Highway Attachment - TXDOT Cable Barrier Installation Policies

HWY22FH001

(7 pages)

Cable Median Barrier Guidance
December 2009

Type. High-tension cable barrier systems

- 3 suppliers are available for use
  - Trinity
  - Nucor
  - Gibraltar
- Each system has a unique post design, cable placement, and end treatment.
- All these systems have the option of being installed in concrete drill shafts with sockets for ease of repair and maintenance.
- Most districts are also placing concrete mow strips with the cable barrier systems for maintenance considerations.

Application. To reduce the likelihood of vehicle median crossovers.

- Table 1 in the Median Barrier Guidance should be referred to when determining the need for barrier based on appropriate medians widths and AADT.

- The cable barrier is for median use only and on medians greater than 25 ft. Median widths of 25 feet or less require the use of a more rigid barrier such as concrete median barrier.

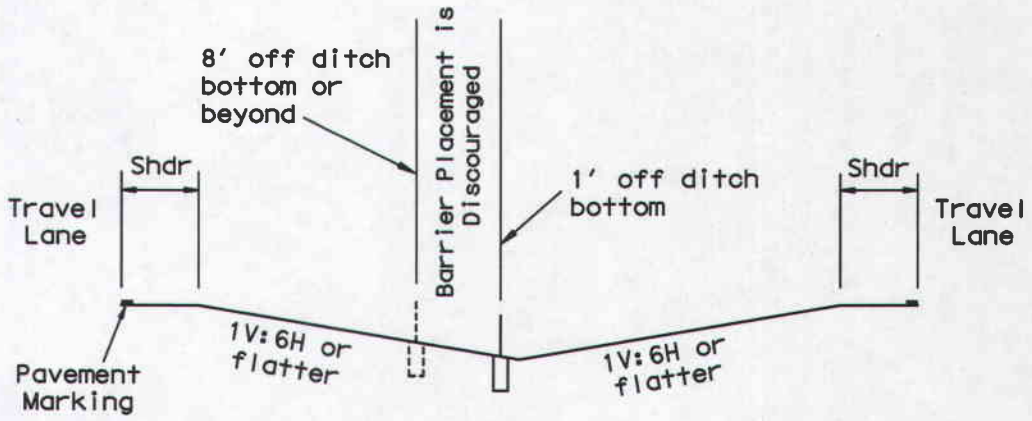
- The selection of Test Level 4 (TL-4) cable barrier over Test Level 3 (TL-3) barrier is at the district's option. FHWA policy requires that all roadside appurtenances such as traffic barriers and barrier terminals used on the National Highway System meet the performance criteria contained in the National Cooperative Highway Research Program (NCHRP) Report 350, Recommended Procedures for the Safety Performance Evaluation of Highway Features or the updated testing procedures found in The Manual for Assessment of Safety Hardware (MASH). Safety features approved to a minimum TL-3 are acceptable for high-speed arterial highways. Any decision to use TL-4 tested barrier should be made based on site conditions and traffic mix, using engineering judgment.

Placement. As a general rule, a barrier should be placed as far from the traveled way as possible while maintaining the proper operation and performance of the system. The more lateral offset afforded a driver, the better the opportunity for the driver to regain control of the vehicle in a traversable median and avoid a barrier impact.

- Although cable barrier was tested to get a maximum deflection of 8', these tests are not based on larger vehicles or extremely long lengths of barrier, and represent only a single series of tests. It is recommended that a minimum clear distance of 12' be maintained from the edge of the travel lane, and between the barrier and any obstruction being protected.

- A 1V:6H approach slope to the cable barrier system from both approach directions is required.

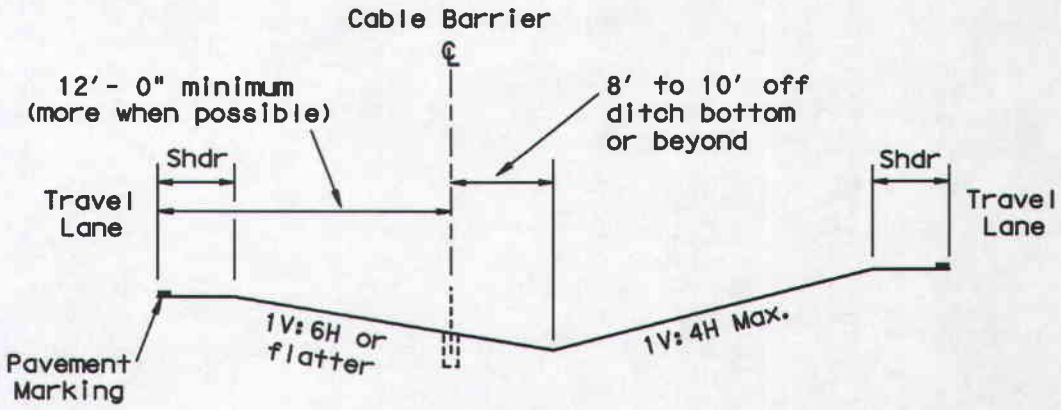
- Placing the system in the area of 1 to 8 feet from the bottom of ditch on the 1V:6H slope is not encouraged. A vehicle's suspension is compressed when it hits the bottom of the ditch and the front bumper may not recover to the bottom cable height within this area. Tests have shown that placing the cable 1 foot from the ditch bottom does capture the vehicles tested.



Preferred Cable Barrier Placement
Within a V-Ditch

Figure 1

- There is some flexibility on the median slope opposite of the cable barrier placement. A maximum 1V:4H slope may be retained as long as the cable barrier is placed on the 1V:6H slope at a distance of 8 to 10 feet from the ditch bottom.



Acceptable Cable Barrier Placement

Figure 2

- The vertical alignment of the system is essential since the location of the bottom cable with respect to the ground is critical to capturing smaller vehicles. Special attention should be placed on sag vertical alignments. The cables and/or posts placed in sockets are free standing (not held down by the system) and will come to a taut elevation between two tangent points when the cable is tensioned creating a larger distance from the ground line to the bottom cable than allowed by the manufacturer's installation manual. Sag vertical alignments with radii of less than a K-Value of 11 should be avoided.

- The placement of the system should also take into consideration the drainage facilities located in the median. Cross drainage structures with less than 36" of cover pose a challenge for placing posts. Structures of less than 16 feet can be spanned and construction of these runs of cable should take these structures into account prior to setting post locations.

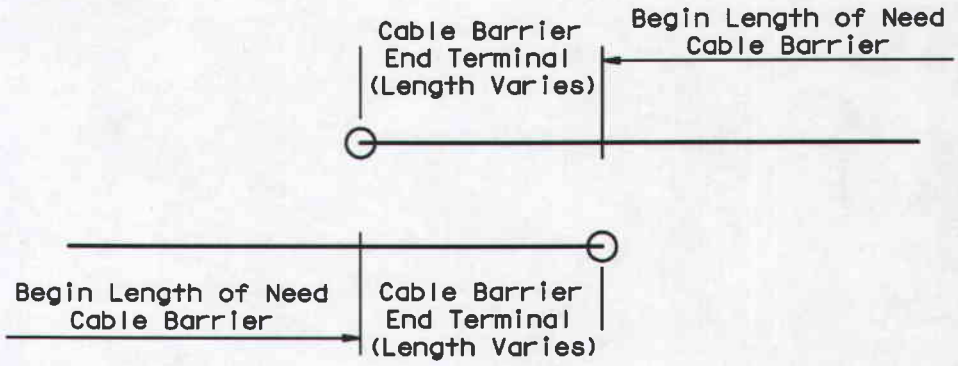
- If an obstruction is currently protected by MBGF and there will be a minimum of 12' clearance from the proposed cable barrier to the obstruction, the MBGF may be removed. If there is less than 12' clearance from the proposed cable barrier to the obstruction, it is recommended that the MBGF be left in place, and the cable barrier be placed such that there is a minimum of 2.5' (5' preferred) from the back of the MBGF posts to the barrier. This allows for deflection of the MBGF without engaging the cable barrier. Cable barrier should be a minimum 5' behind SGT's to allow for extrusion and gating of the end treatment.

- Cable barrier systems deflection is based on it being installed along a tangent or when struck on the "concave" side (from the inside of a curve). When it is struck in the "convex" side (from the outside of the curve) the barrier must deflect enough to redevelop a concave condition. In order to minimize the length over which this occurs, closer post spacing through these curves is recommended. Placement of the barrier on the convex side is also recommended to allow maximum median availability for deflection.

Radius (ft)	Post Spacing
650-2500	6' 8"
2501-5500	10'
> 5500	Standard Recommendation

- A recommended maximum run of cable barrier between anchors should be approximately 10,000 ft. This length allows for proper tensioning of the system and reasonable construction installation time to get a run in operation. Runs of shorter and longer lengths between anchors may be appropriate in specific locations and each run should be determined to meet the field situations.

- When ending a run of cable barrier, the cable barrier terminals should be located, when possible, behind some protection such as the MBGF. The terminals can be placed in locations with no protection, but since they provide the anchorage for the cable barrier system, protecting them from possible hits is recommended. These terminals are also gating (meaning they will not prevent a vehicle from going through). When switching the cable barrier from one median side to the other and the terminals are not protected, overlapping the runs of cable barrier is recommended to provide adequate protection from possible crossovers.



Recommended Cable Barrier Lap Length

Figure 3

Emergency Crossovers. Emergency crossovers may be provided when needed to facilitate emergency and law enforcement vehicles.

- **Location**. When selecting a location for a crossover, the following guidance should be used:
    - Do not install emergency crossovers in urban locations. Interchanges are closely spaced and provide opportunities for making needed turn movements.
    - In rural areas where spacing of interchanges is greater than 3 miles, an emergency crossover may be considered in a favorable location about halfway between the interchanges.
    - Emergency crossovers are not to be spaced closer than 2 mile intervals.
    - The emergency crossover is not to be located within 0.5 mile from any structure that crosses over the highway.
    - The emergency crossover is not to be located within 1 mile from any ramp terminal or other access connection.
    - The emergency crossover is not to be located within curves requiring superelevation.
    - Emergency crossovers should be located where more than minimum stopping sight distance is provided.

- **Construction:**
    - Emergency crossovers utilizing the overlapping of cable barrier as shown above in Figure 3 and depicted in the photo below should be used when possible to provide adequate protection from possible vehicular crossovers.

- Emergency crossovers shall be constructed with a surface treatment using either grade 1 or 2 aggregate which should provide an adequate surface.
- Emergency crossovers shall be no wider than 20 ft. with turning radii of not more than 10 ft.
- To be inconspicuous to mainlane traffic, the surface should be depressed below the shoulder level.

Maintenance. Cable barrier systems must be maintained for best performance.

- Mowing and herbicide operations are life-of-the-facility cost considerations.
- The use of a mow strip (concrete or otherwise) under the cable barrier is also at the district's option but is encouraged to reduce future hand mowing or herbicide operations. If a rigid mow strip is not utilized for the entire length of the system, a concrete mow strip for the length of the anchor section is encouraged for stability of the anchor system. Leave outs for posts, such as those used with MBGF, are not required because the posts are designed to yield (break or bend) at the ground line.
- Distance between the edge of a travel lane and the cable barrier should consider mower widths.
- Mower width considerations also apply to distances between the cable barrier and other objects such as guardrail, bridge columns, and end treatments.
- Repair of damaged barrier should begin within 72 hours of notification.
- Check height and tension of cables on a semi-annual basis.
- Inspect cables for localized damage such as kinks or unseating of cables and broken strands.