How Tippecanoe County is Improving a Local Intersection by Using an RSA and Federal Funds
Survey....

Who knows what an RSA is?

Who has performed an RSA?

What would you like to learn from this presentation?
Quick Review: So What is an RSA?
Step 1: Identify the Location:
Concord Road & CR 430S
Why this Location?
Concord Road (CR 250E)
Looking North at Intersection
Concord Road
Looking South from Intersection
Concord Road
Looking North from Intersection
Elevation Challenges
At Intersection Looking West
CR 430S Elevation Changes
Other Challenges
Step 2: Compile Reference Data

- Aerial Photos
- Road/Intersection Geometric Data
  - Crash Data
- Traffic Volume
  - Topography
- Parcel Boundaries
  - Zoning
Road Geometry

CR 430S
- Functional Class = Local
- Road widths averages 21’, two 10.5’ lanes
- Earth/gravel shoulders, 1’–2’ wide
- Pavement condition is “Good”, Overall Condition Index = 67 (100 Scale)
- Posted Speed Limit = 40 mph
- Vehicle Class
  - Motorcycles = 1%
  - Cars/light trucks = 92.1%
  - 2-3 axle, single frame trucks = 2.9%
  - Semi w/2 or more units = 1.9%
  - Unknown = 2.1%
- Signage = Stop and Street Name signs eastbound (southwest corner)
Road Geometry

Concord Rd (south leg)
- Functional Class = Minor Collector
- Road widths averages 21’, two 10.5’ lanes
- Earth/gravel shoulders, 1’–2’ wide
- Pavement condition is “Good”, Overall Condition Index = 72 (100 Scale)
- Posted Speed Limit = 40 mph
- Vehicle Class
  · Motorcycles = .08%
  · Cars/light trucks = 88.7%
  · 2-3 axle, single frame trucks = 4.3%
  · Semi w/2 or more units = 3.2%
  · Unknown = 2.9%
- Signage = 40 MPH sign 700’ south of CR430S
Road Geometry

Concord Rd (north leg)
- Functional Class = Major Collector
- Road widths averages 21’, two 10.5’ lanes
- Earth/gravel shoulders, 1’–2’ wide
- Pavement condition is “Good”, Overall Condition Index = 79 (100 Scale)
- Posted Speed Limit = 40 mph
- Vehicle Class
  - Motorcycles = .08%
  - Cars/light trucks = 88.7%
  - 2-3 axle, single frame trucks = 4.3%
  - Semi w/2 or more units = 3.2%
  - Unknown = 2.9%
- Signage = 40 MPH sign 400’ north of CR430S
## Crash Summary

### Crash Report Information, January 2010 through February 2015

<table>
<thead>
<tr>
<th>#</th>
<th>Date</th>
<th>Time</th>
<th># of Vehicles Involved</th>
<th>Number Injured</th>
<th>Number Dead</th>
<th>Manner of Collision</th>
<th>Primary Factor</th>
<th>Light Condition</th>
<th>Weather Condition</th>
<th>Surface Condition</th>
<th>Damage Estimate</th>
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<tbody>
<tr>
<td>1</td>
<td>5/3/2010</td>
<td>1735</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>RAN OFF ROAD</td>
<td>SPEED TOO FAST FOR WEATHER CONDITIONS</td>
<td>DAYLIGHT</td>
<td>RAIN</td>
<td>WET</td>
<td>$1001 TO $2500</td>
</tr>
<tr>
<td>2</td>
<td>5/11/2010</td>
<td>0916</td>
<td>2</td>
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<td>0</td>
<td>REAR END</td>
<td>FOLLOWING TOO CLOSELY</td>
<td>DAYLIGHT</td>
<td>CLOUDY</td>
<td>WET</td>
<td>$2501 TO $5000</td>
</tr>
<tr>
<td>3</td>
<td>5/14/2010</td>
<td>0344</td>
<td>1</td>
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<td>0</td>
<td>RAN OFF ROAD</td>
<td>RAN OFF ROAD RIGHT</td>
<td>DARK (NOT LIGHTED)</td>
<td>CLEAR</td>
<td>WET</td>
<td>$5001 TO $10000</td>
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<tr>
<td>4</td>
<td>6/16/2010</td>
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<td>CLEAR</td>
<td>DRY</td>
<td>$1001 TO $2500</td>
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<td>BRAKE FAILURE OR DEFECTIVE</td>
<td>DAYLIGHT</td>
<td>RAIN</td>
<td>WET</td>
<td>$1001 TO $2500</td>
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<td>OTHER (DRIVER) - EXPLAIN IN NARRATIVE</td>
<td>DAYLIGHT</td>
<td>CLEAR</td>
<td>DRY</td>
<td>$1001 TO $2500</td>
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<tr>
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<td>SPEED TOO FAST FOR WEATHER CONDITIONS</td>
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<td>RAIN</td>
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<td>CLEAR</td>
<td>DRY</td>
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<td>RAIN</td>
<td>WET</td>
<td>$5001 TO $10000</td>
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<td>RAIN</td>
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<td>DARK (LIGHTED)</td>
<td>CLEAR</td>
<td>DRY</td>
<td>$5001 TO $10000</td>
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<td>1/12/2012</td>
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<td>0</td>
<td>RIGHT ANGLE</td>
<td>LEFT OF CENTER</td>
<td>DAWN/DUSK</td>
<td>SNOW</td>
<td>ICE</td>
<td>$5001 TO $10000</td>
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<td>1/17/2012</td>
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<td>SPEED TOO FAST FOR WEATHER CONDITIONS</td>
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<td>CLOUDY</td>
<td>WET</td>
<td>$1001 TO $2500</td>
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<td>14</td>
<td>2/17/2012</td>
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<td>0</td>
<td>RIGHT ANGLE</td>
<td>FAILURE TO YIELD RIGHT OF WAY</td>
<td>DAYLIGHT</td>
<td>CLEAR</td>
<td>DRY</td>
<td>$2501 TO $5000</td>
</tr>
<tr>
<td>15</td>
<td>10/17/2013</td>
<td>1449</td>
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<td>0</td>
<td>0</td>
<td>RIGHT ANGLE</td>
<td>FAILURE TO YIELD RIGHT OF WAY</td>
<td>DAYLIGHT</td>
<td>CLEAR</td>
<td>DRY</td>
<td>$1001 TO $2500</td>
</tr>
<tr>
<td>16</td>
<td>11/28/2013</td>
<td>1214</td>
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<td>0</td>
<td>SAME DIRECTION SIDESWIPE</td>
<td>BRAKE FAILURE OR DEFECTIVE</td>
<td>DAYLIGHT</td>
<td>CLEAR</td>
<td>DRY</td>
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<td>3/2/2014</td>
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<td>0</td>
<td>RIGHT ANGLE</td>
<td>ROADWAY SURFACE CONDITION</td>
<td>DAYLIGHT</td>
<td>CLOUDY</td>
<td>ICE</td>
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<td>0</td>
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<td>ROADWAY SURFACE CONDITION</td>
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<td>CLOUDY</td>
<td>ICE</td>
<td>$5001 TO $10000</td>
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<td>19</td>
<td>3/3/2014</td>
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<td>0</td>
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<td>SPEED TOO FAST FOR WEATHER CONDITIONS</td>
<td>DAYLIGHT</td>
<td>CLEAR</td>
<td>ICE</td>
<td>$2501 TO $5000</td>
</tr>
<tr>
<td>20</td>
<td>8/28/2014</td>
<td>0035</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>RAN OFF ROAD</td>
<td>DISREGARD SIGNAL/REG SIGN</td>
<td>DARK (LIGHTED)</td>
<td>CLEAR</td>
<td>DRY</td>
<td>$1001 TO $2500</td>
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<td>21</td>
<td>2/2/2015</td>
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<td>REAR END</td>
<td>FAILURE TO YIELD RIGHT OF WAY</td>
<td>DAYLIGHT</td>
<td>CLEAR</td>
<td>DRY</td>
<td>$2501 TO $5000</td>
</tr>
</tbody>
</table>

### General Summary
- Number of Crashes: 21
- Property Damage Only: 16
- Injury Crashes: 5
- Fatalities: 0

### Light Condition
- Daylight: 16
- Dark (Lighted): 3
- Dark (Not Lighted): 1
- Dawn/Dusk: 1

### Weather Condition
- Clear: 11
- Rain: 5
- Cloudy: 4
- Snow: 1

### Surface Condition
- Dry: 9
- Wet: 8
- Ice: 5

### Damage Estimate
- $1001 TO $2500: 3
- $5001 TO $10000: 5
- $2501 TO $5000: 7
- $1001 TO $25000: 6
# Summary of Crash Data

## Concord and CR 430S

### Crash Data Summary

<table>
<thead>
<tr>
<th>Crash Number</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vehicle traveling too fast for wet pavement. Tried to avoid stopped vehicle in front of them, ran off road and hit rock.</td>
</tr>
<tr>
<td>2</td>
<td>Did not see vehicles turn signal in front of them. Swerved, ran off road and hit utility box.</td>
</tr>
<tr>
<td>3</td>
<td>Car in front stopped suddenly. Vehicle swerved and ran off road.</td>
</tr>
<tr>
<td>4</td>
<td>Driver left scene (intoxicated). Vehicle went off road, over corrected and flipped vehicle at least once.</td>
</tr>
<tr>
<td>5</td>
<td>Rear end collision. Brakes failed.</td>
</tr>
<tr>
<td>6</td>
<td>Rear-end collision. Vehicle started to go but stopped suddenly. Vehicle behind rear ended the vehicle.</td>
</tr>
<tr>
<td>7</td>
<td>A vehicle was stopped to turn left. The other vehicle tried to stop, slid on wet pavement and went off the road. Hit utility box and rock.</td>
</tr>
<tr>
<td>8</td>
<td>Driver did not see stop sign, went through intersection and struck tree on other side of road.</td>
</tr>
<tr>
<td>9</td>
<td>Vehicle tried to stop for school bus. Brakes failed, went left and hit guide wires and utility pole.</td>
</tr>
<tr>
<td>10</td>
<td>A vehicle was stopped to turn left. The other vehicle was unable to stop and rear-ended vehicle.</td>
</tr>
<tr>
<td>11</td>
<td>Drove through intersection and hit rock. Driver fled scene.</td>
</tr>
<tr>
<td>12</td>
<td>Vehicle turned too wide and hit stopped vehicle. Road was ice covered and slick.</td>
</tr>
<tr>
<td>13</td>
<td>Vehicle crested hill and did not see stopped vehicle until too late. Rear-ended stopped vehicle.</td>
</tr>
<tr>
<td>14</td>
<td>Vehicle pulled out and struck southbound vehicle.</td>
</tr>
<tr>
<td>15</td>
<td>Vehicle pulled out and struck southbound vehicle. The report did state that the driver of vehicle did look before turning.</td>
</tr>
<tr>
<td>16</td>
<td>Vehicle was making a left turn. Second vehicles brakes failed and then they tried to pass left of the first vehicle.</td>
</tr>
<tr>
<td>17</td>
<td>Vehicle slid into intersection due to ice on road.</td>
</tr>
<tr>
<td>18</td>
<td>Vehicle hit ice, went through intersection and hit guide wire.</td>
</tr>
<tr>
<td>19</td>
<td>Vehicle went through intersection and hit guide wire and tree.</td>
</tr>
<tr>
<td>20</td>
<td>A vehicle was stopped to turn left. Second vehicle did not see the stopped vehicle and rear-ended it.</td>
</tr>
<tr>
<td>21</td>
<td>Vehicle hit ice and slid into intersection and hit southbound vehicle.</td>
</tr>
</tbody>
</table>
Collision Diagram

Concord and CR 430 S
Crash data, January 2010 - February 2015
Traffic Volume

Traffic Counts

2013 Average Hourly Volume (Concord and 430 S)
Topography
Land Uses in the Area
Step 3: Select RSA Team

*Team Members:*

- Jim Hawley, Former APC Executive Director
- Capt. Brian Sterner, County Sheriff’s Department
- Greg Haltom, Transportation Director for Tip. School Corp.
- Dave Buck, PE, Public Works Director, City of West Lafayette
- Laura Slusher, PE, LTAP, HELPERS Project Manager
- Jim Knapp, PE, Senior Civil Engineer, Purdue Facilities Planning
- Tim Stroshine, EIT, Transportation Planner, APC
- Jon Fricker, PE, Professor at Purdue, Civil Engineering
Step 4: Site Visit
June 18, 2015
Check List

• One for each team member

• 14 Categories:
  - Moving Lanes,
  - Turn Lanes,
  - Driveways,
  - Shoulders,
  - Horizontal/Vertical Alignment,
  - Road Markings/ Delineation,
  - Light Conditions,
  - Signage,
  - Sight Distance,
  - Skid Resistance,
  - Pavement Defects,
  - Drainage,
  - Barriers, and
  - Driver Behavior

• 64 Questions
Step 5: Group Discussion

- Held at County Office Building
- Discussion of Observations and Analysis
- Develop both Short-Term and Long-Term Recommendations.
Short Term Solutions

Short-Term Recommendations – To minimize rear end and right angle crashes the County should take steps to increase driver awareness of the intersection. In the near term significantly improving sight distances is not possible. However, additional driver information about the intersection ahead and slowing left turning vehicles is recommended to improve driver predictability and reduce crashes.

Concord Road (CR 250E)
Greater intersection awareness is needed for north bound vehicles because of inadequate sight distance which is caused by a hill that obstructs the view of the intersection. Advanced intersection signing on the south leg is recommended to provide greater awareness of the approaching intersection.

CR 430S
Greater intersection awareness is needed for east bound vehicles. This can be accomplished with the installation of advanced intersection signing, possibly a stop bar, a larger Stop sign and a double arrow on the far side of the intersection. Vegetation on the west side of the intersection should be trimmed, particularly the northwest corner where it may be in the public right-of-way.
Long Term Solutions

Long-Term Recommendations – To reduce the rear end and run off the road type crashes the County should make significant improvements to the intersections and approaches. These measures will improve sight distance, remove the slower turning traffic from the higher speed through traffic and reduce crashes.

Concord Road (CR 250E)
To address the rear end crashes the intersection should be reconstructed. The hill on the south approach should be removed to improve sight distance and a passing blister should be constructed on the east side of the intersection. The lane and minimal shoulder widths should be widened to current standards and the new pavement should be a high friction surface to address the slippery pavement crash history. The recently completed Lafayette Trail Master Plan recommends a multi-use trail on this section of CR 250W and provisions for the trail should be included in any reconstruction.
Long Term Solutions

CR 430S
The road needs to be reconstructed so the approach eliminates the slight dip and road undulations just prior to the intersection. The lane and minimal shoulder widths should be widened to current standards and the new pavement should be a high friction surface to address the slippery pavement crash history. The 2040 Metropolitan Transportation Plan recommends a trail on CR430S that would connect the proposed trail on CR250E to the elementary and middle school a mile to the west. Provisions for the trail should be included in any reconstruction.

Relocation of CR 430S
In addition to reconstructing the intersection in its current location, there was discussion of completely relocating the intersection a half mile south so it would line up with CR450S on the east side of CR250E. This would eliminate the need to reconstruct the existing intersection, allow for the construction of a new intersection in a location with better sight distance and provide a better network for future traffic in this growing area. Depending upon available funding realigning CR430S should be considered by Tippecanoe County.
Step 6: Prepare Report

Road Safety Audit
County Road 250 E and County Road 430 S
Area Plan Commission of Tippecanoe County
July 2015
Step 7: Approval from INDOT for use of Federal HSIP funds

Request for HSIP Funds by Tippecanoe County

Project: Improvements to the Concord Road (CR 250E) and CR 430S Intersection

Submitted by the Area Plan Commission of Tippecanoe County
September 2015
INDOT Project Eligibility Requirements

1) Address a Strategic Highway Safety Plan Emphasis Area
   Emphasis Area 2, Intersection Crashes

2) Needs Analysis
   Road Safety Analysis

3) Financial Analysis
   Develop Cost Estimates for PE, RW & CN
   Calculate Benefit to Cost Ratio (HAT Software)

4) Project Development Timeline
5) Maintenance of HSIP Installation
6) Post Construction Safety Evaluation
7) Cover Letter
Step 8: Secure Federal HSIP Funds
Summary of Steps

• Step 1: Identify Location
• Step 2: Compiled Reference Data
• Step 3: Select RSA Team
• Step 4: Performed Site Review
• Step 5: Group Discussion & Problem Identification
• Step 6: Prepare Report
• Step 7: INDOT Submittal
• Step 8: Funding
Resources Available

FWHA Web Site:
www.safety.fhwa.dot.gov/rsa/

LTAP HELPERS Web Site
rebar.ecn.purdue.edu/LTAP1/HELPERS/HelpersAbout.aspx

NCHRP Synthesis 336, NCHRP
Questions?
Presentation Information

Reports are available on APC web site:
Tippecanoe County – Area Plan Commission – Transportation Planning - Crashes
- RSA Audit
- INDOT Safety Committee Request

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• Doug Poad, Senior Transportation Planner, Area Plan Commission
  dpoad@tippecanoe.in.gov