ABC AND SAFETY/MOBILITY

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Presentation Outline

Strategies

1- Introduction

2- FHWA alternatives

3- FIU work

4- Conclusions and future direction

ABC and Safety

Introduction

- Construction activities appears to be related to frequency of accidents, injuries and fatalities.
- Regardless of many safety measures taken by FHWA, workers and publics are still exposed to construction zone related hazards, in roadways.
- ABC, results in shortening of construction period. One would think that the shortening of the construction period, using ABC, should result in reducing safety hazards, created by construction zones.
- Ways to quantify the relation between ABC and roadway safety is not well understood.
- Limited work at FIU was recently completed, in an attempt to quantify the safety benefits of ABC.

FHWA Summary

Next few slides shows seven alternatives, developed by FHWA for addressing construction zone safety.

Seven Alternatives identified by FHWA for Controlling Exposure in Construction Zones

Strategies

1- Full Road Closure

2- Diversions

3- Median crossovers

4- Ramp closures

5- Rolling roadblocks

6- Working during nighttime

7- Accelerated Construction Techniques

Exposure Control Measures

1- Full Road Closure

Definition: full road closure is the removal of or suspension of traffic operation during the reconstruction and maintenance activates. During full road closure, the traffic is detoured to other routes for predefined period of time

Benefits: full road closure allows the construction and maintenance crew to have access to the entire roadway, reduces project completion time, and improves work quality

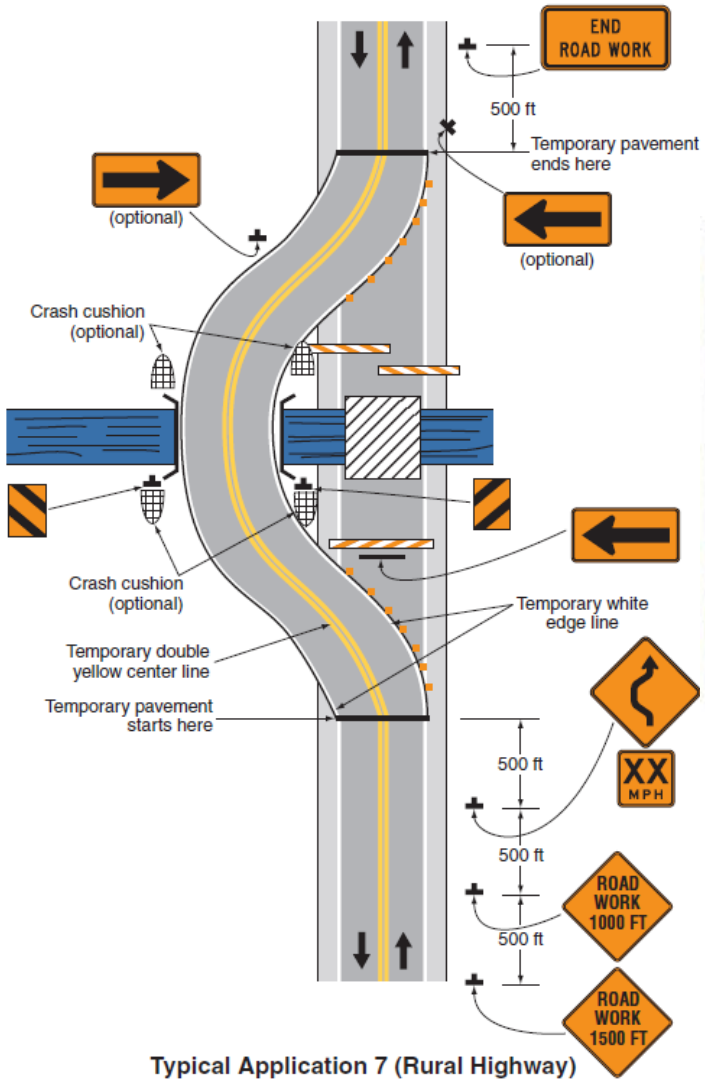
Exposure Control Measures

2- Diversions

Definition: Diversion is a temporary rerouting of road users onto a temporary highway or alignment placed around the work zone.

Full diversion involves the complete closure of all lanes of a roadway.

Partial diversion is where one or more lanes are left open through work zone and diversion is provided to offset the loss of roadway capacity



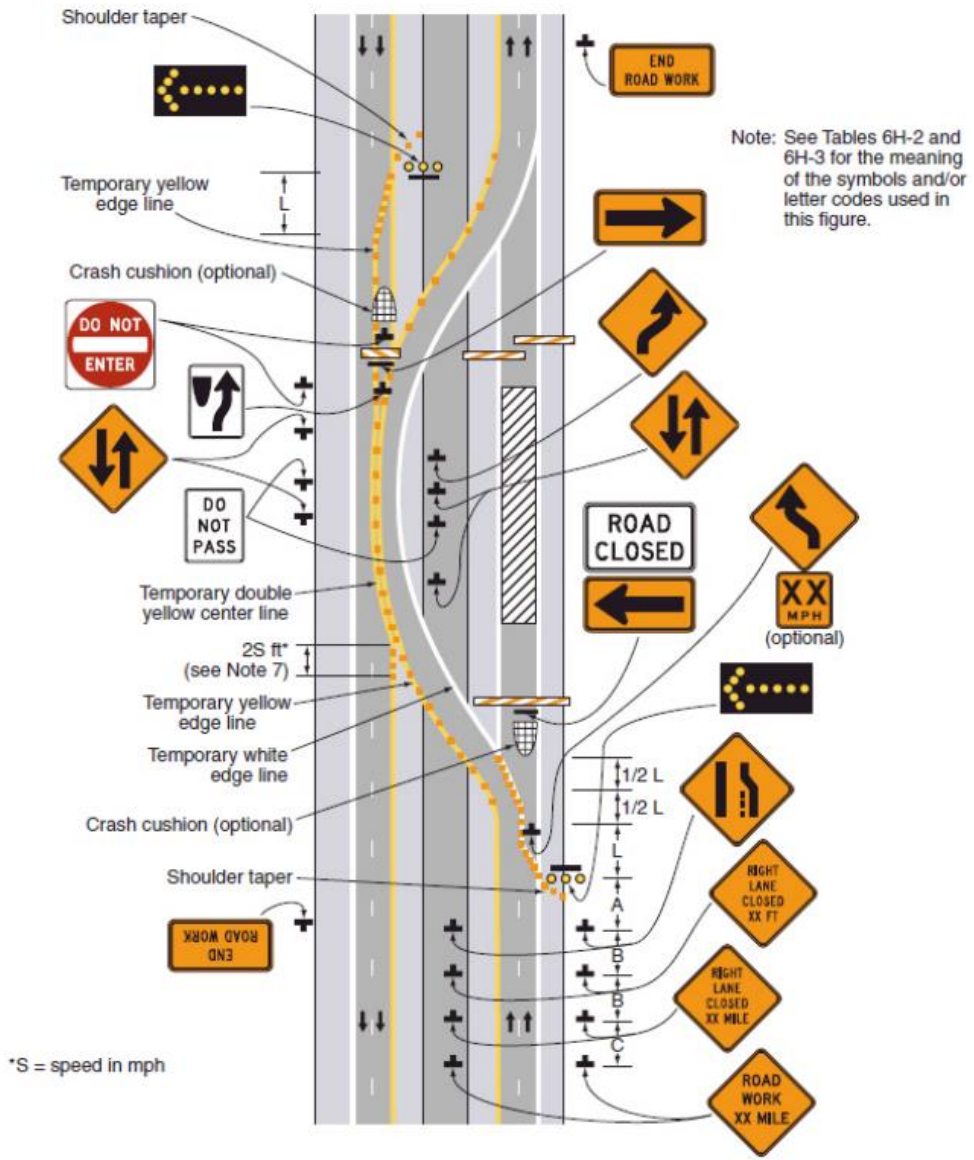
Typical Application 7 (Rural Highway)

Exposure Control Measures

3- Median crossovers

Definition: median crossovers is used to close entirely one side at a time of a divided multi-lane highway and moving all traffic to the other side as two-way traffic.

Benefits: traffic flow is maintained within the agency right-of-way, reducing the impacts on nearby alternative routes, reduction of amount of analysis needed for the alternative routes



Exposure Control Measures

4- Ramp closures

Definition: To reduce vehicle exposure to work zones, temporarily closure of exist and entrance ramps upstream and within the limit of work zones.

Benefits: reduce exposure by causing drivers to seek out alternative routes, eliminates the need for complex traffic control to accommodate entering and exiting traffic, ramps can be restricted to high-occupancy vehicle (HOV) use only by providing incentives for carpooling

Exposure Control Measures

5- Rolling roadblocks

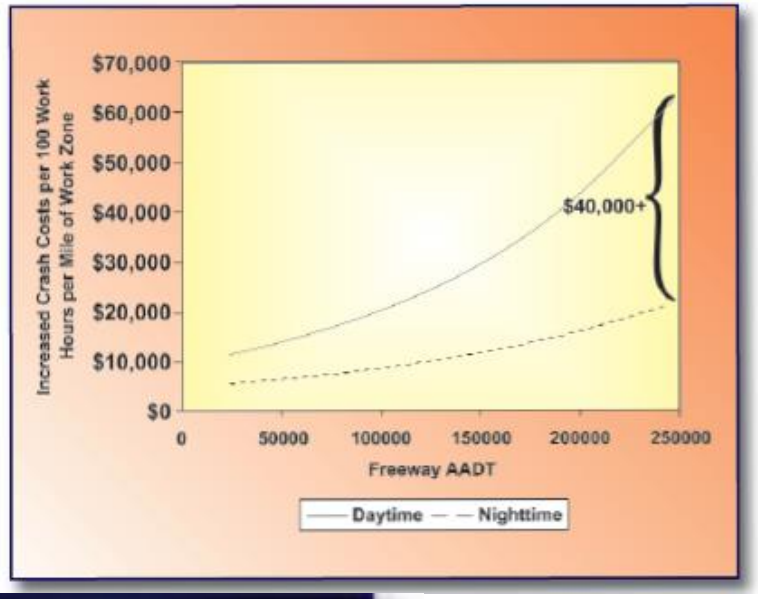
Definition: Law enforcement vehicles with light flashing entering the roadway upstream of the work zone and move at a fairly slow pace to create a blockage across all travel lanes.

Benefits: suitable for temporary traffic control set up and removal activities, and allows workers to finish the installation and removal process

Exposure Control Measures

6- Working during nighttime

Definition: By performing work zone activates at night or weekends to avoid high traffic volumes



Benefits: Many agencies already limit temporary lane closure on high-volume roadway to nighttime to minimize he delays and queues that can develop during daytime.

Exposure Control Measures

7- Accelerated Construction Techniques

Definition: Techniques and strategies that encourage faster completion of construction and maintenance efforts by the highway contractor can reduce worker and motorist exposure in work zones by

- Precast modular concrete road panels and bridge elements
- High early strength concrete
- Self-propelled modular transports (SPMT) for bridge moves
- Hot in-pace asphalt recycling

Brief Summary of FIU Investigation

Next few slides provides high level summary of recent work completed at FIU, in an attempt to quantify the roadside safety aspects of ABC

Brief Summary of FIU Investigation

- FIU study has proposed a methodology that could be adopted to different regions of the country, if the required data are available.

- FIU study has limitations and should be viewed as a first step

- Additional work will be needed to be carried out before the general methodology is developed

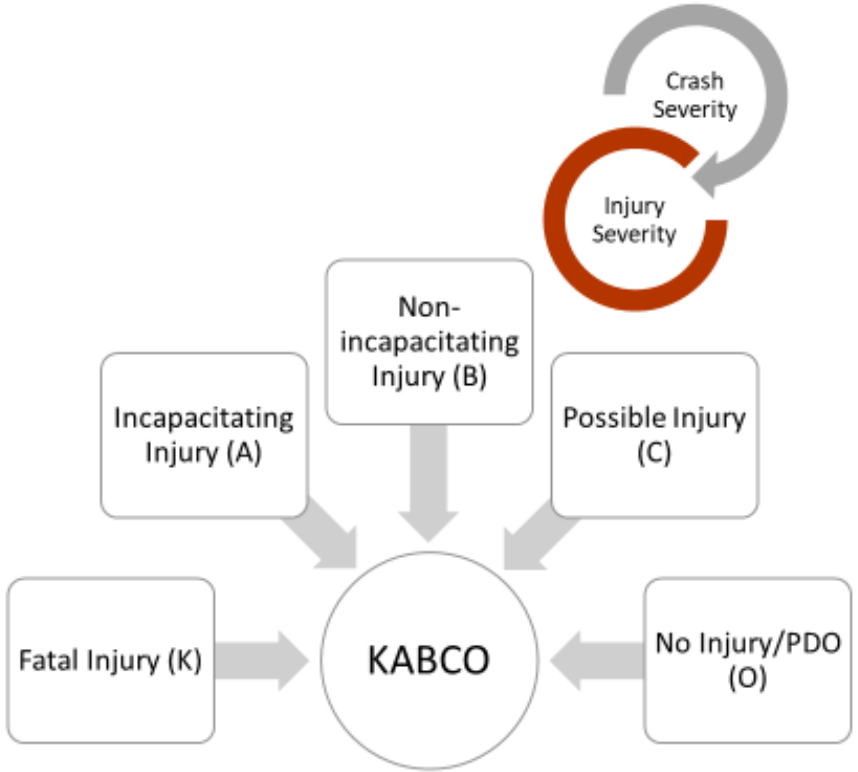
Brief Summary of FIU Investigation

- FIU study using the Miami-Dade County as a testbed has proposed a methodology, where one can assign a dollar value to each day of construction.
- This dollar values, includes costs associated with damage to properties, injuries and fatalities.

Crash Cost Analysis

The estimated costs considered in this study includes:

- Cost per equivalent **KABCO crash severity levels**, using Florida crash cost method based on 2013 USDOT guidance.
- Estimated damage including **property damage** and **vehicle damage** which were recorded in the crash reports.

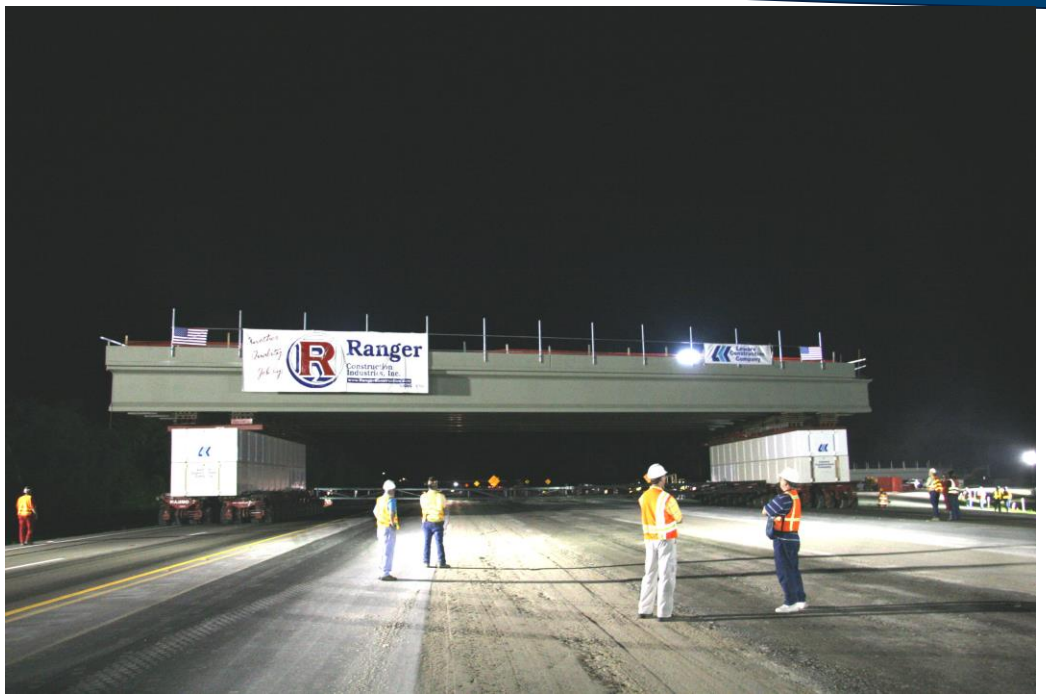


Brief Summary of FIU Investigation

Let’s take a look at an example

Graves Ave over I-4 ABC Project

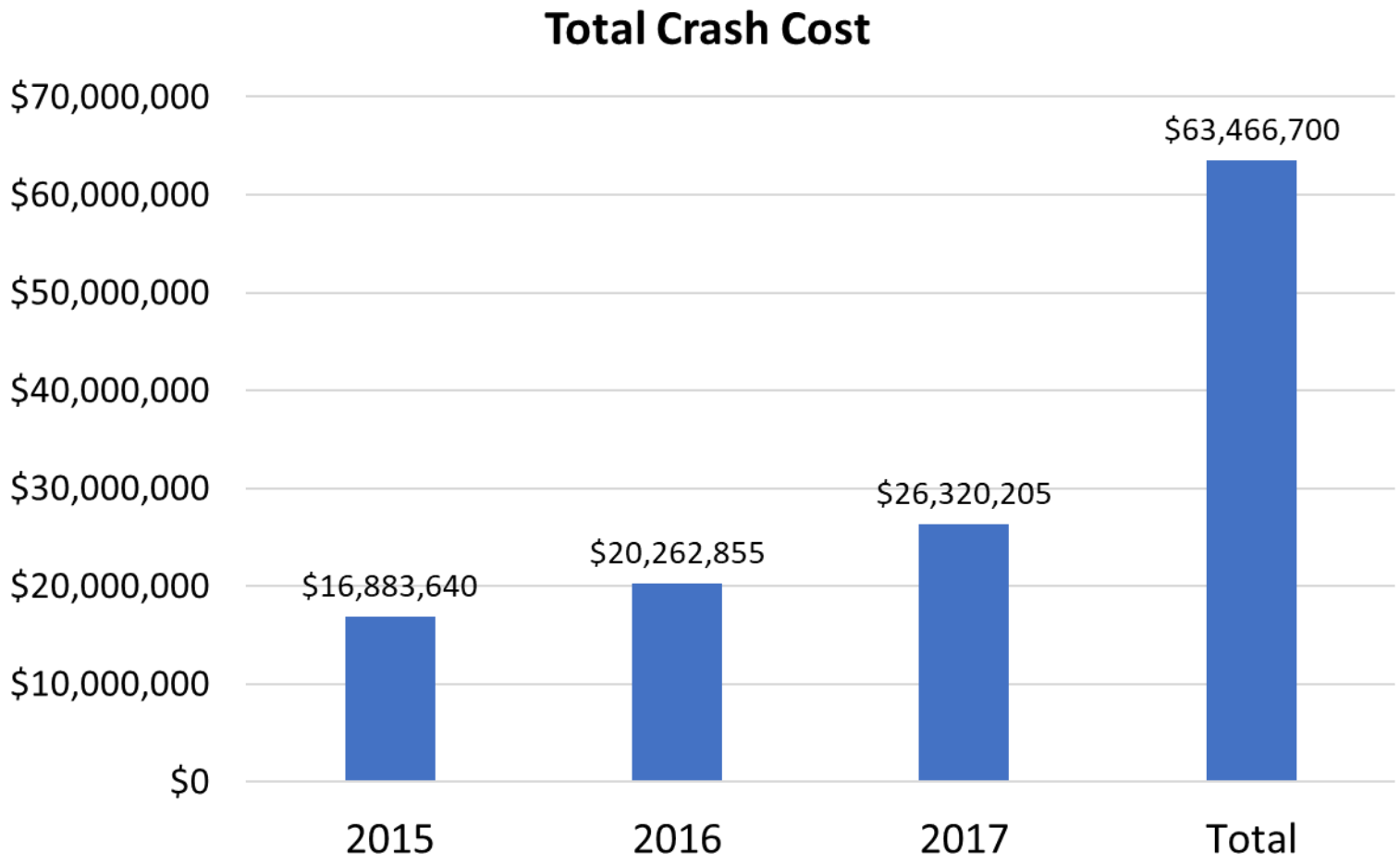
Graves Ave over I-4 ABC Project



Graves Ave over I-4 ABC Project

The Graves Avenue detour was reduced from 12 to 8 months for a time savings of 4 months and a delay-related user cost savings of $2.18 million. Lane closures on I-4 were reduced from 32 nights to four nights, for a time savings of 28 nights and a user cost savings of $50,000. Total savings to the traveling public was $2.23 million.

Crash Cost Analysis for Conventional Bridge Construction



Three-Year Average (present value)= **$21,155,567**

Comparison of ABC and Conventional Method

Method	Mobility Impact (Lane Closure)	Implementation Costs
ABC	4 days	$28, 168,175
Conventional	32 days	$27, 600,000
Difference	28 days	$568,175

Assumption:

- **Assumption –** Each of the 60 cases considered involves 32 days of lane closure
- $21,155,567/60 = $352,592.8 Total cost of lane closure per bridge
- $353,592.8/32 = $11,018.5 Daily cost of lane closure

- Total cost associated with safety, as a result of 28 days of reduction in lane closure is then

28* $11,018.5 = $308,518.7 Saving as a result of reducing roadside related hazards (Safety)

User costs reported by FDOT $2.23M

Conclusions and Future Direction

- A methodology is proposed that its accuracy is related to large extend to availability of adequate data

- For the first time we can assign a dollar value to everyday reduction in lane closure

- Additional work needs to be conducted to take the FIU work to next level.