LTAP Transportation Technology Transfer Center

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Spokesperson Decade of Action for Road Safety 2011-2020

Module 8 – Inspection and Audit

Prioritize Road Safety Needs

1. Identify hazardous location(s) and conditions
2. Conduct a road safety audit
   a. Collect and analyze preliminary data
      - Police accident records
      - Complaint files
      - Maintenance records
      - Roadway video logs
      - Construction prints
   b. Identify and collect data to create condition diagram
      - Gain familiarity with the site conditions
      - Observe traffic operations
      - Collect information and dimensions
      - Identify safety deficiencies

Prioritize Road Safety Needs

c. Select and conduct detailed studies
   i. Traffic volume
   ii. Sight distance
   iii. Roadway / intersection capacity
   iv. Speed of police and emergency services
   v. Response time to clear hazardous operating conditions
d. Evaluate study results
e. Determine safety and operational deficiencies

Prioritize Road Safety Needs

f. Identify potential safety and operational improvements
g. Select appropriate improvements

3. Establish priorities for project implementation
4. Schedule and implement safety projects
5. Evaluate safety improvements

Two Barrier Maintenance Categories

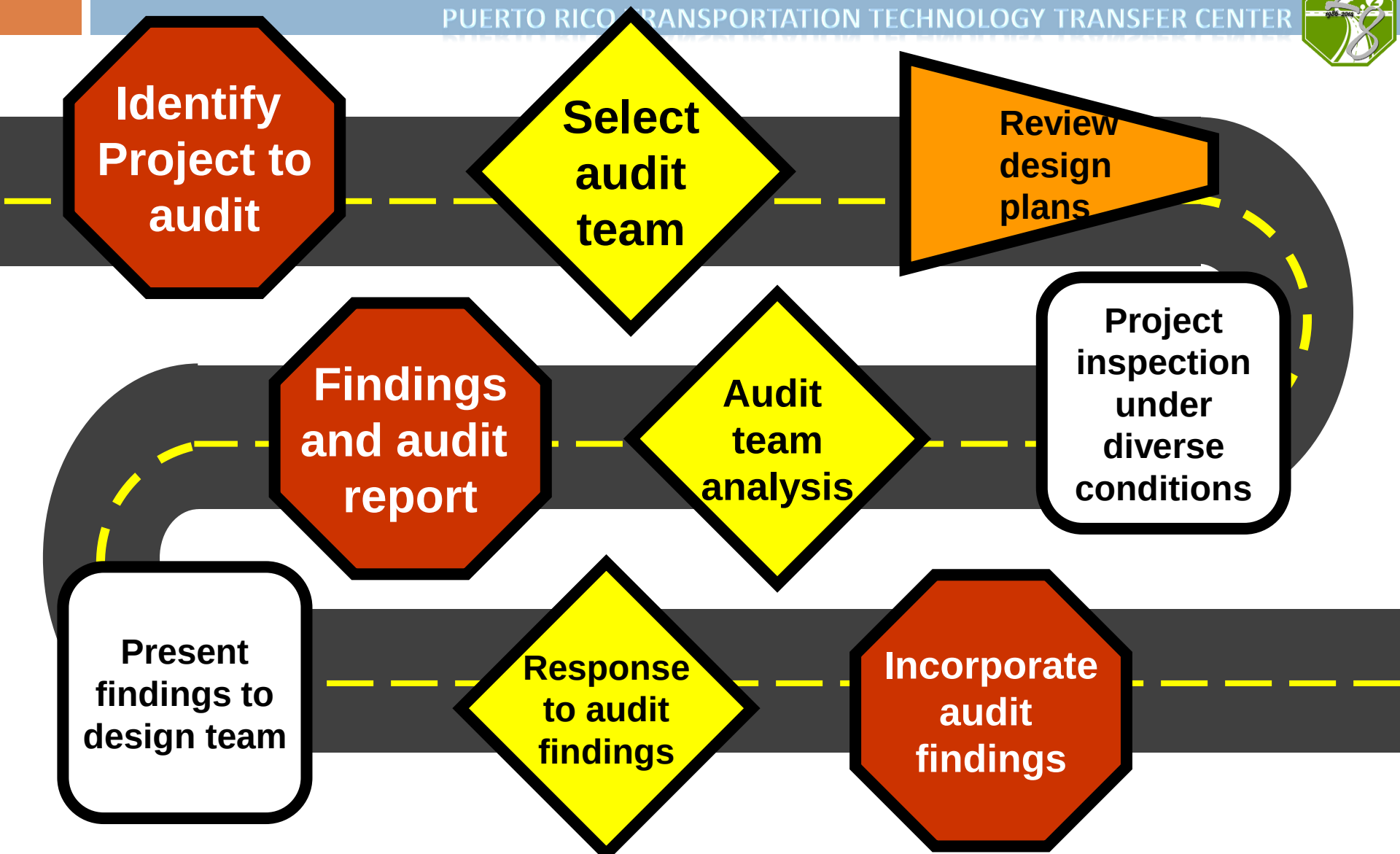
1. **Routine** – Consists of periodic revisions to verify existing conditions in the barrier systems

2. **Repair** – Consists of repairs needed after a crash to the barrier systems

Road Safety Audits

- Formal and systematic process of evaluating safety of existing roads and future projects
- Perform by independent and interdisciplinary team
- Based in engineering principles and focused in the perspective of all road users
- Proactive in the identification and correction of safety deficiencies
- Purpose of reduce crash risks in the road, particularly those near intersections and on the roadside

General Road Safety Audit Process



Typical Road Elements Evaluated

Signs & Markings

Work zones

Pavement

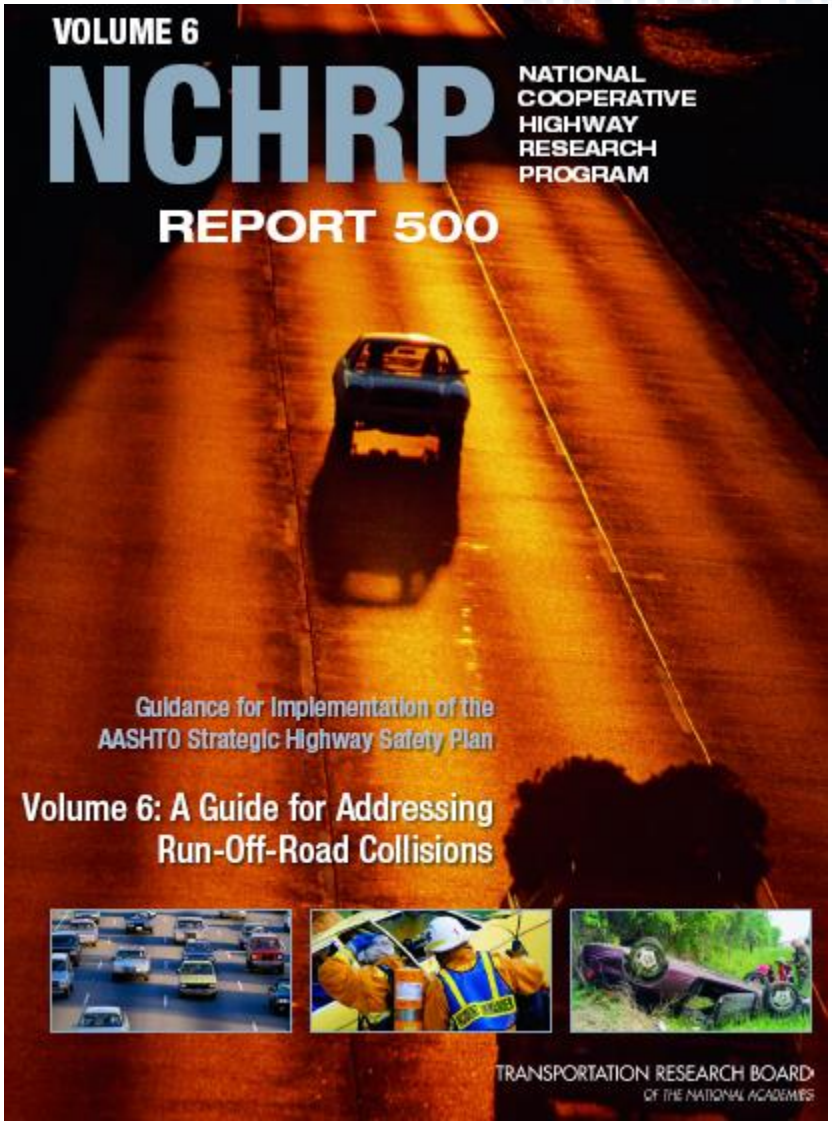
Traffic signals

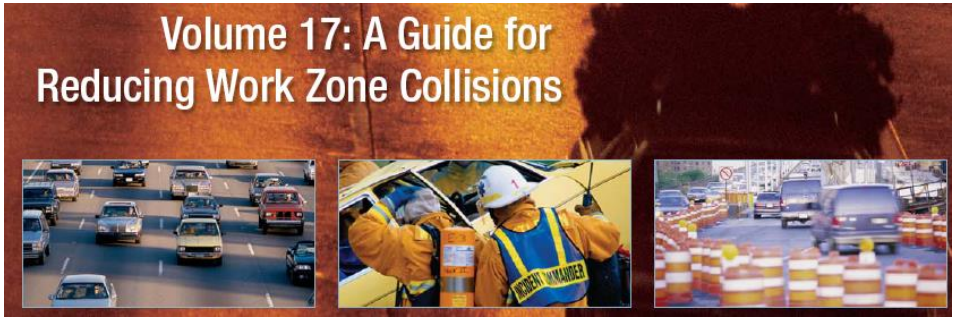
Fixed objects

Road geometry

Barriers

AASHTO Safety Plan





Strategies to Reduce Off-Road Crashes

Emphasis Area Objectives and Strategies

Objectives	Strategies
15.1 A—Keep vehicles from encroaching on the roadside	15.1 A1—Install shoulder rumble strips (T) 15.1 A2—Install edgeline "profile marking," edgeline rumble strips or modified shoulder rumble strips on section with narrow or no paved shoulders (E) 15.1 A3—Install midlane rumble strips (E) 15.1 A4—Provide enhanced shoulder or in-lane delineation and marking for sharp curves (P/T/E) 15.1 A5—Provide improved highway geometry for horizontal curves (P) 15.1 A6—Provide enhanced pavement markings (T) 15.1 A7—Provide skid-resistant pavement surfaces 15.1 A8—Apply shoulder treatments • Eliminate shoulder drop-offs (E) • Widen and/or pave shoulders (P)
15.1 B—Minimize the likelihood of crashing into an object or overturning if the vehicle travels beyond the edge of the shoulder	15.1 B1—Design safer slopes and ditches to prevent rollovers (see "Improving Roadsides," page V-36) (P) 15.1 B2—Remove/relocate objects in hazardous locations (see "Improving Roadsides," page V-36) (P) 15.1 B3—Delineate trees or utility poles with retroreflective tape (E)
15.1 C—Reduce the severity of the crash	15.1 C1—Improve design of roadside hardware (e.g., bridge rails) (see "Improving Roadsides," page V-36) (T) 15.1 C2—Improve design and application of barrier and attenuation systems (see "Improving Roadsides," page V-36) (T)

Strategies to Reduce Tree-Related Crashes

EXHIBIT I-4
Emphasis Area 16.1—Crashes with Trees in Hazardous Locations

Objectives	Strategies
16.1 A—Prevent Trees from Growing in Hazardous Locations	16.1 A1—Develop, Revise, and Implement Planting Guidelines to Prevent Placing Trees in Hazardous Locations
	16.1 A2—Mowing and Vegetation Control Guidelines
16.1 B—Eliminate the Hazardous Condition and/or Reduce the Severity of the Crash	16.1 B1—Remove Trees in Hazardous Locations
	16.1 B2—Shield Motorists from Striking Trees
	16.1 B3—Modify Roadside Clear Zone in the Vicinity of Trees
	16.1 B4—Delineate Trees in Hazardous Locations

Strategies to Reduce Pole-Related Crashes

Emphasis Area Objectives and Strategies

Objectives	Strategies
16.2 A Treat specific utility poles in high-crash and high-risk spot locations.	16.2 A1 Remove poles in high-crash locations. (P)
	16.2 A2 Relocate poles in high-crash locations farther from the roadway and/or to less vulnerable locations. (P)
	16.2 A3 Use breakaway devices. (T)
	16.2 A4 Shield drivers from poles in high-crash locations. (P)
	16.2 A5 Improve the drivers' ability to see poles in high-crash locations. (E)
	16.2 A6 Apply traffic calming measures to reduce speeds on high-risk sections. (T)
16.2 B Prevent placing utility poles in high-risk locations.	16.2 B1 Develop, revise, and implement policies to prevent placing or replacing poles within the recovery area. (T)
16.2 C Treat several utility poles along a corridor to minimize the likelihood of crashing into a utility pole if a vehicle runs off the road.	16.2 C1 Place utilities underground. (P)
	16.2 C2 Relocate poles along the corridor farther from the roadway and/or to less vulnerable locations. (P)
	16.2 C3 Decrease the number of poles along the corridor. (P)

Strategies to Reduce Work Zone-Related Crashes

Emphasis Area Objectives and Strategies

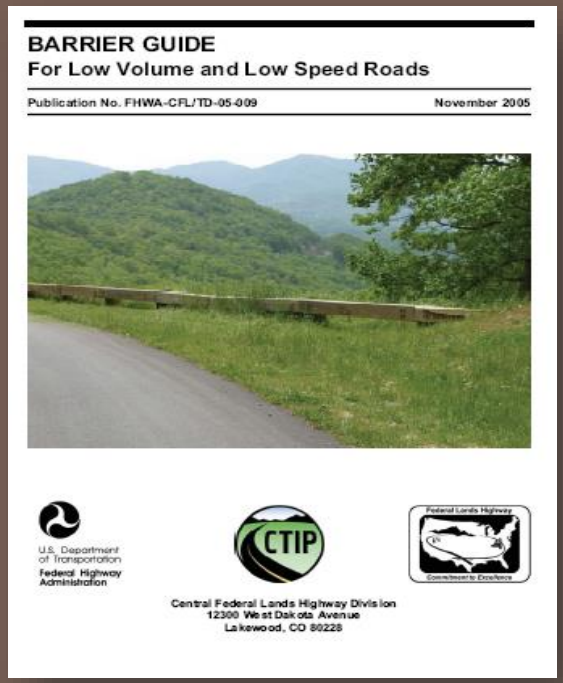
Objectives	Strategies
19.1 A Reduce the number, duration, and impact of work zones	19.1 A1 Improve maintenance and construction practices (P)
	19.1 A2 Utilize full-time roadway closure for construction operations (T)
	19.1 A3 Utilize time-related contract provisions (P)
	19.1 A4 Use nighttime road work (P)
	19.1 A5 Use demand management programs to reduce volumes through work zones (P)
	19.1 A6 Design future work zone capacity into new or reconstructed highways (T)
19.1 B Improve work zone traffic control devices	19.1 B1 Implement ITS strategies to improve safety (E)
	19.1 B2 Improve visibility of work zone traffic control devices (T)
	19.1 B3 Improve visibility of work zone personnel and vehicles (varies)
	19.1 B4 Reduce flaggers' exposure to traffic (T)
19.1 C Improve work zone design practices	19.1 C1 Establish work zone design guidance (T)
	19.1 C2 Implement measures to reduce work space intrusions (and limit consequences of intrusions) (T)
	19.1 C3 Improve work zone safety for pedestrians, bicyclists, motorcyclists, and heavy-truck drivers (T)

Strategies to Reduce Work Zone-Related Crashes

Emphasis Area Objectives and Strategies

Objectives	Strategies
19.1 D Improve driver compliance with work zone traffic controls	19.1 D1 Enhance enforcement of traffic laws in work zones (T)
	19.1 D2 Improve credibility of signs (E)
	19.1 D3 Improve application of increased driver penalties in work zones (T)
19.1 E Increase knowledge and awareness of work zones	19.1 E1 Disseminate work zone safety information to road users (T)
	19.1 E2 Provide work zone training programs and manuals for designers and field staff (T)
19.1 F Develop procedures to effectively manage work zones	19.1 F1 Develop or enhance agency-level work zone crash data systems (T)
	19.1 F2 Improve coordination, planning, and scheduling of work activities (T)
	19.1 F3 Use incentives to create and operate safer work zones (T)
	19.1 F4 Implement work zone quality assurance procedures (i.e., safety inspections or audits) (T)

(P) = proven; (T) = tried; (E) = experimental. An explanation of (P), (T), and (E) appears below. Several strategies have substrategies with different ratings.



IDENTIFICATION OF HAZARDS

Barrier Warrants

Obstacle	Guidelines
Bridge piers, abutments, and railing ends	Shielding generally needed.
Boulders	Judgment decision based on nature of fixed object and likelihood of impact.
Culverts, pipes, headwalls	Judgment decision based on size, shape and location of obstacle.
Foreslopes and backslopes (smooth)	Shielding not generally needed.
Foreslopes and backslopes (rough)	Judgment decision based on likelihood of impact.
Ditches (parallel)	Refer to Figures 3-6 and 3-7.
Ditches (transverse)	Shielding generally needed if likelihood of head-on impact is high.
Embankment	Judgment decision based on fill height and slope (see Figure 5-1).
Retaining walls	Judgment decision based on relative smoothness of wall and anticipated maximum angle of impact.
Sign/luminaire supports[c]	Shielding generally needed for non-breakaway supports.
Traffic signal supports[d]	Isolated traffic signals within clear zone on high-speed rural facilities may need shielding.
Trees	Judgment decision based on site-specific circumstances.
Utility poles	Shielding may be needed on a case-by-case basis.
Permanent bodies of water	Judgment decision based on location and depth of water and likelihood of encroachment.

Notes:

a) Shielding non-traversable terrain or a roadside obstacle is usually necessary when it is within the clear zone and cannot practically or economically be removed, relocated, or made breakaway, and it is determined that the barrier provides a safety improvement over the unshielded condition.

b) Marginal situations, with respect to placement or omission of a barrier, will usually be decided by crash experience, either at the site or at comparable site(s).

c) Where appropriate, most sign and luminaire supports should be of a breakaway design regardless of their distance from the roadway if there is reasonable likelihood of their being hit by an errant motorist. The placement and locations for breakaway supports also should consider the safety of pedestrians from potential debris resulting from impacted systems.

d) In practice, relatively few traffic signal supports, including flashing light signals and gates used at railroad crossings, are shielded. If shielding is deemed necessary, however, crash cushions are sometimes used in lieu of a longitudinal barrier installation..

Ref: Roadside Design Guide, 2011.

Embankment Barrier Warrants

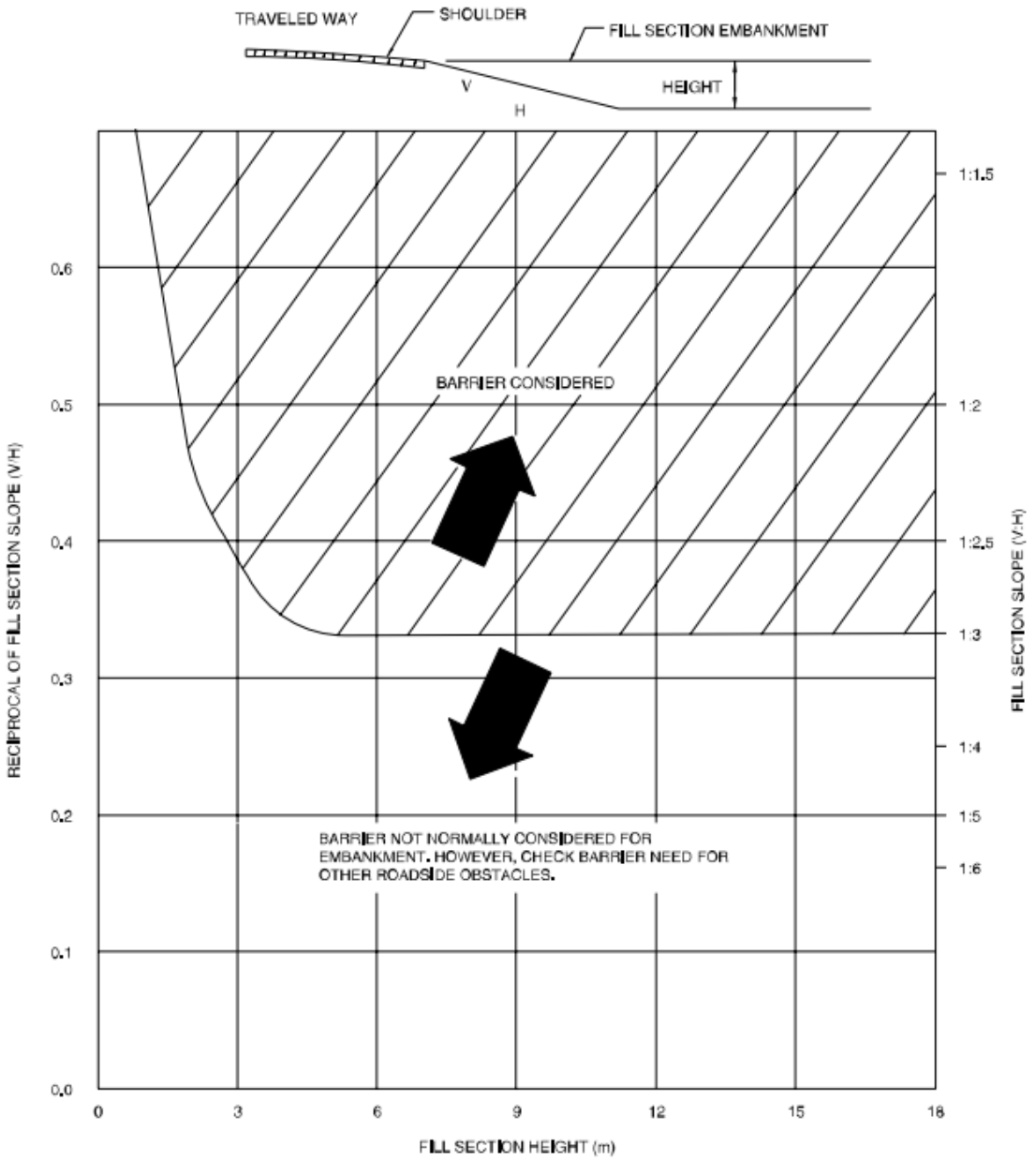


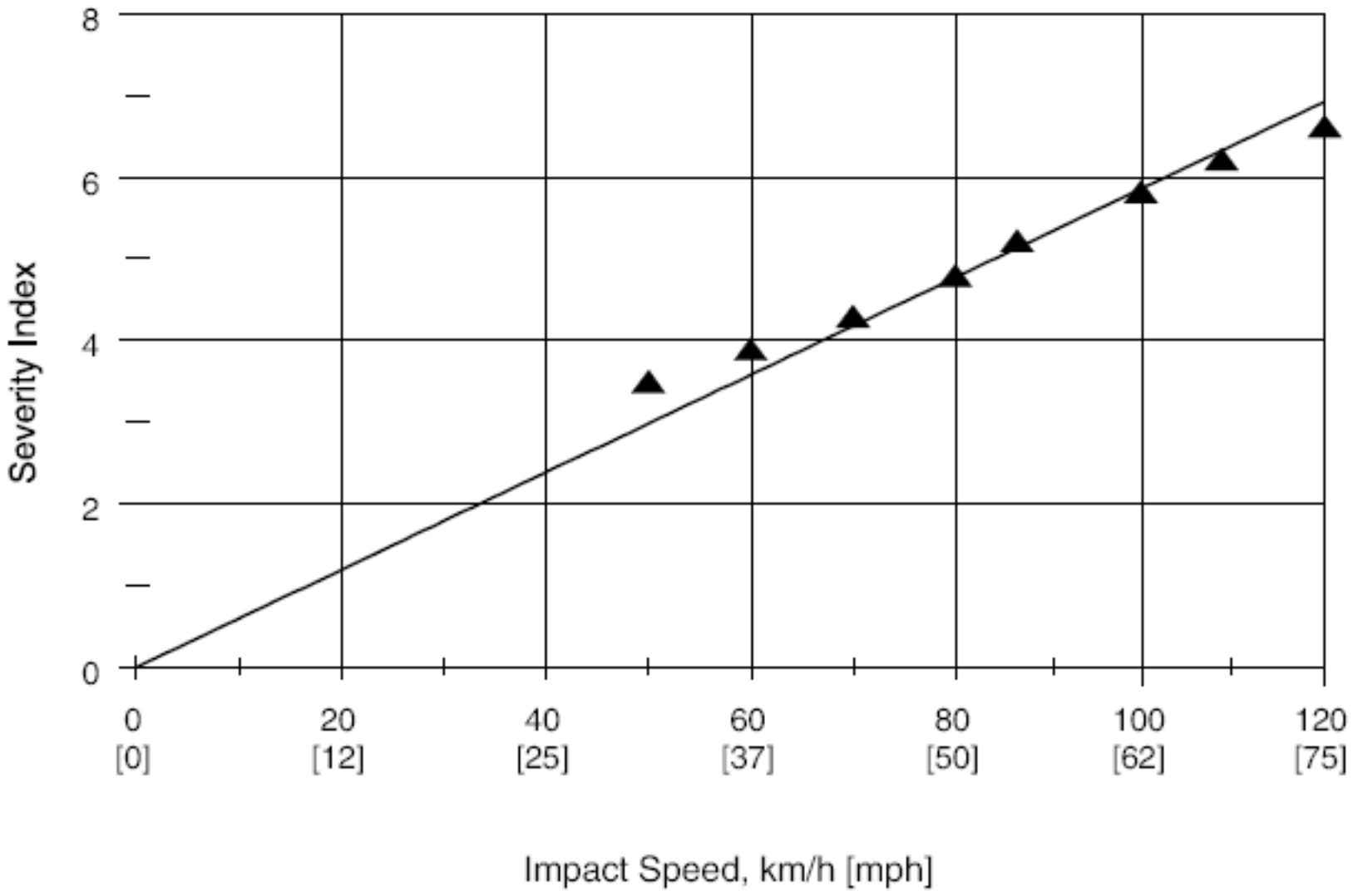
Figure 5-1(a). Comparative Barrier Consideration for Embankments (Metric Units) ***(15)***

Ref: Roadside Design Guide, 2011.

Severity Index and Injury Level

Severity Index (SI)	Injury Level (%)						
	None	PDO1	PDO2	C	B	A	K
0.0	100.0	—	—	—	—	—	—
0.5	—	100.0	—	—	—	—	—
1.0	—	66.7	23.7	7.3	2.3	—	—
2.0	—	—	71.0	22.0	7.0	—	—
3.0	—	—	43.0	34.0	21.0	1.0	1.0
4.0	—	—	30.0	30.0	32.0	5.0	3.0
5.0	—	—	15.0	22.0	45.0	10.0	8.0
6.0	—	—	7.0	16.0	39.0	20.0	18.0
7.0	—	—	2.0	10.0	28.0	30.0	30.0
8.0	—	—	—	4.0	19.0	27.0	50.0
9.0	—	—	—	—	7.0	18.0	75.0
10.0	—	—	—	—	—	—	100.0

Relation of Severity Index with Impact Speed



Typical Crash Costs per Crash Severity

Crash Severity	*Roadside Design Guide*	FHWA Comprehensive Cost
Fatal Crash	$1,000,000	$2,600,000
Severe Injury Crash	200,000	180,000
Moderate Injury Crash	12,500	36,000
Slight Injury Crash	3,750	19,000
PDO Crash Level 2	3,125	2,000
PDO Crash Level 1	625	2,000

* Crash cost figures are based upon the 1996 edition of the *Roadside Design Guide* and a 1994 FHWA memorandum entitled "Update of Value of Life and Injuries for Use in Preparing Economic Evaluations."

Severity Classification of Fixed Objects

Potential Hazard	Group 1 (Low Severity)	Group 2 (Moderate Severity)	Group 3 (High Severity)
Bridge piers, abutments and railing ends			X
Boulders, less than 0.3 m (1 ft) in diameter		X	
Boulders, 0.3 m (1 ft) in diameter or larger			X
Non-breakaway sign and luminaire supports		X	
Individual trees, greater than 100 mm (4 in) and less than 200 mm (8 in) diameter	X		
Individual trees, greater than 200 mm (8 in) diameter		X	
Groups of trees, individually greater than 100 mm (4 in) diameter*			X
Utility poles		X	

* Because of driver expectancy, a group of trees at a consistent offset for lengthy distances may experience lower encroachment rates, even though the offset may be within the clear zone. In such instances, it may be appropriate to consider the trees a Group 2 hazard.

Severity Classification of Cross Drainage Features

Potential Hazard	Group 1 (Low Severity)	Group 2 (Moderate Severity)	Group 3 (High Severity)
Cross Drain Culvert Ends:			
Exposed culvert ends with no headwalls, 1 m (36 in) in diameter or less		X	
Exposed culvert ends with no headwalls, greater than 1 m (36 in) in diameter			X
Sloped culvert ends, less than 1.2 m (4 ft) in diameter	X		
Sloped culvert ends, greater than 1.2 m (4 ft) and less than 2.4 m (8 ft) in diameter		X	
Sloped culvert ends, 2.4 m (8 ft) or greater in diameter			X
Vertical headwalls, less than 1.0 m (3 ft) in height		X	
Vertical headwalls, 1 m (3 ft) or higher			X
Headwalls with parallel sloped wingwalls, 0.6 m (2 ft) or less height		X	
Headwalls with parallel sloped wingwalls, greater than 0.6 m (2 ft) height			X
Headwalls with flared and sloped wing walls, 1.0 m (3 ft) or less height		X	
Headwalls with flared and sloped wing walls, greater than 1.0 m (3 ft) height			X
Culvert end sections with crashworthy grates	X		

Severity Classification of Parallel Drainage Features

Potential Hazard	Group 1 (Low Severity)	Group 2 (Moderate Severity)	Group 3 (High Severity)
Parallel Drain Culvert Ends:			
Exposed culvert ends with no headwalls, less than 0.6 m (2 ft) in diameter	X		
Exposed culvert ends with no headwalls, 0.6 m (2 ft) and less than 1.2 m (4 ft) in diameter		X	
Exposed culvert ends, 1.2 m (4 ft) or greater in diameter			X
Mitered culvert ends, less than 1 m (3 ft) in diameter	X		
Mitered culvert ends, 1 m (3 ft) or greater in diameter		X	
Vertical headwalls, less than 1 m (3 ft) above ditch section		X	
Vertical headwalls, 1 m (3 ft) or higher above ditch section			X

Severity Classification of Parallel Ditches

Potential Hazard	Group 1 (Low Severity)	Group 2 (Moderate Severity)	Group 3 (High Severity)
Parallel Ditches:			
Ditches outside the preferred cross section on Figures 3.6 and 3.7 of the *RDG* and with foreslope flatter than 1V: 3H	X		
Ditches with foreslopes 1V: 3H or steeper (Deep ditches should also meet the foreslope criteria below)		X	

Severity Classification of Slopes

Potential Hazard	Group 1 (Low Severity)	Group 2 (Moderate Severity)	Group 3 (High Severity)
Slopes			
1V: 3H foreslope less than 2 m (7 ft) high*	X		
1V: 3H foreslope 2 m (7 ft) and higher*		X	
1V: 2H to 1V: 1.5H foreslope less than 4 m (13 ft) high*		X	
1V: 2H to 1V: 1.5H foreslope 4 m (13 ft) high and higher			X
Vertical foreslope or fill wall less than 2 m (7 ft) high		X	
Vertical foreslope or fill wall 2 m (7 ft) and higher			X
Backslopes that are uneven, or with deep erosion ruts, large rocks, and trees		X	
Vertical backslope with horizontal projections of 200 mm (4 in) or smaller	X		
Vertical backslope with horizontal projections larger than 200 mm (4 in)		X	
Downward intersecting slope (transverse to travel way, such as a river bank) 1V: 4H or steeper, between than 0.5 (2 ft) high to 2 m (6 ft) high		X	
Downward intersecting slope (transverse to travel way, such as a river bank) 1V: 4H or steeper, 2 m (6 ft) or higher			X
Upward intersecting slope (transverse to travel way, such as an overpass fill) 1V: 4H to flatter than 1V: 1.5H, greater than 0.3 m (1 ft) high		X	
Upward intersecting slope (transverse to travel way, such as an overpass fill) 1V: 1.5 H or steeper, greater than 0.3 m (1 ft) high			X

Severity Classification of Other Features

Potential Hazard	Group 1 (Low Severity)	Group 2 (Moderate Severity)	Group 3 (High Severity)
Parallel smooth retaining wall or cut slope	X		
Retaining wall parallel or flared away from approaching traffic at flatter than 1:8	X		
Retaining wall flared away from approaching traffic at 1:8 or steeper		X	
Water at a depth of 0.3 m (1 ft) to 1 m (3 ft)		X	
Water at a depth of 1 m (3 ft) or deeper			X

Other Safety Considerations

- Crash history
  - Assist in identifying and evaluating hazards
  - History of several years is needed
    - Three to five years is usually sufficient, but even longer periods are useful for low volume roads
  - Crash analysis should look for patterns of crashes at several sites that share common characteristics, such as roadway features and hazard types
- Presence of bystanders

Hazard Severity Classification

- Severity Index is a measure of the consequences of crashes once a hazard or condition is struck, regardless of probability
- Severity indices are estimated at 100 km/h (62mph), but generally will have the same relative meaning at lower speeds
  - Function of speed and the relative seriousness of crash
  - Measured by the mix of likely crash types: fatal, injury and property-damage-only
  - Measured by a severity index using a 0 to 10 scale
  - Severity Index of 5.0 implies that of all the crashes that might occur, 15% will be PDO, 77% will be injury crashes and 8% will be fatal crashes

Hazard Severity Index

- Group 3 - Severity index of 5 and higher (may be more severe than a crash into a barrier)
  - Currently acceptable roadside barriers are estimated to have a severity index of 4.9
- Group 2 - Severity index of 3 to 4.9 (some possibility of serious injury and fatality, but probably less severe than barriers)
  - Should be considered for the same corrective actions as Group 3 if they have crash histories or are located so that a vehicle could strike more than one hazard in the same run-off-the-road event
- Group 1 - Severity index of below 3 (fatalities are unlikely)

Suggested Corrective Actions

- Group 3
  - Evaluate for possible use of roadside barriers if it is too expensive or impractical to eliminate either the hazard or make it crashworthy
  - If a barrier is found not to be warranted or if an alternate treatment is less expensive than a barrier, treat as a Group 2 hazard
- Group 2
  - Consider cost-effective strategies to reduce probability, eliminate the hazard or reduce the severity of the hazard
  - Because these hazards generally do no warrant shielding with a roadside barrier, the cost of a corrective action should be less than the expected cost of a barrier
  - If a new road, avoid placing Group 2 hazards in the clear zone
- Group 1
  - Avoid placing these conditions in the clear zone or take simple, low-cost corrective actions, if possible
  - Accept the risk and leave the hazard

Barrier Warrants Consideration

Consideration	Barrier is more warranted if:	Barrier is less warranted if:
Speed	70 km/h (45 mph) or higher	40 km/h (25 mph) or lower
Hazard on outside of horizontal curve	350 m (1,150 ft) or smaller radius	Radius larger than 400 m (1,430 ft)
Hazard does not fit the descriptions in Tables 2.3 through 2.6	Hazard is more severe	Hazard is less severe
Size of hazard	Very large	Very small
Traffic volume	Above 1,000 vpd	Below 400 vpd
Hazard on inside of horizontal curve	350 m (1,150 ft) or smaller radius	Radius larger than 400 m (1,430 ft)
Hazard on a downgrade	5 percent or greater	Less than 3 percent
Crash history	Clear crash pattern	No crash pattern
Anticipated cost of barriers	Expected costs are low	Expected costs are high
Roadway cross section	Severe section elements	Good section elements
Multiple hazards exist at the site	Many additional hazards	
Aesthetic impacts		Serious concerns
Environmental impacts		Serious concerns

Minimize mistakes =
Meet specifications, plans, etc.
+ use of good engineering judgment

Inspection Checklist

Inspection Checklist

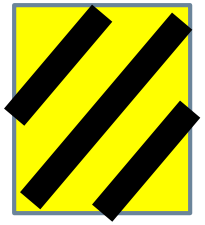
- Observe the condition of existing barriers
  - Impact frequency
  - Erosion in post foundation
  - Corrosion in bolts, non-galvanized connectors
  - Consolidation of terrain (barrier under the recommended minimum height)
  - Replacement of steel block-out for wood or plastic to meet TL-3 criteria in NHS roads

Inspection Checklist

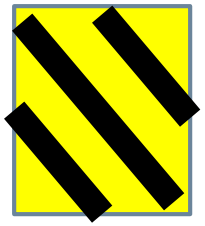
- Barrier height
- Post spacing (critical for end treatments)
- Distance from traveled way edge to barrier
- Distance from barrier to hazard
- Knowledge about barrier deflection
- Aspects of barriers: flare vs parallel
- Aspects of end treatments: gating vs. non-gating

Inspection Checklist

- Presence of recovery area behind end treatment
- Flat slope (desired 10H: 1V) in front of barrier
- Object markers and delineators in the adequate location as indicated by plans
- Panel in front of end treatment with adequate stripe orientation
  - + 45° in right-hand side of roadway edge



  - - 45° in left-hand side of roadway edge



Inspection Checklist

- Diameter of utility poles installed in concrete barriers
  - Not to exceed the top width of barrier
- Anchor cable in end treatment should not be too loose or tense
- End treatment in concrete barriers should be painted yellow; and standard section should be painted white
- Portable concrete barriers connected with adequate pins in order to function as a system

Inspection Checklist

PUERTO RICO TRANSPORTATION TECHNOLOGY TRANSFER CENTER

ITEM	N/A	Yes	No	Priority	Ranking			Km	Comments
					Good	Regular	Poor		
				High, Medium, Low	>9	6<R<8.9	< 6		
CRASH BARRIERS AND CLEAR ZONES									
1. Clear zones									
Is the clear zone width traversable?									
Is the clear zone width free of rigid fixtures? (if not, can all of these rigid fixtures be removed or shielded?)									
Are all power poles, trees, etc., at a safe distance from the traffic paths?									
Is the appropriate treatment or protection provided for any objects for any objects within the clear zone?									
2. Crash barriers									
Are crash barriers installed where necessary?									
Are crash barriers installed at all necessary locations in accordance with the relevant guidelines?									
Are the barrier systems suitable for the purpose?									
Are the crash barriers correctly installed?									
Is the length of crash barrier at each installation adequate?									
Is the guardrail attached correctly to bridge railings?									
Is there sufficient width between the barrier and the edge line to contain a broken-down vehicle?									

Inspection Checklist

PUERTO RICO TRANSPORTATION TECHNOLOGY TRANSFER CENTER

ITEM	N/A	Yes	No	Priority	Ranking			Km	Comments
					Good	Regular	Poor		
				High, Medium, Low	>9	6<R<8.9	< 6		
3. End treatments									
Are end treatments constructed correctly?									
Is there a safe run-off area behind breakaway terminals?									
4. Fences									
Are pedestrian fences frangible?									
the barrier is:									
Rigid:									
F-Shape									
New Jersey									
Vertical Concrete barrier									
Single Slope barrier									
Tall wall									
Stone Mansory wall									
Semi- rigid:									
W-beam strong post									
Steel block out									
Plastic block out									
Wood block out									
Thrie beam strong post									
Steel block out									
Plastic block out									
Wood block out									

Inspection Checklist

					Ranking				
ITEM	**N/A**	**Yes**	**No**	**Priority**	**Good**	**Regular**	**Poor**	**Km**	**Comments**
				High, Medium, Low	>9	6<R<8.9	< 6		
Flexible									
Weak post									
3-stand cable									
W-beam									
Modified W-beam									
Ironwood Aesthetic barrier									
5. Visibility of barriers and fences									
Is there adequate delineation and visibility of crash barriers and fences at night?									

W-Beam Guardrail Crash Site Review

- Define the extent or severity of damage to guardrail relative to roadway functional class and crash history

Damage is so high that rail no longer functions and could be a hazard

1. Rail beam is pulled completely apart

2. Three or more post are broken off or are no longer attached to rail

3. Rail beam is bent or pushed more than 18 inches out of line

Damage is so high that rail no longer functions and could be a hazard

MAINTENANCE OPTION

1. Clean traffic debris from traffic lanes and shoulders
2. Put out temporary warning devices to warn traffic if damage cannot be repaired immediately
3. Make an inspection report and decide what materials and equipment are needed
4. Get the repair job as soon as possible

Guardrail is obviously damaged but may still work for most traffic conditions

1. Rail beam is not separated even though it is bent or crushed

2. Two or fewer posts are broken off or separated from the rail

3. Rail beam is bent or pushed out of line less than 12 inches

Guardrail is obviously damaged but may still work for most traffic conditions

MAINTENANCE OPTION

1. Make an inspection of damage to decide the rail is acceptable for awhile
2. Make an inspection report and decide what materials and equipment are needed
3. Schedule the repair as routine maintenance job. Use engineering judgment to decide if site is potentially hazardous (classify as emergency repair)
4. Revisit the damage site for subsequent hits and damage to review rail condition

Guardrail damage is minor and rail will continue to work

1. Rail beam might be crush or flattened but it is not cut

2. No posts are broken off or separated from the rail

3. Rail beam is bent or pushed out of line less than 6 inches

Guardrail damage is minor and rail will continue to work

MAINTENANCE OPTION

1. Make an inspection of damage to decide the rail is acceptable and functional
2. Make an inspection report and decide if the rail needs to be repaired
3. If repair is needed, decide how much of the rail needs to be repaired
4. Schedule the repair
5. Revisit the damage site for subsequent hits and damage to review rail condition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San Juan
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Santurce Pda. 18
26 ESTE
Carolina
Aeropuerto
Isla Verde

Barrier Maintenance and Repair Information on the Internet

- http://www.fhwa.dot.gov/tfhrc/safety/pubs/90001/90001.pdf
- http://www.dot.state.co.us/WorkplaceSafetyManual/WP%20Safety%20Manual%20Intranet/WP%20Safety%20Manual%20-%20PDF/Safe%20Operating%20Guides/Introduction/SOG%20Codes%20numerical.pdf
- http://www.dot.state.oh.us/maintadmin/orc.htm
- http://www.trans.gov.ab.ca/Content/doctype248/production/mns274ed3.htm

QUESTIONS

Additional Information

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- **Fax: (787) 265-5695**