

CLEAR ZONES

Stay on the Road:
Defending the Road Departure Lawsuit

INTRODUCTION

- Prior to **1960** – Highway Departments focused on *Roadway Geometry*
 - If a driver ran off the road . . . Too Bad!
- By the mid **1960's** – Attitudes began to change.
 - Designers began to worry about RUN-OFF-ROAD type crashes
 - Late **1960's** – Research began on *Roadside Geometry*
 - **1967** – AASHO Published the *Highway Design and Operational Practices Related to Highway Safety* , “Yellow Book.”
- **1974** – AASHTO first discussed **Clear Zone**:

For adequate safety, it is desirable to provide an unencumbered roadside recovery area.

CLEAR ZONE

*Because bad things happen when we run off the road:
rocks, trees, steep slopes.*



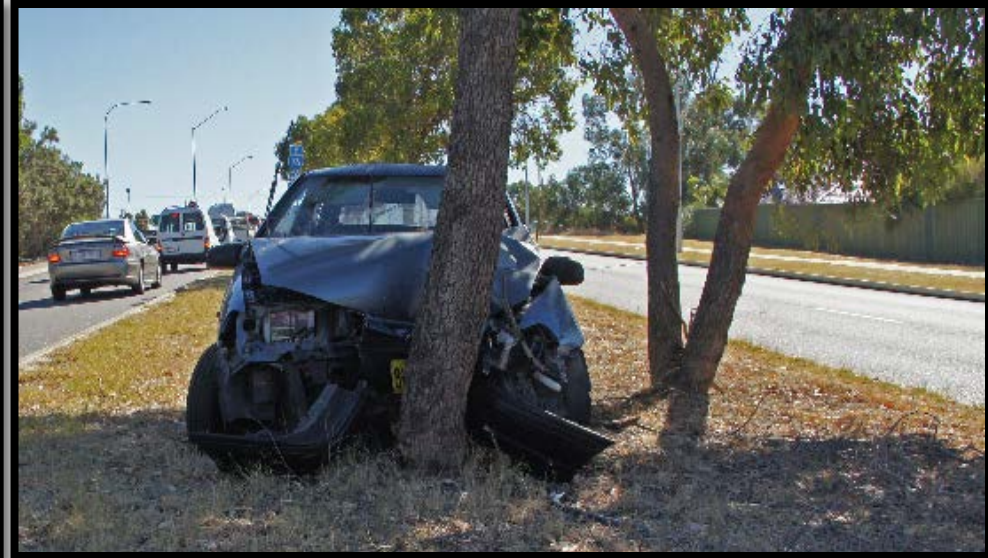
This tree sat 13 feet off of edge of pavement. There wasn't another tree this close within a mile stretch of roadway. Driver hit the tree head-on and suffered significant injuries. We settled the case, then removed the tree.

CLEAR ZONE

Because a clear, unobstructed, flat, roadside is highly desirable



Young man fell asleep at the wheel and drove into this rock outcropping, shattered his leg and face.



This guy probably didn't fare much better. Clear Zone applies to both sides of roadway – median too.

HISTORY

- Between 1968 and 1976, as the Clear Zone concept was first being developed and researched, and recommendations were being made, it was a time of great change and turmoil as design criteria was cussed and discussed at length.
- Research eventually led to discussions of shielding. Where obstacles and steep slopes existed, focus shifted to how to build barriers that would keep vehicles on the highway, where to place them, and proper installation procedures.

BARRICADES

(when Clear Zone is not an option)

- 1977: AASHTO published the *Guide for Selecting, Locating, and Designing Traffic Barriers* – “The Yellow Book”.
- Attitude was: When in doubt, put one in.
- 1988: AASHTO published the *Roadside Design Guide*.
 - Roadside safety features should be provided for in the design phase of a highway.

ROADSIDE DESIGN PHILOSOPHY #1

Where possible, **PROVIDE A CLEAR ZONE**

- Initially, the recommended Clear Zone was **30 feet** from edge of travel lane. Quickly became apparent not every roadway is the same.
- Because most existing roads cannot accommodate 30 foot clear zones, the 30 foot distance has been modified, depending on type of highway, operating speed, urban vs. rural, traffic volume, roadside slopes, existing features, and driver expectations.

ROADSIDE DESIGN PHILOSOPHY #2

Where not possible,

PROTECT WITH A GUARDRAIL

- The presence of a guardrail means there is no clear zone, and a driver now has only two feet from the edge of the traveling surface to the face of the barricade. This two foot space is called a “lateral offset”.
- By the 1990s, the industry concluded there were too many guardrails. We had put too many fixed objects along our roadways that were unnecessary.
- “When in doubt, put one in,” became . . .
- “When in doubt, LEAVE IT OUT.”

As we did here, in rural Reynolds County.

Defending the Steep Slope: Gordon v. MHTC



DANGEROUS CONDITION = NO GUARDRAIL ON 2:1 SLOPE

- Fatality lawsuit when a 12 year old boy was partially ejected from the pick-up truck and then crushed to death when the pick-up rolled over on top of him.
- No one in the truck was wearing a seatbelt.
- Driver was his 15-year-old brother.
- Plaintiff's attorney argued MoDOT needed guardrail on this 2:1, non recoverable, non traversable slope.

DEFENSE STRATEGY

- We couldn't claim slope wasn't steep, IT WAS STEEP.
- MoDOT can't install guardrail everywhere there's a steep slope. Roadsides and budgets won't allow it.
- Guardrail itself is an obstacle, and striking it is a crash.
- Here, the lanes were narrow. The road bed was narrow. A guardrail would force vehicles closer to center line, closer to each other, and increase the potential for head-on collisions. **Guardrail would have been a bad decision.**
- The arbitration panel agreed and returned a verdict on behalf of MHTC.

APPLICATION OF CLEAR ZONE TO NEW HIGHWAYS

- A clear area provides safety benefits to drivers on all types of roadways, but is **primarily** applicable to **new construction**, where it is physically possible to minimize the proximity of roadside obstacles, high fills, and non traversable terrain from the travelled lanes.
- But even on new roadways, it can be impossible to provide a wide, unencumbered clear zone because of necessary roadway structures, like bridges, interchanges, culverts, & roadside topography.
- Therefore, there will always be a need for barriers and crash cushions.



SO WHAT DO WE DO ABOUT IT?

When a wide, unobstructed clear zone is not possible

The basic principals for handling fixed objects and steep slopes has not changed since the start of the clear zone concept, and apply in the order of preference listed below:

1. Remove the object.
2. Redesign the location.
3. Relocate the object.
4. Reduce severity with breakaway device.
5. Redirect the vehicle with barrier or attenuation device.
6. Delineate/warn of the object.

APPLICATION OF A CLEAR ZONE TO EXISTING HIGHWAYS

- A clear roadside, free of encumbrances, needs a wide right-of-way, and most old highways do not have wide rights-of-way.
- So it's difficult to impossible to provide clear recoverable areas along some highways designed prior to 1970, because roadside safety features were not a part of the original design of the highway, and the topography offers little additional space.
- On existing highways, neither AASHTO nor EPG require or suggest implementation of a 30 foot wide clear zone when work is being done without changing the vertical or horizontal alignment and there is no substantial crash history.

SO WHAT DO WE DO *WHEN A WIDE UNOBSTRUCTED CLEAR ZONE IS NOT POSSIBLE?*

On existing highways, consider the following:

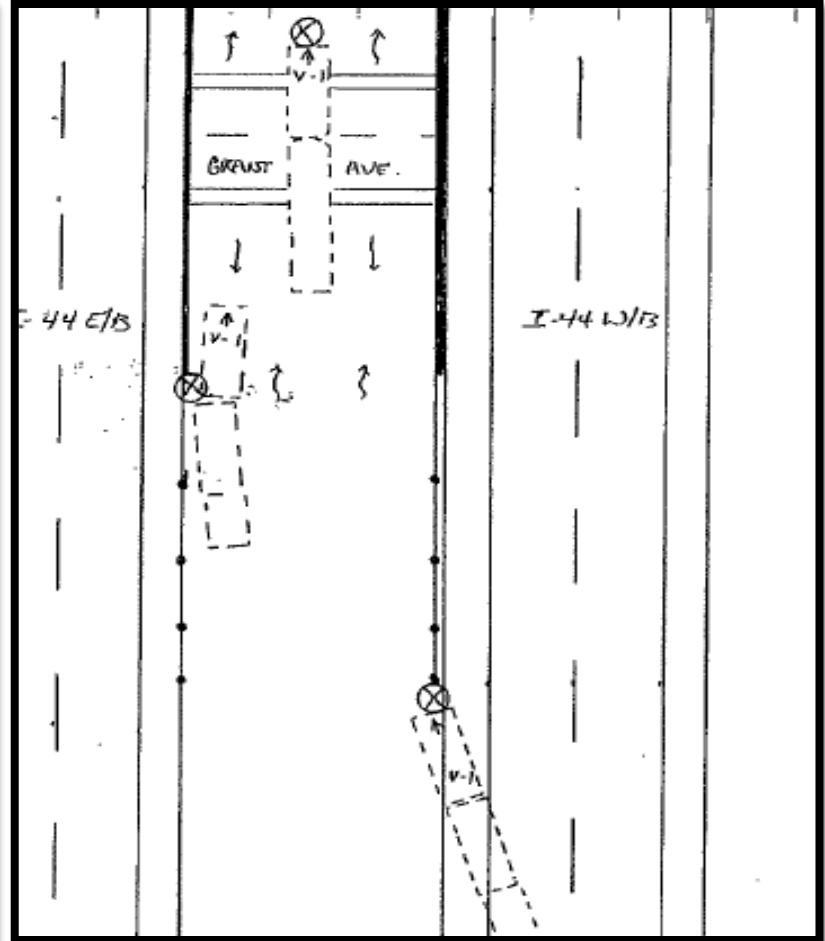
- Install breakaway sign posts.
- Install breakaway light poles.
- Install barriers.
- Install attenuators.
- Reconstruct, short of full reconstruction.
- Sometimes remove the obstacle.



APPLICATION OF CLEAR ZONE TO BRIDGE PROJECTS, LENGTH OF NEED

- What happens on a construction project for an existing highway where we're changing geometry through grading, etc.?
- Or when we rebuild a bridge/overpass where we're replacing or adding guardrail as a safety enhancement?
- How much guardrail is enough?
- **UNDENIABLE TRUTH:** Protecting just the bridge ends is not enough.
- Designer must consider the obstacle our bridge is protecting motorist from encountering.
- Driver will inevitably find a way behind that guardrail. The designer must determine the distance in which the driver is able to stop before encountering obstacle under the bridge.

I-44 Twin Bridges Crash



Truck was traveling westbound on I-44, drifted off the roadway, struck the guardrail, got behind the guardrail, collided with the inside eastbound bridge rail, became airborne and landed on Grant street under the I-44 overpass.

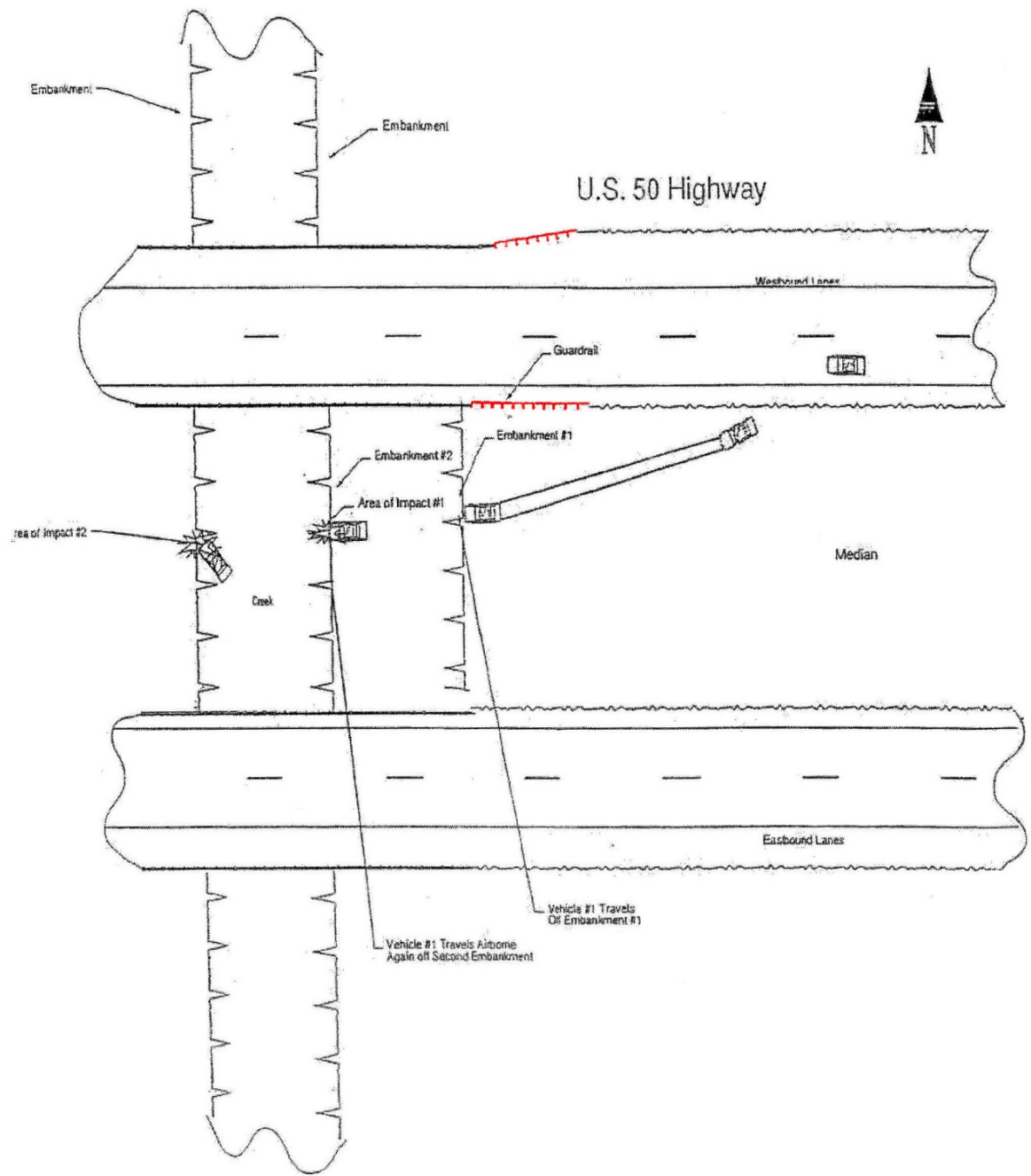
Binkley v. MHTC

WHEN LENGTH OF NEED WAS NOT CALCULATED

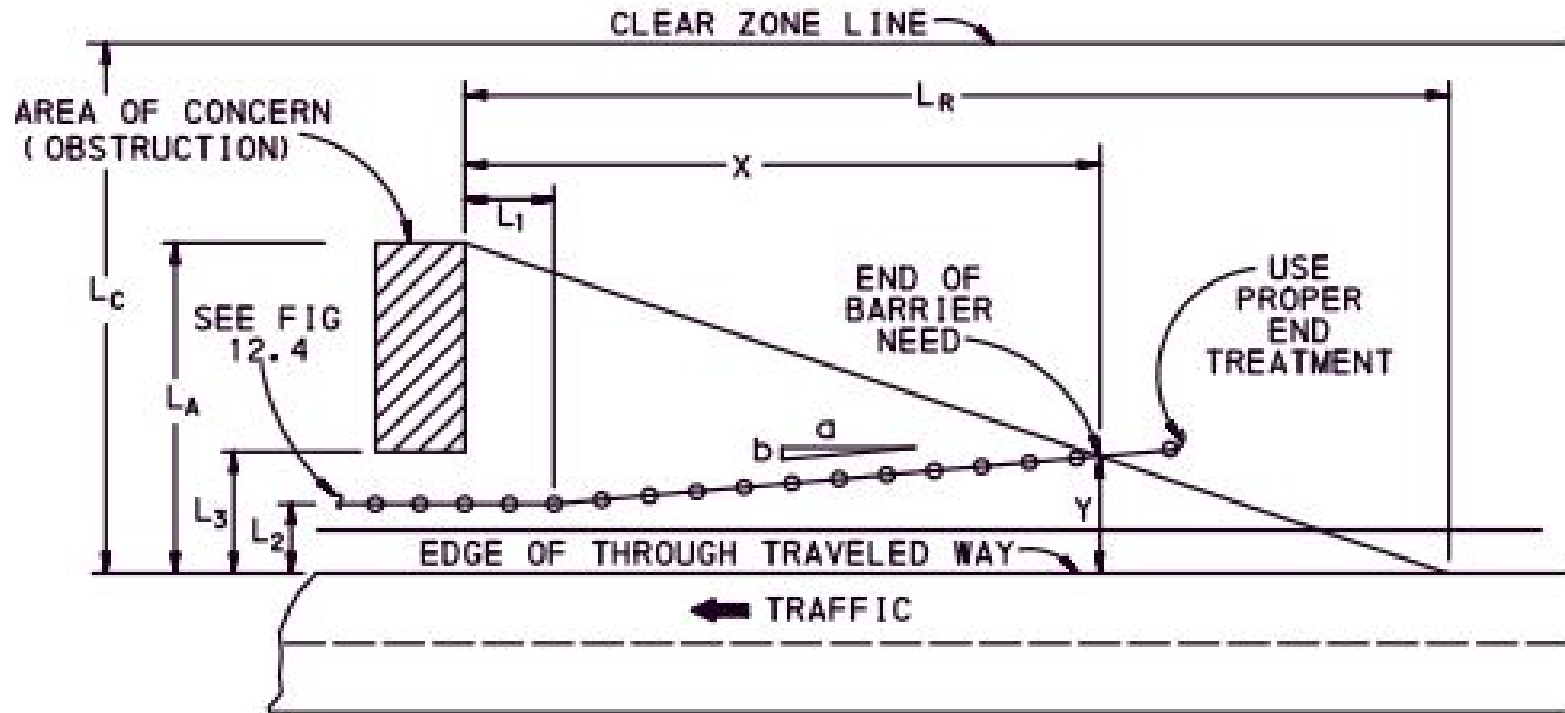
- **186 feet** of guardrail located on Highway 50 in Johnson County to protect motorists from encountering the embankment located underneath “Devil’s Bridge.”
 - Driver fell asleep and drifted into the median **330 feet** from the bridge.
 - Driver and back-seat passenger suffered fatal injuries, front-seat passenger Derek Binkley was seriously injured and sued.



- **425 feet** of guardrail was determined to be the appropriate Length of Need calculation at this location. Again, driver exited roadway at 330 feet.
- The Roadside Design Guide Section 12.8 states, *“Not only is this barrier intended to shield the ends of the bridge rail, but it also should be designed to prevent a motorist from running off the road and into or onto whatever feature the bridge crosses.”*
- We settled this lawsuit, and replaced the 186 feet of guardrail with 425 feet.



Clear Zone Concepts



- Where:
- X = DISTANCE FROM OBSTRUCTION TO END OF BARRIER NEED.
 - Y = DISTANCE FROM EDGE OF THROUGH TRAVELED WAY TO END OF BARRIER NEED.
 - L_A = DISTANCE FROM EDGE OF THROUGH TRAVELED WAY TO LATERAL EXTENT OF OBSTRUCTION.
 - L_1 = TANGENT LENGTH OF BARRIER UPSTREAM FROM OBSTRUCTION.
 - L_2 = DISTANCE FROM EDGE OF THROUGH TRAVELED WAY TO BARRIER.
 - L_3 = DISTANCE FROM EDGE OF THROUGH TRAVELED WAY TO OBSTRUCTION.
 - L_c = DISTANCE FROM EDGE OF THROUGH TRAVELED WAY TO THE OUTSIDE EDGE OF THE CLEAR ZONE.
 - L_R = THE THEORETICAL RUNOUT LENGTH NEEDED FOR A VEHICLE LEAVING THE ROADWAY TO STOP.
 - $a : b$ = FLARE RATE.

Practical Design

- Under MoDOT's Practical Design model, a project is structured solely on the basis of its purposes and need, no more, no less.
- Practical Design defines the scope by focusing on achieving the project purpose and need while considering the surroundings of each project.
- It encourages sensitivity to where the project is located, whether it is an interstate or a letter route and allows the surrounding context to help determine the design criteria.

Practical Design provides good solutions across the entire system, as opposed to perfect solutions in isolated locations.

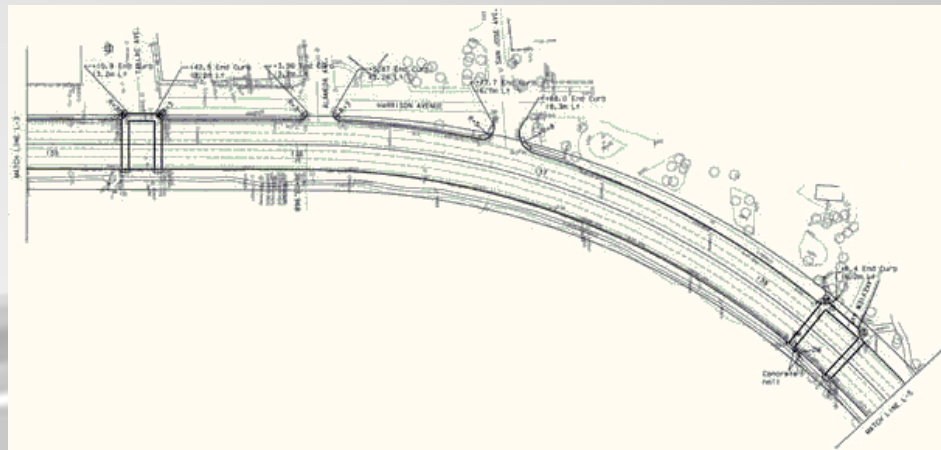
Now, all we have to do is find a successful way to defend the inevitable tort claims that will come!



- Until recently, the threat of tort claims and insurance practices discouraged engineers from trying innovative designs and effectively limited them to using "cookbook" guidelines and standards.
- When defending design defect cases, DOTs typically need to prove that the original design complied with the generally accepted standard that were in place at the time the road was designed and constructed.

- When a new lawsuit alleges that the roadway is defective because of noncompliance with the Green Book, that presumption can be overcome with documentation from the original design file that shows the thorough analysis the engineer went through to determine the best design.

THE CONTENTS OF THAT FILE WILL BECOME THE BASIS OF THE MoDOT'S DEFENSE



CLEAR ZONES AND LITIGATION

*WHEN, WHERE, WHY IT BECOMES AN ISSUE
(AKA: WE GET SUED)*

Philosophy

The Missouri Highways and Transportation Commission's (MHTC) philosophy with respect to general and fleet vehicle liability is as follows:

Claims against the MHTC will be administered in a fair and expeditious manner, paying those claims where it is determined that the commission is responsible, but resisting all claims that are not the responsibility of the commission, the department or any employee thereof.

- **\$Millions for Defense, \$0 for Blood Money**

MAINTAINING OUR CLEAR ZONE:

Wall v. MHTC

- Plaintiff driver fell asleep and ran off roadway striking a highway sign.
- The sign was not on breakaway posts.
- Plaintiff's husband was killed in crash.
- Vehicle caught fire.
- Plaintiff claims sign was within clear zone, 16 feet from edge of travel lane.

MHTC Defense

Plaintiff did not know how to measure the clear zone. Sign actually located 32 feet **FROM** edge of travel way, outside the clear zone.

Since the sign was damaged in crash, MoDOT replaced sign, using breakaway posts, allowing for improved reflectivity by moving the sign closer to the roadway.



Guardrail Works...



















Cook Road @ I-29



Google Earth



2019 Conference March 14, 2019 Chateau on the Lake, Branson, MO



Guardrail Works... But Not Always

POORLY MAINTAINED GUARDRAIL



Michelle Wallace v. MHTC

Arbitration Award for Plaintiff, Reduced to Cap



- Guardrail had obviously been struck more than once pre-crash. It was dented and bent, lying low to the ground, and it was falling down the slope of the levee.
- Plaintiff passenger sued us, even though the driver testified crash was all her fault in that she decided to make a right hand turn when it was clearly to late to do so. Plaintiff's expert testified the van vaulted over the top of Guardrail before crashing into the utility pole = dangerous condition.



But we knew about this, right? So, why didn't we fix it?

- The U.S. Army Corps of Engineers owned the levee, and MoDOT owned the roadway that sat on top.
- In order to bring the guardrail back up to proper height and placement, we would need to do some dirt work.
- The Corps would not allow any dirt work for fear of compromising the integrity of the levee.

Why This One Hurt

- MoDOT sent out a survey crew to measure the slope of the levee; it was 3:1.
- Minor route, less than 750 ADT, 50 mph.
- Zero crash history in 10 years.
- Under FHWA, AASHTO, and State/EPG guidelines, we did NOT need guardrail at this location.
- So, after reviewing the location, we took it out.
- Again, when in doubt, **LEAVE IT OUT** or **TAKE IT OUT...**

SALINE COUNTY FATALITY CRASH

FEBRUARY 6, 2017

GUARDRAIL END TREATMENT PERFORMANCE



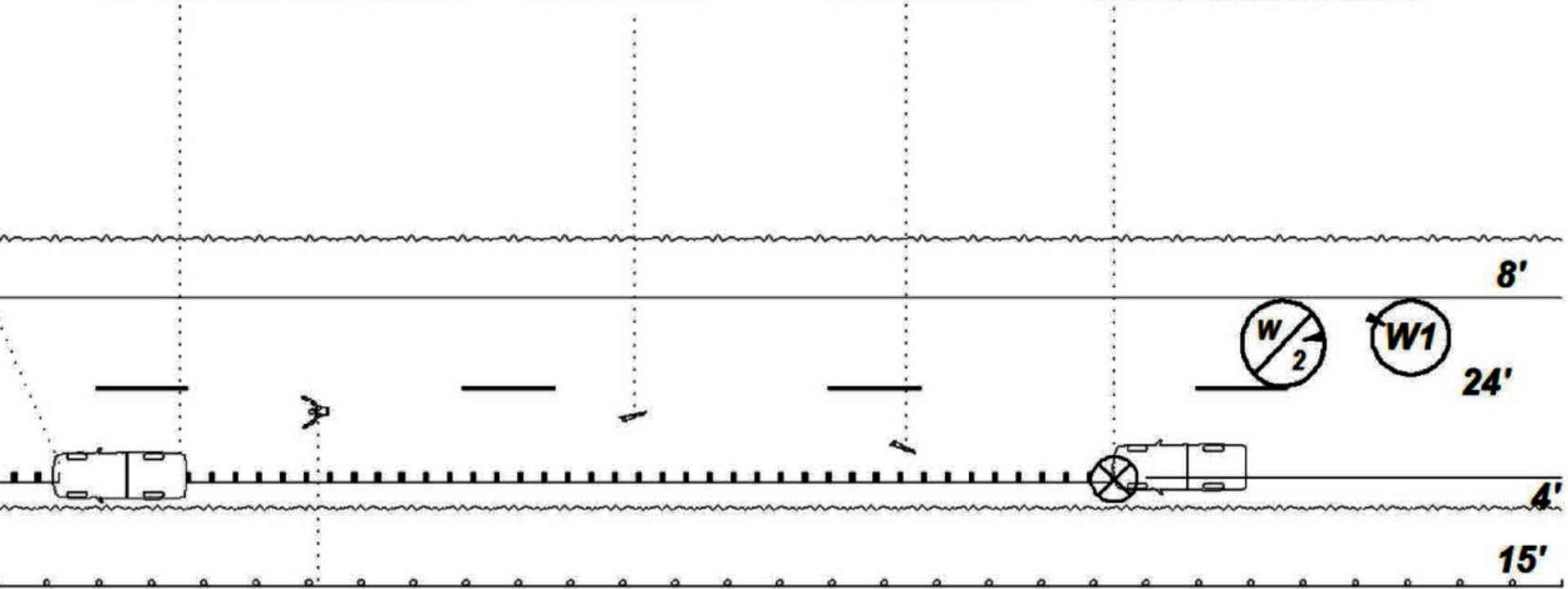
This was an X-LITE Guardrail End Treatment

- The X-Lite end treatment was on MoDOT's Approved Products List and approved by FHWA. However, due to past performance, MoDOT was monitoring the performance of this device.
- The plate on the end of the guardrail was designed to grab the first rail, slide it down to the second rail, second to third, and so on. As the rails collapsed on each other, the vehicle's energy was supposed to dissipate.
- In this strike, the X-Lite did not work as designed – the yellow and black striped plate ripped off the rail where it lodged into the engine block, sending 175 feet of guardrail through the steering column.



175 Feet of Guardrail
sliced through the
steering column of the
truck, cutting the
driver into three
pieces.

313' FINAL REST OF V1'S REAR TIRES **240' FINAL REST OF DRIVER'S 1 LEFT LEG** **191' FINAL REST OF DRIVER 1'S RIGHT LEG** **159' V1 STRUCK GUARDRAIL FACE**



281' FINAL REST OF DRIVER'S 1 TORSO

- At the time of this accident, this device was **not** considered dangerous to have out on our roadways.
- After this crash, MoDOT removed all of the approximately 700 X-LITE end treatments from Missouri roadways.



WHAT TO TAKE FROM THIS PRESENTATION?

- Start with the concept of a clear roadside recovery area.
- Where that won't work, consider a guardrail.
- And when you cannot barricade a potential hazard without creating a worse situation, admit the inevitable. . .
 - ***If you build it, they will come. When they come, they will wreck. When they wreck, they will sue.***
 - ***It doesn't matter if you build the Cadillac, if you overdesign, or if you delineate the entire length of the route.***
 - ***You cannot build a roadway where someone will not wreck.***
- But that doesn't mean that we'll ever stop trying.