Best Practices for Removing Vehicles from Cable Barrier for the NC Guardrail Committee

Since the last Committee Meeting on March 15, 2006 we have been sending out emails to the AASHTO TIG-CMB team members to find out their experiences and best practices for removing vehicles from cable barrier. The attached photo from the Charlotte Fire Department, labeled as saab trapped in cable.jpg, spawned this inquiry. The following information summarizes the email responses we received from various persons. After reading this summary and reviewing the attachments and videos, please let me know what direction the Committee would like to go with this topic. For instance, does this give us the answers we needed? Do we need to put some standards/best practices together for the rescue teams or maintenance personnel based on this information? Let me know your thoughts and ideas.

Reynolds - NCDOT Cable Barrier Contractor

From speaking with Reynolds it seems like they have dealt with this issue a good bit in the past. Reynolds recommendations are to go to the anchor unit and release the tension there UNLESS it is a life or death situation. This does the least amount of damage to the system and is the least expensive to fix. The bolts can be loosened with a typical wrench. If the car needs to be removed immediately, the cable should be cut and then spliced back together. They are setting up a section of cable guardrail in Concord at their firefighter's training facility so their staff can practice on releasing the tension.

NCDOT Mecklenburg County Maintenance Engineer

For the subject crash this was the response:

Would prefer them not to cut the cables – concerned over backlash when cutting. He prefers getting contractor to come release tension – he's not sure what would happen after hours. He was not sure what to do if someone was injured and had to be removed from car quickly. Said he would speak with his district engineer and see if he had any comments. The district engineer was called in on the subject crash. He called Reynolds and got them to come out there and release the tension on the system. He had plenty of time since no one was injured.

NCDOT Pender County Maintenance Engineer

What we are doing is to tell them to cut the cable and we will fix cable when repairs are done and send the bill to the party responsible. I have talked with some of my supervisors about this concern. They are telling me that a cut off saw is the best way to cut the cable. And concerning the backlash, they have also advised that when they have to cut the cable that there is not a lot of tension so they do not experience a lot of backlash.

Arizona DOT - Terry Otterness

The following information is from our maintenance folks regarding the low-tensioned 3-cable system that we have in place. Yes we have spliced it back together in cases where we had to cut it to free a vehicle. Usually that is when it gets wrapped up pretty tight in some part of the drive train. We also have cases where the repair contractor and our crew determine that a kink is too severe to remain in the strand so we cut out the kink and then splice it back together.

FHWA - Richard Powers

I have seen a video prepared by one of the cable barrier manufacturers showing a high-tension cable being cut with a power saw. The cable simply falls down rather than rebound as an elastic band would. I recommend you ask the manufacturers what they recommend for any of the proprietary systems. Perhaps the greatest concern would be the effort required to repair the cables after the vehicle is extricated. The basic question remains "does cutting a highly-tensioned cable create a serious problem with the cut ends flying apart?"

FHWA - Frank Julian

I think Jerry's E-mail makes Richard's response more clear. They are not encouraging Fire Departments to cut the cable because of the damage it does to the system and added repair time and there are several other options. However, if it is deemed necessary, then cutting the cable does not pose lose of life and limb to responders. The video I am sending you will help alleviate fear among responders and cable Nay Sayers. We will have to put this on the future website to alleviate urban legends among firefighters.

The videos referenced above have been placed on the following link and are labeled as follows: Cutting Cable.wmv and MarionCableCutting.avi

ftp://ftp.dot.state.nc.us/Dept-Units/Traffic/TSSM/Transfer/cablevideos/

Trinity - Rich Figlewicz

If a vehicle is snagged in the cable there are several approaches:

1.) If not deeply entangled you can go upstream and downstream and lift the cable out of the CASS post slot till the weight of the cable overcomes the tension and it lays on the ground (75' to 100' in each direction). This allows some latitude in being able to free the vehicle.

2.) Similarly going upstream and downstream to the closest turnbuckles and loosening them a few turns will release tension.

3.) If deeply entangled, as we have seen with 18-wheeler involvement, and it is felt that it is necessary to cut the cable it is best to do it 250 to 300' away from the vehicle. Although the tensioned cable will not "whiplash" (especially the pre-stretched type) it is better to be safe. Either hydraulic cutters or an abrasive blade cutoff saw can be used.

4.) We have had one instance of the cable tearing and that was in MN where a 90,000# truck going over 70 mph snagged and tore a cable as it passed into the median. The DOT simply replaced the 1,000' section with a new piece. This involved just hand tools and loosening of the turnbuckles. The same thing can be done if any of the end terminal cables are torn or cut....there is a CASS part number for each section of cable. The price for the new cable with pre-swaged ends is probably a trade-off when considering the purchase of the field-applied fittings and labor / time needed to splice in a new cable section.

If it is decided that the DOT wants to replace the cut section you can, for instance, remove a 3' section (or whatever length desired) and replace with an equal length section using a field splice "torpedo" at each end of the cut. Again, this is a common part which has been used for years with the U.S. Standard system.

Gibraltar - Jay Winn

We get approximately a dozen system hits per month. In no case has the vehicle been entangled in the cables. Our high tension cable barriers systems have contained and redirected the vehicles in every case. In the rare event that a vehicle is entangled and time or circumstance does not permit to utilized the turnbuckles to release some of the tension and the cable/s must be cut, we recommend that no person/s stand next to the cable barrier system and the person making the cut stand perpendicular to the cable barrier system extending the chop saw with their arms towards the cable. Cut cable in the center between line posts. Upon removing the vehicle from the system, splice the cable at cut with a turnbuckle.

Brifen USA - Jerry Emerson

I talked with Lyndal Wiseman, our field technical expert who has experience over nearly 6 years with Brifen WRSF here in OKC and he says he has never had to cut a cable. Several posts can be removed each way from the crash site (since the cables aren't rigidly attached) and that removes the weave, which gets enough slack in the cables to allow vehicle removal. He has never had to loosen a turnbuckle either. Training has been provided for EMS people to explain this. One state did have a cable cut by a wrecker driver who didn't understand the Brifen system, and we know of a different state where a wrecker driver loosened a turnbuckle. Cutting a cable is never recommended, since that would disable the system and cause unnecessary repair costs, but loosening a turnbuckle is OK...but it will mean having to re-tension that section of WRSF.

We have had no situation where vehicles have wedged in between anchors, since Brifen doesn't use intermediate anchors. And the high tension in the cables prevents them from flying around and wrapping up a vehicle during a crash. The Arizona DOT may have some ideas, as they have

quite alot of the low tension 3-cable system and it gets hit alot due to high traffic volumes. Terry Otterness (602-712-4285) or Ken Cooper (602-712-8674) might know the details.

The pictures show a vehicle between the cables, but it is not between two intermediate anchors, since there are no intermediate anchors. With the slack created by the cables being loose from many posts, it should have been possible to move the cables enough to free the car. However, if that wasn't possible, then the turnbuckles nearby could have been loosened, or even disconnected...a preferable option to cutting the cables. However, if a matter of life and death and the previous won't work, then cutting the cables might be done.

Attached is the Brifen brochure for vehicle removal labeled as: Brifen Crash Vehicle Removal.pdf

Brifen USA - Richard Butler

Although there are several different types of systems (low tension and high tension) and several manufacturers of the high tension systems, they all use the same cable. It's a 3x7, 21 wire 3/4" (19mm) wire rope. I manufactured this cable for over ten years and supplied it to states and manufacturers, so that's where my knowledge comes from. The low tension cable system typically has 3 ropes that are held on the post by a J-shaped hook and used in medians in NC, SC and MO or used as a ROR roadside barrier in numerous states in the NE and Midwest. This rope is under very little tension and when engaged by a vehicle can pull loose from the hardware and get tangled. In most cases because of the slack introduced during the impact and subsequent release of the cables, there is no need to cut the cable. The high tension designs vary, but there are several options rather than cutting the cable. Let me say first, if a life is in the balance, cut the cable. There should be no major kickback from cutting it as long as you take proper shielding precautions and it is not under excessive force as it might be if tangled in a vehicle and pulled 10-15' from the center line of the fence section. There are two simple methods to remove the cable, but first, if the cables are tied up in a vehicle, pull the vehicle back towards the CL of the fence to take the lateral force out of the cable. If that does not introduce enough slack to get the cable out, you can loosen the tension at the rigging screws that connect the 1000' cable segments (need a couple of pipe wrenches and some muscle). Another option is to remove additional posts (if it's a socketed system) which will introduce some additional slack.