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**TRB** TRANSPORTATION RESEARCH BOARD

# TRB Webinar: The Value of Access Management—Tools for Difficult Conversations

*September 28, 2023*

*11:00 AM – 12:30 PM*



# PDH Certification Information

1.5 Professional Development Hours (PDH) – see follow-up email

You must attend the entire webinar.

Questions? Contact Andie Pitchford at [TRBwebinar@nas.edu](mailto:TRBwebinar@nas.edu)

***The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Program. Credit earned on completion of this program will be reported to RCEP at RCEP.net. A certificate of completion will be issued to each participant. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the RCEP.***



# AICP Credit Information

1.5 American Institute of Certified Planners Certification  
Maintenance Credits

You must attend the entire webinar

Log into the American Planning Association website to claim your  
credits

Contact AICP, not TRB, with questions

# Purpose Statement

This webinar will provide agencies and their consultants with research-based tools for demonstrating the many benefits of managing roadway access when conversations become difficult.

## Learning Objectives

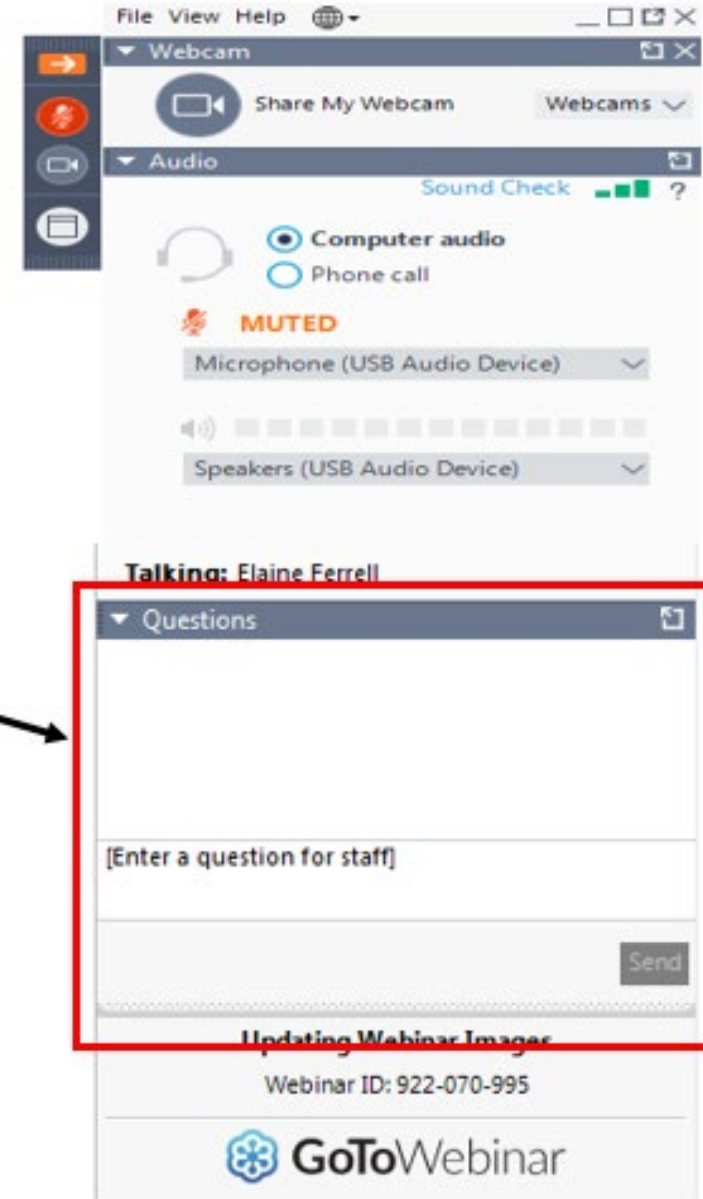
At the end of this webinar, you will be able to:

- Articulate the concept of access management through the lenses of safety, mobility, economy, and livability
- Identify and access the resources and tools in the Access Management Communications Toolkit
- Apply the Access Management Communications Toolkit to explain the benefits and cost of access management decisions



# Questions and Answers

- Please type your questions into your webinar control panel
- We will read your questions out loud, and answer as many as time allows



# Today's presenters



Grant Schultz  
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*Brigham Young University*



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*Texas A&M Transportation Institute*

# The Value of Access Management— Tools for Difficult Conversations

Kristine Williams, Jerome Gluck, Karen Dixon, Brianne Glover

Transportation Research Board • September 28, 2023

Access management can increase safety, reduce delay, improve modal quality of service, and enhance livability.



Before



After

Photo by J. Malone



I need that  
extra driveway!



Where is the  
signal I  
asked for?



# NCHRP 25-47 Research Objectives

Guidance for  
transportation agencies

Measure  
benefits and  
costs

Communicate  
value of access  
management





# NCHRP

Web-Only Document 339

## Developing a Toolkit to Measure and Communicate the Value of Access Management

Center for Urban Transportation Research  
*Tampa, FL*

Texas A&M Transportation Institute  
*College Station, TX*

AECOM  
*New York, NY*

Teach America  
*Fort Myers, FL*

Conduct of Research Report for NCHRP Project 25-47  
Submitted February 2021

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# NCHRP

Research Report 1032

National  
Cooperative  
Highway  
Research Program

## How to Measure and Communicate the Value of Access Management



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# Access Management Communication TOOLKIT

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- A visual document that organizes ideas, images, and resources on the value of access management.





# HOW TO USE THE TOOLKIT

## Safety | Mobility | Economy | Livability

This area above indicates the value being communicated.



Photo by J. Malone

The photo or graphic shown in this area can be used to communicate about your project.

The technique is highlighted here with an icon so you know where you are in the Toolkit.

### MESSAGING

This area shows messages you can share with stakeholders and includes example infographics.

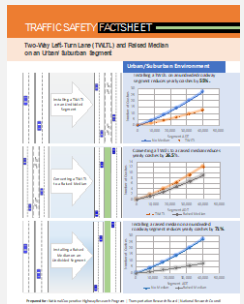
**Access management preserves the safety, economy, mobility and livability of our community.**

A Fact Sheet is available for every spreadsheet

Simple spreadsheet tools provide help in calculating the safety, mobility, and economic value of selected techniques.

### TECHNICAL SUPPORT

This area provides technical support in the form of information, tools, and links to other resources.



Use the spreadsheets to generate project-specific data for your communication tools

Spreadsheets

See the final report for more information on how to use the tools.

# Safety (*Example page*)



Source: St George News, Utah

**Medians improve safety by reducing left-turn crashes and conflicts.**

## Reducing Left-Turn Conflicts

- Medians reduce left-turn conflicts between motor vehicles and with other roadway users. More than two-thirds of all access-related collisions involve left-turning vehicles. Left turns represent the highest injury and fatality crashes on at-grade arterials.

## Increasing Pedestrian and Bicycle Safety

- Medians increase pedestrian and bicycle safety by reducing left-turn conflicts and by incorporating safe crossing refuges into the median design.

Converting a TWLTL to a raised median reduces yearly pedestrian crashes by

**46%**



Converting a TWLTL to a raised median reduces yearly crashes by

**27%**

Use spreadsheet to calculate your own values



## Median Type and Driveway Density

### Spreadsheet

 [MedianTypeDwyDensity.xlsx](#)

Calculates reduction in crashes by installing a raised median on an undivided roadway or roadway with a two-way left-turn lane (TWLTL).

### Impact of Median Installation:

Total Crashes (All Severities)	2.76
PDO Crashes	7.22
Base Condition: Absence of raised median.	

[Median and TWLTL Fact Sheet.pdf](#)

TRAFFIC SAFETY FACTSHEET


Two-Way Left-Turn Lane (TWLTL) and Raised Median on an Urban Suburban Segment


TECHNIQUES

- Undivided
- TWLTL
- Divided

OUTPUTS

- Total Crashes
- PDO Crashes

 Spreadsheet

 **FACTSHEETS**

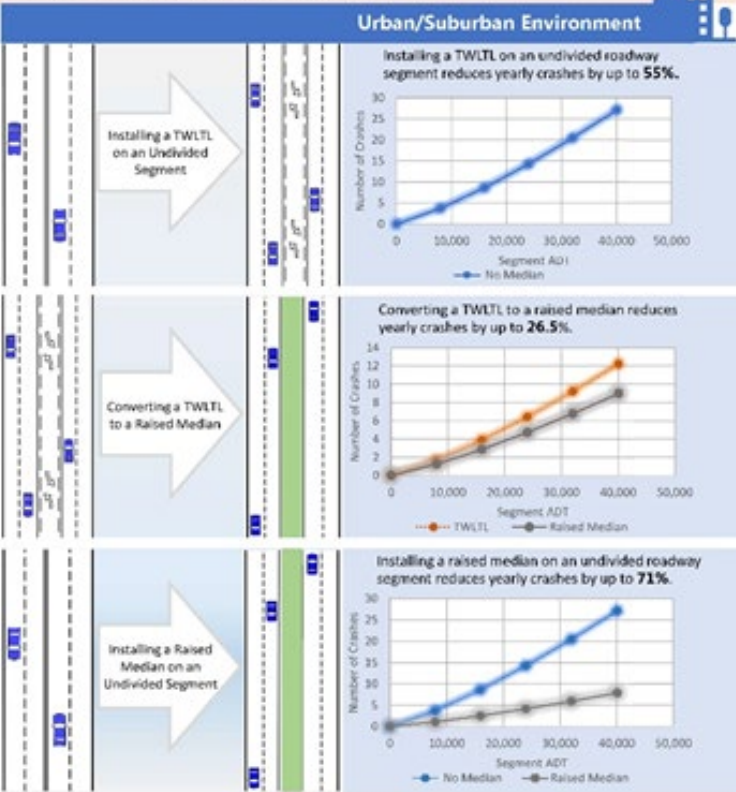




# Fact Sheets Demonstrate Outputs or Methods

## TRAFFIC SAFETY FACTSHEET

### Two-Way Left-Turn Lane (TWLTL) and Raised Median on an Urban/Suburban Segment



Prepared for: National Cooperative Highway Research Program | Transportation Research Board | National Research Council

## TRAFFIC MOBILITY FACTSHEET

### Signal Spacing

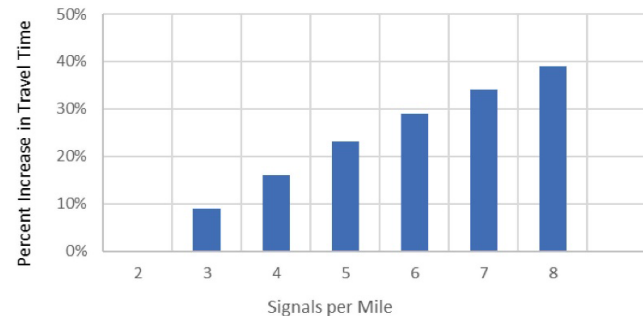
#### Estimated Increase in Travel Time from Adding New Traffic Signals

Installing additional traffic signals has a negative effect on travel along the arterial and on maintaining market areas for businesses.

Motor vehicle travel speeds are estimated to increase by 2 to 3 mph with each one-signal-per-mile reduction in the signal density, when signals are closely or irregularly spaced. In other words, there is a 2- to 3-mph decrease in speed for each added traffic signal per mile. Using two traffic signals per mile as a base, it may be estimated that travel time increases as signal density increases. For example, travel time on a segment with four signals per mile would be about 16 percent higher than on a segment with two signals per mile.



#### Percent Increase in Travel Time (compared with 2 signals per mile)



Prepared for: National Cooperative Highway Research Program | Transportation Research Board | National Research Council

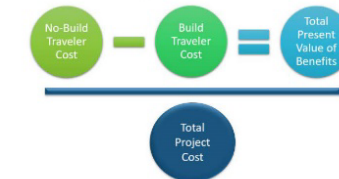
## ECONOMIC FACTSHEET

### Economic Impacts of Access Management

- Access management treatments have a range of benefits, including economic benefits.
- Benefits can be quantifiable and used within a benefit/cost analysis (BCA). A BCA assesses the benefit of a project, or in this case treatment, by systematically identifying, quantifying, and comparing the benefits and costs of a treatment.

#### Quantifiable Benefits: Benefit-Cost Analysis

- A BCA compares the impacts of a baseline or no treatment scenario to a scenario with the treatment applied.
- In terms of access management treatments, two calculations can be made for travel time savings and safety cost savings (in dollars). For example:



$$\begin{aligned} & (\text{Person Hours of Travel No treatment} \\ & - \text{Person Hours of Travel with treatment}) \\ & \times \text{Person Cost Per Hour} \\ & = \text{Cost Savings \$} \end{aligned}$$

$$\begin{aligned} & (\text{Total Crashes No treatment} \\ & - \text{Total Crashes with treatment}) \\ & \times \text{Monetized Value of Crashes} \\ & = \text{Cost Savings \$}^{[1]} \end{aligned}$$

#### Monetized Value of Crashes Includes:

##### Emergency services

- Police, EMS, fire, incident management

##### Medical services

- ER, hospitals, coroner

##### Household productivity loss

- Lost ability to perform household responsibilities

##### Market productivity loss

- Lost wages and fringe benefits

##### Insurance administration

- Processing claims

##### Workplace costs

- Training and overtime due to absence

##### Legal costs

- Fees and litigation

##### Property damage

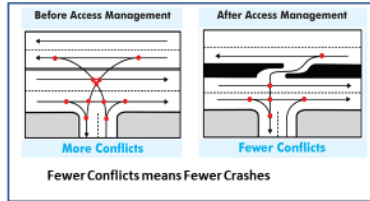
- Vehicles, cargo, roadways, roadside damage

<sup>[1]</sup> Monetized Value of Crashes uses Guidance on Treatment of the Economic Value of a Statistical Life in U.S. Department of Transportation Analyses (2016).

Prepared for: National Cooperative Highway Research Program | Transportation Research Board | National Research Council

# Infographics and Slide Decks

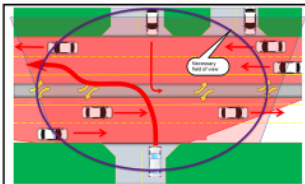
## The Main Reason for Access Management Because Traffic Conflicts can be **Deadly**



Safety, by reducing conflicts, is **THE** reason for access management

## Our Most Important Safety Concern *Manage left-turns out at unsignalized locations*

Why are left-turns out so dangerous?



Driver has a large area to observe for a safe gap to enter traffic

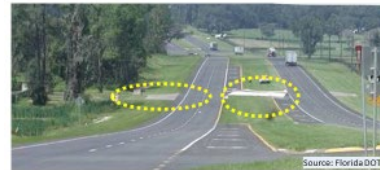


As the line of traffic grows, drivers get frustrated and begin taking more risks



When crashes happen, they are more likely to be side-impact crashes that pose the highest chance of severe injury or death.

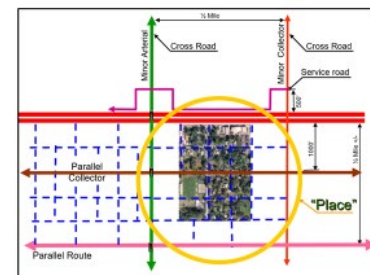
## How to Manage Left Turns Out of Unsignalized Driveways



Restrictive medians designed to support U-turns



Closing and channelizing median openings



Connecting streets and parking areas so left turns can be made at signals or other safe locations

## Preventing this



## 2 OUT OF 3 crashes involve left turns



1 out of 3 severe injury crashes involve left turns



10 times as many crossing-path crashes involve left turns versus right turns

22% involve a left turn at an intersection



for more information, visit [www.accessmanagement.info/toolkit](http://www.accessmanagement.info/toolkit)



Left turns are roughly 3 times as likely as right turns to cause a fatal crash involving a pedestrian

Can be edited for your project

Converting a TWLTL to a raised median reduces yearly pedestrian crashes by

46%





# Brochures

New version coming soon!

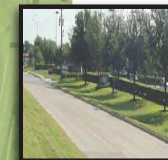
## Ten Ways to Manage Roadway Access in Your Community



Links to adaptable and published brochures



## SAFE ACCESS IS GOOD FOR BUSINESS



You may be reading this primer because your state transportation agency or local government has told you about plans that will affect access to your business. They may be planning to install a raised median on your roadway, to close a median opening, or to reconfigure your driveway. Perhaps your request for a driveway is under review or the regulating agency has imposed conditions on its approval. Or, maybe the state or local agency is planning a new access policy and you have questions or concerns about the economic effects of these changes.

**Whatever the reason, it is important for you to understand the basis for these changes and how they might affect your business.**

This primer will address questions you may have about access management and its effect on business activity and the local economy. It focuses on economic concerns that may arise in response to proposed access changes or policies, including potential impacts on business activity, freight and deliveries, parking for customers, and property or resale value of affected property.



Photo by J. Malone

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# Mobility Assessment Tools

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Signal Spacing

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Signal Progression

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Right-turn Lanes and Left-turn Lanes

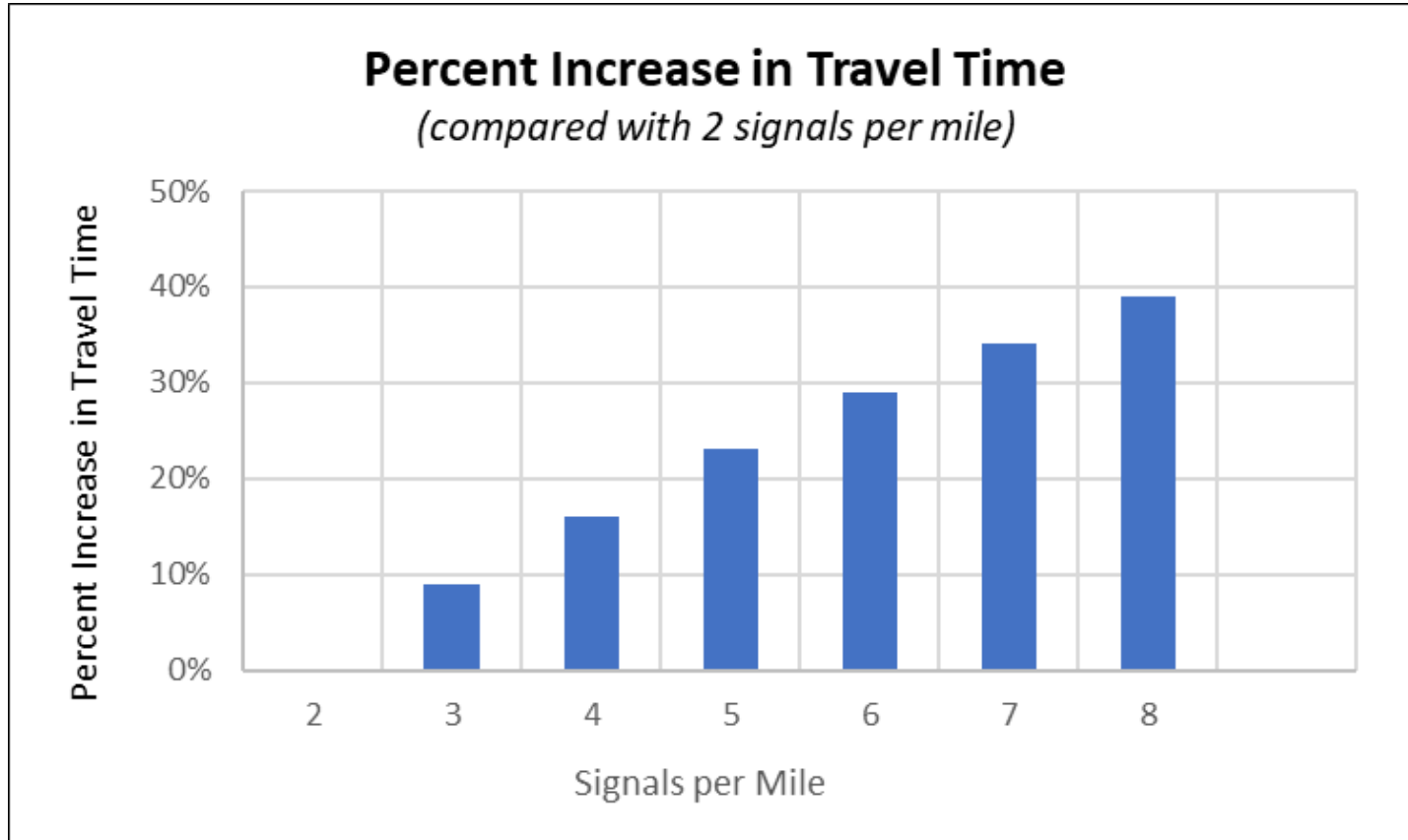
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Unsignalized Access Spacing

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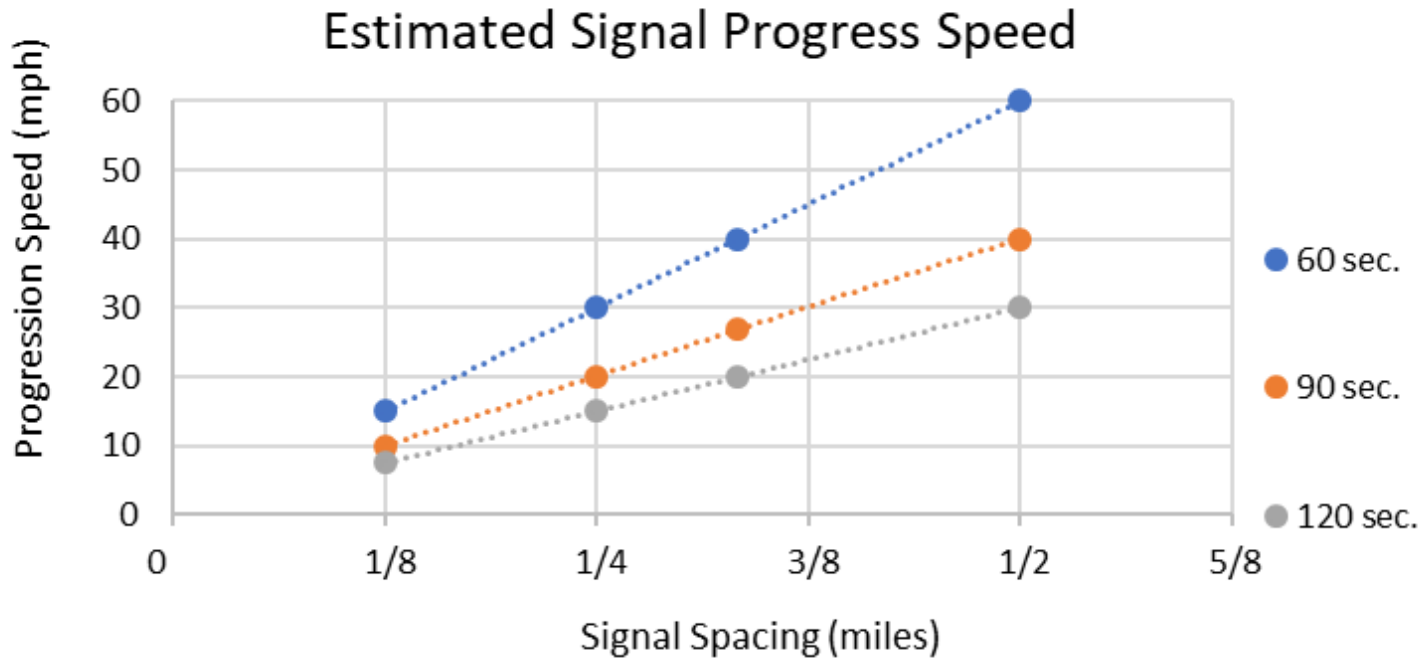
Corner Clearance

# Signal Spacing



Estimated increase in travel time based on adding new signals

# Signal Progression



Estimated progression speed  
based on signal spacing and  
cycle length



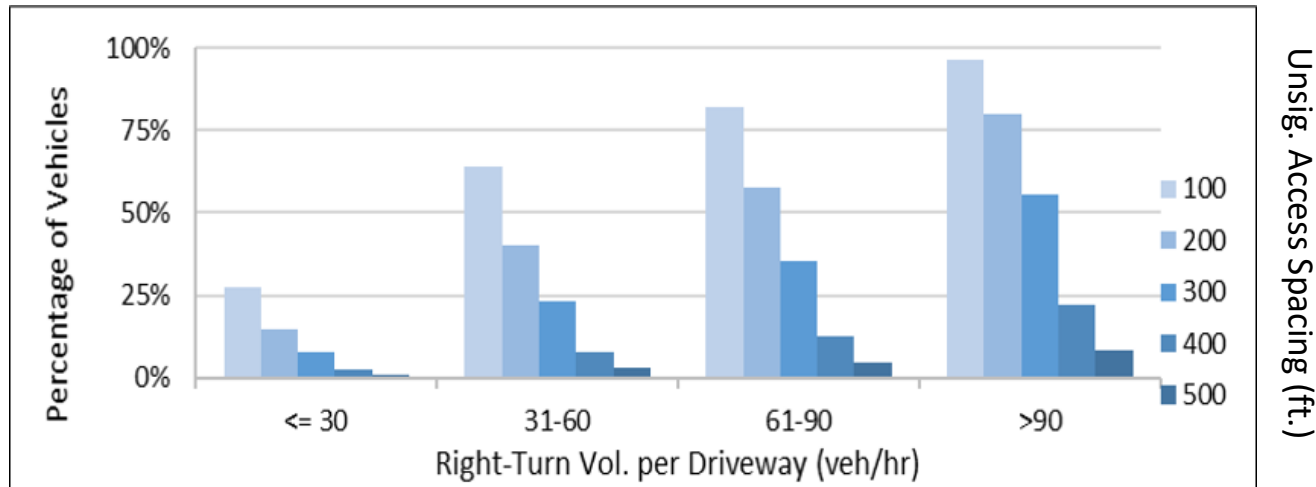
# Right-turn Lanes and Left-turn lanes (two tools)



Estimated delay reduction from providing right-turn deceleration lane or left-turn deceleration lane at unsignalized intersection

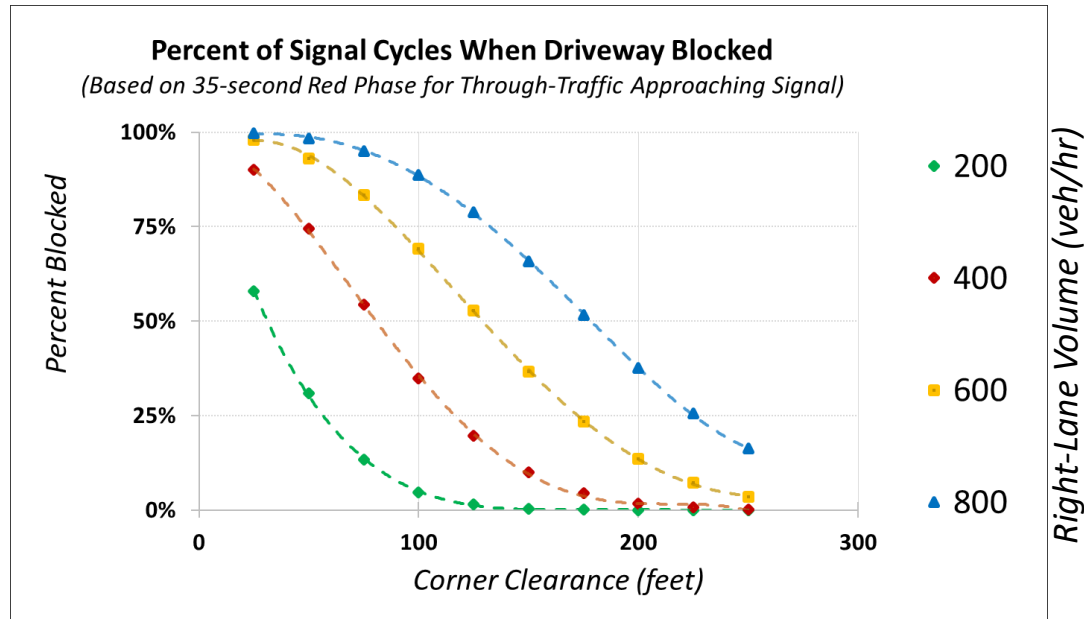
# Unsignalized Access Spacing

Percentage of vehicles impacted by another driveway



Estimated impact of driveway spacing on right-lane, through-vehicle mobility

# Corner Clearance



Estimated % of cycles during which a driveway near a signalized intersection will be blocked



# Signal Spacing Module

Estimated increase in travel time  
based on adding new traffic signals

Signal Spacing

Inputs:

Valid Data Ranges

		Units
1	Current signal density	2 Signals per Mile
2	Potential signal density	4 Signals per Mile

	Min	Max
-->	2	2
-->	0	8

Outputs:

Calculations/Data

	Units
1	Estimated percent change in travel time

16%

	% Increase in Signal Density
-->	100.0%



## TRAFFIC MOBILITY FACTSHEET

### Signal Spacing

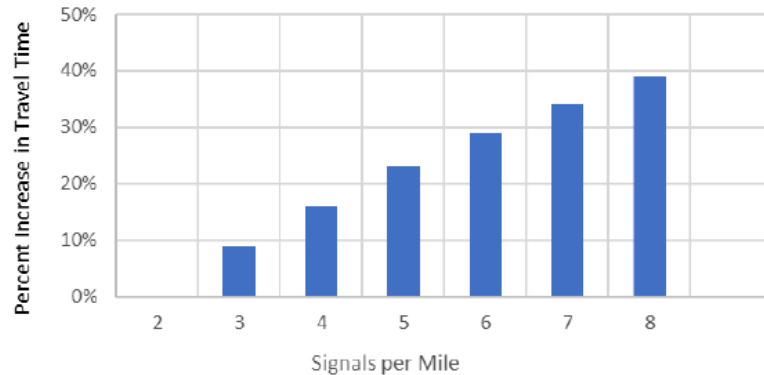
#### *Estimated Increase in Travel Time from Adding New Traffic Signals*

Installing additional traffic signals has a negative effect on travel along the arterial and on maintaining market areas for businesses.

Motor vehicle travel speeds are estimated to increase by 2 to 3 mph with each one-signal-per-mile reduction in the signal density, when signals are closely or irregularly spaced. In other words, there is a 2- to 3-mph decrease in speed for each added traffic signal per mile. Using two traffic signals per mile as a base, it may be estimated that travel time increases as signal density increases. For example, travel time on a segment with four signals per mile would be about 16 percent higher than on a segment with two signals per mile.



**Percent Increase in Travel Time**  
(compared with 2 signals per mile)



# Signal Spacing Fact Sheet

- Illustrates percentage increase in travel time (delay) when adding new traffic signals compared to two signals per mile.



# Safety Assessment Tools

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Median Type

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Right-turn Lanes

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Left-turn Lanes

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Unsignalized Intersection and Driveway Density

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Signalized Intersection Density

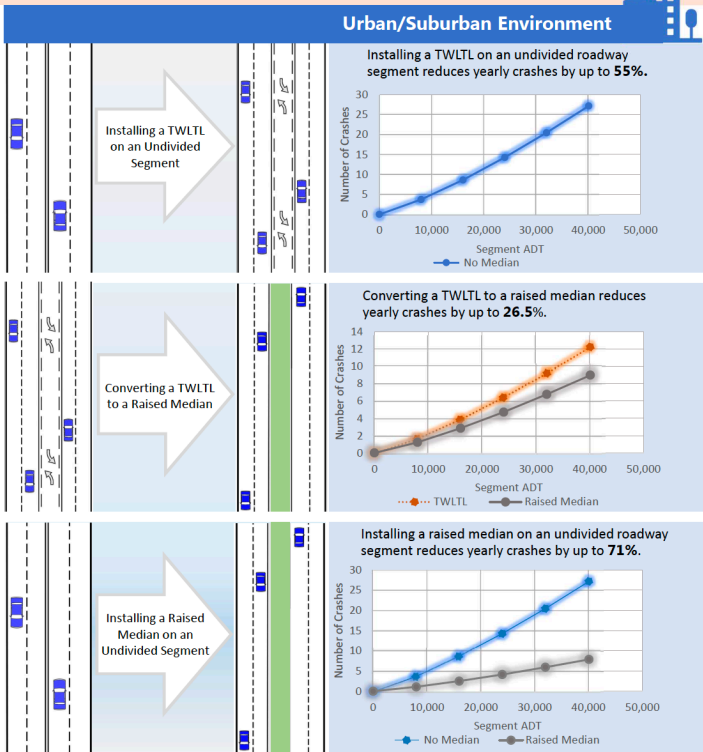
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Median Opening Near Signalized Intersection

# Median Type

## TRAFFIC SAFETY FACTSHEET

### Two-Way Left-Turn Lane (TWLTL) and Raised Median on an Urban/Suburban Segment



Prepared for: National Cooperative Highway Research Program | Transportation Research Board | National Research Council

## Estimated crash reduction of providing a median versus undivided or TWLTL

Converting a TWLTL to a raised median reduces yearly crashes by

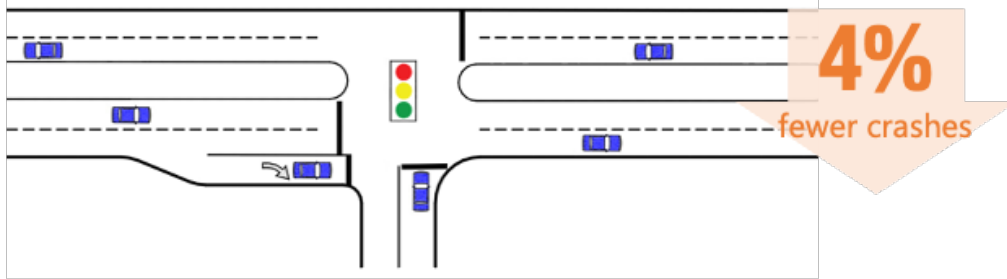
XX%

Use spreadsheet to calculate your own values



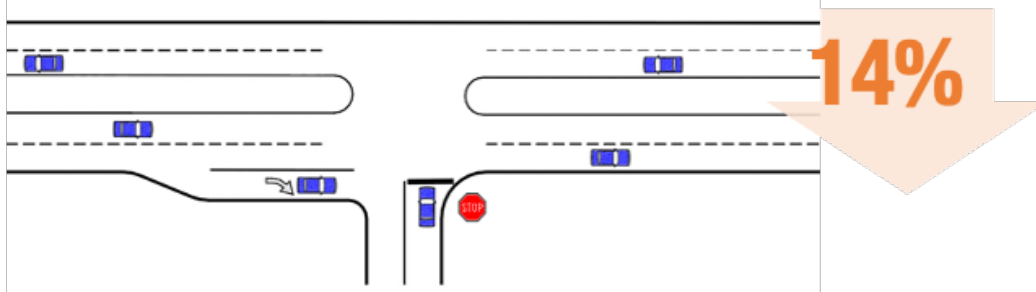
# Right-turn Lanes

Urban **Signal Controlled Intersection**



Estimated crash reduction of providing right turn lanes at three-leg and four-leg intersections

Rural Multi-Lane **Stop Controlled Intersection**

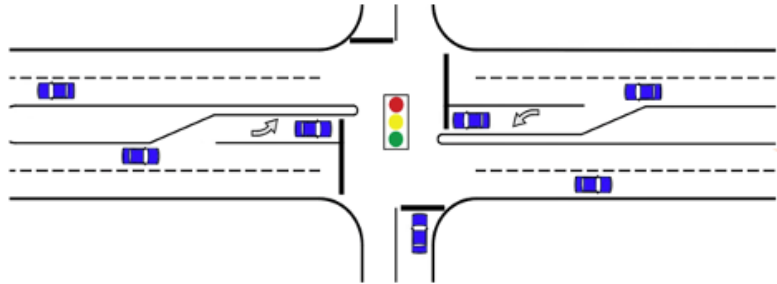


Examples represent AADT Major= 40,000 vpd and AADT Minor = 1000 vpd



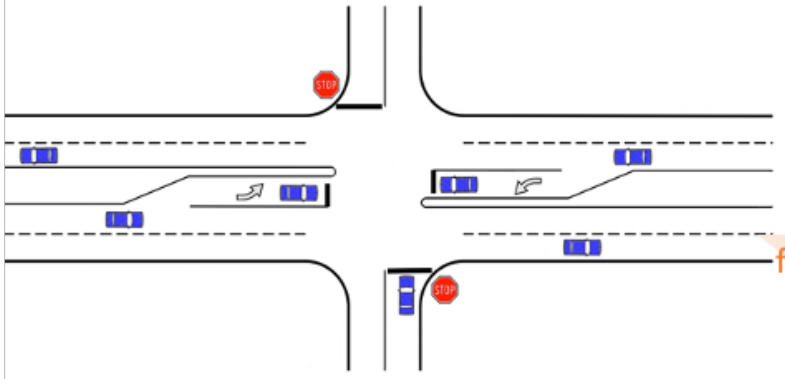
# Left-turn Lanes

## Signal Controlled Intersection



**19%**  
fewer crashes

## Stop Controlled Intersection



**47%**  
fewer crashes

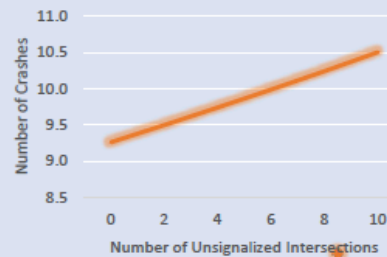
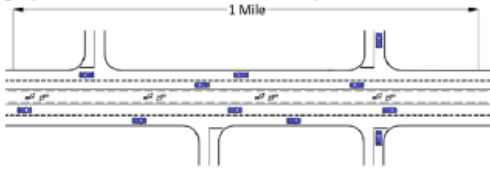
Estimated crash reduction from providing left-turn lanes at three-leg and four-leg intersections

Examples represent urban/suburban 4-leg, AADT Major=40,000 vpd and AADT Minor= 1000 vpd, left-turn bay on two approaches

# Unsignalized Intersection and Driveway Density

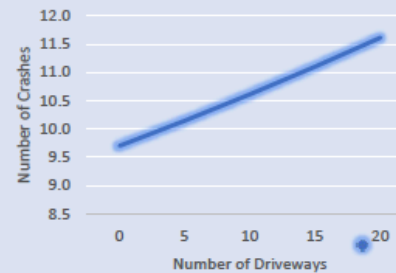
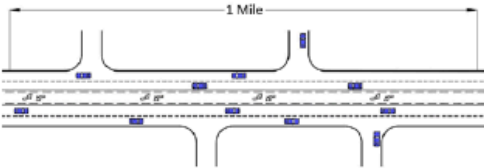
## Unsignalized Intersection Density

Providing an additional unsignalized intersection within a mile section on an urban/suburban 4-lane roadway with a TWLTL, increases the number of crashes by 1.3%. The graphic is based on AADT = 56,000 vpd.

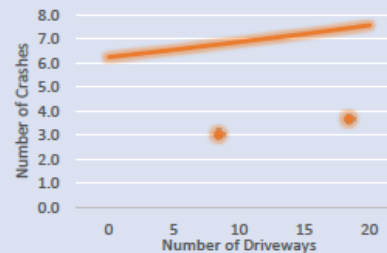
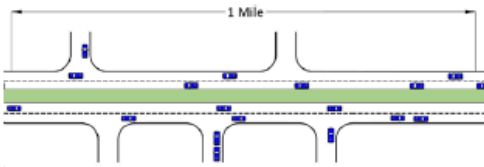


## Driveway Density

Providing an additional driveway within a mile section on an urban/suburban 4-lane roadway with a TWLTL, increases the number of crashes by 0.90%. The graphic is based on AADT = 57,000 vpd.



Providing an additional driveway within a mile section on an urban/suburban 4-lane roadway with a raised median, increases the number of crashes by 0.96%. The graphic is based on AADT = 57,500 vpd.



Estimated number of crashes for different access densities on:  
(a) urban/suburban 4-lane roadways with TWLTL or  
(b) by median type

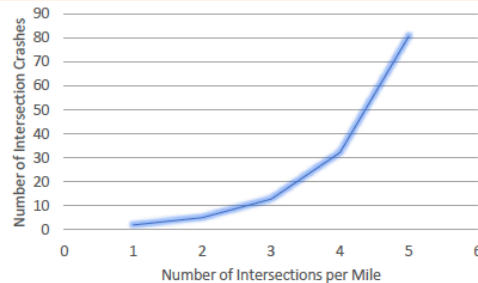
# Signalized Intersection Density

## TRAFFIC SAFETY FACTSHEET

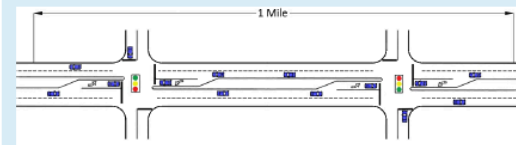
### Signalized Intersection Density in Urban/Suburban Areas

- Although installing a signalized intersection provides maximum control for the orderly movement of traffic, the density of signalized intersections should be managed to improve traffic safety.
- Signalized intersections could be either three-leg or four-leg intersections.

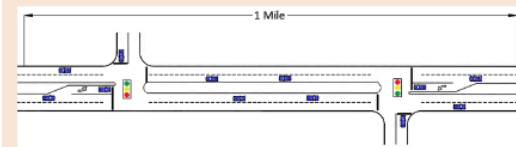
Adding an additional signalized intersection within a mile, increases the total number of intersection crashes by about **150%**.



This chart is for purposes of demonstration and only depicts a specific combination of average annual daily trips (AADT) and intersection configurations. Graphic based on urban/suburban signalized 4-leg intersections: Leg 1 AADT<sub>major</sub>=25,000 and AADT<sub>minor</sub>=18,000 vpd; Leg 2 AADT<sub>major</sub>=23,500 and AADT<sub>minor</sub>=16,500 vpd.



4 Leg Intersections



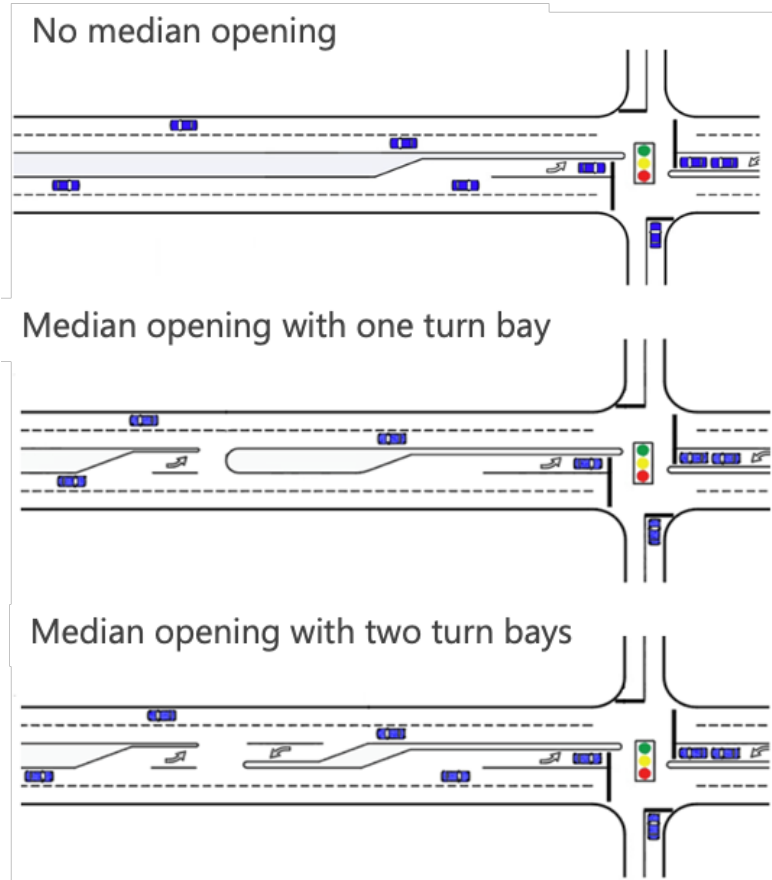
3 Leg Intersections



3 & 4 Leg Intersections

Estimated number of crashes by changing density of four-leg and three-leg intersections per mile

# Median Opening near Signalized Intersection



Estimated number of crashes from providing a median opening near a signalized intersection.

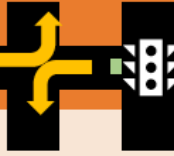


# Median Opening Near Signalized Intersection Module

Inputs:			Valid Data Ranges	
1	Median Opening Type	Median Opening with one Turn Bay	Min	Max
2	AADT	22,000	11,525	55,000
3	Number of Arterial Through Lanes (both directions)	4		

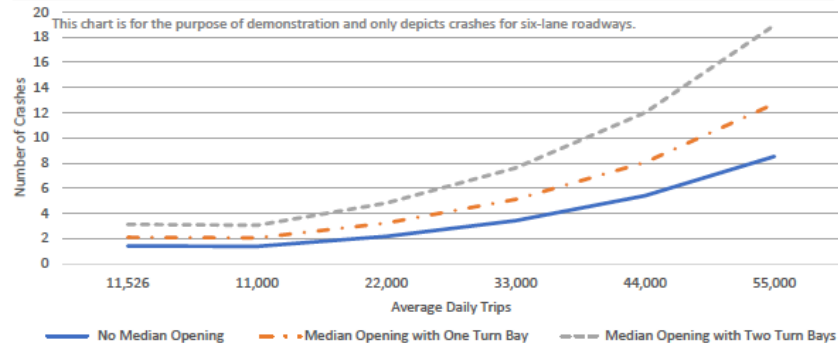
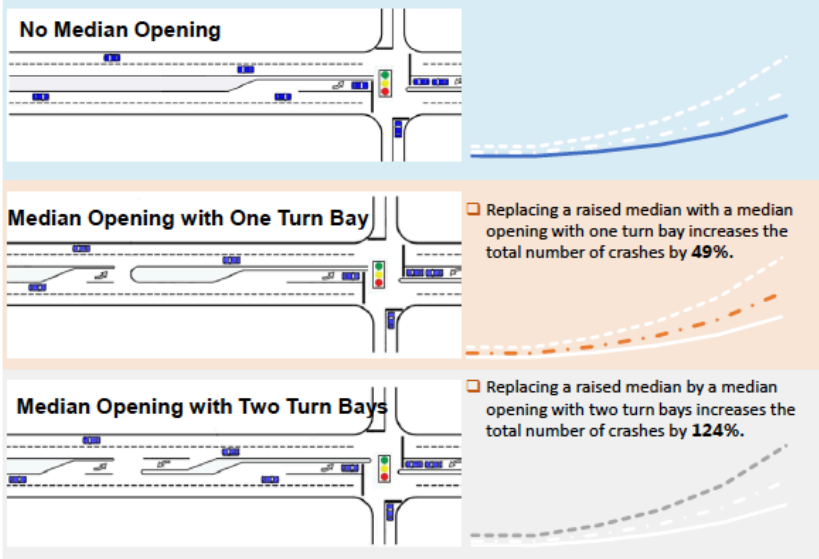
Outputs:	
Total Number of Crashes	3.23

# TRAFFIC SAFETY FACTSHEET



## Median Opening Near a Signalized Intersection

Although providing a median opening supports direct left turns to adjacent properties, the safety effects should not be neglected. Installing a median opening near a signalized intersection creates additional safety issues, due to the overlap in functional areas.



Prepared for: National Cooperative Highway Research Program | Transportation Research Board | National Research Council

## Median Opening Near Signalized Intersection Fact Sheet

- Illustrates relative increase in crashes when:
  - Installing a median opening with one turn bay
  - Installing a median opening with two turn bays

# Economic Value Assessment Tools

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## Safety Economic Value

monetized value of crash reduction in 2020  
dollars

benefit-cost ratio: the monetary value of the  
reduction in number of crashes and expenditures  
to construct and maintain the facility



## Mobility Economic Value

applies a value of time for a daily and annual cost  
of increase in travel times due to changes in  
signal spacing

# Safety and Mobility Economic Value

Scenario	Calculated Change in Crashes (Unknown If Injured)	Monetized Value of Change in Fatalities and Injuries (\$2020)
Left-Turn Lane(s) at Three-Leg Intersections	0.00	\$0
Left-Turn Lane(s) at Four-Leg Intersections	0.00	\$0
Right Turn Lane(s) at Three-Leg Intersections	0.00	\$0
Right Turn Lane(s) at Four-Leg Intersections	0.00	\$0
Median Addition	3.00	\$412,800
Other Situation: Crashes, unknown if injured	11.00	\$1,513,600
Property Damage Only	1.00	\$4,500

Signal Spacing	
Data from Mobility Spreadsheet Tool	
Estimated percent change in travel time	16%
Other Inputs Needed	
Segment Length (miles)	1
Current Speed (mph)	26
Average Annual Daily Traffic (AADT)	20,750
Default Values	
Recommended Hourly Value of Travel Time Savings (\$/person hour)	\$2020
Average Passenger Vehicle Occupancy	\$17.30
	1.67
Change in Travel Time	
Vehicle Miles Traveled (VMT)	20,750
Current Vehicle Hours Traveled (VHT)	798
Current Value of Time	\$23,057
Increased Value of Time Due to Signal Density	\$26,746
Output	
Daily Cost of Additional Travel Time	\$3,689
Annual Cost of Additional Travel Time	\$1,346,543



# Livability

## LIVABILITY FACTSHEET

### What we do improves livability.

Installing landscaped medians, limiting driveways on major roads, using roundabouts, managing the location and spacing of signals, and organizing land uses on a connected network all increase livability in a variety of ways.

Medians	Signals	Driveways	Network
 <small>Photo by F. Broen</small>	 <small>Source: Street View, 2019, Google</small>	 <small>Source: Map Data © 2019 Google</small>	 <small>Source: Map Data © 2019 Google</small>
Medians provide space for landscaping, art, and other aesthetic treatments that improve the character of a roadway corridor or gateway to a community. Combining medians with roundabouts improves safety while offering more possibilities for art and aesthetic treatments.	Managing the spacing of signalized and unsignalized access can reduce the need to widen major roadways. Signal spacing improves signal coordination, greatly reducing emissions and fuel consumption, which spike when vehicles decelerate and accelerate.	Fewer access connections increase the area for landscaping and enhance the appearance of major corridors. Landscaping also provides a buffer between vehicular traffic and pedestrians on heavily travelled roads.	Access management can be achieved through land use strategies that organize land uses into activity centers on a connected street network. These same strategies promote a more livable and accessible built environment.

## LIVABILITY FACTSHEET

### What we do improves livability.

Making a corridor safer for non-motorized users benefits the environment and supports social priorities like Safe Routes to School, Vision Zero, and Complete Streets.

A 4-lane road with good access management and supporting network may delay or even prevent the need for a 6-lane road that decreases the livability of a community.

Managing signals and driveways helps reduce congestion, which reduces fuel consumption and emissions.

Medians and fewer driveways increase the area for landscaping and aesthetic treatments.



Where would you want to live or shop?

Here?



Or here?

Photos by J. Malone

## LIVABILITY FACTSHEET

### Placemaking on a network

Access management can be achieved through land use strategies that discourage strip development and promote activity centers organized on a street network. This creates a more accessible built environment that supports bicycle, pedestrian, and transit mobility.



Context matters! Access management strategies vary by land use context. Livability is enhanced regardless of context.



Source: Duany Plater-Zyberk & Company 2003

### Pedestrian Access and Building Line

Buildings are more accessible to transit when they are closer to the curb. Parking can be placed in the rear of the property.




- Access management promotes accessibility while preserving local and regional mobility.
- Accessibility = land use proximity + network connectivity.
- Mobility = the ability to move around via multiple alternative paths and modes
- Access = the ability to enter and exit a site.

In rural and coastal areas, poorly planned access roads and driveways can damage landscapes and sensitive ecosystems. Working together on a network plan can preserve the natural beauty of these areas.

# Videos and Case Examples

Access Management Communication Toolkit  
Communicating the value of access management




02:05

1 AMC Toolkit Trailer

The National Academies

Access Management Communication Toolkit  
Communicating the value of access management



02:32

2 AMC Toolkit Introduction

The National Academies

Access Management Communication Toolkit  
Communicating the value of access management

Driveway Spacing & Safety

00:05

3 AMC Toolkit Planning

The National Academies

**Spreadsheets**

- SAFETY
  - Unsignalized Intersection Density
  - Signalized Intersection Density
  - Left-turn Lanes (3-Leg, 4-Leg)
  - Right-turn Lanes (3-Leg, 4-Leg)
  - Median Types and Driveway Density
  - Median Openings near Signalized Intersection
- MOBILITY
  - Signal Spacing
  - Right-turn Lanes
  - Left-turn Lanes
  - Signal Progression
  - Driveway Spacing
  - Corner Clearance
- ECONOMIC

TWLTL TO RAISED MEDIAN

Access Management Communication Toolkit  
Communicating the value of access management

00:00

4 AMC Toolkit Median Pro...

The National Academies

**Spreadsheets**

- SAFETY
  - Unsignalized Intersection Density
  - Signalized Intersection Density
  - Left-turn Lanes (3-Leg, 4-Leg)
  - Right-turn Lanes (3-Leg, 4-Leg)
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  - Right-turn Lanes
  - Left-turn Lanes
  - Signal Progression
  - Driveway Spacing
  - Corner Clearance
- ECONOMIC

Permit Review

Mobility Impacts for Installation of a Right-Turn Lane  
Mobility Impacts for Installation of a Left-Turn Lane

03:03

5 AMC Toolkit Permit

The National Academies

**Permit Review**

AS PERMITTED

Right-turn lane: The installation of a right-turn lane can be expected to reduce delay by as much as 1.5 hours/day.

Left-turn lane: The installation of a left-turn lane can be expected to reduce delay about 8 hours/day.

Adding a right-turn lane reduces delay by 1.5 hrs

Adding a left-turn lane reduces delay by 8 hrs

**Outcome D:**

Encouraged to provide better alternative access, the permit applicant was asked to add a driveway on the collector road with a right turn lane and left turn lane into the site at that location, as the collector was a hush-hush road with a high volume of pedestrian traffic. Based on a peak-hour volume of 800 through vehicles, providing a right turn lane would reduce peak-hour delay 10 minutes. If only one primary driveway was approved for:

The estimated peak-hour total intersection volume is 1,640 vehicles (700 northbound through, 800 southbound through, and 140 southbound right turns). For a new development with no existing left turn demand, providing a left turn lane would result in a peak-hour delay reduction of about 2 hours. If there are 4 cars/hour on the site:

<https://vimeo.com/showcase/10163881>



# NCHRP 1032: How to Measure and Communicate the Value of Access Management



# Today's presenters



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# Upcoming events for you

**October 25, 2023**

TRB Webinar: Cloud Computing for  
Next Generation Traffic Management  
Systems

**November 13-15, 2023**

TRB's Transportation Resilience 2023

[https://www.nationalacademies.org/trb/  
events](https://www.nationalacademies.org/trb/events)





**June 24–26, 2024**  
**Boston, MA**

# 4th International Conference on Access Management



TRANSPORTATION RESEARCH BOARD

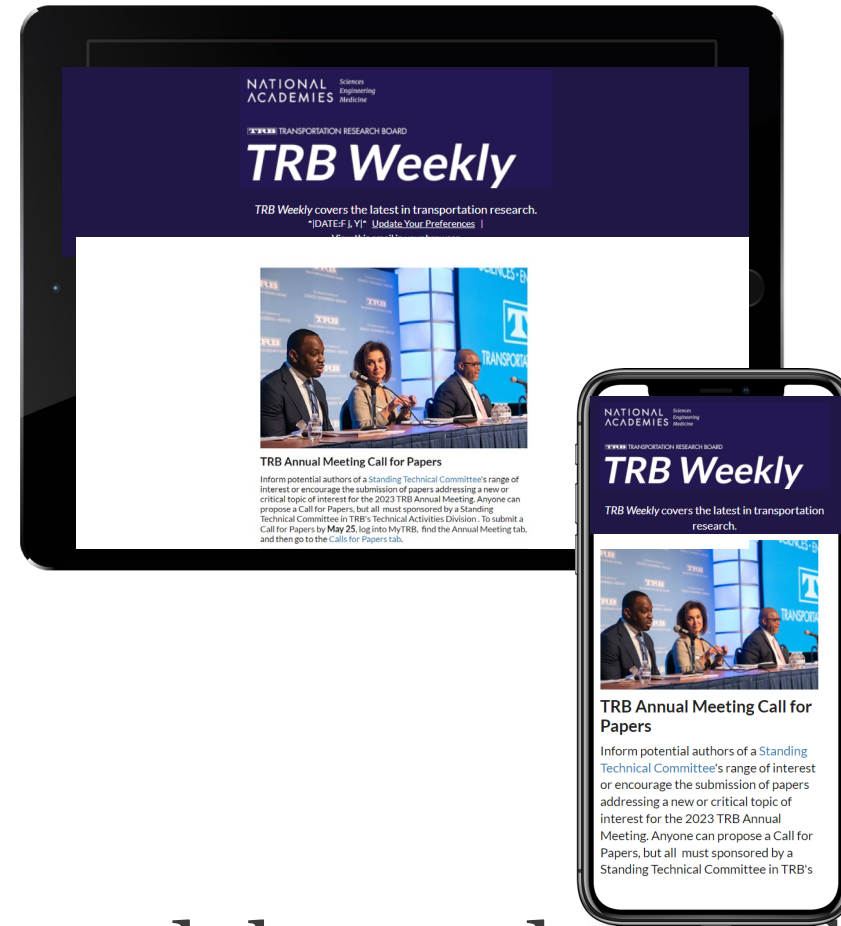


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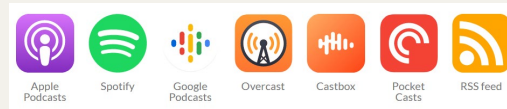
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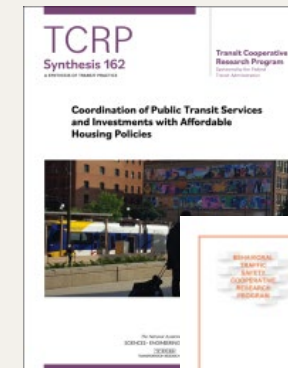
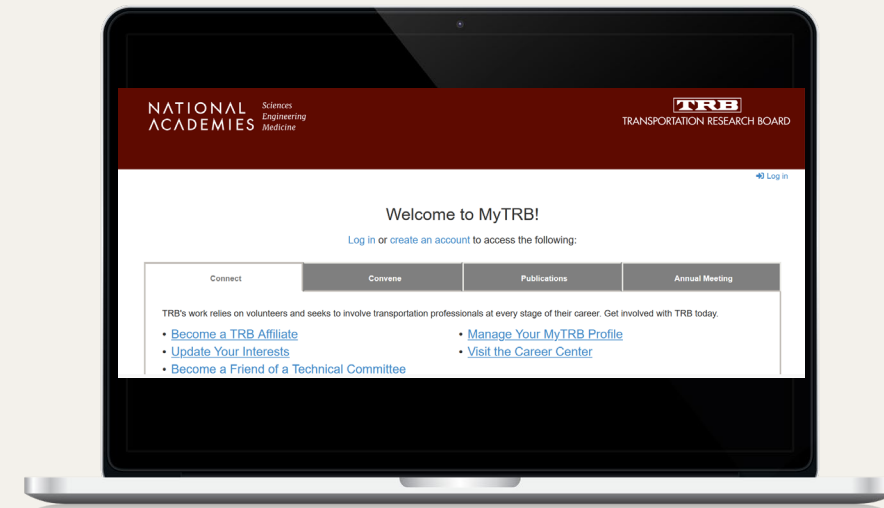
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