

Safety Analysis For All Projects

Mike Holowaty PE

Taylor Ruble PE

Office of of Traffic Safety

INDOT – Central Office

Outline

- Introduction – Mike Holowaty
- Traffic Requirements in Scoping – Taylor Ruble
- Traffic Safety SharePoint Site – Mike Holowaty
- Questions – Mike & Taylor



Introduction

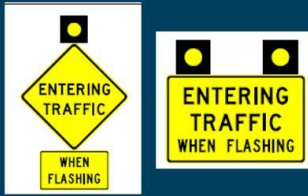
- The Safety Asset Class

Intersection Conflict Warning Signs

Minor Road Warning



Major Road Warning

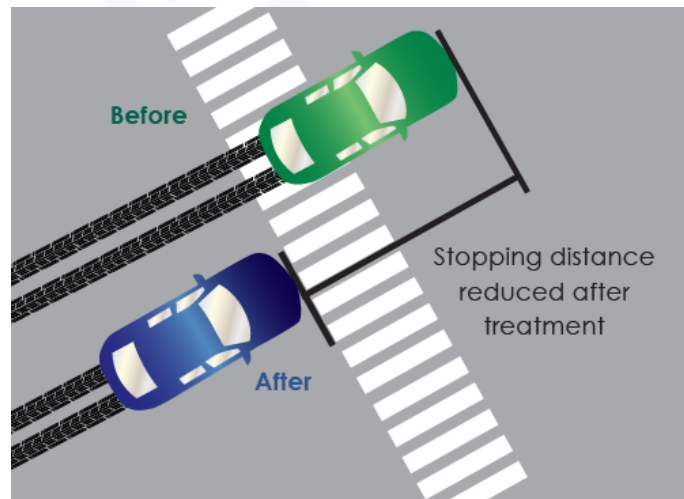
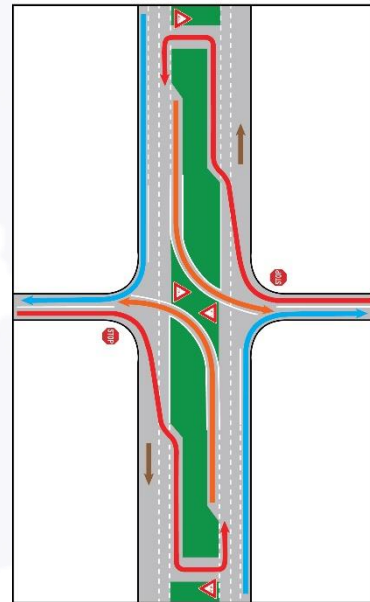


W3-X8A
2-Lane

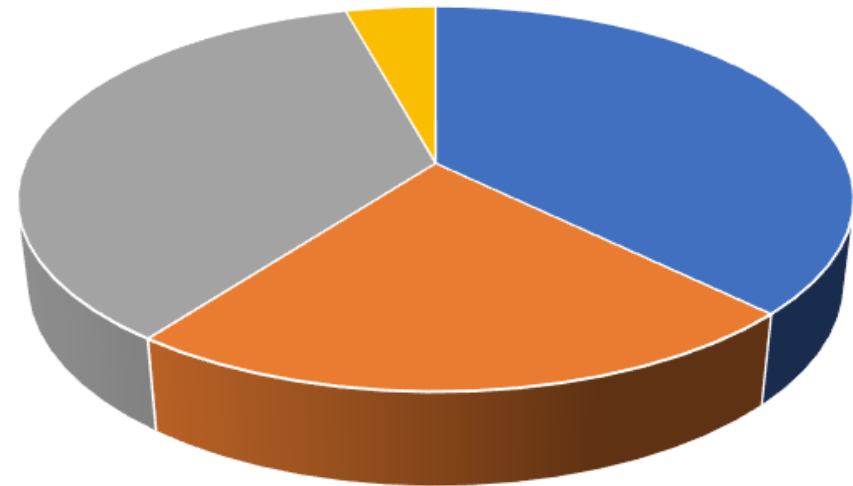
W3-X8
4-Lane



J-Turn



2022 Programmed Spending In Millions

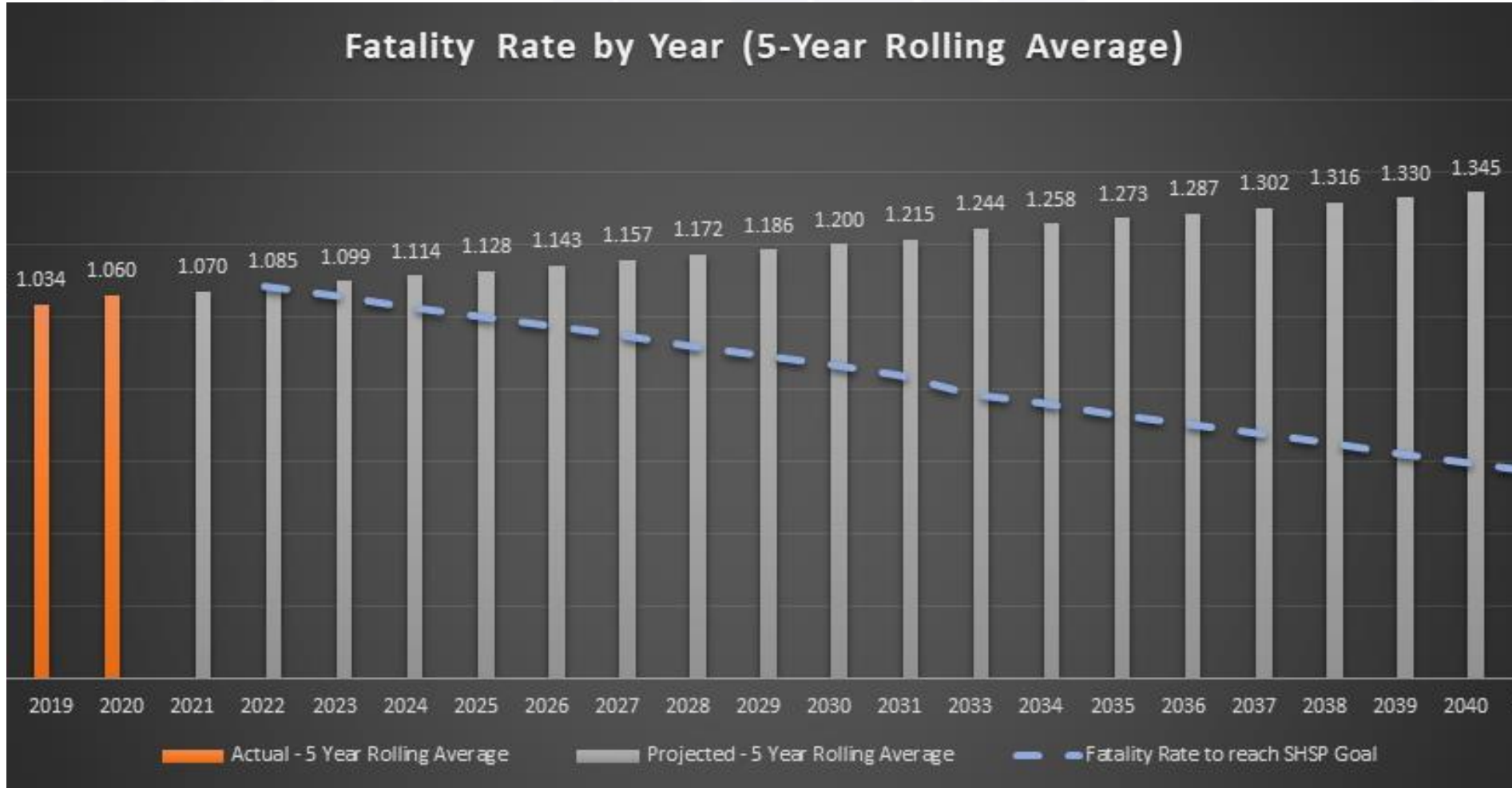


■ Bridges ■ Mobility ■ Roads ■ Safety

Introduction

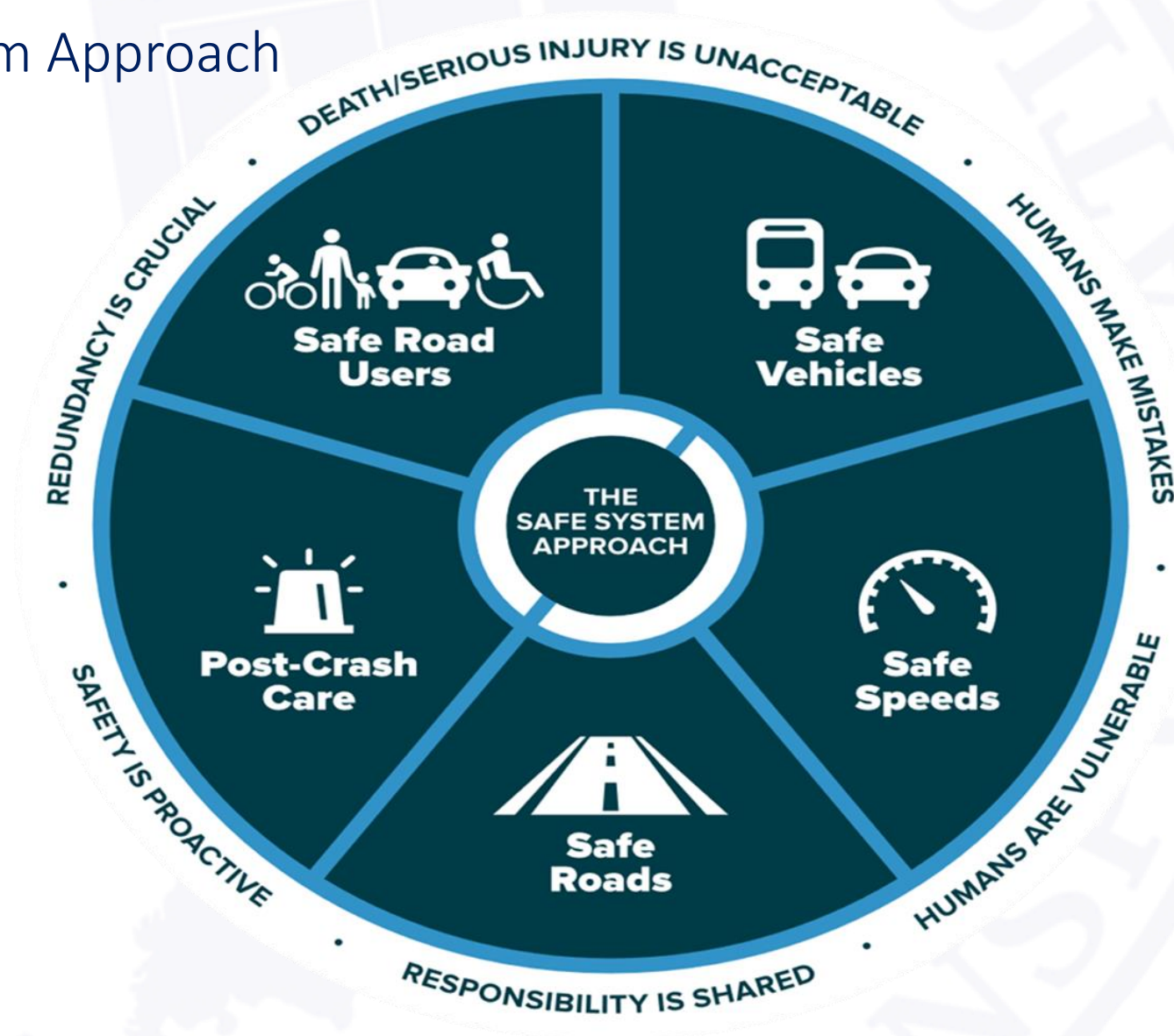
- The Battle for Safer Roadways

- Serious Injuries are trending down slowly, but Fatalities are a Stubborn Problem



Introduction

- FHWA's Safe System Approach



Introduction

- NCHRP And FHWA Guidance
- NCHRP 244 - Guidelines for Integrating Safety and Cost-Effectiveness into Resurfacing, Restoration, and Rehabilitation (3R) Projects – 2017 Harwood, Coakly & Polk
- NCHRP 867 - Guidelines for Integrating Safety and Cost-Effectiveness into Resurfacing, Restoration, and Rehabilitation (3R) Projects - 2021 Harwood, Coakly & Polk
- FHWA 2021 White Paper – Level of Safety Effort for All Projects - A Reassessment for Indiana
- “Safety is our number one priority. This is the mantra of the Federal Highway Agency (FHWA) and most any State Department of Transportation (DOT) and even local agencies. In order to achieve a higher level of safety, and work toward zero deaths, it is imperative that agencies do not rely solely on a safety program to improve highways safety in areas where analysis dictates. It is necessary to prevent high crash locations from developing and treat minor safety issues at as many locations as reasonably possible. This can only be done by judiciously including safety analysis and implementing countermeasures in all projects.”

Introduction

- FHWA Guidance on SAFE SYSTEMS

FHWA White Paper: HSIP Eligibility and Use of Funds

Improvements to safety features, including traffic signs and pavement markings, that are routinely provided as part of a broader Federal-aid highway project can and should be funded from the same source as the broader project as long as the use is eligible under that funding source. FHWA encourages the use of other Federal-aid highway funds for safety-related investments as part of system-wide replacement projects, where eligible.

Outline

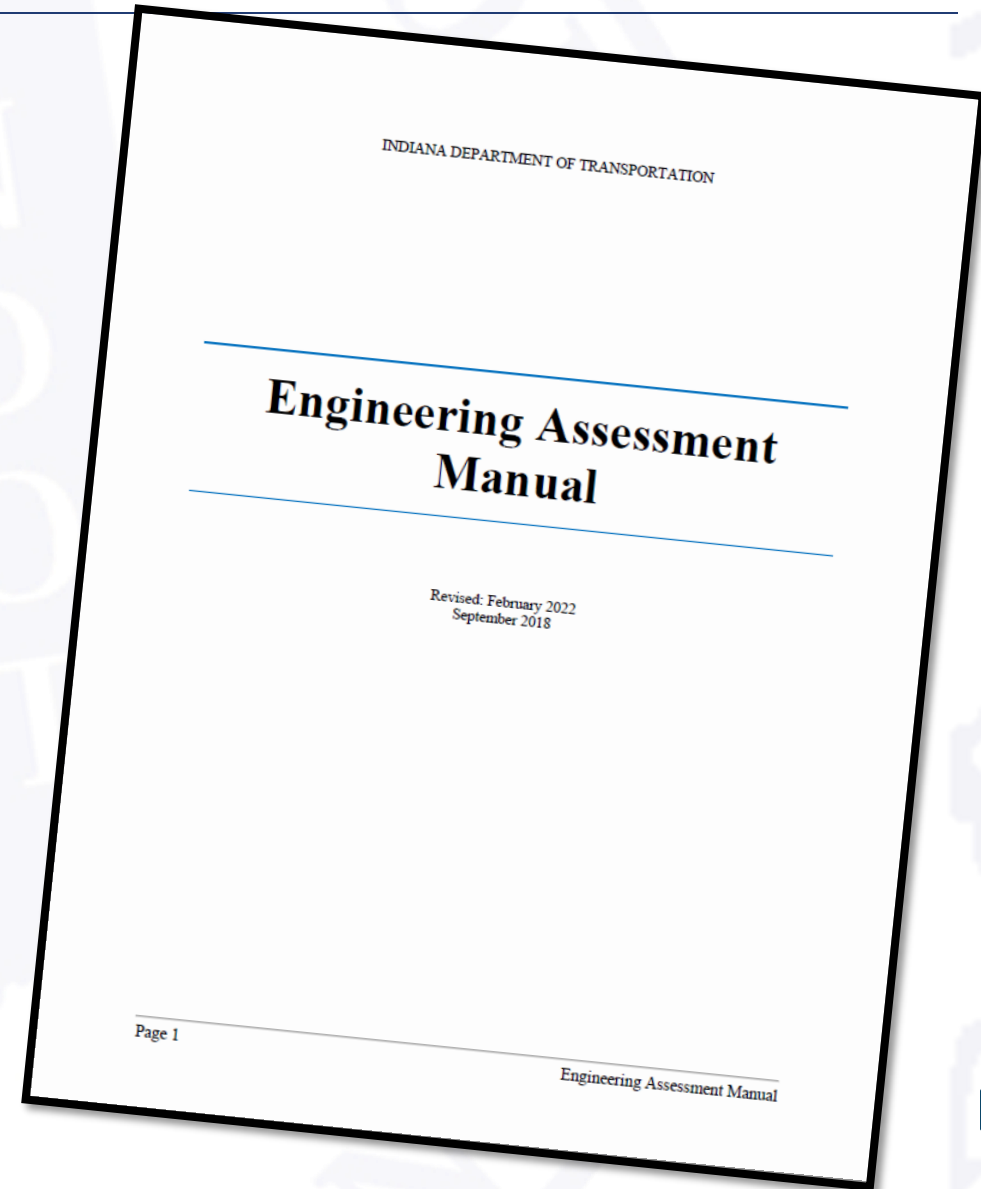
- Introduction – Mike Holowaty
- **Traffic Requirements in Scoping – Taylor Ruble**
- Traffic Safety SharePoint Site – Mike Holowaty
- Questions – Mike & Taylor



Traffic Requirements in Scoping

- NEW EA MANUAL SOON!
- What is Required for Traffic?
 - Traffic Forecast
 - Traffic Capacity Analysis
 - Traffic Safety Analysis

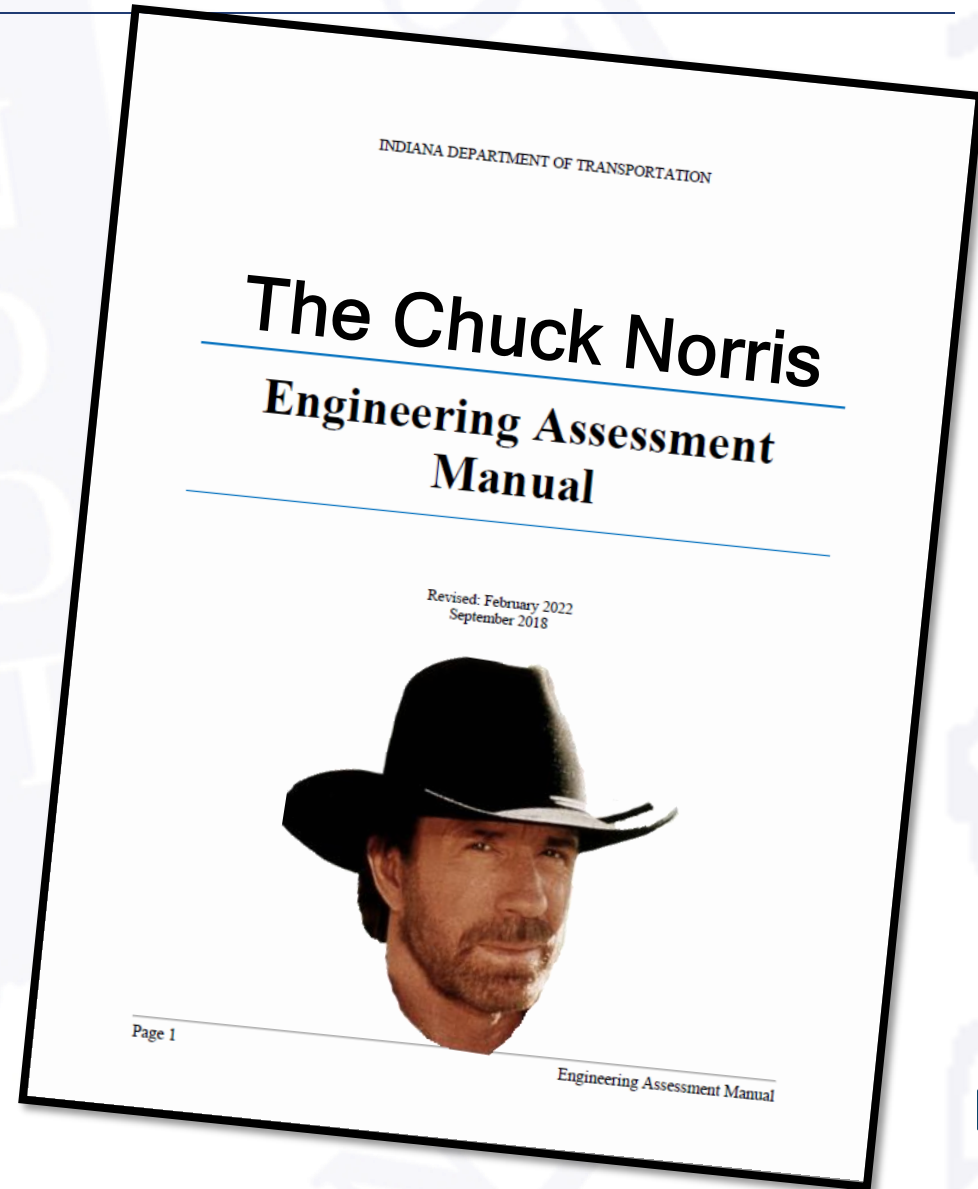
DRAFT



Traffic Requirements in Scoping

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DRAFT

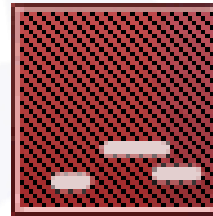


Traffic Requirements in Scoping

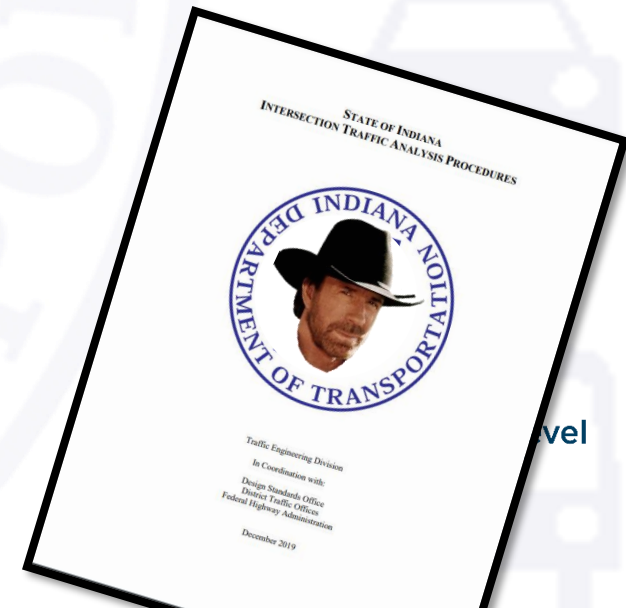
- Traffic Forecast
 - Req. for all projects
 - Base year AADT
 - Design year AADT (20yr typ.)
 - Counts come from TCDS
 - Future volumes come from Projector App

Traffic Requirements in Scoping

- Traffic Capacity Analysis
 - Req. when intersection traffic control changed
 - Req. when Purpose & Need dictates
- Follow Intersection Traffic Analysis Procedure & Intersection Decision Guide



HCS



Traffic Requirements in Scoping

WORK TYPE SCOPE REQUIREMENTS

Work Type	Preliminary Alternative Analysis Required	Crash Analysis	Scope Document Recommended
ROAD			
HMA, PM Overlay	No	Recommended	AbbEngRpt
HMA, Minor Structural Overlay or HMA, Functional Overlay	No	Required (3R) Recommended (Partial 3R)	AbbEngRpt
HMA, Structural Overlay	No	Required (3R) Recommended (Partial 3R)	AbbEngRpt
PCCP Patching	No	Recommended	AbbEngRpt
Conc Pav't Restoration	No	Recommended	AbbEngRpt
Conc Pav't Preservation	No	Recommended	AbbEngRpt
Profiling, PCCP	No	Recommended	AbbEngRpt
Surface Treatments, all types	No	Recommended	AbbEngRpt
Shoulder Rehab & Repair	Maybe	Recommended	AbbEngRpt or EngRpt
Crack and Seat, all types	No	Recommended	AbbEngRpt
Rubblize	No	Recommended	EngRpt
Full-depth reclamation	No	Recommended	AbbEngRpt or EngRpt (5)
PCCP on PCCP Pav't	No	Required	EngRpt
Storm sewer repair/replace (4)	Yes	Not Recommended	EngRpt
Pump/lift station	Yes	Not Recommended	EngRpt
Pav't replacement, all types	Maybe	Required	AbbEngRpt or EngRpt (5)
Slide correction	Yes	Recommended	EngRpt

- Traffic Safety Analysis
 - Req., Recommended, or Not Req. based on Work Type
 - Required for all 3R or higher projects (non-PM)

Traffic Requirements in Scoping

Type of Work

Requirement

WORK TYPE SCOPE REQUIREMENTS

Work Type	Preliminary Alternative Analysis Required	Crash Analysis	Scope Document Recommended
ROAD			
HMA, PM Overlay	No	Recommended	AbbEngRpt
HMA, Minor Structural Overlay or HMA, Functional Overlay	No	Recommended (Partial 3R)	AbbEngRpt
HMA, Structural Overlay	No	Required (3R) Recommended (Partial 3R)	AbbEngRpt
PCCP Patching	No	Recommended	AbbEngRpt
Conc Pav't Restoration	No	Recommended	AbbEngRpt
Conc Pav't Preservation	No	Recommended	AbbEngRpt
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Slide correction	Yes	Recommended	EngRpt

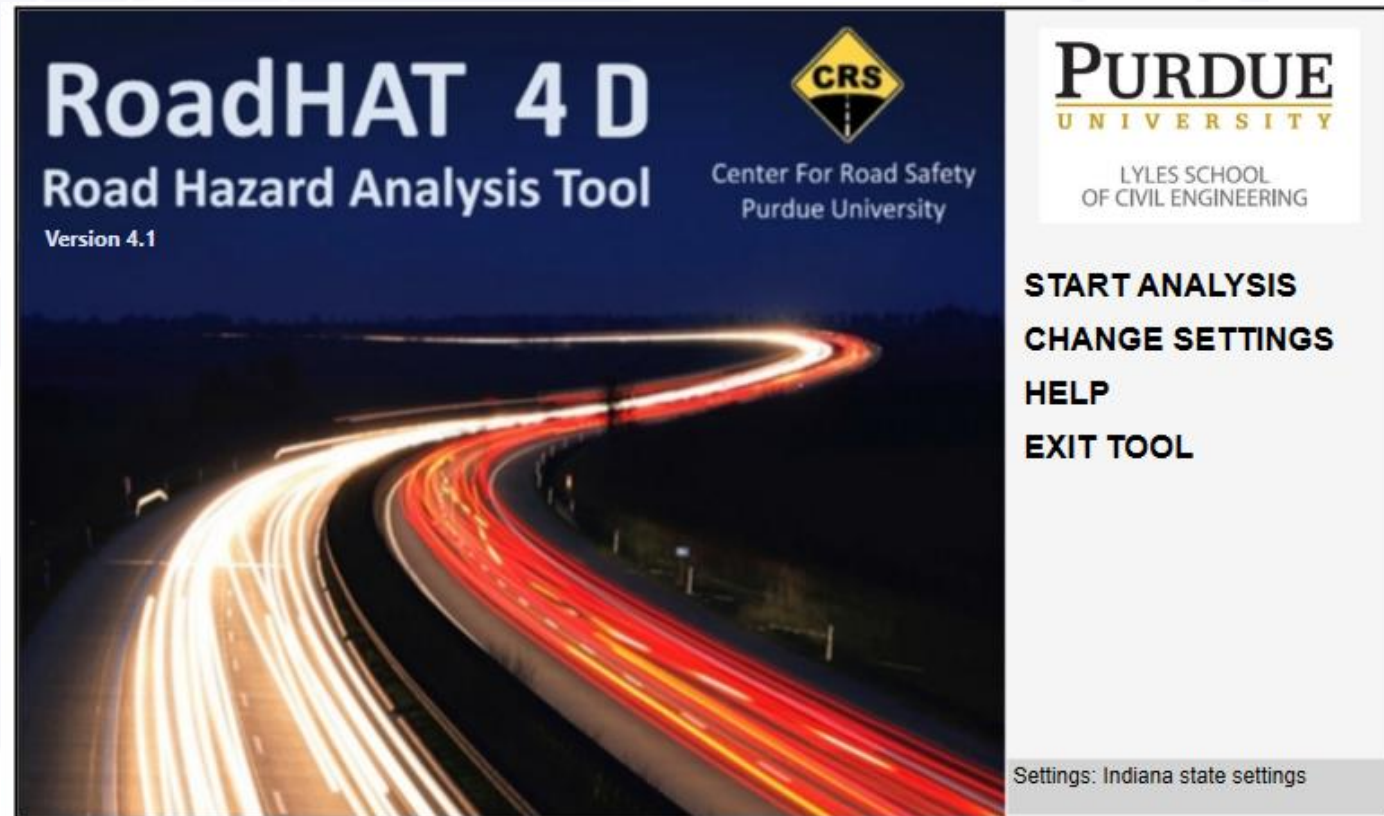
Traffic Requirements in Scoping

BRIDGE			
Bridge replacement, all types (2) (S)	Maybe (6)	Required	EngRpt
New bridge (2) (S)	Yes	Required	EngRpt
Bridge rehabilitation or repair (3) (S)	Maybe (6)	Recommended	AbbEngRpt
Bridge deck overlay (either type) (S)	No	Recommended	AbbEngRpt
Replace superstructure (2) (S)	No	Required	EngRpt
Replace deck (S)	No	Required	EngRpt
Bridge widening (2) (S)	No	Required	EngRpt
Bridge painting	No	Not Recommended	AbbEngRpt
Substr repair/rehabilitation (3) (S)	No	Recommended	AbbEngRpt
Bridge maintenance or repair (S)	No	Recommended	AbbEngRpt
Repair/replace joints (S)	No	Recommended	AbbEngRpt
Arch reconstruction / repair (S)	No	Recommended	AbbEngRpt
Small structure replacement (4) (S)	Maybe	Required	AbbEngRpt or EngRpt (5)
New small structure (4) (S)	Maybe	Required	AbbEngRpt or EngRpt (5)
Small structure pipe lining (4) (S)	Maybe	Recommended	AbbEngRpt or EngRpt (5)
Small culvert, all types (4) (S)	No	Recommended	AbbEngRpt

Traffic Requirements in Scoping

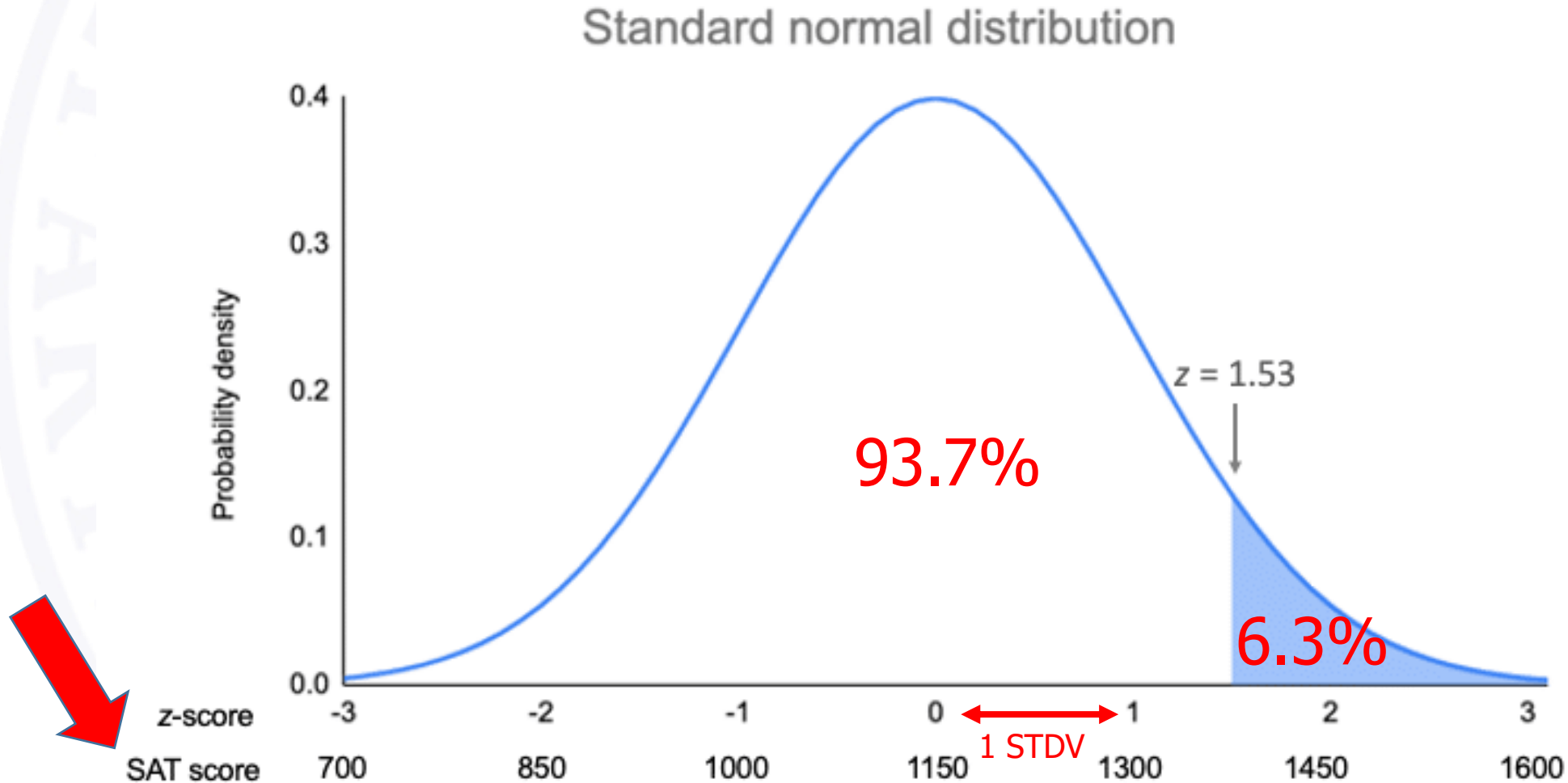
- Traffic Safety Analysis
 - Should be done during preliminary engineering/scoping or prior to STG1 submittal
 - Must use INDOT approved tools for analysis, i.e. RoadHAT

**Training Video
On ERIN!**



Traffic Requirements in Scoping

What are ICC and ICF?



Traffic Requirements in Scoping

- Traffic Safety Analysis (Ref. IDM Sect. 55-8.0)
 - Must use minimum of 3 most recent full calendar years of crash data
 - Must produce RoadHAT report(s)
 - Must include crash summary breakdown by manner of collision

**Training Video
On ERIN!**

Traffic Requirements in Scoping

- Traffic Safety Analysis (Ref. IDM Sect. 55-8.0)
 - Must use minimum of 3 most recent full calendar years of crash data
 - Must produce RoadHAT report(s)
 - Must include crash summary breakdown by manner of collision



**Each major intersection &
Each long segment.**

Traffic Requirements in Scoping

3-4.03(05) Crash Analysis

Crash data was reviewed as part of this assessment and a RoadHAT analysis was prepared. A total of xx recorded crashes took place within the project limits during the three-year crash study period (20aa through 20bb). The following tables summarize the number and types of crashes, as well as the RoadHAT results.

Crash History

<i>Icc</i>		<i>Number of Crashes</i>	
<i>Icf</i>		<i>Number of Fatal and Incapacitating Crashes</i>	
<i>First Year of Crash Data</i>		<i>Number of Non-Incapacitating Crashes</i>	
<i>Last Year of Crash Data</i>		<i>Number of Property Damage Only Crashes</i>	

Crash Patterns: Manner of Collision

<i>Manner of Collision</i>	<i>Number</i>	<i>Percent</i>
<i>Backing Crash</i>	<i>X (Y)</i>	
<i>Collision With Animal (Including Deer) *</i>	<i>X (Y)</i>	
<i>Collision With Object in Road</i>	<i>X (Y)</i>	
<i>Head On (Between Motor Vehicles)</i>	<i>X (Y)</i>	
<i>Left Turn, Right Turn or Angle</i>	<i>X (Y)</i>	
<i>Opposite Direction Sideswipe</i>	<i>X (Y)</i>	
<i>Ran Off Road</i>	<i>X (Y)</i>	
<i>Rear End</i>	<i>X (Y)</i>	
<i>Same Direction Sideswipe</i>	<i>X (Y)</i>	
<i>Other</i>	<i>X (Y)</i>	
<i>Total</i>	<i>X (Y)</i>	

X (Y): X indicates the number of crash type

Y indicates those resulting in injury

**In almost all cases, deer crashes and other animal crashes should be removed from the analysis completely prior to completing the RoadHAT report.*

Crash Pattern Analysis

Pavement Condition Percentages

Type	Number	Percent	Standard Value* Comparison:
On Snowy or Icy Pavement			11.18%
On Wet Pavement			15.49%
On Dry Pavement			73.17%
On Other Condition Pavement			0.16%

*Standard values are based on 2014-2018 data for all state-owned facilities. Standard values are included for comparison purposes only.

Lighting Condition Percentages

Type	Number	Percent	Standard Value* Comparison:
Dark (Lighted or Unlighted)			32.76%
Dawn/Dusk			5.49%
Daylight			61.66%
Other			0.10%

*Standard values are based on 2014-2018 data for all state-owned facilities. Standard values are included for comparison purposes only.

Weather Condition Percentages

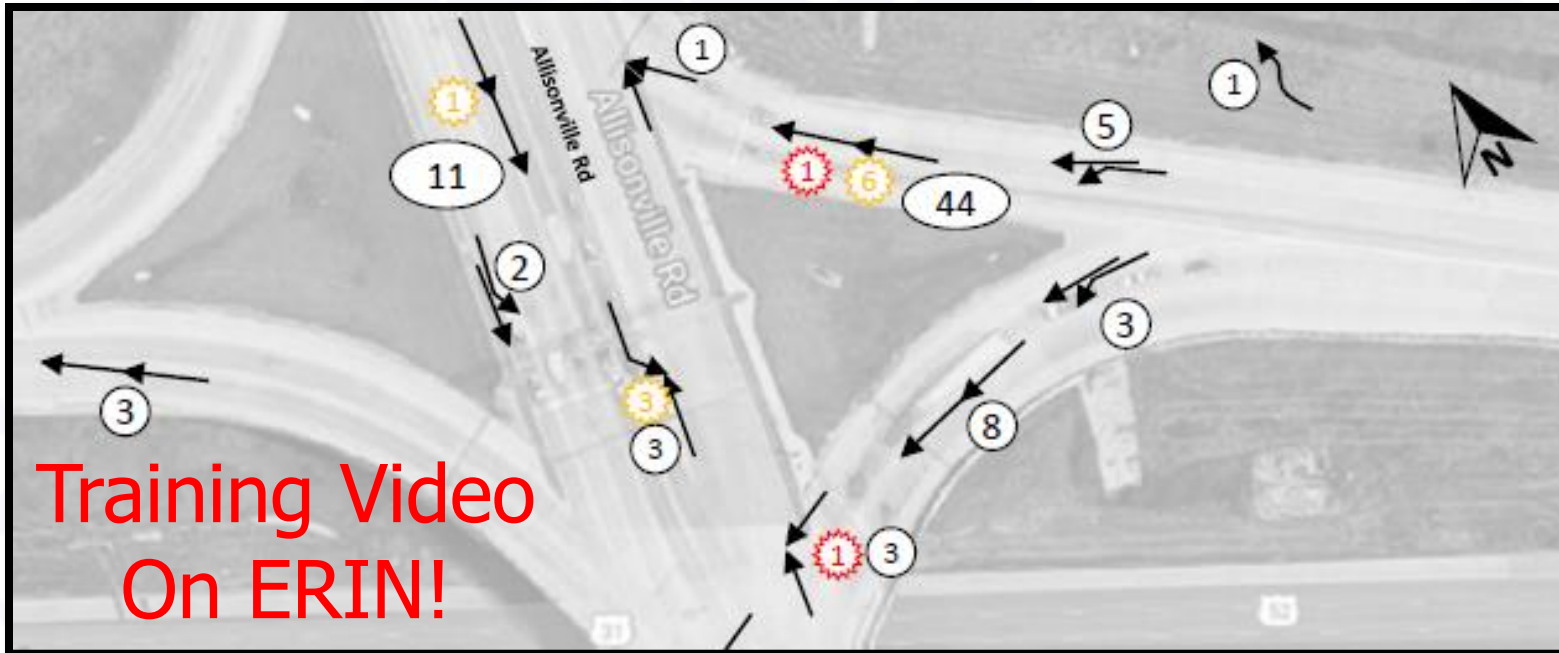
Type	Number	Percent	Standard Value* Comparison:
Clear			62.39%
Cloudy			18.33%
Fog (Or Smoke or Smog)			0.68%
Rain			9.79%
Snow or Sleet			6.41%
Blowing Material			2.13%
Severe Cross Winds			0.26%

*Standard values are based on 2014-2018 data for all state-owned facilities. Standard values are included for comparison purposes only.

The RoadHAT output, crash statistics summary and crash diagrams shall be included as attachments to this report appendix.

Traffic Requirements in Scoping

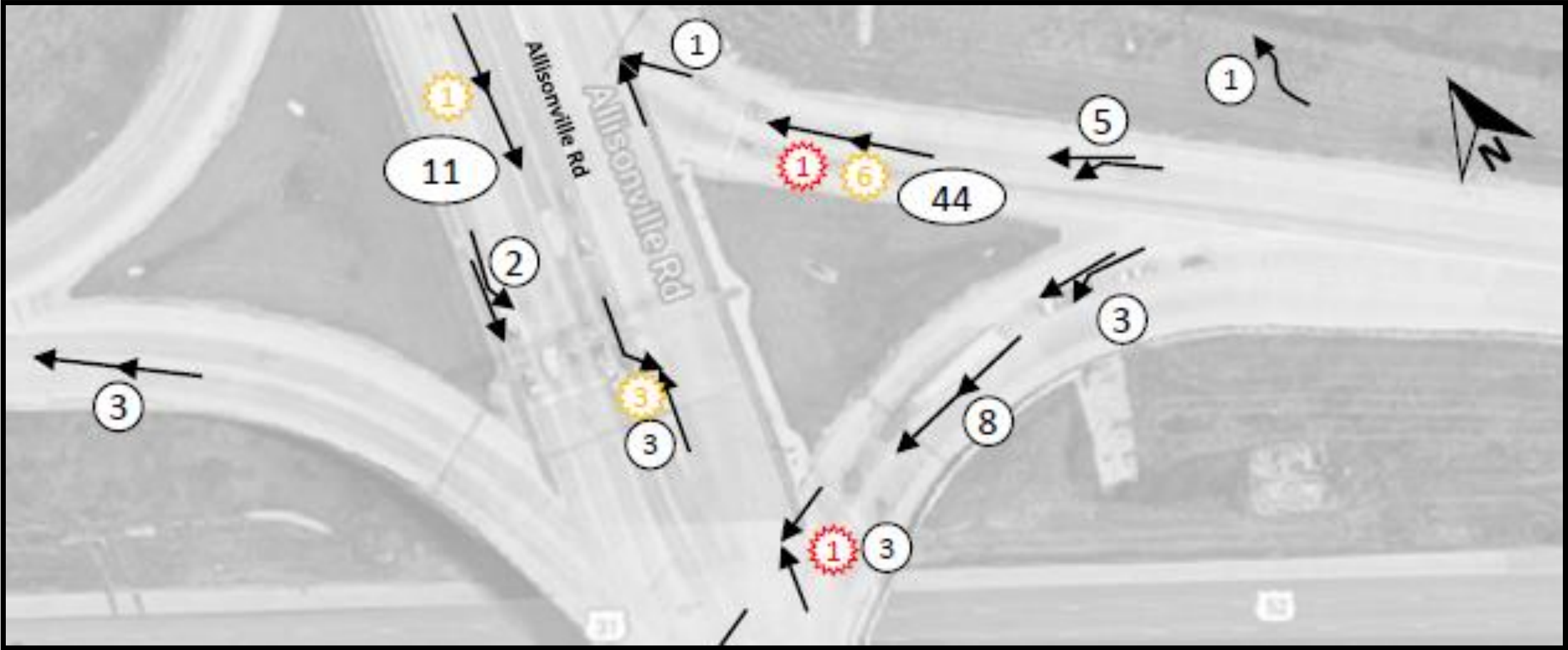
- Traffic Safety Analysis (Ref. IDM Sect. 55-8.0)
 - Must use minimum of 3 most recent full calendar years of crash data
 - Must produce RoadHAT report(s)
 - Must include crash summary breakdown by manner of collision
 - Crash Diagram (Recommended!)



**Training Video
On ERIN!**

**Audience
Participation**

Traffic Requirements in Scoping



Traffic Requirements in Scoping

- Traffic Safety Analysis – Now What

1.) Is there a clear pattern

2.) Is there an elevated rate (ICC,ICF)

3.) Can countermeasures be reasonably added to address?

Traffic Requirements in Scoping

- Traffic Safety Analysis – Now What

2.) Is there an elevated rate (ICC,ICF)

1.) Is there a clear pattern

1b.) Why is this pattern happening

1c.) What countermeasures would address this?

3.) Can countermeasures be reasonably added?

Traffic Requirements in Scoping

- Traffic Safety Analysis (Ref. IDM Sect. 55-8.0)
 - Discuss with District Traffic Engineer if issue discovered
 - IDM provides list of possible countermeasures (55-8E)
 - If improvement is not practical, include discussion in report

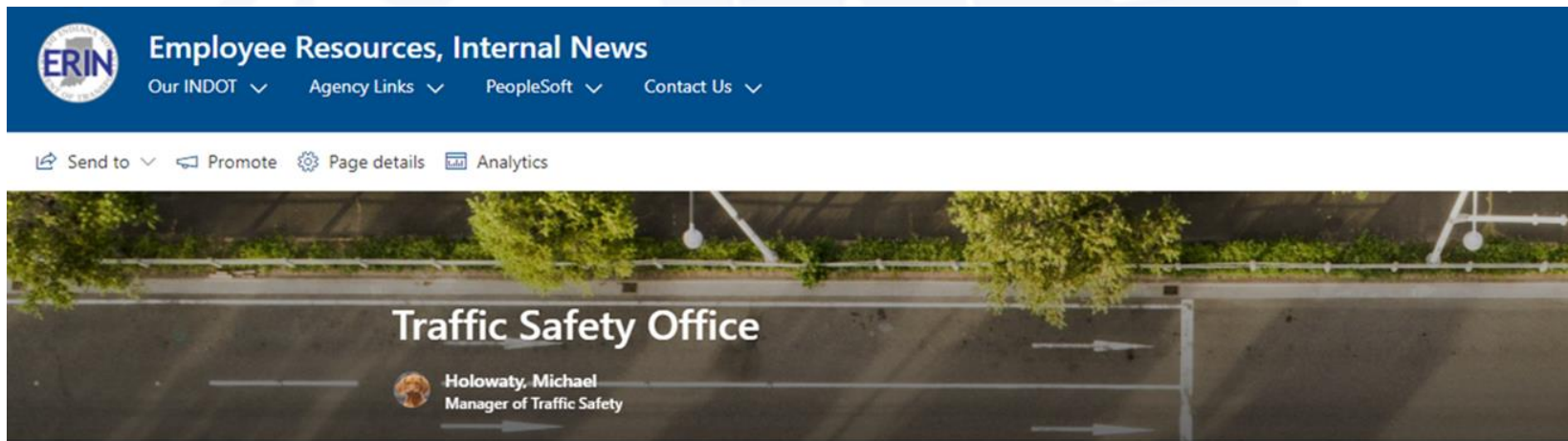
Accident Pattern	Probable Cause	Safety Enhancement
Run-off-roadway	Slippery Pavement	Improve skid resistance; provide adequate drainage; groove existing pavement
	Roadway Design Inadequate for Traffic Conditions	Widen lanes/shoulders; relocate islands; provide proper super-elevation; install/improve traffic barriers; improve alignment/grade; flatten slopes/ditches; provide escape ramp
	Poor Delineation	Improve/install pavement markings; install roadside delineators; install advance warning lights
	Poor Visibility	Improve roadway lighting; increase sign size
	Inadequate Shoulder	Upgrade roadway shoulders
	Improper Channelization	Improve channelization
Overturn	Roadside Features	Flatten slopes and ditches; relocate drainage facilities; extend culverts; provide traversable culvert end treatments; install/improve traffic barriers
	Inadequate shoulder	Widen lane/shoulder; upgrade shoulder surface; remove curbing obstructions; revise cross slope
	Pavement Feature	Eliminate edge dropoff; improve superelevation/crown

Outline

- Introduction – Mike Holowaty
- Traffic Requirements in Scoping – Taylor Ruble
- **Traffic Safety SharePoint Site – Mike Holowaty**
- Questions – Mike & Taylor



Traffic Safety Sharepoint Site - Internal Webpages



- New internal webpage for all things Traffic Safety including Documents, Tools and Training
- External webpage will be similar.

Traffic Safety Pages

★ [Traffic Safety Office](#)

[Traffic Safety for All Projects](#)

[Traffic Safety Documents](#)

[Traffic Safety Asset Management \(TSAM\)](#)

[Traffic Safety Training](#)

[Network Screening and Heat Maps](#)

[Traffic Safety Statistics \(Snapshot\)](#)

INDOT Office of Traffic Safety

INDOT's Office of Traffic Safety administers safety programs to meet safety goals. Traffic Safety works to reduce the frequency and severity of crashes on the highway system and local roads.

Updated 9/21/21

Strategic Highway Safety Plan (SHSP)

Improving highway safety is vital to the health and well-being of our state. Each year, Centers for Disease Control, motor vehicle-related injuries are the leading cause of death for people in the United States.

Looking beyond the personal tragedy of death and injury, the economic impact of traffic crashes is calculated in the billions of dollars.

Traffic Safety Sharepoint Site - Internal Webpages



- The Traffic Safety for All Projects page will provide information useful to INDOT Scoping and Design Staff engaged in developing projects that are not initiated by Traffic Safety Asset Management, with the purpose of incorporating traffic safety analysis and improvements into other types of projects.

Traffic Safety Office

★ Traffic Safety for All Projects

Traffic Safety Documents

Traffic Safety Asset Management (TSAM)

Traffic Safety Training

Network Screening and Heat Maps

Traffic Safety Statistics (Snapshot)

Traffic Safety Sharepoint Site - Documents

Traffic Safety Documents

Ruble, Taylor
Traffic Safety Systems Engineer

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[Traffic Safety Statistics \(Snapshot\)](#)

Manuals, Policies & Guides

[Intersection Decision Guide \(IDG, ICE\)](#)

[Intersection Traffic Analysis Procedures](#)

[Engineering Assessment Manual](#) (Update Coming Fall 2021)

[INDOT Access Management Guide](#)

[INDOT Complete Streets Policy](#)

[Indiana Strategic Highway Safety Plan](#) (Update Coming Spring 2022)

[Left Turn Signal Display Worksheet](#) (FYA Worksheet)

[Traffic Safety Asset Management Business Rules](#) (TSAM)

[How to Access and Use the Traffic Safety Portal](#) (TSP)

[INDOT Roundabout Brochure](#)

Traffic Safety Sharepoint Site - Documents



Documents & Tools

- [Crash Reduction Factors for Indiana](#)
- [Left Turn Lane & Passing Blister Warrant Worksheet](#)
- [Pavement Cost Estimating Tool for Scoping](#)
- [Crash Diagram Builder \(PPT Template\)](#)
- [Traffic Safety Asset Management Score Sheet \(TSAM\)](#)
- [Road Safety Audit Process \(RSA\)](#)
- [Engineering Assessment Template](#)
- [Engineering Assessment District Version](#)
- [Road Safety Audit and Engineering Assessment Process Flow Chart](#)



Useful Links

- Traffic Safety Documents page provides templates and tools as well as links to manuals and guides.

Traffic Safety Sharepoint Site - Documents



Useful Links

[INDOT Roadway Inventory Viewer & INDOT Functional Class Viewer](#)

[ARIES Portal \(State Police Crash Warehouse\)](#)

[Traffic Safety Portal \(TSP\) \(INDOT Crash Warehouse\)](#)

[Instructions for Installing RoadHAT](#)

[Capacity Analysis for Planning Junctions Tool \(CAP-X\)](#)

[Crash Modification Factor Clearinghouse](#)

[Indiana GIS Map Website](#)

Traffic Safety Sharepoint Site - TSAM

Traffic Safety Asset Management (TSAM)



Holowaty, Michael
Manager of Traffic Safety

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TSAM

For all projects under the Traffic Safety Asset Class, safety should be considered first, every time, and at every stage of a project. Safety should be the first consideration in every investment decision. Safety projects consider the crash risk for all road users and transportation modes, especially for crashes which result in injuries and fatalities.

The processes described herein are applicable to all infrastructure projects that are under consideration for potential assignment to safety funding programs. The scoring methodology provides decision-makers with resources to prioritize safety projects.

All decisions regarding funding of safety projects should be a part of a process that is:

1. Based on data driven analysis
2. Uses proven countermeasures
3. Is easily defended

Traffic Safety Sharepoint Site - Training

Ruble, Taylor
Traffic Safety Systems Engineer

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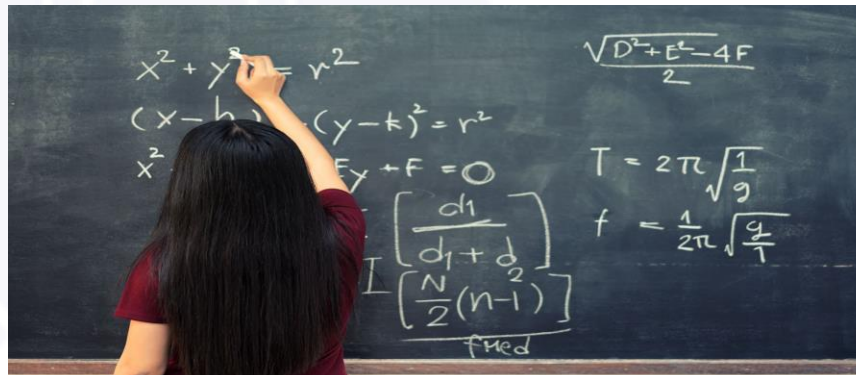
Training

The following training videos are available to all INDOT employees. They cover various Traffic Safety and Traffic Engineering Topics.

There are also some training documents on various topics included below such as Traffic Engineering Road School presentations.

If you would like to see a Traffic Safety training on a specific topic in the future please contact the Office of Traffic Safety at trafficsafety@indot.in.gov.

IF THE VIDEOS DO NOT WORK, TRY SWITCHING TO INTERNET EXPLORER. (Videos may not work on VPN)



Traffic Safety Sharepoint Site - Training

Traffic Safety Analysis Training (Modules 1-6)

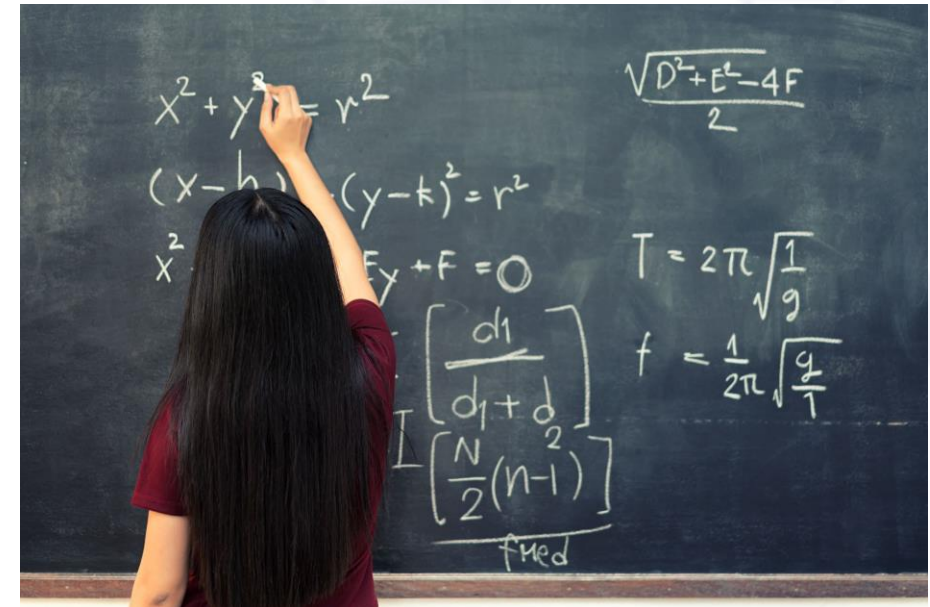
This training was developed by the Office of Traffic Safety in 2021.

The training covers many aspects of crash history analysis. The trainee can follow along on their own to learn the basics of:

1. Introduction to Traffic Safety
2. How to Use the Traffic Safety Portal (TSP)
3. How to Clean Crash Data
4. How to Create a Crash Diagram
5. How to Use RoadHAT 4
6. How to Conduct a Road Safety Assessment (RSA)

The entire training can be watched here, or each module is also included below as an individual video.

- Traffic Safety Training page will have training videos and presentations on many Traffic Analysis topics



Traffic Safety Sharepoint Site – Network Screening



2020 Network Screening Results by District

- [Crawfordsville District](#)
- [Fort Wayne District](#)
- [Greenfield District](#)
- [LaPorte District](#)
- [Seymour District](#)
- [Vincennes District](#)

- Network Safety Screening and Heat Maps page will have statewide and district specific crash analysis maps and tables



Understanding the crash “Heat Maps”

The crash Heat Maps are meant to assist with the planning process and are not meant to substitute for quality crash analysis. They are a starting point to highlight potential concern.

- The crash data used to make these maps is from 2015 through 2019 (5 years)
- Only crashes with a valid Latitude and Longitude were included. If these values were blank or if they were incorrect, they were left off the map or incorrectly plotted. That the data in these maps is an undercount in almost all cases (by an estimate).

Traffic Safety Sharepoint Site - Statistics



- Traffic Safety Statistics page will update monthly with statewide traffic statistics

Traffic Safety Pages

Content Coming Fall 2021

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[Traffic Safety for All Projects](#)

[Traffic Safety Documents](#)

[Traffic Safety Asset Management \(TSAM\)](#)

[Traffic Safety Training](#)

[Network Screening and Heat Maps](#)

★ [Traffic Safety Statistics \(Snapshot\)](#)



Traffic Safety Sharepoint Site - Statistics

Statewide Crash Statistics

Most Recent Full Year Snapshot Report:
Full Calendar Year 2021

Monthly Crash Snapshot*

The Office of Traffic Safety produces a monthly crash snapshot for the state of Indiana. This brief report outlines how the state is performing in terms of crashes when compared with previous years. Each monthly report is included below.

*There is a 30 day delay in updating the monthly statistics.

Contributing Factor Cross-Tab

This table shows the relationship between various factors related to injury and fatality crashes in Indiana.

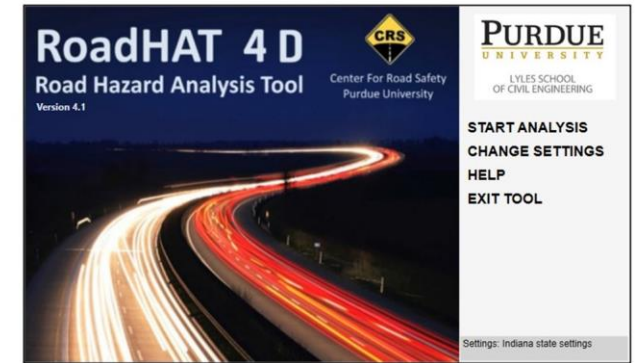
Injuries and Fatalities 2017-2019	Urban	Rural	Local	State	Light	Dark	Clear/Dry Road Conditions	Wet Road Conditions	Intersection	Lane Departure	Speeding	Alcohol	Drugs	Large Vehicle	Pedestrian	Bicycle	Unrestrained Occupants	Young Drivers	Older Drivers	Motorcycles	Distracted Drivers	Drowsy	Work Zone
Intersection	44574	13047	39625	17197	44641	12983	45617	12037	7283	1569	732	136	1783	1537	1033	3856	12987	13284	1703	2863	601	928	
Lane Departure	16859	22920	23593	15313	24343	15408	28016	11773	7283	2889	1360	311	1439	541	94	5801	8187	4946	1464	1878	2261	697	
Speeding	3274	2752	3334	2574	3672	2355	3129	2904	1569	2889	600	127	390	66	9	876	1429	702	250	221	52	166	
Alcohol	1437	1076	1586	852	801	1711	2029	487	732	1360	600	124	64	49	11	485	239	193	104	99	45	51	
Drugs	246	255	271	217	269	232	415	86	136	311	127	124	22	5	1	143	106	58	16	39	24	5	
Large Vehicle	3118	3849	1347	5541	5211	1754	5376	1591	1783	1439	390	64	22	101	23	793	794	1436	77	445	241	523	
Pedestrian	4083	568	2934	777	2778	1875	3688	967	1537	541	66	49	5	101	3	159	441	649	29	234	11	82	
Bicycle	1722	185	1618	199	1516	394	1723	189	1033	94	9	11	1	23	3	63	166	256	15	48	3	11	
Unrestrained Occupants	6401	6147	7326	4758	7966	4581	9709	2843	3856	5801	876	485	143	793	159	63	2562	1732	254	882	358	275	
Young Drivers	19001	11297	18903	10766	21820	8475	22737	7568	12987	8187	1429	239	106	794	441	166	2562	3494	548	2103	612	644	
Older Drivers	19093	8951	15828	11403	23904	4127	22772	5277	13284	4946	702	193	58	1436	649	256	1732	3494	749	1507	442	877	
Motorcycles	2905	2286	3190	1905	3904	1279	4819	372	1703	1464	250	104	16	77	29	15	254	548	749	142	15	155	
Distracted Drivers	5534	3156	4587	3854	6868	1827	7426	1270	2863	1878	221	99	39	445	234	48	882	2103	1507	142	46	336	
Drowsy	1492	1817	1348	1902	2020	1286	2836	473	601	2261	62	45	24	241	11	3	358	612	442	15	46	119	
Work Zone	2188	1589	1155	2611	2810	967	3277	502	928	697	166	51	8	523	82	11	275	644	877	155	336	119	

Most Recent Snapshot Report: January 2022



External Traffic Safety Webpage – Coming 2022

- INDOT's Office of Traffic Safety administers safety programs that strive to meet state and federal safety goals. Traffic Safety works to reduce the frequency and severity of crashes on both the state highway system and local roads.
- Strategic Highway Safety Plan
- Highway Safety Improvement Program
- HSIP Eligible Systemic Safety Improvements
- Local Roadway Safety Programs
- Traffic Safety Statistics
- Rial-Highway Crossing Safety Program (Section 130)



CONCLUSIONS and What's Next

- Follow Development of the FHWA's Safe Systems Approach
- Learn from our Peer States
- Improve the Indiana Design Manual
- Complete the Revision of the SHSP to Include the **Safe Systems Approach**
 - Enhance Safety Equity for All Road Users
 - Look Out for Older (and young) Road Users
 - Reduce Roadway Conflict Points through Innovative Design
 - Continue to Drive Innovations that reduce Serious Crash Outcomes



Questions?

