Common Sense Solutions for Intersection Safety Problems

Andrew Morgan

WV Local Technical Assistance Program

A Closer Look at the WV LTAP

The WV LTAP is part of the national Local Technical Assistance Program (LTAP). The Federal Highway Administration (FHWA) created the LTAP in 1982 to provide local agencies with information and training programs to address the maintenance of local roadways and bridges.

The WV LTAP, housed at West Virginia University, receives funding from the FHWA and the West Virginia Department of Transportation.

CHECK OUT OUR FACEBOOK PAGE.

Type in Facebook.com/WVLTAP or within the search feature in Facebook, type WV Local Technical Assistance Program (WVLTAP). You can also scan the tag to the right with your smart phone. Be sure to "like" our page!

VISIT THE WV LTAP WEBSITE.

Visit our website to view training opportunities, request technical assistance, access publications such as our quarterly newsletter *Country Roads & City Streets,* and more! You can also update your contact information.

wvltap.org

INTERESTED IN OTHER LTAP CLASSES?

Seminars, workshops, and training sessions are scheduled both on-demand and at preset times around the state. Our trainers are available to come to your location!

Thank your for attending today's training.

Our goal is for you to be able to apply what you learned to your professional duties in the field.

Common Sense Solutions for Intersection Safety Problems

1

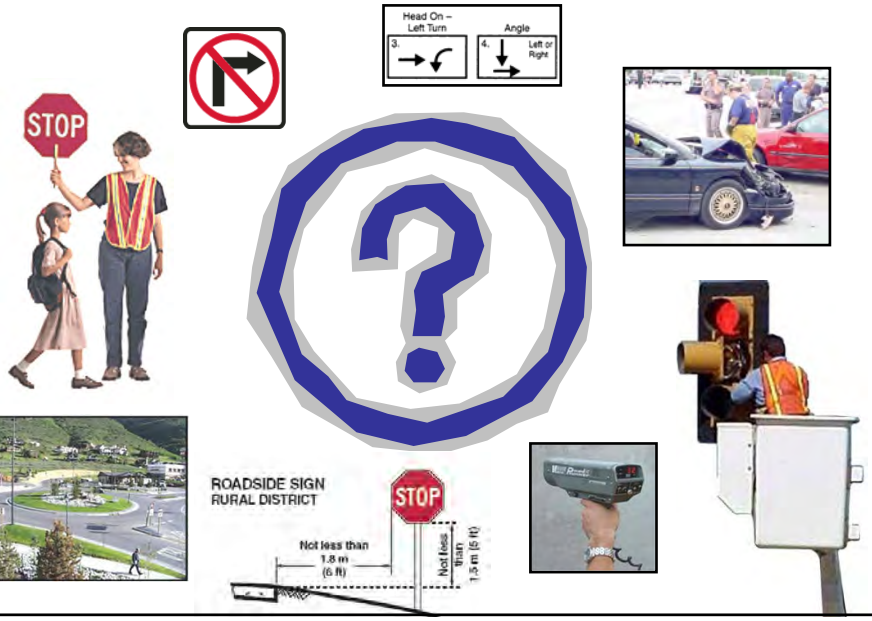
2

Agenda

1. Introduction
2. Crash Statistics
3. Evolution
4. Signs
5. Getting Help
6. Signals
7. Road Safety Studies
8. Sight Triangles
9. Pedestrians
10. Geometric Flaws
11. Crash Data
12. Red Light Running
13. Roundabouts

3

What Brought You Here Today?



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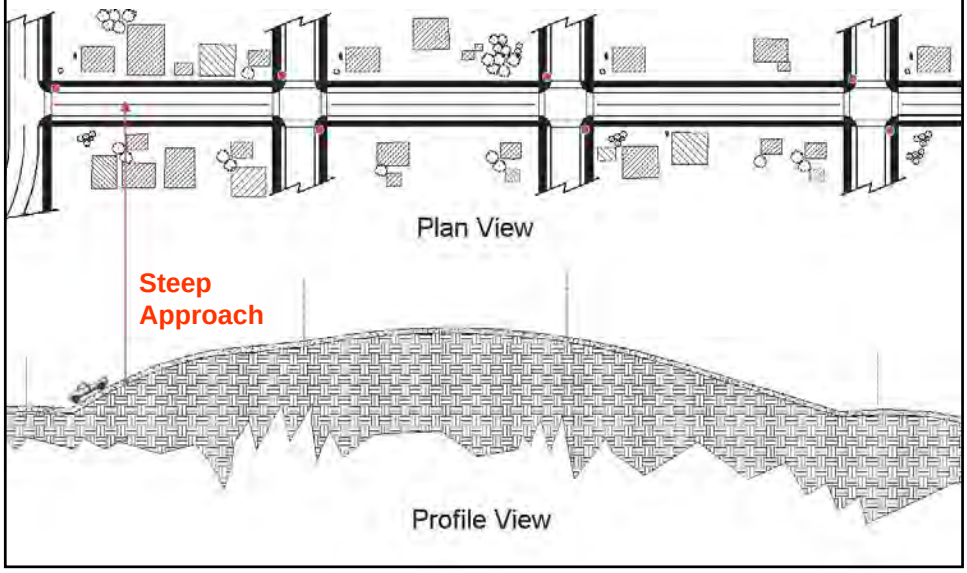
Who is Responsible for Intersection Safety?

- Traffic Engineer?
- Local / State Police?
- Schools?
- City Manager?
- DOT?
- County?
- Road Users?
- Department of Public Works?
- Road Maintenance Crews?
- Citizens Groups?
- Outreach and Education Groups?

All Of YOU!

5

A Story About a "Safety" Project



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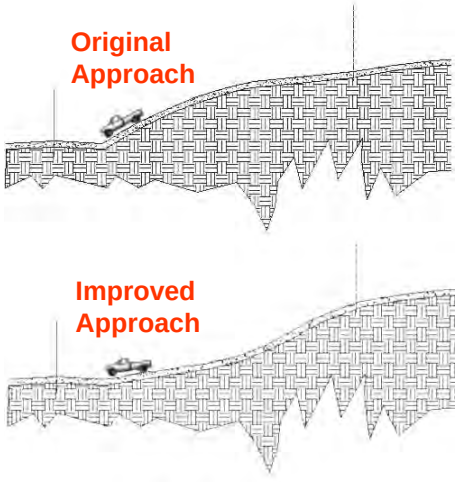
The Solution

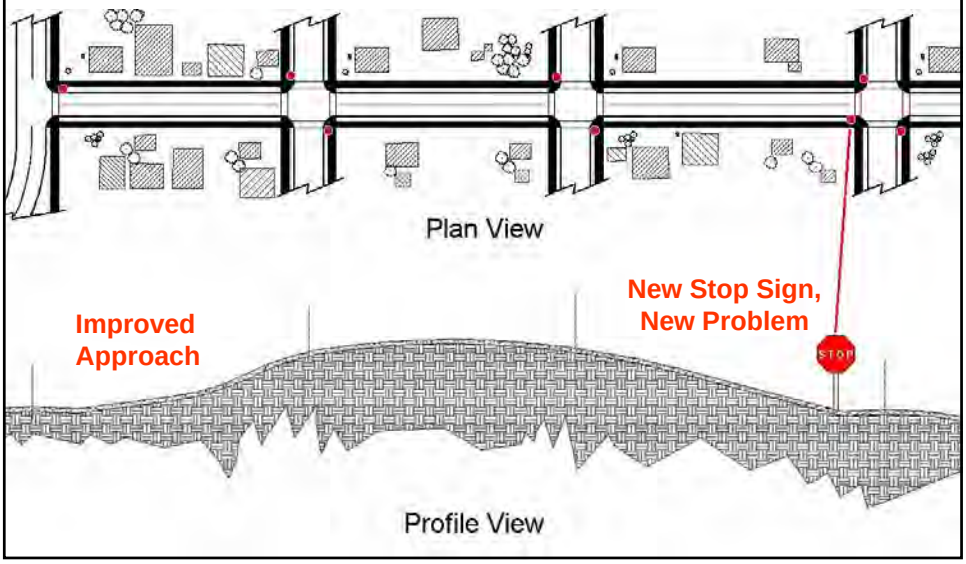


Profile View

8

A New Problem!

Another Situation



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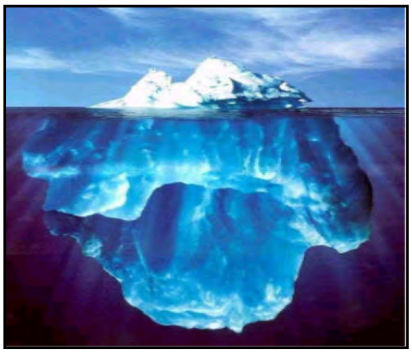
"Three Es" of Traffic Safety

Engineering Education Enforcement

10

Common Sense Solutions for Intersection Safety Problems

Most Bad Accidents Happen on YOUR Roads!



1

Education Goals

- Understand the types of roads that experience most crashes
- Understand the cost in lives and dollars for intersection crashes in the United States

2

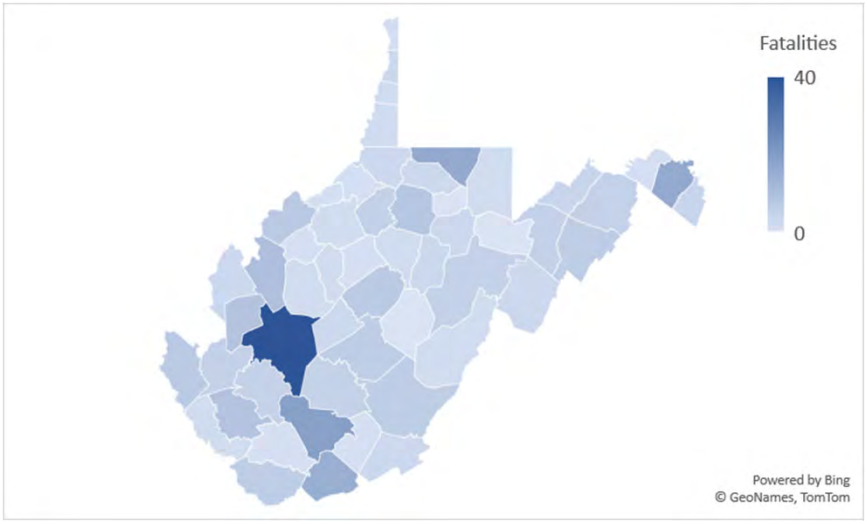
How Bad Is It In WV?

2009-2012

Totals	Crashes	Fatals
2015	246	268
2016	250	269
2017	280	304
2018	280	294
Average	264	284

3

2018 Fatalities



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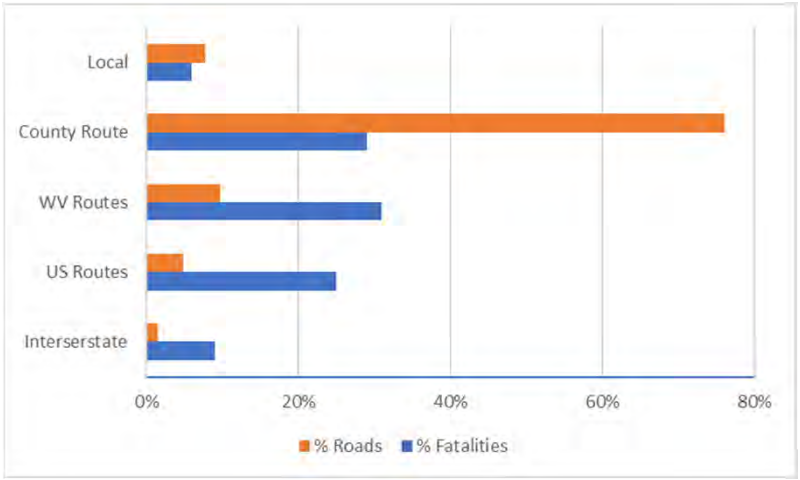
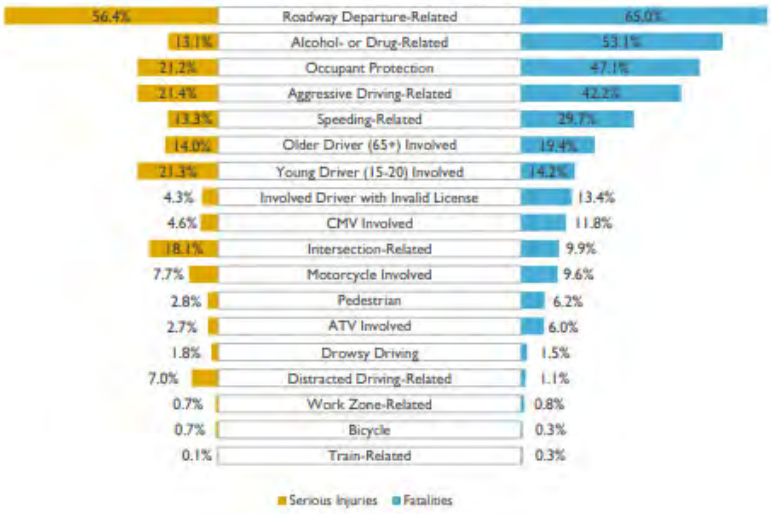
Where Do Fatal Crashes Happen in WV?



~70% Rural

5

How Do Fatal Crashes Happen in WV?



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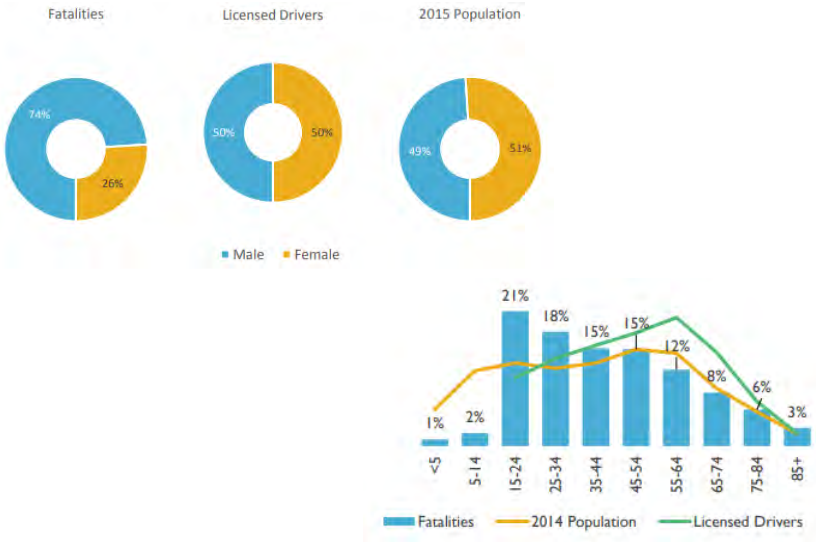
When Do Fatal Crashes Happen in WV?

Sunday	14%	Daylight	58%
Monday	14%	Dark	39%
Tuesday	11%	Dawn/Dusk	3%
Wednesday	14%		
Thursday	14%		
Friday	15%		
Saturday	18%		

7

Who are they?



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National Fatal Crash Statistics Average

- ~37,000 Total Fatal Crashes
- ~8,190 Intersection Related Fatal Crashes
- -20% of all Fatal Crashes ~27% of all Crash Fatalities

9

Nurture Curiosity: Ask a Good Question

Life was meant to be lived, and curiosity must be kept alive.

Eleanor Roosevelt

10

Common Sense Solutions for Intersection Safety Problems

The Evolution of an Intersection

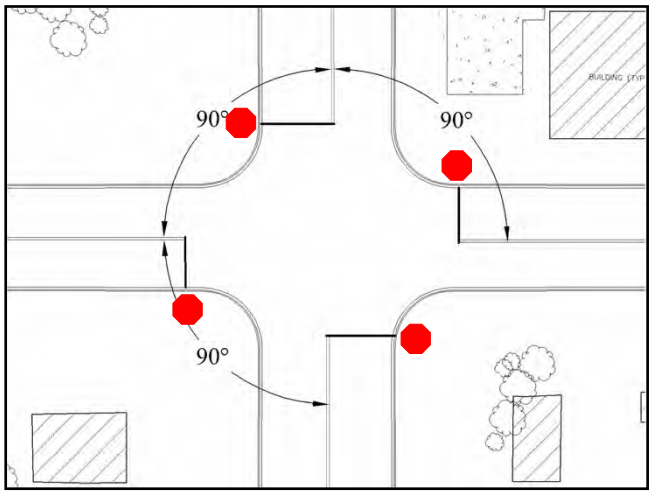
1

Education Goals

- Understand seven characteristics that make an intersection safe.
- Understand the types of traffic control used to manage different volumes of vehicles through intersections.

2

Approaches at 90 Degrees



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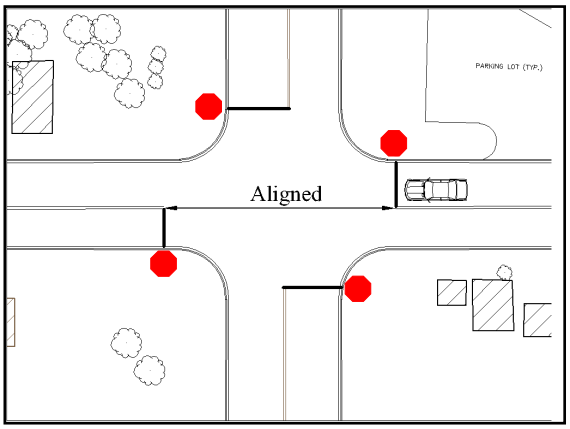
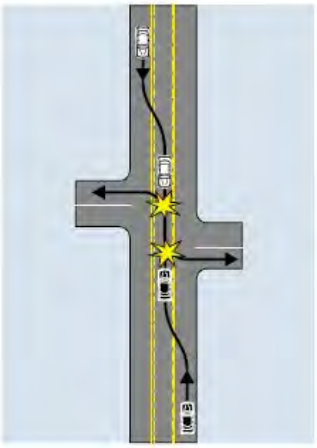
Approaches at 90 Degrees

4

Approaches are Aligned





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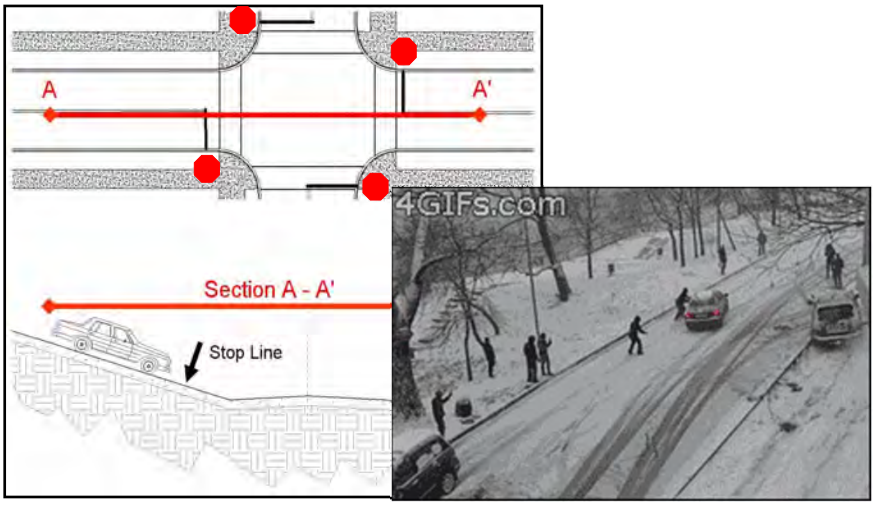
Low Grade on Approaches



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Allows Free Flow of Traffic

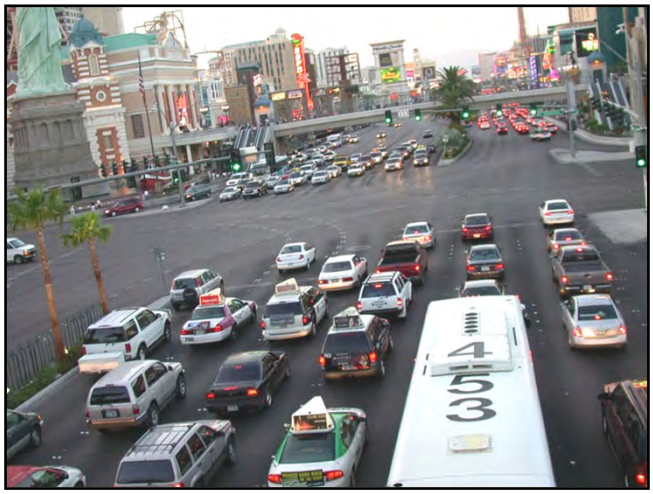

Photo Courtesy of Yuri V. Takhteyev

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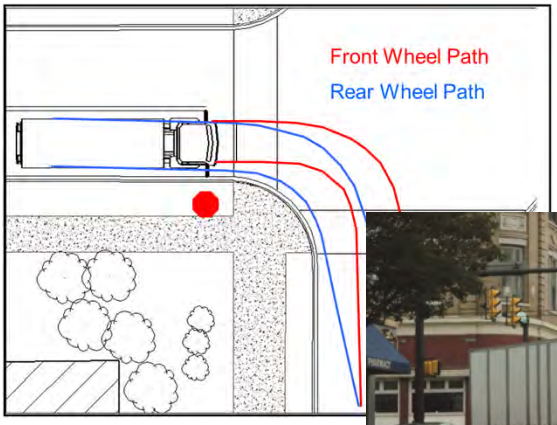
Appropriate Curb Radius



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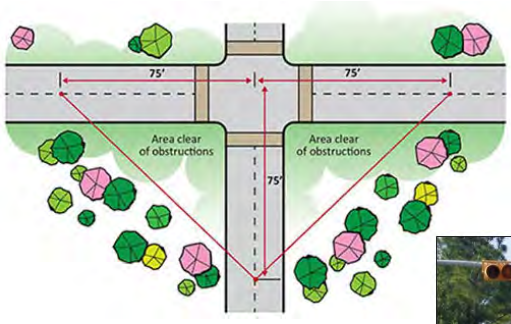
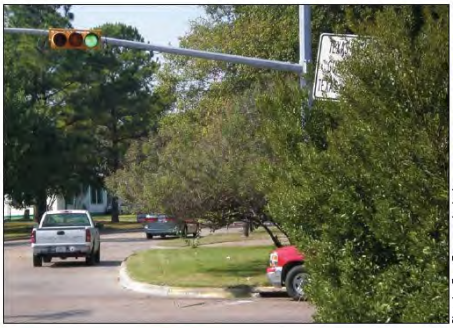
Uncomplicated Traffic Control

9

Sufficient Sight Distance





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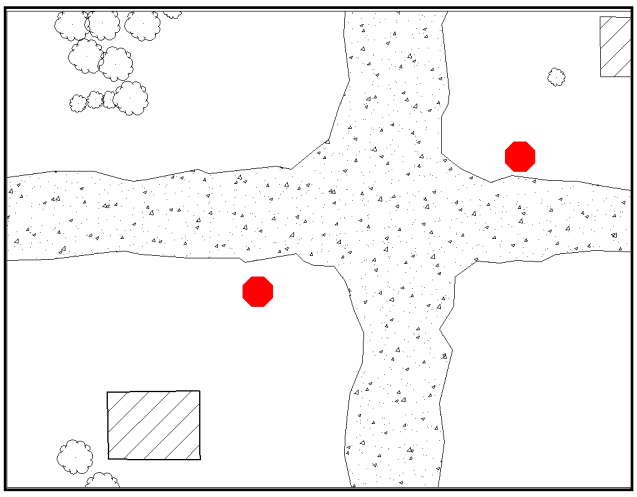
7 Key Principles

1. Approaches at 90 Degrees
2. Approaches are Aligned
3. Low Grade on Approaches
4. Allows Free Flow of Traffic
5. Appropriate Curb Radius
6. Uncomplicated Traffic Control
7. Sufficient Sight Distance

11

Low Volume Roads



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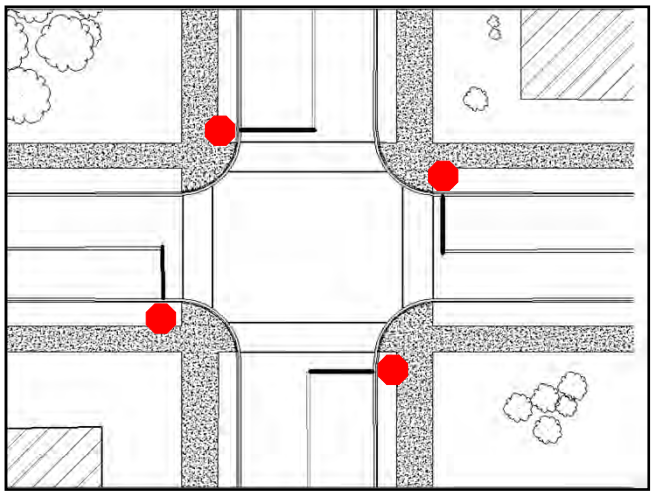
Low to Medium Volume Semi-Urban



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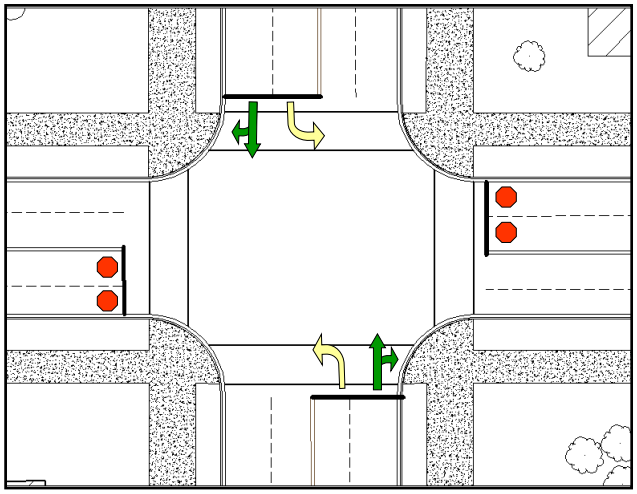
Roundabout

14

Signalized Operation



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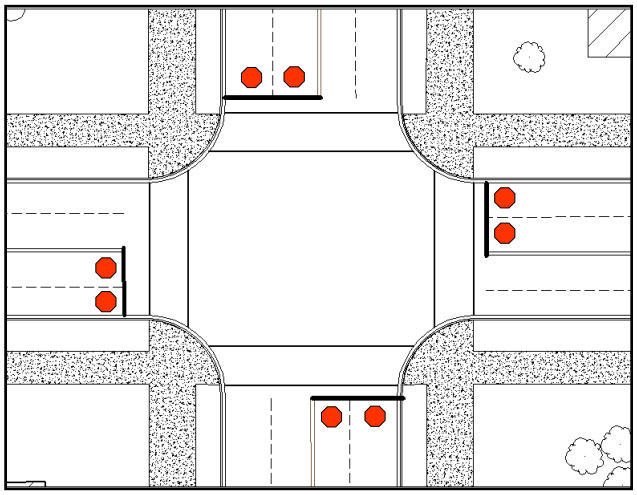
Signalized Operation

All Red or “Clearance” Interval



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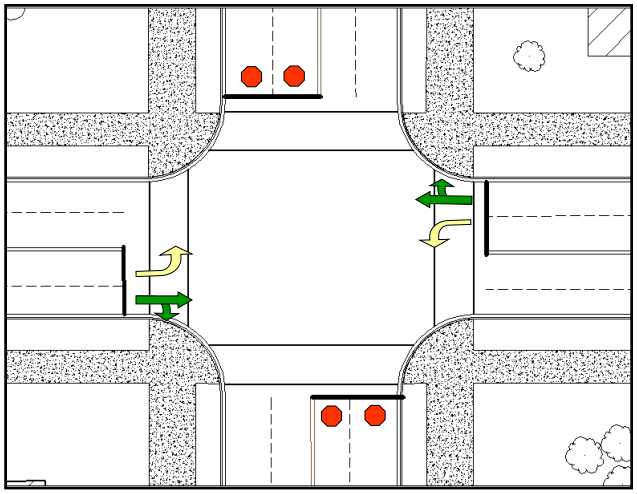
Signalized Operation



17

That's it right?

18

One-Off Designs

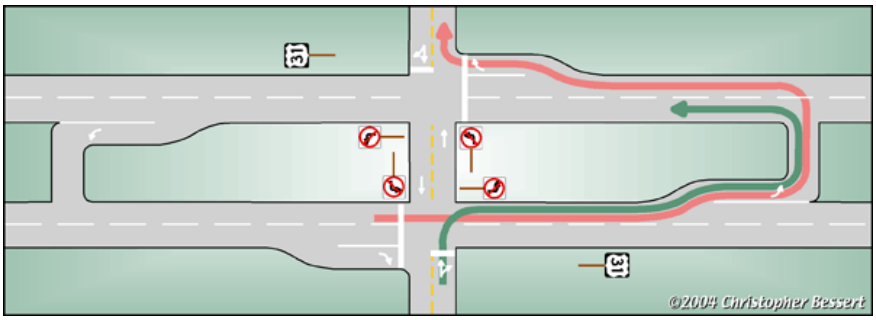
Quadrant or Jug Handle

19

20

One-Off Designs

Median U-Turn or Michigan Left



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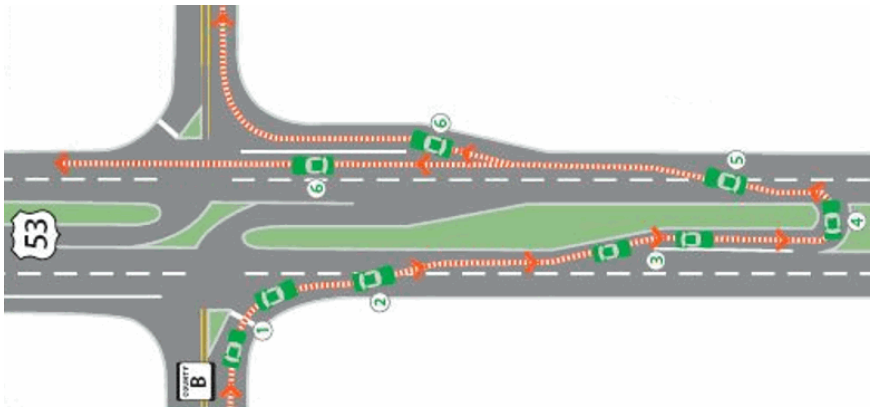
One-Off Designs

Restricted Corssing U-Turn



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One-Off Designs

Displaced Left of Continuous Flow Intersection

23

24

Grade Separated Interchanges

US-131 near Grand Rapids, MI

25

This was 1913

26

Gain an Advantage: Ask Questions

An organization's ability to learn, and translate that learning into action rapidly, is the ultimate competitive advantage.

Jack Welch

27

Common Sense Solutions for Intersection Safety Problems

Signs – Do it Right or Pay the Price!

1

Education Goals

- Understand how to use signs correctly.
- Understand the purpose of the MUTCD and how to use it to select and install signs.
- Describe the different sign classifications.
- Understand the rules for placing a sign.

2

What are Signs for?

Signs should be used to:

- ❑ Convey a simple message
- ❑ Fulfill a specific need

Signs should not be used:

- ❑ To confirm rules of the road
- ❑ As a “silver bullet” for all road problems

Who is responsible for Signs?

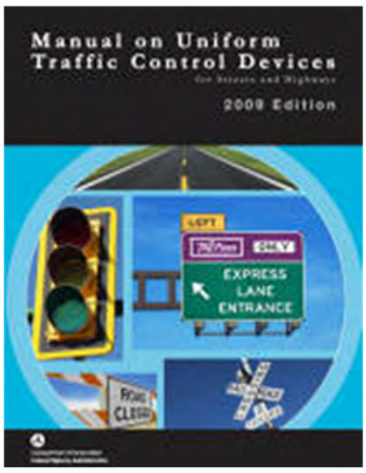
- ❑ The road owner

3

What Sign Should I Use?

Manual on Uniform Traffic Control Devices (MUTCD)

- ❑ Signs
- ❑ Pavement markings
- ❑ Flashing beacons
- ❑ Traffic signals
- ❑ Temporary traffic control
- ❑ Rail, bicycle and school TCDs



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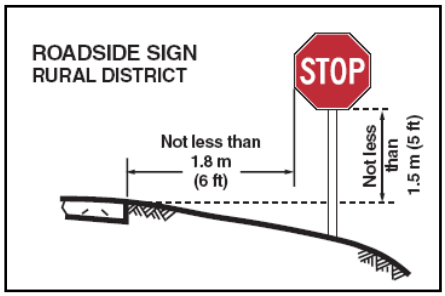
What is the purpose of the MUTCD?

Establishes standards

- ❑ Design
- ❑ Application
- ❑ Placement

Increases uniformity and safety

Creates a non-biased standard



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Sign Classifications

Regulatory Signs

- ❑ Colored white, red, or black
- ❑ Advise of a legal requirement
- ❑ Require a Traffic Control Order (TCO)

R5-1

R10-11c

R1-1

R2-1

6

Sign Classifications

Warning Signs

- ❑ Colored yellow
- ❑ Provide advanced warning information
- ❑ Not enforcement related

7

Sign Classifications

Guide Signs

- ❑ Colored green, brown or blue
- ❑ Provide directions

8

Key Placement Rules

- Fulfills a need
- Commands respect
- Commands attention
- Provides adequate time for response
- Conveys a simple message
- Meets drivers expectations
- Is consistent with other applications

9

Does it Fulfill a Need?

Determining if a sign is needed

- Engineering Study
- Engineering Judgment

Sign warrants

- Describes threshold conditions where a traffic control device can be applied.
- Meeting a warrant does not mean it must be installed.
- Warrants are not a substitute for engineering judgment.

10

Example Warrants: Speed Limit Sign

MUTCD Section 2B.15

Speed limit signs are warranted when:

1. Located at the points of change from one speed limit to another.
2. Where there is a change in the speed limit.
3. At major intersections and at other locations where it is necessary to remind road users.
4. At entrances to the State and at jurisdictional boundaries of metropolitan areas**.**

11

Example Warrants: Multi-Way Stop Sign

MUTCD Section 2B.07

A. Where traffic control signals are justified, as an interim measure.

B. A crash problem, as indicated by **5 or more reported crashes** in a 12-month period that are susceptible to correction by a multi-way stop installation.

C. Minimum volumes:

1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least **300 vehicles per hour** for any 8 hours of an average day, **and**
2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least **200 units per hour** for the same 8 hours, **with** an average delay to minor-street vehicular traffic of at least **30 seconds** per vehicle during the highest hour.
3. If the 85th-percentile approach speed of the major-street traffic exceeds 65 km/h or exceeds **40 mph**, the minimum vehicular volume warrants (C1 and C2) are **70 percent** of the above values.

(CONTINUED ON NEXT SLIDE)

12

Example Warrants: Multi-Way Stop Sign

MUTCD Section 2B.07 (Continued)

4. If the criteria B, C1,and C2, are satisfied to 80 percent.

In other words…

- 4 crashes in a 12 month period that are correctable with stop control
- 240 vph average for 8 hours – Major street
- 160 vhh average for 8 hours – Minor street

(CONTINUED ON NEXT SLIDE)

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Example Warrants: Multi-Way Stop Sign

MUTCD Section 2B.07 (Continued)

Other Options For An Engineering Study:

A: The need to control left-turn conflicts;

B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;

C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to safely negotiate the intersection unless conflicting cross traffic is also required to stop; and

D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.

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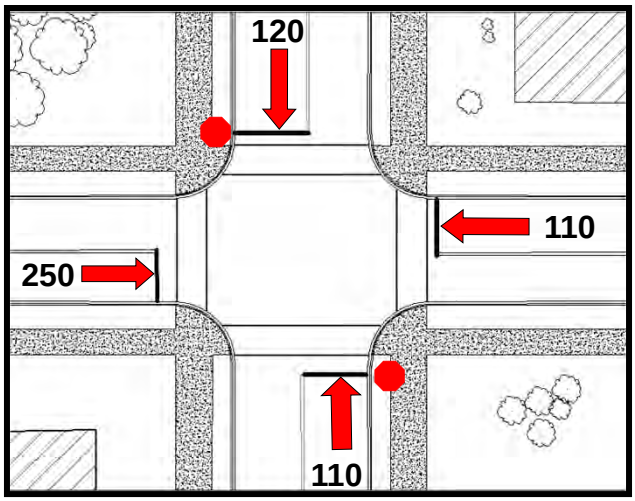
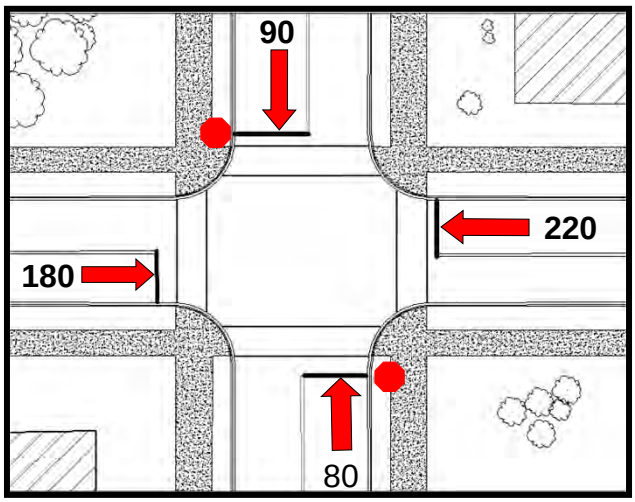
Multi-Way Stop - Is it Warranted?



Approach 38 mph Delay 40 sec

15

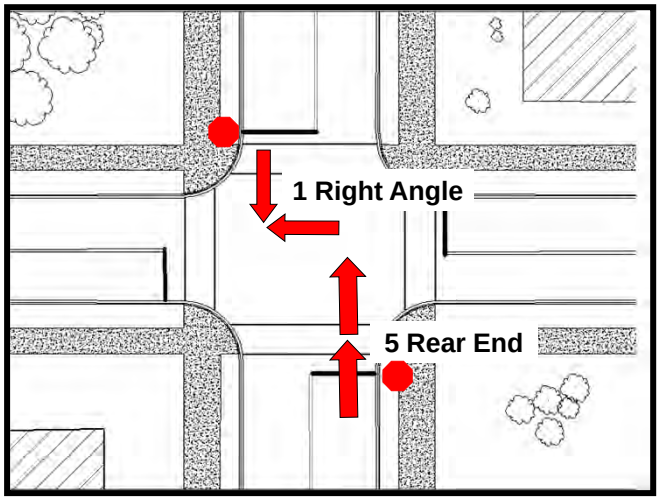
Multi-Way Stop - Is it Warranted?



Approach 42 mph Delay 60 sec

16

Multi-Way Stop - Is it Warranted?



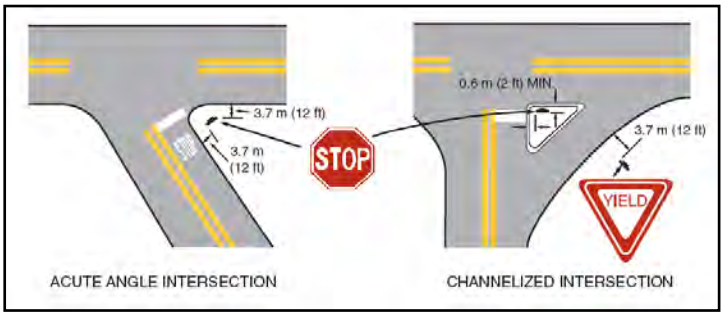
Approach 42mph Delay 60 sec

17

Command Respect and Attention

Barriers to respect and attention

- ❑ Sign over-use
- ❑ Improper use or placement



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Unwarranted Stop Signs

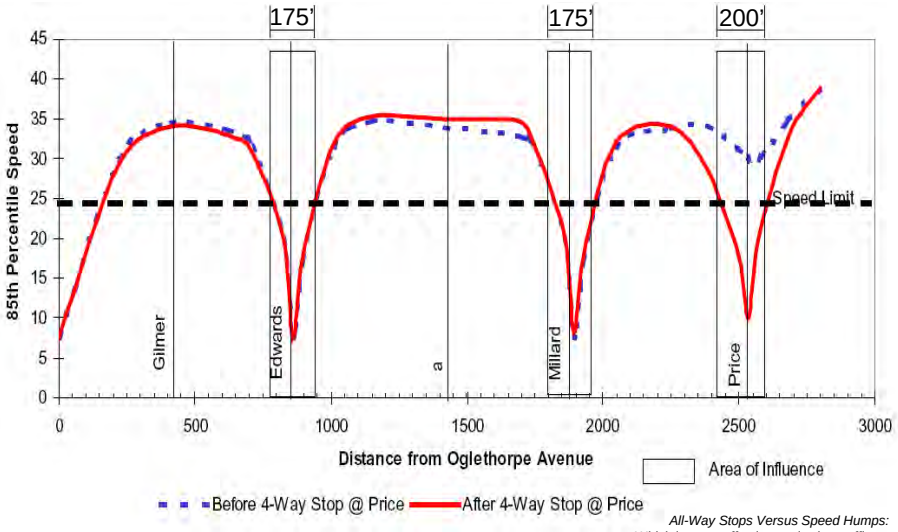
MUTCD Section 2B.05

STOP signs **<u>should not</u>** be used for speed control.

- Over 20 research papers conclude that stop signs are ineffective for speed control.
- Stop signs don't influence mid block speeds.

19

Speed Before and After Installation of 4-way Stop Control



All-Way Stops Versus Speed Humps: Which is more effective at slowing traffic speeds?
by David E. Clark, P.E.

20

Provide Adequate Response Time

Response time depends on:

- ❑ PIEV Time
  - **P**erception
  - **I**dentification (understanding)
  - **E**motion (decision making)
  - **V**olition (execution of decision)
- ❑ Driver Expectations
- ❑ Consistency with Other Applications

21

Convey a Simple Message

To simplify messages, the MUTCD specifies that signs:

- ❑ Use standard shapes and colors
- ❑ Incorporate symbols whenever possible
- ❑ Be easily recognizable

R1-1

R3-7

R3-9a

22

Hidden Sign

23

Hidden Sign

24

No Maintenance

25

Nonconforming Colors

Photo Courtesy of Mark Bott, P.E. - MDOT

26

Improper Installation

Photo Courtesy of Mark Bott, P.E. - MDOT

27

Improper Installation

28

Too Many Signs

Photo Courtesy of Mark Bott, P.E. - MDOT

29

Improper Post

30

31

32

Just for Fun

33

Stick with it: Ask a Question

It's not that I'm so smart, it's just that I stay with problems longer.

Albert Enstein

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Common Sense Solutions for Intersection Safety Problems

You're not Alone – Getting Others to Help

1

Education Goals

- Understand why working together to achieve safety goals is more effective than doing it alone.

2

Who Is Responsible For Traffic Safety?

- Traffic Engineer?
- State / Local Police Officer?
- Insurance Companies?
- City Manager?
- State / Federal DOT?
- Schools?
- Road Users?
- Department of Public Works?
- Road Maintenance Crews?
- Health care professionals?
- Citizens Groups?
- Outreach and Education Groups?

All Of YOU!

3

Partnering

4

Why Work Together?

- Greater pool of skills and resources
- Increased likelihood of funding
- Higher public visibility
- Reduced burden on any individual agency

5

Case Study – A Team Approach

- Must form a “Neighborhood Traffic Team” to request changes
- City doesn’t deal with individuals requesting a change
- City Council supports the process
- Avoids the attitude “This is my street”
- Very customer service driven

6

Case Study - Citizens Radar Patrol

- Neighborhood Traffic Teams issued radar units
- Log of violators turned in to police department
- "Friendly reminder" notices issued to violators

Naperville Police Department Traffic Unit

Date of Incident: _____ Time: _____
Speed: _____ Speed Limit: _____
Location: _____

On the above time and date your vehicle was being operated in excess of the posted speed limit. The operator of the vehicle was observed by a citizens patrol, utilizing Naperville Police Department Radar.

This traffic offense is of serious concern to the citizens of Naperville and the Police Department. Speeding is one of the leading causes of traffic crashes. In an effort to reduce traffic crashes, and the speed of vehicles within Naperville, this WARNING post card has been sent out. Please cooperate with our traffic laws and make our community a safer place to live.

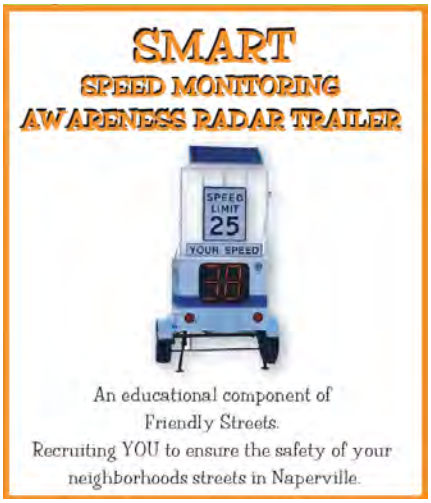
If you have any questions please call the Naperville Police Department's Traffic Unit at (630) 420-6197.

HELP KEEP OUR COMMUNITY SAFE BY DRIVING SAFELY

7

Case Study - SMART Trailers

- Used at locations with a documented speed problem.
- Used as an Educational component of the program
- Issued upon request of Neighborhood Traffic Teams



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Case Study - Pace Car Program

- Residents sign “Pace Car Pledge”
- Pace cars drive the speed limit
- A few pace cars can effectively regulate traffic speeds

9

Benefits

- Encourages positive public participation
- Enlists the public as part of the solution
- Minimizes wasted effort of key City resources
  - Engineering staff
  - Law enforcement staff
  - Elected officials
- Discourages “public ranting” at City Commission meetings
- Significantly reduces the installation of unwarranted stop signs

10

Partnering Resources

- Local Technical Assistance Program (LTAP)
  wvltap.org
- Federal Highway Administration Office of Safety
  www.safety.fhwa.dot.gov
- National Highway Traffic Safety Administration
  www.nhtsa.dot.gov

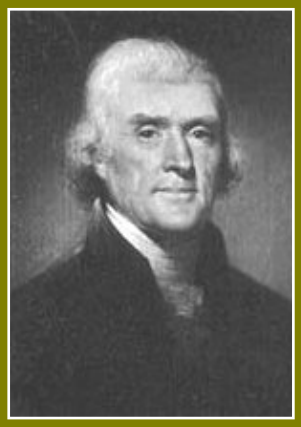
11

12

Learn the Truth: Ask Questions

For here we are not afraid to follow truth wherever it may lead.

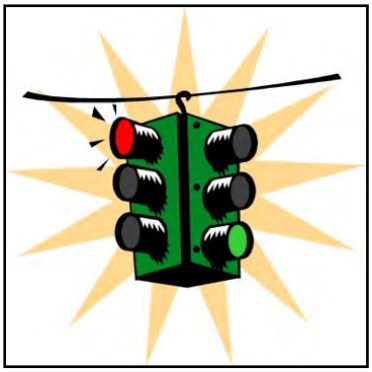
Thomas Jefferson



13

Common Sense Solutions for Intersection Safety Problems

Signals – They Solve Problems, They Create Problems



1

Education Goals

- Understand the terminology used to describe a signal.
- Understand the benefits of properly warranted and installed signals.
- Understand the problems caused by unwarranted or improperly installed signals.

2

Education Goals (*cont.*)

- Understand the options available, instead of a signal, to solve specific problems at an intersection.
- Understand the significance of a signal timing plan, and the difference between fixed, actuated, and coordinated signal timing plans.
- Understand the uses for the eight different types of signal warrants

3

Benefits of Signals

Properly warranted and installed signals:

- Increase traffic-handling capacity over 4-way stops
- Enhance the orderly movement of traffic
- Reduce the frequency of *left turn straight* and *right angle* crashes
- Regulate speed along a route
- Permit other traffic and pedestrians to cross

4

Problems Caused by Signals

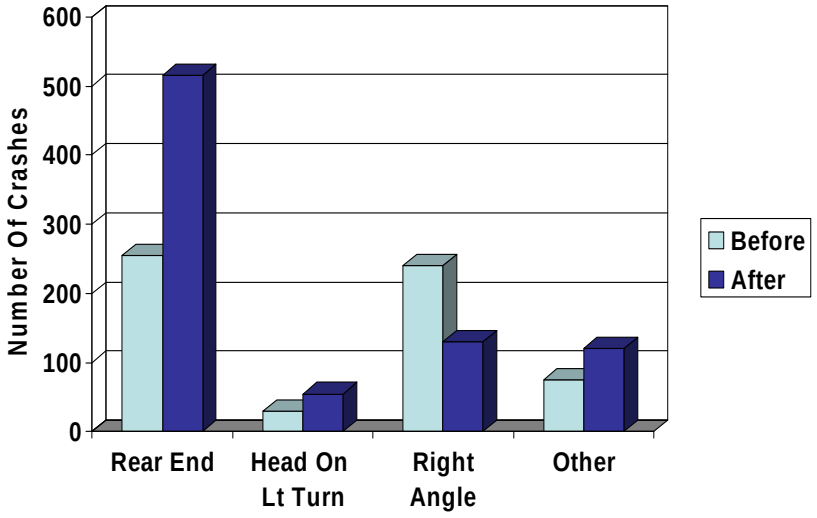
Unwarranted or improperly installed signals:

- ❑ Create excessive delays
- ❑ Encourage a disregard for traffic signals
- ❑ Encourage the use of alternate routes
- ❑ Increase the likelihood of *rear end* collisions

5

Before And After Studies

Of 20 Intersections In Michigan

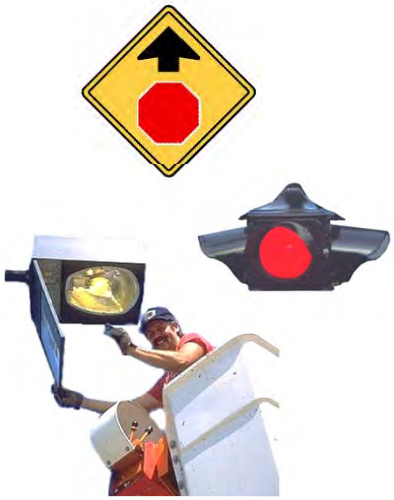


6

Options to Consider Before Installing a Signal

To improve visibility:

- ❑ Advance warning signs (with or without beacons)
- ❑ Relocating stop lines
- ❑ Flashing red beacon
- ❑ Roadway lighting

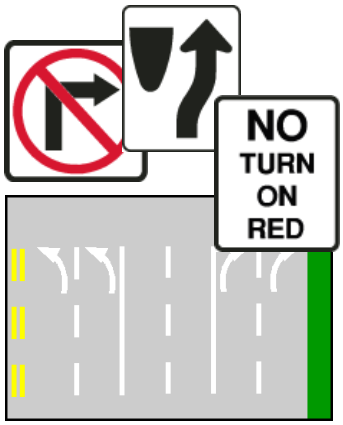


7

Options to Consider Before Installing a Signal

To improve traffic operation:

- ❑ Additional lanes
- ❑ Revised geometrics
- ❑ Restricted turning movements
- ❑ Roundabout

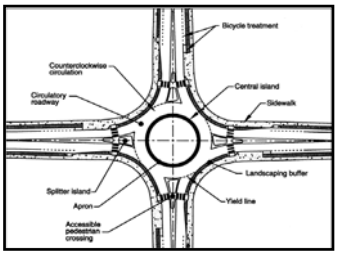


8

Options to Consider Before Installing a Signal

To reduce speeds:

- ❑ Traffic calming measures
- ❑ Targeted enforcement
- ❑ Roundabout



9

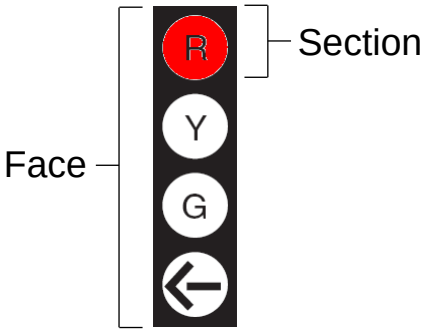
Signal Terminology

Signal Face

- ❑ Contains 3, 4, or 5 sections

Signal Section

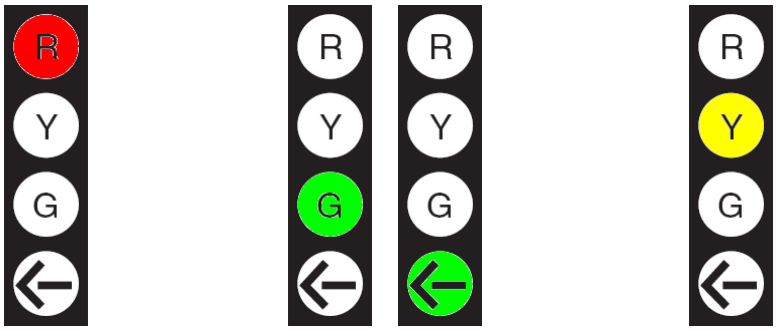
- ❑ Each light is a section
- ❑ Must be red, green, or yellow
- ❑ Modern sections are 12 inches in dia.



10

Signal Terminology

- **Interval** - Period of time that one color illuminates on the signal face

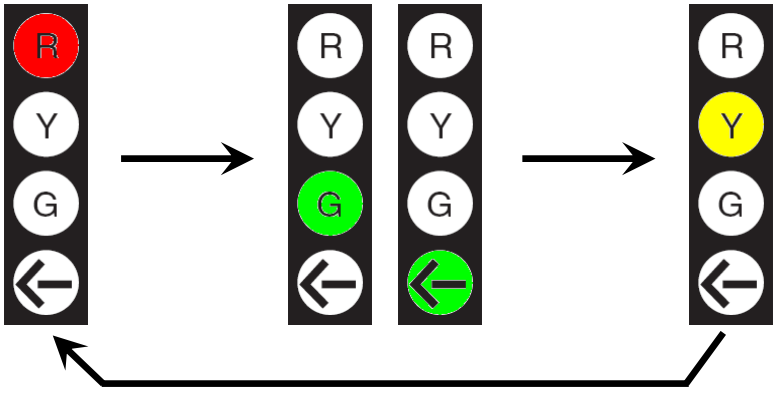


Red Interval Green Interval Yellow Interval

11

Signal Terminology

- **Cycle** - Series of all intervals



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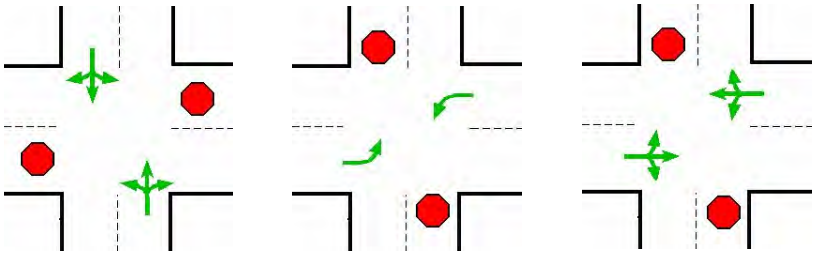
Signal Terminology

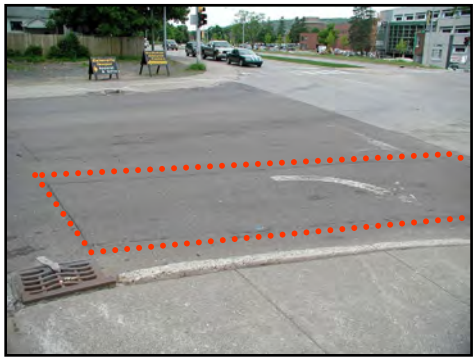
- **Phase** - Defined by traffic movement allowed



13

Signal Timing

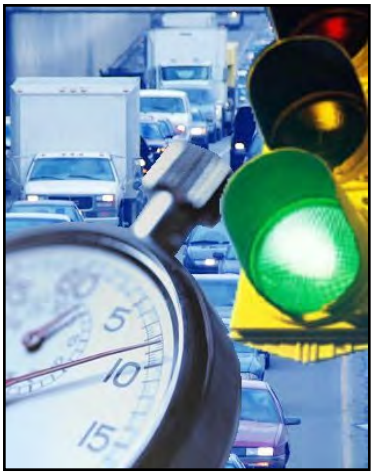
- Fixed signal
  Operates independent of time of day or traffic patterns
- Actuated signal
  Changes based on time of day or traffic pattern
- Coordinated signal
  Operates within a series of synchronized signals



14

Signal Timing

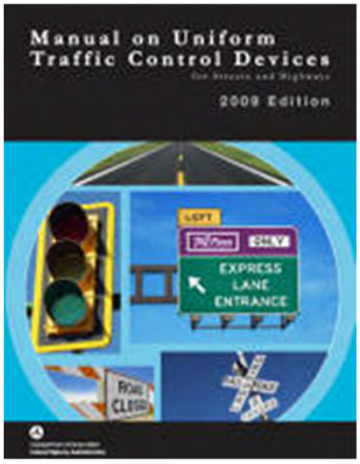
- Cycle length: 60 to 120 seconds
- Green phase: 5 to 40 seconds
- Yellow phase: 3 to 6 seconds
- All red phase: 1.5 to 6 seconds



15

Signal Warrants: Where to Start

- Manual on Uniform Traffic Control Devices (MUTCD) Part 4
- Get an engineer involved for a signal warrant



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Signal Warrants: Engineering Study

- Number of vehicles entering the intersection
- Traffic movement volumes
- Pedestrian volume counts
- Facilities for young, elderly, or disabled
- Speeds (posted and 85%)
- Condition diagram
- Collision diagram

17

Types Of Signal Warrants

- Eight-Hour Vehicular Volume
- Four-Hour Vehicular Volume
- Peak Hour
- Pedestrian Volume
- School Crossing
- Coordinated Signal System
- Crash Experience
- Roadway Network

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Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1.....	1.....	500	400	350	280	150	120	105	84
2 or more...	1.....	600	480	420	336	150	120	105	84
2 or more...	2 or more...	600	480	420	336	200	160	140	112
1.....	2 or more	500	400	350	280	200	160	140	112

Condition B—Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1.....	1.....	750	600	525	420	75	60	53	42
2 or more...	1.....	900	720	630	504	75	60	53	42
2 or more...	2 or more...	900	720	630	504	100	80	70	56
1.....	2 or more	750	600	525	420	100	80	70	56

19

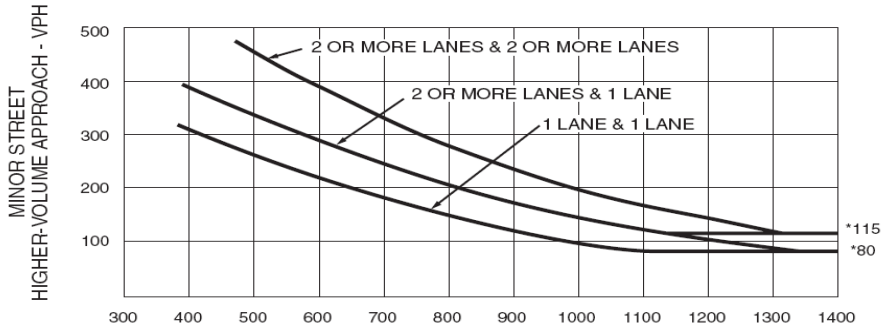
8 Hour Vehicular Volume Warrant: Table 4C-1

- Meet condition A, B, or combination of both.
- 100% column – Basic warrant volumes.
- 80% column – Warranted if other remedies have been tried first.
- 70% column – Warranted if speeds >40 mph in isolated communities of 10,000 or less.
- 56% column - Warranted if A and B are met and speeds >40 mph in isolated communities of 10,000 or less where other remedies have been tried first.

20

4 Hour Volume Warrant

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

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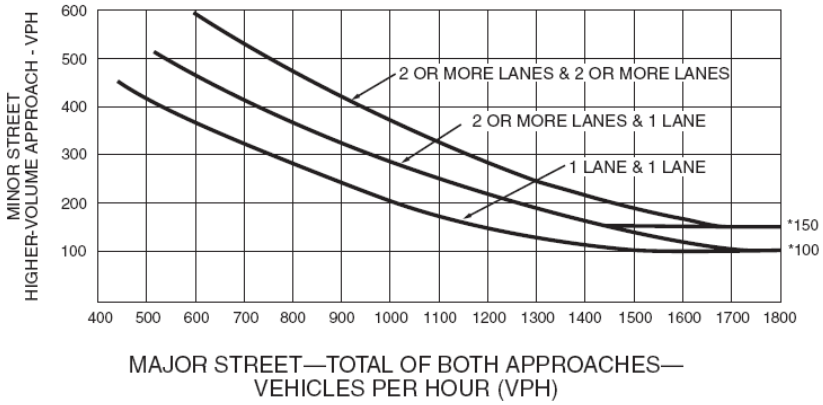
Peak Hour Volume Warrant

Figure 4C-3. Warrant 3, Peak Hour



22

Pedestrian Warrants

- ❑ >100 Pedestrians per hour for any 4 hours, OR
- ❑ >190 Pedestrians per hour for any 1 hour at the major street

  AND
- ❑ <60 gaps per hour during same period
- ❑ Volume may be reduced up to 50 % for pedestrians with lower walking speed (children & elderly)

23

School Crossing Warrant

- ❑ Fewer traffic gaps than minutes in period of study.
- ❑ Must be a minimum of 20 students per hour

EXAMPLE

- Students cross between 7:30 and 8:00 = 30min
- <30 crossing gaps during this time
- >20 students present per hour (Signal would be Warranted)

24

Crash Experience

- ❑ Other alternatives have been tried and failed AND
- ❑ 5 or more correctable crashes in 12 months AND
- ❑ Meet minimum volume criteria from:
  - Criteria A (80% column) Major street for 8hr warrant AND
  - Criteria B (80% column) Minor street for 8hr warrant Or
  - 80% of the pedestrian warrant volume
- ❑ Can use 56% column (criteria A&B) for speeds over 40 mph in communities <10,000 pop.

25

Traffic Operations Warrants

Coordinated signals

- ❑ Designed to keep vehicles progressing in platoons
- ❑ Allows gaps in traffic

Roadway Network

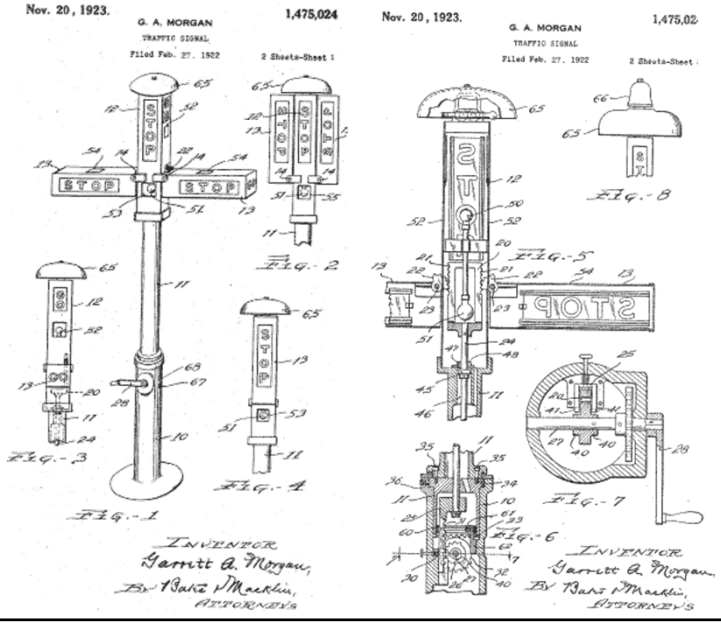
- ❑ For major traffic routes
- ❑ Traffic traversing a city
- ❑ Entering volumes greater than 1000 vehicles/hour

26

Just for Fun

27

Just for Fun



28

Learn More: Ask Questions

I am always ready to learn although I do not always like being taught.

Winston Churchill

29

Common Sense Solutions for Intersection Safety Problems

Components of a Road Safety Study

1

Education Goals

- Understand the three phases of a road safety study.
- Understand the five different types of analysis performed during the site study phase of a road safety study.
- Understand the four parts of a Human Factors Analysis.

2

The Safety Study Process

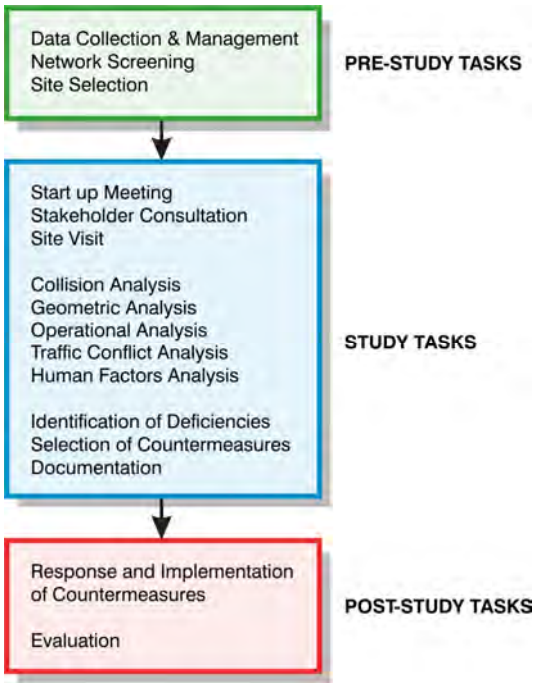


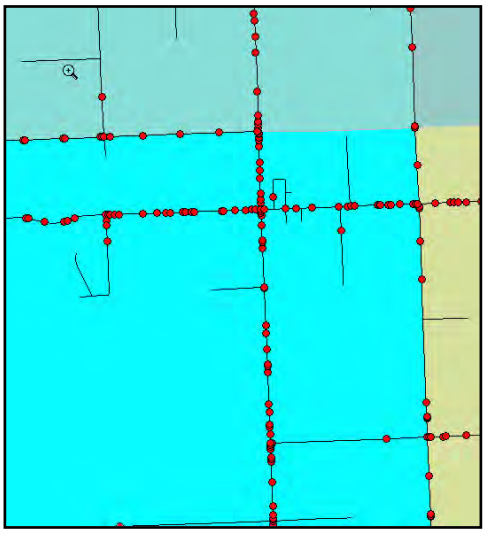
Illustration courtesy of Hamilton Assoc.

3

Finding the Problem Areas

Pre-Study Phase

- ❑ Data Collection
- ❑ Network Screening
- ❑ Site Selection



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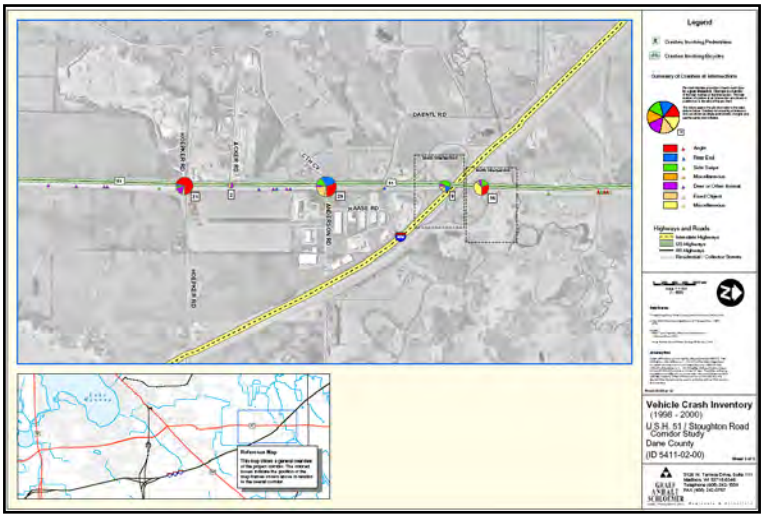
Finding The Problem Areas



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Site Study Phase

- ❑ Kickoff Meeting
- ❑ Site Visit
- ❑ Geometric Analysis
- ❑ Collision Analysis
- ❑ Operational Analysis
- ❑ Conflict Analysis
- ❑ Human Factors Analysis

6

Geometric Analysis

Contributing Factors

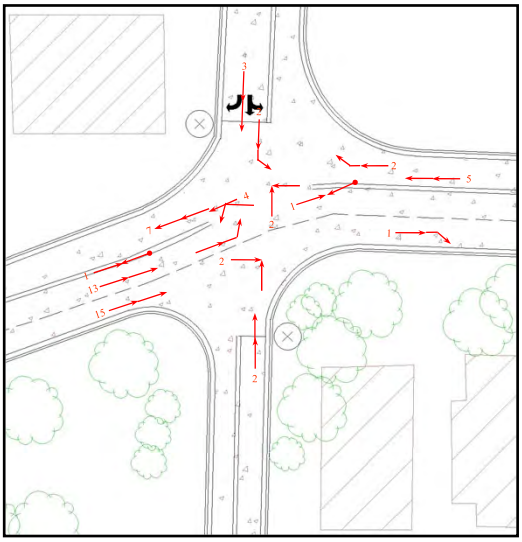
- ❑ Alignment of legs
- ❑ Skew of legs
- ❑ Sight distance & obstructions
- ❑ Grade

7

Crash Analysis

Requirements

- ❑ Analysis of crash reports
- ❑ Plot crashes
- ❑ Crash statistics



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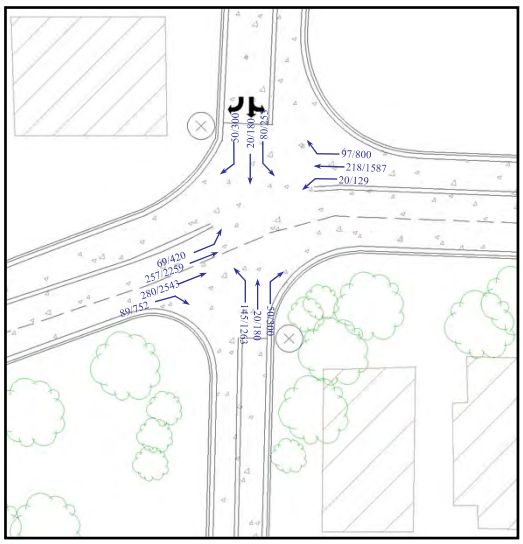
Operations Analysis

Requirements

- ❑ Traffic turning movements
- ❑ Traffic volume data
- ❑ Signal timing
- ❑ Crash statistics



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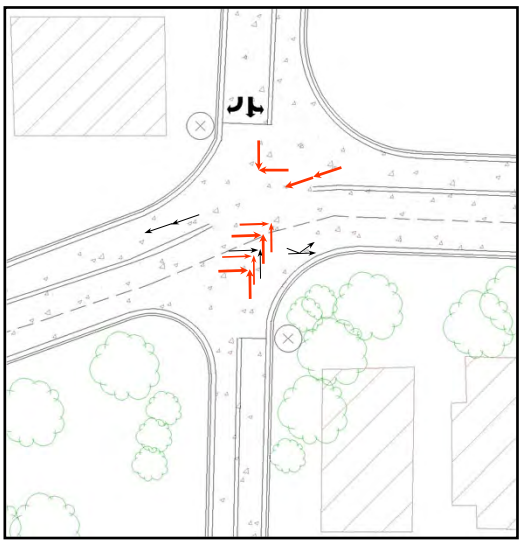
Conflict Analysis

Requirements

- ❑ On site observer
- ❑ Record vehicle conflicts
- ❑ Rate by severity



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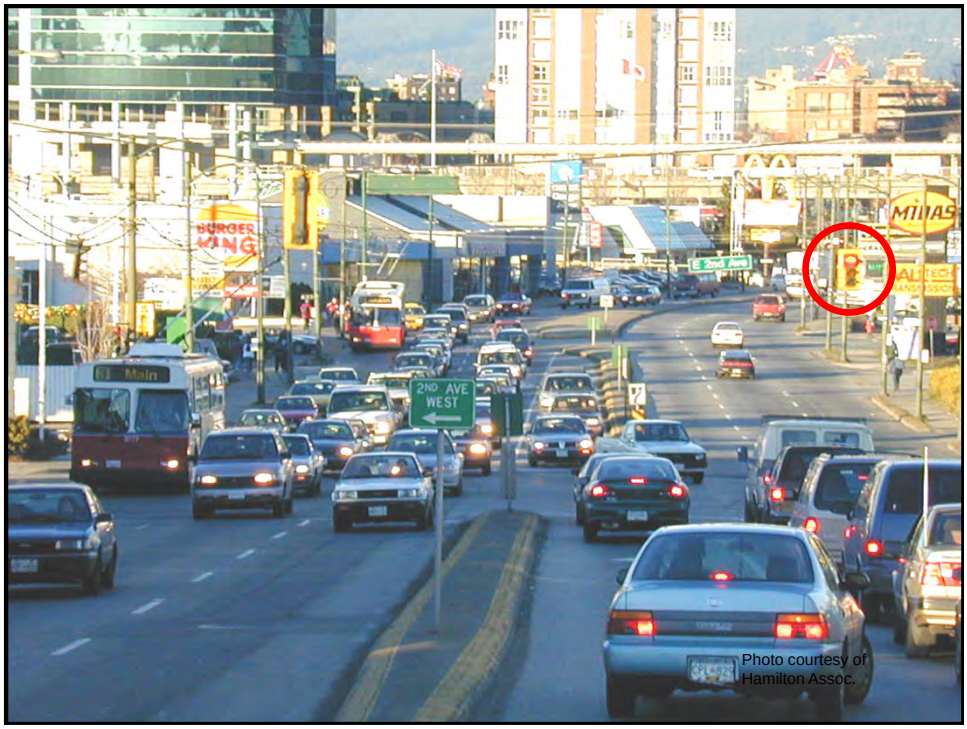
Human Factors Analysis

Review of the intersection from the driver's perspective

- ❑ Visibility
  Can you see the sign or signal?
- ❑ Expectancy
  Do you expect it to be there?
- ❑ Consistency
  Is it the same at other locations?
- ❑ Visual workload
  Can you understand what it is?

11



12

Report Phase

REQUIREMENTS

- ❑ Identification of deficiencies
- ❑ Selection of Countermeasures

RANK	CONSTRUCTION CLASSIFICATION	B/C RATIO
1	ILLUMINATION	21.0
2	RELOCATED BREAKAWAY UTILITY POLES	17.2
3	TRAFFIC SIGNS	16.3
4	UPGRADE MEDIAN BARRIER	13.7
5	NEW TRAFFIC SIGNAL	8.3
6	NEW MEDIAN BARRIER	8.3
7	REMOVE OBSTACLES	8.3
8	IMPACT ATTENUATORS	7.8
9	UPGRADE GUARDRAILS	7.6
10	UPGRADE TRAFFIC SIGNALS	7.4
11	UPGRADE BRIDGE RAIL	7.1
12	SIGHT DISTANCE IMPROVEMENTS	7.0
13	GROOVE PAVEMENT FOR SKID RESISTANCE	5.6
14	REPLACE OR IMPROVE MINOR STRUCTURE	5.2
15	TURNING LANES AND TRAFFIC SEPARATION	4.4
16	NEW RR FLASHING GATES	3.9
17	CONSTRUCT MEDIAN FOR TRAFFIC SEPARATION	3.3
18	NEW RR CROSSING FLASHING LIGHTS	3.2
19	NEW RR FLASHING LIGHTS AND GATES	3.0
20	UPGRADE RR FLASHING LIGHTS	2.9
21	PAVEMENT MARKING AND DELINEATION	2.6
22	FLATTEN SIDE SLOPES	2.5
23	NEW BRIDGE	2.2
24	WIDEN OR IMPROVE SHOULDER	2.1
25	WIDEN OR MODIFY BRIDGE	2.0
26	RE-ALIGN ROADWAY	2.0
27	OVERLAY FOR SKID TREATMENT	1.9

13

Post Report Phase

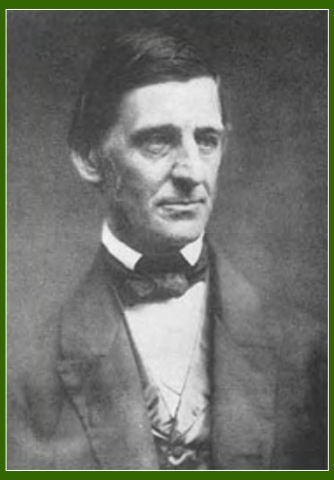
- ❑ Implementation
- ❑ Evaluation
- ❑ Recommendations for next study phase

14

Ask Questions, Understand More

Life is a succession of lessons which must be lived to be understood.

Ralph Waldo Emerson



15

Common Sense Solutions for Intersection Safety Problems

Clear Sight Triangles

1

Education Goals

- Understand the four different types of sight distance.
- Understand the three different types of intersection control that effect the calculation of clear sight triangles.
- Understand the difference between an *approach* sight triangle and a *departure* sight triangle.

2

Education Goals (*cont.*)

- Understand how to identify sight obstructions.
- Understand factors that complicate the calculation of sight triangles at some intersections.

3

Types of Sight Distance

Stopping sight distance: Length of visible roadway necessary to safely stop to avoid an obstruction.

Passing sight distance: Length of visible roadway necessary to safely complete a passing maneuver.

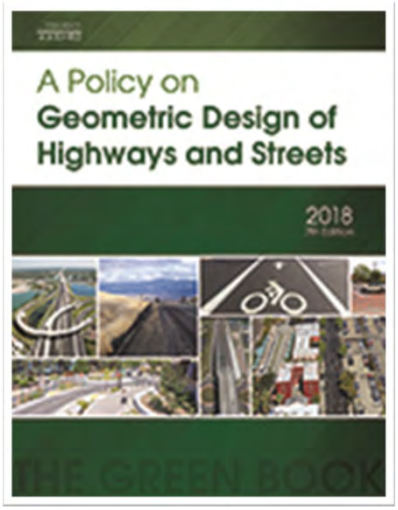
Decision sight distance: Distance in advance of a driving decision point (lane reduction, toll plaza).

Intersection sight distance: Distance in advance of an intersection that enables a driver to determine whether or not the intersection is safe to maneuver.

4

Sight Triangle Guidance

- AASHTO – ***A Policy on Geometric Design of Highways and Streets***
- Also referred to as ***The Green Book***



5

Clear Sight Triangle Cases

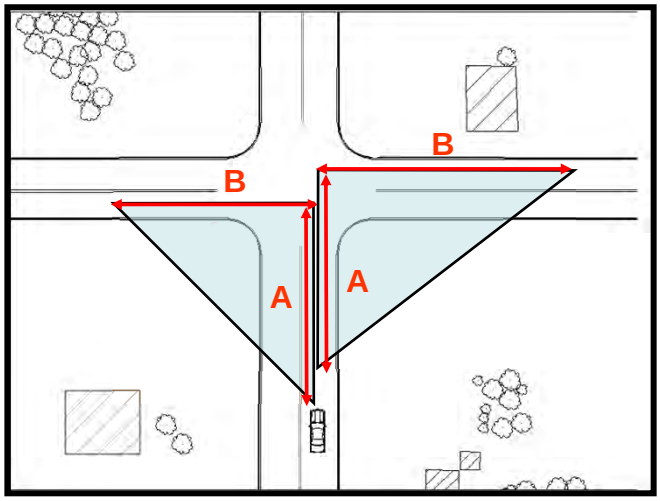
Sight triangles are calculated differently for:

- No intersection control
  - All maneuvers the same
- Minor road yield controlled
  - Left and right turn from minor road
  - Crossing maneuver
- Minor road stop controlled
  - Left turn from minor road
  - Right turn from minor road
  - Crossing maneuver

6

Approach Sight Triangle

Uncontrolled and Yield Controlled Intersections



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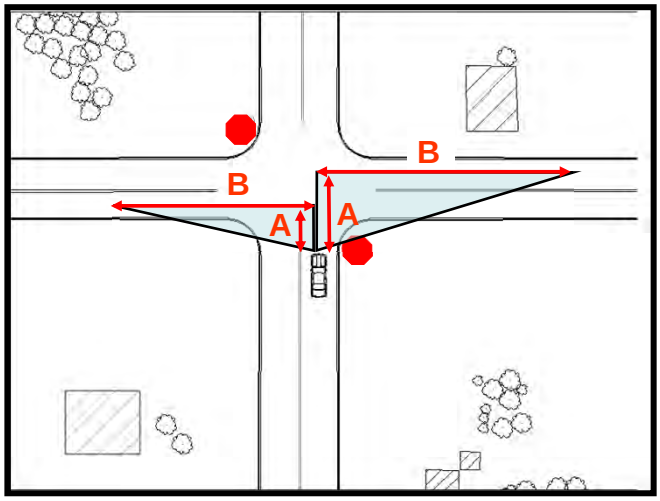
Departure Sight Triangle

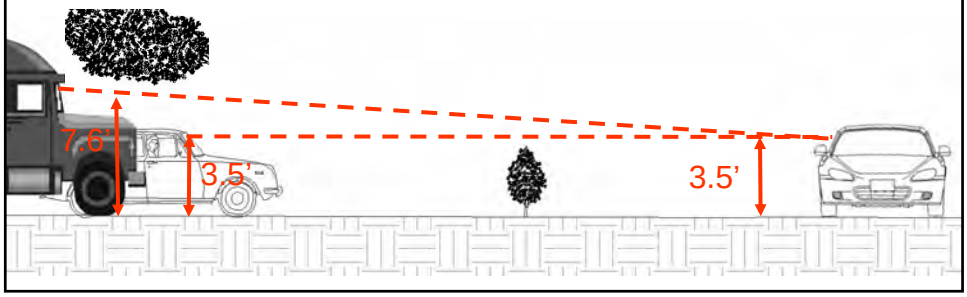
Stop Controlled Intersections



8

Sight Obstructions

- Driver's eye 3.5 feet above the road in a passenger car
- Driver's eye 7.6 feet above the road in a large truck
- Anything rising above 3.5 feet or hanging below 7.6 feet should be removed.

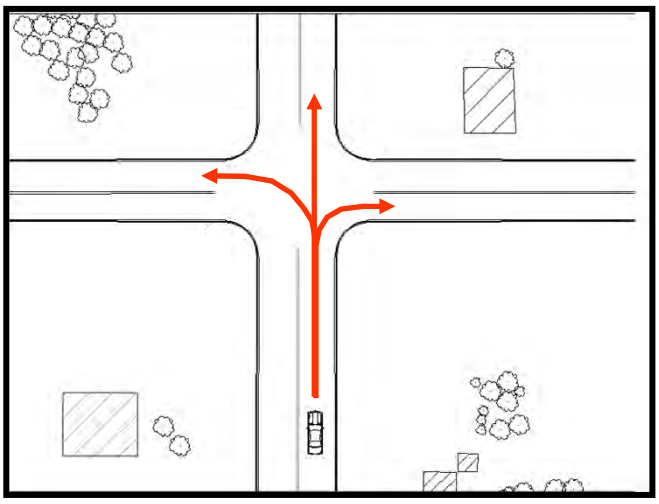


9

Uncontrolled Intersection Example

All Movements Considered in one Case

Design Speed: 55mph east-west road, 45 mph north-south road



10

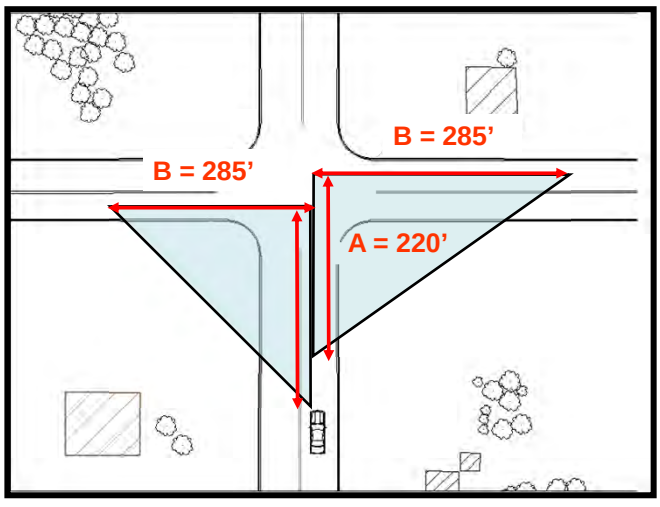
Uncontrolled Intersections

Distance along the approach leg	
Design Speed (MPH)	**Length (FT)**
15	**70**
20	**90**
25	**115**
30	**140**
35	**165**
40	**195**
45	**220**
50	**245**
55	**285**
60	**325**
65	**365**

11

Uncontrolled Intersection Example

Design Speed: 55mph east-west road, 45 mph north-south road

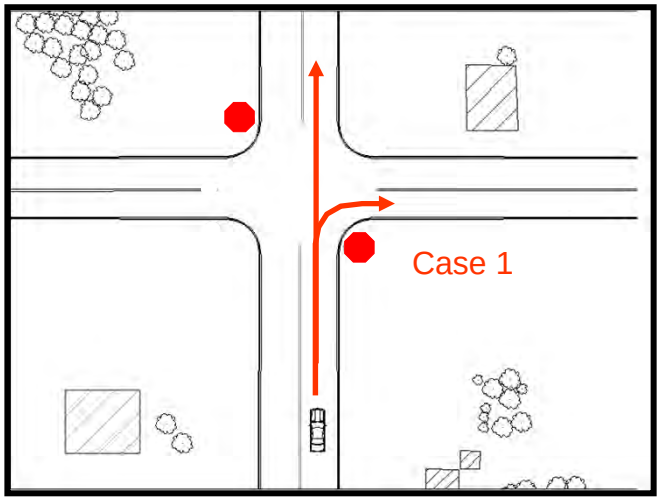


12

Stop Control on Minor Street Example

Case 1: Crossing and Right Turn Maneuver

Design Speed: 55mph east-west road, 45 mph north-south road.
2 way stop control on north-south (minor) street.



13

Stop Control on Minor Street

Case 1: Crossing and Right Turn Maneuver

For approach grades between +3% and –3%,
passenger car as design vehicle

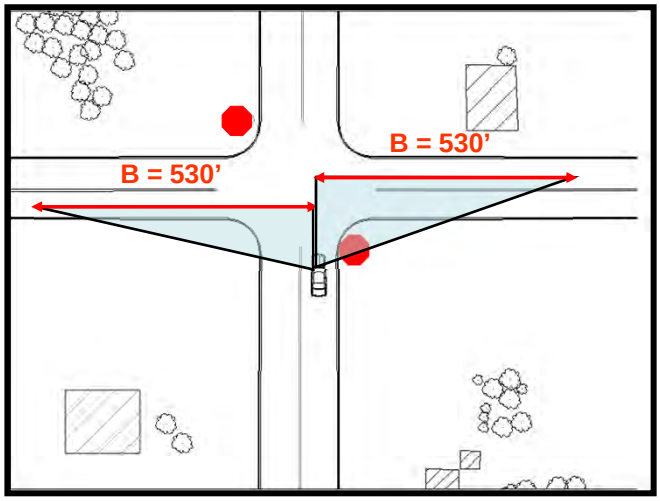
Distance along the major approach leg	
Design Speed (mph)	**Length (ft)**
20	**195**
25	**240**
30	**290**
35	**335**
40	**385**
45	**430**
50	**480**
55	**530**
60	**575**
65	**625**

14

Stop Control on Minor Street Example

Case 1: Crossing and Right Turn Maneuver – B Leg

Design Speed: 55mph east-west road, 45 mph north-south road.
2 way stop control on north-south (minor) street.

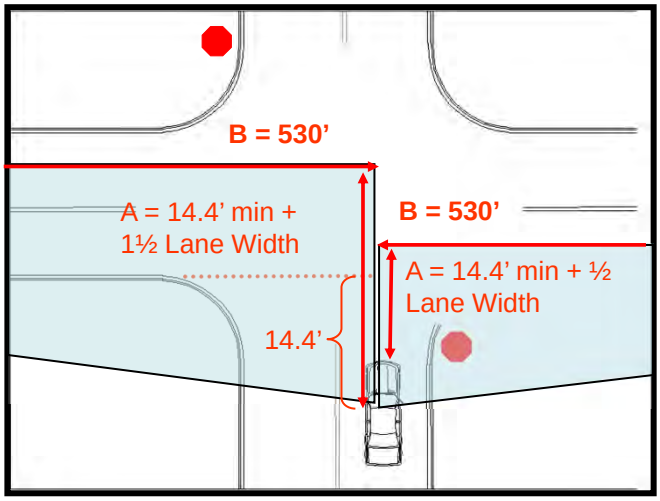


15

Stop Control on Minor Street Example

Case 1: Crossing and Right Turn Maneuver – A Leg

Leg A starts 14.4 feet from the edge of the major street

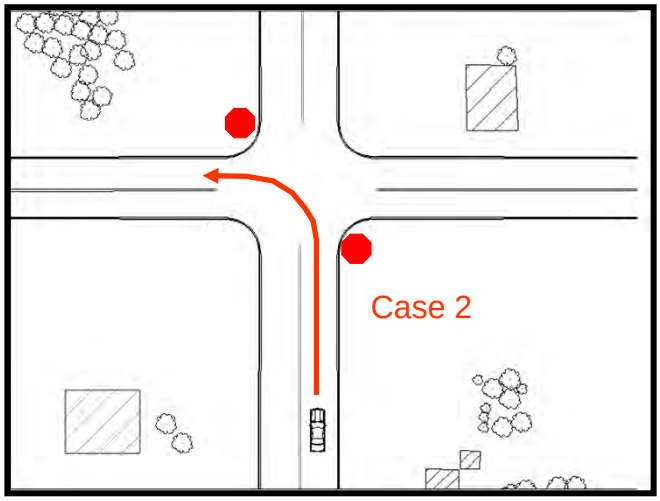


16

Stop Control on Minor Street Example

Case 2: Left Turn Maneuver

Design Speed: 55mph east-west road, 45 mph north-south road.
2 way stop control on north-south (minor) street.



17

Stop Control on Minor Street

Case 2: Left Turn Maneuver

For approach grades between +3% and –3%,
passenger car as design vehicle

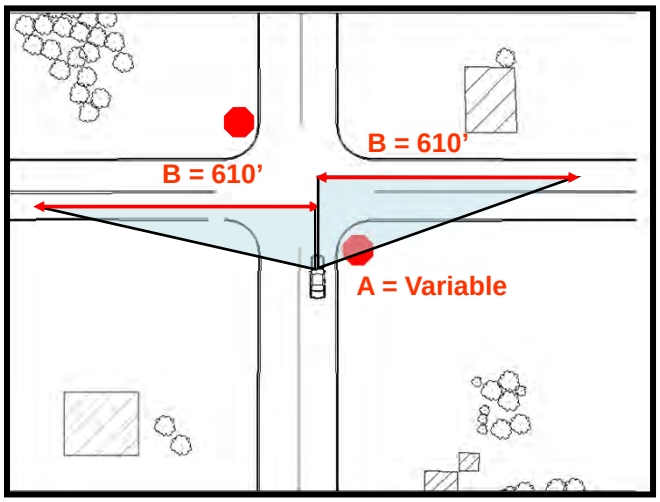
Distance along the major approach leg	
Design Speed (MPH)	**Length (FT)**
20	**225**
25	**280**
30	**335**
35	**390**
40	**445**
45	**500**
50	**555**
55	**610**
60	**665**
65	**720**

18

Stop Control On Minor Street Example

Case 2: Left Turn Maneuver

Design Speed: 55mph east-west road, 45 mph north-south road.
2 way stop control on north-south (minor) street.



19

Sight Triangle Modifications

Sight triangles can be modified for:

- ❑ Type of vehicle
- ❑ Approach grade
- ❑ Number and width of lanes and medians
- ❑ Length of vehicle
- ❑ Deceleration rates
- ❑ Approach speeds
- ❑ Reaction time
- ❑ Approach speed reduction

20

Common Sight Obstructions

- Trees and shrubs
- Farm crops
- Buildings and fences
- Earth slopes
- Cars parked on street and in right of way

21

Sight Obstructions

22

Sight Obstructions

23

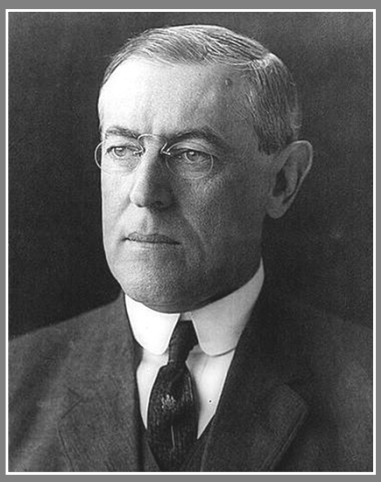
Sight Obstructions

24

Borrow Some Brains: Ask a Question

"I not only use all the brains that I have, but all that I can borrow."

Woodrow Wilson



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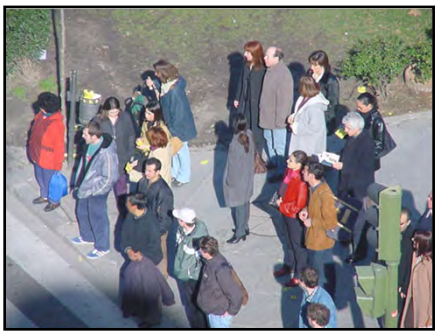
Common Sense Solutions for Intersection Safety Problems

Pedestrians at Intersections



1

Education Goals

- Understand why it is important to consider pedestrians when designing intersections
- Understand the four main issues involved in designing an intersection for pedestrian use

2

Why Design for Pedestrians?

3

Why Design for Pedestrians?

- 1/3 of population too old or too young to drive
- 1/10 of households in U.S. do not own a car
- Everyone is a pedestrian at some point of trip
- Walking has health and environmental benefits
- Pedestrians cover an extremely wide range of physical abilities.

4

Pedestrian Crash Statistics

- 5,000 pedestrians killed in the U.S. annually
  - 24% are at intersections
  - 5% of all traffic fatalities are pedestrians
- 78,000 pedestrians injured in the U.S. annually
  - 42% are at intersections

5

Pedestrian Friendly?

6

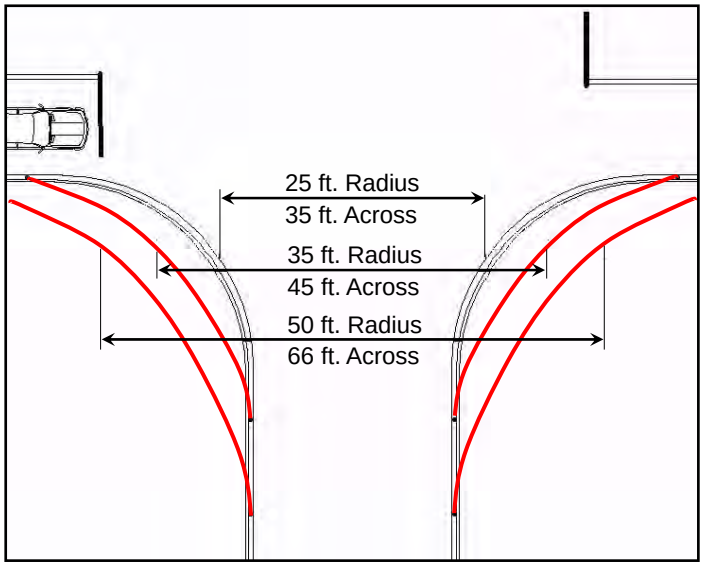
7

Intersection-Pedestrian Issues

- Roads and intersections are historically designed around the needs of vehicles
- Pedestrians not visible or expected by drivers
- Access issues
- Signal timing

8

Crossing Distance – Curb Radii



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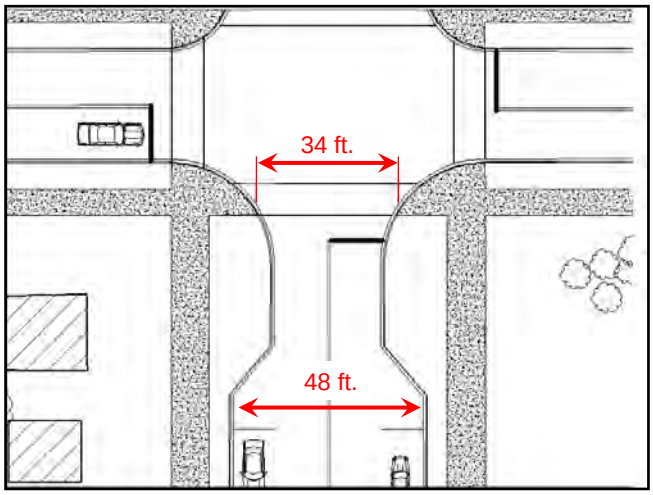
Solutions for Crossing Distance

Bull Nose



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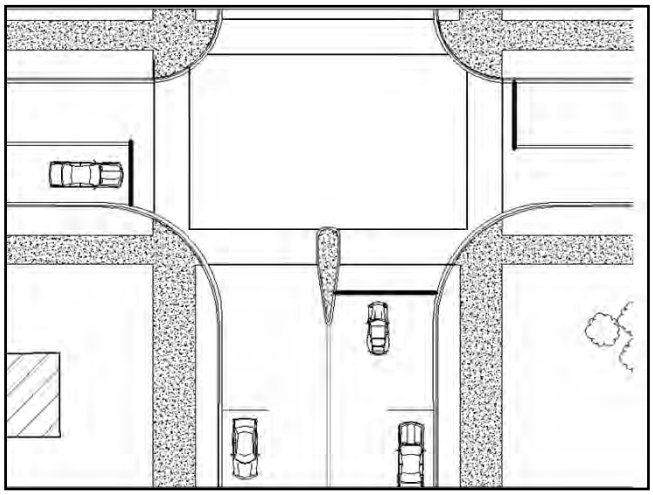
Solutions for Crossing Distance
Refuge Island



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Sight Obstructions

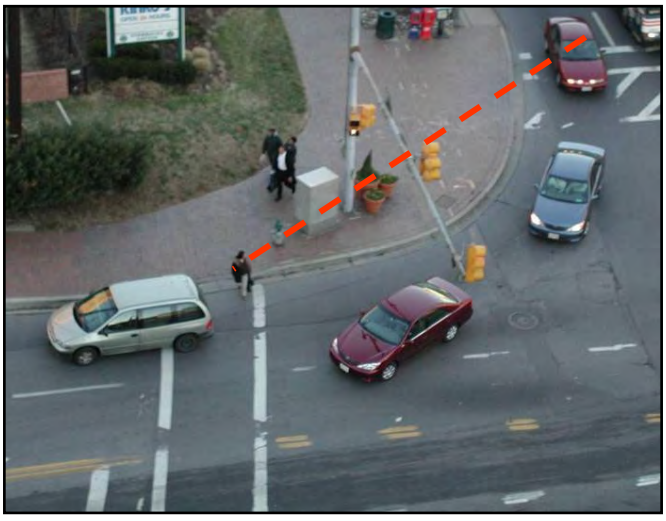


Photo George Branyan -Maryland Highway Safety Office

12

Sight Obstructions

Photo Mark Bott, P.E. MDOT

13

Sight Obstructions

14

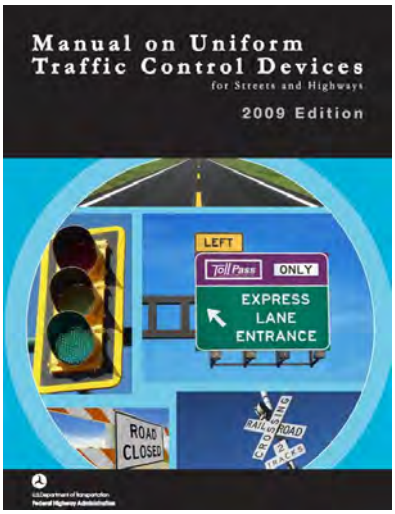
Crosswalk Marking Issues

Why Mark Them?

- ❑ Give drivers a reminder to expect pedestrians
- ❑ Delineate the crossing area for pedestrians

Which Should Be Marked?

- ❑ MUTCD "..where there is substantial conflict between vehicular and pedestrian movements."



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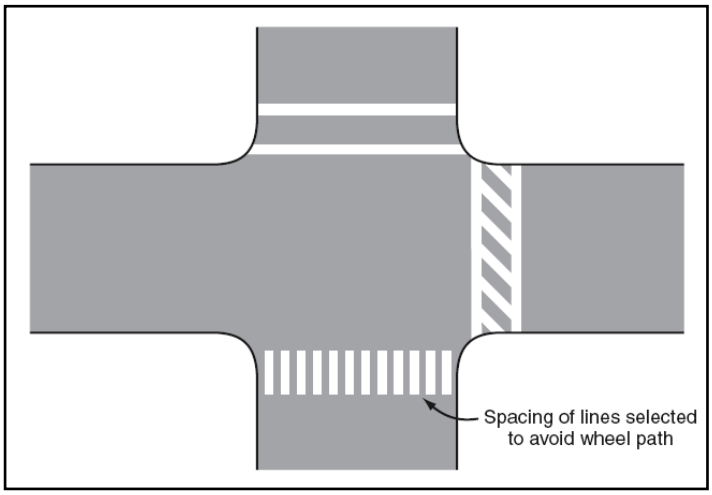
Types of Markings



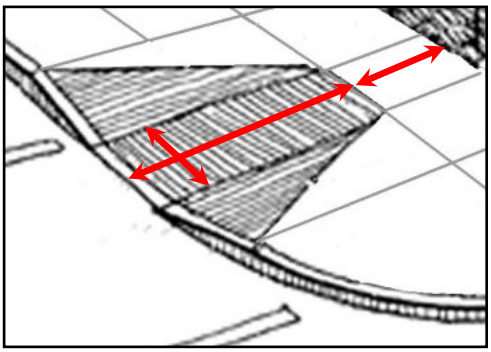
16

Sidewalk Accessibility

- **Title II of the Americans With Disabilities Act of 1990 States:**
  "Newly constructed and altered streets and pedestrian walkways must contain curb cuts at intersections…."

Sidewalk Ramps

- 36 inch minimum width
- Less than 2% Cross slope
- Less than 1:12 Running Slope
- 48 inch minimum landing



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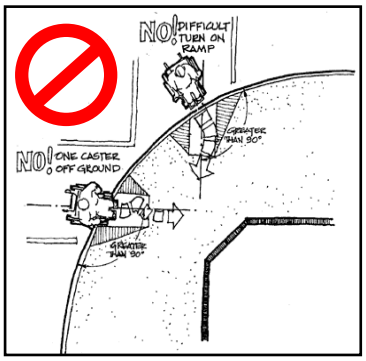
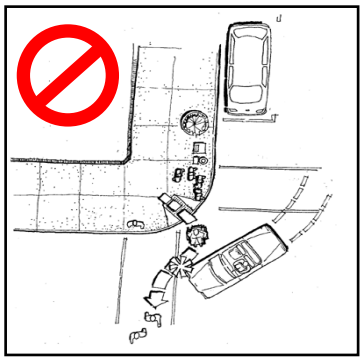
Sidewalk Accessibility

Ramp Usability

- Perpendicular to curb
- Exit directly to crosswalk
- Even transition to gutter





18

Obstructions

19

Obstructions

20

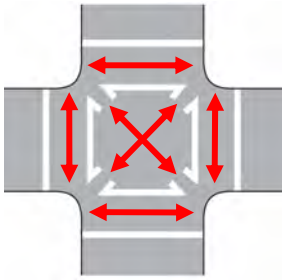
Pedestrian Signals

Standard Pedestrian Signal Timing

- Pedestrians walk in the same direction as traffic flows.
- Pedestrians are given time to cross to at least the center of the far lane.
- Pedestrians kept from conflicting with protected turn phases.

Scramble Phasing

- Traffic is stopped and all pedestrians can walk in any direction including diagonally.



21

Explore with Questions

No pessimist ever discovered the secrets of the stars, or sailed to an uncharted land, or opened a new heaven to the human spirit

Helen Keller

22

Common Sense Solutions for Intersection Safety Problems

Flaws in Your Intersection

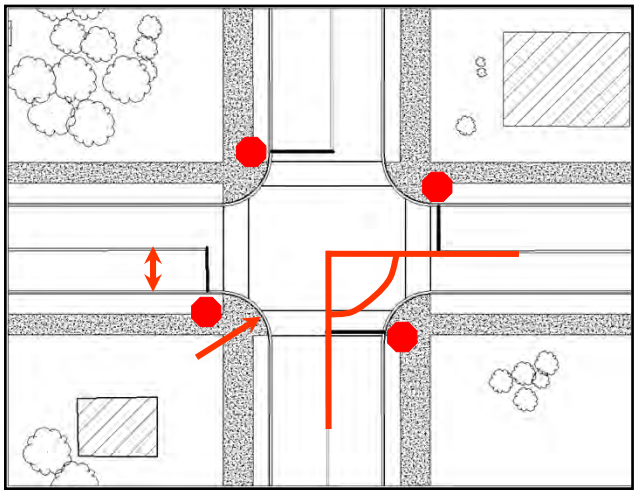
1

Education Goals

- Understand the features that describe the geometry of an intersection.
- Understand how the geometry of an intersection can influence motorists.
- Understand common geometric problems that could create a safety risk.
- Understand strategies for fixing geometric problems.

2

What is Geometry?



3

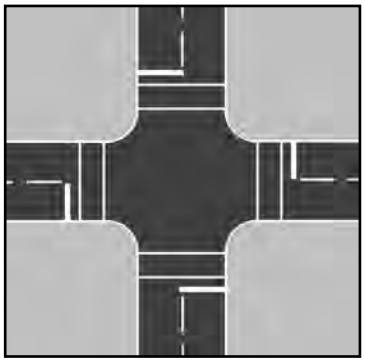
What Does Geometry Influence?

- ❑ Driver perception
- ❑ Physical maneuvering space
- ❑ Stopping distance
- ❑ Driver field of view

4

Ideal Geometry

- Streets intersect at 90 degree angles
- Flat approach grade
- Legs aligned
- Appropriate radius on curbs
- Clear sight triangle



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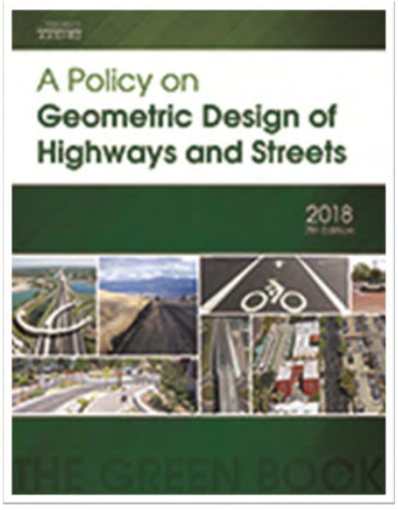
Geometry Resource

- AASHTO – ***A Policy On Geometric Design Of Highways and Streets***
- Also referred to as “The Green Book”



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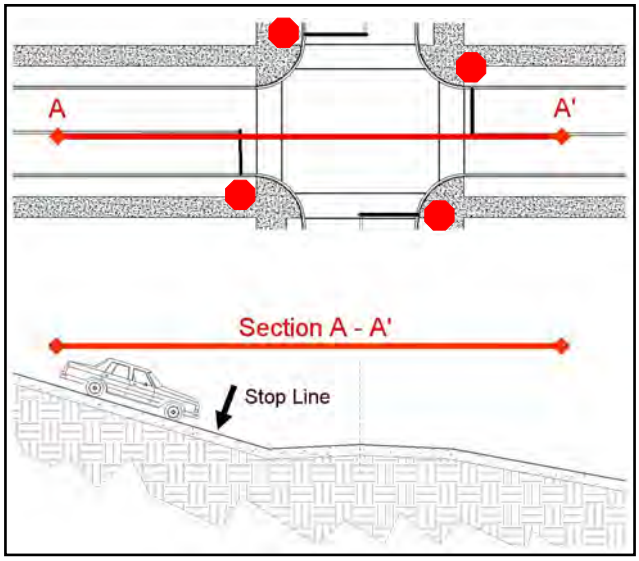
Stopping Grade



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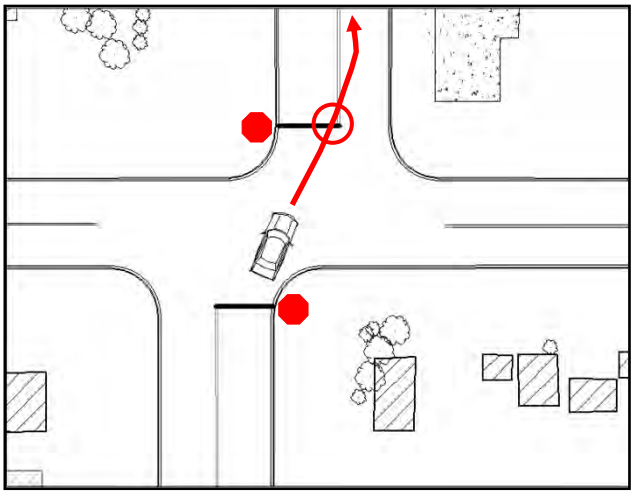
Stopping Grade

8

Stopping Grade

9

Legs Not Aligned (Offset)



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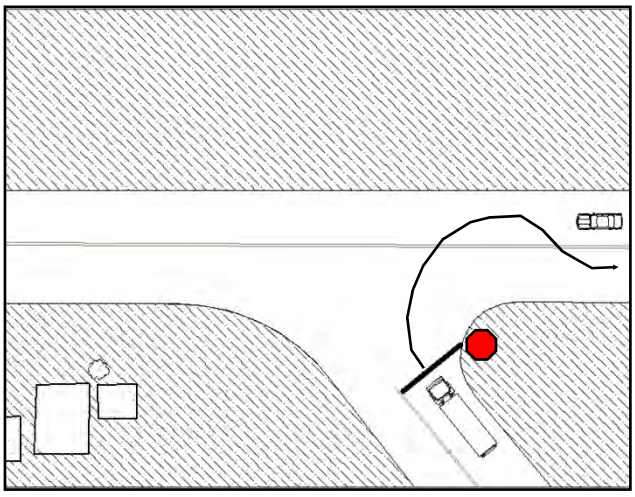
Legs Not Aligned (Offset)

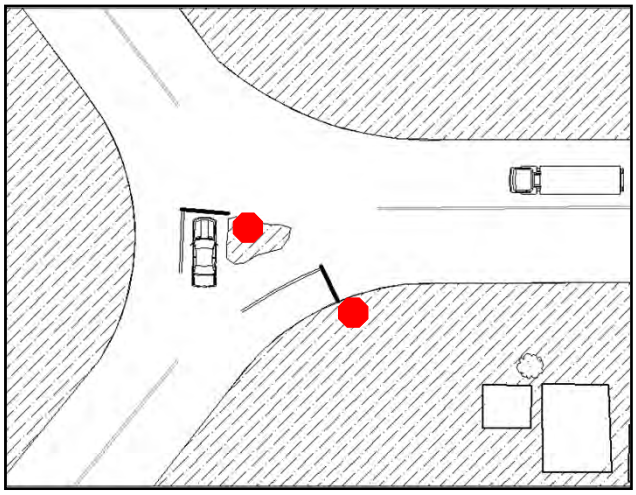
11

Low Degree Intersection (Skew)



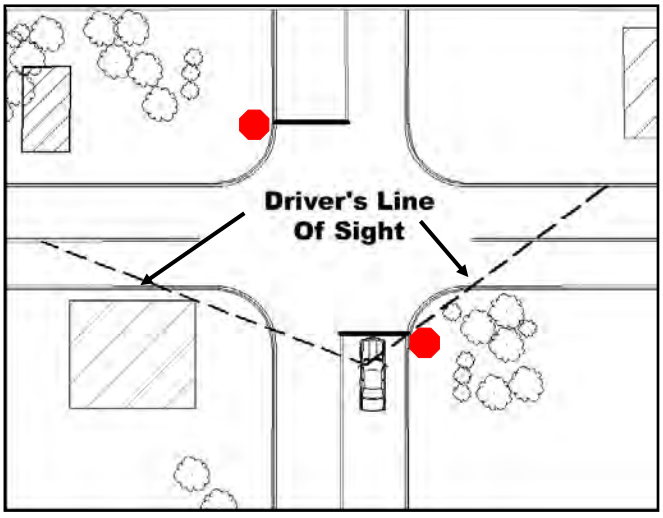
12

Legs Not Perpendicular



13

Clear Sight Triangle



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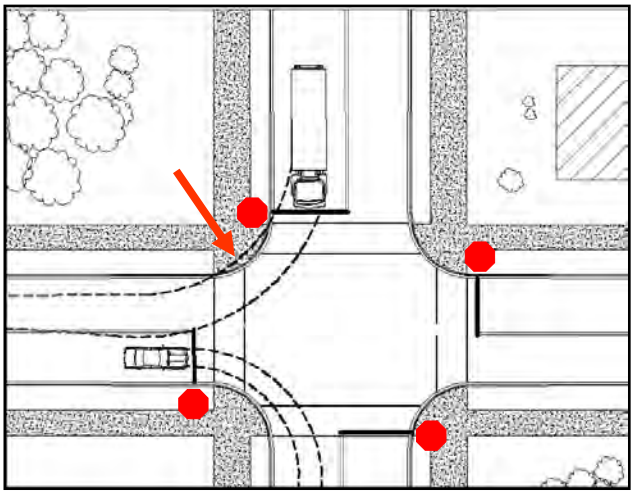
Curb Radius Too Small



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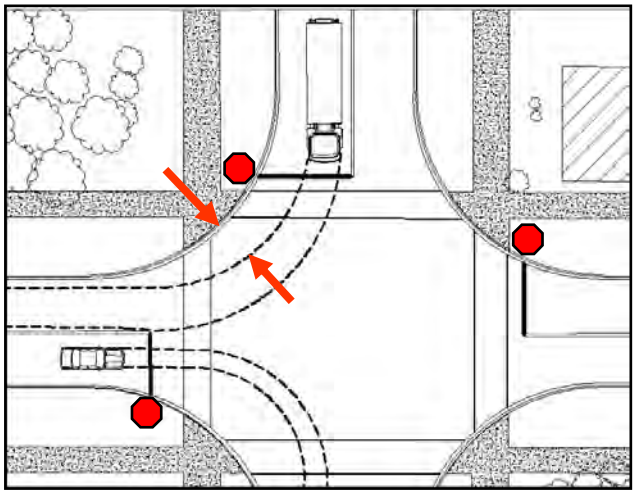
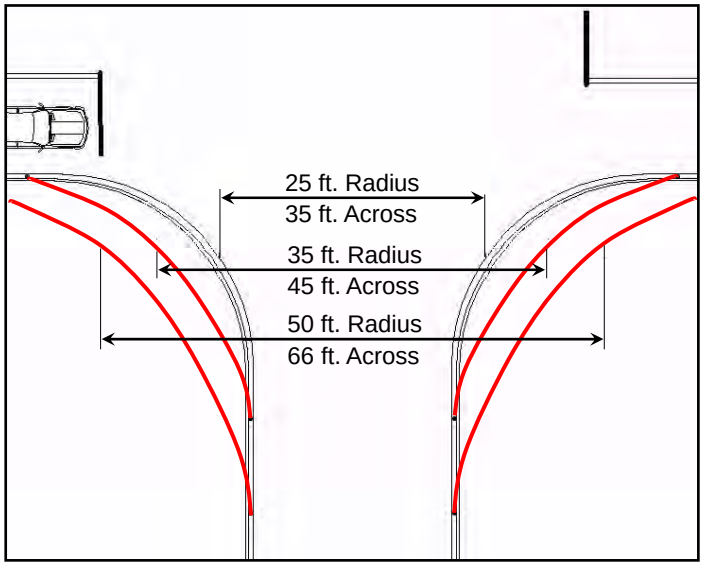
Curb Radius Too Large



16

Walking Distance



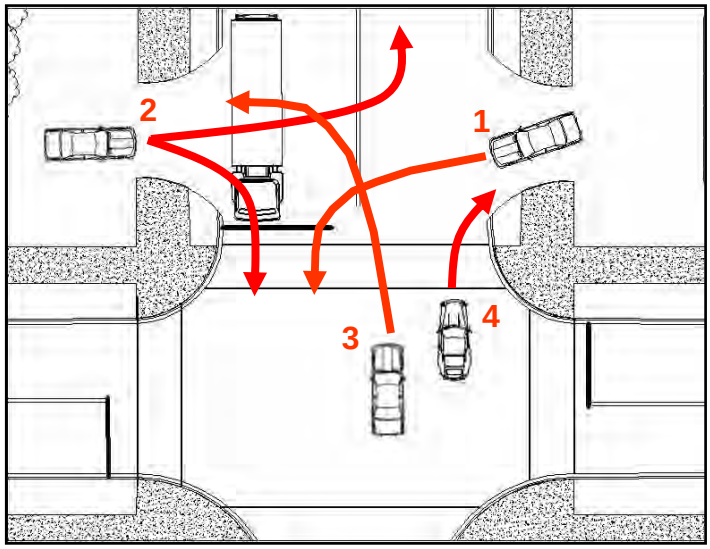
17

Access Management

- Driveways have higher crash rates than other intersections
- Driveways should be as far away from the intersection as possible
- Driveways should be of limited width
- Connect driveways with frontage roads

18

Access Management Problems



19

Fixing Geometric Problems

- Generally high cost fixes
- Identify areas geometrically lacking
- Capture safety funding if hazards exist
- Combine with other projects

20

21

22

Make a Difference: Ask Questions

There's always an opportunity to make a difference.

Michael Dell

23

Common Sense Solutions for Intersection Safety Problems

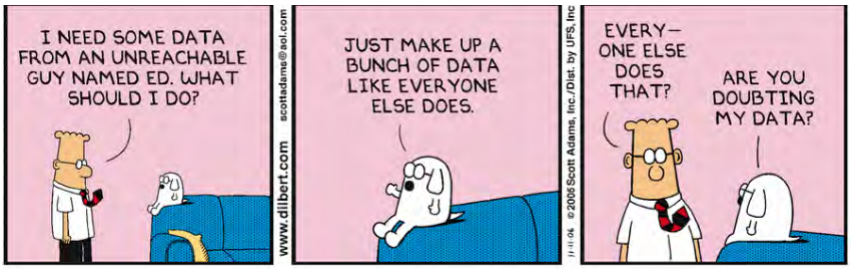
It's Your Intersection, It's Your Crash Data

1

Education Goals

- Understand the most important pieces of data that a traffic engineer needs to perform a crash analysis.
- Understand how to improve the integrity of the data collected.
- Understand how analyzing crash data using statistics can be misleading.

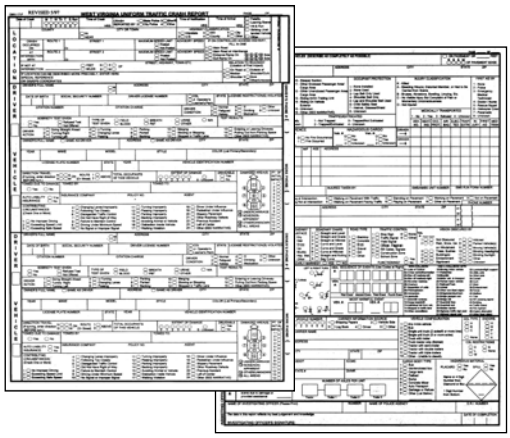
2



3

Where do we Get Crash Data?

- Police officer collection
- Standardized data form
- Drivers, after the fact

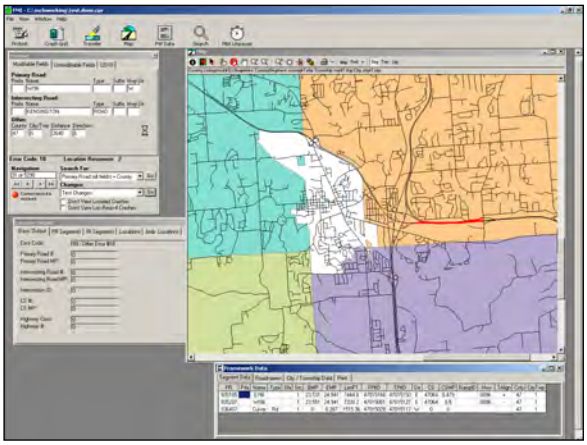


Form: DMV17F

4

Crash Location and Processing

- On site data form
- Street-based location method
- Centralized data processing



5

Crash Report Summaries

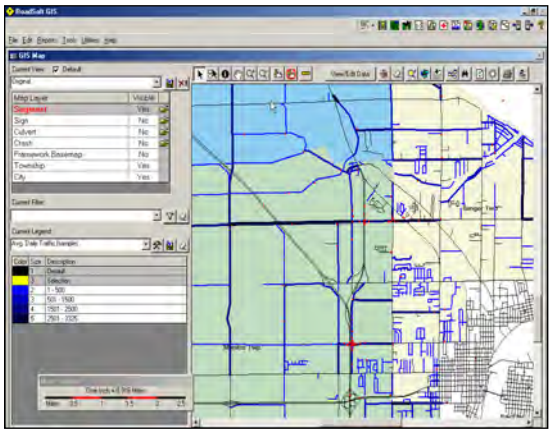
- Local reports
- State reports
- National reports

6

Agency Level Crash Analysis

For Crash Analysis You Need:

- ❑ Detailed crash location data
- ❑ Detailed crash cause & type data



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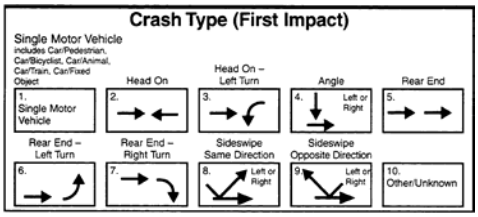
Critical Crash Analysis Data



- ❑ The type of crash
- ❑ The cause of crash
- ❑ The location of the crash:
  - What street did it occur on?
  - Where on the street did it occur?
- ❑ Severity of the crash (fatalities and Injuries)
- ❑ Vehicle direction of travel

8

Crash Data Accuracy

Massachusetts Study

- <3% of crash reports were error free
- Up to 30% – 40% unlocatable
- 14% collision conditions error
- Collision diagrams 14% error

9

Crash Data Accuracy

Michigan Study

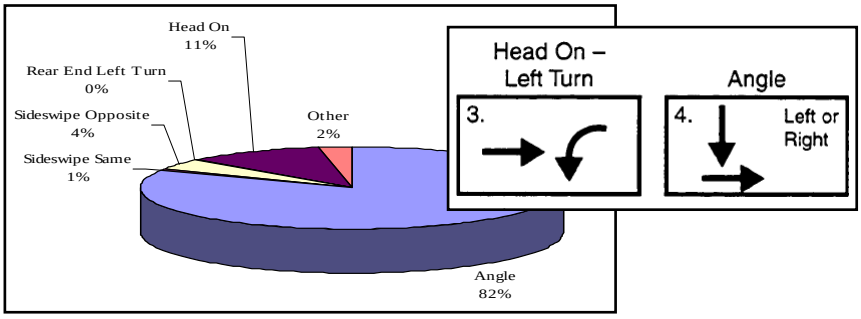
- 30% of crashes fail to locate (computer location)
- Those 30% (120,000) need manual entry
- Manual entry is done months after the crash occurred

10

Crash Data Accuracy

Wayne State University - Michigan Study

- 24% of all crashes reported as incorrect type
- Left turn-head on crashes under reported by 57%
- Angle crashes over reported by 25%



From Investigation of the Quality of Traffic Crash Data in Michigan – Wayne State University

11

How Can we Improve the Data?

- Education—Many officers think the form is only for insurance purposes
- Provide officers GPS for recording crash locations
- Minimize hand data entry
- Use interactive computer driven forms

12

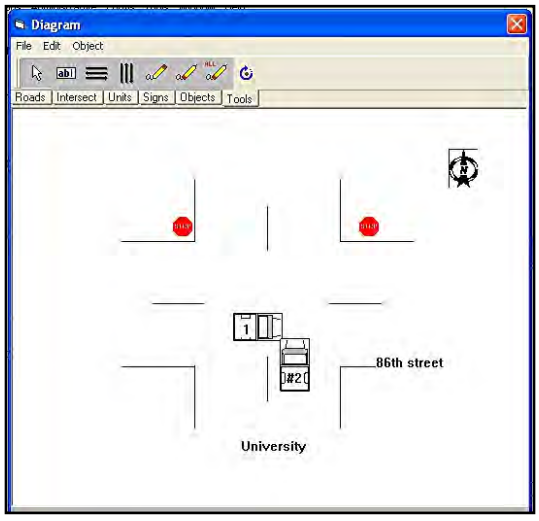
Better Crash Location

Traffic and Criminal Software (TraCS)

- In-car GPS location of crashes
- Barcode scan of license and registration
- Ability to take pictures with in-car scanner
- Computerized crash report verifies data fields

13

TraCS Screenshots



14

Which is a Safer Pet: A Dog or an Alligator?

Dogs

- 4.7 million attacks/year
- 800,000 attacks/ year require medical treatment
- 1979-1996 304 fatalities

Alligators

- 7.8 attacks/year
- 1948-1999, 248 attacks
- 1948-1999, 9 fatalities

15

What if we Correct for Their Difference in Population?

Dogs

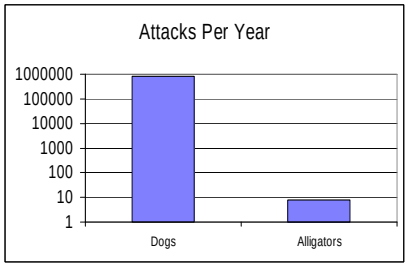
- 52 million dogs in U.S.
- 15 attacks/year/1000
- 0.33 fatalities/year/million

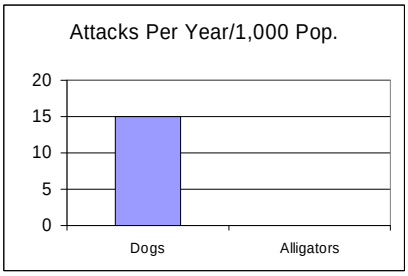
Alligators

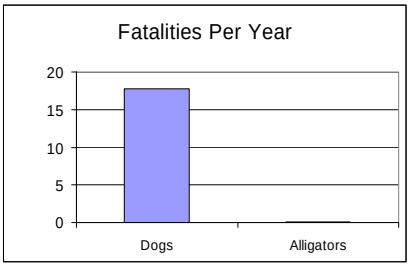
- 1 million alligators in U.S.
- 0.008 attacks/year/1000
- 0.17 fatalities/year/million

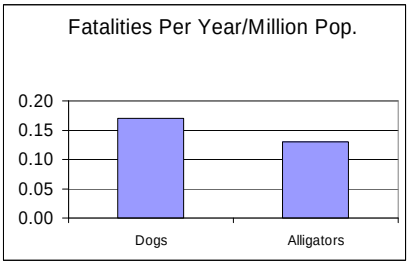
16

Graphical Summary of the Data









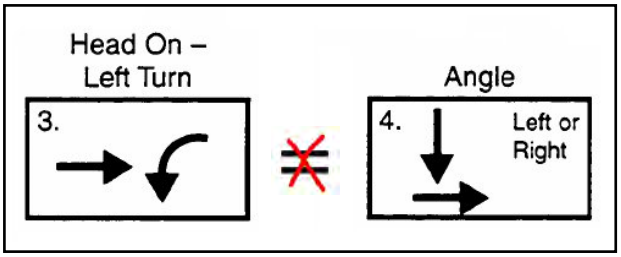
17

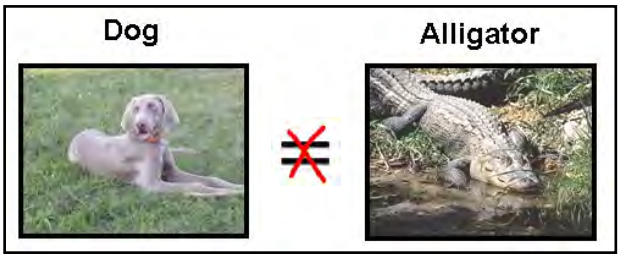
What's the Point?

- The raw data doesn't tell the whole story
- If you don't understand the data you are likely to arrive at the wrong conclusion
- Exposure is an important consideration
- The data trend is a great place to start further evaluation; but it is never the final answer

18

Be Careful with the Data!





19

Just Look in the News

From the CNN Website

Thursday, June 19, 2003 Posted: 4:42 PM EDT (2042 GMT)

Gators blamed for some 10 fatalities in 55 years

Statistics show that dogs lead in attacks on people

While Wednesday's fatal attack on a 12-year-old boy in central Florida has thrown a spotlight on alligators, several animals are known to take human lives at a higher rate than those swimming reptiles.

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Just for Fun:
A Real Public Health Hazard!

- 44,000 people injured installing or using them every year
- They are in almost every household and workplace
- Most people are exposed to them daily
- The Government regulates them strictly
- Countless number of illegal non-conforming units are smuggled into the U.S. every year

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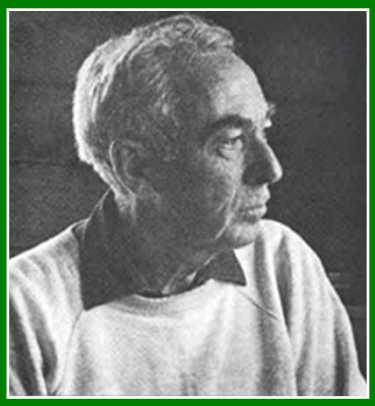
Understand Your World: Ask a Question

I arise in the morning torn between a desire to improve the world and a desire to enjoy the world. This makes it hard to plan the day.

E.B. White



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Common Sense Solutions for Intersection Safety Problems

Red Light Running – Is it Your Fault or Theirs?

1

Education Goals

- Understand the factors that contribute to red light running.
- Understand the differences between unintentional and intentional red light running violations.
- Understand countermeasures that can be used to correct intentional and unintentional red light running violations.

2

What is Red Light Running?

3

Red Light Running Resources

- Institute of Traffic Engineers (ITE)
- FHWA Web site http://safety.fhwa.dot.gov/programs/srlr.htm

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Red Light Running Statistics

- In urban areas RLR are the most common crash type

  (about 20% of crashes at signalized urban intersections)
- Violation frequencies range 1 per 9 hr. to 1 per 3.5 min.
- Nationally 46% of RLR crashes result in injury
- Signalized intersection fatalities – 40% RLR related
- Economic impact of RLR estimated at $14 billion annually

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Who is the Typical Red Light Runner?

Old Dominion University Study:

- Younger drivers
- People without children
- Alone in the car
- Employed in less skilled jobs or unemployed
- Rushing to school or work during the week day
- More likely to have had a prior RLR offense

6

Factors Contributing to RLR

- Traffic volume
  - more vehicles = more RLR
- Frequency of signal cycles
  - more cycles = more RLR
- Driver following distance
  - more tailgating = more RLR
- Approach grade
  - steeper approach = more RLR
- Yellow interval length
  - too short or too long = more RLR
- Poorly coordinated signals
  - more driver frustration = more RLR

7

Root Causes of RLR

Unintentional Violations

- Didn't see the signal
- Misidentified the signal color
- Couldn't stop in time
- Confusion over the signal indication

Intentional Violations

- Tried to "beat" the yellow
- Intentional disregard of signal

8

RLR Countermeasures
Unintentional Violation

Improve Signal Visibility

- ❑ Line of sight
- ❑ Number of signal heads
- ❑ LED lamps
- ❑ Size and number of signal lenses
- ❑ Backer plates and visors

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Multiple Signal Heads

Photo By Mark O'Niel

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Larger Red Lens

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Multiple Signal Lenses

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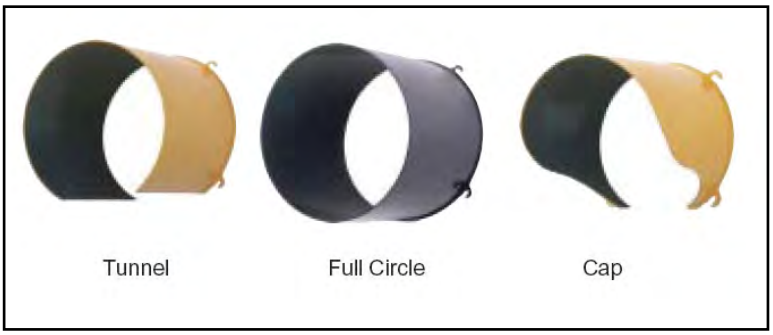
Signal Visors



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Backer Plates

14

RLR Countermeasures
Unintentional Violation

Improve Stopping Conditions

- ❑ Reduce approach grade
- ❑ Improve pavement surface condition
- ❑ Remove the need to stop
- ❑ Advanced warning signs / flashing beacons
- ❑ In-lane rumble strips on the approach

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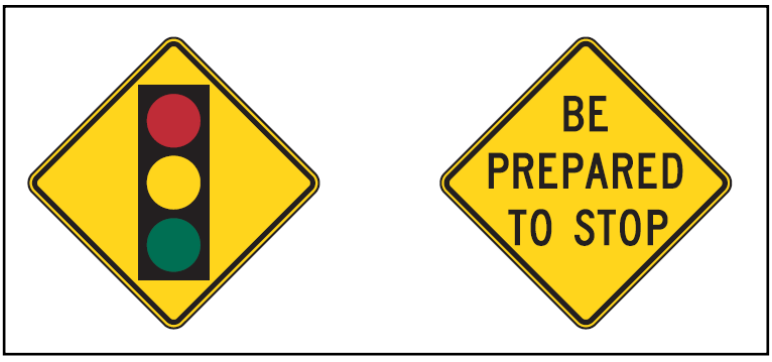
Advanced Warning Signs



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In-Lane Rumble Strips

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RLR Countermeasures Intentional Violation

Signal Timing Improvements

- ❑ Signal coordination
- ❑ Signal cycle length
- ❑ Yellow phase

Education

- ❑ Training, public outreach

Enforcement

- ❑ Indicator lights
- ❑ Team enforcement approach
- ❑ Automated cameras

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Automated Camera Enforcement

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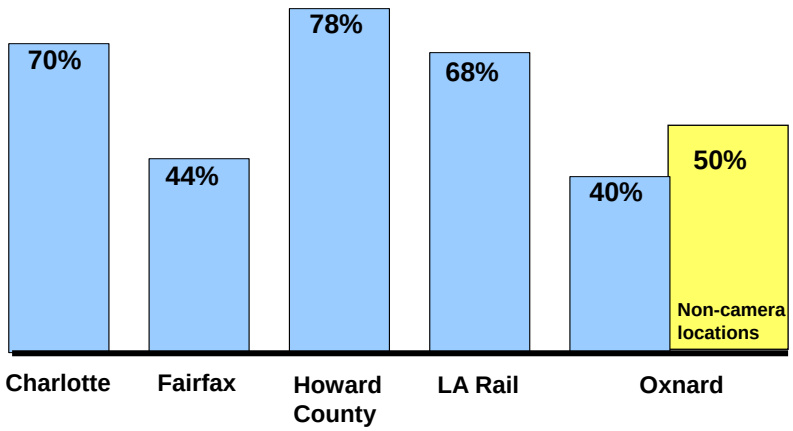
Reduction In RLR Violations After Camera Installation



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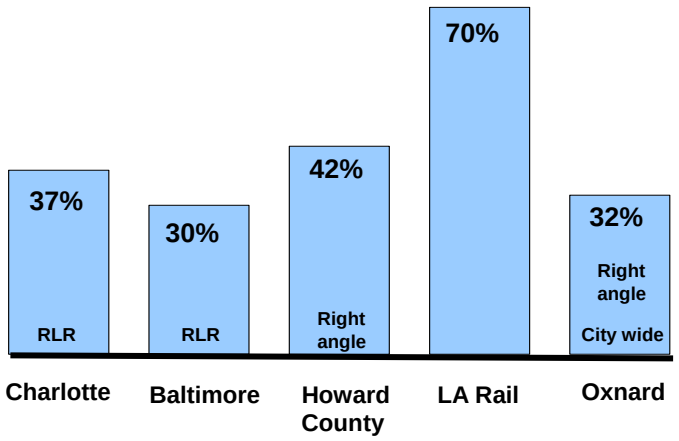
Reduction In Crashes After RLR Cameras Installation



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Issues With Automated Enforcement Cameras

Positive

- ❑ Low cost per ticket ratio
- ❑ No officer exposure
- ❑ Have high conviction and ticket payment rates
- ❑ Shown to reduce RLR incidences

Negative

- ❑ Opposed by privacy advocacy groups
- ❑ Not currently legal in many states
- ❑ Can be viewed as a revenue generator

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Just for Fun

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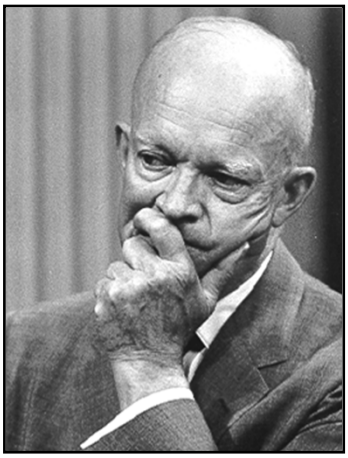
Ask Questions, Get Answers

An intellectual is a man who takes more words than necessary to tell more than he knows.

Dwight D. Eisenhower



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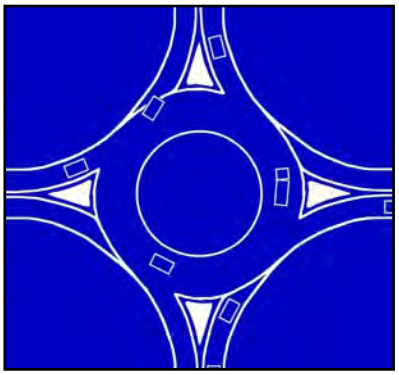
Common Sense Solutions for Intersection Safety Problems

Roundabouts – Take a Deep Breath, Don't Panic



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Education Goals

- Understand the operational rules of roundabouts that make them more efficient than cross intersections.
- Understand common arguments used to oppose roundabouts.
- Understand characteristics of an intersection that indicate whether or not a roundabout would be a good solution.

2

Rounda-What?

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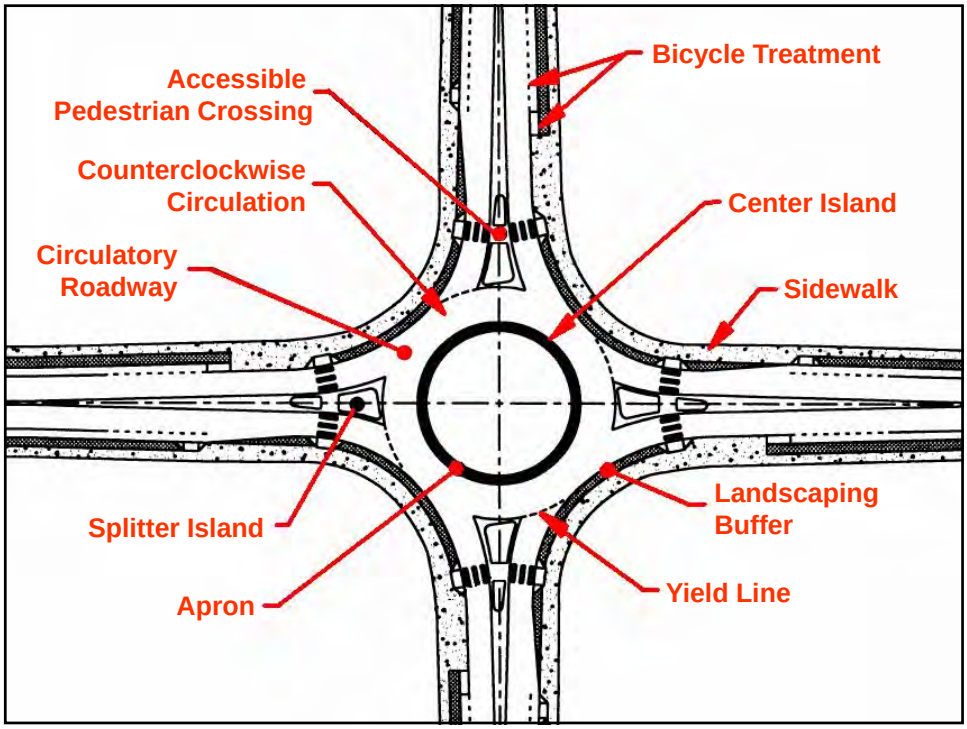

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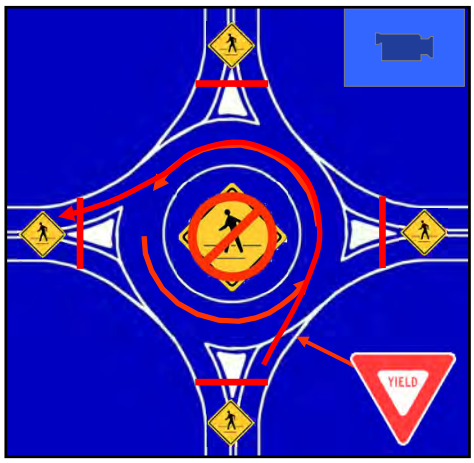
How Do They Work?

- Counterclockwise rotation
- Yield before entering
- Circulate until desired exit is reached
- Pedestrians are not allowed; they cross at approaches



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Why Do They Work?

- Drivers don't need to stop unnecessarily
- Average speed is very low (15 - 20 mph)
- Left turn volume does not greatly impact operation
- All traffic movement given equal priority
- Traffic queues move continuously

7

A Roundabout in Action

Kansas State University Center for Transportation Research

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Before A Roundabout

Video courtesy of DLZ Michigan

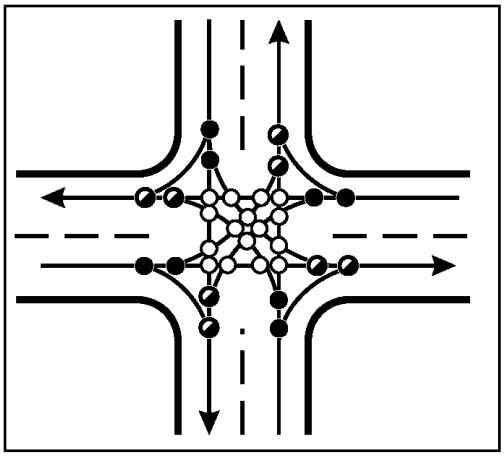
9

After A Roundabout

Video courtesy of DLZ Michigan

10

Cross Intersection Conflict Points



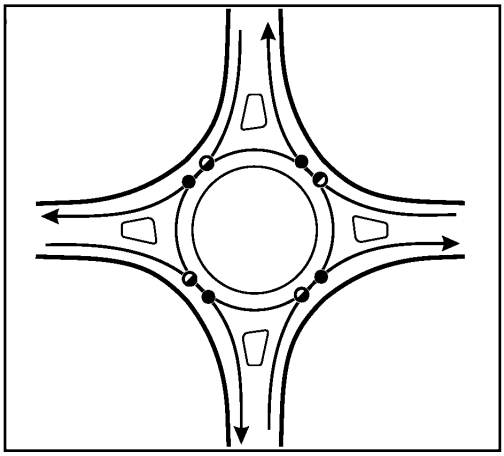
- Diverging
- Merging
- Crossing

32 Vehicle Conflict Points

12 Ped. Conflicts Points

11

Roundabout Conflict Points



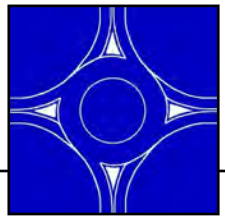
- Diverging
- Merging
- Crossing

8 Vehicle Conflict Points

8 Ped. Conflicts Points

12

Roundabout vs. Traffic Signal



Roundabout

Cost: $300 K to $500K

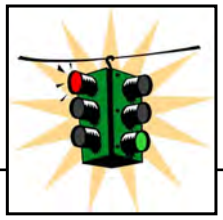
Speed: 20 mph

Safety:
29% to 50% fewer crashes
30 to 73% fewer injury crashes

Delay: Shorter

Space Required: More

Initial opposition: Can be fierce



Traffic Signal

Cost: $125K to 250K + O&M

Speed: 35 mph +

Safety: Less

Delay: Longer

Space Required: Less

Initial opposition: Acceptable

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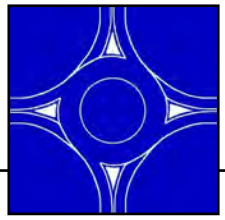
Roundabout vs. Rotary



Roundabout

Size: 100’ to 200’ dia.

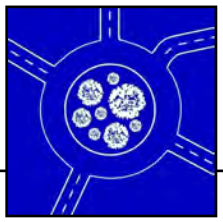
Speed: 20 mph

Crashes: Less frequent

Traffic Control: Yield to enter

Center Island: No pedestrians; low vegetation only

Parking: Not allowed in circle



Rotary

Size: 400’ dia and up

Speed: 35 mph +

Crashes: More frequent

Traffic Control: Circle yields

Center Island: Open to pedestrians and trees

Parking: Allowed in circle

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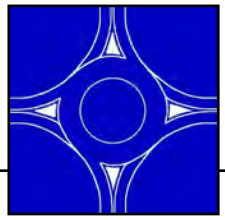
Roundabout vs. Traffic Circle



Roundabout

Size: 100’ to 200’ dia.

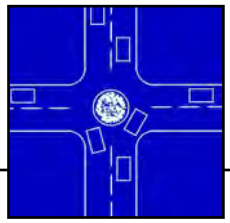
Speed: 20 mph

Application: Traffic control, safety

Application: Mid to high volume

Space Required: More

Large Vehicles: Yes



Traffic Circle

Size: 10’ to 50’ dia.

Speed: 10% less than standard intersection

Application: Traffic calming

Application: Low volume only

Space Required: Standard

Large Vehicles: Can be limited

15

Applications: Before

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Application: After

17

Opposition: How Bad Can It Get?

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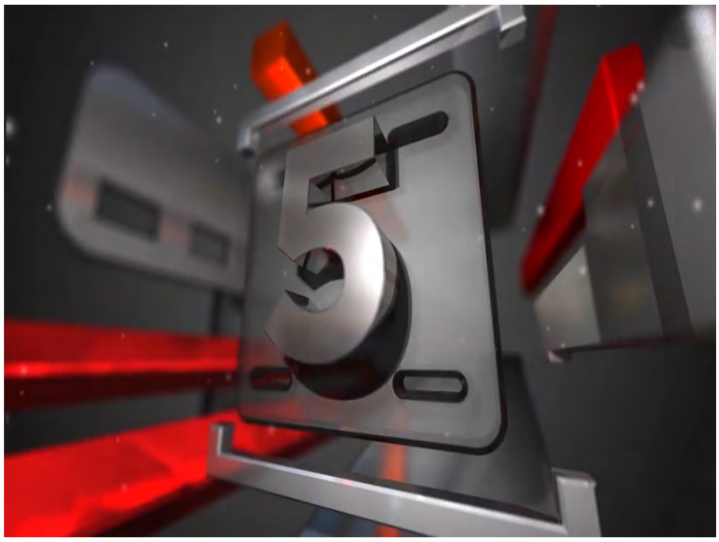
Why?



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Case Study in Opposition

TRAVERSE CITY RECORD EAGLE ONLINE EDITION
NORTHERN MICHIGAN'S NEWSPAPER

Excerpts from the Traverse City Record-Eagle

“I was wondering what the city planners are thinking “

"These people can’t drive, and now you want them to negotiate a circle"

“A recall effort against the city commission for its decision to build a traffic roundabout at the intersection of Eighth and Woodmere stalled on Friday - but not for very long. Supporters filed a new recall petition minutes after the other was rejected at a hearing ”

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Case Study in Opposition


Metro and State news
Milwaukee
Packers' new home: Cozy, efficient
Page 2
Santa's parade needs help
Page 3
THURSDAY, OCTOBER 19, 2000 B MILWAUKEE JOURNAL SENTINEL

Brookfield WI

"We're not stupid people. Those of us who have never driven on a roundabout can learn how to do it; we just don't want to."

“This project is not Brookfield's roundabout - it is Brookfield's folly!”

“You have to be a fighter pilot to get on one and a kamikaze pilot to get off.”

21

Opposition Becomes Support

National Cooperative
Highway Research Program
NCHRP

Opinion Study

Prior to Construction
68% of the responses negative or very negative

After Construction
73% of the responses positive or very positive

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Ingham County Road Commission

23

Opposition: Large Trucks

24

Opposition: Snow Plowing

25

Opposition: Fire Truck Access

John Gallic: Assistant Fire Chief, Town of Vail, CO

Experience with roundabouts:

- They are an improvement over stop signs or signals.
- Response times were reduced.
- Drivers do not stop in the circulating roadway when an emergency vehicle approaches (with siren). or can be coaxed.
- All of the fire department's equipment can negotiate the roundabouts, including the large ladder trucks.

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Vail, CO Roundabout

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Roundabout: When To Use Them?

Good Application

- ❑ Intersections with high crash severity or frequency
- ❑ Heavy left turn lane volume
- ❑ Intersections that would qualify for a signal

Concerns

- ❑ High volume of large truck traffic (Industrial park entrance)
- ❑ Limited right of way space
- ❑ Routinely congested area (network wide)
- ❑ High traffic volume with a coordinated signal network
- ❑ High volume of pedestrians and traffic

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Please Ask Questions

One who asks a question may appear a fool for five minutes; one who does not ask a question remains a fool forever

Chinese Proverb

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ROADS SCHOLAR I (RS I) & ROADS SCHOLAR II (RS II) PROGRAMS

ltap West Virginia

WV Local Technical Assistance Program

The Roads Scholar I program is designed for local and state level transportation personnel to expand their knowledge and improve their skills in roadway maintenance and management techniques. This is a great way for road-way agencies to keep their employees properly trained and educated on efficient and safe roadway management practices! There is little to no cost to participants and sessions occur at various locations throughout the state.

The Roads Scholar II program is designed for local, state, and private sector transportation employees in higher-level supervisory and management positions. Elected officials, engineers, planners, consultants, and contractors are a few of the individuals who will benefit from this program. There is little to no cost to participants and sessions occur at various locations throughout the state.

Graduation Requirements and Completion Awards

- To become either a RS I graduate, or a RS II gradate, each participant must take a total of 8 classes in the respective program. These classes must be completed in a 5 year period, with exceptions made if class offerings have not been available.
- Participants are automatically enrolled in the Roads Scholar Programs. There is no need to do any extra paperwork, other than submitting the typically requested registration information.
- Each RS I graduate receives a framed certificate, an orange and white traffic barrel shaped mug, and a baseball cap.
- Each RS II graduate receives a framed certificate and a leather bound embossed pad-folio.

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