

**CASS<sup>®</sup> TL-3**  
**(Utilizing C-Shaped Post)**

**Maintenance and Repair Manual**

Part No. 620290B

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**TRINITY**  
HIGHWAY PRODUCTS  
ENERGY ABSORPTION SYSTEMS

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## **INTRODUCTION**

The amount of general CASS™ maintenance is based on the cable being pre-stretched or standard. The amount of repair after an impact is based on the severity of the impact and the cable being pre-stretched or standard. If an agency allows both pre-stretched and standard cable, it is important that they know what cable has been supplied for each installation.

The appropriate CASS™ or CASS-TL3™ & CASSTL4™ Installation Manual should be used in conjunction with these instructions.

When performing any of the following activities, please observe all safety regulations.

## **GENERAL CASS™ MAINTENANCE**

### **PRE-STRETCHED CABLE**

For pre-stretched cable, the cable tension should be checked at least once a year. The tension value is established based on the air temperature or cable temperature. See the CASS™ Temperature and Tension Chart for the tension values.

### **STANDARD CABLE**

For standard cable, the cable tension should be checked at least twice a year. The tension value is established based on the air temperature or cable temperature. See the CASS™ Temperature and Tension Chart for the tension values.

## **REPAIRS**

After an impact, the system will require some repair. Under most impacts, the cable will still maintain its original height and may be able to withstand additional hits. Even with this capability, it is recommended that the system be repaired as soon as possible. Because of the ease of repair, most impacts can be repaired in a short period of time.

An impact that encounters a CASS™ Cable Terminal (CCT) may require the re-tensioning of the entire run of cable. After repairing the cable, the tension throughout the system should be checked.

It is recommended that for impacts with vehicles larger than those used in the NCHRP Test Level 3 or Test Level 4 tests, the cable should be checked to determine if it needs to be re-tensioned.

## **REPAIR FOR SYSTEM IMPACT** **(CCT NOT DAMAGED)**

If an impact occurs and the CCT is not involved, usually only the posts will have to be replaced and the cables re-inserted in the posts. The following steps should be followed in making this repair:

1. Inspect the damaged system to determine whether the CCT has been affected. If it is determined that the CCT has not been affected, continue with the following steps. If it has been affected, then refer to the “Repair for CCT Impacts” Section.
2. Inspect the damaged system and determine what material will be required to make the repairs.
3. Remove the damaged posts. They should come out of the sockets easily. If the posts are driven, then they will have to be pulled out of the ground.
4. Install new posts in place of damaged ones. The C-channel posts shall be installed with every other post being rotated 180 degrees (**See Figure 1**).



**Figure 1**  
**Post Orientation**

5. The bottom cable is then placed in the post slot.
6. The appropriate CASS™, CASS-TL3™ or CASS-TL4™ spacer is placed above the bottom cable.
7. The middle cable is then placed in the post slot.
8. The appropriate CASS™, CASS-TL3™ or CASS-TL4™ spacer is placed above the middle cable. The stainless steel strap is also placed on the post above the middle cable.
9. The top cable is then placed in the post slot.
10. If the post caps are used, they should be placed on the posts.
11. Depending on the severity of the impact, after the repair, the cable might have to be re-tensioned. If the cable is standard and has been installed less than 2 years, the tension on the cable should be checked. If the

tension has to be adjusted, this can be done by adjusting the turnbuckles at each end of the impacted cable section to the recommended values in the CASS™ Temperature and Tension Chart.

**Note: The reflective sheeting may be placed on the post caps or the spacers for the CASS™ system and on the CASS-TL3™ and the CASS-TL4™ spacers based on the agency's specification.**

## **REPAIR FOR CCT IMPACT**

When the cable has been impacted and the CCT is involved, the following steps should be followed:

1. Steps 1 through 9 for the "Cable Repair for non CCT Impact" should be followed.
2. Disconnect the CCT cables from the line cables. Before disconnecting cables, mark the location of the turnbuckles and CCT nuts on the fittings. The damaged CCT line posts need to be removed and replaced.
3. The top of the Controlled Release Posts (CRP) should be re-installed to the stub CRP posts.
4. The cables should be installed per the installation manual. The nuts installed on the fittings should be located on the mark made before removing them.
5. The CCT cables and line cables can be connected by the use of a backhoe or other mechanical means. The turnbuckle should be turned to the marks before they were disconnected. The cable should be checked with the tension meter and adjustments made to bring it to the correct tension. If the correct tension cannot be obtained with the turnbuckles, the line cable will have to be re-measured, cut, and re-attached per the installation manual(s).

## **Repair for Cable Transition to W-beam (CTW) or Rail Element(s)**

When an impact occurs with the transition to W-beam, there will be damage to the cable post and there could be damage to the W-beam or W-beam posts. If only the cable posts have been damaged, the procedures presented earlier on cable repair should be followed.

If the guardrail posts are the only damage to the guardrail system, then the post should be replaced by normal guardrail repair procedures. If the W-beam transition rail elements or other guardrail elements in the vicinity of the transition

are damaged, one of the following options should be taken to repair the rail elements:

### **Option 1 (Cable Tension not Released)**

1. If guardrail panel(s) other than the W-beam transition rail panels is the ones that need to be replaced, the panel(s) can be replaced without releasing the cable tension.
2. **Before the rail splice bolts are removed, the guardrail system needs to be secured to prevent the post from leaning over when the panel(s) is removed. This is done by the use of a chain or come-a-long.**
3. Once the posts are secured, the rail panel(s) can be removed and replaced.
4. After the rail panels are replaced, the method of securing the spacing can be removed.

### **Option 2 (Cable Tension Released)**

1. When the W-beam transition rail elements need to be replaced, the cable tension will need to be released. Before releasing the tension, place a mark on the fittings at the end of the turnbuckles and end of the CTW nuts.
2. Release the tension on the cables and remove the cable from the anchor brackets.
3. Replace the rail panels and posts as needed.
4. Reinstall the cables in the anchor brackets and reinstall the nuts. The nuts installed on the fittings should be located on the mark made before removing them.
5. The CCT cables and line cables can be connected by the use of a backhoe or other mechanical means. Normally the cables do not have to be re-cut, just re-connected. The turnbuckle should be turned to the marks before they were disconnected. The cable should be checked with the tension meter and adjustments made to bring it to the correct tension.

## **EMERGENCY REPAIR**

There could be an occasion when an accident could cause significant traffic congestion, or the cable can be entangled with the vehicle. The following are some suggestions on what to do to get traffic moving or the cable untangled.

### **ROAD BLOCKED DUE TO AN ACCIDENT**

To resume traffic flow after an accident, or to get emergency vehicle(s) access to the accident site, crossover access through the cable may be necessary. To

provide this access, remove cables from several posts upstream and downstream of the desired opening. Opening width can be adjusted by removing posts from the ground sleeves. The cable can be held down and the traffic or emergency vehicle(s) can pass over it.

In life threatening or emergency situations, the cable can be cut. If the cable was put under additional tension due to the accident, the tension should be reduced at the nearest turnbuckles to the impact. The cable should be cut at a location midway between two posts. To reduce the amount of cable damage during cutting, duct tape should be wrapped around the cable on each side near where the cable will be cut. Even though the cable should move only a short distance in each direction, caution should be used when cutting the cable.

## **REMOVING ENTANGLED CABLE FROM VEHICLE**

There may be an occasion when the cable gets entangled with a vehicle and needs to be removed before the vehicle can be towed away. Methods described above are a few ways of removing the cable. Another option may be to lift one or more of the cables up over the vehicle. **During this operation, if any of the line posts entangled with the cable start to lift up out of the sleeves, the lifting should be stopped and the post(s) removed from the cable.** Once the post(s) are removed, the cable can be lifted up over the vehicle.

## **REPAIR OF A CUT OR DAMAGED CABLE**

Below are several methods to repair a cable that has been cut or damaged.

Splicing of the cable may be necessary if a cable is cut, or in a rare case, it is damaged during an impact. An appropriate length of cable **(50 feet or longer)** to make the splice should be obtained. The end of the cut cable should have the ends re-cut so as to provide a clean/smooth end. Because the cable was cut and the tension removed from the system, the cable will have to be re-tensioned. If an accurate length of cable is used for the splice section, this could reduce the effort it will take to re-tension. Two cable splice connectors will be required to connect the cables together. One end of the splice cable is connected to one end of the cut cable with a connector. Another connector is applied to the other end of the splice cable and the end of the cut cable. This cable splice connector is assembled and this is done by the use of a backhoe or other mechanical means. The tension on the cable should be checked with the tension meter and adjustments made at the turnbuckles to bring cable to the correct tension based on the ambient air temperature or the cable temperature and the values on the CASS<sup>TM</sup> Temperature and Tension Chart. If the cable splice has been cut accurately, the tension may be obtained by turning the turnbuckles at each side of the cut.

If the tension cannot be obtained at the turnbuckles at each side of the splice, it may be necessary to re-tension the cable at the end of the cable run. This would be done at the end where the field splice was made. The field splice should be removed and the cable measured, cut, and re-connected with the correct tension. Follow the procedures in the installation manual when doing the re-tensioning. Some installations may have field splices at all locations. If this is the case, then the measuring, cutting and re-connecting can be done at any location.

A second method to reconnect the cables is to use a 5 foot section of cable with factory applied fittings on each end. This method will also require two (2) turnbuckles and a left-hand and right-hand threaded fitting to complete the connection. About 9'8" of cable should be removed from the cut cable. The removal of this amount of cable should allow the system to be re-tensioned with the two (2) turnbuckles inserted into the system. The threaded fittings should be installed and the cable ends connected per the installation manual.

In lieu of the 5 foot section of cable, a short piece of cable can be used but a left-hand and right-hand threaded fitting will have to be applied to the cable. When using a cable length other than 5 feet, the amount of cable removed from the cut cable should be adjusted based on the cable length removed. If the length of cable use is less than 5 feet, then less than 9'8" of cable should be removed from the cut cable. If more than 5 feet of cable is used, then more than 9'8" of cable should be removed from the cut cable. To help to determine the amount of cable to be removed, after the threaded fittings are installed on the piece of splice cable, take a measurement from end of fitting to end of fitting. Take this measurement and add 4'6" and this will be the amount of cable to be removed from the cut cable.

If the damaged cable after cutting is less than a total of 4'6", the connection can be made with a left and right threaded fitting and a turnbuckle. Remove 4'6" of cable from the cable run. Place a left-hand threaded fitting on one end of the cut cable and a right-hand threaded fitting on the other end of the cut cable. Follow the procedures in the installation manual for connecting the two ends using the turnbuckle.

# CASS™ TEMPERATURE AND TENSION CHART

(FOR CASS™, CASS™-TL3 AND CASS™-TL4)

Pre-Stretched Cable		Standard Cable	
°F	Tension (lbs)*	°F	Tension (lbs)*
-15	7500	-15	8800
-10	7300	-10	8600
-5	7100	-5	8400
0	7000	0	8200
5	6800	5	8000
10	6600	10	7800
15	6500	15	7600
20	6300	20	7400
25	6100	25	7200
30	6000	30	7000
35	5800	35	6800
40	5600	40	6600
45	5500	45	6400
50	5300	50	6200
55	5100	55	6000
60	5000	60	5800
65	4800	65	5600
70	4600	70	5400
75	4500	75	5200
80	4300	80	5000
85	4100	85	4800
90	4000	90	4600
95	3800	95	4400
100	3600	100	4200
105	3500	105	4000
110	3300	110	3800
115	3100	115	3600
120	3000	120	3400
125	2800	125	3200
130	2700	130	3000
135	2600	135	2900
140	2500	140	2700
145	2400	145	2500
150	2300	150	2400
160	2100	160	2200
170	1900	170	2000
180	1700	180	1800
190	1500	190	1600
200	1300	200	1400

\* Tolerance: -200 to +200 pounds



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