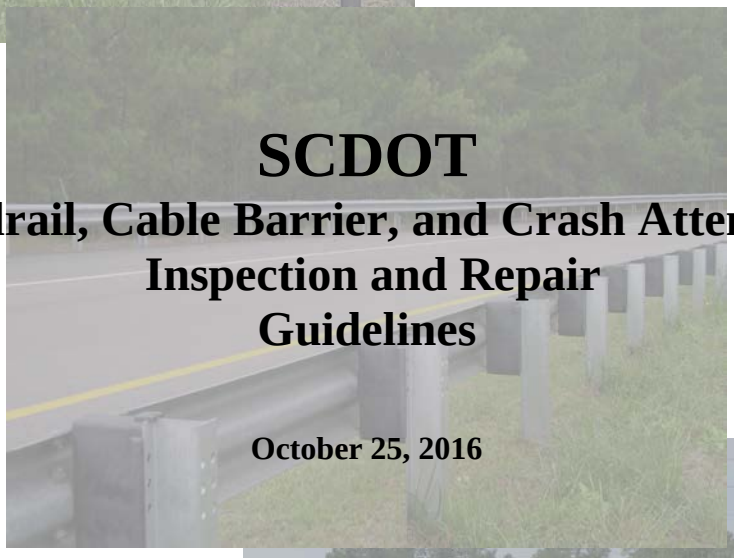

SCDOT

Guardrail, Cable Barrier, and Crash Attenuator Inspection and Repair Guidelines

October 25, 2016

Contents

Introduction

Barrier systems and crash attenuators are installed to restrain and redirect vehicles from potentially hazardous areas or obstacles. The Maintenance Division is presently responsible for the inspection, maintenance, and repair of over eight million linear feet of guardrail, over thirty-six thousand end anchor systems, 470 miles of median cable barrier and 150 crash attenuators presently located within the Department's rights-of-way.

The Maintenance Division conducted an inventory of all guardrails and associated end anchors in 2004 and 2005. This inventory was the first comprehensive review of the guardrail located along the Department's roadways and provided not only a physical count of this feature, but included an inventory of the repairs necessary to meet current standards. It is extremely important that this inventory of guardrail be kept current. Therefore, the inventory spreadsheet located on the Maintstateshare Directory must be updated as additional guardrail is installed or existing guardrail is repaired or removed. Inventories for the cable barrier and crash attenuator systems are also located on the Maintstateshare Directory. It is the District's responsibilities to ensure that they are complete and kept up to date.

The following guidelines provide guidance for the inspection, maintenance and prioritizing the repair of these systems. This manual is not intended to provide instruction as to how the repairs are to be performed. That information is provided in training material on the repair of each of system type.

Guardrail

Inspection

All guardrails and end treatments on the Interstate system will be formally inspected in detail every **three years** and immediately upon notification that damage has occurred. Guardrail located on all non-interstate routes will be inspected every **five years**. These inspections should be hands-on, conducted while walking the entire segment of rail, and entered in the Highway Maintenance Management System (HMMS) using the "Inspection" activity and the "Guardrail" work description. All discrepancies shall be entered into the HMMS Work Request module and repaired in accordance with the guidelines set forth in this document. Outstanding work items, whether done under contract or by in-house staff, should be cleared once the work has been completed. The Guardrail Inspection Form (Appendix A) should be completed for each section of guardrail. Inspection records should be retained for three calendar years. The District Engineering Administrator will notify the Director of Maintenance by January 10th following the year that the inspections were conducted. A document summarizing the inspection of all barrier systems may be found in Appendix B.

Routine drive-by inspections for the purpose of discovering damage should be conducted as a part of the roadway inspections (see EDM 8 for frequency) and documented in HMMS using the "Inspection" activity and the "Roadway" work description. The following are some of the things that should be noted during the formal walking inspection:

- Check guardrail for damage as well as any signs of rust and deterioration, it should have good alignment and present a smooth path
- Check all nuts and bolts for tightness and proper size
- Check all offset blocks for proper position, they should align with the post and should not be twisted
- Check all timber posts for damage, rot or insect infestation
- Check steel posts for rusted, bent or badly deflected posts
- Check rail to ensure proper height from ground to top of rail (conform with current standard drawing), a buildup of material along the shoulder and beneath the guardrail can put the rail at the wrong height
- Check the shoulder and area beneath the guardrail for excessive erosion and ruts that could snag the wheel of an errant vehicle or not provide sufficient support of the posts

- Check the shoulder width behind the posts to ensure they are properly supported (necessary shoulder width may be reduced if extra long posts are used)

Repairs

There are many types of damage that result from crashes and normal maintenance operations such as pulling shoulders and vegetation management. Upon discovery of damage, all debris should be cleared from the shoulder and temporary warning devices should be placed to warn motorists of the damage if it cannot be repaired immediately. (See Appendix C) Repairs must be prioritized based on the severity and functionality of the guardrail. Damage will be classified as follows:

- Severe - Guardrail or end treatment damage is so severe that it no longer functions as designed or has become a hazard to the traveling public
- Moderate - Guardrail or end treatment is obviously damaged but will still perform as designed for most traffic conditions
- Minor - Guardrail or end treatment damage is minor and though not aesthetically pleasing, it will still perform its intended function

Severe damage should be repaired by the end of the fourth day after notification, excluding days where work is completely restricted by the Department. (This could be longer if rail has to be ordered with a unique radius etc.) If repairs are outsourced, the contractor should be notified within 24 hours of damage discovery. Examples of severe damage include situations where the rail beam is pulled completely apart and/or there are at least three or more consecutive posts that are broken off or are no longer attached to the rail. (This also includes rail that has three or more consecutive rotten posts.) The rail will usually be 12 inches or more out of alignment. Severe damage is not difficult to identify, as it is obvious that the guardrail will not redirect an errant vehicle, or prevent a vehicle that leaves the paved portion of the roadway from striking a hazard.

Moderate damage is obvious to the inspector and of such a degree that it should function in most traffic conditions. The rail can be badly bent or crushed, but it is not separated anywhere. There are no more than two consecutive posts that have been broken or separated from the rail. The rail is usually pushed out of alignment less than 12 inches. Guardrail that does not meet the height requirements falls into this category. Damage of this nature should be repaired along with other scheduled work, but no later than ninety (90) days from the date of discovery.

Minor damage is usually more aesthetic than structural. In most cases the damage may not be bad enough to warrant repair. There may be numerous types of dings all along its length and still be very safe and perform properly. As long as the rail can perform its intended purpose, repairs should not be made until convenient to the work schedule and all severe and moderate repairs have been completed.

New Installation

Each District shall develop a list of locations that have been identified for the installation of new guardrail (where rail does not presently exist). Reference the "*AASHTO Roadside Design Guide*" and SCDOT Standard Drawings for guidance concerning warrants and placement criteria. The District will be responsible for specifying the appropriate barrier system. Contact the SCDOT Preconstruction Support Engineer for advice with complex scenarios. Each location should be prioritized using the procedure outlined in Appendix D and the appropriate barrier system installed as funding becomes available. Each District Engineering Administrator shall make the determination regarding available funding in his/her District. Once funding has been identified, the District will enter the necessary quantities into the Contract Bid Estimating System and provide a letting packet for inclusion in the next available project letting.

Temporary Warning Devices

If the guardrail is still functional and will perform its intended purpose for most traffic conditions, the placement of temporary warning devices will not be necessary. Temporary warning devices should only be used when the guardrail no longer functions as designed and could itself become a hazard. Warning devices should remain in place until repairs have been made. Devices used will be dictated by the proximity of the guardrail to the edge of the travel way and the space available for their placement. Flashers should be considered for use on devices that will remain in place during hours of darkness. See Appendix C for guidance regarding warning devices and their placement.

Estimating Parts and Materials

Typical elements of the W-beam guardrail on blocked-out wood posts. (See standard drawings)

- 12'-6" galvanized steel W-beam rail sections (rail also comes in 25' and 37'-6" lengths)
- Eight each 5/8" x 1-1/4" galvanized button head (carriage) bolts with recess nuts for each splice in the rail
- One each 5/8" x 18" long galvanized button head (carriage) bolt with washer and recess nut for fastening rail to wooden post with wooden or composite offset block
- One 6" x 8" x 14" treated wood or composite offset block for each post
- 6" x 8" x 6'-0" treated wood posts
- 16d galvanized nails to keep offset block aligned with post

Typical elements of the W-beam guardrail on blocked out steel posts. (See standard drawings)

- 12’-6” galvanized steel W-beam rail sections (rail also comes in 25’ and 37’-6” lengths)
- Eight each 5/8” x 1-1/4” galvanized button head (carriage) bolts with recess nuts for each splice in the rail
- One each 5/8” x 10” long galvanized button head (carriage) bolt with washer and recess nut for fastening rail to steel post with wooden or composite offset block
- One wood or composite 6” x 8” x 14” offset block for each post
- Steel post – W6 x 9 AASHTO M270 Grade 36 zinc coated galvanized

Typical elements of Thrie-beam guardrail on blocked out steel posts. (See standard drawings)

- 12’-6” galvanized steel Thrie-beam rail sections (rail also comes in 25’ sections)
- Twelve each 5/8” x 1-1/4” galvanized button head (carriage) bolts with recess nuts for each splice in the rail
- Two each 5/8” x 10” long galvanized button head (carriage) bolt with washer and recess nut for fastening rail to steel post with wooden or composite offset block
- One wood or composite 6” x 8” x 21-3/4” offset block for each post
- Steel post – W6 x 9 AASHTO M270 Grade 36 zinc coated galvanized

Checklists are provided in the attached Appendices for use in computing the required parts and hardware necessary to return the guardrail to service. (See Appendix E, F, & G)

Note: See Standard Drawings for end treatment details

Cable Barrier

The cable barrier that has been installed on our interstates and select primary routes provides protection to the traveling public against cross-over crashes. This system is to be maintained to the highest level of service that resources allow. In order to achieve this high level of service the maintenance of this system will be performed by the private sector under contract.

Inspection

All cable barrier systems will be formally inspected on an annual basis using the "**Cable Barrier Inspection Report**" form (see Appendix H). These inspections should be hands-on, conducted while walking the entire segment of barrier. They should be documented in HMMS using the "Inspection" activity and the "Guardrail" work description or in SiteManager via the daily diary depending on who performs the inspection. Inspection records should be retained for three calendar years. The District Engineering Administrator will notify the Director of Maintenance by January 10th each year that the inspections have been completed. A document summarizing the inspection of all barrier systems may be found in Appendix B.

Cable barrier should be inspected two to three times per week preferably each Monday and then in the latter part of the week and documented in HMMS under the "Inspection" activity and the "Roadway" work description. These inspections will be drive by inspections. Look for damage such as slack or down cables, and leaning posts. Discrepancies should be noted on the **"Cable Barrier Inspection Report"** form.

Repairs

Discrepancies noted on the "**Cable Barrier Inspection Report**" form should be immediately faxed to the appropriate construction office tasked with administering the cable barrier maintenance contract. The contractor should be notified immediately or no later than the close of the next business day after receiving the inspection report. Repairs should be completed by the end of the fourth day after contractor notification, excluding days the contractor may be completely restricted from performing work by the Department. See the contract document for complete specifications and requirements.

Temporary Warning Devices

Temporary warning devices should be used to delineate sections of cable barrier that is no longer functional. Warning devices should remain in place until repairs have been made. See Appendix C for guidance regarding warning devices and their placement.

Crash Attenuators

Crash attenuators are placed at locations with fixed objects in order to lessen the severity of an impact with the object being protected.

Inspection

All attenuators will be formally inspected on an annual basis and immediately upon notification that damage has occurred. This includes a thorough detailed inspection of all parts and mounting hardware. These inspections shall be entered in the Highway Maintenance Management System (HMMS) using the "Inspection" activity and the "Guardrail" work description. All discrepancies shall be entered into the HMMS Work Request module as Activity Code 613-Impact Attenuators/Terminal and repaired in accordance with the guidelines set forth in this document. Work Requests, whether done under contract or by in-house staff, should be completed or closed once the attenuator is repaired. Inspections should be documented using the **"Crash Attenuator Inspection Report"** (see Appendix I). Once repairs are completed the Attenuator Inventory Spreadsheet located in the Maintstateshare/Attenuator folder should be reviewed to ensure that it is up to date. Inspection records should be retained for three calendar years. The District Engineering Administrator will notify the Director of Maintenance by January 10th each year that the inspections have been completed. A document summarizing the inspection of all barrier systems may be found in Appendix B.

Drive by inspections for the purpose of identifying damage shall be performed during roadway inspections. This inspection should be documented in HMMS as a part of the roadway inspection using the "Inspection" activity and the "Roadway" work description.

The following descriptions will be used to classify the condition of an attenuator system:

- Good – unit contains minimal deterioration and will provide the desired level of performance under impact. Minor weathering and aging that does not affect the function of the system should be ignored when classifying a unit to be in good condition.
- Fair – unit contains some deteriorated components, but will provide the desired level of performance under impact.
- Poor – unit contains deteriorated components and/or deficiencies that effectively reduce its ability to provide the desired level of performance and should be repaired or replaced.

Repairs

Damage or deterioration that affects the ability of the attenuator to perform its intended function (poor condition) should be repaired by the end of the fourth day after discovery or as soon as the necessary parts can be obtained. Work on units rated in fair condition should be done as work schedules and budget permit, since units in this condition will still perform their intended function. Repairs should be performed only by trained individuals that are familiar with the repair and maintenance requirements of the unit in question, and in accordance with the manufacturers' manuals, training and engineering advice for repair and installation of their products.

Attenuators that are significantly damaged (more than 50% of the cost of a new unit) should be replaced entirely with a system that meets the latest applicable standards.

Temporary Warning Devices

If the attenuator is still functional and will perform its intended purpose, the placement of temporary warning devices will not be necessary. Temporary warning devices should only be used when the attenuator will no longer function as designed. Warning devices should remain in place until repairs have been made. Devices used will be dictated by the proximity of the attenuator to the edge of the travel way and the space available for their placement. Flashers should be considered for use on devices that will remain in place during hours of darkness. See Appendix C for guidance regarding warning devices and their placement.

Estimating Parts and Materials

Manufacturers publish literature for each attenuator system regarding operational characteristics, maintenance checklists, repair procedures, and a materials list for parts replacement. This information may be requested from each manufacturer. The Crash Attenuator Inspection Report lists the most common attenuator elements.

Recovery for Damages

The cost for all repairs to guardrail, cable barrier, and crash attenuators damaged as a result of the negligent operation of a motor vehicle by a third party (whether performed in house or by contract forces) should be documented and furnished to the Claim's Office along with the location and description of the damage. See Departmental Directive No. 21 for complete instructions.

Appendices

Appendix A

Guardrail Inspection Form

General Information					
Date of Inspection	District	County	Road Type	Route Number	Aux

Guardrail Segment Information		Guardrail Condition	
Guardrail Identification Number		Measured Height to Top of Rail (Inches)	
Guardrail ID Tag Condition		Number of Rotten Posts	
Guardrail Segment Length (feet)		Highest Number of Consecutive Rotten Posts	
Direction of Travel (N,S,E,W)		Number of Posts with Missing or Loose Hardware	
End Terminal	Type: _____ Quantity: _____	Highest Number of Consecutive Posts with Missing or Loose Hardware	
Shoulder Condition	☐ Good ☐ Poor	Guardrail Damaged? ☐ Yes ☐ No	

Damaged Guardrail Information			
Type of Damage: ☐ Severe ☐ Moderate ☐ Minor			
Length of Damage (feet):		End Terminal Damaged? ☐ Yes ☐ No	
Measured Horizontal Misalignment (inches):		Number of Damaged Terminals:	
Number of Damaged Posts:		Highest Number of Consecutively Damaged Posts:	

Notes or Comments:

Inspected By: _____ _____

(Name) (Signature)

Appendix B

Inspection Calendar

Guardrail Inspections

Formal walking hands-on inspection – every three years for interstate routes and every five years for non-interstate routes
Inspect for damage – during drive by inspections
Reports – due to Director of Maintenance January 10th of the year following the inspection cycle

Cable Barrier

Formal walking hands-on inspection – annually
Inspect for damage – two or three times per week (drive by inspection)
Reports – due to Director of Maintenance January 10th each year

Crash Attenuators

Formal walking hands-on inspection – annually
Inspect for damage – during roadway inspections (drive by inspection)
Reports – due to Director of Maintenance January 10th each year

Appendix C

DELINEATION OF DAMAGED BARRIER SYSTEMS

Delineation of Damaged Guardrail

Sections of damaged barrier on the Interstates and other roadways with speeds greater than 55 MPH should be delineated with drums. (Use drums included on the *Approved Products List for Traffic Control Devices in Work Zones*.) Drums should be made of light weight plastic, a minimum of 36" in height with a minimum width of 18". Drums should be reflectorized with Type III High Intensity retroreflective sheeting with two orange and two white retroflective bands four to six inches in width. The bands should alternate with an orange band always at the top. Three drums should be placed prior to the damaged area and additional drums should be placed along the damaged area at ten foot spacing. A minimum of five drums should be used. If a section longer than twenty feet is damaged, the drums should be continued throughout the damaged section at ten foot spacing.

On all other roadways, cones should be used to delineate the damaged area. The cones should be a minimum of twenty-eight inches in height and be retroreflectorized. Three cones should be placed prior to the damaged area and additional cones should be placed along the damaged area at ten foot spacing. A minimum of five cones should be used. If a section longer than twenty feet is damaged, the cones should be continued throughout the damaged section at ten foot spacing.

Delineation of Damaged Median Cable Barrier

Sections of damaged cable barrier on all roadways should be delineated with thirty-six (36") retroreflectorized cones. Three cones should be placed at the beginning of the damaged area and three cones should be placed at the end of the damaged area at ten foot spacing. If a damaged section is two hundred feet (200') or longer, the cones should be continued throughout the damaged section at one hundred (100') spacing. Cones should be placed on the side of the cable barrier that is nearest to the travel way.

Delineation of Damaged Crash Attenuators

Damaged attenuators on all roadways should be delineated with retroreflectorized drums. One drum should be placed in front of the attenuator and one drum should be placed on each side of the attenuator. If the attenuator is larger than a six bay unit, an additional drum should be placed on each side.

If space does not permit the placement of the drums, thirty-six (36") retroreflectorized cones may be used instead of drums.

Appendix D

Guardrail Priority Ranking

This procedure was developed to provide a priority ranking database of roadway segments where guardrail installation may be warranted.

Methodology

Each segment of roadway will be compared by the following criteria:

- Accident Severity Index - Accident Severity Index is calculated with the standard severity index calculation:

  ((12 x Fatal Accidents) + (3 x Injury Accidents) + Property Damage Only Accidents) / (365 x # of Years Accidents researched x Length of Section Researched x ADT)

- [1]Hazard Severity Index for each hazard to be protected - Hazard severity index is based on the crash experience over the past 5 1/2 years (January 2002 – June 2007) of roadside hazards statewide. The index was calculated by using the following modified severity index calculation for a specific roadside hazard:

  ((12 x Fatal Accidents) + (3 x Injury Accidents) + Property Damage Only Accidents) / (Total Accidents)

- ADT of the roadway segment

All roadway segments are compared in order of descending accident severity index, then hazard severity index and then ADT to determine the final ranking. This places the highest priority on the roadway segments where crashes are occurring by first prioritizing on Accident Severity Index. However, a number of these segments will not have any recorded crashes during the study period or may have the same Accident Severity Index. In these cases, the descending order of the Hazard Severity Index will place the highest priority on the most severe hazard, as determined by the above calculation that is to be protected. The final criterion utilized in the ranking process is the ADT. This is used when the other criteria are equal and places the highest priority on the highest ADT segment, which equates to the highest exposure factor. The final ranking encompasses all three criteria into one overall ranking priority.

Database

A Guardrail Priority Ranking database has been developed to automate the ranking process. This database may be found on the Maintenance server in the Maintstateshare/Guardrail-Traffic Signal folder. This database includes data entry screen, Run Program button, and a Print Final Ranking button.

[1]This database also includes the Hazard Severity Index information. There is no data entry required from the operator to obtain this information.

Data Entry Screen:

In this screen, the basic data such as County, Route, beginning and ending milepost and ADT is input for the roadway segment. Please note that there is a field "Installed" in the entry screen. This field is utilized to remove a segment from the ranking when the guardrail has been installed, but the data for the segment will be retained in the database. In addition, the crash data for this specific location must be entered. This will include the number of fatal, injury and property damage only crashes and the timeframe of the crash study in years in decimal form. This crash data is utilized to calculate the Accident Severity Index. The final data input is to select the hazard type that will be protected by the installed guardrail. This selection will be accomplished from a drop down menu in the data entry screen. The hazard types listed were generated from the output of the crash experience noted in the methodology section for the Hazard Severity Index.

Run Program button:

The database has been programmed to perform all calculations and prioritization of the roadway segments entered into the database. **Please note that the program must be run every time a new location is added or when any data is updated.**

Print Final Ranking button:

This button provides a printout of the roadway segments in priority ranking.

Appendix E

W-Beam on Blocked-out Wood Posts
Check List of Materials for Repair

Item	Compute	Number Needed
W-Beam galvanized steel rail section 12'-6" long	Tally # of damaged sections	
5/8" x 18" long bolts with nuts for connecting rail to post and block	(# sections x 2) + 1	
5/8" x 1-1/4" long bolts with nuts for rail splice connections	(# sections x 8) + 8	
6" x 8" x 6'- 0" wood treated post	(# sections x 2) + 1	
6" x 8" x 14" wood or composite spacer block	Same as # of posts	
16d galvanized nails		

Note: Guardrail designs change over the years. When sections of older guardrail are repaired they should be replaced in accordance with the latest Standard Drawings.

Other Items Needed

Item	Compute	Number Needed

Appendix F

W-Beam on Blocked-out Steel Posts
Check List of Materials for Repair

Item	Compute	Number Needed
W-Beam galvanized steel rail section 12'-6" long	Tally # of damaged sections	
5/8" x 10" long bolts with nuts for connecting rail to post and block	(# sections x 2) + 1	
5/8" x 1-1/4" long bolts with nuts for rail splice connections	(# sections x 8) + 8	
6'- 0" W6 x 9 steel post	(# sections x 2) + 1	
6" x 8" x 14" wood or composite spacer block	Same as # of posts	

Note: Guardrail designs change over the years. When sections of older guardrail are repaired they should be replaced in accordance with the latest Standard Drawings.

Other Items Needed

Item	Compute	Number Needed

Appendix G

Thrie-Beam on Blocked-out Steel Posts
Check List of Materials for Repair

Item	Compute	Number Needed
Thrie-Beam galvanized steel rail section 12'-6" long	Tally # of damaged sections	
5/8" x 10" long bolts with nuts for connecting rail to post and block	(# sections x 4) + 2	
5/8" x 1-1/4" long bolts with nuts for rail splice connections	(# sections x 12) + 12	
6'- 0" steel post	(# sections x 2) + 1	
6" x 8" x 21-3/4" wood or composite spacer block	Same as # of posts	

Note: Guardrail designs change over the years. When sections of older guardrail are repaired they should be replaced in accordance with the latest Standard Drawings.

Other Items Needed

Item	Compute	Number Needed

Appendix H

Cable Barrier Inspection Report
Notes: MM = Mile Marker

Contractor Notification:	**Date:**	**Time:**
Mobilization:	**Date:**	**Time:**
Repairs Complete:	**Date:**	**Time:**

SCDOT CONTACT:
TELEPHONE:

Note: All quantities are estimated and subject to change .

Date of Hit	MILE MARKER	County Code	Mobili-zation	Traffic Control Typical X	Traffic Control Typical XIII	Remov. & Dispo. of End Anchor	Remov. & Repl. of End Anchor	C. Z. Change. Mess. Sign	Cable Bar. Delin.-Yellow	Reset Med. Cable Barrier	Cable Barrier Tension	Cable Barrier Post	Cable Splice	Cable	J Hook	Cab.Bar. End Anchor (Maint.)	Reset Cab.Bar. End Anchor	Repair Cab.Bar. End Anchor	Remarks
			EA	EA	EA	EA	EA	EA	EA	LF	EA	EA	EA	LF	EA	EA	EA	EA	

SCDOT Inspector Signature: **Date:**

Contractor Signature: **Date:**

Appendix I

CRASH ATTENUATOR INSPECTION REPORT

ROUTE	DIRECTION	INVENTORY NUMBER	POSTED SPEED	LOCATION DESCRIPTION	
ATTENUATOR TYPE		TYPE BACKUP	# OF BAYS	UNI-DIRECTIONAL OR BI-DIRECTIONAL	MODEL NUMBER

A. GENERAL	YES	NO
1. Is the current inventory data correct? If not, note the corrected data in the above spaces in red.	_____	_____
2. Is the installation in accordance with the site design? If not, explain who authorized the change and why in the following space.	_____	_____
_____		
_____		
3. Is the attenuator delineated in accordance with the current standards?	_____	_____
4. Is the general appearance of this unit satisfactory?	_____	_____
5. Is the unit number attached?	_____	_____

B. PERFORMANCE	YES	NO
1. Does the unit show evidence of:		
a. vehicle impact or damage?	_____	_____
b. non-design impacts?	_____	_____
c. angle hits?	_____	_____
d. vandalism?	_____	_____
e. Anchorage failure?	_____	_____
2. If the unit sustained a hit, did it adequately protect the hazard?	_____	_____
3. Has the unit deteriorated or been impacted beyond repair?	_____	_____
4. Does this location need additional study as to site and design selection criteria?	_____	_____

C. CONDITION	ACTION NEEDED	OK
1. Check the Unit for Proper alignment	_____	_____
2. Check the unit for debris, sand or vegetation around, under or on the unit.	_____	_____
3. Check the anchorage and backup assembly for firm attachment, position, fit, etc.	_____	_____
4. Check the concrete pad and / or concrete backup for cracks, splits, spalling, etc.	_____	_____

C. CONDITION (cont'd)

	ACTION NEEDED	OK
5. Check all componets (where applicable) for deformaties, corrosion, position, tension, tightness, vandalism, installation, etc.		
a. Nose Cover / Nose Section		
b. Cartridges / Sand Containers		
c. Guidance Cable		
d. Chain Rail / Monorail		
e. Fender Panels		
f. Transition Panels		
g. Anchor Bolts		
h. Diaphragm		
i. Mushroom Bolts (GREAT, QUADGUARD)		
j. Mushroom Bolt Deflector (GREAT)		
k. Support Legs		
l. Bolts, Nuts, Washers		
m. Shear Bolts		
n. Backup System		
o. Other _____		
p. Other _____		
q. Other _____		
r. Other _____		

E. COMMENTS AND CORRECTIVE ACTION

F. PARTS NECESSARY FOR CORRECTIVE ACTION

INSPECTED CONDITION (Circle One)

GOOD FAIR POOR

DATE	**INSPECTOR(S)**
DATE	**CORRECTIONS COMPLETED BY**