



# MEMORANDUM

**TO:** District Engineers

**FROM:** Mark A. Marek, P.E. *mm*

**SUBJECT:** Cable Barrier Systems

---

**DATE:** June 21, 2006

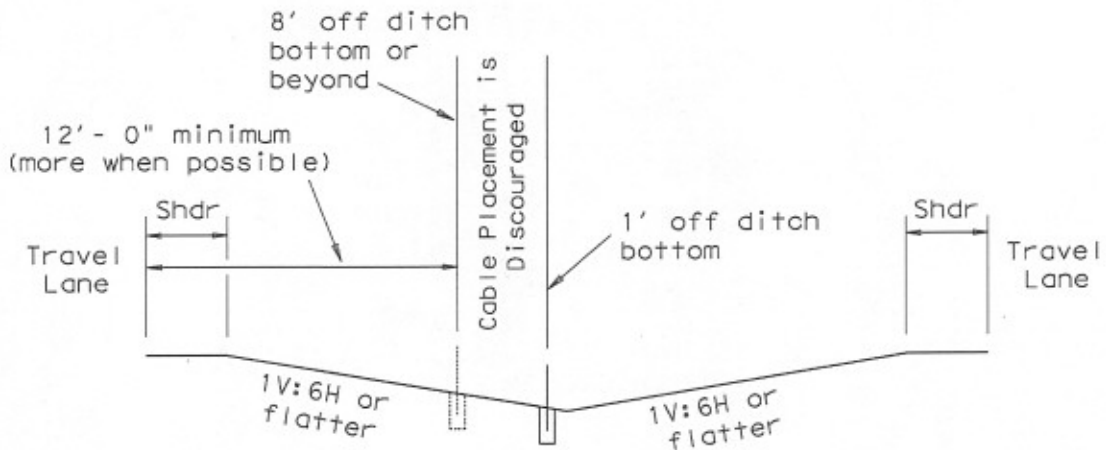
TxDOT uses four suppliers for the high tensioned cable median barriers systems seen across the state, Brifen, Trinity, Nucor (Marion Steel), and Gibraltar. Each system has a unique post design, cable placement, and end treatment. The post spacing has also changed in the past year as each supplier refines their system and tries to be competitive in the market. All these systems are placed in concrete drill shafts with sockets for ease of repair and maintenance. Most districts are also placing mow strips with the cable barrier systems for maintenance considerations.

With almost two years of experience with cable barrier systems in 14 districts, additional guidance for installing these systems have been developed based on field experience, district and suppliers' recommendations, and changes to AASHTO's Roadside Design Guide.

The following should be considered when making the decision to use cable barrier:

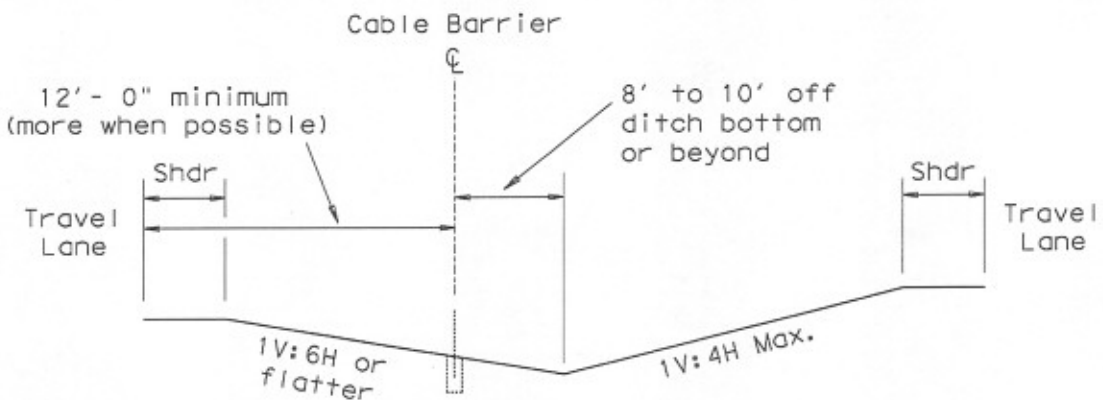
- The cable barrier is for median use only and on medians greater than 25 feet. Median widths of 25 feet or less require the use of a more rigid barrier such as concrete median barrier.
- Although the barrier was tested to get a maximum deflection of 8 feet, these tests are not based on larger vehicles, and represent only a single series of tests. It is recommended that a minimum clear distance of 12 feet be maintained from the edge of the travel lane, and between the barrier and any obstruction being protected. Future mowing requirements should be considered when selecting cable barrier placement.
- 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

- 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.

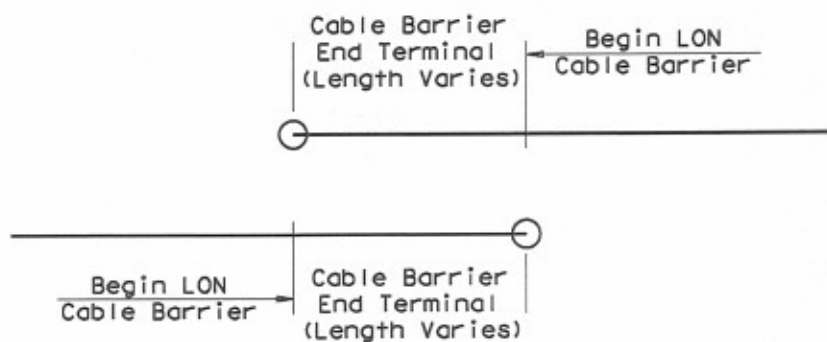


Acceptable Cable Barrier Placement

- 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 manufacturers' 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 inches 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 currently protected by MBGF is located within a run of cable barrier, and there is a minimum of 12 feet clear from the cable barrier to the obstruction, the MBGF may be removed. If there is less than 12 feet clear from the 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 feet (6 feet 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 6 feet behind SGTs 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 on 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	As Shown On Details

- 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. Safety features approved to Test Level 3 (TL-3) are acceptable for high speed arterial highways. Any decision to apply TL-4 should be made based on site conditions, local traffic, and economy, using engineering judgment.
- A recommended maximum run of cable barrier between anchors should be approximately 10,000 feet. 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 at the end of bridges. The terminals are NCHRP 350 crash tested and approved, and 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

A new Special Specification is in the process of being approved and will include:

- The use of only pre-stretched cable.
- The maximum deflection under test conditions will be 8 feet.
- Delineation will be at 100-foot spacing, unless otherwise approved by the engineer.
- A payment option for cable barrier at specified post spacing for tighter horizontal radii within the project limits.

For future maintenance considerations, the Maintenance Division encourages the use of mow strips to reduce future hand mowing or herbicide operations. Distance between the edge of a travel lane and the cable barrier should consider mower widths. The same consideration applies to distances between the cable barrier and other objects such as guardrail, bridge columns, and end treatments. Mowing and herbicide operations are life-of-the-facility cost considerations.

The suppliers are continuing to test and make modifications to these cable systems on an ongoing basis. Together with experience gained in field installations, it is reasonable to expect that additional changes and guidance will be forthcoming.

It is critical that each project considered for any type of barrier installation be analyzed and engineered for specific location requirements, barrier function, and future maintenance considerations. Questions related to barrier selection and placement may be directed to Aurora (Rory) Meza, Design Division, at (512) 416-2678.

cc: Amadeo Saenz, Jr., P.E.  
Thomas R. Bohuslav, P.E., CST  
Zane L. Webb, P.E., MNT  
Joe S. Graff, P.E., MNT  
Carlos A. Lopez, P.E., TRF  
Rory Meza, P.E., DES