

Performance Based Practical Design

Illinois Transportation and Highway
Engineering Conference

George Merritt

404-895-0250

George.merritt@dot.gov



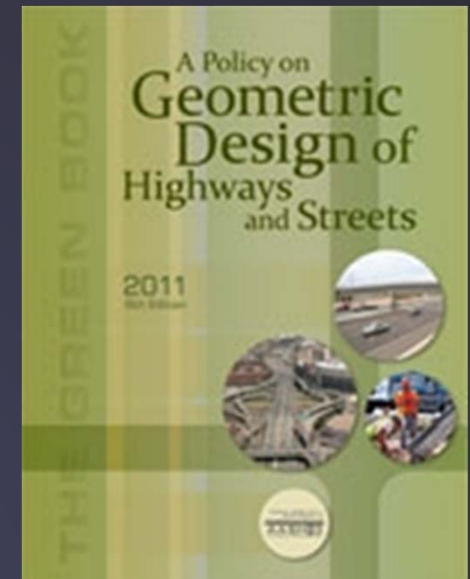
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Federal Highway Administration

DOT's Face Tremendous Challenges



The “Rules” Of Business Are Changing

- We learned from those who taught us how and why we follow the standards...
- There are valid reasons that tell us we now need to work differently:
 - Funding
 - Staff Resources
 - Aging infrastructure
 - Environmental considerations
 - Availability of reliable data and information
 - Technology



The “Rules” Of Business Are Changing

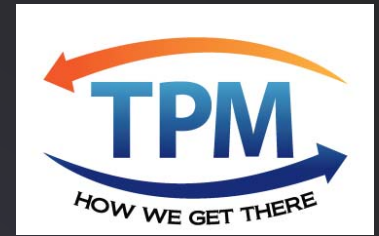


Unprecedented flexibility:

- 10 Controlling Criteria
- Intersection Control Evaluation (ICE)
- Diverging Diamond Interchange
- Part-Time Shoulder Use
- Travel Demand Management Solutions
- **Transportation Performance Management (TPM)**

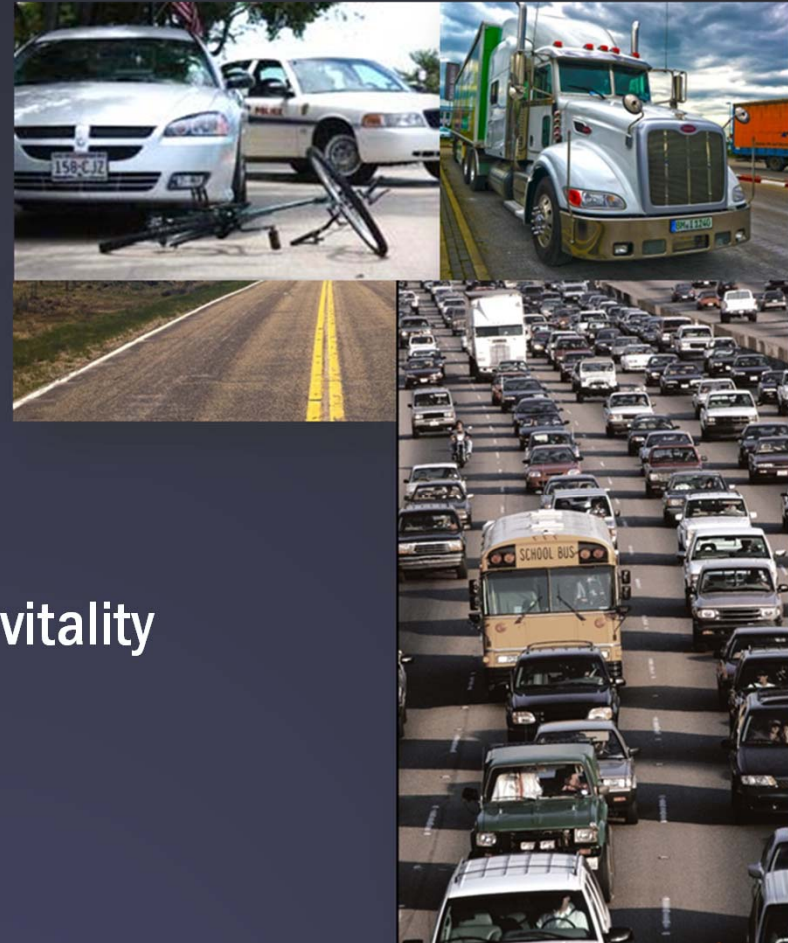


Performance Mgmt. Will Change Everything

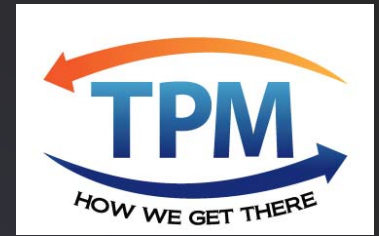


National Goals:

- Safety
- Infrastructure condition
- Congestion reduction
- System reliability
- Freight movement and economic vitality
- Environmental sustainability
- Reduced project delivery delays



Safety Performance Management



5 Performance Measures:

- Number of Fatalities
- Rate of Fatalities per 100 million VMT
- Number of Serious Injuries
- Rate of Serious Injuries per 100 million VMT
- Number of Non-motorized Fatalities and Non-motorized Serious Injuries

5-Year Rolling Averages



Where Are We Heading?

- Performance Based Standards

PBPD is a decision making approach that helps agencies better manage transportation investments and **serve system-level needs and performance priorities with limited resources.**



PBPD is not:

- **New Policy, Regulation, or Requirement**
- **Opportunity to disregard long-term needs:**
 - For short term cost savings
 - Overlooking future development
- **Compromising on safety, user needs (bike, ped, etc.), or accommodation of freight to save money**

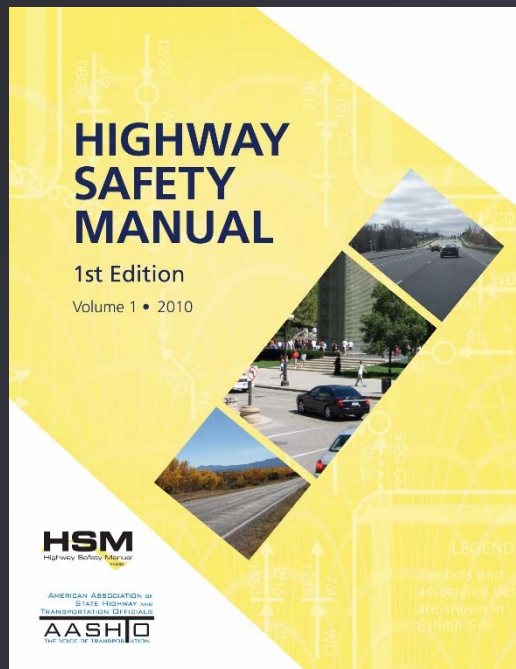




System Performance

The AASHTO Highway Safety Manual

Integrating Safety Performance into Decision Processes:

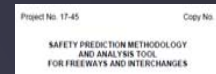
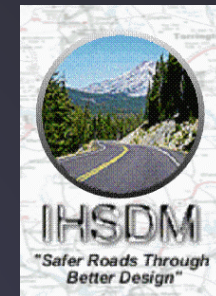
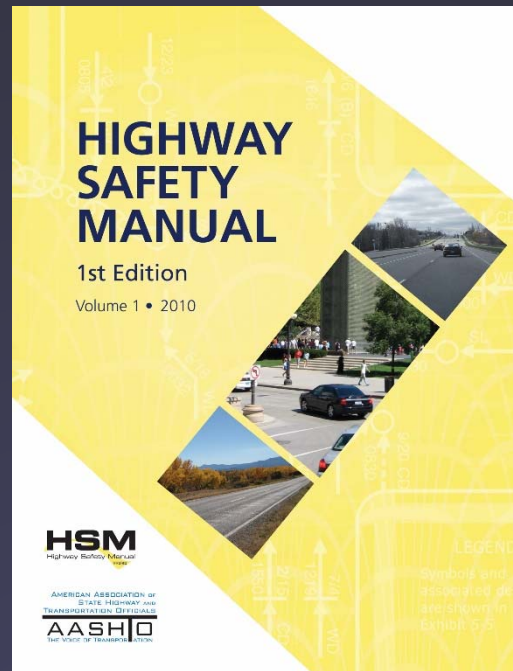


“Road safety management is in transition. The transition is from action based on experience, intuition, judgment, and tradition, to action based on empirical evidence, science, and technology...”



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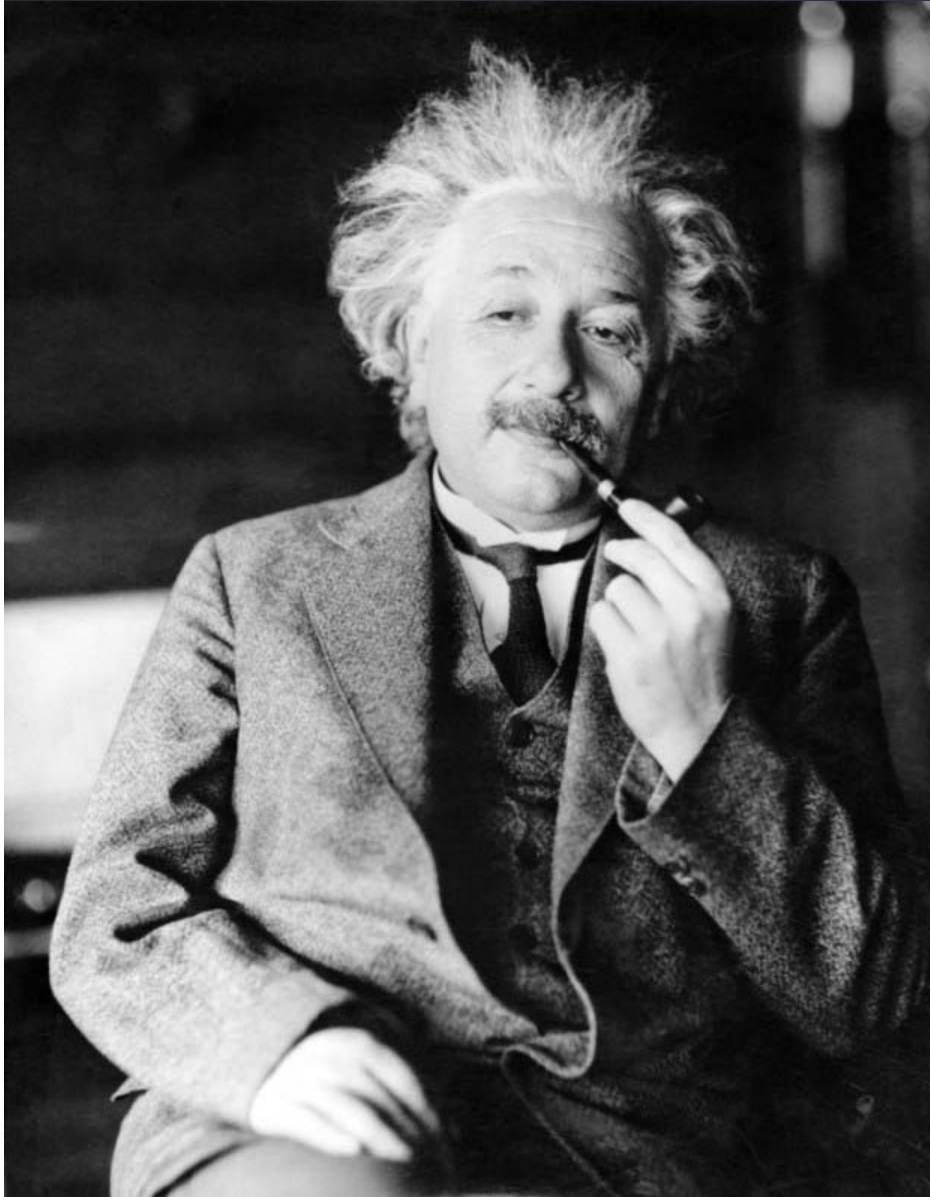
So, Can Predictive Safety Tools Help Us?



**ISATe,
Spreadsheets**



What Can We Improve On?



*"If you can't explain it simply,
you don't understand it well enough."*

Albert Einstein

Are We Effectively Communicating?

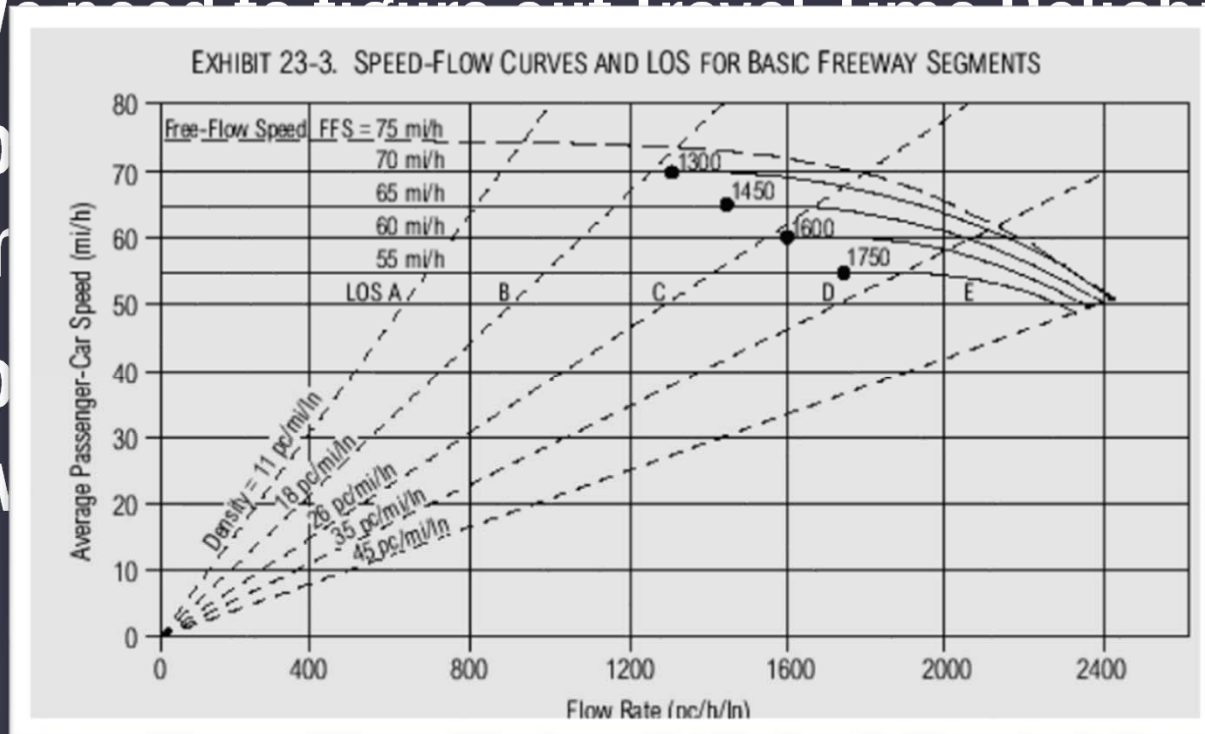
How many dollars is 10% of your annual budget?



Communication...

- Do people really understand LOS?
- We need to figure out Travel Time Reliability...

- Do people understand “Corridor”?
- Do people understand the difference between...



nces
e?



Communication...

We must strive to inform our investment decisions using relevant, objective, credible data...

...and be careful not to let the appearances of data mislead us



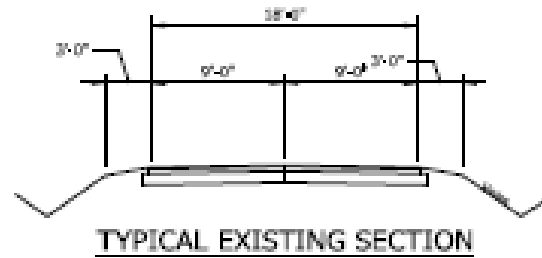
Are We Prepared?

- Technology is happening faster than any of us can comprehend
 - V2V & V2I will change everything
 - Automated Trucking is likely first out of the gate
- We must strive to understand what we can confidently control

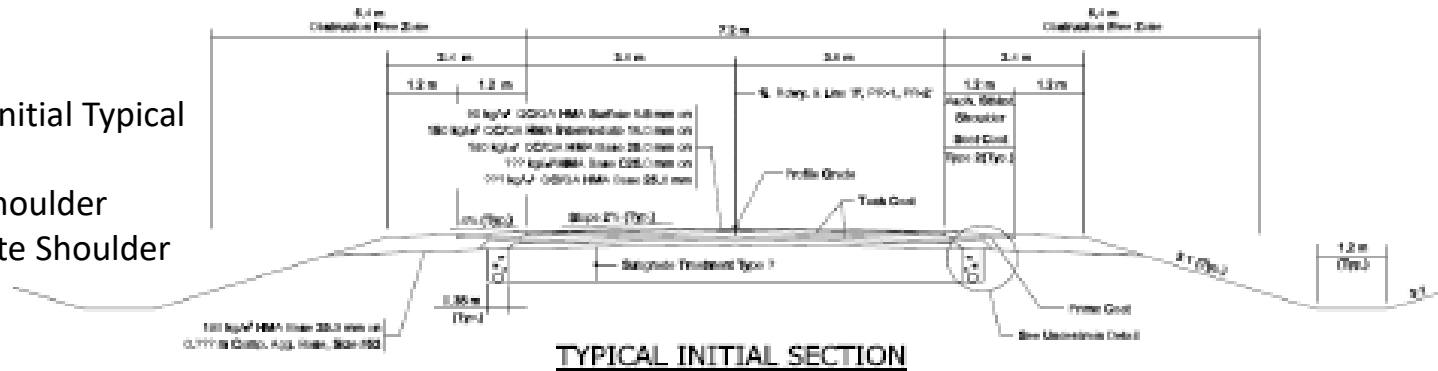


Practical Design Example

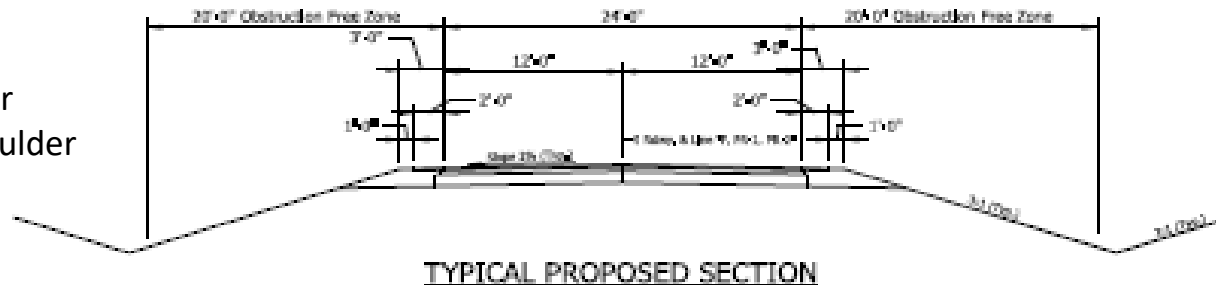
Existing Typical
9' Lanes
3' Shoulders



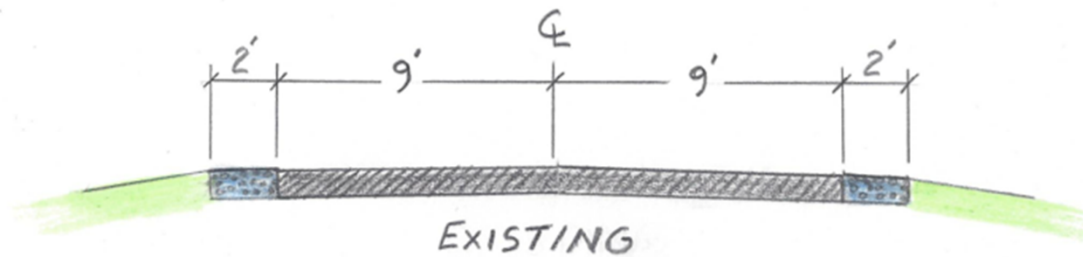
Proposed Initial Typical
12' Lanes
4' Paved Shoulder
4' Aggregate Shoulder



11' Lane
2' Paved Shoulder
1' Aggregate Shoulder



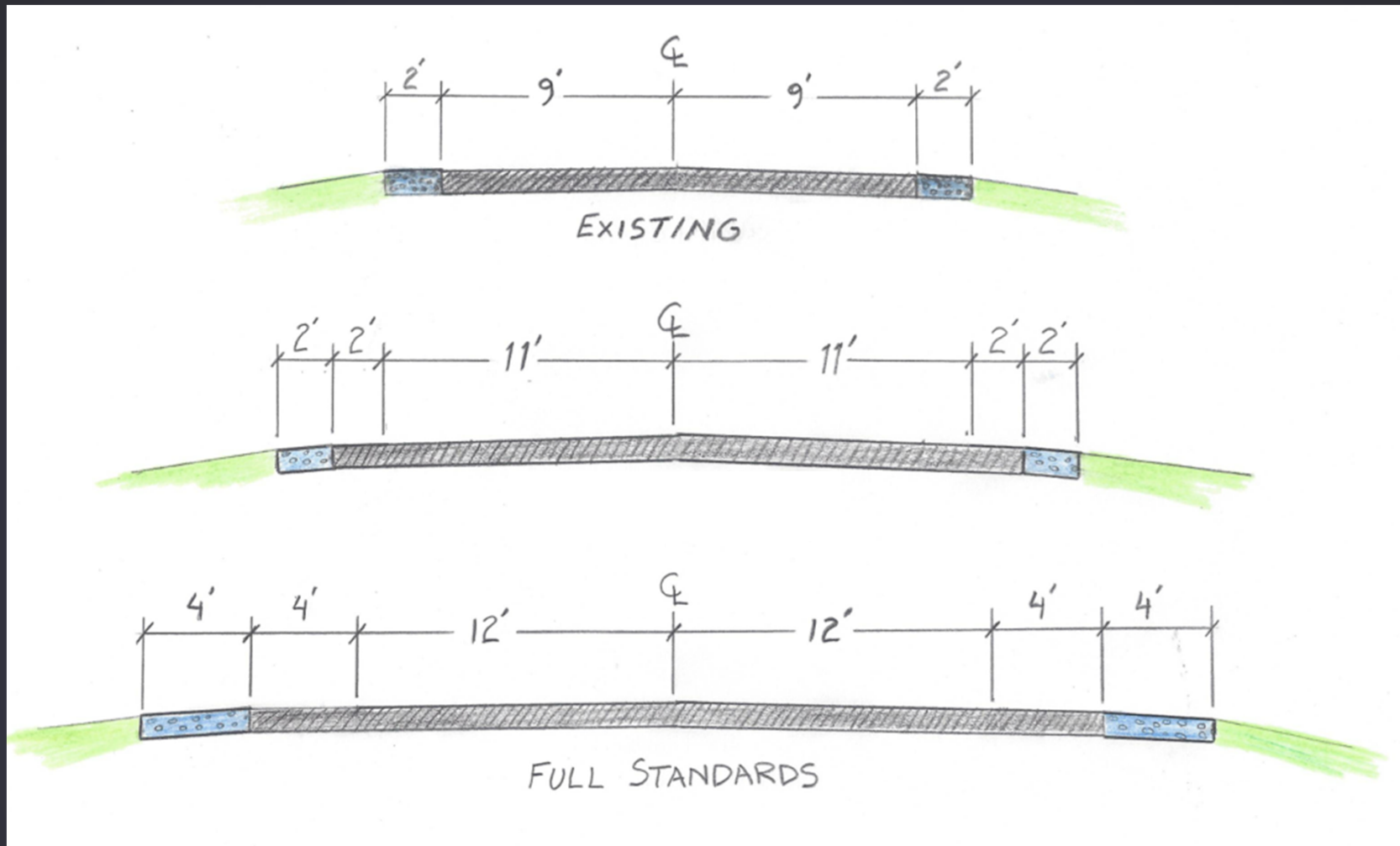
Practical Design Example



Practical Design Savings

Item	Original Cost	Practical Cost	Savings
Pavement Design			
<i>Reduce driving lane from 12' to 11'</i>	\$3,600,000	\$3,300,000	\$300,000
<i>Minimize Underdrain Depth and locations</i>	\$120,000	\$60,000	\$60,000
Shoulder Design			
<i>Reducing shoulder Aggregate width 4' to 1'</i>	\$160,000	\$40,000	\$120,000
<i>Reduce to 3:1 Side Slopes and V-bottom ditches</i>	\$775,000	\$525,000	\$250,000
Utilities			
<i>Relocate 8" gas line to lower elevation</i>	\$3,000,000	\$500,000	\$2,500,000
<i>Move OH utilities inside Clear Zone:</i>			
<i>Reduce trees to be removed</i>	\$232,000	\$132,000	\$100,000
<i>Reduce area of mitigated wetlands</i>	\$500,000	\$400,000	\$100,000
<i>Reduce number of mitigated trees</i>	\$50,000	\$10,000	\$40,000
Structures			
<i>Modify instead of replace most large structures</i>	\$700,000	\$200,000	\$500,000
<i>Structure Removal</i>	\$120,000	\$20,000	\$100,000
<i>Minimizing Cover Depth at Crest Curves</i>			\$40,000
<i>Structure Backfill</i>	\$60,000	\$20,000	\$40,000
TOTAL PROJECT SAVINGS:		\$4,150,000	

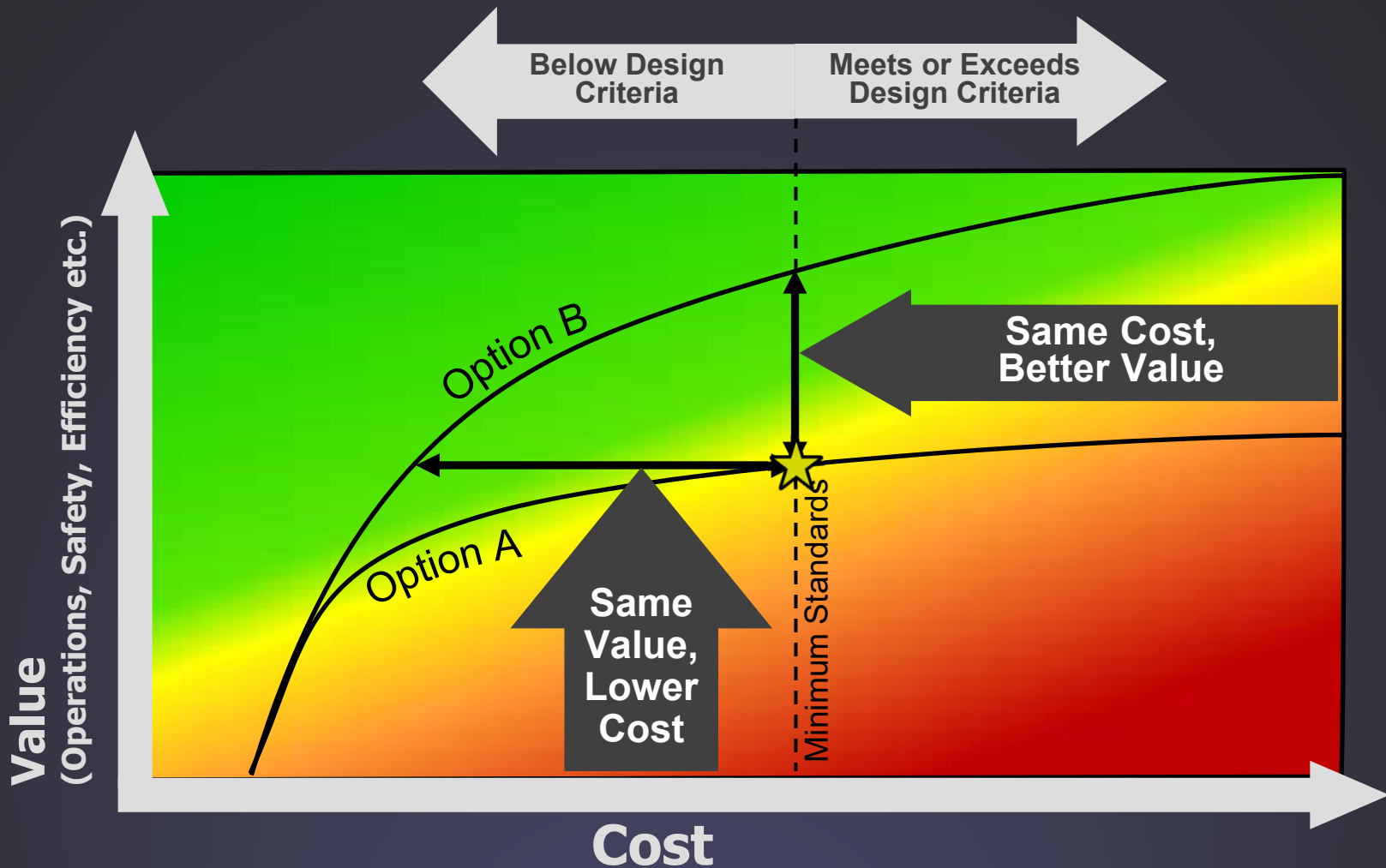
Performance Based Practical Design (PBPD) Example



Performance Based Practical Design Example



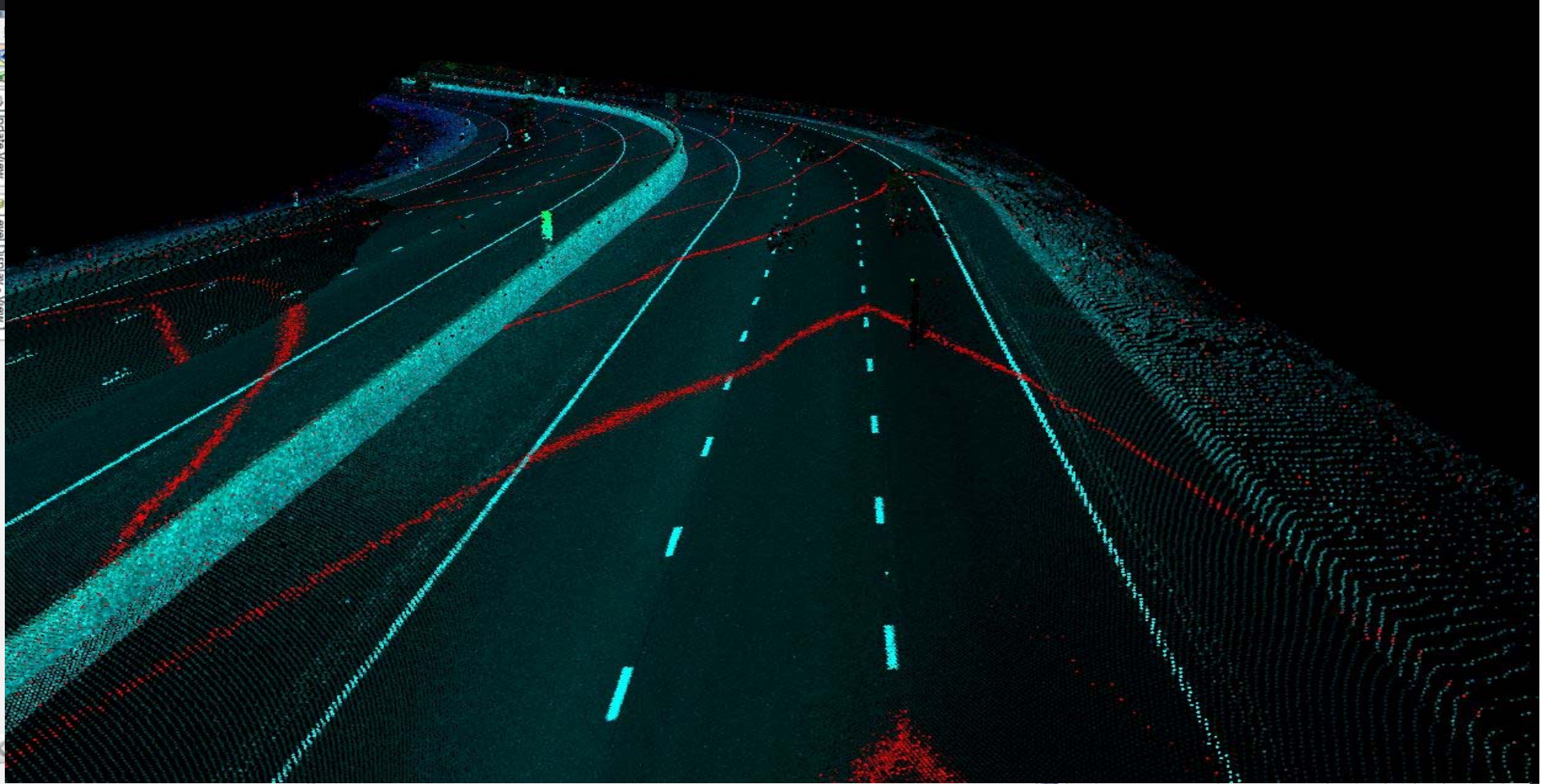
Which One Would You Choose?



Is this a Rutting Issue? A Cross-Slope Issue? Or Some Combination of Both?

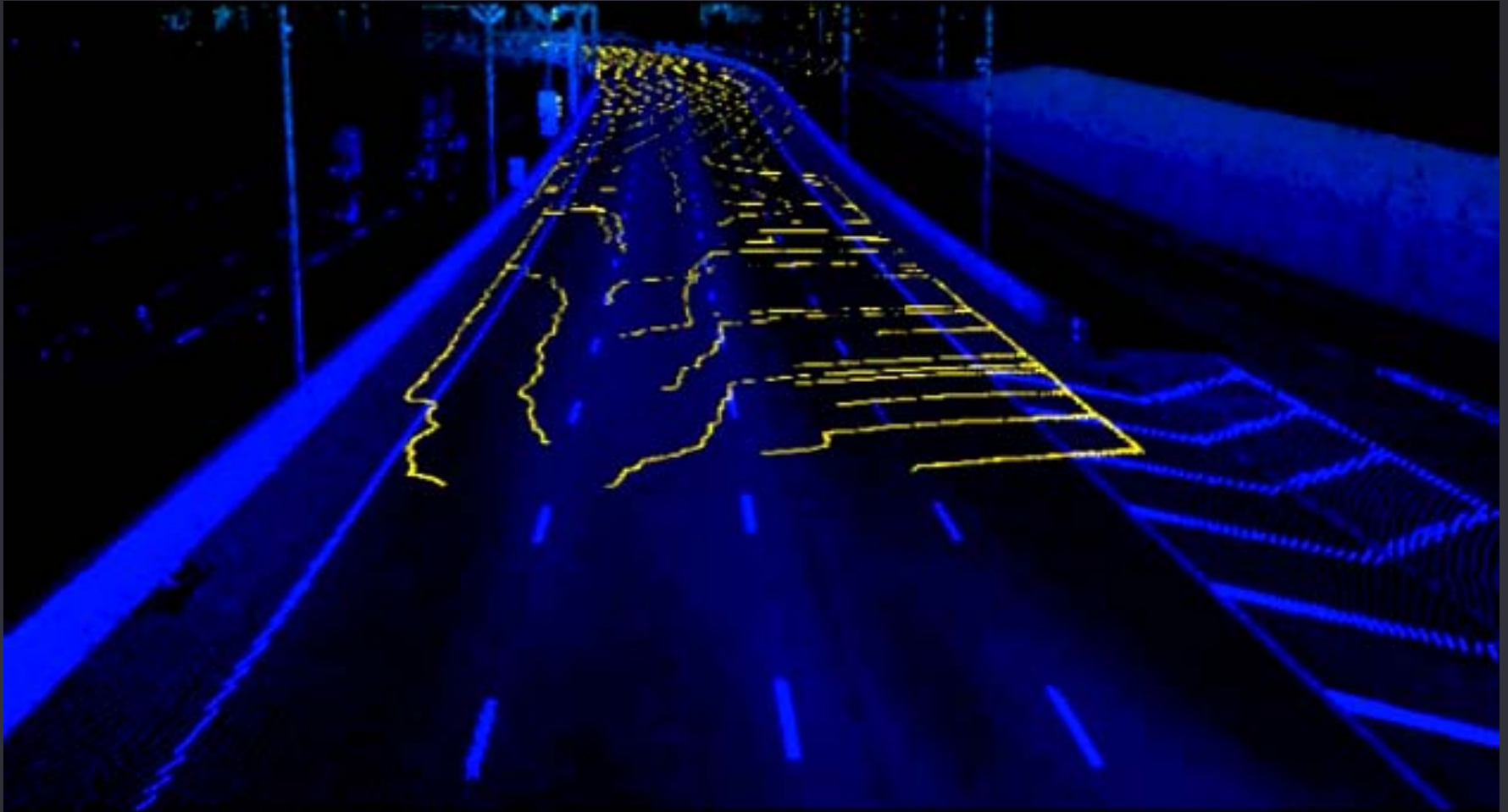


Hydroplaning Predictive Analysis Results



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LiDAR with Drainage Path Length Modeled



LiDAR with Drainage Path Length Modeled



Fixing This Is Expensive & Complicated Especially When Bridges Are Involved...



Is Variable Speed Limits a Viable Mitigation?



Regulatory VSL Sign



Advisory VSL Sign



U.S. Department of Transportation
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Guidelines for the Use of Variable Speed Limit Systems in Wet Weather



FHWA Safety Program

 U.S. Department of Transportation
Federal Highway Administration
FHWA-SA-12-022

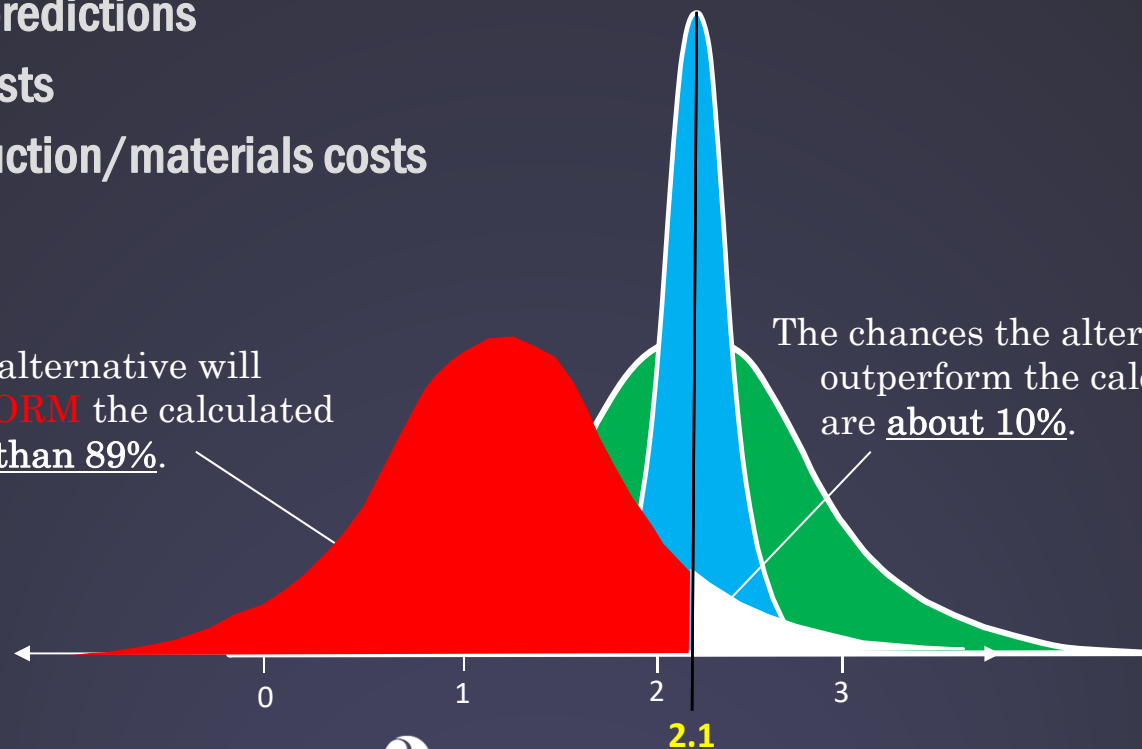
 Safe Roads for a Safer Future
Investment in roadway safety saves lives
<http://safety.fhwa.dot.gov>

When You Consider The Risk Of Being “Off” On Your Predicted Performance Calculations...

- What if the following assumptions are “off”?
 - Traffic data
 - Crash predictions
 - User costs
 - Construction/materials costs

The chances the alternative will **UNDERPERFORM** the calculated B/C is greater than 89%.

The chances the alternative will outperform the calculated B/C are about 10%.



FHWA Will be a GOOD PARTNER

***FHWA is prepared to support States
as they develop projects with a
system performance mindset using
data-driven methods***



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Please...
Push The
Boundaries On
Highway Safety



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