Enhancing Road Safety through the Improvement of Unsignalized Intersections

National Association of Counties

April 6, 2016

Stronger Counties. **Stronger America.**

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Enhancing Road Safety through the Improvement of Unsignalized Intersections

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Today's Speakers

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Senior Transportation Engineer
VHB

National Association of Counties Webinar

April 6, 2016

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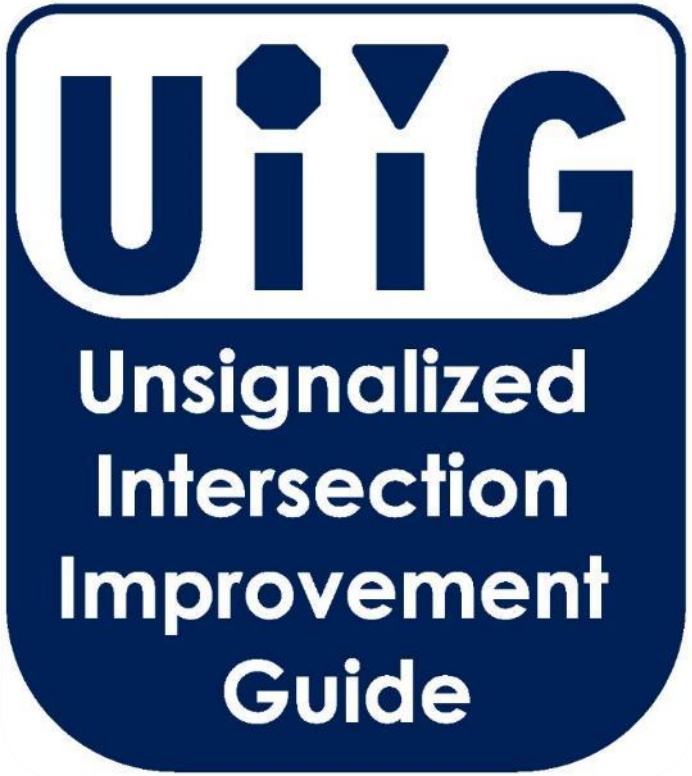
FHWA Office of Safety

Jonathan Soika, PE

VHB



Overview

- The UIIG story
- UIIG information
- UIIG toolkit
- Using the UIIG
- Q & A

The UIIG Story

NCHRP Project 03-104

- Problem statement:
  - Develop **comprehensive guide** to enhance **safe operation for all users** of unsignalized intersections
  - Should be practical and multimodal and aid practitioners in selecting **design, operational, maintenance, enforcement, and other types of treatments** to improve **safety, mobility, and accessibility**

Our take: develop a PROBLEM-SOLVING guide

Diverse collaborators

NCHRP Oversight Panel

- Municipal
- State DOT
- Academia
- Law Enforcement

Technical Advisory Group

- LTAP
- USDOT
- Consultants

UIIG project team

vhb

LEE ENGINEERING

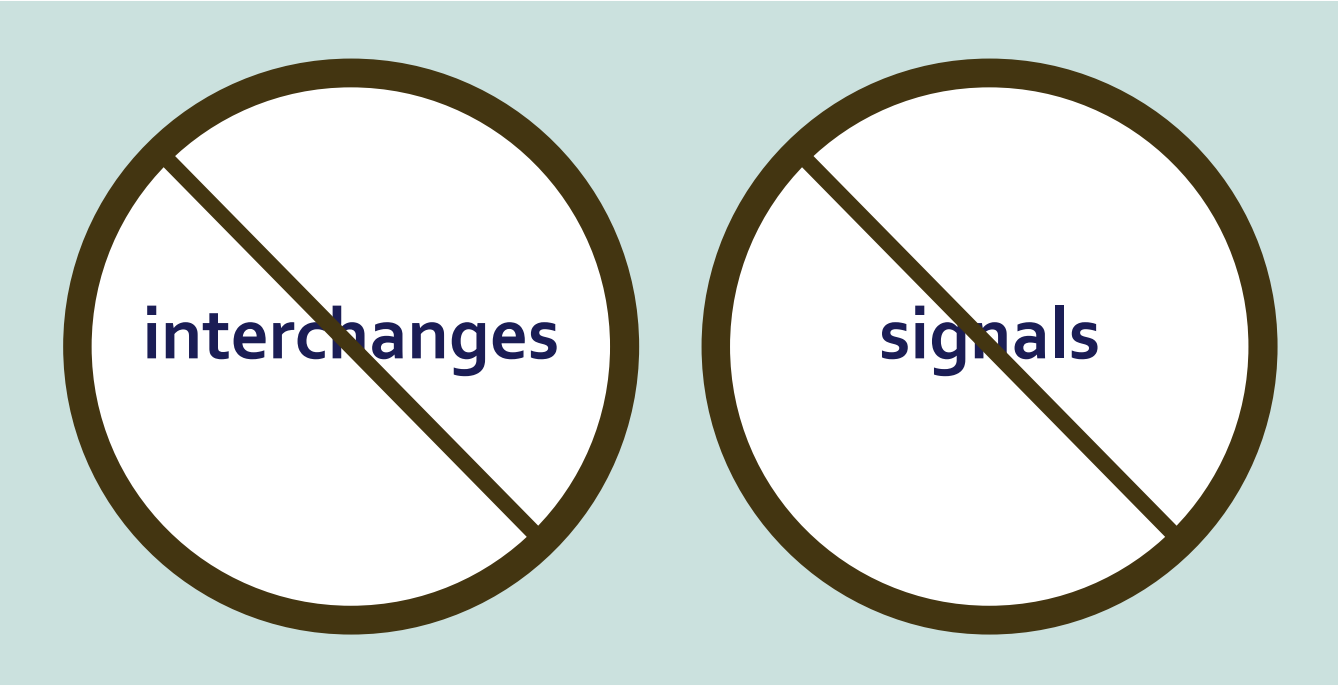
ite

- Independent consultants:
  - *Tony Giancola*
  - *Capt. Glenn Hansen*
  - *Frank Spielberg*

UIIG

What is an *unsignalized intersection?*

- Any at-grade junction of two or more public roads whose traffic movements are not controlled by a traffic signal



Why the UIIG

2010 - 2012

21K

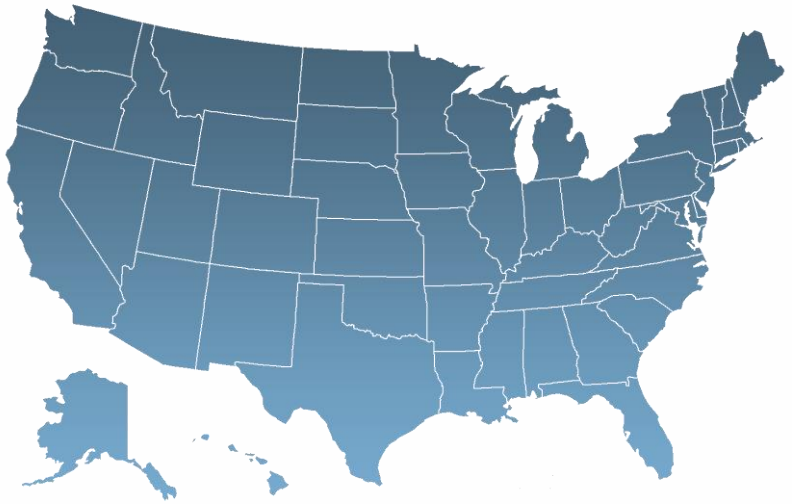
fatal intersection crashes

7 of 10

w/o traffic signal

Majority

locally-maintained



Many agencies lack professional transportation engineers

Target audience of UIIG

PRIMARY

- Local road-owning agencies
  - Majority of unsignalized intersections under their control
  - Especially useful to those without transportation engineers on staff

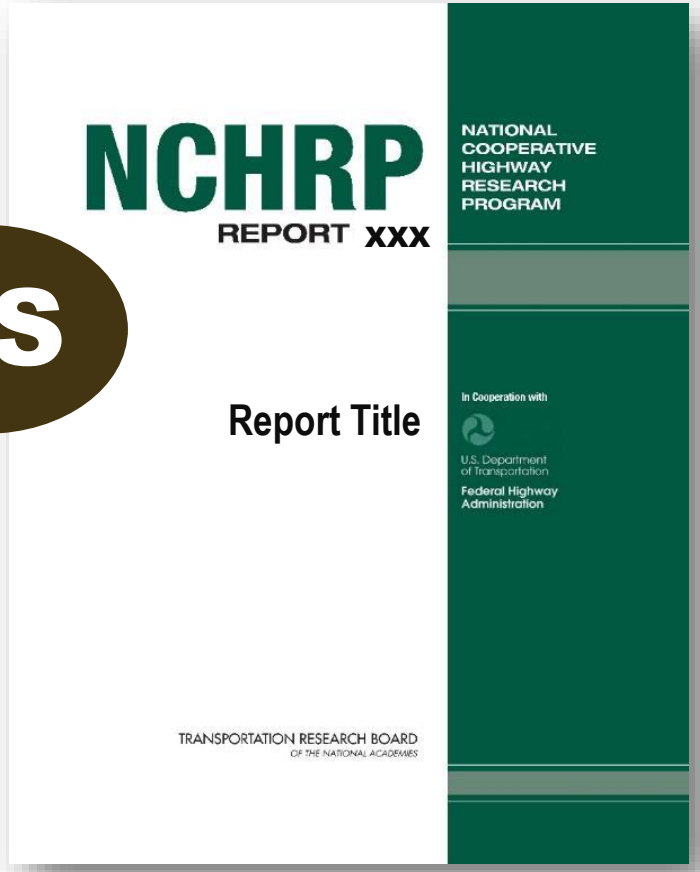
SECONDARY

- State DOTs, large local agencies, consultants
  - Comprehensive nature
  - Provides references on variety of intersection-related topics
  - Valuable resource for individuals without safety training

UIIG format—deviating from the norm

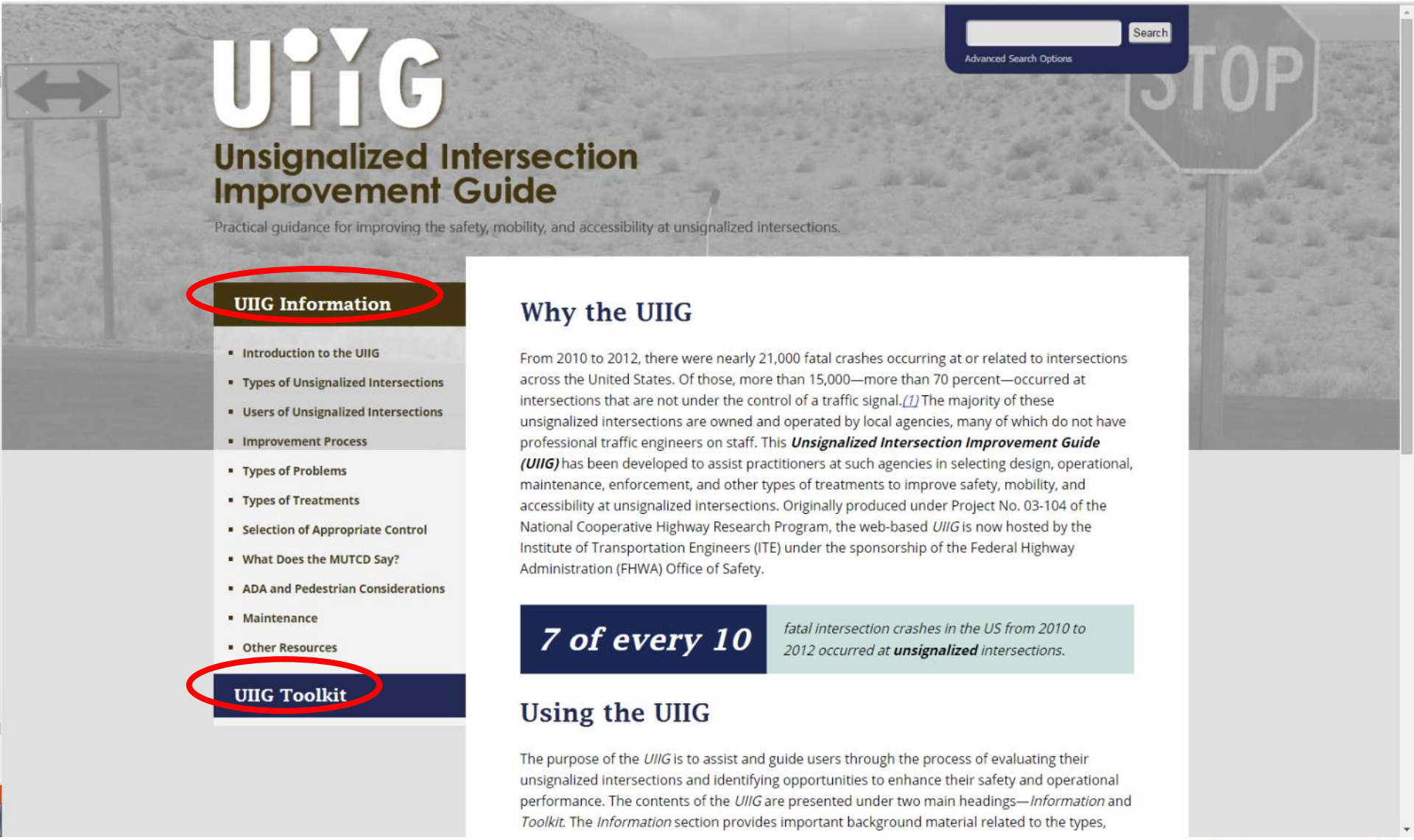
- Continuous revisions
- User interaction
- Hyperlinks to other sources
- Internet-based innovations
- Downloadable tools

VS



- Keeps papers from blowing off desk

UIIG Structure—2 main sections



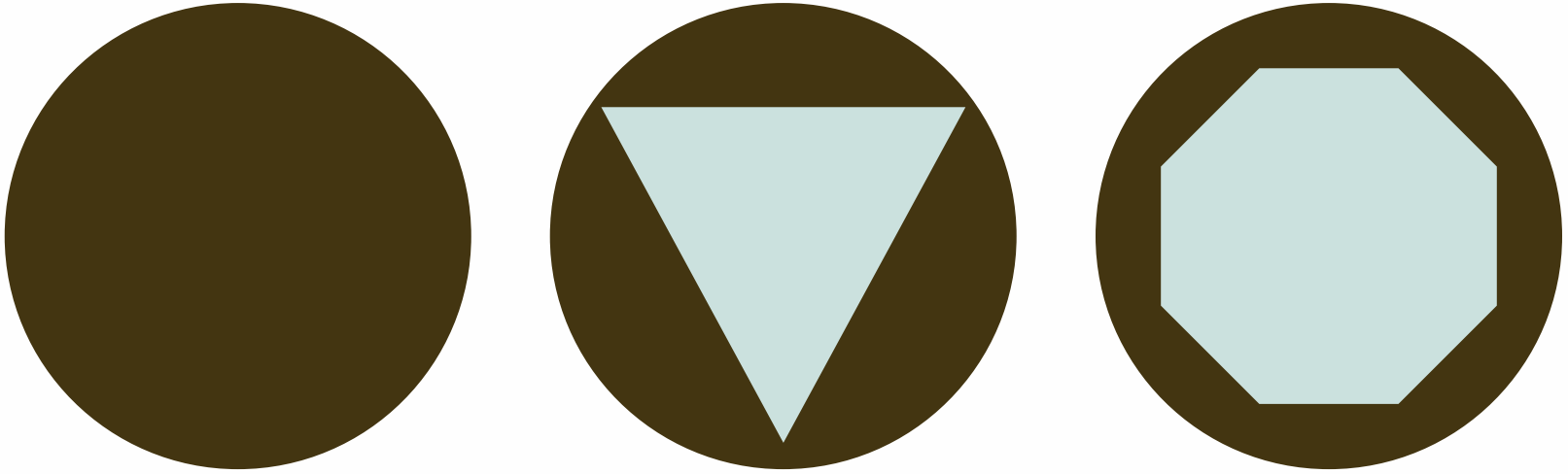
UIIG Information

UIIG Information

- Background technical content that is "static" but will change as necessary
- First-time UIIG users should become familiar with content
- Relies heavily on links to primary resources that provide further details

Types of unsignalized intersections

- Primary typology → **traffic control**



Uncontrolled **YIELD** **STOP**

- Also touches on **traditional v. nontraditional**

Users of unsignalized intersections

Motor Vehicle Operators

- Compose largest user group at most intersections
- Vehicle characteristics must be considered
- Majority of UIIG treatments target drivers

Bicyclists

- Bicycle travel on the rise in U.S.
- Must adhere to rules of road when riding on it
- Skill & experience vary widely
- Vulnerable users

Pedestrians

- Skill & experience vary
- Surrounding land use affects nos. and demographics
- Kids, seniors, persons w/ disabilities are often of particular concern
- Vulnerable users

UIIG

Intersection improvement process

Identify problem intersection(s)

Analyze location(s) to quantify & characterize problem

Identify potential treatments that may address problem

Select/implement cost-effective treatment(s)

Monitor over time & evaluate treatment's effectiveness

Types of problems at unsignalized ints.

- UIIG describes 10:
  1) Inappropriate traffic control
  2) Inadequate visibility of the intersection
  3) Inadequate sight distance from the intersection
  4) Inadequate guidance for motorists
  5) Excessive intersection conflicts
  6) Vehicle conflicts with non-motorists
  7) Poor operational performance
  8) Misjudgment of gaps in traffic
  9) Speeding
  10) Non-compliance with traffic control devices

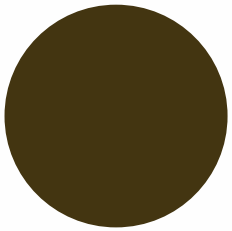
Types of treatments

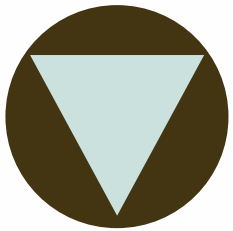
- UIIG's mission:
  - Assist in determining appropriate treatments to improve **safety, operations, and access** at unsignalized intersections

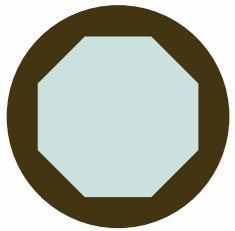
- **Balanced approach** → 3 E's
- 75 treatments described by 1-page fact sheets

Selecting appropriate control

- MUTCD → control selection is engineering judgment



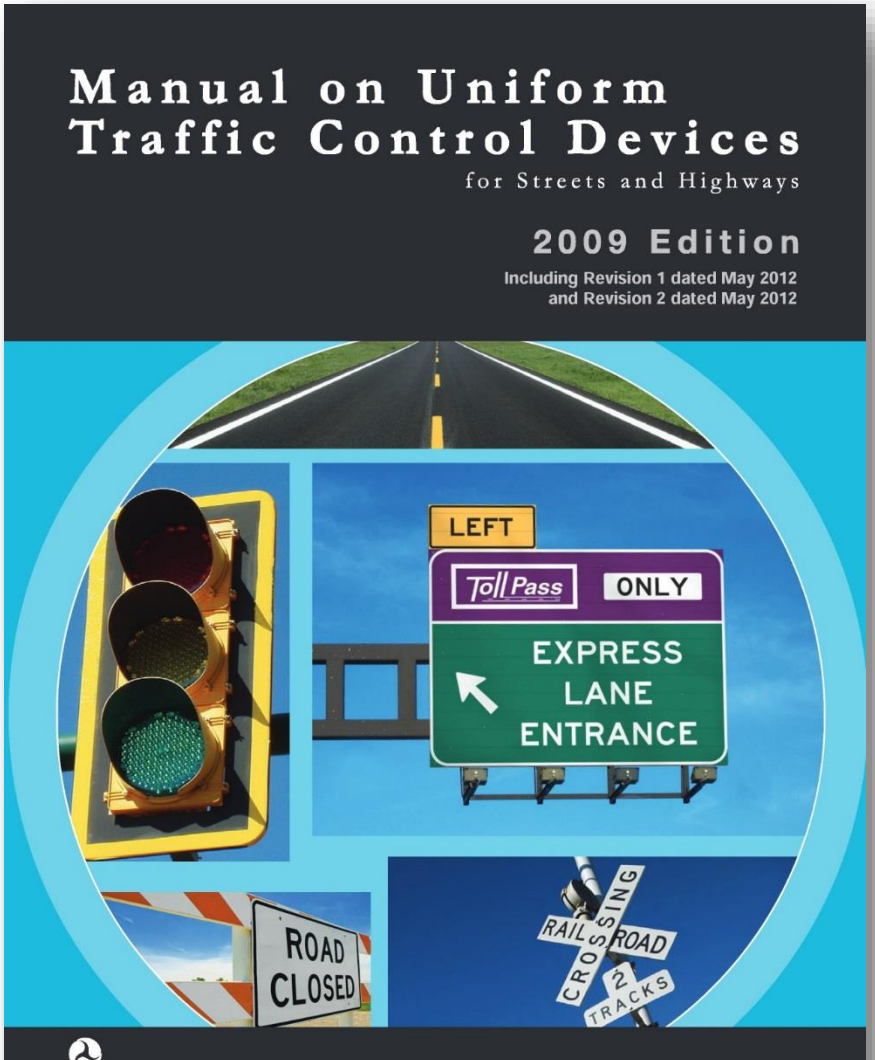




- References & links to ***MUTCD*** and ***Uniform Vehicle Code***
- Brief discussion of roundabouts and other circular intersections

What does the MUTCD say?

- Highlights TCDs specific to **unsignalized intersections**



MUTCD: Sign conspicuity enhancements

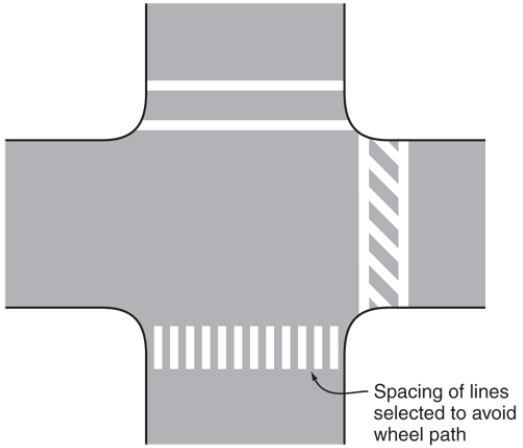
MUTCD: Pavement markings

- Longitudinal lines
  - Center, edge, and lane
- Stop & yield lines
- Word, arrow, and symbol markings
  - STOP (AHEAD)
  - YIELD (AHEAD)
  - RIGHT (LEFT) TURN ONLY
  - PED XING

MUTCD: Pedestrian TCDs

- Regulatory signs
- Crosswalk markings
- Pedestrian hybrid beacon
- Rectangular rapid flashing beacon

Figure 3B-19. Examples of Crosswalk Markings



ADA & pedestrian considerations

- Americans with Disabilities A
- Primary features:
  - Curb ramps
  - Pedestrian refuge islands
  - Crosswalk markings
  - Sidewalk

Other resources

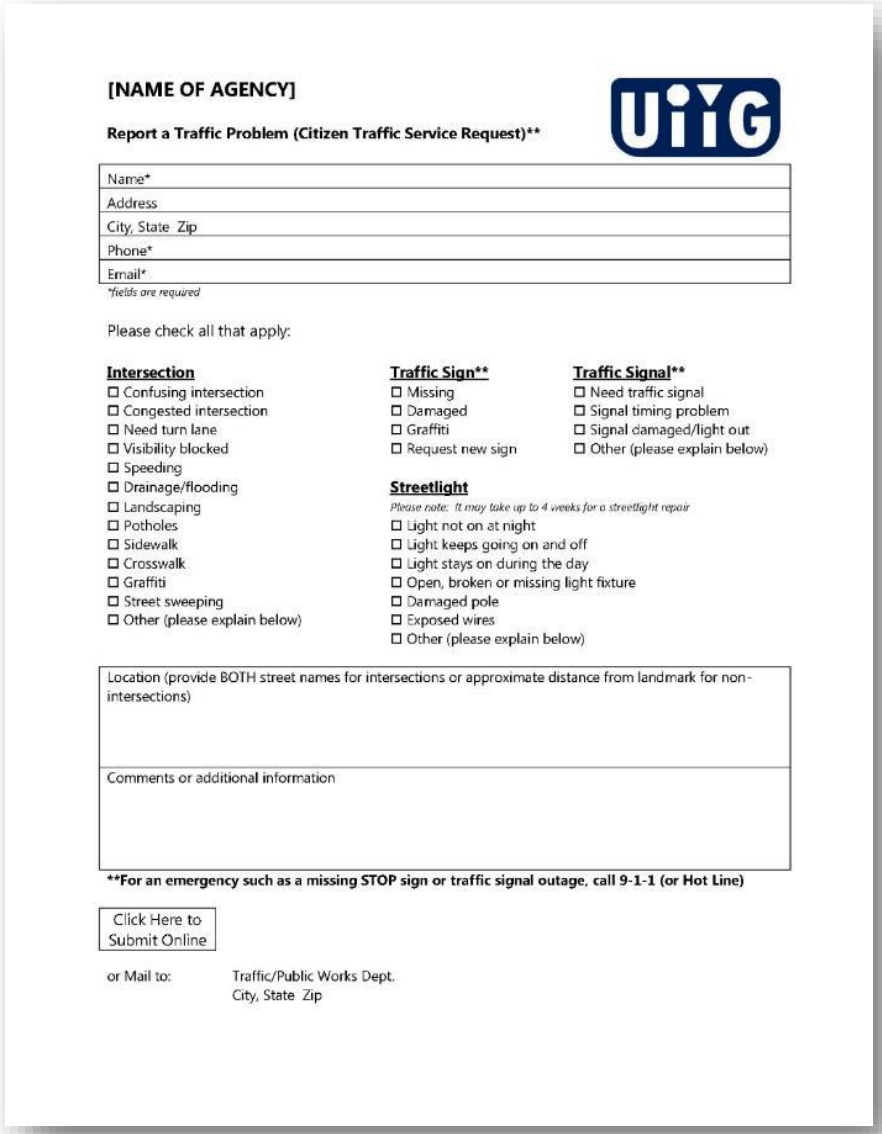
- UIIG was not scoped to summarize entire knowledgebase on topics related to unsignalized intersections
- Web format conducive to putting numerous resources at users' fingertips

UIIG Toolkit

UIIG Toolkit

- Developed to provide **applications and examples** related to enhancement of unsignalized intersections
- Focus on data and decision-making
- Three “tools”:
  - Citizen traffic service request form
  - Assessment and inventory form
  - Treatment selection tool

1. Citizen traffic service request form



[NAME OF AGENCY]

Report a Traffic Problem (Citizen Traffic Service Request)**

Name*
Address
City, State Zip
Phone*
Email*

**fields are required*

Please check all that apply:

Intersection
- ☐ Confusing intersection
- ☐ Congested intersection
- ☐ Need turn lane
- ☐ Visibility blocked
- ☐ Speeding
- ☐ Drainage/flooding
- ☐ Landscaping
- ☐ Potholes
- ☐ Sidewalk
- ☐ Crosswalk
- ☐ Graffiti
- ☐ Street sweeping
- ☐ Other (please explain below)

Traffic Sign**
- ☐ Missing
- ☐ Damaged
- ☐ Graffiti
- ☐ Request new sign

Traffic Signal**
- ☐ Need traffic signal
- ☐ Signal timing problem
- ☐ Signal damaged/light out
- ☐ Other (please explain below)

Streetlight

Please note: It may take up to 4 weeks for a streetlight repair
- ☐ Light not on at night
- ☐ Light keeps going on and off
- ☐ Light stays on during the day
- ☐ Open, broken or missing light fixture
- ☐ Damaged pole
- ☐ Exposed wires
- ☐ Other (please explain below)

Location (provide BOTH street names for intersections or approximate distance from landmark for non-intersections)
Comments or additional information

****For an emergency such as a missing STOP sign or traffic signal outage, call 9-1-1 (or Hot Line)**

Click Here to Submit Online

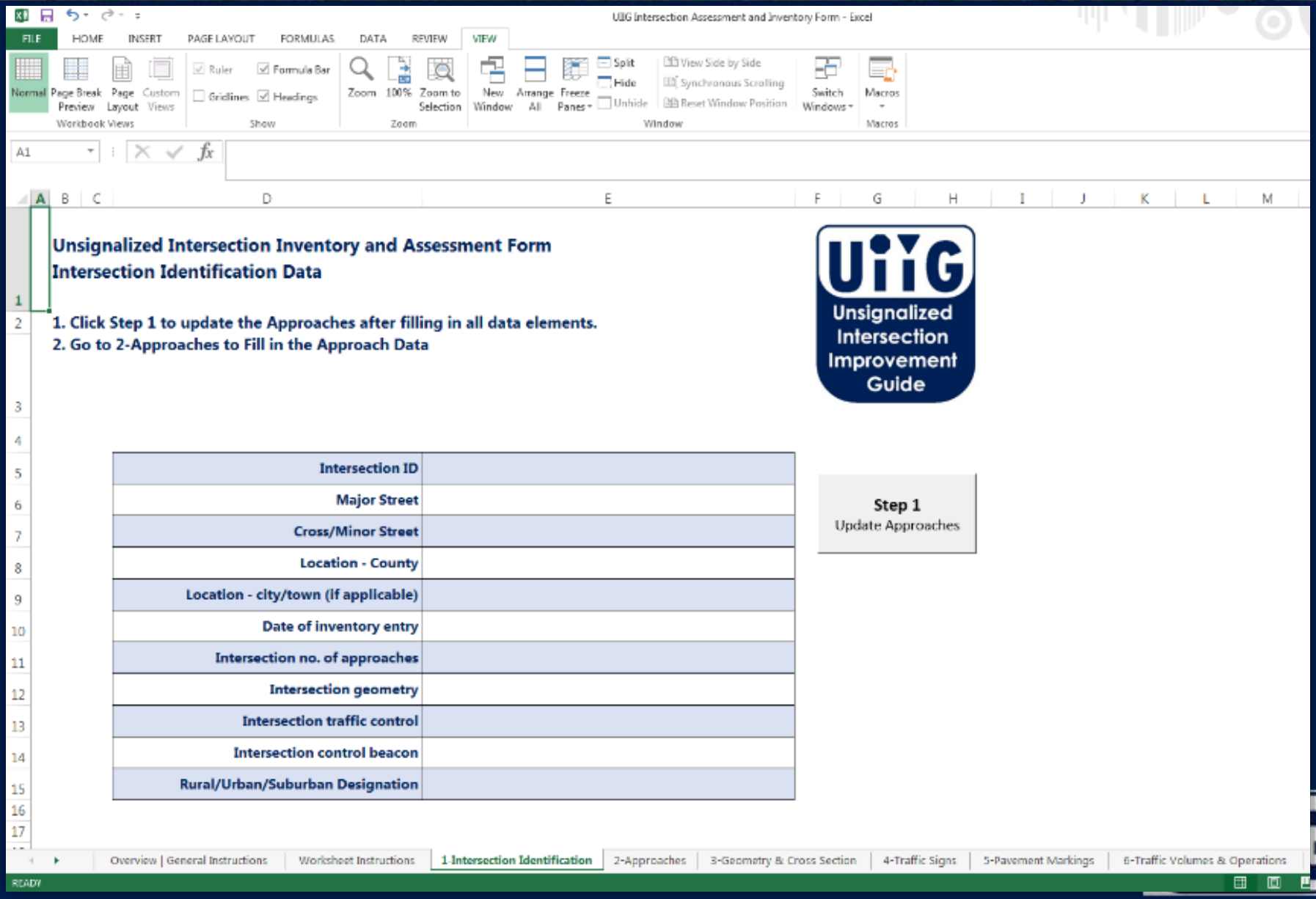
or Mail to: Traffic/Public Works Dept.
City, State Zip

- Available from Toolkit as PDF or Word document
- Meant for agencies with no formal mechanism to solicit public feedback
- Purpose is to serve as **conversation-starter** for agency in establishing feedback method

2. Intersection assessment & inventory form

- Two primary purposes:
  1) Present **comprehensive list of data elements** related to the safety, operations, and access of unsignalized intersections
  2) Provide **user-friendly interface** through which data can be entered and catalogued
- Downloadable Microsoft Excel spreadsheet
  - Includes detailed instructions
  - 10 data tabs spanning multiple subjects
  - Final tab compiles all data inputs into single table
  - Most elements are optional (i.e., can be hidden)

2. Intersection assessment & inventory form



UIIG Intersection Assessment and Inventory Form - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW

Normal | Page Break Preview | Page Layout | Custom Views — Workbook Views
Ruler | Formula Bar | Gridlines | Headings — Show
Zoom | 100% | Zoom to Selection — Zoom
New Window | Arrange All | Freeze Panes | Split | Hide | Unhide | View Side by Side | Synchronous Scrolling | Reset Window Position — Window
Switch Windows | Macros — Macros

A1

Unsignalized Intersection Inventory and Assessment Form
Intersection Identification Data

UIIG Unsignalized Intersection Improvement Guide

1. Click Step 1 to update the Approaches after filling in all data elements.
2. Go to 2-Approaches to Fill in the Approach Data

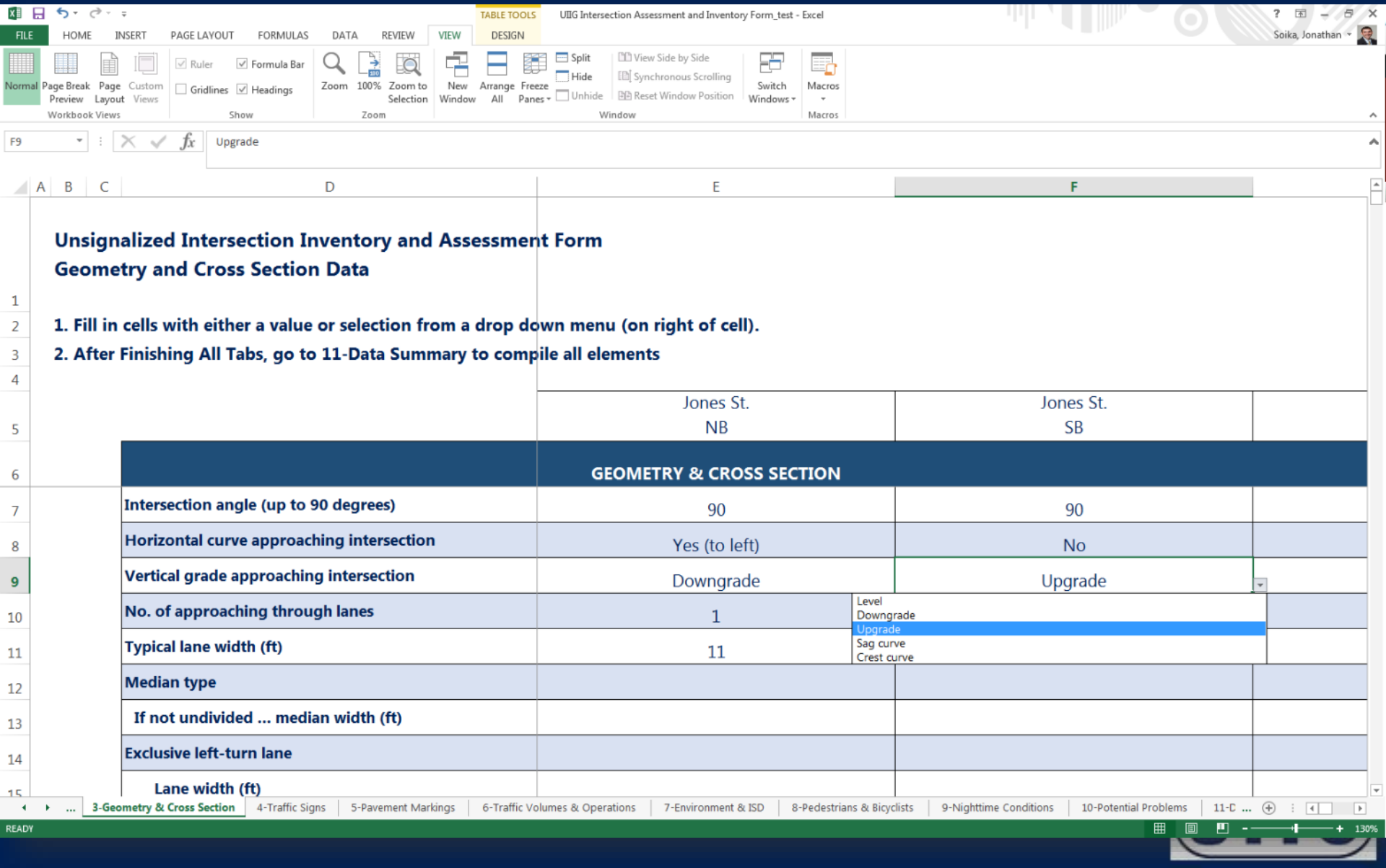
Intersection ID	
Major Street	
Cross/Minor Street	
Location - County	
Location - city/town (If applicable)	
Date of inventory entry	
Intersection no. of approaches	
Intersection geometry	
Intersection traffic control	
Intersection control beacon	
Rural/Urban/Suburban Designation	

Step 1
Update Approaches

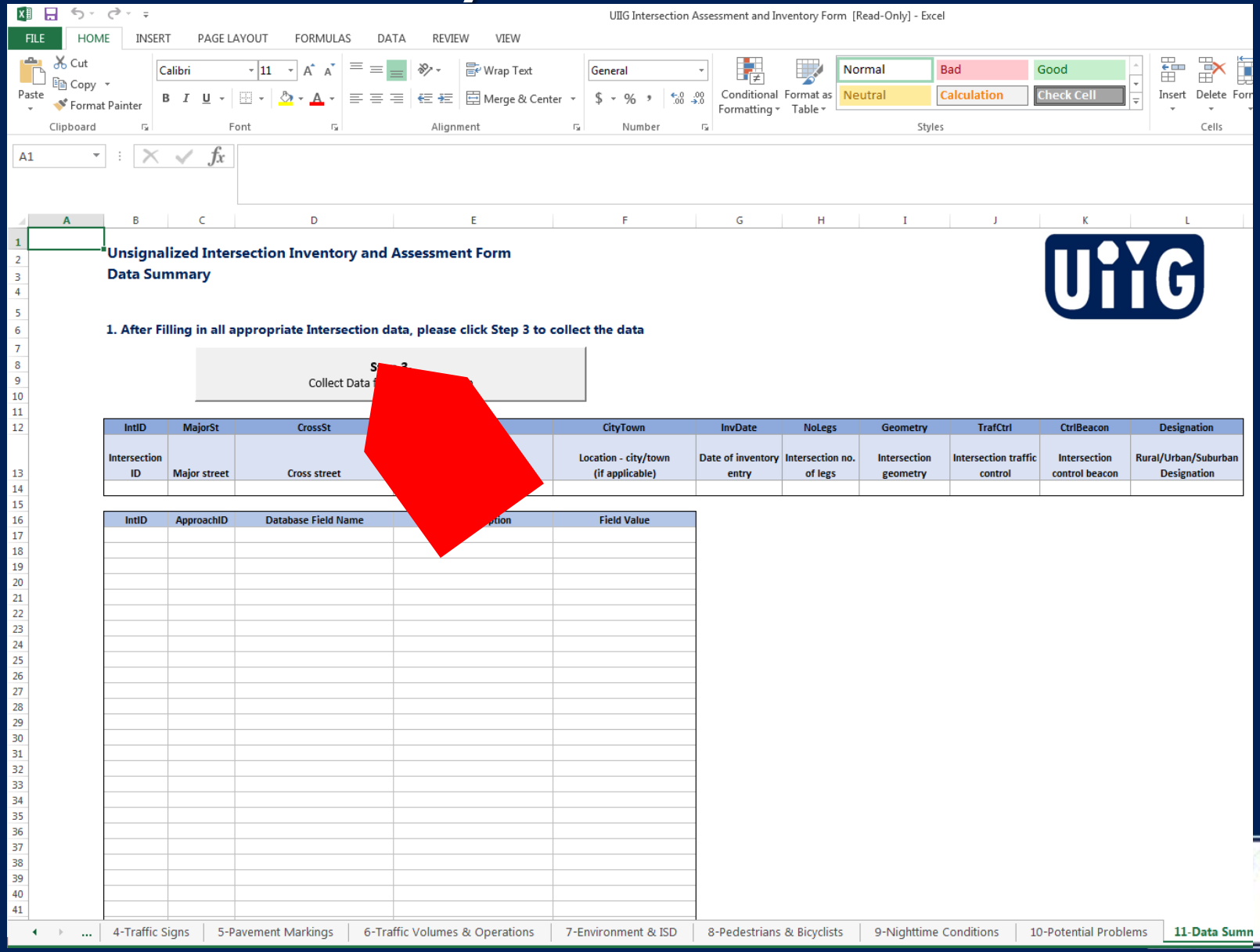
Overview | General Instructions | Worksheet Instructions | 1 Intersection Identification | 2-Approaches | 3-Geometry & Cross Section | 4-Traffic Signs | 5-Pavement Markings | 6-Traffic Volumes & Operations

READY

2. Intersection assessment & inventory form: Geometry tab

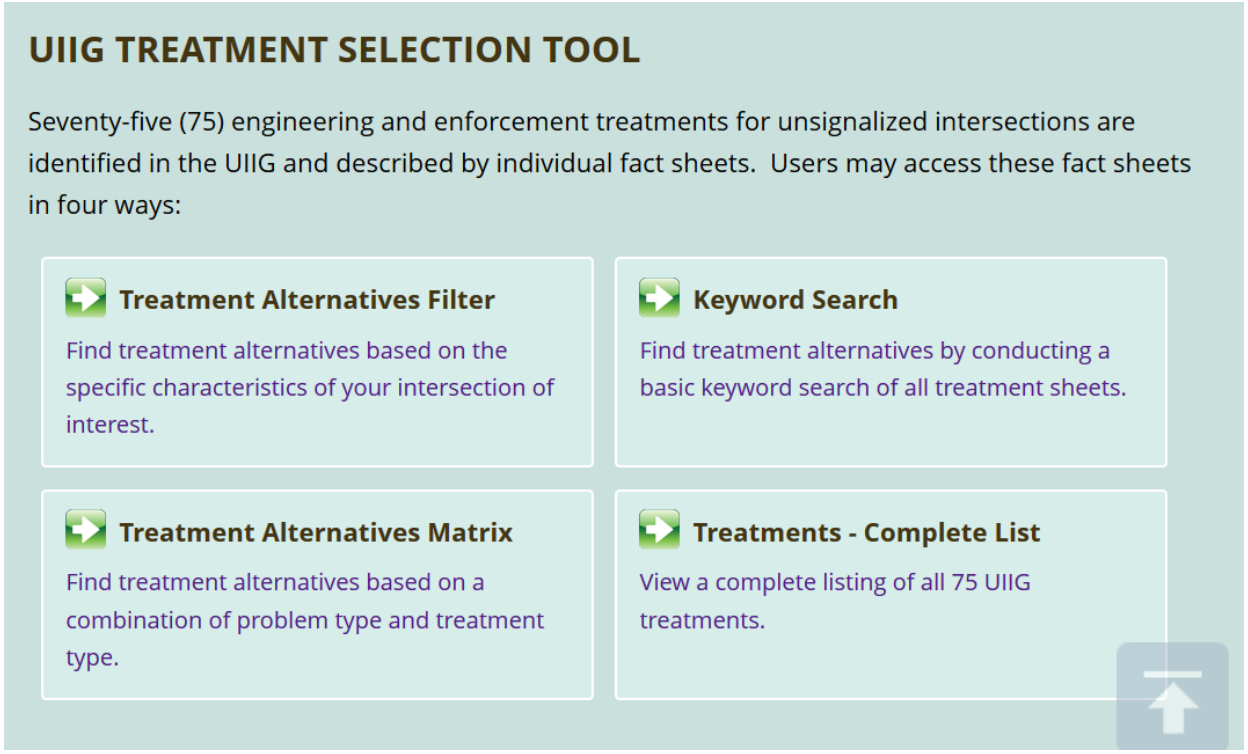


2. Intersection assessment & inventory form: Data Summary tab



3. UIIG treatment selection tool

- Purpose:
  - To provide users with treatment alternatives
- Four ways to access UIIG treatments:



UIIG treatment fact sheet PDFs

Targeted crash types

Problem types addressed

Photographs

Relevant ***MUTCD/ Green Book*** sections

Link to ***CMF Clearinghouse*** website

Description

Conditions addressed

Considerations for installation

Links to external resources

Link to internet mapping of several actual applications

UIIG Unsignalized Intersection Improvement Guide

Install a Stop Beacon

A flashing beacon that is placed on top of a STOP (R1-1) sign. The Stop Beacon consists of one or more signal sections of a standard traffic signal face with a flashing circular red signal indication.

Source: VHB

This Stop Beacon has two horizontally aligned signal indications.

Source: VHB

This Stop Beacon comprises a single signal indication above the STOP sign.

Source: VHB

This Stop Beacon has two vertically-aligned signal indications.

Check for Crash Modification Factor: CMF

Targeted Crash Types

- Right-angle
- Rear-end (minor road)

Problems Addressed

- Non-compliance with intersection traffic control devices
- Inadequate visibility of intersection or intersection traffic control devices

Conditions Addressed

- Crash history or observed vehicle conflicts caused by non-compliance with intersection traffic control or lack of awareness of intersection traffic control.
- Existing STOP sign is not conspicuous in surroundings.
- Recent change in traffic control or traffic regulation at the intersection.
- Poor visibility of the intersection from stop-contolled approach(es).

Considerations

- One or two red beacons may be installed—see MUTCD Section 4L.05 for additional guidance.
- A power source (typically solar or electric) will be required.
- The beacon may be actuated to flash red when approaching vehicles are detected through loop detectors.
- This strategy can be used in conjunction with other strategies to increase sign conspicuity.

Industry Standard

MUTCD

Section 2A.15: Enhanced Conspicuity for Standard Signs

Section 4L.05: Stop Beacon

Other Resources

Innovative Operational Safety Improvements at Unsignalized Intersections, Florida DOT

Safety Evaluation of Flashing Beacons at STOP-Controlled Intersections, FHWA

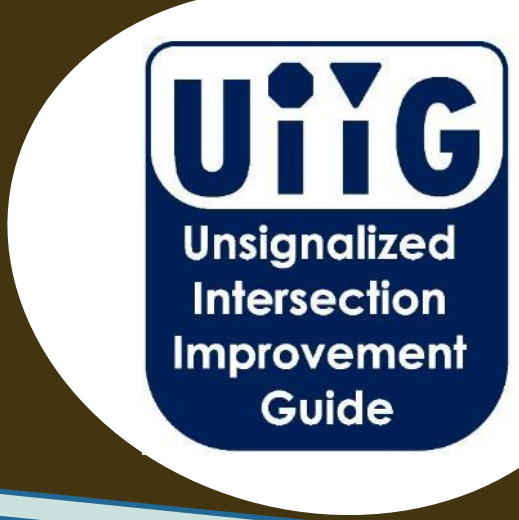
Select Examples

Ridge Rd. & E. Four Mile Rd., Cheyenne, WY

Hoover Hill Rd. & Kennedy Rd., Trinity, NC

UIIG Unsignalized Intersection Improvement Guide Treatment ID No. 007

www.ite.org/uiig



Vision for the UIIG

Future of UIIG

- Institute of Transportation Engineers (ITE) hosting and maintaining UIIG website
  -
  - Available **free of charge** (regardless of ITE membership)
- FHWA Office of Safety providing financial, tech. support
- ITE intends to periodically review and update content through technical committees & working groups composed of ITE members
- **Version 1.0 can be improved via YOUR feedback**

Contact us

- UIIG background and development:
  - Jonathan Soika, PE
    jsoika@vhb.com

- Federal Highway Administration Office of Safety:
  - Jeff Shaw, PE, PTOE, PTP

U.S.Department of Transportation
Federal Highway Administration

- UIIG website, hyperlinks, maintenance, revisions:
  - uiigfeedback@ite.org

Question & Answer session

- Type your question into the “Questions” box and the moderator will read the question on your behalf.

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June 30, 2016: **Saving Lives through Local Road Safety Planning**

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www.naco.org/webinars

THANK YOU!

Additional questions or feedback?

Contact Kathy Rowings at krowings@naco.org