Trends and Cost Benefits of: Low-Maintenance Impact Attenuators

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The Benefit of an Impact Attenuators

1. This is a simple gore location with adequate signage.
2. This attenuator has been impacted <u>48 times</u> in four years averaging one time per month.
3. Most impacts are at full speed with no skid marks.
4. These impacts would most likely have resulted in multiple fatalities without an attenuator!

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Types of Attenuators

1. **Non-Redirective Attenuators are sacrificial, allow penetration and do not redirect vehicles.**

2. **Standard Duty Redirective Attenuators have sacrificial parts and high maintenance costs.**

3. **Low Maintenance Attenuators are designed for fast and low cost repairs.**

A Low-Maintenance Impact Attenuator (LMIA) has the following benefits:

1. **Quicker repair times reduce exposure of maintenance workers and the traveling public.**
2. **Can produce dramatic savings on the cost of repair parts.**
3. **Can result in a substantial reduction of spare parts inventory costs.**

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Why are Quick Repair Times Important?

1. Worker exposure is very important.
2. These workers are extremely vulnerable!
3. One intoxicated, texting or distracted driver can mean life or death!
4. A 30 minute repair instead of 4-6 hours has tremendous value.
5. Maintenance Supervisors know this but sometimes have no authority over specifications.

LMIA Parts Advantages!

1. Systems that require a lot of parts cause:
   A. Increased labor and parts costs
   B. Extended delays in repairs waiting for parts
   C. Multiple trips back to the Maintenance yard to get additional parts that weren't anticipated
   D. Longer repair times that reduce other maintenance output
   E. Longer traffic delays during repairs
   F. Substantial inventory usage and carrying costs
   G. Increased hazard exposure of the traveling public

Human Nature and Quick Repair Times

1. If an attenuator needs a lot of parts and is hard to repair, it is human nature to put off or delay these repairs.
2. These two pictures are six months apart but on Google Earth, this location has never been maintained properly from 2007-2015 and is a very dangerous situation.

3. If this attenuator repair was a simple repair, the situation may not exist.

Attenuator Cost Studies

1. There is now enough research to verify attenuator repair costs and produce an LMIA List.
2. The most important factor of these reports is that they were produced by independent sources.

Attenuator Cost Study Findings

1. We found independent data reports from eight states.
   A. Minnesota - ATSSA Presentation of Data
   B. Washington - Actual cost study
   C. Iowa – In-depth cost study of all attenuators
   D. Wisconsin - Information provided to MwRSF
   E. Arizona - Justification info for Sole Sourcing
   F. Kansas - Justification info for Sole Sourcing
   G. Nevada - Justification info for Sole Sourcing
   H. Pennsylvania – Email and Tracking from purchasing officer

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Attenuator Cost Study Findings

1. This spreadsheet includes the independent data.
   A. Most data included traffic control costs.
   B. In most cases, you can see a reasonably consistent pattern across the sheet for each attenuator.
   C. These documents are available upon request.

AVERAGE COST OF ATTENUATOR REPAIRS AS REPORTED BY STATES AND COST STUDIES										
System	MN	WA	IA	WI	AZ	KS	NV	PA	AVERAGE	% More than SCI
SCI Smart Cushion	$844	$400	$2,804	$659	$2,930	$1,153	$192	$600	$1,198	100%
QuadGuard	$7,272	$4,750	$8,415	$9,993	$6,356	$6,270	$5,960	$9,000	$7,252	605%
QuadGuard Elite		$3,750		$8,625					$6,188	517%
REACT		$2,600	$7,948	$4,819	$8,898				$6,066	506%
TAU II	$5,262	$4,400	$6,550	$6,615	$6,550				$5,875	491%
TRACC			$9,900	$9,106	$9,900				$9,635	804%
Include Traffic Control and Labor	X	X	X	X	X			X		

A Case Study On One Location

1. This location was previously shown.
2. It had 48 impacts on the same unit over 4 years.
3. It is assumed that most impacts are close to full speed as the maintenance supervisor stated that there are rarely any skid marks.
4. Also, one impact was witnessed by this supervisor and was at full speed and the woman walked away.

A Case Study On One Location

1. The Nevada DOT ran a maintenance report on this location that included the costs of:
   A. Labor
   B. Materials – Repair Parts
   C. Equipment
   D. Stockpile – Inventory Costs
2. Again, these impacts are all on the same unit which was verified by the Nevada DOT.
3. The system, in this case, was an SCI Smart Cushion.

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A Case Study On One Location

1. These are the totals generated from the report.

IMPACT COUNT	DIVISION	DATE	ROAD	MP FROM	TASK	CAUSE	LABOR COSTS	MATERIAL COSTS	EQUIPMENT COSTS	STOCKPILE COSTS	TOTAL COSTS
46	C252	12/23/2017	IR 580	25	Repair / Replace / Install End Treatment Or Impact Attenuator	Accident	$69.82	$0	$30.56	$0	$100.38
47	C252	12/28/2017	IR 580	25	Repair / Replace / Install End Treatment Or Impact Attenuator	Accident	$126.62	$70	$98.60	$0	$295.22
48	C252	12/29/2017	IR 580	25	Repair / Replace / Install End Treatment Or Impact Attenuator	Accident	$126.62	$0	$98.60	$0	$225.22
						Totals	**$7,031.64**	**$1,777.50**	**$5,065.42**	**$0.00**	**$13,874.56**

2. With all Costs, the average cost of repair was $289.

Total Impacts	48
Averages	
Labor	$146
Materials	$37
Equipment	$106
Stockpile	$0
Total	$289

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A Case Study On One Location

1. **Using our previously shown averages for other attenuators, you can now see the financial impact of just ONE location.**
2. **Not to mention, this location was quickly maintained due to the frequency of impacts.**

Nevada Location Comparison				
System	Average	# Impacts	Total Cost	Additional Cost Vs. Low Maintenance
SCI Smart Cushion	$289	48	$13,875	
QuadGuard	$7,252	48	$348,096	$334,221
QuadGuard Elite	$6,188	48	$297,000	$283,125
REACT	$6,066	48	$291,180	$277,305
TAU II	$5,875	48	$282,019	$268,144
TRACC	$9,635	48	$462,496	$448,621

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Safety

Having a system that can be repaired quickly, properly and at low cost has a direct correlation to:

1. **Minimizing the exposure that the traveling public has to an unprotected hazard**
2. **Minimizing worker exposure**
3. **Minimizing an agencies' financial burden**

Current U.S. LMIA Use

1. In the US, there are 31 states that recognize the need for an LMIA.
2. Less populated and smaller DOT's have less need and some are slow to recognize the cost benefits of an LMIA.
3. You do not need LMIA in all locations as systems far from the roadway or in rural applications may rarely be impacted.

LMIA Use

1. The required use of an LMIA is usually done thru categorization.
2. This categorization spells out two things:
   a. When to use an LMIA.
   b. What is the qualification/inclusion criteria for an attenuator to be considered an LMIA.

Criteria To Be A LMIA

1. **The Chapter 8 of the Roadside Design Guide also talked about the attributes required to be considered an LMIA.**
   - **A. Repair parts of <$1000 for EACH NCHRP 350 and/or MASH Impacts**
   - **B. Repair times of <1 hour**

> Low Maintenance/Self-Restoring Crash Cushions—To be included in this category, a threshold on repair parts could be considered, perhaps $1000 per impact. Similarly, a threshold on repair time could be established, such as a repair time for a four-person crew of one hour or less. Such criteria may be defined based on frontal and side impacts approximating the severity of crash test impacts. It may be reasonable to expect reporting of repair cost and time results from a yet-to-be established minimum number of real-world impacts before a device would be formally incuded in this category.

   - **C. It also states that these repair times and the cost data needs to be well documented and substantiated.**

When to Use a LMIA

1. **The Chapter 8 of the Roadside Design Guide has very good criteria on when to use an LMIA. Locations are:**
   - **A. All Gore Locations**
   - **B. Roads with >25,000 ADT**
   - **C. Sites requiring night repairs**
   - **D. Locations within 10 feet of the roadway**

- Low Maintenance/Self-Restoring Crash Cushions—ADT of 25,000 or more; history or expectation of multiple impacts each year; sites with repair time limitations, locations within 10 feet of the traveled way, sites requiring night repairs, and gore locations.

Maintenance Contracts

1. **Maintenance Contracts need to be mentioned.**
   - A. **These contracts many times mask the exorbitant costs of these repairs.**
   - B. **Many times this is a profit center desiring a high cost of repair.**
   - C. **Whether an agency sees the costs or doesn't see them, it is there.**
   - D. **The Public is paying for it one way or another.**

Summary

- **Impact attenuators play a vital part in the safety of our roadways.**
- **Proper maintenance of attenuators can put an extreme burden on the transportation budget.**
- **Using a Low Maintenance Impact Attenuator can make your roadways much safer while providing you with a dramatic reduction in costs.**
- **Creating criteria of when to use an LMIA is important.**
- **The attenuators you allow in the LMIA category is key to accomplishing what is intended.**

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MASH Testing

The End!

Questions??????