

Tech Brief

May 2019

Maintenance of High Tension Cable Guardrail

CATEGORY: Maintenance

ISSUE: High-tension cable guardrail has proven effective to reduce the frequency and severity of median crossover crashes. Like all barriers, it is important to properly design, install, and maintain HTCG for the best performance. To function properly in an impact, a high-tension cable guardrail must be able to gradually redirect or arrest an impacting vehicle by cable deflection, which minimizes forces on the vehicle and its occupants. To obtain the desired results, the cables must be properly tensioned and at the correct heights above the ground.

Currently all HTCG systems are proprietary and are eligible for Federal funding by the FHWA. They must be repaired with manufacturer's supplied replacement parts. Do not intermix parts between systems. The systems below meet all full-scale crash testing conducted under AASHTO MASH 09 guidelines.



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SAFENCE

OBJECTIVE: To provide NDDOT maintenance personnel with general guidance regarding maintenance of high-tension cable guardrail. Maintenance can be divided into two areas—routine maintenance and repairs after crashes. For maintenance and repair procedures for specific systems, personnel should receive manufacturer-based training and keep on-hand and use the manufacturer's installation and repair manual.

METHODOLOGY: After striking a high-tension cable guardrail, a motorist is oftentimes able to drive away from the crash scene, resulting in no documentation, such as a police crash report. Therefore it is important to have frequent field inspections by maintenance and other personnel to identify damaged locations and to aid in timely repairs to maintain optimal performance. This would include both drive-by assessments for obvious impact damage as well as checking cable tension. A repair log should be kept to track and document all activities. This could aid in recovery of damage cost and in the evaluation of the systems performance. Any system failures should be reported to the District Engineer.



EXPECTED RESULTS:

To provide the personnel charged with repair and maintenance of HTCG with guidance on appropriate actions.

Cable Inspections: It is important that crews routinely check tension, even in the absence of an impact (photo A), as per manufacturers' recommendations. This is particularly important during the first few years following cable installation. Cables can lose tension because of construction stretch, anchor creep, fitting slippage, and/or previous impacts elsewhere in the same run of HTCG. As well as checking the tension, maintenance personnel should check and inspect the individual cables for kinks or broken strands as part of routine maintenance, and following any repair, in accordance with manufacturer's guidelines. The height of the cables should be checked after impacts and repairs to make sure they are in accord with manufacturer's specifications.

In situations where there is an impact and the vehicle becomes tangled in the cable (photo B), it is important to keep the cable intact. Maintenance personnel (as well as emergency responders) should consider **cutting the cables only under life-threatening situations**, if not a life threatening situation the tension should be released as explained below:

1. Move the cables back to their original positions: This can be accomplished by driving, pushing or pulling the vehicle back in the opposite manner that it entered the cable system.
2. Tension in the cables can be released at the nearest upstream and downstream turnbuckles. Loosen the turnbuckle until the end of each threaded cable end reaches the inspection hole. **Warning: The threaded cable end should always remain visible in the inspection holes. Unscrewing the turnbuckle or cable anchor end beyond this point can be unsafe.**
3. Removing cables and posts for approximately 100 feet upstream and downstream of the vehicle. This will allow the cables to lie on the ground. If the cables are under extreme tension, use extra caution and secure the post with a chain or restraining device during removal.
4. Release at anchoring points.
5. Cutting at the turnbuckle (preferred than cutting the cable). Before cutting a turnbuckle, remove the adjacent posts in the vicinity of the turnbuckle. Loosen the turnbuckle until the end of each threaded terminal reaches the inspection hole. Cut in the middle of the turnbuckle. **Warning: Everyone except the person making the cut should stand a safe distance clear of the cable.**

Posts Inspections: Posts can be installed with cast-in-place concrete sockets, precast concrete sockets, driven metal sockets, or driven posts. Systems installed using socketed posts, possibly in conjunction with a continuous mow strip, will facilitate removal and replacement of damaged posts. In most impacts, only the posts are typically damaged (photo C). If enough posts have been hit or if the damaged section is along a sharper roadway curve, the cables may be on the ground (photo D) and maintenance personnel should expedite repairs to keep the time the cable system is non-functional to a minimum. Damaged posts can present a sparring concern should a secondary impact occur; crews should remove damaged or bent-over posts to eliminate the sparring potential and appropriately delineate the area to warn the motorist as soon as practical after the discovery/notification of the impact. It is recommended that a District maintain a supply of posts and associated hardware for the high-tension cable guardrails used in the District.

Anchorage Inspections: Most anchors for high-tension cable guardrail are designed that when impacted end-on, the tension in the barrier run is released making it ineffective. For this reason, anchors are ideally located in areas where they are least likely to be impacted. Some terminal designs anchor each cable separately (photo E), so tension is retained in some cables when only one anchor post is released. However, most designs use a single anchor point and all tension is lost upon impact. Therefore, repair of the anchorage and resetting the cable should be a high priority. Maintenance personnel should also periodically inspect anchors for any damage or movement that could affect performance.



A



B



C



D



E

It cannot be emphasized enough that the maintenance personnel should utilize the manufacturer's installation and repair manuals for each system.