



*Missouri Department of Transportation*

**2011 Transportation Research Forum**  
*What's on the Horizon?*

*March 10, 2011*

*“First In the Nation”*

# *Diverging Diamond Interchange*

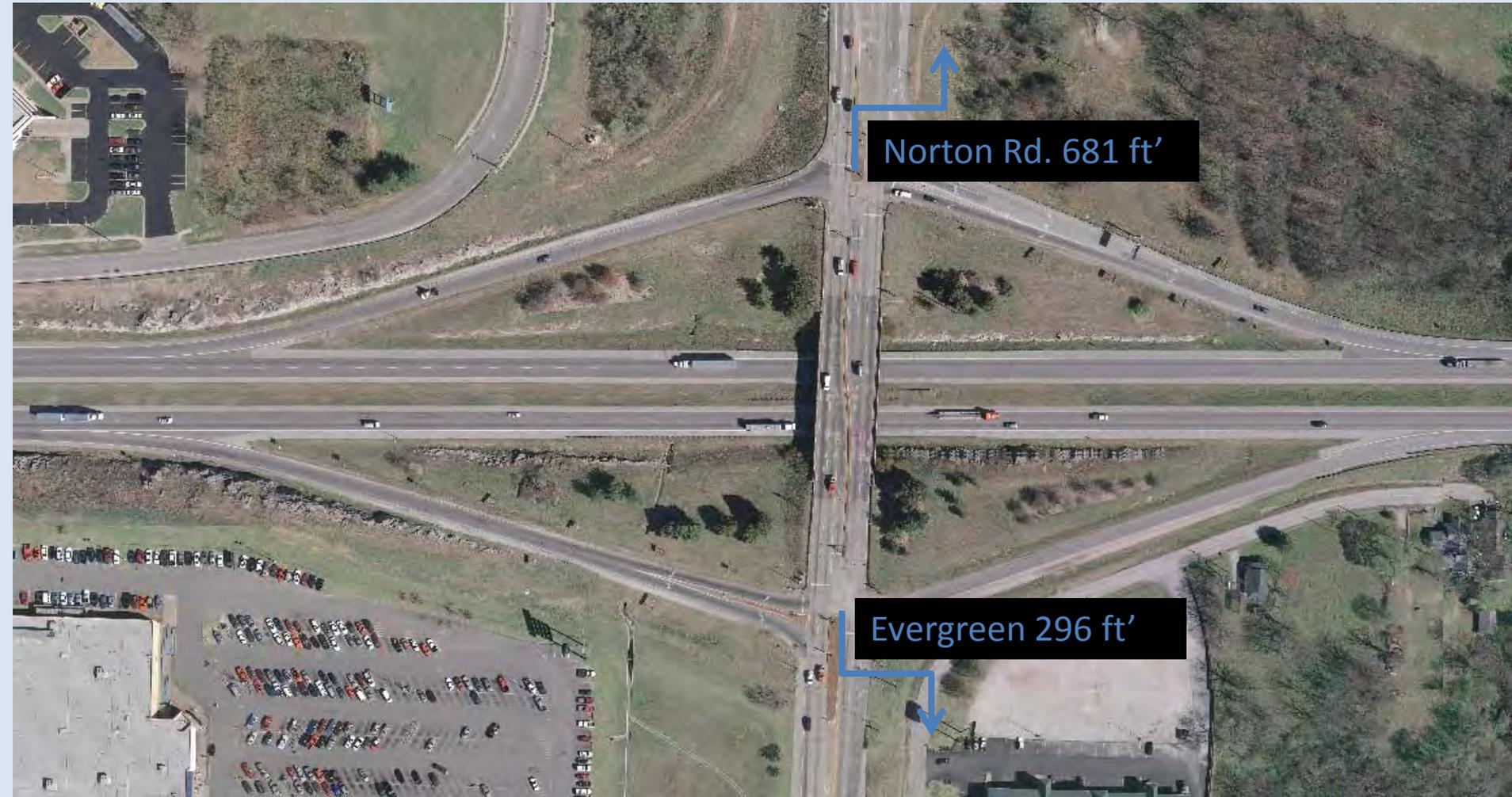
*IS 44 and MO 13 - Springfield, MO*

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**District Traffic Engineer**  
**MoDOT – Springfield Region**

**Thomas K Ryan, PE**  
**Senior Traffic Engineer**  
**HDR**



# Kansas & I-44, 2008



# Basic Interchange Problems

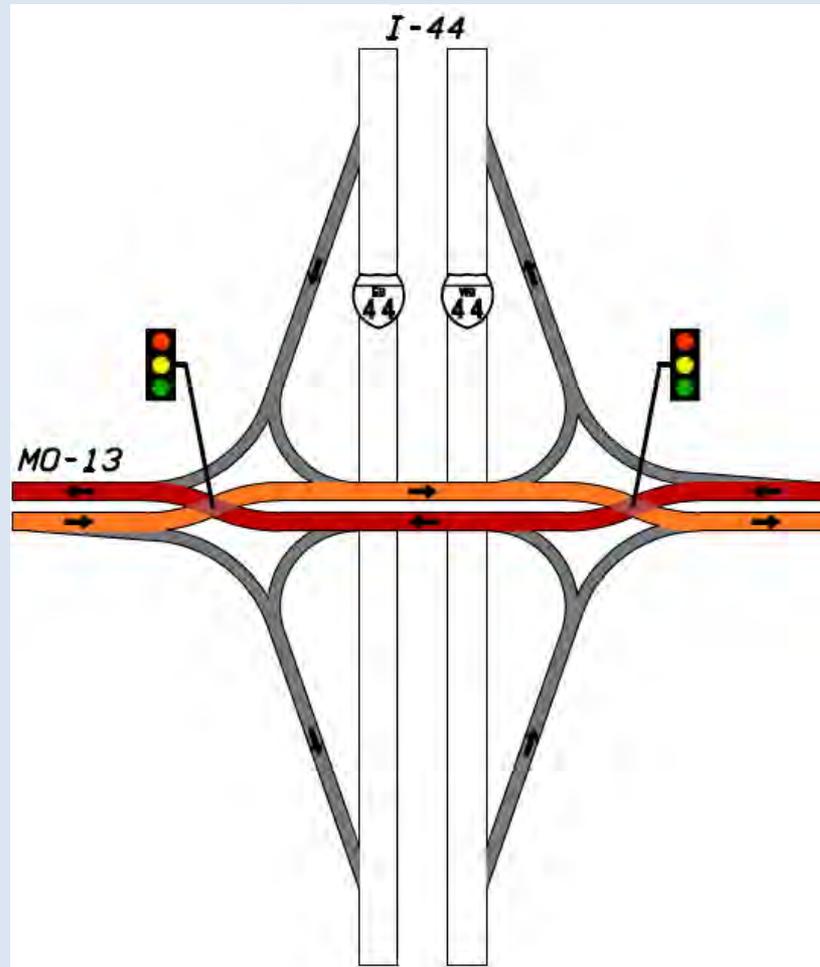
- Congestion
  - 15-30% left turns
  - 10-15% HGV
  - Closely spaced signals
- Crashes
- Pedestrian Accommodations



# Congestion



# Concept Design of the DDI



# inVISION Studios Simulation

This video animation/simulation is a graphic representation and is intended to be used for informational and entertainment purposes only and does not necessarily follow Missouri Department of Transportation Specifications or Standards. This video animation/simulation is not intended to be a comprehensive standard or guideline for use or placement of traffic control devices.



# Opening Day – June 21<sup>st</sup>, 2009



# July 7<sup>th</sup>, 2009



2011 Transportation Research Forum

# Pedestrian Access



# Pedestrian Access



# Project Timeline

- Construction began: Jan 16<sup>th</sup>, 2009
- Lane restrictions on bridge: Mar 4<sup>th</sup>, 2009
- Traffic moved to DDI: Jun 21<sup>st</sup>, 2009
- Construction completed: Jul 7<sup>th</sup>, 2009
- Last modification: Aug 25<sup>th</sup>, 2009
  
- Final cost: \$3.2 million



# Operational Effects

- Accidents
  - Total Reduction 24% (50% between ramps)
  - Injury Reduction 50%
- Congestion removed on the bridge
- Consultant Performance Evaluation (HDR)



# DDI Evaluation

## Areas of Evaluation

- Traffic Operations
- Safety
- Public Opinion
  - Public Survey
  - Interview Larger Vehicle Drivers
  - Bike/Pedestrian



# DDI Evaluation

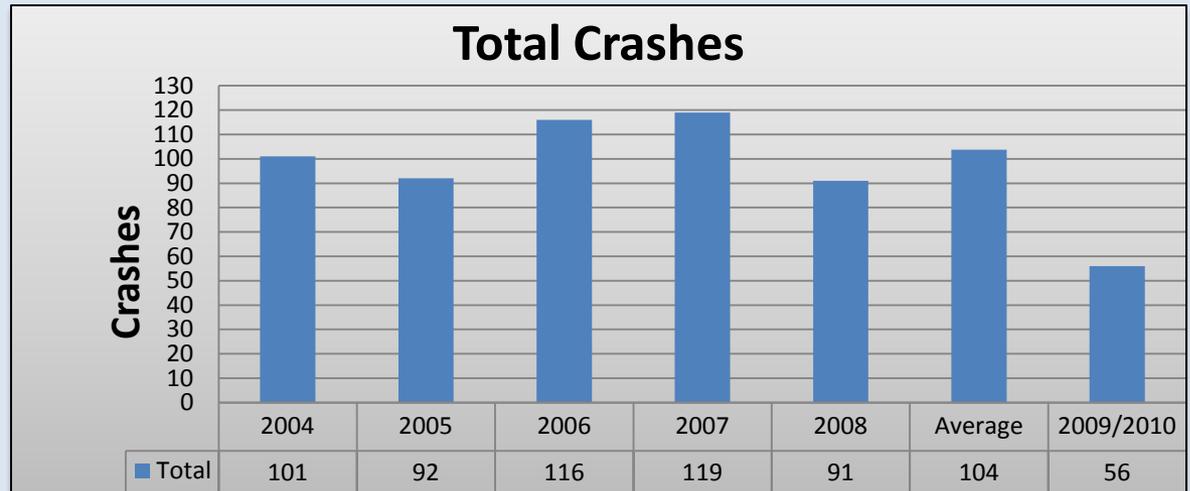
- Traffic Operations
  - Left Turn Movements (Ramp and Crossroad)
  - Through Movements
  - Future Traffic Conditions (2035)
  - Event/Incident Traffic Conditions
  - Over-dimension loads (18' x 200')

		Average delay time per vehicle (Seconds)	Total delay time (Hours)	Total Stops
2008 Diamond	AM	32.9	74.0	6,290
	PM	39.4	95.7	7,095
2010 DDI	AM	29.6	68.2	5,853
	PM	42.4	107.5	7,896
2035 Diamond	AM	74.4	184.2	13,908
	PM	103.5	269.6	19,701
2035 DDI	AM	93.0	202.2	11,112
	PM	95.6	250.7	16,881



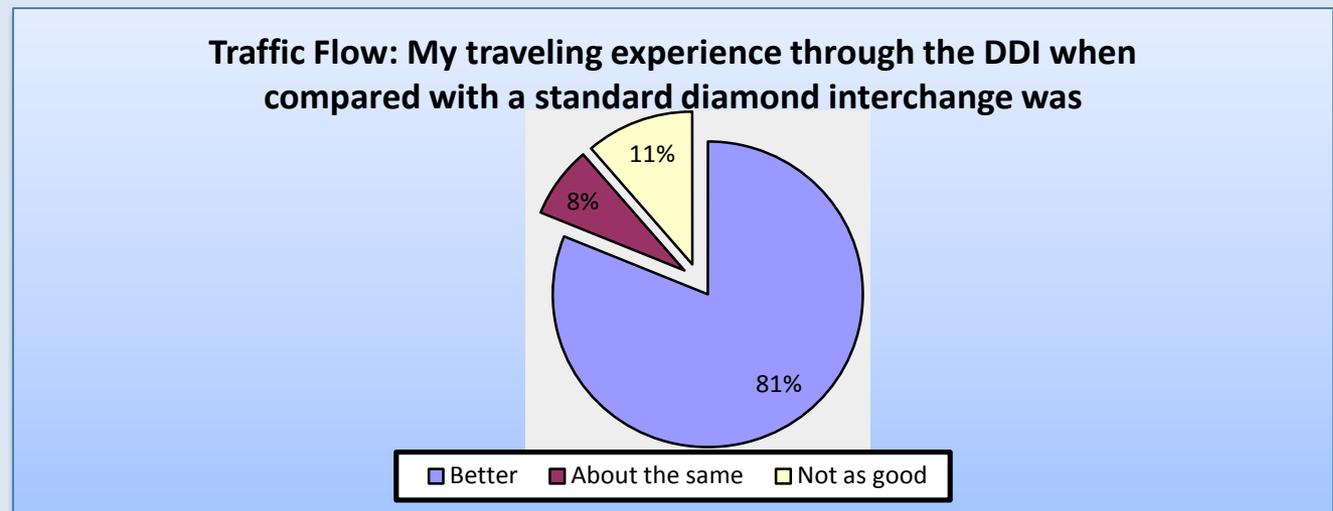
# DDI Evaluation

- Total Crashes were down
- Left Turn Crashes were reduced or eliminated
- Rear-end Crashes were down
- No noticeable difference in crash types



# DDI Evaluation

- Public Opinion
  - Traffic delay or congestion
  - Safer or as safe as a diamond interchange
  - Understanding
  - Pedestrian/bike movements are better
  - Larger size vehicles



# DDI Evaluation

- Pedestrian/Bike Community
  - Enhancement to Ped/Bike were appreciated
  - Safety was improved
  - Bike and Pedestrian Separation
  - Outside versus middle facilities



# DDI Evaluation

- Larger Vehicles
  - Traffic Delay and Congestion
  - Understanding
  - Movement through the DDI
  - Over-dimension loads
  - Recreational – trailers, boats, etc.



# National Media

“Kudos to MODOT for such a simple and elegant solution”



“Looks pretty strange, but if it improves traffic flow, and safety, how can anyone complain?”



# Questions?

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# DDI Video

