Overview of Reduced Conflict Intersection Design & Operations

WisDOT Webinar
December 16 & 18, 2013
What are We Talking About?

Reduced Conflict Intersections

Unconventional Intersections

Innovative Intersections

Non-Traditional Intersections

Alternative Intersections
Intersection Design and Operations Task Force

• **Purpose**
  - Obtain and disseminate information on emerging intersection and interchange design and operations concepts
  - Work with project teams on communication and implementation.
  - Develop mechanisms to successfully implement new intersection types in Wisconsin
Intersection Design and Operations Task Force

Members:

- **BPD**: Jerry Zogg, John Bridwell, Pat Fleming
- **BTO**: Bill McNary, Rebecca Szymkowski, Travis Feltes
- **BHM**: Todd Matheson
- **Regional PDS**: Brian Roper
- **Regional Ops**: Angela Adams, Brian Bliesner
- **FHWA**: Dave Kopacz
- **Communications**: Mae Knowles, Kathleen Scholl, Steve Theisen
Overview

Why Intersection & Interchange Geometrics?

Wisconsin Statistics (05-09)

- 37% of all Crashes
- 26% of all traffic fatalities
- 49% of all non-fatal injuries
- 37% of all incapacitating injuries

Congested Intersections

Rural High Speed Intersections

Congested Interchanges

Geometric and/or Multimodal Challenges
Overview

- Diverging Diamond Interchange (DDI)
- J-turn Intersection
- Single Point Interchange (SPI)
- Continuous Flow Intersection (CFI)
- Echelon Interchange
- Turbine Interchange
- Grade-Separated Quadrant Interchange
(1) Alternative Intersections/Interchanges: Informational Report (AIR)
(2) USDOT Tech Briefs
(3) Signalized Intersections: Informational Guide

Unconventional Design Principles

**RE-ROUTE** left turn movements
- Move left turns away from main conflicts
- Improve overall signal timing for all movements
- Serve thru traffic more efficiently

**REDUCE** signal phases
- Shorter cycle length, service times, queuing & average delay

**REMOVE** and separate conflicts
- Reduce number of conflict points
- Separate conflict points
Reduced Conflict Points = Increased Safety

Diamond = 30
SPI = 24
DDI = 18
The Benefits of Two-Phase Signals

- **% Green Time**: 
  - Available for Main Through Movement
  - 100%
  - 90%
  - 80%
  - 70%
  - 60%
  - 50%
  - 40%
  - 30%
  - 20%
  - 10%
  - 0%

- **Phase 1 (no signal)**: 100% green time available for movement.

- **Phase 2**: 70% green time available for movement.

- **Phase 3**: 50% green time available for movement.

- **Phase 4**: 30% green time available for movement.

- **Red Phase**: 30% red time when movement sees red and cannot go.

- **Green Phase**: 30% green time when movement sees green and can go.

- **Red Phases**: More arrows = More phases = Less time for Main Through Movement.
What is a Diverging Diamond Interchange?

- Essentially a diamond interchange with cross-over intersections at the ramp terminals.
DDI Signal Phasing
DDI Signal Phasing
Diverging Diamond Interchange (DDI)

Typical Application:
Service interchange between a freeway and a high-volume arterial with heavy left turn movements

Advantages
- Handles more turning traffic
- Eliminates left-turn conflicts/signals
- Minimizes right of way impacts
- Safer design

Disadvantages
- Not well suited for arterials with high through volumes
- Typically no ramp off/ramp on movements allowed
- Interchange layout is unfamiliar to drivers
**General Design Standards**

- **Design speed** is based on the design class and regulatory speed of the roadway.
- **Vertical alignment** and **sight distance** are based on the **design speed**.
- **Intersection design vehicles** and **check vehicles** and **OSOW checks** are per FDM 11-25-2.
- **Cross sections** on the approach roadways are based on the design class.
- **Bridge width** is based on the design class of the roadway.
- **Ramp designs** are based on FDM requirements.
The eyebrow helps prevent wrong way movement:

- Makes a right turn difficult
- Head-On collision obstructed

1 Page 10 of July 2013 Jacobs-peer-review of proposed DDI at IH 39-90 and STH 11 (Avalon Road)
Page 13 of May 2013 HDR Peer review of proposed DDI at WIS 441 and US 10 shows acceptable range of 25-50 degrees
High-center crown, aka table-top
- Driver experiences change in cross slope
- Common for retrofits
- Can cause snow removal issues
- Drainage on outside

Low-center crown, aka reverse-crown
- Slopes to drivers’ right
- Snow removal without blade switch
- Drainage in center
DDI – Crossover - Reverse Curve & Tangent

**Horizontal Curve and Superelevation**
- Based on Low-Speed Urban design
- 10 mph below posted speed *(desirable min.)*
- 15 mph below posted speed *(absolute min.)*
- NC or RC superelevation
- Widen travel lanes to accommodate truck off-tracking

**Tangent Thru Crossover**
- 15-20 feet min. in advance of the stop bar
- 10-15 feet beyond the last transverse travel path

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1 Page 10 of July 2013 Jacobs-peer-review of proposed DDI at IH 39-90 and STH 11 (Avalon Road)
Exit ramp to Entrance Ramp movement
Requires special design

Approach to free flow left turn entrance ramp
Avoid excessive speed differential between thru traffic and left turning traffic

Expected Oncoming Traffic
Actual Oncoming Traffic

ISD for right turn at Exit ramp terminal
Driver expectancy issue

Original graphic per IH 39/90 project team
**Pedestrians in Median**
No conflict with left turns
Barrier protected

**Pedestrians on Outside**
Potentially unsafe because of conflicts with free-flow left-turn entrance ramp

**Pedestrians path thru island**
*Kinked* to make it clear that a safe two-stage crossing cannot be made one immediately after the other.
Bicyclists use the on-road bicycle lane to navigate through the DDI, or bicyclists may use the shared-use path if one is provided.
Design & Operations DOT References

1. Missouri DOT
   - Missouri’s Experience with a Diverging Diamond Interchange
   - Lessons Learned

2. Utah DOT
   - Report No. UT-12.05
   - UDOT DIVERGING DIAMOND INTERCHANGE (DDI) OBSERVATIONS AND EXPERIENCE
   - Prepared For: Utah Department of Transportation
   - Prepared By: I-15 CORE Traffic Team
   - April 2012

3. Missouri DOT
   - 234.6 Diverging Diamond Interchanges
   - From Generation Policy Class
   - First in the Nation

WisDOT DDI Projects - Peer Reviews
HDR workshop presentation - February 2013

1. [http://library.modot.mo.gov/RDT/reports/UnNumbrd/or10021.pdf](http://library.modot.mo.gov/RDT/reports/UnNumbrd/or10021.pdf)
SW Region Experience

Diverging Diamond Interchange

Wis 11 (Avalon Rd) Interchange
IH 39/90 & STH 11 (Avalon Road)

- 3 interchange types evaluated through the ICE process:
  - Diamond Interchange
    - Traffic signals
    - Roundabouts
  - Diverging Diamond Interchange
- IH 39/90 CMT Decision in coordination with:
  - WisDOT:
    - SWR
    - BTO
    - BPD
    - OSOW Group
  - FHWA
Why a DDI at the Avalon Road Interchange

Good traffic flow at interchange
• Design allows better traffic flow for turning vehicles
  ▪ 85% of traffic destined for Interstate
• Fewer lanes needed than signalized diamond

Improved Safety
  – Fewer conflict points

Large Vehicle Accommodation
  – Trucks stay in their lane through cross-over intersections
  – Need to accommodate Oversize / Overweight vehicles

Positive results with other DDIs constructed around the country
Lessons Learned in DDI Presentations

• Focus on the driver’s eye view
• Discuss DDI as two one-way streets
• Emphasize “easy” and “simple”
• Use personal stories
• Prepare for roundabout questions
WIS 441 Tri-County Project

Diverging Diamond Interchange (DDI)
NE Region
Oneida Street
WIS 441 Interchange control

Proposed roundabouts
Roundabouts no longer proposed
Proposed diverging diamond interchange (DDI)
Design updates

• Diverging diamond interchange
Why a DDI at Oneida?

- Saves $3M compared to RAB and standard signal alternatives
- Better 2038 traffic level-of-service than alternatives (C v. D/E)
J-Turn Intersection

Operational Characteristics

- Side road traffic turns right only
- Side road left-turns and through required to U-turn downstream
J-Turn Intersection

• Where are they applicable?
  - Low to medium side-street Thru/left volume divided expressways
  - Heavy left-turn volume from major road
  - Side road total volume ratio is typically ≤ 20%
  - Side road daily volume between 1,000 – 4,000
  - High number of far-side right angle crashes
  - Side road crossing gap times are insufficient
  - Median width is preferably 50 ft or greater
    • Minimum can be down to 40 ft
# J-Turn Intersection

## Typical Application:
- Low to medium side-street Thru/left volume divided expressways

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reduces crash potential</td>
<td>• Requires special signage</td>
</tr>
<tr>
<td>• Particularly far side right angle crashes</td>
<td>• Requires public education</td>
</tr>
<tr>
<td>• Can accommodate up to two times the volume when compared to traditional median crossover type</td>
<td>• Creates indirect movements</td>
</tr>
<tr>
<td>• Easily retrofitted without purchasing additional R/W</td>
<td>• Creates mainline weaving movements</td>
</tr>
<tr>
<td>• Low to medium cost</td>
<td></td>
</tr>
<tr>
<td>• Non signalized treatment</td>
<td></td>
</tr>
</tbody>
</table>
J-turn Geometric Considerations

- Offset Left-turn lane and ISD
- Offset Right-turn lane and ISD
- Do not offset turn bay for U-turn
- U-turn distance from intersection
- Locate U-turn median openings on or close to a tangent
- U-turn lane length
- ISD for U-turns
- Median width
- Loons for U-turning trucks
- WisDOT has not used right-turn acceleration lanes
- WisDOT has only used STOP control at the side road intersection
- Protect against wrong-way entry
- Bicyclists/ Pedestrians
J-turn Design Guidance

- FDM 11-25-1.3.2, “J-turn Intersection”, A
- WisDOT recent project plans
- NCHRP Report 650, “Median Intersection Design for Rural High-Speed Divided Highways”,
- FHWA-HRT-09-60, “Alternative Intersections / Interchanges: Informational Report (AIIR), chapter 4,
- Missouri DOT: 233.2.6 Type 4: Directional Median Opening with Downstream U-Turns,
  [http://epg.modot.mo.gov/index.php?title=233.2_At-Grade_Intersections_with_Stop_and_Yield_Control](http://epg.modot.mo.gov/index.php?title=233.2_At-Grade_Intersections_with_Stop_and_Yield_Control)
J- Turn
USH 53 & CTH B
Douglas County

By: Greg Helgeson,
Traffic Safety Engineer
J-Turn

Background Info:

- **USH 53/CTH B, Douglas County**
- **USH 53**
  - 65 MPH rural expressway
  - AADT about 7000 VPH
- **CTH B**
  - 55 MPH rural arterial
  - AADT about 1500/2500 VPH
- 95’ median with yield control
- “Far side” right angle crashes
Road Safety Audit (RSA) was conducted

- Recommended multiple alternatives for further consideration.

Alternative Analysis looked at 5 alternatives:

- Widening median to create STOP
- Offset T intersections
- J-turn intersection
- Overpass with right-in/right-out roadways in two quadrants
- Diamond interchange

J-turn qualified for HSIP funding
J-Turn – Consent Building

• Initial Meeting:
  ▪ County Highway Dept.
  ▪ County Sheriff’s Dept.
  ▪ Wisconsin State Patrol
  ▪ Township of Hawthorne

• Support from FHWA Safety engineer

• County Highway Committee endorsement

• County Board presentation (informed consent)
J-Turn – Public Consent

- Strong support from County Board member/school bus driver.
- Primary objector was adjacent business owner.
- PIM was contentious
  - Many wanted an interchange
  - Officials showed support of J-turn
- Packaging with mill/fill project timely decision
• Final design added:
  - Positive left turn offset
  - Offset right turns
  - Median curb cuts for pedestrians, bicycles, snowmobiles and ATV’s
  - LED lighting of intersection and both J-turns.
• No real estate purchase
J-Turn Design
• Developed “Driving a J-Turn Intersection” flyer
• Placemats for area restaurants.
J-Turn – Results

• Construction complete 10/8/2011
  ▪ No crashes in two years since
  ▪ Delay – about one minute to traverse
  ▪ Added:
    • Diagrammatic guide signs for CTH B
    • Flex tubes to prevent median cross-cutting
J-Turn – Results

- Less opposition once built
- Emergency responders pleased
- Consent building was key to success
J- Turn
STH 29 & CTH VV
Brown County
Scott Nelson
Traffic Safety Engineer
NE Region
J-Turn

• Background Info:
  - STH 29 & CTH VV, Brown County
  - STH 29
    • 65 MPH rural expressway
    • AADT about 23,000
  - CTH VV
    • 55 MPH rural arterial
    • AADT about 1800/2000
  - 60’ Median
  - HSIP project to correct
    “Far side” right angle crashes
J-Turn – Public Outreach

• Handout following NW Region Template with FAQ
J-Turn Design
J-Turn Design

Bulb-Out to J-turns
J-Turn – Results

• Construction complete 7/12/2013
  ▪ Too early to make a conclusions on safety improvement
  ▪ Law enforcement is very supportive of the J-Turn
  ▪ Only reported crash is one property damage rear end at the side-street approach
J-Turn Lessons Learned

• Left turn approach to U-turn should be adjacent to the through lane

• Intersection and U-turns should be lighted
J- Turn

STH 23 & CTH M

Sheboygan County

Opened: Nov. 15, 2013
J-Turn

• Background Info:
  - STH 23 & CTH M, Sheboygan County
  - STH 23
    • 65 MPH rural expressway
    • AADT about 19,000
  - CTH M
    • 55 MPH rural arterial
    • AADT about 800/1300
  - 60’ Median
  - HSIP project to correct
    “Far side” right angle crashes
• Intersection geometrics similar to STH 29 & CTH VV
• Moderate opposition to the J-turn alternative
• Quarry to north of intersection. Several small businesses to the south including some trucking
• Farm machinery utilizes the intersection
• Implemented 3 right-in/right-out, left-in intersections just to the west of this intersection at the same time this intersection was constructed
3-Phase Signal Operation

1-Traffic Signal
Single Point Interchange (SPI)

**Typical Application:**
- Service interchange between a freeway and a high-volume arterial with both heavy left turns and through movements

**Advantages**
- Simplified signal phasing
- May require less R/W
- Increased capacity for all movements
- Operates well with closely spaced signalized corridor
- Safer design – 24 vehicular conflict points

**Disadvantages**
- Requires large structure
- Longer clearance times
- Pedestrian traffic must be low
- No ramp off/ramp on movements allowed
- Interchange layout is unfamiliar to drivers
- Left turn curves are desirably single radius
- If compound curve is used then smaller curve is at least 0.5 of larger curve
- SSD along curve based on speed rating of curve
- Structure skew is desirably less than 30-degrees
AASHTO GDHS 2004 ("Green Book"), page 785

**Missouri DOT:** 234.4 Single Point Urban Interchanges (SPUIs),

**FHWA-HRT-09-60,** “Alternative Intersections / Interchanges: Informational Report (AIIR), chapter 9

**WisDOT project plans**
- Eau Claire: USH 53 & USH 12 (SPI is on top)
- Madison: Beltline & Verona Road (SPI is underneath)
Single Point Interchange
USH 53 & USH 12
Eau Claire County
By: Greg Helgeson, Traffic Safety Engineer
Single Point Interchange (SPI)

• Background Information
  ▪ Location
  ▪ USH 53 by-pass project
  ▪ SPI decision late 1990’s
  ▪ Opened August 2006
  ▪ Interchange Cost: $11.4 million
SPI - Design
Signal Monotube

USH 53 NB
USH 53 SB
USH 12 WB
USH 12 EB
OTTER RD
Opposing left turns allow clear view of conflicting traffic.
SPI – Design

- New Interchange
- Otter Road proximity
- Era prior to Roundabouts and Diverging Diamonds
- Ramp right turns not signalized
- Tower Lighting
- Back-up Power Generator
- MnDOT I-494 SPI used as guide
SPI – Field Review

• Field changes prior to opening:

Supplemental far side signals heads
• Field changes prior to opening:

Grooved left turn guide markings
Results

• Has performed well
• No formal operation or safety complaints
• Average Crashes
  ▪ 12 crashes per year
  ▪ 8 rear end crashes per year
  ▪ Low severity
• Current ADT’s
  ▪ USH 53: 34,000 VPH
  ▪ USH 12: 20,000 VPH
SPI – Lessons Learned

- Need more spacing to adjacent signals (Otter Road)
Continuous Flow Intersection (CFI)

• Best suited for signalized intersections where:
  ▪ Triple lefts are needed
  ▪ Additional thru-lanes are needed

http://www.youtube.com/watch?v=C1UeB3-5dnA

Source: Utah DOT
Typical Application:
Signalized intersections where a traditional at grade alternative is not sufficient

Advantages
- 2 or 3 Phase signal operation
- Removes left turn traffic from main intersection
- More green time for all movements
- Serves high volume facilities
- Lower cost vs. Interchange

Disadvantages
- Corner business access impact
- May be a larger footprint than traditional
- Potential for wrong way movements
- Potential for right turn and left turn conflicts
## UDOT CFI Guidelines

### CFI Guideline

A UDOT Guide to Continuous Flow Intersections

**July 2013**

<table>
<thead>
<tr>
<th>No.</th>
<th>Intersection</th>
<th>City</th>
<th>2-Leg</th>
<th>4-Leg</th>
<th>Bypass Right Turn</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>3500 S &amp; Bangerter Hwy</td>
<td>West Valley City</td>
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<td>●</td>
<td>●</td>
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<tr>
<td>2</td>
<td>6200 S &amp; Redwood Rd</td>
<td>Taylorsville</td>
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<td>●</td>
<td>●</td>
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<tr>
<td>3</td>
<td>5400 S &amp; Bangerter Hwy</td>
<td>Taylorsville</td>
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<td>5</td>
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<tr>
<td>6</td>
<td>5400 S &amp; Redwood Rd</td>
<td>Taylorsville</td>
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<td>7</td>
<td>3100 S &amp; Bangerter Hwy</td>
<td>West Valley City</td>
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<tr>
<td>8</td>
<td>Sandy Pkwy &amp; University Pkwy</td>
<td>Orem</td>
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<td>●</td>
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<td>9</td>
<td>6200 S &amp; Bangerter Hwy</td>
<td>West Jordan</td>
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<td>10</td>
<td>7000 S &amp; Bangerter Hwy</td>
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<td>11</td>
<td>13400 S &amp; Bangerter Hwy</td>
<td>Riverton</td>
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</tr>
</tbody>
</table>
Echelon Interchange

• Operation
  ▪ Two independent two-phase signals
    • Preserves progression capabilities on both arterials
  ▪ Unopposed left turns
  ▪ Two left merges
Echelon Interchange

**Typical Application:**
- Signalized intersections where an at grade alternative is not sufficient

**Advantages**
- 2 Phase signal operation
- Unopposed left turns
- More green time for all movements
- Serves high volume arterials

**Disadvantages**
- High structure cost
- Corner business access impact
- No u-turns at or near interchange
- Additional structure maintenance
- Pedestrians must climb grades or cross streets unprotected by signals
- Two left side entrance merge lanes
### Geometric Issues

1. **Left-hand entrances**
2. **Free-flow right turn - Potential ped conflict**
3. **Approach Sight Distance to intersection beyond structure**
4. **ISD to left - thru structure**
5. **Vertical alignment on structure:**
   - Approach grades
   - Vertical curve and sight distance to and thru intersection
6. **Intersection geometry – vehicle turning radii**
7. **Wrong-way entry potential**

### Structure Issues

<table>
<thead>
<tr>
<th>Lateral &amp; Vertical Clearances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pier placement</td>
</tr>
<tr>
<td>Barriers and transitions</td>
</tr>
<tr>
<td>Retaining wall crash worthiness</td>
</tr>
</tbody>
</table>

### Other

Accommodating other intersection users: pedestrians, bicyclists, transit
Echelon Interchange - Region Experience

Madison Beltline & USH 51 / Broadway (proposed)
Turbine Interchange

I-85/I-485 Interchange in North Carolina

## Turbine Interchange

### Typical Application:
A system interchange between two freeways or between a freeway and a high-volume arterial. A turbine interchange is an alternative to a multi-level directional interchange.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• All movements are free-flow</td>
<td>• May require more R/W than a multi-level directional interchange</td>
</tr>
<tr>
<td>• Weaving eliminated within interchange</td>
<td>• Initial public acceptance may be challenging because the interchange layout is unfamiliar</td>
</tr>
<tr>
<td>• Very high capacity</td>
<td>• Curved sections of ramps may have restricted sight lines in segments with roadside barrier (Similar to multi-level directional interchanges)</td>
</tr>
<tr>
<td>• Flexibility in traffic handling and construction phasing</td>
<td></td>
</tr>
<tr>
<td>• Compared to a multi-level directional interchange, a turbine interchange has:</td>
<td></td>
</tr>
<tr>
<td>• Smaller bridges with simpler designs, which are less expensive to construct and maintain</td>
<td></td>
</tr>
<tr>
<td>• Flatter ramp grades</td>
<td></td>
</tr>
</tbody>
</table>
Turbine Interchange - Region Experience

IH 39/90 & Madison Beltline (proposed)
Grade Separated Quadrant Interchange

**Typical Application:**
Provide an interim or long term solution at rural expressway intersections instead of a full interchange. Design is similar to at-grade quadrant intersection.

**Advantages**
- T-intersections have fewer conflict points
- Less expensive than a full interchange
- No signals on expressway

**Disadvantages**
- Structure cost
- Structure maintenance

Grade Separated Quadrant Interchange

References

• NCHRP Report 650, “Median Intersection Design for Rural High-Speed Divided Highways”,

• FHWA-HRT-09-60, “Alternative Intersections / Interchanges: Informational Report (AIIR), chapter 5,
Grade-Separated Quadrant Interchange

Madison: Junction Road & Mineral Point Road in (under construction) [Grade separation on SB Junction Rd. only]

Dane County: US 12 and Hwy 73 (proposed) [Neither road is currently expressway]

Fond du Lac:
- US 151 at Hwy 175
- US 151 at US 45


IH 39/90 North Segment - Sep 20, 2013 meeting handout – EMCS/Dane Partners
Public Outreach

Goal: Consistent, understandable messages

- Templates are located in the PIO Toolbox
Consistent Messaging

Innovative Interchange and Intersection Design

WisDOT is considering the use of a variety of interchange options at key highway interchanges across the state, using innovative design to help move large volumes of traffic through limited amounts of space safely and efficiently.

- **Diverging Diamond Interchange (DDI)** - This innovative interchange, sometimes called a "double crossover diamond," is designed to intuitively guide motorists through the pathways. These interchanges have been shown to increase capacity and safety, decrease congestion and minimize the cost of new infrastructure.
- **Echelon Interchange** - This innovative interchange is designed to accommodate two high-volume streets. An echelon introduces a bridge, splitting traffic into two levels, creating two separated intersections of one-way streets. Because there is no opposing traffic for left turns there is more green light time for moves.
- **Single Point Interchange (SPI)** - This innovative design helps move large volumes of traffic through limited amounts of space safely and efficiently. All traffic controlled by a single set of traffic signals located in the center of the intersection.

Videos
- North Carolina DDI video - Good overview of a DDI interchange.
- Missouri DDI video - A driver's experience traveling through a DDI.
- Example Video of Diverging Diamond Interchange

Questions about the content of this page, contact:
John Bishop and Mark Morrison
Last modified: June 7, 2012
Customizing for the Project

What is a Diverging Diamond Interchange?

A Diverging Diamond Interchange (DDI) is a type of highway interchange with a radial layout. The DDI is designed as a standard diamond layout, providing increased capacity and efficiency while minimizing overall construction time and impact to traffic. DDIs are commonly used at major intersections, where the number of vehicles is high, to improve traffic flow and safety.

ADVANTAGES of the DDI

- DDIs are an alternative to roundabouts, traffic signals, and stop signs at control points, offering a higher capacity and lower costs, and are designed to meet the needs of all road users.
- They are easier to build and maintain, reducing the need for ongoing maintenance.
- DDIs can be designed to accommodate varying traffic volumes.
- They can be integrated into existing road networks, facilitating the smooth flow of traffic.
- DDIs are visually appealing and contribute positively to the surrounding environment.

DRIVING the DDI

- Accelerate in the center lane and move to the left
- Continue through the intersection
- Merge onto the exit onto I-94

Driving a J-turn intersection

How to drive a future crossing US 53 or turning left:
1. On County D, Yellow Lake Rd, US 53, look left for a stop sign with a turn. Turn right from County D into the right turn lane of US 53, increasing your speed to 35 mph.
2. Look for a stop sign in the left lane of US 53, signal left, and enter the left turn lane.
3. Stop at signal, make left turn.

Video - How a J-turn intersection works

- PLAYLIST: WISDOT - How a J-turn Intersection Works
Next Steps

• Look in the FDM for current guidance, sections
• Follow the ICE process when evaluating alternatives
• Plan for analysis and design training for DDI’s
• FDM guidance will be developed for some of this designs
• Contact a task force member with any question
Questions?