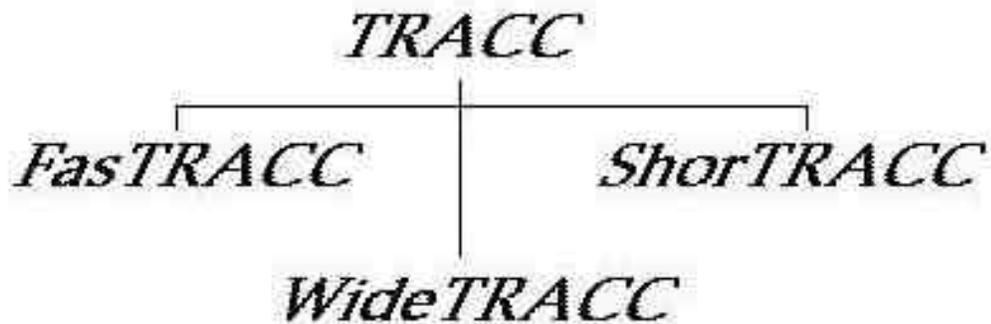


TRACC



Trinity Attenuating Crash Cushion

TRACC-Family System Manual



A Family of NCHRP Report 350 Crash Cushions



**Trinity Industries, Inc.
2525 Stemmons Freeway
Dallas, Texas 75207**

U.S. Calls: (800)-644-7976
International Calls: (214)-589-8140
Fax (214) 589-8423
E-mail: TRACC.info@trin.net
Internet: www.highwayguardrail.com

11/18/02

Table of Contents

<u>Customer Service</u>	4
Corporate Contacts	4
Regional Telephone Contacts	4
<u>TRACC Family Design Information</u>	5
General Information	5
Product Overview	
TRACC	
SHORTRACC	
FASTRACC	
WIDETRACC	
Maintenance Overview	
Crash Performance	
Low-Risk Repair Options	6
Configuration Options	7
Location Requirements	9
Unidirectional Application	
Bidirectional Application	
Approach Zone and Clear Zone	
Downstream Zone	
Installation Options	11
Foundations	
Backup Supports	
Transitions	
Nose Delineation	
<u>TRACC Family Installation Guidelines</u>	13
Drawings and Bills of Material	13
Recommended Tools and Equipment	13
Safety Instructions	13
Installation of TRACC Systems	14
Lifting the System	
Anchoring the System	

Attaching Backups and Transitions
Attaching Plastic Nose and Delineator
WideTRACC Wing Extensions

<u>TRACC Family Repair after Impact</u>	18
Low-Risk Repair Options	18
Types of Damage	19
Field Repair	19
Removal / Replacement of System	20
Repair at Maintenance Facility	20
Removal of Side Panels and Frames	
Removal of Sled	
Removal of Rip Plates	
Replacement of Damaged Parts	
Assembly of System	
<u>Appendix</u>	23

CUSTOMER SERVICE

Trinity Industries, Inc., is committed to the highest level of customer service. Comments regarding the quality and workmanship of our products, their installation procedures, supporting documentation, and roadside performance are welcome. Our goal is to enhance highway safety through continuous improvement and innovation. More information can be obtained in the following ways:

Corporate Contacts:

Telephone:	800-644-7976 (U.S. Calls) 214-589-8140 (International Calls)
Fax:	214-589-8423
E-mail:	TRACC.service@trin.net TRACC.info@trin.net
Internet:	www.highwayguardrail.com www.trin.net

Regional Telephone Contacts:

Centerville, Utah	800-772-7976
Dallas, Texas	800-644-7976
East Hartford, Connecticut	800-634-7245
Elizabethtown, Kentucky	800-282-7668
Girard, Ohio	800-321-2755
Orangeburg, South Carolina	800-835-9307
International	214-589-8140

TRACC FAMILY DESIGN **INFORMATION**

General Information

Product Overview

The TRACC (Trinity Attenuating Crash Cushion) family of products from Trinity Industries, Inc., includes TRACC, a narrow Test Level 3 cushion; SHORTTRACC, a narrow Test Level 2 cushion; FASTRACC, a narrow Test Level 3 cushion with additional capacity for head-on impacts up to 70 mph; and WideTRACC, a wide Test Level 3 cushion for any large gore area.

TRACC crash cushions are fully redirective, non-gating, bidirectional, energy absorbing crash cushions designed to protect motorists from impacting the end of concrete barriers and bridge parapet rail, bridge piers and other hazards in both permanent and temporary work zone locations. All TRACC family products are accepted by the U.S. Federal Highway Administration for use on the National Highway System regardless of design or posted speed.

WideTRACC is an innovative system that allows the designer to tailor the cushion to the specific location. One or both sides of the system can be flared to practically any width using standard, repeating components. The flexibility of the system to flare down its left side, its right side, or both sides means that the unit can be oriented parallel with mainline roads while flaring to additional width along exit ramps or other similar roadway features.

No matter what the situation, a member of the TRACC Family of Crash Cushion products is available to meet the requirements in the most convenient, user-friendly and economical way.

Maintenance Overview

The entire TRACC family of products is designed to be a very low maintenance roadside safety feature. Except for repairs due to impact, there is virtually no maintenance required for the system. It is recommended that an annual drive-by inspection be performed to ensure that no minor impacts went undetected and that debris has not accumulated around the system.

Crash Performance

All TRACC products meet National Cooperative Highway Research Program (NCHRP) Report 350 requirements at Test Level 2 or Test Level 3. The systems will redirect vehicles that impact along its side at angles up to 20 \pm with the axis of the system. They will also stop vehicles that impact the ends of the systems at angles up to 15 \pm . Testing was performed at speeds up to 100 km/hr (62.1 mph) making the TRACC Family of Crash Cushions an appropriate choice for **ALL** design speeds or posted speed limits on the National Highway System. If additional protection is desired beyond the mandated Test Level 3, the FASTRACC system is available in narrow and flared (wide) configurations and has been tested end-on at speeds up to 70 mph (113 km/hr.) For locations with design-speeds at or below 45 mph (72 km/hr), the ShorTRACC can provide full NCHRP Report 350 Test Level 2 protection.

A copy of NCHRP Report 350 can be obtained at the following address:

Transportation Research Board
National Research Council
2101 Constitution Avenue, N.W.
Washington, D.C. 20418
(202) 334-2933

Low-Risk Repair Options

TRACC systems are designed for field repair or rapid replacement of the entire unit.

The energy absorbing base assembly of the TRACC system can be replaced in stages depending on the extent of the impact or it may be replaced completely while reusing the upper system components. Because TRACC systems are delivered fully assembled, it is extremely practical to replace the entire damaged system on the roadside and then perform the necessary repairs safely and accurately in the maintenance shop away from traffic dangers.

Many of a TRACC system's components remain undamaged after most impacts making refurbishment simple and economical. Entire units can be repaired and then reused on the roadside or the damaged portion of a partial base assembly can be refurbished and reused as needed.

NOTE: TRACC PRODUCTS ARE **NOT** DISPOSABLE. COMPLETE REPLACEMENT ON THE ROADSIDE AFTER AN IMPACT IS A CONVENIENT - BUT NOT REQUIRED - WAY TO PROTECT WORKERS BY LIMITING EXPOSURE TO TRAFFIC. UP TO 98% OF A TRACC SYSTEM IS REUSABLE AFTER DESIGN IMPACTS REGARDLESS OF WHETHER THE REPAIR IS PERFORMED IN THE FIELD OR IN THE SAFETY OF THE MAINTENANCE YARD.

Configuration Options

The TRACC Family of NCHRP Report 350 qualified crash cushions is available in several configurations as shown in Table 1.

Table 1. TRACC Crash Cushion Configurations

	Test Level	Width	Length
TRACC	3	24", 30"	21'
ShorTRACC	2	24", 30"	14'
FasTRACC	3+ *	24", 30"	25'-8"
WideTRACC-L	3, 3+	41" **	21' **
WideTRACC-R	3, 3+	41" **	21' **
WideTRACC-B	3, 3+ *	58" ***	21' ***

* - Test Level 3+ refers to the fact that some units have been tested or are accepted for test conditions that exceed normal Test Level 3. Additional testing included the 2000 kg vehicle impacting at zero degrees at 70 mph.

** - The width of the WideTRACC-L and -R can be increased by adding approved wing extensions on one side. The extensions will add 28 inches of length and 3-7/16 inches of width for each section included.

*** - The width of the WideTRACC-B can be increased by adding approved wing extensions on both sides. The extensions will add 28 inches of length and 6-7/8 inches of width for each section included.

WideTRACC offers designers new options in protecting wide barriers and gores. The WideTRACC can be flared down its left side only, its right side only, or both sides simultaneously. Figure 1 shows the basic options available. The extension attached to the rear of the WideTRACC consists of a pair of guardrail panels continuing the height and flare angle of the WideTRACC side panels. The panels are supported by specially designed braced, base-plated posts. The lower panel is further supported by a channel that is installed between the post and the guardrail.

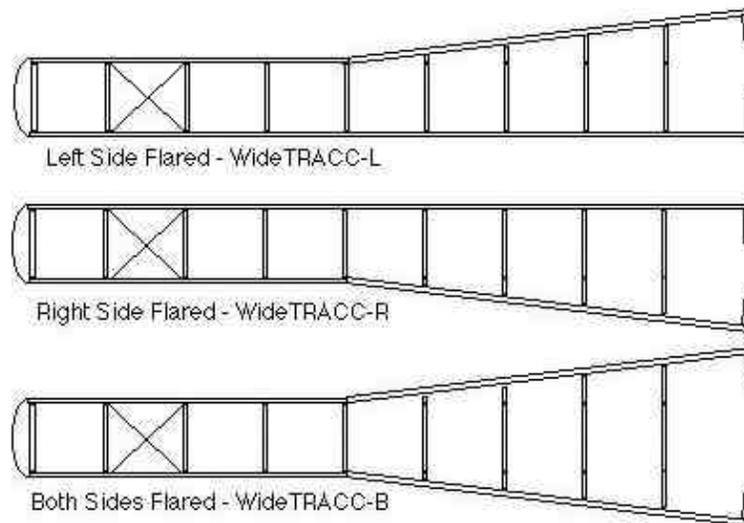


Figure 1. Basic WideTRACC configurations.

Location Requirements

Unidirectional Application

Installation of a TRACC System and its transitions depends on the traffic pattern and the backup structure at the particular location. Unidirectional traffic (one side or both) requires no transition. See Figures 2 and 3. The backup frame can be attached to any solid structure including a square cast-in-place concrete pillar, a vertical concrete wall, or the end of a New Jersey style barrier. The backup frame provides a hole pattern that may require adaptation to the backup structure. Trinity Industries can provide an adaptor to allow direct attachment of the backup frame to a variety of concrete barrier profiles. Call Technical Service at 800-644-7976 with questions regarding this and other types of installation.

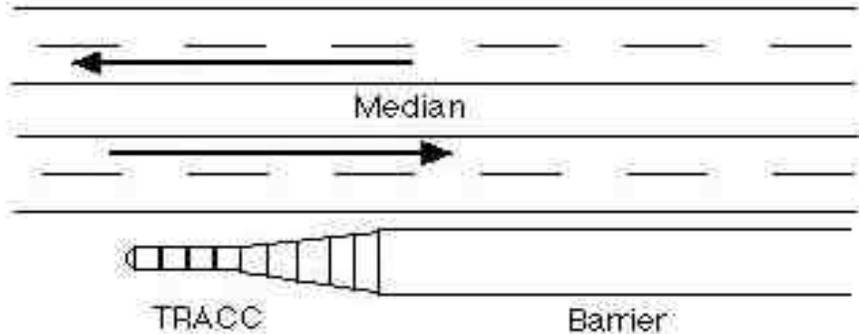


Figure 2. Unidirectional Traffic Flow - One Side - Requires No Transition.

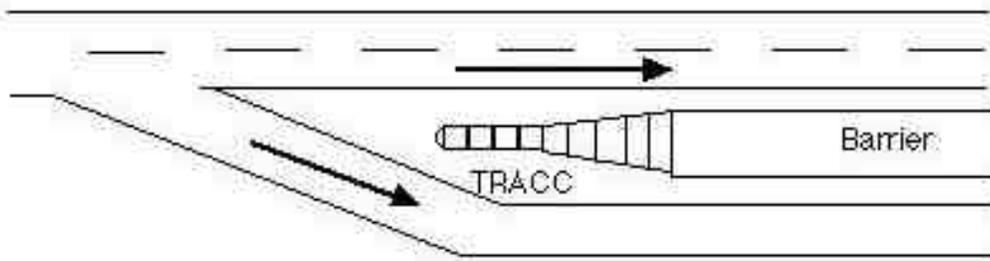


Figure 3. Unidirectional Traffic Flow - Both Sides - Requires No Transition.

Bidirectional Application

For installations that face oncoming traffic from the reverse direction (see figure 4), appropriate transitions should be installed on the end of the backup structure.

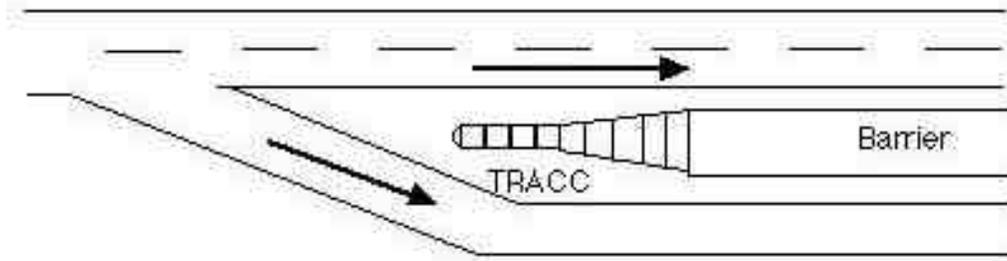


Figure 4. Bidirectional Traffic Flow - Requires Transition on One Side.

Approach Zone and Clear Zone

The TRACC System should not be placed directly behind a raised curb. The approach area in front of the system should slope at a rate no greater than 10:1 in the direction of traffic flow. The cross slope should be no more than 12:1. The clear zone behind the TRACC should be consistent with the area behind the downstream Length-of-Need of the barrier. The entire length of the TRACC can be used in Length-of-Need calculations as it is fully redirecting.

Downstream Zone

The TRACC should be installed so that a 60' clear space will exist on both sides of the backup structure for the side panels to retract during an end-on impact (see figure 5).



Figure 5. Clear Space for Panel Retraction

Installation Options

Foundations

During an impact, the stopping force provided by a TRACC System is **NOT** transferred to the backup structure beyond the cushion. All the stopping loads pass to the foundation **BELOW** the system through the anchor bolts that attach the system to the foundation.

TRACC Systems can be anchored to combinations of asphalt, concrete, and compacted subbase as shown in Table 2 below.

Table 2. Foundation Options

6" Reinforced Concrete
8" Unreinforced Concrete
3" Minimum Asphalt over 3" Minimum Concrete
6" Asphalt over 6" Compact Subbase
8" Minimum Asphalt

Backup Support and Transition Options

The TRACC with its sliding side panels can be attached or transitioned to any backup structure capable of supporting the last frame. If the system has been extended to greater widths as described previously for the WideTRACC, the flared guardrail panels used to create the extra width can be attached to any downstream barrier or structure just as a standard guardrail would be attached.

The following drawings are located in the Appendix of this manual and can be obtained online at www.highwayguardrail.com. They provide the necessary detail for attachment and transition to their subject structures.

SS453, "TRACC Transition to W-Beam Median Barrier Soil Post Option"

SS454, "TRACC Transition to Thrie Beam Median Barrier Soil Post Option"

SS455, "TRACC Transition to W-beam Median Barrier Plan, Elevation & Sections"

- SS456, "TRACC Transition to Vertical Wall"
- SS461, "TRACC Transition to Concrete Safety Shape Barrier
Plan, Elevation & Sections"
- SS462, "TRACC Transition to Concrete Barrier Single Slope
Plan, Elevation & Sections"
- SS463, "TRACC Transition to Thrie Beam Median Barrier
Plan, Elevation & Sections"
- SS464, "TRACC Transition to Thrie Beam Median Barrier All Wood Post"
- SS497, 'WideTRACC - Optional Wing Extensions'

Nose Delineation Options

The TRACC is intended for use on either shoulder or in the median in both unidirectional and bidirectional traffic situations. To provide the greatest level of safety, the delineation of the plastic nose section can be customized for any particular location. Four pieces of reflective tape are provided with the TRACC and can be used to delineate left shoulder, right shoulder, and gore applications. All four identical pieces of reflective tape can be used to create the three designs as shown in Figure 6.

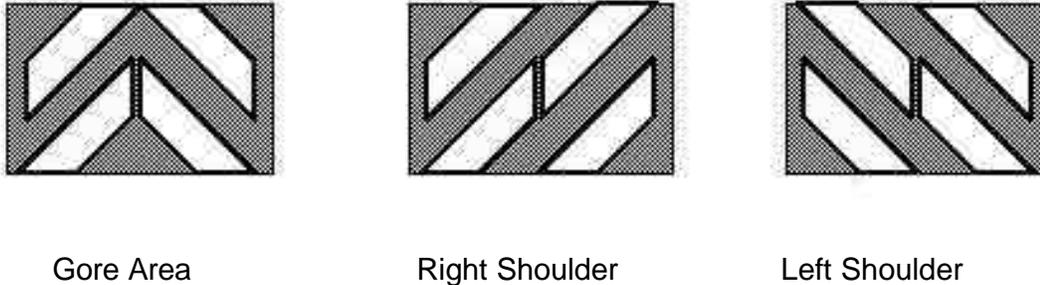


Figure 6. Nose Delineation Options.

Note: Consult local transportation authorities for delineation requirements.

TRACC FAMILY INSTALLATION **GUIDELINES**

Drawings and Bills of Material

Drawings and bills of material for the most popular TRACC System options are shown in the Appendix to this manual. If parts are missing from a TRACC System shipment or if you have questions regarding installation options, please contact Trinity Industries, Inc., Highway Safety Products Division Technical Service at 800-644-7976.

Recommended Tools and Equipment

1. Forklift or Crane (4000 pound capacity)
2. Lifting Slings or Chains
3. Air hammer/drill 35/50# and appropriate power source
4. Rock drill bit 11/16" x 16" with 30" extender
5. Socket and Ratchet Set or Flat Wrenches - 3/8" to 1-1/4"
6. Traffic control equipment
7. Gloves, safety goggles, and back protection for lifting
8. Dispensing Gun and Mixing Tubes for Hilti HY-150 Adhesive

NOTE: HILTI anchors supplied with TRACC systems require 11/16" holes for installation. Dispensing gun and mixing tubes for HY-150 adhesive are available from Trinity Industries or directly from Hilti, Inc., at 800-879-8000 in the United States or 800-363-4458 in Canada.

Safety Instructions

Always use appropriate safety precautions when operating power equipment, mixing chemicals, and moving heavy equipment. Gloves, safety goggles and back protection should be used.

Safety measures incorporating appropriate traffic control devices should also be used to protect personnel while at the installation site. Trinity Industries, Inc., offers an economical and effective truck mounted attenuator, the MPS-350, for the protection of workers in work zones. For more information on the MPS-

350 call 800-644-7976, or visit the Trinity Industries Highway Safety Products website at www.highwayguardrail.com.

Installation of System

To facilitate accurate communication regarding the parts of the TRACC and WideTRACC, Figure 7 shows the two system with side panels removed and major parts labeled.

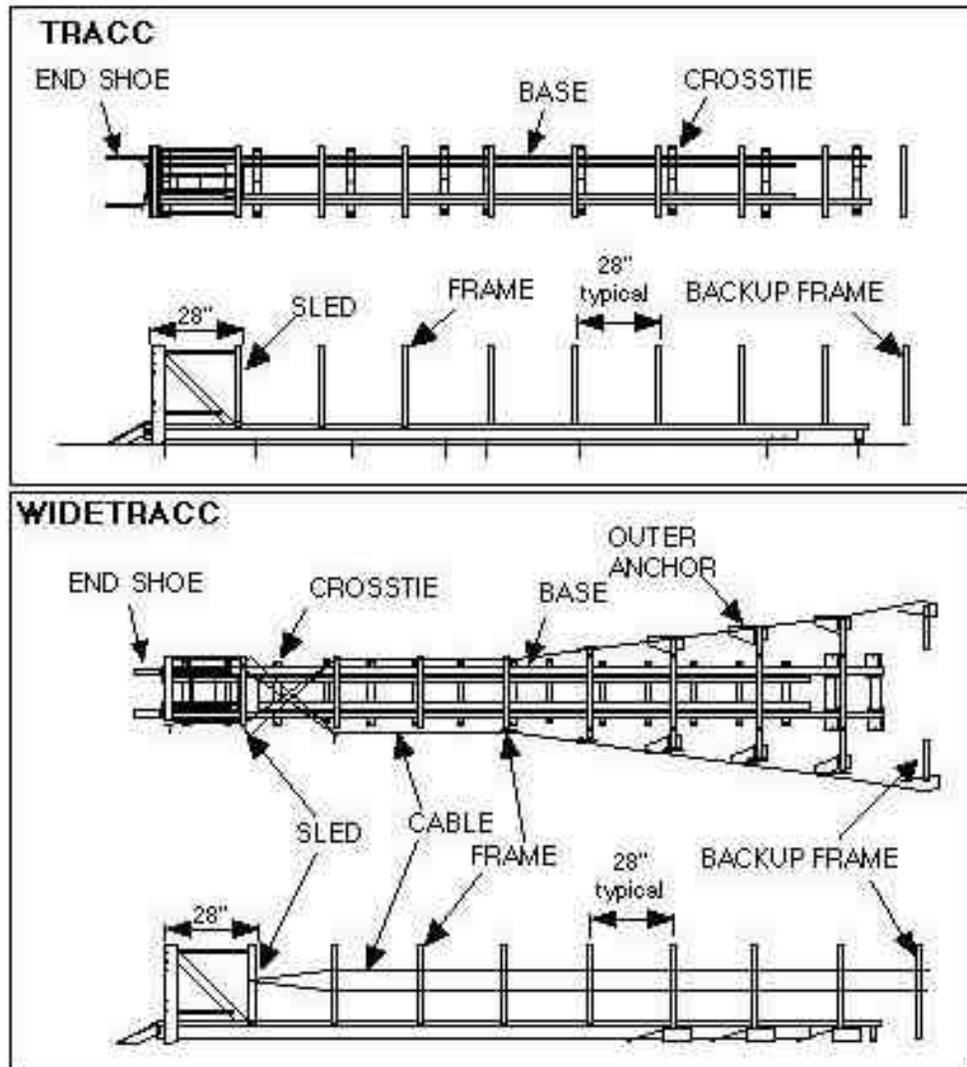


Figure 7. Major Components of the TRACC and WideTRACC. (The side panels have been removed from the outside of the systems for clarity.)

Lifting the System

TRACC Systems can be lifted as complete units by threading lifting chains or slings directly through the tops of the frames. Someone should maintain control of the system by guiding the end as it is lifted and moved. Care should be taken to ensure that the system can be handled safely prior to moving.

Anchoring the System

TRACC Systems can be installed on combinations of asphalt and concrete. Table 3 shows the types of foundations that can be used and the anchoring studs that are required. In general, concrete installation can be performed using 7-1/8 inch anchor studs while asphalt installation requires 18-inch anchor studs. Holes should be drilled 1.5 inches less than the overall length of the anchor stud to ensure proper embedment.

TRACC Systems can be placed directly onto the foundation as a complete unit. The system should be aligned within 1° of the downstream barrier according to the approach and downstream zone requirements set forth in the section entitled, "Location Requirements." Holes for the anchor studs can be drilled into the foundation using the system as a template. Because of the open design of all the TRACC systems including the WideTRACC, it is not necessary to disassemble any portion of the system in order to drill the anchoring holes. Note that the flared portion of the WideTRACC requires additional outboard anchors that have been shipped loose and must also be anchored to the foundation. Special attention should be paid to drawing SS496, "WideTRACC Double Flare - Plan Elevations and Sections," for the location of those outboard anchors.

After the holes are drilled, the adhesive system can be dispensed into the hole and then the anchor stud should be suspended by its nut and washer through the crosstie. Figure 8 shows how the anchor stud should pass through the crosstie suspended by its nut and washer. The stud should hang in the uncured adhesive with no threads showing above the nut. Final tightening of the anchor nuts should be done after the adhesive has set. (See adhesive manufacturer's instructions for set times under various environmental conditions.)

NOTE: Hilti HIT HY 150 adhesive cures in 50 minutes at 68 °F.

Table 3. Anchor Stud Selection Table

Foundation	Anchor Stud Size
6" Reinforced Concrete	5/8" d x 7.125" long
8" Unreinforced Concrete	5/8" d x 7.125" long
3" Minimum Asphalt over 3" Min. Concrete	5/8" d x 18" long
6" Asphalt over 6" Compact Subbase	5/8" d x 18" long
8" Minimum Asphalt	5/8" d x 18" long

NOTE: If asphalt is located over a minimum of 6-inches of concrete, the 18-inch anchor studs can be cut off to a total length equal to the asphalt thickness plus 7.5 inches. This may eliminate some drilling in locations with thick concrete and relatively thin asphalt overlays.

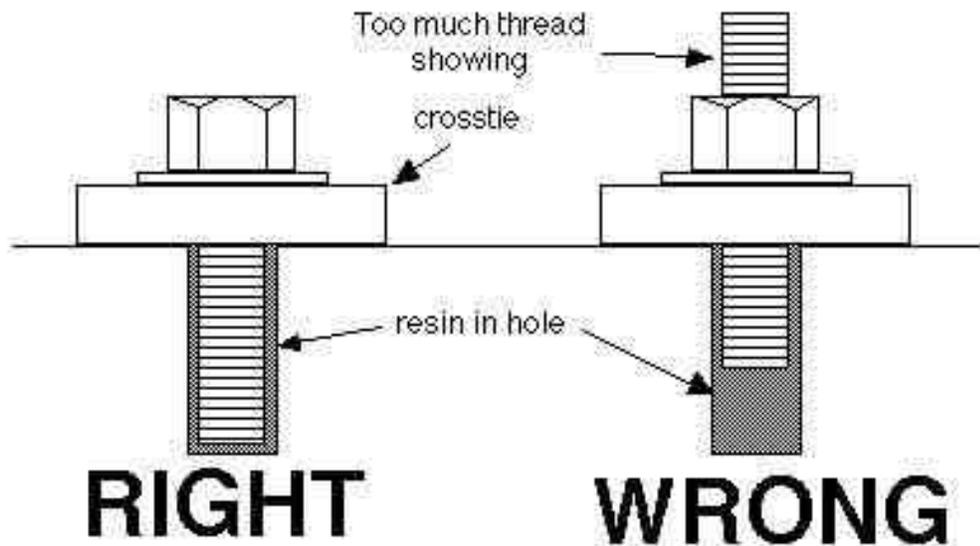


Figure 8. Suspending the Anchor Studs in the Uncured Adhesive.

Attaching Backups and Transitions

The last support frame on a TRACC System must be attached to something in order to support the side panels and any required transition panels. While no direct stopping forces are transmitted into the backup support structure, its presence is important for possible redirecting impacts. Drawings in the

Appendix show the TRACC systems attached to and shielding a variety of downstream barriers and structures. For more information about specific installation options not shown in the Appendix drawings, contact Technical Service at 800-644-7976.

NOTE: The width of the WideTRACC can be adjusted through the addition of wing extension sections as shown in drawing SS497, "WIDETRACC Double Flare Wing Extension Structures," located in the Appendix.

Attaching Plastic Nose and Delineator

The TRACC System is intended for use on either shoulder or in the median in both unidirectional and bidirectional traffic situations. To provide the greatest level of safety, the delineation of the plastic nose section can be customized for any particular location. Four pieces of reflective tape are provided with each TRACC System and can be used to delineate left shoulder, right shoulder, and gore applications. All four identical pieces of reflective tape can be used to create the three designs as shown in Figure 9. The plastic nose should be attached to the front of the TRACC System using the side panel attachment hardware already located on the system.

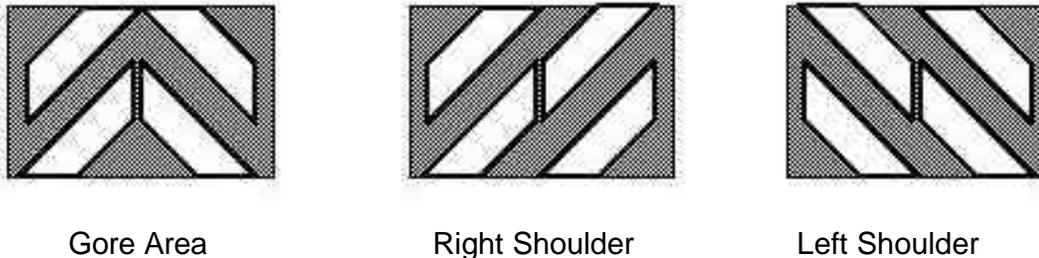


Figure 9. Nose Delineation Options.

NOTE: Consult local transportation authorities for delineation requirements.

TRACC FAMILY REPAIR AFTER **IMPACT**

Low-Risk Repair Options

TRACC systems are designed for field repair or rapid replacement of the entire unit.

The energy absorbing base assembly of the TRACC system can be replaced in stages depending on the extent of the impact or it may be replaced completely while reusing the upper system components. Because TRACC systems are delivered fully assembled, it is extremely practical to replace the entire damaged system on the roadside and then perform the necessary repairs safely and accurately in the maintenance shop away from traffic dangers.

Many of a TRACC system's components remain undamaged after most impacts making refurbishment simple and economical. Entire units can be repaired and then reused on the roadside or the damaged portion of a partial base assembly can be refurbished and reused as needed.

NOTE: TRACC PRODUCTS ARE **NOT** DISPOSABLE. COMPLETE REPLACEMENT ON THE ROADSIDE AFTER AN IMPACT IS A CONVENIENT - BUT NOT REQUIRED - WAY TO PROTECT WORKERS BY LIMITING EXPOSURE TO TRAFFIC. UP TO 98% OF A TRACC SYSTEM IS REUSABLE AFTER DESIGN IMPACTS REGARDLESS OF WHETHER THE REPAIR IS PERFORMED IN THE FIELD OR IN THE SAFETY OF THE MAINTENANCE YARD.

Types of Damage

TRACC Systems are designed to withstand end-on impacts and redirecting side impacts. Side impacts, depending on the severity, may only cause cosmetic damage to the system. Any system that has been impacted along its side should be examined to make sure that the damage is only cosmetic and that any damage that might hinder subsequent function of the system is repaired.

During some severe high-speed redirecting impacts with heavy vehicles, a TRACC System may be damaged as shown in Figure 10. If the deformation of the base is greater than the 3/4-inch maximum indicated in the figure, replace the damaged components with new or refurbished parts available from Trinity Industries.

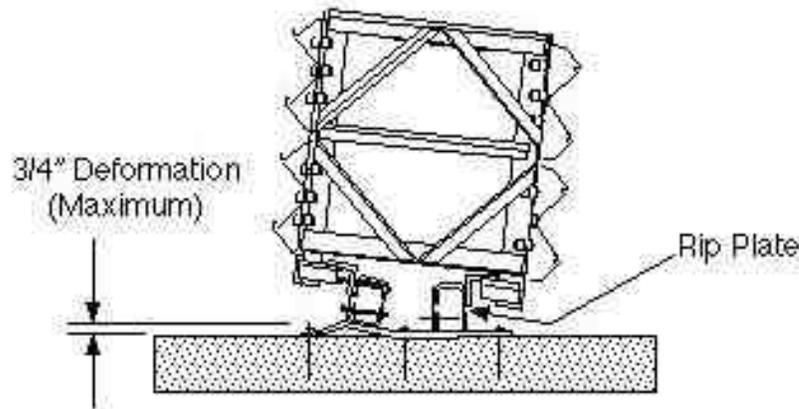


Figure 10. Damage Due to Uncommonly Severe Redirecting Impact.

Field Repair

TRACC Systems can be repaired in the field by replacing the parts that have been damaged. After an end-on impact, the modular, energy absorbing base assembly can be replaced in stages corresponding to the three stages of the energy absorbing rip plates. Upper portions of the TRACC system can be removed and reset on the modular base assembly after the damaged base modules have been replaced.

In the case of redirecting impacts along the side of the system, it may be possible to replace only side panels and other upper structural pieces so long as the modular base assembly under the system is not damaged.

Removal / Replacement of System

The TRACC can be removed from its foundation by releasing the anchor nuts that hold the crossties down. Flat wrenches may be required to access the anchor studs under the displaced frames and sled. Once released, the system can be lifted as a unit and transported back to a maintenance facility for repair. A new or reconditioned TRACC can be positioned on the existing anchor studs and firmly attached using the appropriate nuts and washers.

In some impacts, a small number of anchor studs may become bent or fractured. In these cases it will be necessary to remove the old anchor, drill out the adhesive in the old hole, and replace the removed anchor with a new anchor and adhesive.

Repair at Maintenance Facility

Additional assistance is available by calling Trinity Industries Highway Safety Products Technical Service at 800-644-7976.

Removal of Side Panels and Frames

The TRACC System side panels and frames will be compressed into a bundle during an end-on impact as the frames translate forward and the side panels retract. The bundle can slide off the downstream end of the base to make disassembly easier. For the WideTRACC it will be necessary to release the cable clips that connect the downstream panels to the sled structure.

Side panels can be removed from the support frames beginning at the upstream end and proceeding downstream. As the hardware for each frame is removed, the side panels will release from the sides of the bundle. Disassembly of the entire bundle of frames and side panels can be accomplished in about 30 minutes by one experienced technician.

Side panels and frames should be inspected for damage. Replacement parts are available from Trinity Industries. Questions about specific types of damage can be directed to Trinity Industries Highway Safety Products Technical Service at 800-644-7976.

Removal of Sled

The TRACC System sled can be removed by pulling it back toward the nose of the system after it is completely disconnected from the downstream panels. The end-shoes which hold the top and bottom sections of the base

together should be removed to allow complete removal of the sled off the nose-end of the system.

Removal of Rip Plates

For a TRACC System that has been damaged in an end-on impact, it will be necessary to repair the base by replacing the damaged rip plates, or, the owner of the system may opt to replace the damaged base modules with preassembled modules. Factory-assembled base modules for the TRACC are readily available and will result in a shorter overall repair time after an end-on impact.

If the rip plates are to be replaced, each of the attaching bolts should be removed. Note that the top bolt is four-and-one-half inches long and the bottom attachment bolt is four inches long. Hardware details are shown in Appendix drawings that correspond to the particular TRACC system in question.

The TRACC System rip plates are divided into three separate stages. An impact that causes any part of a stage to be consumed will require that the entire stage be replaced. For example, an impact that strokes the TRACC system eight feet will progress into (but not through) the second stage of rip plates. All of stages one and two will require replacement in such a case.

Disassembly of a damaged TRACC base can be completed in about 45 minutes by two experienced technicians.

Replacement of Damaged Parts

All parts that are damaged should be replaced with new or refurbished parts from Trinity Industries, Inc. Parts can be ordered by calling any of the Regional Contacts listed on Page 5. Product Codes for the various TRACC systems are shown on the Bill of Materials in the corresponding drawing located in the Appendix.

Assembly of System

TRACC Systems can be reassembled using the corresponding Appendix drawings as an assembly guide. Technical Assistance is available and can be obtained by calling 800-644-7976.

The base should be assembled very carefully ensuring that the rip plates are located properly and that the correct hardware is used for attachment as shown in the Appendix drawings. Tighten all the base hardware taking special care not to overtighten as this may cause the channels which support the rip

plates to deform. A complete base can be assembled by two experienced technicians in about two and one-half hours.

With the base completely reassembled, the sled and support frames can be slid into place. All of these components are spaced 28 inches apart. Note that the backup frames (farthest downstream, if present) cannot be slid into place as the base of the system does not extend that far downstream. The backup frames (if present) can be attached directly to the side panels after they have been attached to the other support frames.

With the sled in place, the end-shoes can be replaced. Some of the end-shoe attachment bolts may need to be located in the base prior to sliding the sled into its final location.

Side panels should be replaced beginning at the downstream end and overlapping the panels while proceeding upstream. The side of the TRACC system uses a combination of two-bay and one-bay side panels depending on the length and configuration of the system. Consult the appropriate appendix drawing for specific requirements.

With all the side panels and hardware in place, make sure that the system is fully extended and that no slack exists along the length. Tighten all the upper TRACC System hardware after the system is fully assembled and extended. Thread the cables of the WideTRACC version of the system under the two center humps of the side panels as shown in the WideTRACC drawings and then attach the cable at each location using the cable clips provided. Assembly of the upper section can be accomplished by two experienced technicians in approximately three hours.

With the components reassembled and all the hardware tightened correctly, the repaired TRACC System is ready for installation where it can save another life.

APPENDIX

- SS450, "Crash Cushion Attenuating Terminal - Plan, Elevations, and Sections"
- SS451, "Crash Cushion Attenuating Terminal - Shop Assembly Details"
- SS452, "TRACC Anchoring Options"
- SS453, "TRACC Transition to W-Beam Median Barrier Soil Post Option"
- SS454, "TRACC Transition to Thrie Beam Median Barrier Soil Post Option"
- SS455, "TRACC Transition to W-beam Median Barrier Plan, Elevation & Sections"
- SS456, "TRACC Transition to Vertical Wall"
- SS457, "Crash Cushion Attenuating Terminal 22' Foundation Plan"
- SS458, "Crash Cushion Attenuating Terminal 23' Foundation Plan"
- SS459, "Crash Cushion Attenuating Terminal 24' Foundation Plan"
- SS461, "TRACC Transition to Concrete Safety Shape Barrier Plan, Elevation & Sections"
- SS462, "TRACC Transition to Concrete Barrier Single Slope Plan, Elevation & Sections"
- SS463, "TRACC Transition to Thrie Beam Median Barrier - Plan, Elevation & Sections"
- SS464, "TRACC Transition to Thrie Beam Median Barrier All Wood Post"
- SS466, "TRACC - TL2 Plans, Elevations and Sections"
- SS467, "TRACC - TL2 Shop Assembly Details"
- SS468, "TRACC - TL-2 Foundation Plan"
- SS469, "FASTRACC - Plan, Elevations, and Sections"
- SS470, "FASTRACC - Shop Assembly Details"
- SS471, "FASTRACC - Foundation Plan"
- SS475, "TRACC Family Comparison Drawing"
- SS476, "SHORTRACC - Foundation Plan"
- SS480, "30" WideTRACC"
- SS481, "30" WideTRACC - Shop Assembly Details"
- SS483, "30" SHORTRACC"
- SS484, "30" SHORTRACC - Shop Assembly Details"
- SS488, "SHORTRACC Foundation – 16' "
- SS493, "WideTRACC - Double Flare, Shop Assembly Details"
- SS494, "WideTRACC - Double Flare 22" Foundation Plan"
- SS495, "WideTRACC Anchoring Options"
- SS496, "WideTRACC - Double Flare - Plan, Elevation & Sections"
- SS497, "WideTRACC - Optional Wing Extensions"
- SS498, "WideTRACC – 21' Foundation Plan"