Session 1: Roadside Safety Problem, Clear Zone and Warrants for Barrier

FAST Act Guardrail Safety Training

Highway Barrier Installation, Inspection and Maintenance Training

FHWA COTM: Will Longstreet
FHWA, Office of Safety
(202) 366 0087

Instructors: Bill Fitzgerald, PE and John Durkos
KLS Engineering, LLC
(703) 858 1356

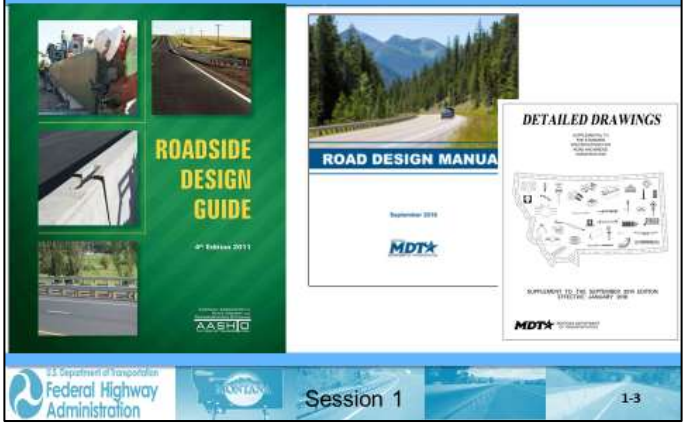
September 18 - 19, 2018

Disclaimer

This material is based upon work supported by the Federal Highway Administration under Grant Agreement No. 693JJ317500085. Any opinions, findings and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the Federal Highway Administration. This document does not constitute a national standard, specification or regulation.

Federal Highway Administration | Session 1 | 1-2

Guidance Presented



Federal Highway Administration | Session 1 | 1-3

Ground Rules

- Be on time
- Participate
- Restrict sidebar conversations
- Turn off cellphones

Federal Highway Administration | Session 1 | 1-4

Objectives of Course

This 2-day session will help you to:

- Verify that a traffic barrier is the best treatment to use at a specific site.
- Understand the principles of good barrier system design
- Identify installations that may not adequately shield all the significant hazards or secondary hazards.
- Recognize common installations errors for barriers and terminals and know how to avoid them.
- Understand when damaged barrier and/or terminal is no longer functional.

Federal Highway Administration | Session 1 | 1-5

Course Topics

- Session One – Roadside Safety Problem, Clear Zone and Warrants for Barrier
- Session Two – Testing Requirements and Performance Characteristics of Common Barrier Systems
- Session Three – Testing Requirements and Performance Characteristics of Common Terminals and Crash Cushion

Federal Highway Administration | Session 1 | 1-6

Course Topics (cont'd)

- Session Four – Guardrail Design, Length of Need and Site-specific Installation Considerations
- Session Five – Installation/Common Errors of Systems
- Session Six – Maintenance of Systems

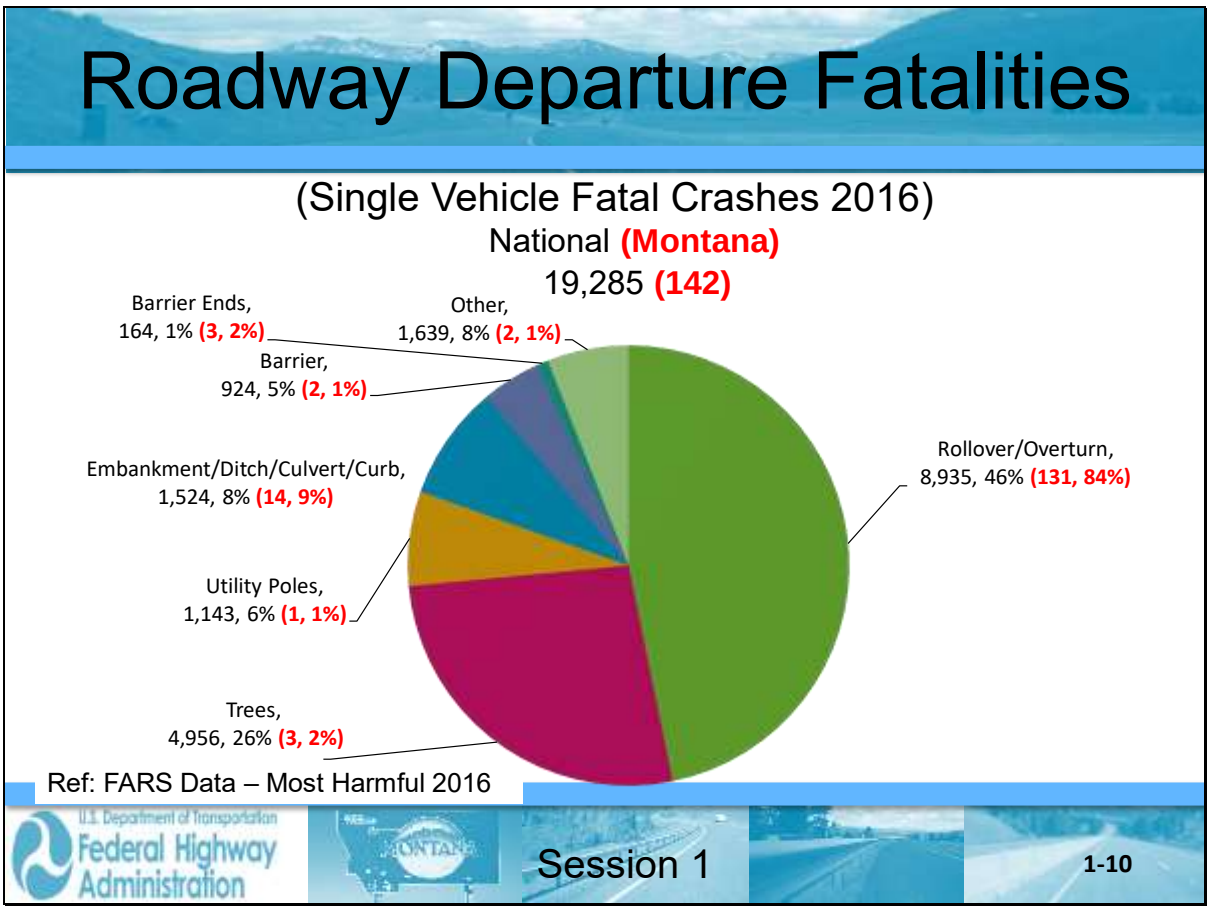
Session 1:

Roadside Safety Problem, Clear Zone and Warrants for Barrier

Session 1 Learning Outcomes

At the end of this session, you will be able to:

- Describe the primary Roadside Safety Concerns in Montana.
- Identify the need for training.
- Define clear zone and barrier warrants.


Roadway Departure Fatalities
(Single Vehicle Fatal Crashes 2016)
National (Montana)
19,285 (142)
Barrier Ends, 164, 1% (3, 2%)
Other, 1,639, 8% (2, 1%)
Barrier, 924, 5% (2, 1%)
Embankment/Ditch/Culvert/Curb, 1,524, 8% (14, 9%)
Rollover/Overturn, 8,935, 46% (131, 84%)
Utility Poles, 1,143, 6% (1, 1%)
Trees, 4,956, 26% (3, 2%)
Ref: FARS Data – Most Harmful 2016
Federal Highway Administration
Session 1
1-10


Real World Crashes
Video Clip
Federal Highway Administration
Session 1
1-11

Real World Crashes

U.S. Department of Transportation Federal Highway Administration — Session 1 — 1-12

_____

_____

Need for Training

Potential consequences of poorly Designed/Installed barrier systems include:

- Systems may not function as designed.
- Crash severities may be increased.

U.S. Department of Transportation Federal Highway Administration — Session 1 — 1-13

_____

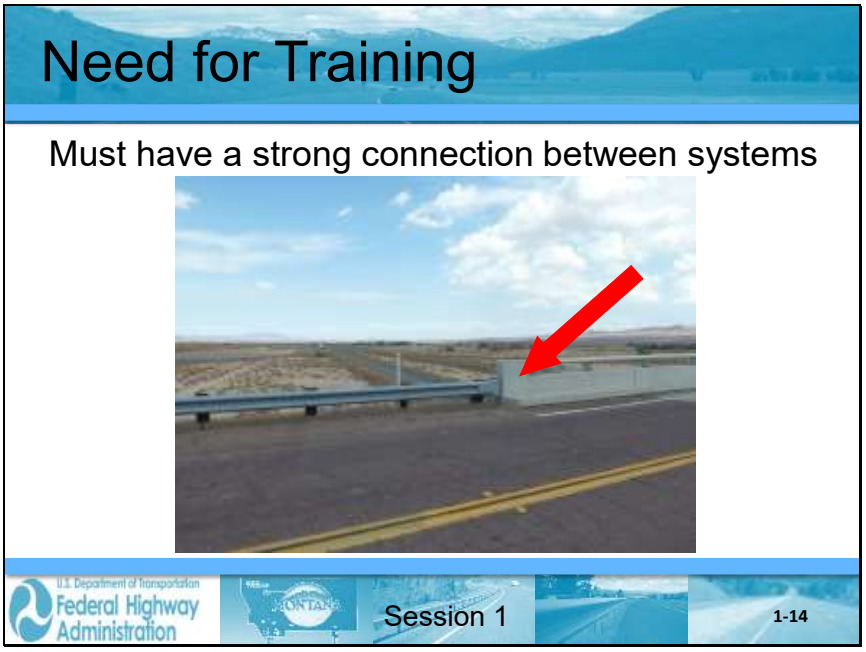
_____

_____

_____

_____

_____

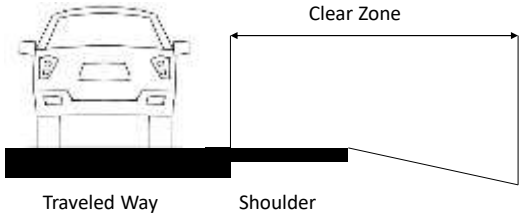

Need for Training
Must have a strong connection between systems
Federal Highway Administration
Session 1
1-14


Need for Training
Examples of improper installation of systems:
Fatal Flaw
Federal Highway Administration
Session 1
1-15

Need for Training

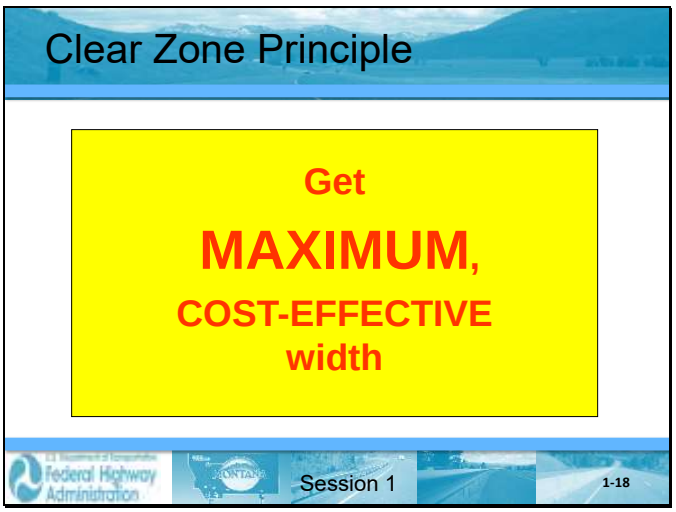
Examples of improper installation of systems:

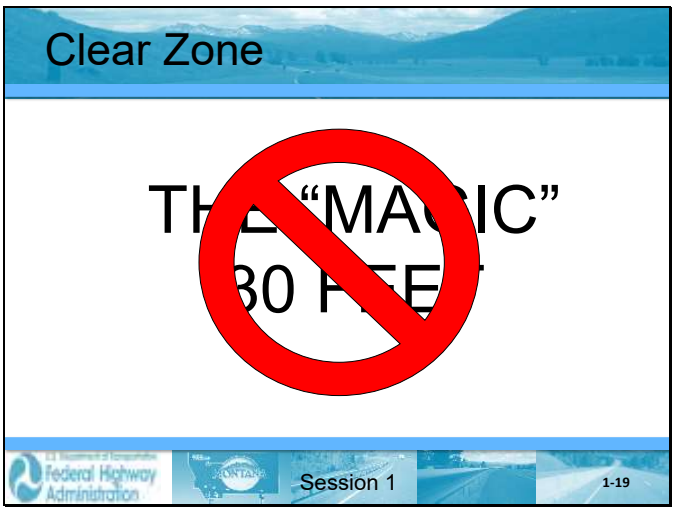
Clear Zone: A Definition



The unobstructed, traversable area provided beyond the edge of the through traveled way for the recovery of errant vehicles. The clear zone includes shoulders, bike lanes, and auxiliary lanes, except those auxiliary lanes that function like through lanes.

Ref: AASHTO Roadside Design Guide, 4th Edition, Glossary


Clear Zone Principle
Get
MAXIMUM,
COST-EFFECTIVE
width
Federal Highway Administration
Session 1
1-18


Clear Zone
Federal Highway Administration
Session 1
1-19

MDT Design Clear Zone Distance - Fill

Design Speed	Design AADT	Fill Slopes/Foreslopes		
		6:1 or Flatter	5:1	4:1
40 mph or less	< 750	8	8	10
	750-1499	10	12	14
	1500-6000	12	14	16
	> 6000	14	16	18
45 mph	< 750	10	12	14
	750-1499	14	16	18
	1500-6000	16	20	24
	> 6000	20	24	26
50 mph	< 750	12	12	14
	750-1499	16	18	20
	1500-6000	18	22	26
	> 6000	22	26	28
55 mph	< 750	12	14	18
	750-1499	16	20	24
	1500-6000	20	24	30
	> 6000	22	26	32
60 mph	< 750	16	20	24
	750-1499	20	26	32
	1500-6000	26	32	40
	> 6000	30	36	44
70 mph	< 750	20	22	26
	750-1499	24	30	36
	1500-6000	30	36	42
	> 6000	32	38	46
80 mph	< 750	24	26	30
	750-1499	28	32	38
	1500-6000	34	40	46
	> 6000	38	44	50

Page 9-5
Chapter 9— Roadside Safety

MDT Road Design Manual

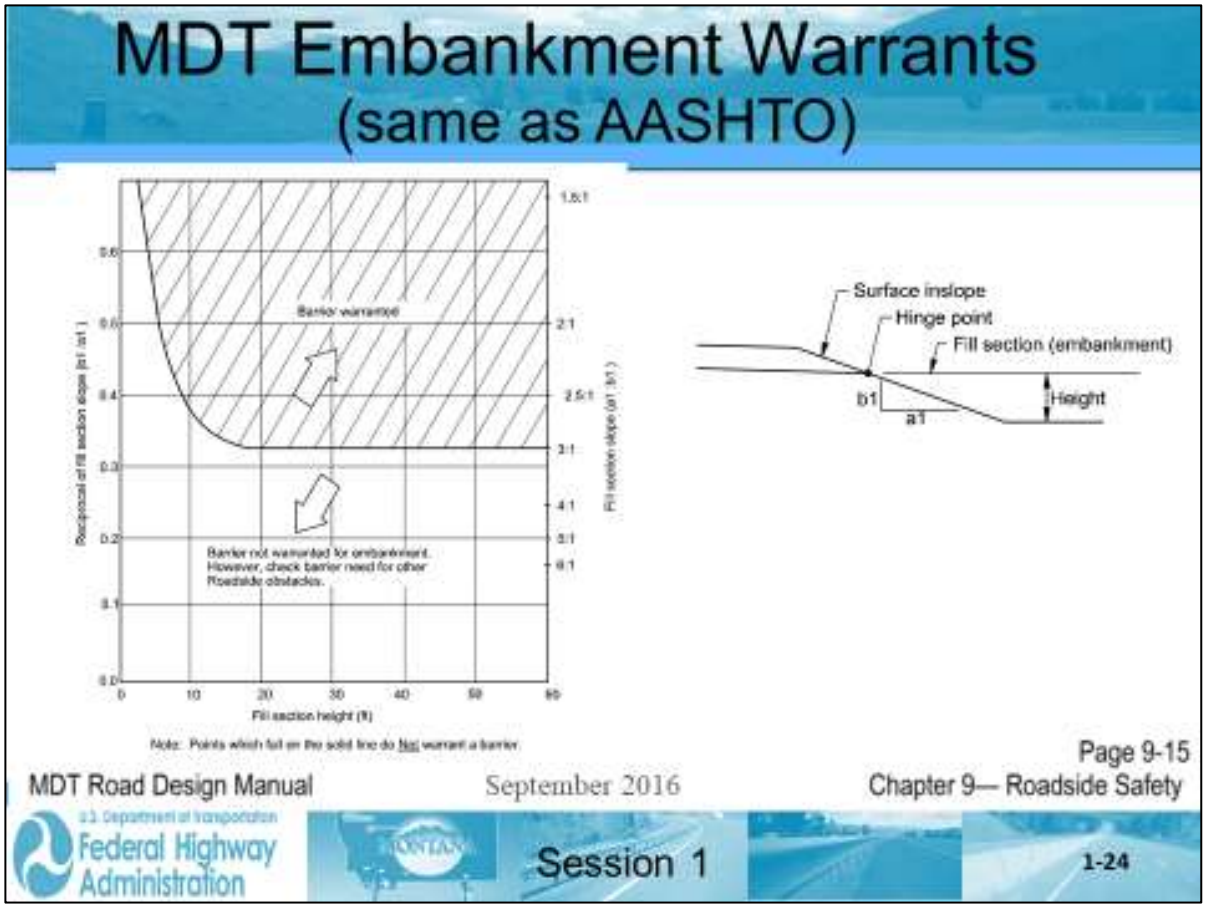
Order of Preference

1. Remove hazard
2. Redesign hazard (make traversable)
3. Relocate hazard (move away from traffic)
4. Reduce Impact Severity (use breakaway design)
5. SHIELD hazard
6. Delineate hazard so motorist can avoid

Ref: AASHTO Roadside Design Guide, 4th Edition – Pg. 1-4

Potential Hazards

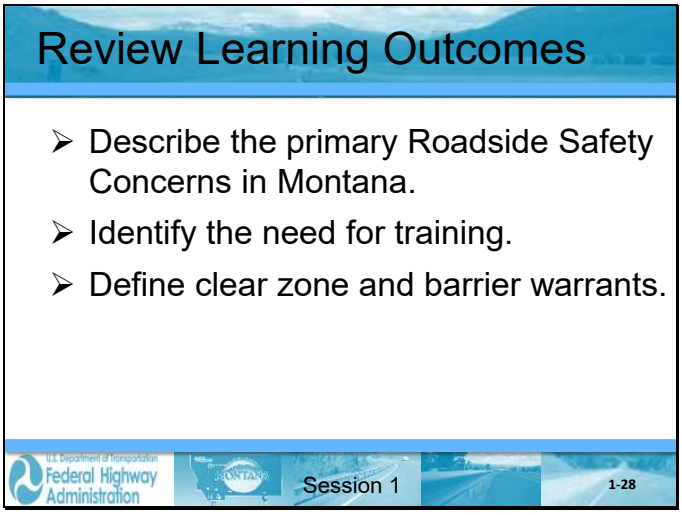
- Bridge Piers / Abutments / Railing Ends
- Drainage Structures / Ditches
- Sign and Luminaire Supports
- Permanent Bodies of Water
- Steep Embankments


MDT Embankment Warrants
(same as AASHTO)
Barrier warranted
Barrier not warranted for embankment. However, check barrier need for other Roadside obstacles.
Fill section height (ft)
Note: Points which fall on the solid line do Not warrant a barrier
Surface inslope
Hinge point
Fill section (embankment)
b1
a1
Height
MDT Road Design Manual
September 2016
Page 9-15
Chapter 9— Roadside Safety
Federal Highway Administration
Session 1
1-24


Federal Highway Administration
Session 1
1-25


U.S. Department of Transportation
Federal Highway Administration
Session 1
1-26


U.S. Department of Transportation
Federal Highway Administration
Session 1
1-27


Review Learning Outcomes
Describe the primary Roadside Safety Concerns in Montana.
Identify the need for training.
Define clear zone and barrier warrants.
U.S. Department of Transportation
Federal Highway Administration
Session 1
1-28