Innovative Intersection Improvements in Tennessee

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Types of Innovative Intersections in TN!

Roundabouts
J-Turns (RCUT)
Diverging Diamond Interchange
Temporary Compact Roundabout
ROUNDABOUTS

INNOVATIVE INTERSECTION IMPROVEMENT
Types of Projects Initiating Roundabouts?

- Traditional/Safety
- Private Development
- Local
Roundabouts – Traditional/Safety

Five Points, SR-81 @ SR-353 and Depot St, Jonesborough, TN
State Route 33 @ Everett High Rd and E Harper Ave, Maryville, TN

  ◦ Roundabouts to be installed at most interchanges
Five Points
State Route 33

BEFORE

AFTER
Future Projects – Alcoa Highway Project
Future Projects – Alcoa Highway Project
Future Projects – Alcoa Highway Project
Future Projects – Alcoa Highway Project
Roundabouts – Private Development

I-40 Exit 380 West Hills Exit Leonard Rogers

CostCo
I-40 Exit 380 West Hills Exit Leonard Rogers
I-40 Exit 380 West Hills Exit Leonard Rogers
I-40 Exit 380 West Hills Exit Leonard Rogers
I-40 Exit 380 West Hills Exit Leonard Rogers
CostCo Development

As part of this development, a mini roundabout was required in order to allow the traffic signal to function properly.
Local

BEFORE

AFTER

Bob Kirby Rd

Bob Gray Rd
Local

BEFORE

AFTER

Choto Rd
Local
Local

https://www.google.com/maps/d/viewer?mid=1H7kzy1IrISMK8rl_GLEiXe_70kA&ie=UTF8&hl=en&msa=0&z=18&ll=35.02510662829156%2C-85.14567031183134

23 Roundabouts
J-TURNS (RCUTS)

INNOVATIVE INTERSECTION IMPROVEMENT
WHAT IS A J-TURN?

• J-turns are an alternative to traditional roadway intersections on a four-lane highway
• Instead of motorists crossing fast-moving lanes of traffic to get to the opposing lanes, drivers at a J-turn intersection turn right in the same direction of traffic, merge into the left lane, and then make a left turn in the direction they intend to travel
• A J-Turn requires side road movements to be made indirectly by making a right turn, traveling about a quarter-mile (pending speed and curves) on the divided main road, and then making a U-turn to proceed in the opposite direction on the main road toward the intended destination
• The point of these turns is to greatly reduce – or even eliminate - a significant number of severe crashes common when drivers must cross-over busy highways to reach another road
• Angle Crashes account for over 40% of fatal crashes at intersections, and left turn crashes account for over 20% of fatal crashes at intersections
J-TURN EXAMPLE
Maury County State Route 6
J-Turn Projects
Maury County State Route 6
J-Turn Projects

State Route 6 at Canaan Road

State Route 6 at South Cross Bridge Road
Maury County State Route 6 J-Turn Projects

State Route 6 at Canaan Road  
State Route 6 at South Cross Bridge Road
Maury County State Route 6
J-Turn Projects

Canaan Road at State Route 6

South Cross Bridge Road at State Route 6
State Route Road Safety Audit

J-Turn Projects

• Due to the high number of fatal and other severe crashes at both the Canaan Road and South Cross Bridges Road intersections. A Road Safety Audit was performed in 2009

• It was determined that both of the intersections needed to be improved

• After a site review, and several other improvement options being considered, the RSA Team selected J-Turn improvements at both sites

• The J-Turns were completed in August 2010

• A crash summary of the intersection area showed an improvement after the installation of the J-Turns, with no further fatal or severe injury crashes
# State Route 6 Project Crashes Before and After the Completion of the J-Turns

<table>
<thead>
<tr>
<th>Location</th>
<th>FATAL</th>
<th>INCAPACITATING</th>
<th>NON-SEVERE INJURY</th>
<th>PROPERTY DAMAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Route 6 @ Canaan Road</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crashes 2000-2010</td>
<td>2</td>
<td>6</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Crashes 2010-2019</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>FATAL</th>
<th>INCAPACITATING INJURY</th>
<th>NON SEVERE INJURY</th>
<th>PROPERTY DAMAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Route 6 @ South Cross Bridge Road</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crashes 2000-2010</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Crashes 2010-2019</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>20</td>
</tr>
</tbody>
</table>
Other J-Turn Projects

- MONROE COUNTY SR 33 @ WALMART ENTRANCE
- CROCKETT COUNTY SR 20 @ CHESTNUT BLUFF ROAD
Crockett County and Monroe County

Crockett County State Route 20 @ Chestnut Bluff Road.

Monroe County State Route 33 @ Walmart Entrance.
# Crockett County and Monroe County Crash Comparison

## CROCKETT COUNTY STATE ROUTE 20 @ CHESTNUT BLUFF ROAD
**Pre and Post J-Turn Crash Comparisons**

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatal</th>
<th>Incapacitating</th>
<th>Non-Severe Injury</th>
<th>Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-2007</td>
<td>0</td>
<td>1</td>
<td>10</td>
<td>39</td>
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<tr>
<td>2007-2019</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>16</td>
</tr>
</tbody>
</table>

## MONROE COUNTY STATE ROUTE 33 @ WALMART ENTRANCE
**Pre and Post J-Turn Crash Comparisons**

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatal</th>
<th>Incapacitating</th>
<th>Non-Severe Injury</th>
<th>Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2013</td>
<td>1</td>
<td>8</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>2013-2019</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>
Diverging Diamond

INNOVATIVE INTERSECTION IMPROVEMENT
Current and Future DDI Locations

Interstate 40 @ State Route 66
Interstate 26 @ State Route 345
I-40 @ SR 66 – Traffic Analysis

60% of Northbound traffic is destined for I-40 West

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2032</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-40 Average Daily Traffic =</td>
<td>78,050</td>
<td>130,020</td>
</tr>
<tr>
<td>SR-66 Average Daily Traffic =</td>
<td>40,760</td>
<td>77,250</td>
</tr>
</tbody>
</table>

QUEUES!
I-40 @ SR 66
I-40 @ SR 66 – Other Options

Proposed Movements for Exit 407
I-40 @ SR 66 – Construction Begins

Project was let to Construction on **February 14, 2014**
Contract was awarded to **J & M Grading Division LLC**
Contract Estimated Costs:  **$15,647,552.60**

Set to be built in 3 phases
- Each phase varies the impacted roadways

Construction began on **March 12, 2014**
I-40 @ SR 66 – Post Construction Aerial
I-40 @ SR 66 – Post Construction Aerial
I-40 @ SR 66 – Before and After Crashes
### I-40 @ SR 66 – Before and After Crashes

<table>
<thead>
<tr>
<th></th>
<th>Before 2011</th>
<th>2012</th>
<th>2013</th>
<th>Yearly Average</th>
<th>After 2016</th>
<th>2017</th>
<th>2018</th>
<th>Yearly Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Crash</td>
<td>128</td>
<td>90</td>
<td>115</td>
<td>111</td>
<td>78</td>
<td>70</td>
<td>72</td>
<td>73</td>
</tr>
<tr>
<td>Rear End</td>
<td>78</td>
<td>47</td>
<td>70</td>
<td>65</td>
<td>36</td>
<td>25</td>
<td>27</td>
<td>29</td>
</tr>
<tr>
<td>Angle</td>
<td>19</td>
<td>9</td>
<td>10</td>
<td>13</td>
<td>14</td>
<td>14</td>
<td>18</td>
<td>15</td>
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<tr>
<td>Sideswipe, Same Direction</td>
<td>12</td>
<td>17</td>
<td>14</td>
<td>14</td>
<td>19</td>
<td>18</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>Roadway Departure</td>
<td>18</td>
<td>16</td>
<td>15</td>
<td>16</td>
<td>9</td>
<td>10</td>
<td>13</td>
<td>11</td>
</tr>
</tbody>
</table>

Construction on the DDI began in March 2014 and was completed in December 2015.

**Incapacitating Injury Crashes**

\[ \frac{6}{2} = 2 \text{ Crashes/Year} \]

\[ \frac{4}{1.33} = 1.33 \text{ Crashes/Year} \]

**Other Injury Crashes**

\[ \frac{52}{17.3} = 14 \text{ Crashes/Year} \]

\[ \frac{42}{14} = 14 \text{ Crashes/Year} \]
Under Construction – I-26 @ SR-354
Future DDI Locations?
I-75 at SR-131 - Ramp Queue
Temporary Compact Roundabout

INNOVATIVE INTERSECTION IMPROVEMENT
THANK YOU ..

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