-	4
3*	4002050	THRIE BEAM WOOD BLOCK OUT 6x8	-	4
4*	1831499	KIT, HDW, THRIE BEAM SPLICE	-	4
4.1*	4001115	GUARDRAIL BOLT 5/8-11 X 1 1/4	12	48
4.2*	4001116	NUT, 5/8-11 GR-2 RECESSED	12	48
5*	4002051	GRDRAIL WSHR RECT AASHTO FWR03	-	8
6*	2001636	WASHER, 5/8 F436 STRUCT	-	10

Items marked with * are non-proprietary industry standard components and may be alternatively sourced. These components must meet AASHTO M180 requirements.

Preparation

Foundation

The TAU-M & TAU-XR Wide Hazard Extensions must be installed on a concrete pad as shown in the foundation drawings. In addition, when using a TAU-M & TAU-XR Wide Hazard Extension the TAU-M or TAU-XR system must also be installed on a concrete pad. The TAU-M or TAU-XR foundation must be continuous with the TAU-M & TAU-XR Wide Hazard Extension foundation.

Alternative foundation configurations shall be reviewed and approved by the engineer responsible for the project to ensure that the alternative design is equivalent or stronger than the foundation specified by Lindsay Transportation Solutions.

Transition

Placement and installation of the TAU-M & TAU-XR Wide Hazard Extensions and Transitions must be accomplished in accordance with the guidelines and recommendations set forth in the "AASHTO Roadside Design Guide", FHWA memorandum, and other state and local standards.

The TAU-M & TAU-XR Wide Hazard Extensions must be transitioned to the hazard on both sides regardless of traffic direction. Two standard transitions are available for vertical profiles as well as safety shape or single slope hazard profiles. Refer to the transition drawings for additional details. For additional information or details for a specific application, contact Lindsay Transportation Solutions.

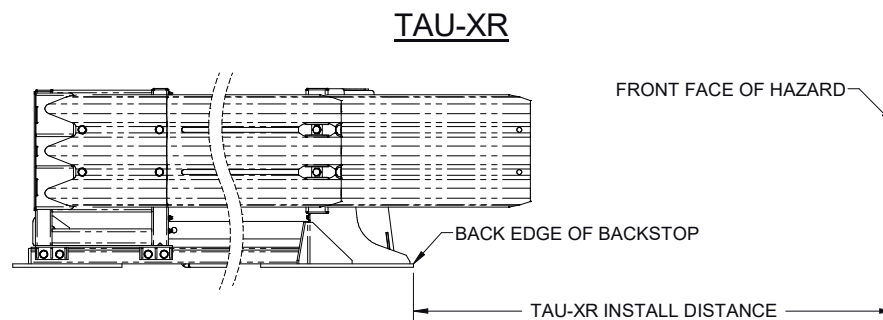
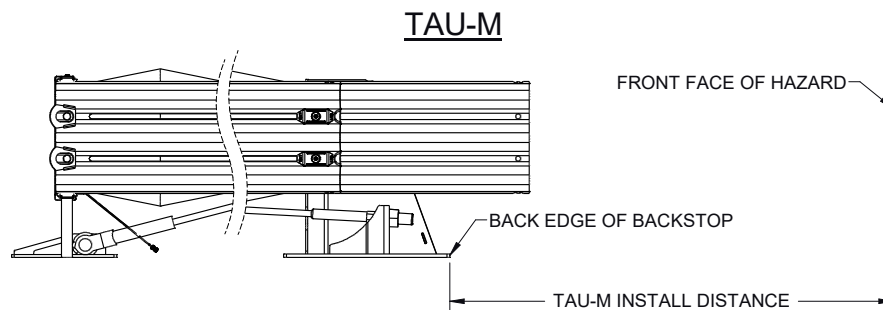
Before installing the TAU-M & TAU-XR Wide Hazard Extension or the TAU-M or TAU-XR system, ensure that all the materials required have been identified and are on site.

Anchoring Specifications

The TAU-M & TAU-XR Wide Hazard Extensions must be securely anchored to a concrete foundation utilizing all the holes provided in each of the post bases. Anchoring of the TAU-M & TAU-XR Wide Hazard Extensions should be done in accordance with the recommendations and requirements of the TAU-M or TAU-XR systems. Refer to the TAU-M or TAU-XR installation manual for details.

Installation

1. Determine the correct position of the TAU-M or TAU-XR system. The crash cushion should be centered with the hazard and the proper distance upstream of the face of the hazard. The distance between the face of the hazard and the crash cushion varies depending on the size of extension being installed. Refer to the table below.



Extension Size	TAU-M Install Distance	TAU-XR Install Distance
762mm-965mm 30in-38in	2032mm +/- 25mm 80in +/- 1in	2203mm +/- 25mm 86-3/4in +/- 1in
965mm-1143mm 38in-45in	2972mm +/- 25mm 117in +/- 1in	3143mm +/- 25mm 123-3/4in +/- 1in
1143mm-1321mm 45in-52in	3912mm +/- 25mm 154 in +/- 1in	4083mm +/- 25mm 160-3/4in +/- 1in

2. Install TAU-M or TAU-XR system in accordance with their respective installation manual.
3. Replace TAU system end panels on both sides with 2x nested transition panels (1830055).

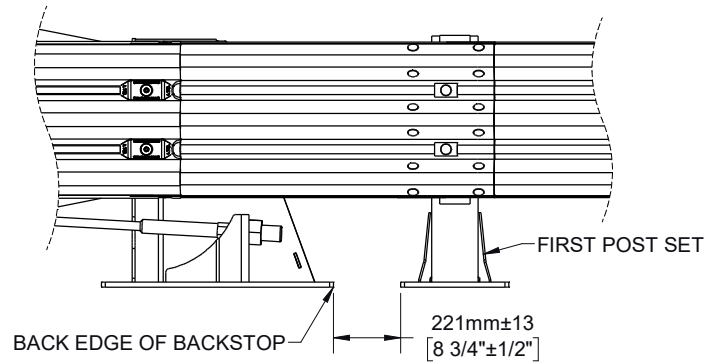
WARNING

The slider panel of the TAU system must overlap the transition panels.

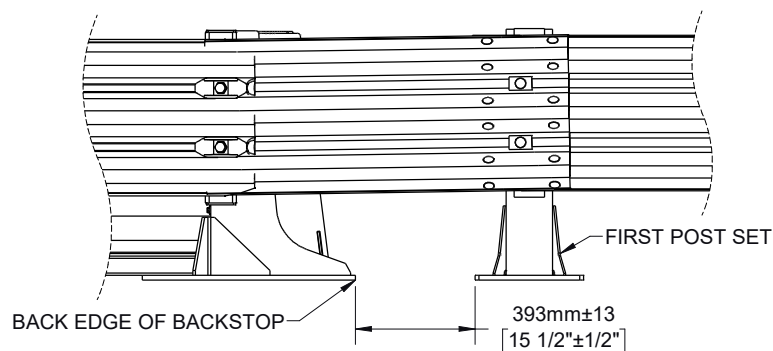
4. Loosely connect 2x nested thrie beam panel (1830066 or 1831424 or 1830067) to transition panels with splice hardware (1831499) and spread outward over the hazard. Thrie beam and transition panels should be lapped according to traffic direction. Do not tighten hardware at this stage.
5. Loosely assemble the transition to extension. All components should be lapped according to traffic direction.

- a. If utilizing the end shoe transition (1831808) begin anchoring the end shoe to hold it in place. Do not tighten anchors or splice hardware at this stage.
 - b. If utilizing the half-length thrie beam transition (1831816) trim the first set of transition blockouts as necessary and begin anchoring the thrie beam through the first set of transition blockouts to hold it in place. Do not tighten anchors or splice hardware at this stage.
6. Loosely connect all blockouts (1830084) to the posts using attachment hardware (1831564). Thread the nut onto the bolt enough to fully engage the threads but do not tighten at this stage.
 7. If applicable, loosely attach post extensions (1831307 or 1831345) to the braced posts (1830127) using attachment hardware (1831564). Thread the nut onto the bolt enough to fully engage the threads but do not tighten at this stage.
 8. Position the first post set as indicated below and connect the posts with the connector hardware (1831565) and post spacer tubes (1830070).

TAU-M



TAU-XR



Pro-tip: Even though the position of this post is defined, do not anchor the posts yet or tighten the hardware. Keeping the posts loose with loose hardware at this stage can help shape the thrie beam in later steps.

9. Position all remaining posts in their correct position along the thrie beam using the standard post slots. See drawings for details. Do not anchor these posts at this stage as their final position may change at later steps when shaping the thrie beam.
10. Loosely connect the blockouts (1830084) to the thrie beam using the attachment hardware (1831567). Thread the nut onto the bolt enough to fully engage the threads but do not tighten at this stage.
11. Loosely connect the post sets together using the correct connector hardware sets (1831566 or 1831572). If or where necessary, temporarily use longer hardware in any of the connection locations to allow all post sets, blockouts, post extensions, and thrie beam to be joined together.
12. Begin tightening all hardware to begin shaping the thrie beam with the goal of fully tightening all hardware at the first post set with the first post set in the correct position and centered with the crash cushion. See step 8 for position.
13. Continue tightening the remaining hardware with the goal of creating a smooth S shape curve with the thrie beam from the first post set to the beginning of the transition. All splice hardware (1831808), attachment hardware (1831564 and 1830084) should be fully tightened. Post set connector hardware (1831565 or 1831566 or 1831572) should be positioned as necessary to achieve a smooth curve with all nuts fully tightened to rigidly connect the post sets together.
14. Ensure any temporary hardware has been replaced with original hardware.
15. Anchor all posts into place using provided threaded rod anchors (1831581) and any approved adhesive. Refer to TAU-M or TAU-XR installation manual for additional information on adhesives and anchoring procedure.
16. Complete assembly of the transition (1831808 or 1831816) and anchoring to the hazard. Ensure there is a smooth connection between the transition components and the extension components and between the transition components and the hazard.

Inspection

Installation Inspection Checklist

Confirm all items in the checklist have been properly completed.

Inspection		
Date	By	Item
		Crash cushion has been properly installed – See crash cushion installation manual for inspection checklist
		Crash cushion is installed at correct distance from the hazard
		All hardware at first post set, including connector hardware is fully tightened and post set is centered with the crash cushion
		All hardware at subsequent post sets is fully tightened with connector hardware tightened to posts or post extensions
		Post sets are appropriately spread to create a smooth S shape curvature of the thrie beam panels
		Transition components are adequately installed to create a smooth connection from the extension components and to the hazard on both sides
		All thrie beam components, including the transition end panels of the crash cushion, are lapped according to traffic direction
		All posts are anchored to the foundation using all available holes

Maintenance Inspection Checklist

Before performing walk-up inspections, ensure traffic control is deployed in accordance with local guidelines.

Recommended inspection frequency twice a year.

Walk-Up Inspection	
Item	Comment
Damage caused by vehicle impacts.	
Minor damage caused by impacts from roadside maintenance equipment.	
Missing components.	
Vandalism.	
Any debris in and around the system.	
Grading around system.	
Loose hardware.	
Foundation Damage.	
Inspector Signature:	Date:
Print Name:	Location:

Drawings FOUNDATION SPECIFICATIONS

FOUNDATION SPECIFICATIONS

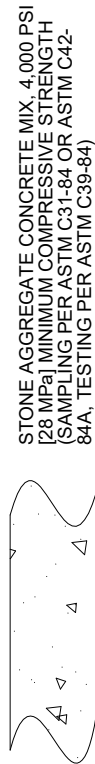
THE TAU-M AND TAU-XR WIDE HAZARD EXTENSIONS HAVE BEEN DESIGNED TO ATTACH TO CONCRETE FOUNDATIONS. ANCHORAGE DETAILS APPLY TO STANDARD ANCHORS - 3/4" THREADED ROD AND ADHESIVE. ANCHOR LENGTHS AND EMBEDMENT DEPTHS MAY VARY FOR ALTERNATIVE ANCHORS.

CONCRETE PAD



MATERIAL SPECIFICATIONS

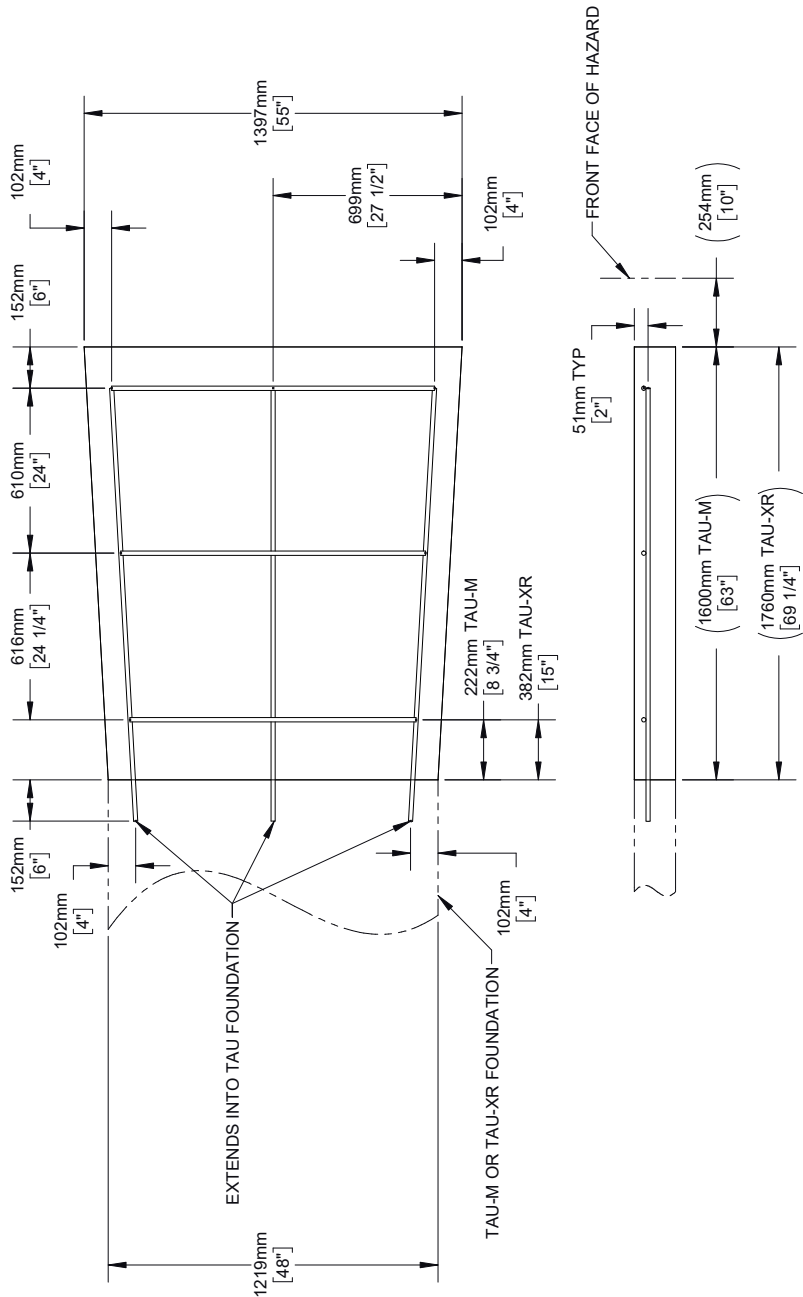
CONCRETE



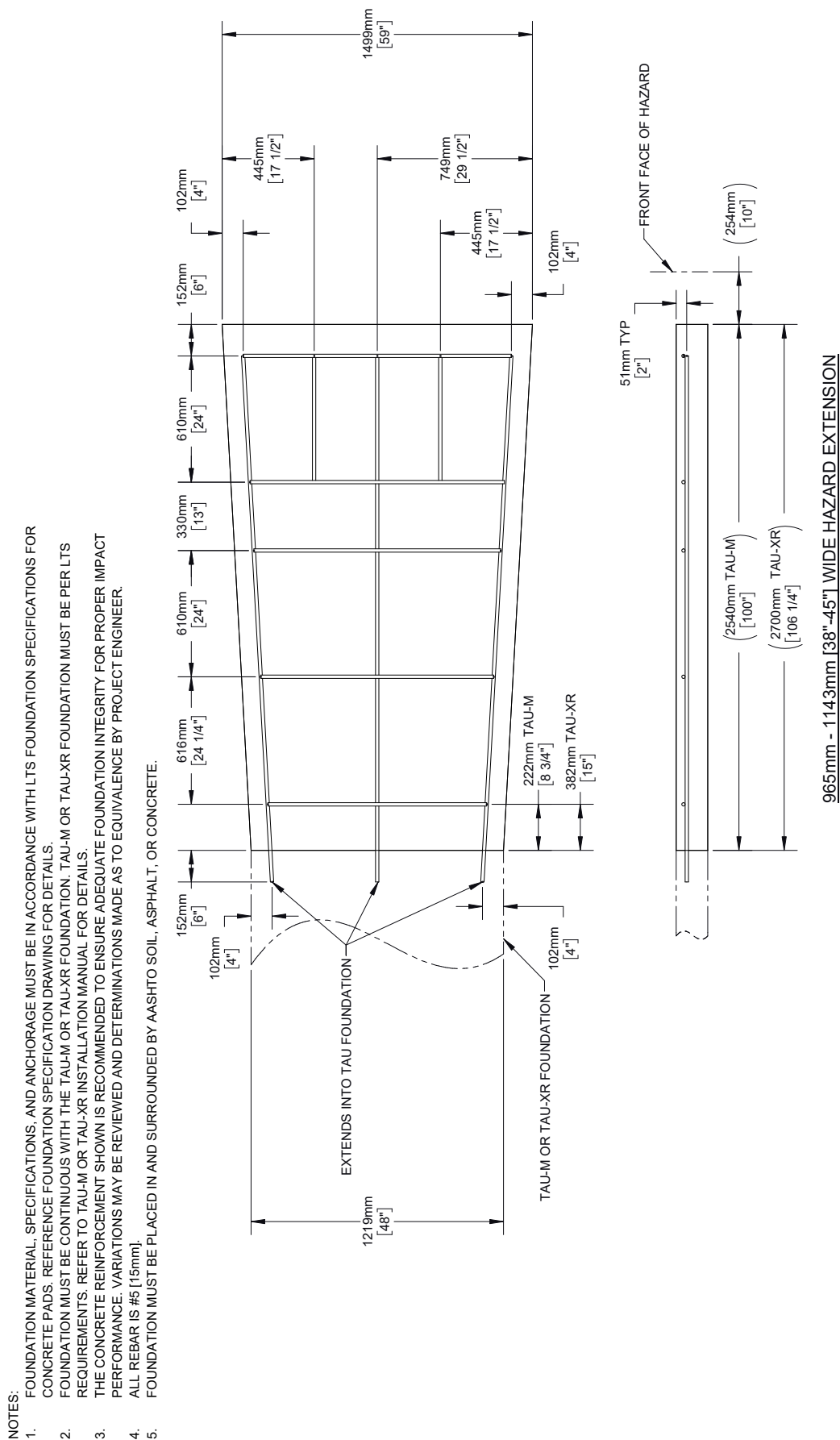
Drawings FOUNDATION DRAWING

NOTES:

1. FOUNDATION MATERIAL, SPECIFICATIONS, AND ANCHORAGE MUST BE IN ACCORDANCE WITH LTS FOUNDATION SPECIFICATIONS FOR CONCRETE PADS. REFERENCE FOUNDATION SPECIFICATION DRAWING FOR DETAILS.
2. FOUNDATION MUST BE CONTINUOUS WITH THE TAU-M OR TAU-XR FOUNDATION. TAU-M OR TAU-XR FOUNDATION MUST BE PER LTS REQUIREMENTS. REFER TO TAU-M OR TAU-XR INSTALLATION MANUAL FOR DETAILS.
3. THE CONCRETE REINFORCEMENT SHOWN IS RECOMMENDED TO ENSURE ADEQUATE FOUNDATION INTEGRITY FOR PROPER IMPACT PERFORMANCE. VARIATIONS MAY BE REVIEWED AND DETERMINATIONS MADE AS TO EQUIVALENCE BY PROJECT ENGINEER.
4. ALL REBAR IS #5 [15mm].
5. FOUNDATION MUST BE PLACED IN AND SURROUNDED BY AASHTO SOIL, ASPHALT, OR CONCRETE.

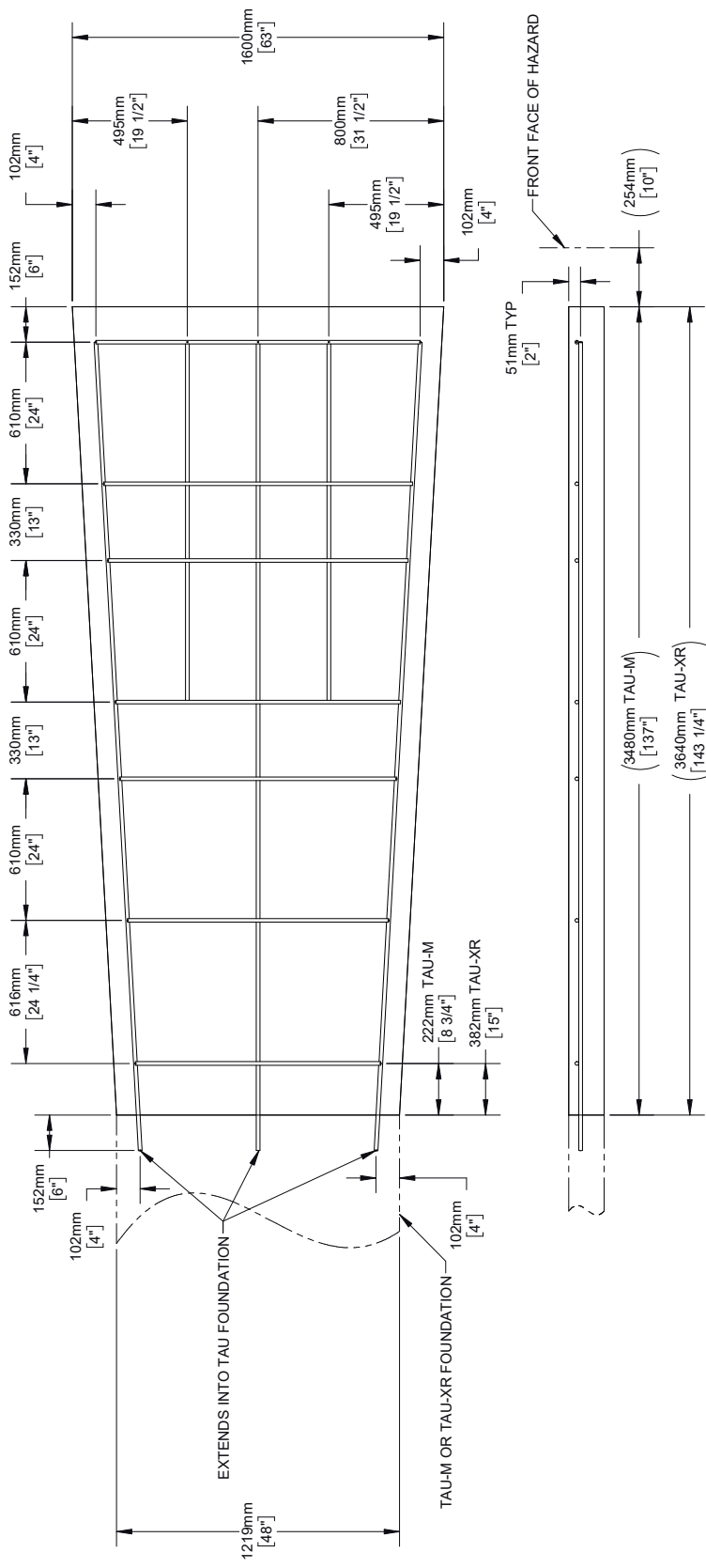


762mm - 965mm [30"-38"] WIDE HAZARD EXTENSION



NOTES:

1. FOUNDATION MATERIAL, SPECIFICATIONS, AND ANCHORAGE MUST BE IN ACCORDANCE WITH LTS FOUNDATION SPECIFICATIONS FOR CONCRETE PADS. REFERENCE FOUNDATION SPECIFICATION DRAWING FOR DETAILS.
2. FOUNDATION MUST BE CONTINUOUS WITH THE TAU-M OR TAU-XR FOUNDATION. TAU-M OR TAU-XR FOUNDATION MUST BE PER LTS REQUIREMENTS. REFER TO TAU-M OR TAU-XR INSTALLATION MANUAL FOR DETAILS.
3. THE CONCRETE REINFORCEMENT SHOWN IS RECOMMENDED TO ENSURE ADEQUATE FOUNDATION INTEGRITY FOR PROPER IMPACT PERFORMANCE. VARIATIONS MAY BE REVIEWED AND DETERMINATIONS MADE AS TO EQUIVALENCE BY PROJECT ENGINEER.
4. ALL REBAR IS #5 [15mm].
5. FOUNDATION MUST BE PLACED IN AND SURROUNDED BY AASHTO SOIL, ASPHALT, OR CONCRETE.

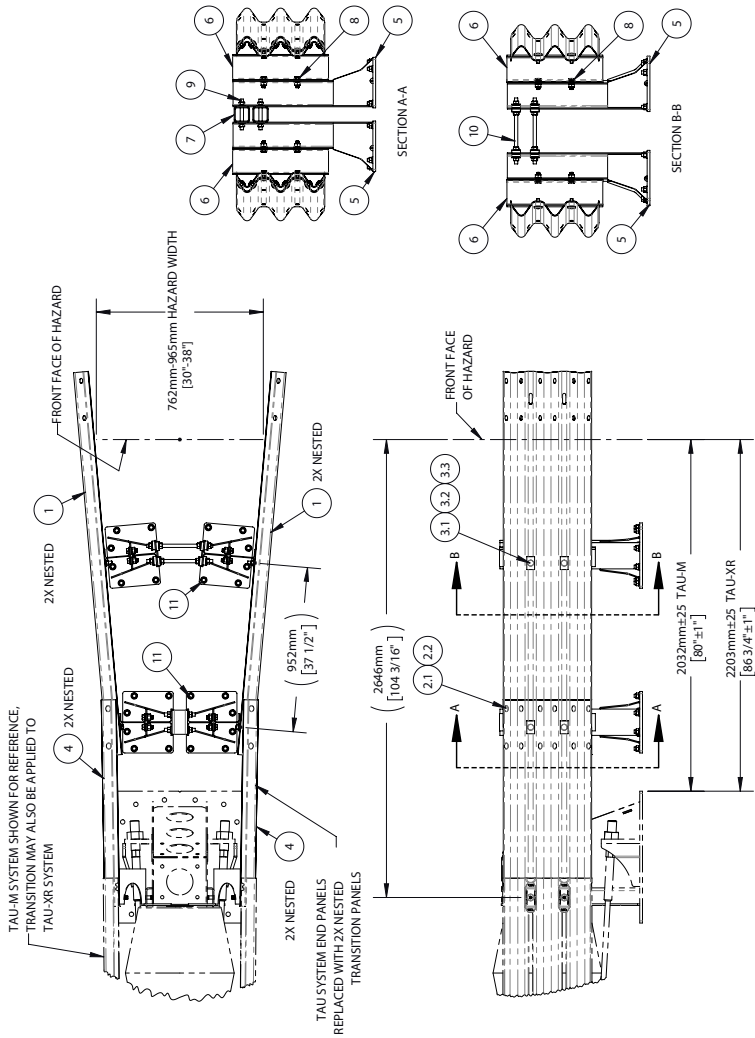


1143mm - 1321mm [45"-52"] WIDE HAZARD EXTENSION

Drawings 762mm-965mm (30in-38in) Wide Hazard Extension - 1831592

LINDSAY				
ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT
1	1830066	THRIE BEAM, HALF, 25PA, 12GA	4	EA
2	1831499	KIT, HDW, THRIE BEAM SPLICE	2	EA
2.1	4001115	GUARDRAIL BOLT 5/8-11X 1 1/4	12	EA
2.2	4001116	NUT, 5/8-11 GR-2 RECESSED	12	EA
3	1831567	KIT, HDW, EXT THRIE ATCH SET	2	EA
3.1	2001758	GUARDRAIL BOLT 5/8-11 X 2, 1/2 GAL	4	EA
3.2	4002051	GRDRAIL WSHR Rect AASHTO FWR03	4	EA
3.3	4001116	NUT, 5/8-11 GR-2 RECESSED	4	EA
1831584 - KIT, 30-38 TAU EXTENSION, PROP				
4	1830055	THRIE BEAM END TRANS, 12GA	4	EA
5	1830105	WLDMT, TRANSITION POST	4	EA
6	1830084	BEAM, W6X9 TRANSITION BLOCKOUT	4	EA
7	1830070	TUBE, TRANSITION POST SPACER	2	EA
8	1831564	KIT, HDW, EXT POST ATCHMNT SET	2	EA
9	1831565	KIT, HDW, POST 1 CONNECTOR	1	EA
10	1831566	KIT, HDW, POST 2/4 CONNECTOR	1	EA
11	1831581	KIT, HDW, POST ANCHOR SET	2	EA

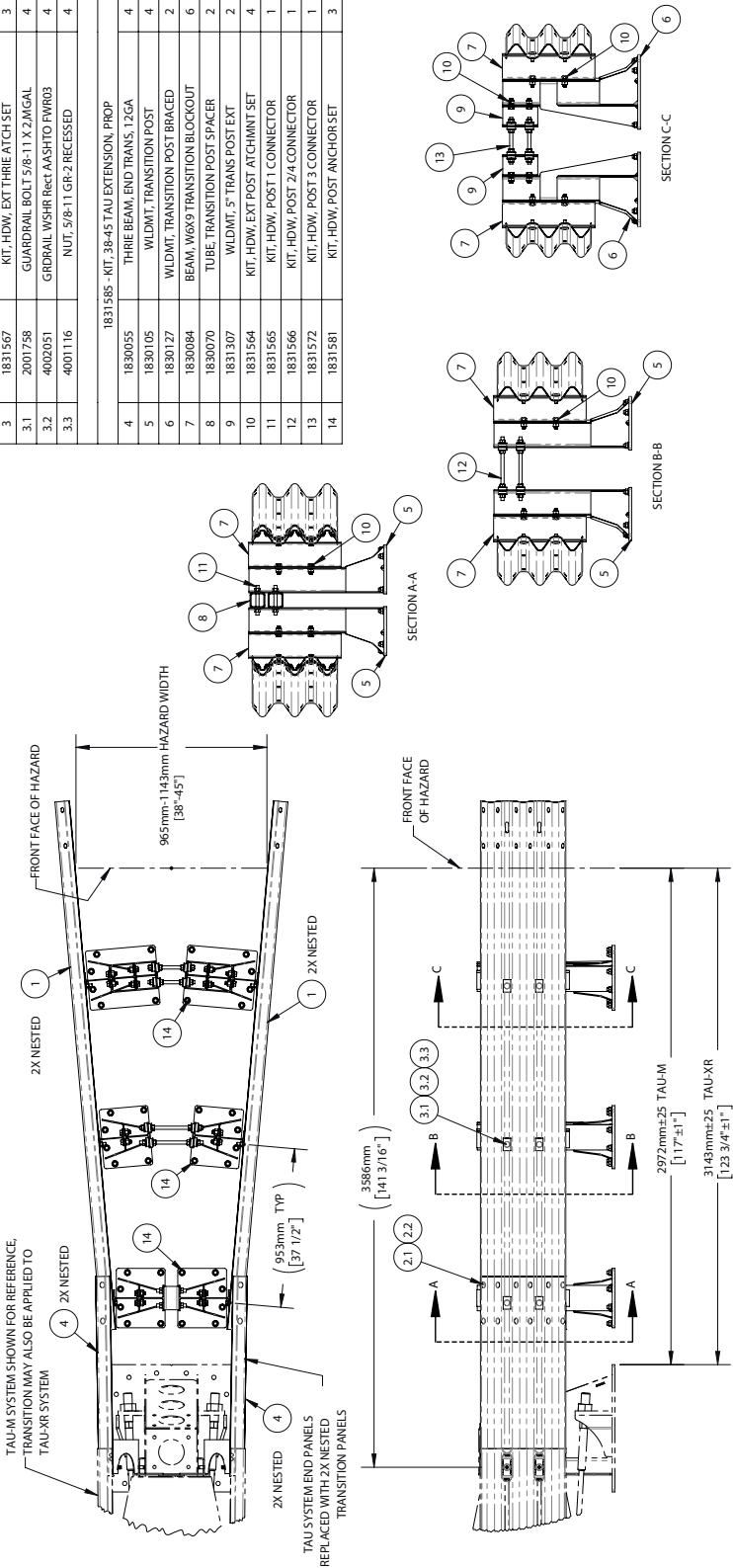
- NOTES:
1. TAU-M OR TAU-XR SYSTEM TO BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS. SEE RESPECTIVE INSTALLATION MANUAL FOR DETAILS.
 2. SEE TAU EXTENSION MANUAL FOR INSTALLATION INSTRUCTIONS AND DETAILS FOR TRANSITIONS TO WIDER HAZARDS.
 3. ITEMS 1-3 MAY BE ALTERNATIVELY SOURCED. INDUSTRY STANDARD COMPONENTS MUST BE PER AASHTO M180 SPECIFICATIONS.
 4. WIDE TRANSITION MUST BE CONNECTED TO HAZARD. SEE LIT'S DRAWING 1831808 FOR CONNECTION DETAILS TO VERTICAL HAZARDS. SEE LIT'S DRAWING 1831816 FOR CONNECTION DETAILS TO SAFETY SHAPE OR SINGLE SLOPE PROFILES.



Drawings 965mm-1143mm (38in-45in) Wide Hazard Extension – 1831593

LINDSAY				
ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT
1	1831424	THRIE BEAM, 9'-4.5" 35PA, 12GA	4	EA
2	1831499	KIT, HDW, THRIE BEAM SPLICE	2	EA
2.1	400115	GUARDRAIL BOLT 5/8-11X1 1/4	12	EA
2.2	400116	NUT, 5/8-11 GR-2 RECESSED	12	EA
3	1831567	KIT, HDW, EXT THRIE ATCH SET	3	EA
3.1	2001758	GUARDRAIL BOLT 5/8-11 X 2, M GAL	4	EA
3.2	4002051	GUARDRAIL WSHR Rct AASHTO FWR03	4	EA
3.3	4001116	NUT, 5/8-11 GR-2 RECESSED	4	EA
1831585 - KIT, 38-45" TAU EXTENSION, PROP				
4	1830055	THRIE BEAM, END TRANS, 12GA	4	EA
5	1830105	WLDMT, TRANSITION POST	4	EA
6	1830127	WLDMT, TRANSITION POST BRACED	2	EA
7	1830084	BEAM, W6X9 TRANSITION BLOCKOUT	6	EA
8	1830070	TUBE, TRANSITION POST SPACER	2	EA
9	1831307	WLDMT, 5" TRANS POST EXT	2	EA
10	1831564	KIT, HDW, EXT POST ATCHMNT SET	4	EA
11	1831565	KIT, HDW, POST 1 CONNECTOR	1	EA
12	1831566	KIT, HDW, POST 2/4 CONNECTOR	1	EA
13	1831572	KIT, HDW, POST 3 CONNECTOR	1	EA
14	1831581	KIT, HDW, POST ANCHOR SET	3	EA

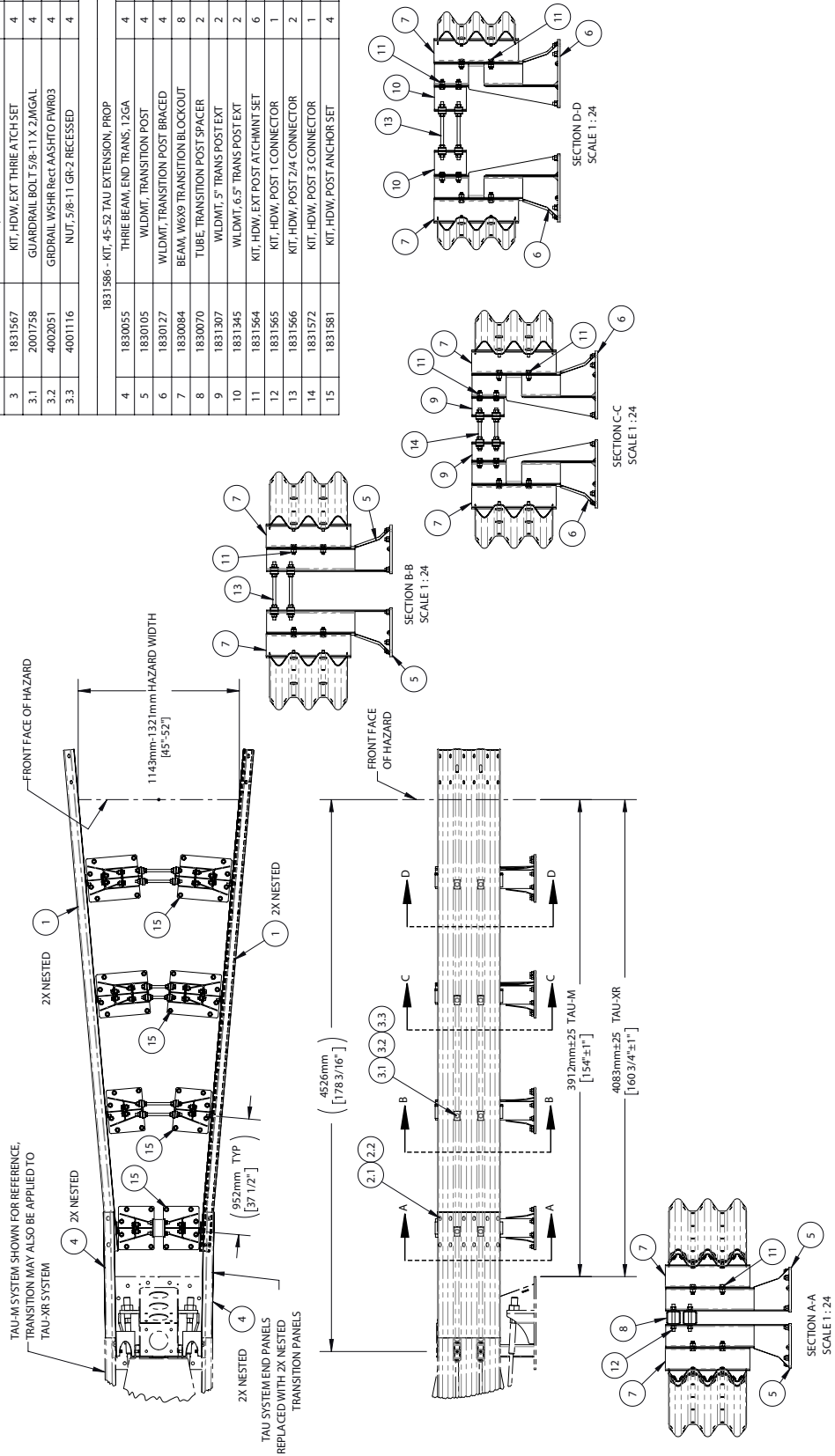
- NOTES:
1. TAU-M OR TAU-XR SYSTEM TO BE INSTALLED PER MANUFACTURERS INSTRUCTIONS. SEE RESPECTIVE INSTALLATION MANUAL FOR DETAILS.
 2. SEE TAU EXTENSION MANUAL FOR INSTALLATION INSTRUCTIONS AND DETAILS FOR TRANSITIONS TO WIDER HAZARDS.
 3. ITEMS 1-3 MAY BE ALTERNATIVELY SOURCED. INDUSTRY STANDARD COMPONENTS MUST BE PER AASHTO M180 SPECIFICATIONS.
 4. WIDE TRANSITION MUST BE CONNECTED TO HAZARD. SEE LITS DRAWINGS 1831808 FOR CONNECTION DETAILS TO VERTICAL HAZARDS. SEE LITS DRAWING 1831816 FOR CONNECTION DETAILS TO SAFETY SHAPE OR SINGLE SLOPE PROFILES.



Drawings 1143mm-1321mm (45in-52in) Wide Hazard Extension - 1831594

LINDSAY				
ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT
1	1830067	THREE BEAM, 12'-6", 45PA, 12GA	4	EA
2	1831499	KIT, HDW, THREE BEAM SPLICE	2	EA
2.1	4001115	GUARDRAIL BOLT 5/8-11X1 1/4	12	EA
2.2	4001116	NUT, 5/8-11 GR-2 RECESSED	12	EA
3	1831567	KIT, HDW, EXT THREE ATCH SET	4	EA
3.1	200758	GUARDRAIL BOLT 5/8-11 X 2.2M GAL	4	EA
3.2	4002051	GRDRAIL WSHR Rect AASHTO FWR03	4	EA
3.3	4001116	NUT, 5/8-11 GR-2 RECESSED	4	EA
1831586 - KIT, 45-52 TAU EXTENSION, PROP				
4	1830055	THREE BEAM, END TRANS, 12GA	4	EA
5	1830105	WLDMT, TRANSITION POST	4	EA
6	1830127	WLDMT, TRANSITION POST BRACED	4	EA
7	1830084	BEAM, W6X9 TRANSITION BLOCKOUT	8	EA
8	1830070	TUBE, TRANSITION POST SPACER	2	EA
9	1831307	WLDMT, 5" TRANS POST EXT	2	EA
10	1831345	WLDMT, 6.5" TRANS POST EXT	2	EA
11	1831564	KIT, HDW, EXT POST ATCHMNT SET	6	EA
12	1831565	KIT, HDW, POST 1 CONNECTOR	1	EA
13	1831566	KIT, HDW, POST 2/4 CONNECTOR	2	EA
14	1831572	KIT, HDW, POST 3 CONNECTOR	1	EA
15	1831581	KIT, HDW, POST ANCHOR SET	4	EA

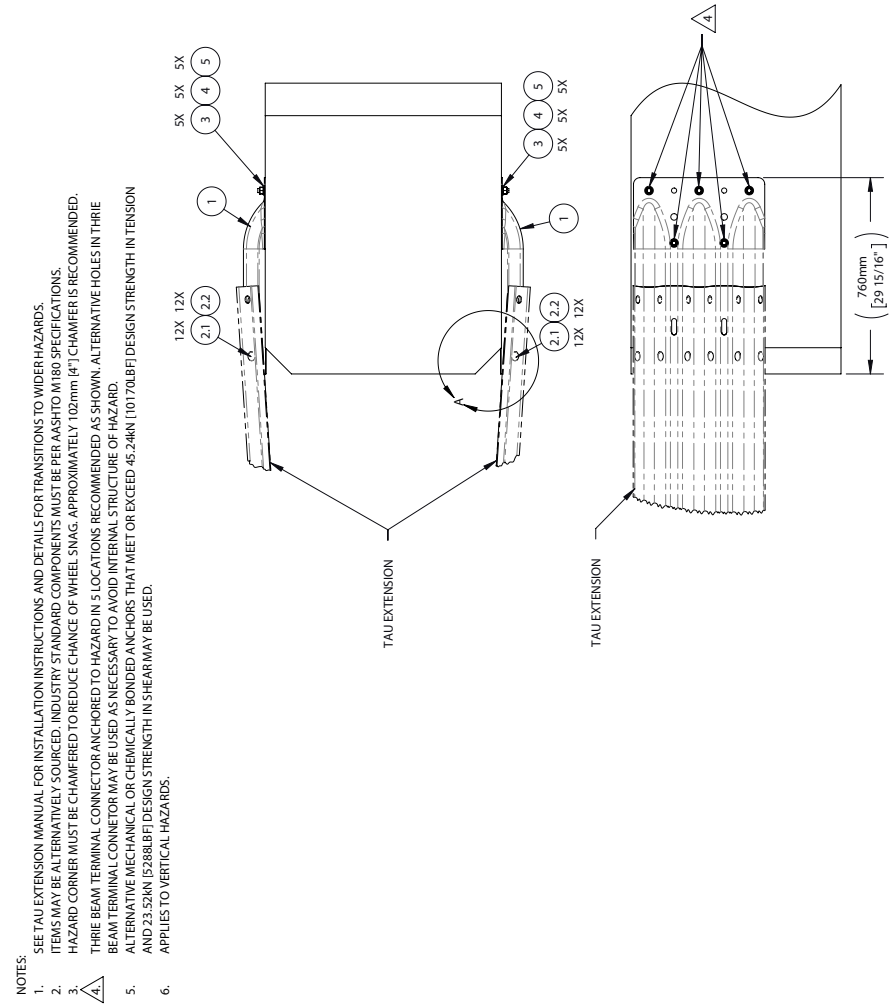
NOTES:
1. TAU-M OR TAU-XR SYSTEM TO BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS. SEE RESPECTIVE INSTALLATION MANUAL FOR DETAILS.
2. SEE TAU EXTENSION MANUAL FOR INSTALLATION INSTRUCTIONS AND DETAILS FOR TRANSITIONS TO WIDER HAZARDS.
3. ITEMS 1-3 MAY BE ALTERNATIVELY SOURCED. INDUSTRY STANDARD COMPONENTS MUST BE PER AASHTO M180 SPECIFICATIONS.
4. WIDE TRANSITION MUST BE CONNECTED TO HAZARD. SEE LITS DRAWINGS 1831808 FOR CONNECTION DETAILS TO VERTICAL HAZARDS. SEE LITS DRAWING 1831816 FOR CONNECTION DETAILS TO SAFETY SHAPE OR SINGLE SLOPE PROFILES.



Drawings

Extension Transition with End Shoe - 1831808

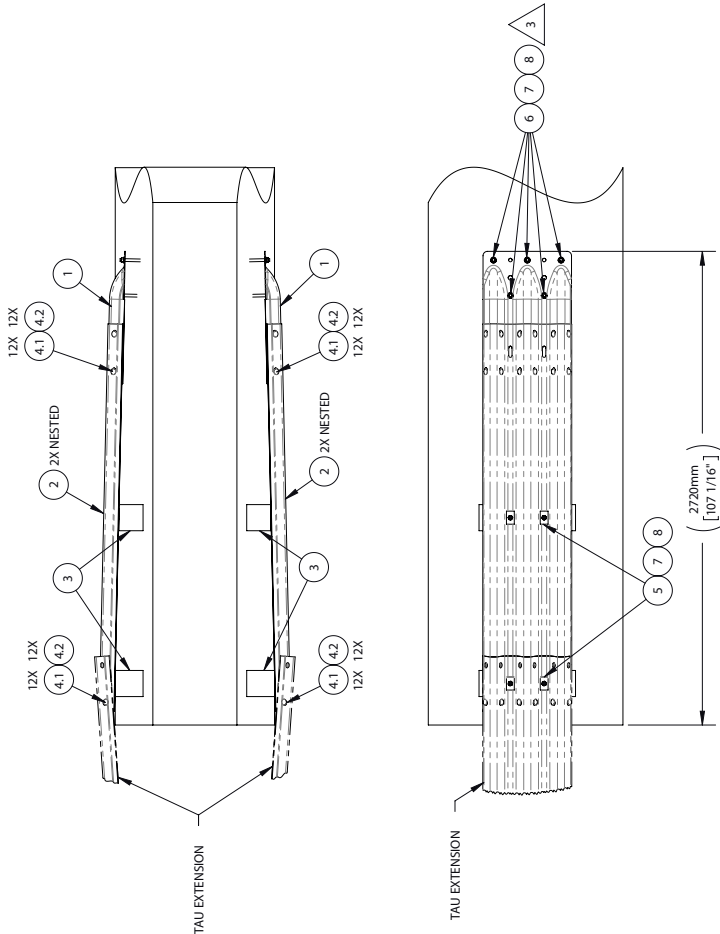
LINDSAY				
ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT
1	4002049	THRIE-BEAM TERMINAL CONNECTOR	2	EA
2	1831499	KIT, HDW, THRIE BEAM SPLICE	2	EA
2.1	4001115	GUARDRAIL BOLT 5/8-11X1 1/4	12	EA
2.2	4001116	NUT, 5/8-11 GR-2 RECESSED	12	EA
3	2001636	WASHER, 5/8 F436 STRUCT	10	EA
ANCHORS - NOT INCLUDED (SEE NOTE 5)				
4	BSI-1309061-00	THREADED ROD, 5/8-11 x 24"	10	EA
5	4001116	NUT, 5/8-11 GR-2 RECESSED	10	EA
6	-	ADHESIVE	-	-



Drawings Extension Transition with Half Length Thrie Beam - 1831816

LINDSAY				
ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT
1	4002049	THRIE-BEAM TERMINAL CONNECTOR	2	EA
2	1830066	THRIE BEAM, HALF, 25PA, 12GA	4	EA
3	4002050	THRIE BEAM WOOD BLOCK OUT 6x8	4	EA
4	1831499	KIT - HDW, THRIE BEAM SPLICE	4	EA
4.1	4001115	GUARDRAIL BOLT 5/8-11X 1 1/4	12	EA
4.2	4001116	NUT, 5/8-11 GR-2 RECESSED	12	EA
5	4002051	GRDRAIL W5HR Rect AASHTO FWR03	8	EA
6	2001636	WASHER, 5/8 F436 STRUCT	10	EA
ANCHORS - NOT INCLUDED (SEE NOTE 4)				
7	BS11309061-00	THREADED ROD, 5/8-11 x 24"	18	EA
8	4001116	NUT, 5/8-11 GR-2 RECESSED	18	EA
9	-	ADHESIVE	-	-

- NOTES:
- SEE TAU EXTENSION MANUAL FOR INSTALLATION INSTRUCTIONS AND DETAILS FOR TRANSITIONS TO WIDER HAZARDS.
 - ITEMS MAY BE ALTERNATIVELY SOURCED. INDUSTRY STANDARD COMPONENTS MUST BE PER AASHTO M180 SPECIFICATIONS.
 - THRIE BEAM TERMINAL CONNECTOR OR ANCHORED TO HAZARD IN 5 LOCATIONS. RECOMMENDED AS SHOWN. ALTERNATIVE HOLES IN THRIE BEAM TERMINAL CONNECTOR MAY BE USED AS NECESSARY TO AVOID INTERNAL STRUCTURE OF HAZARD.
 - ALTERNATIVE MECHANICAL OR CHEMICALLY BONDED ANCHORS THAT MEET OR EXCEED 45,24KN [10170LBF] DESIGN STRENGTH IN TENSION AND 23,52KN [5288LBF] DESIGN STRENGTH IN SHEAR MAY BE USED.
 - APPLIES TO SAFETY SHAPE AND SINGLE SLOPE HAZARD PROFILES.



REVISIONS				
DATE	ECN	PUBLISHED ECN	REVISION	DESCRIPTION OF CHANGE
05/31/2024	62534	62534	A	New release



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It is your and your employers' responsibility to comply with all applicable local and national safety codes and standards, including but not limited to the requirements of the U.S. Occupational Safety and Health Administration (OSHA), the National Fire Protection Association (NFPA) (including but not limited to the NFPA 70: National Electrical Code (NEC) and NFPA 70E), and other appropriate governmental and industry accepted guidelines, codes, and standards in their entirety.



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