

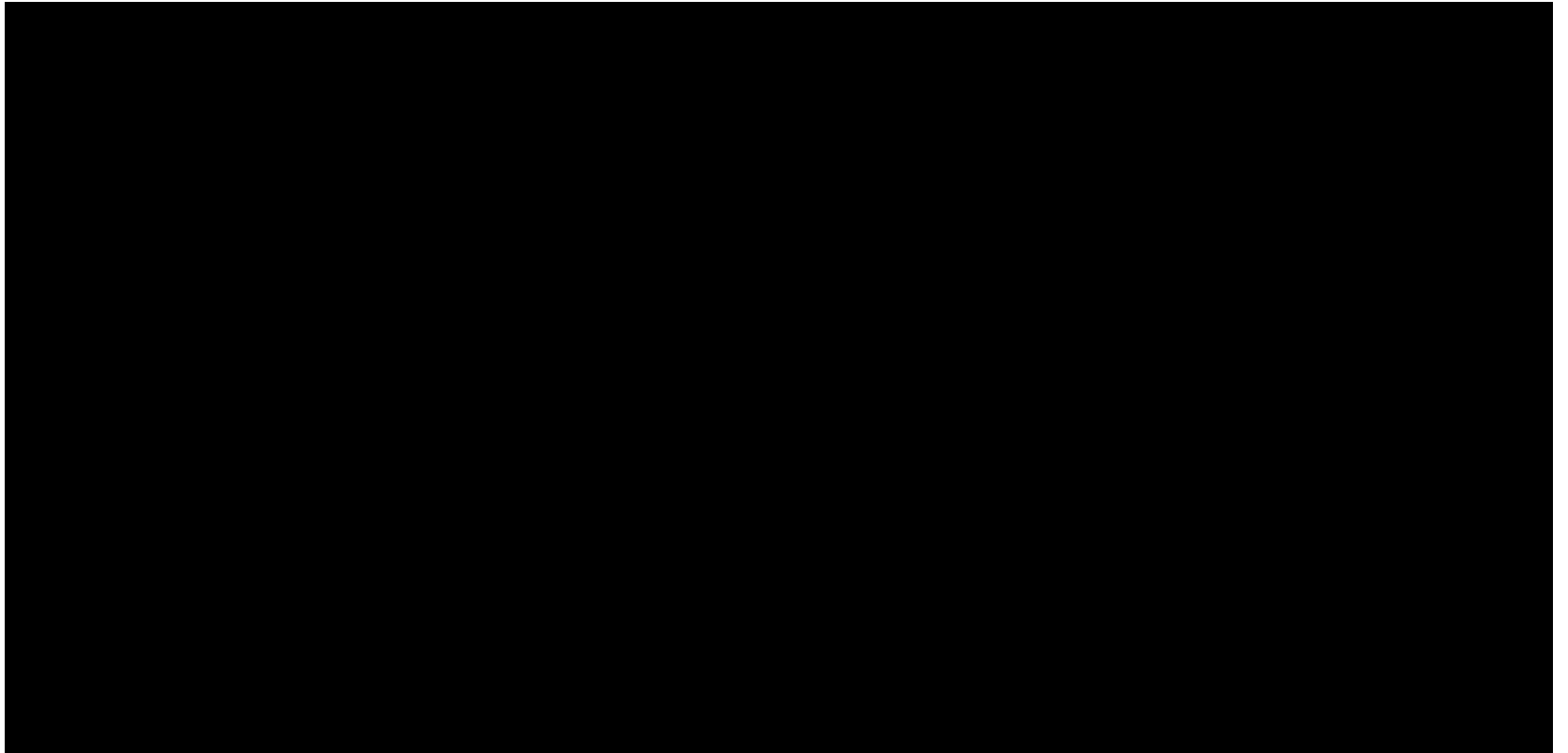


## DDIs – State of the Practice and the Next Evolution

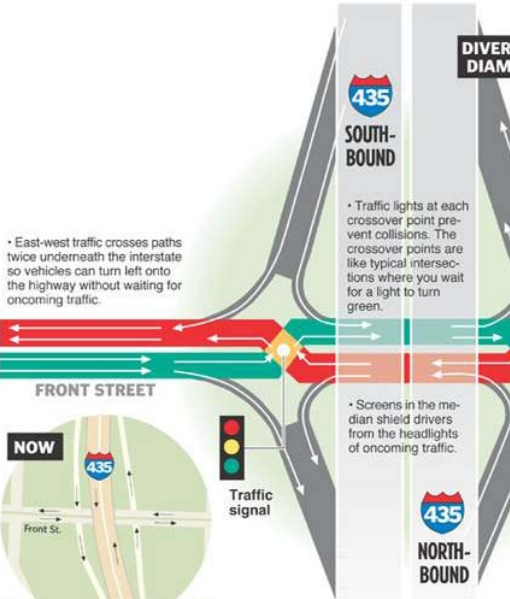
Smith Siromaskul



# OVERVIEW



# CONCEPTUAL OVERVIEW

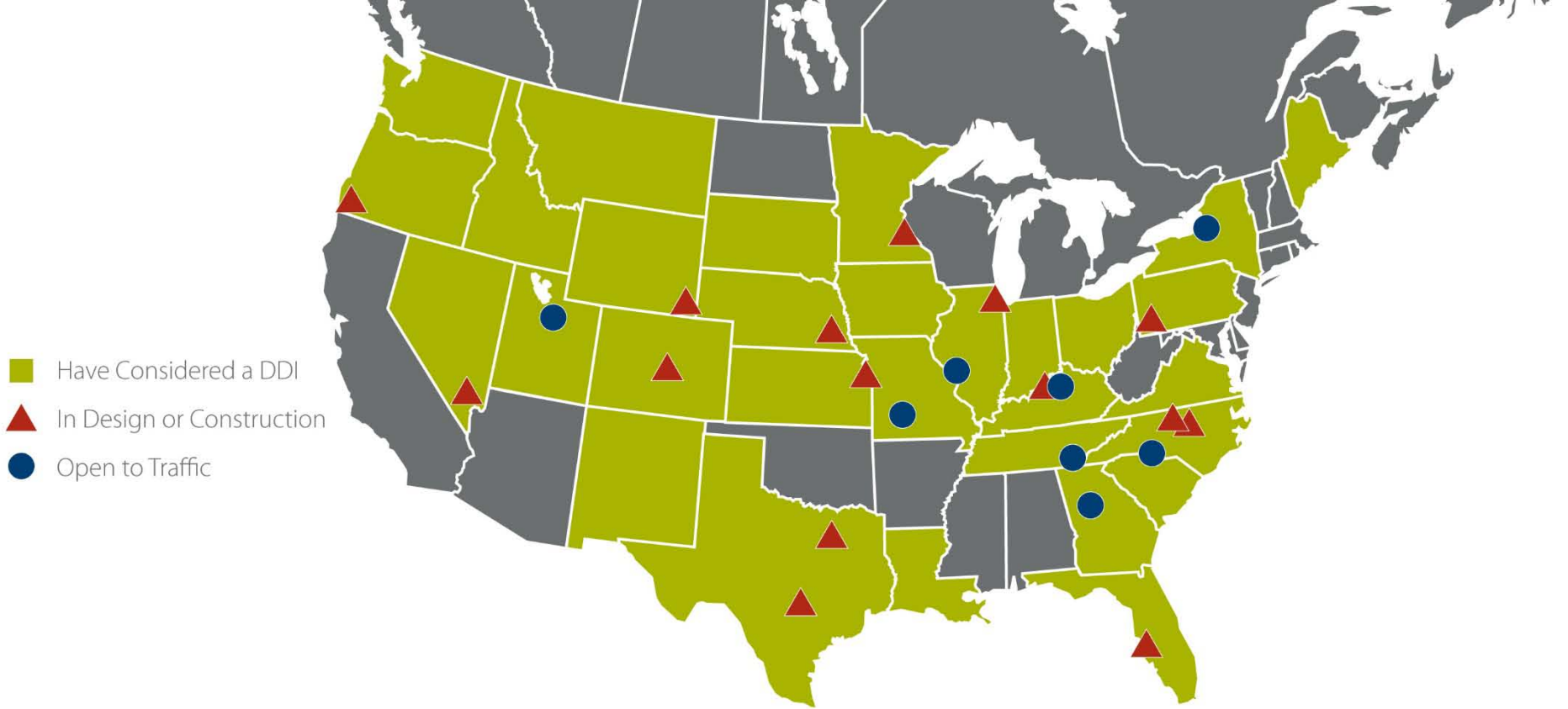


**NEW KIND OF INTERCHANGE** Ac  
ov  
in  
• M  
ca  
• F  
• C  
• U

**NAME:** Diverging diamond  
**LOCATION:** I-435 and Front Street  
**COST:** \$6 million  
**COMPLETION:** End of 2007  
**UNIQUE FEATURE:** Cars drive British-style on the left side of Front Street under I-435 bridges.

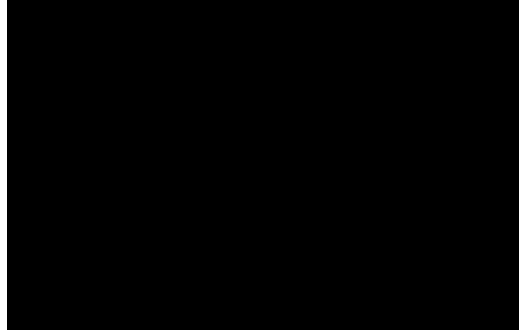






# THE BIG PICTURE

- » Used for high volumes of turns
- » Typically requires fewer lanes
- » Possibly costs less
- » Generally looks cool



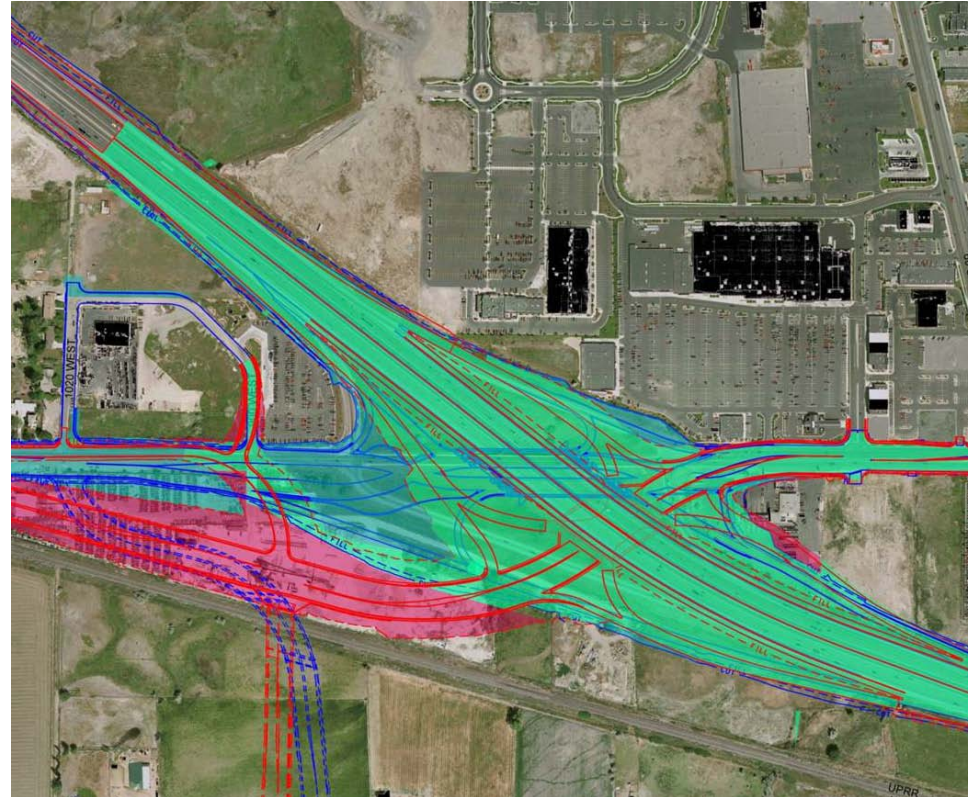
# A WORD OF WARNING

» Concept to 15% Design



# NON-PERPENDICULAR CROSSING ANGLE

- » Crossroad alignment driven by structure cost
- » No need to achieve a perpendicular crossing can mean *MUCH* less right-of-way with a DDI



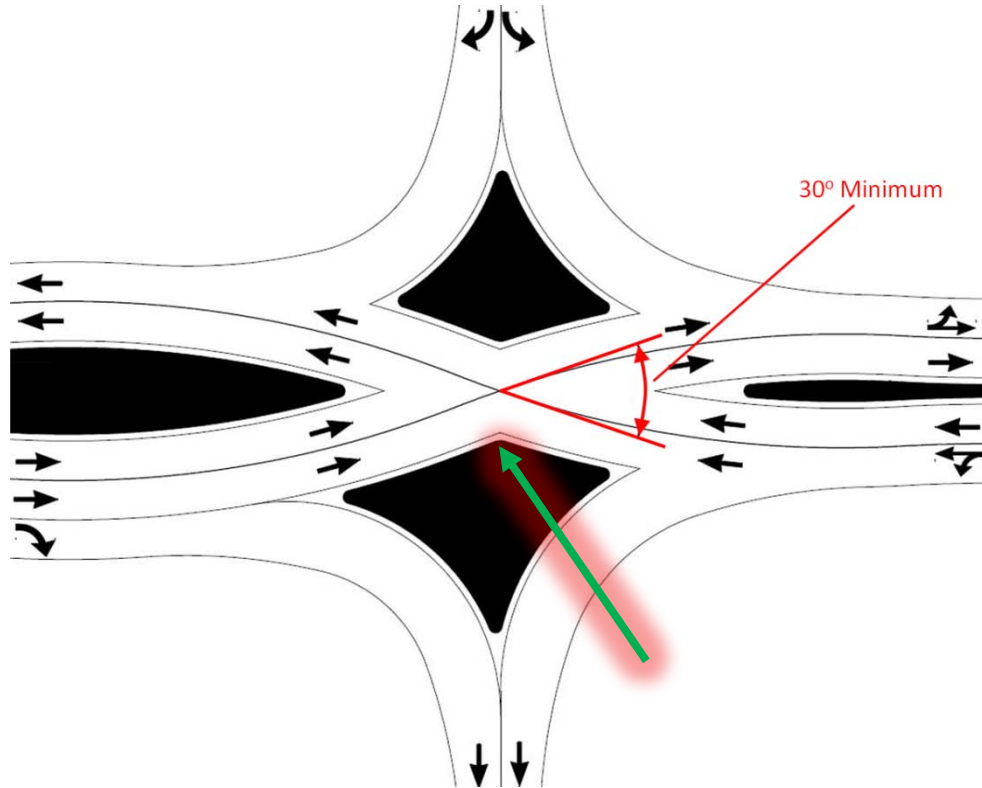




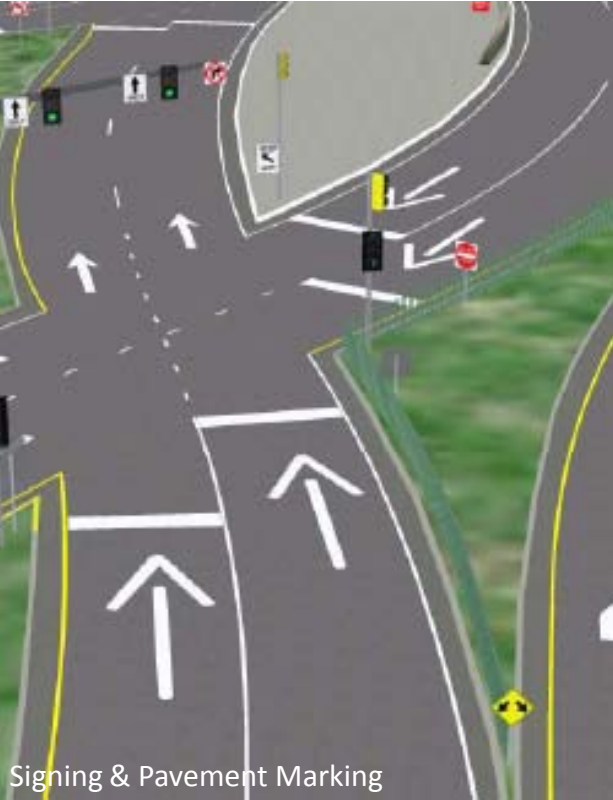
Pioneer Crossing DDI Intersection



# INTERIOR ANGLE



# SIGNING AND PAVEMENT MARKINGS



Signing & Pavement Marking



Signing & Pavement Marking

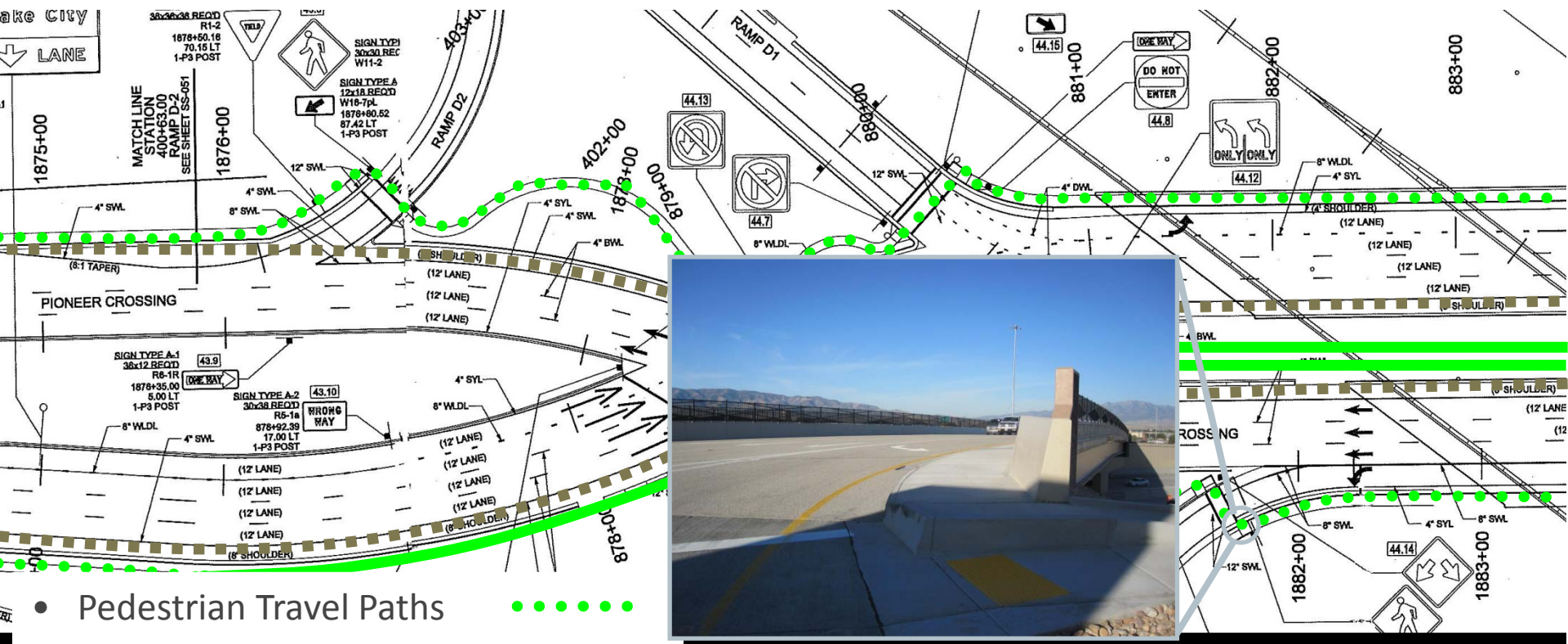


Monotube Option



Overhead Signage

# PEDESTRIANS – OUTSIDE TREATMENT



- Pedestrian Travel Paths ●●●●●
- Bicycle Travel Paths ■■■■■



# PEDESTRIAN TREATMENT

- » Common practice to keep pedestrians to outside
- » Conflicts with left turn onto entrance ramp
- » Unsafe condition with limited sight distance



# PEDESTRIAN TREATMENT

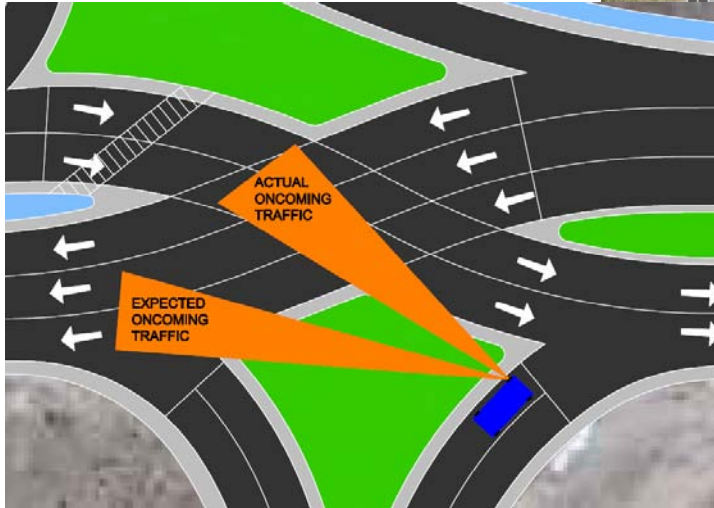
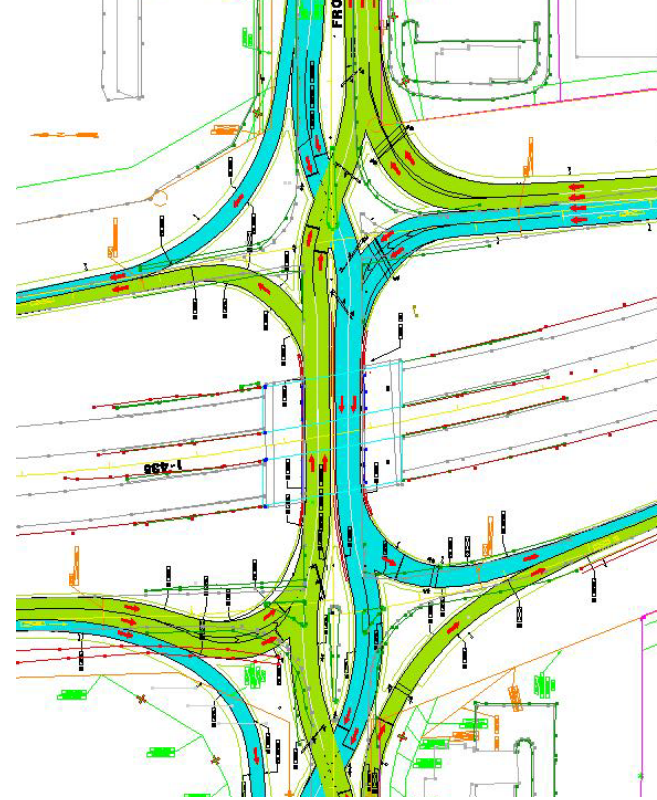
- » No conflict with left turns
- » Barrier-protected sidewalk
- » 80-90% public approval





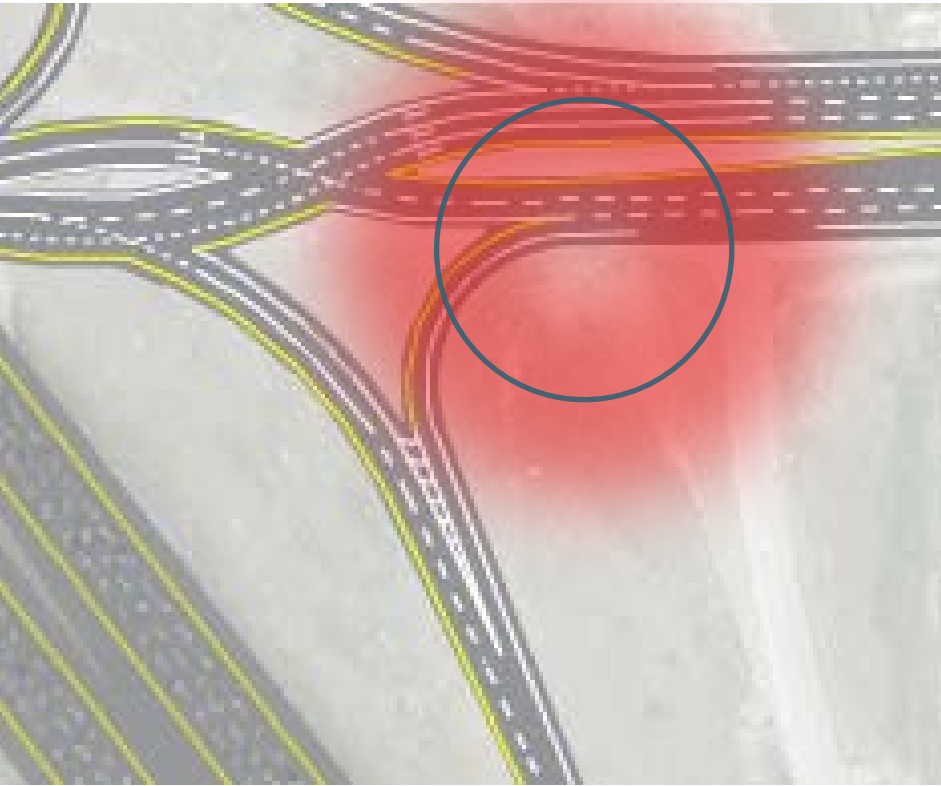
# SIGNALIZED MOVEMENTS

- » Significant pedestrian volumes are present
- » Turning roadways have more than one lane
- » To eliminate weaving issues





# OFF RAMP RIGHT TURN OPTIONS





Cheyenne, WY

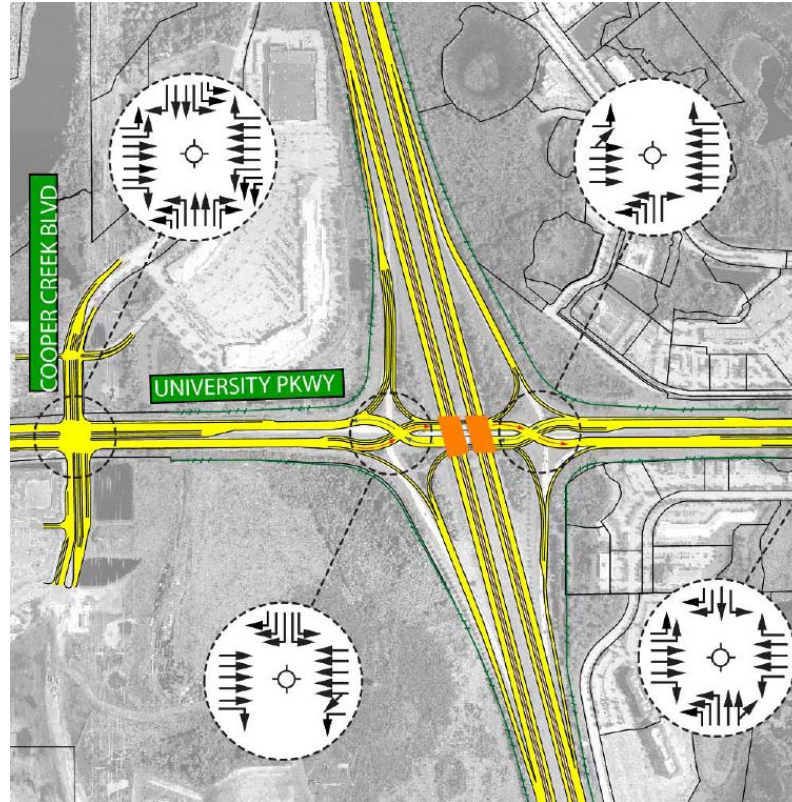




Cheyenne, WY



# FL LESSONS LEARNED



# FL LESSONS LEARNED

Model	West Ramp Terminal				East Ramp Terminal			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Synchro	24.2	C	42.2	D	31.9	C	23.6	B
VISSIM	18.4	B	17.9	B	13.3	B	12.8	B

# THE NEXT EVOLUTION

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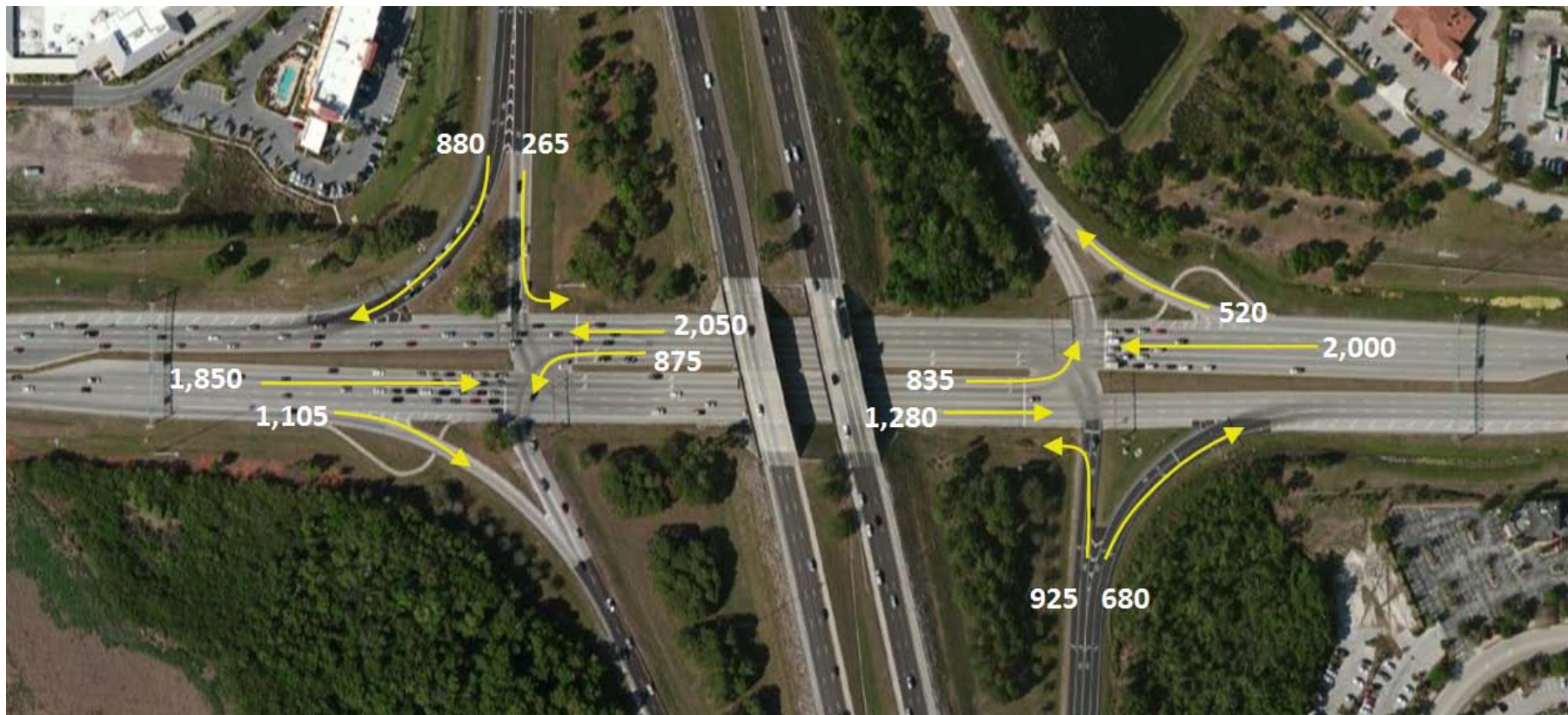
- » Splintered Diverging Diamond Interchanges
- » Here's where it gets weird...



# ONCE UPON A TIME IN FLORIDA

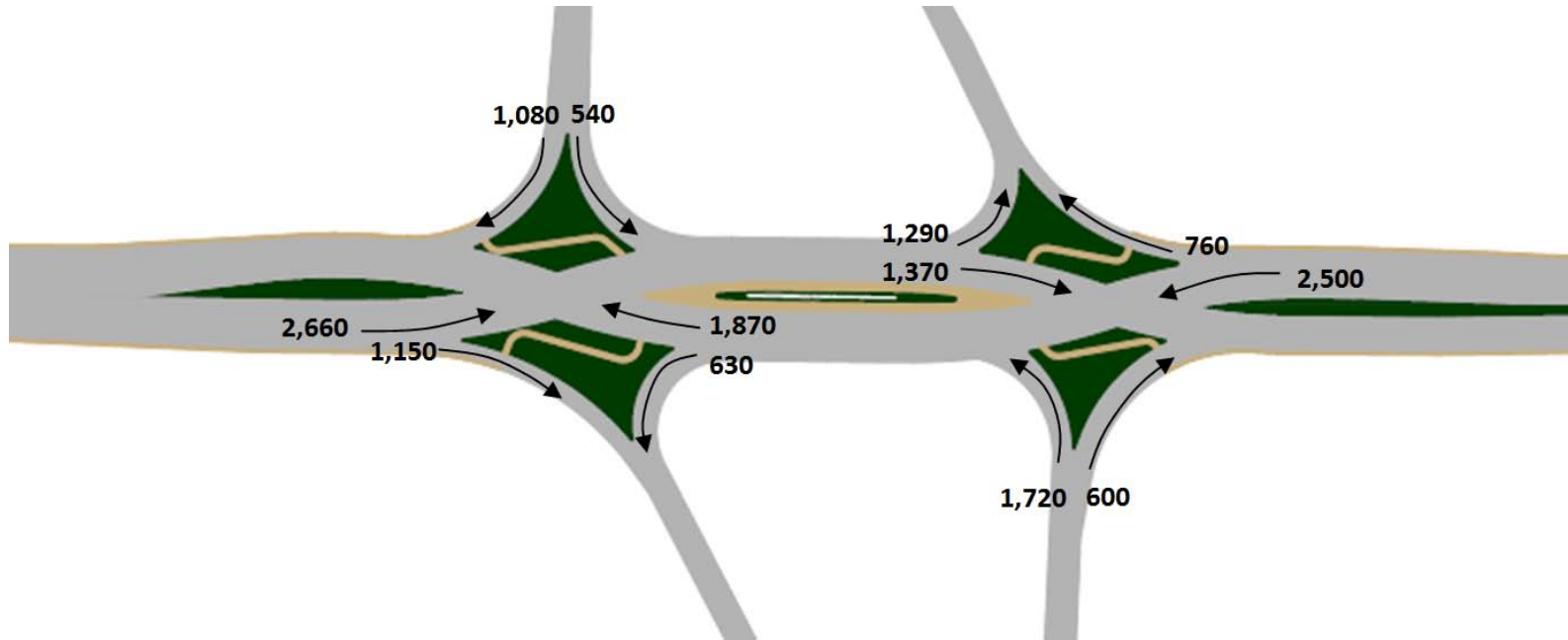


# EXISTING VOLUMES





# PROJECTED VOLUMES





# TYPICAL DDI LAYOUT- UNIVERSITY PARKWAY

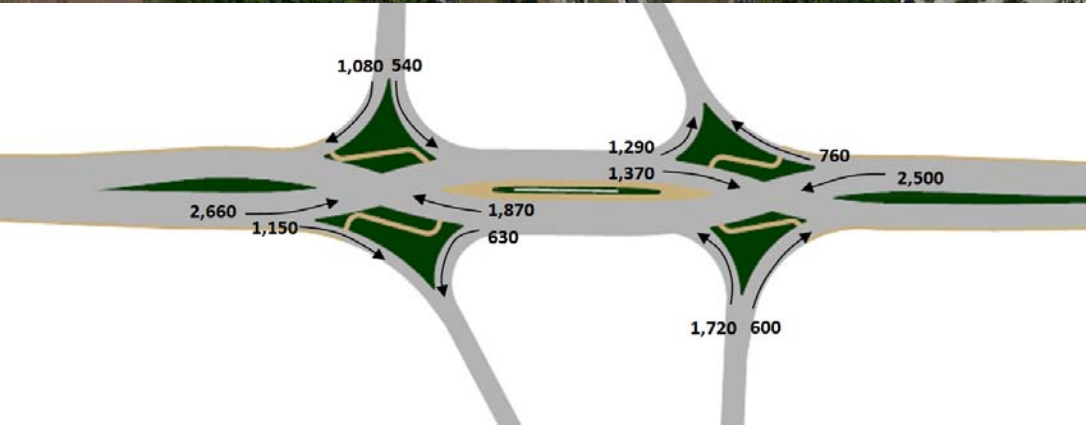
- » Median pedestrian treatment
- » Pavement slope concerns
- » Uncertainty of future volumes



# DIFFERENCES



» Existing (2012 counts)



» Design Year (2034)

# WHAT'S NEARBY

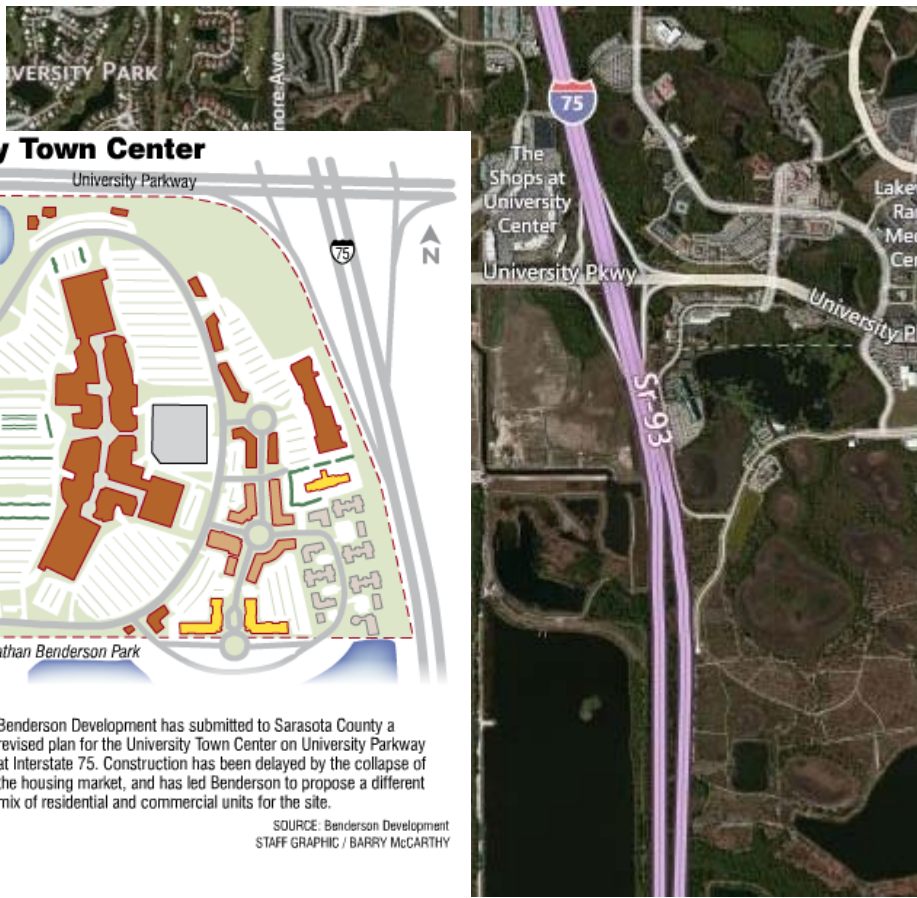
## A new plan for University Town Center

- Existing retail
- Retail
- Office/Retail
- Hotel
- Residential
- Parking garage

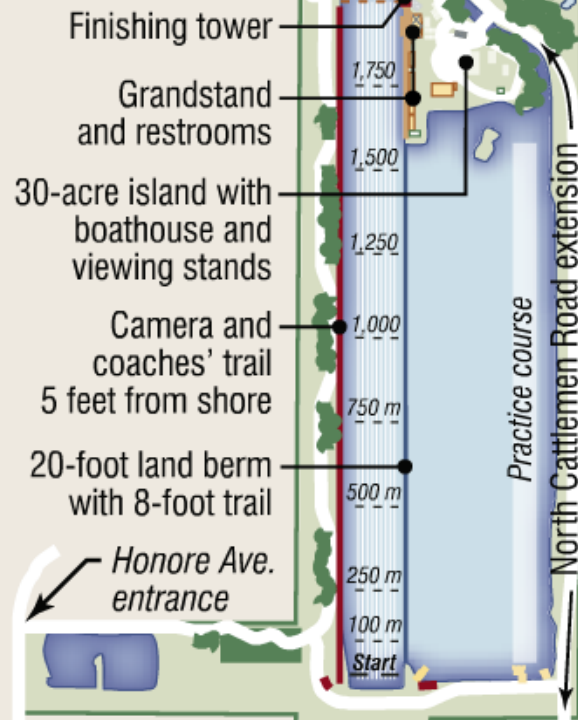


Benderson Development has submitted to Sarasota County a revised plan for the University Town Center on University Parkway at Interstate 75. Construction has been delayed by the collapse of the housing market, and has led Benderson to propose a different mix of residential and commercial units for the site.

SOURCE: Benderson Development  
STAFF GRAPHIC / BARRY MCCARTHY



## Nathan Benderson Park rowing venue





## CHOOSING A DESIGN

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- » Need for excess capacity, within reason
- » Mitigation for pavement sloping issues
- » DDI Variants

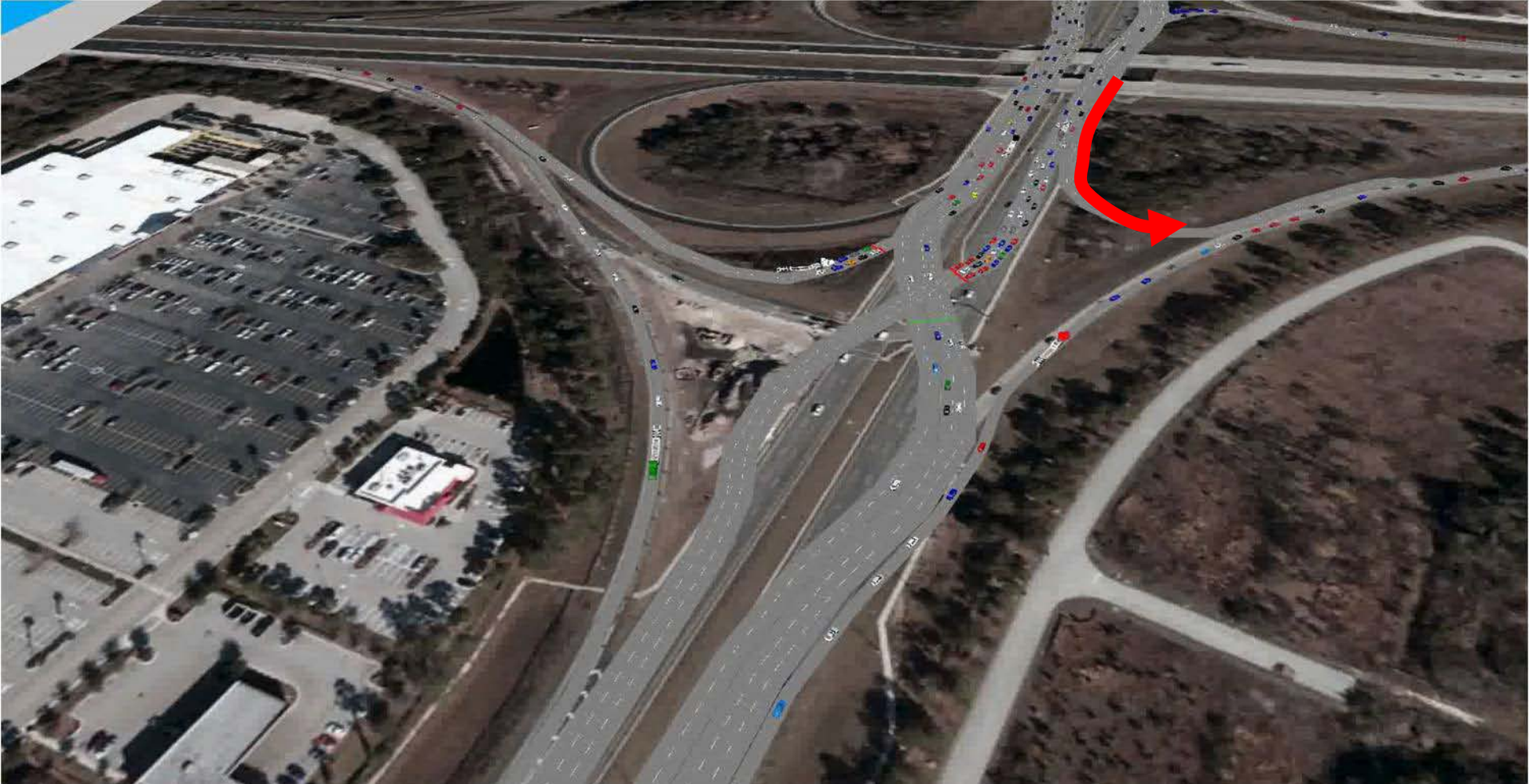


# ADVANCED LEFT DDI – SECLIN, FRANCE

- » Three structures
- » Three roadways (2 EB, 1 WB)





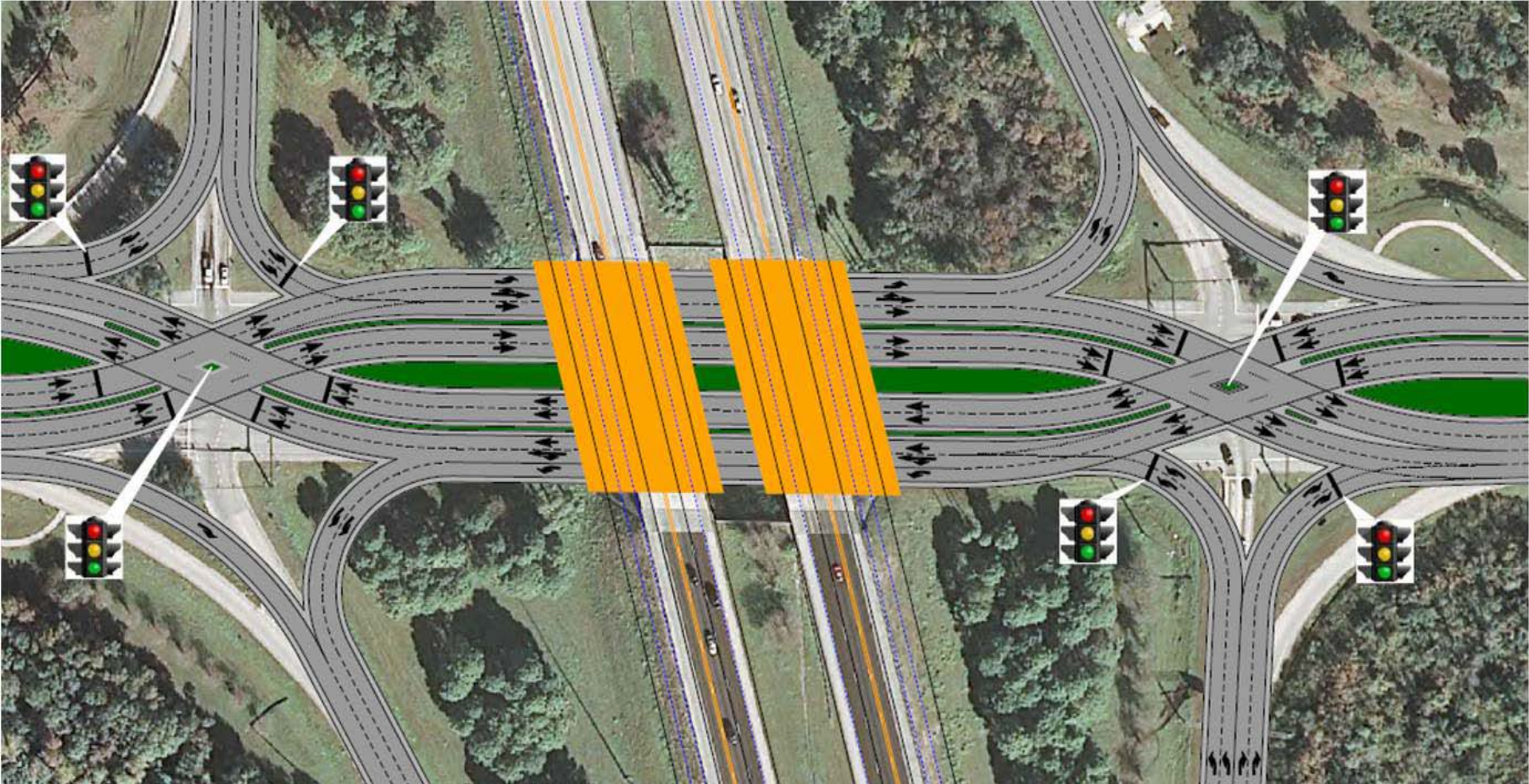


Advanced Left Turn DDI / I-75 at SR 70 – Sarasota, FL

# ADVANCED LEFT TURN DDI



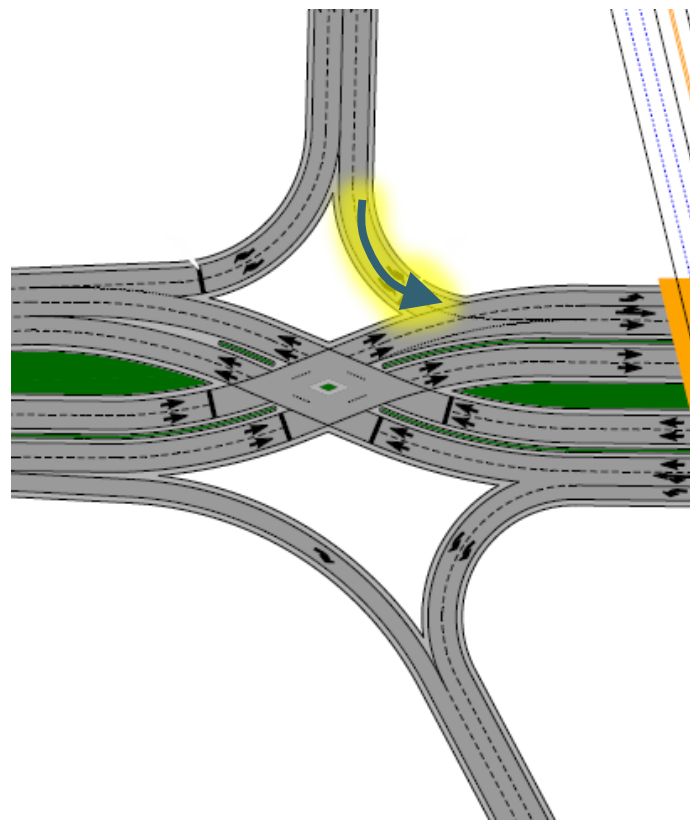


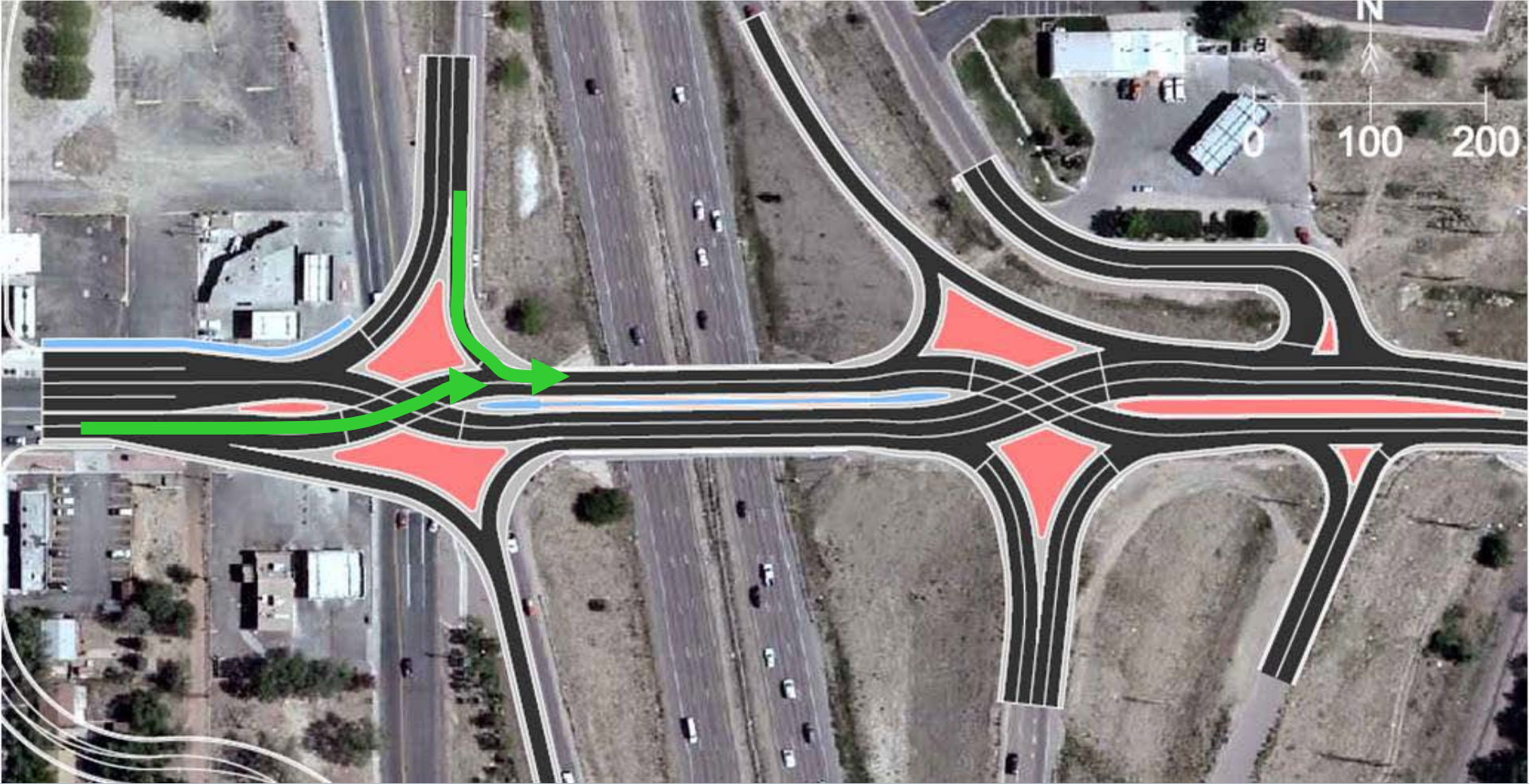


Splintered DDI / I-75 at SR 70 – Sarasota, FL

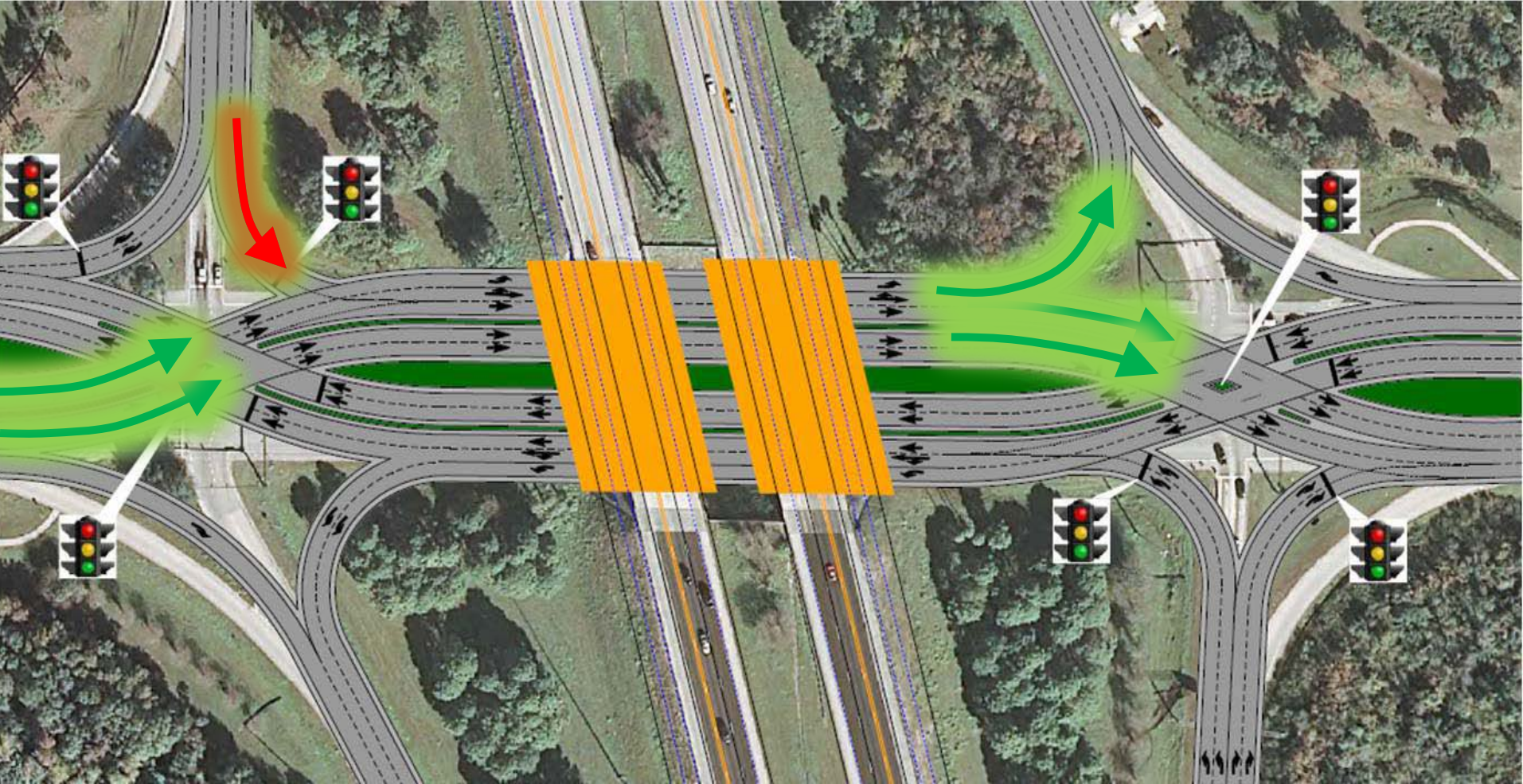


# KEY DIFFERENCES





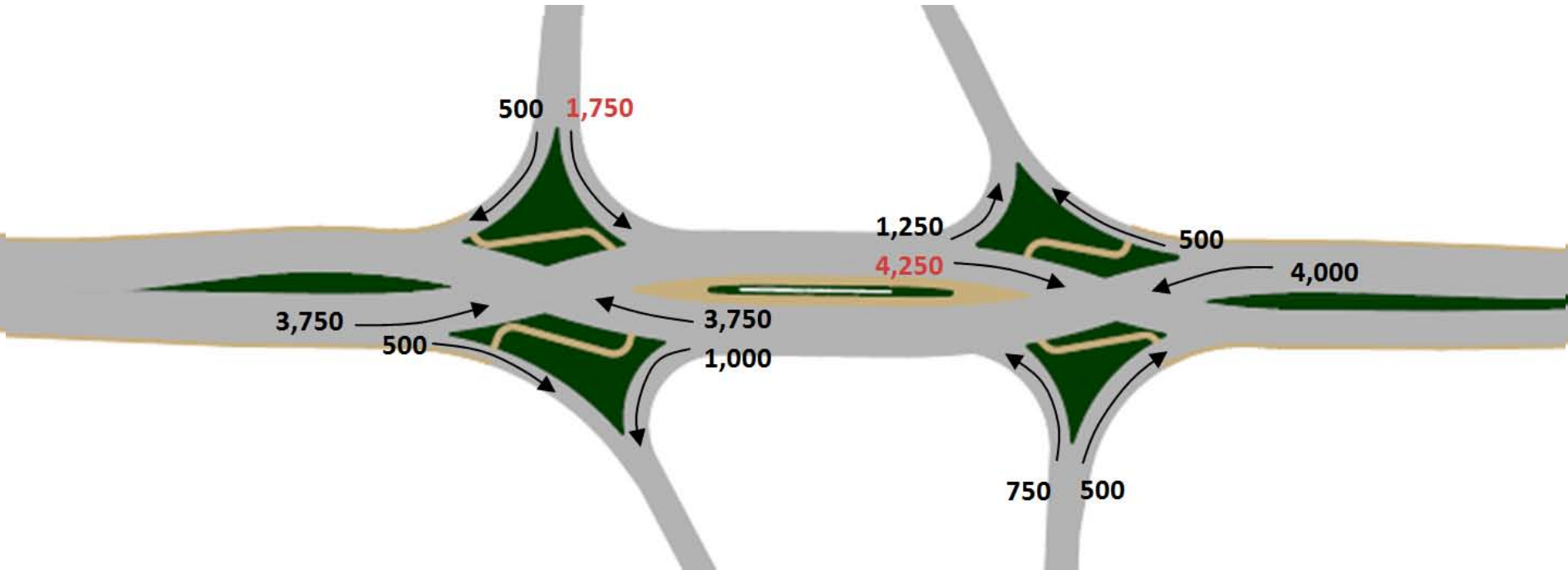




Splintered DDI / I-75 at SR 70 – Sarasota, FL



# VOLUME SCENARIOS



# FINDING FLAWS IN A DIAMOND

Scenario	Typical DDI			Splintered DDI		
	EB Thru	SB Left	Overall	EB Thru	SB Left	Overall
Scenario 1	<b>60.5</b>	<b>39.7</b>	<b>33.0</b>	<b>63.4</b>	<b>23.1</b>	<b>37.6</b>
Scenario 2	<b>133.2</b>	<b>87.9</b>	<b>61.3</b>	<b>63.4</b>	<b>28.6</b>	<b>37.2</b>
Scenario 3	<b>171.0</b>	<b>155.5</b>	<b>82.3</b>	<b>63.3</b>	<b>52.9</b>	<b>42.0</b>

Delay in seconds per vehicle through the entire interchange area

# SUMMARY

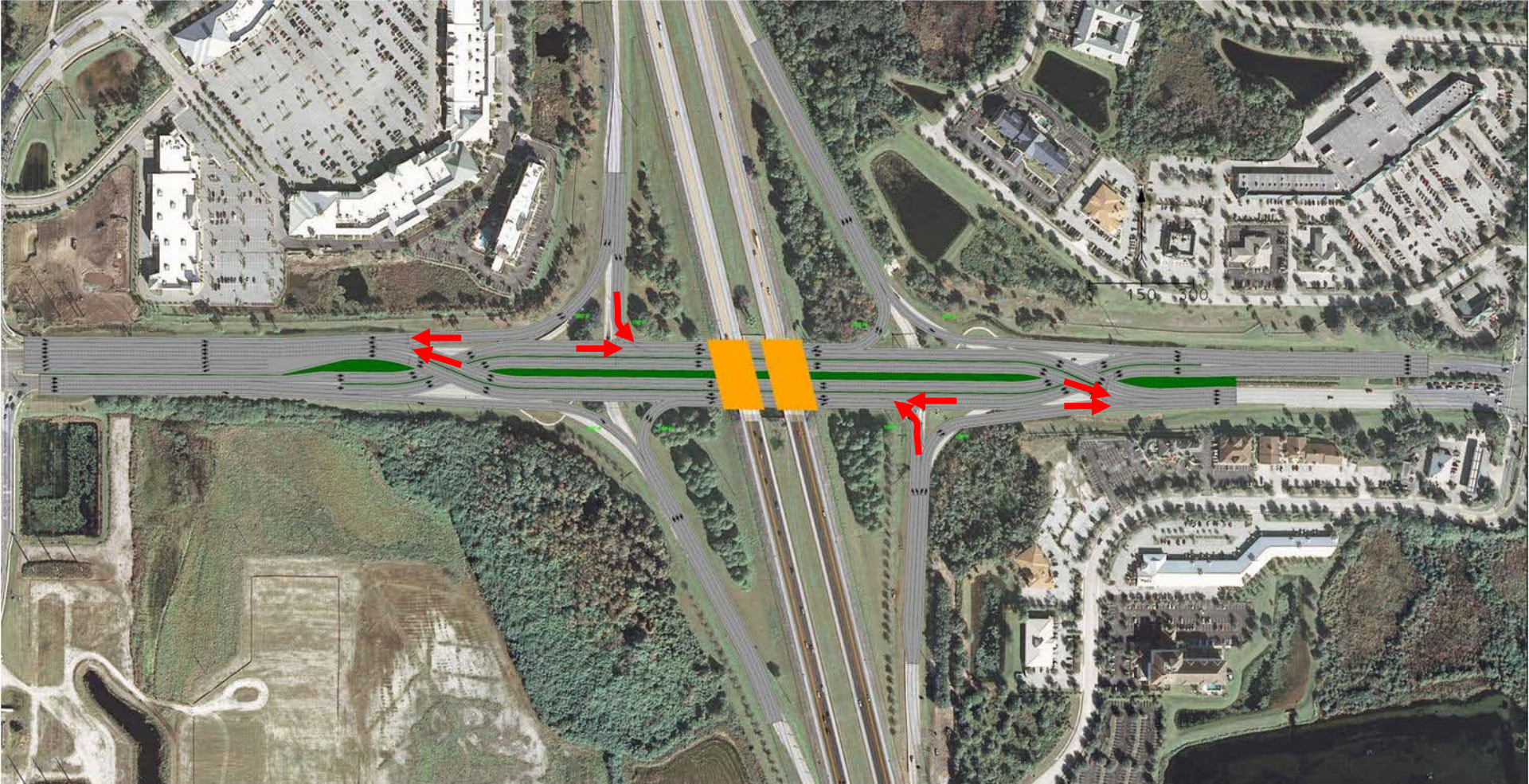
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## Advanced left DDI

- » Improves core lane utilization
- » Separation of crossroad left queue

- » Splintered DDI
- » Large number of lanes
- » Excessive internal queuing
- » Left turns from ramps
- » Unbalanced lefts





Braided Splintered DDI / I-75 at SR 70 – Sarasota, FL

## CONTACT INFORMATION

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