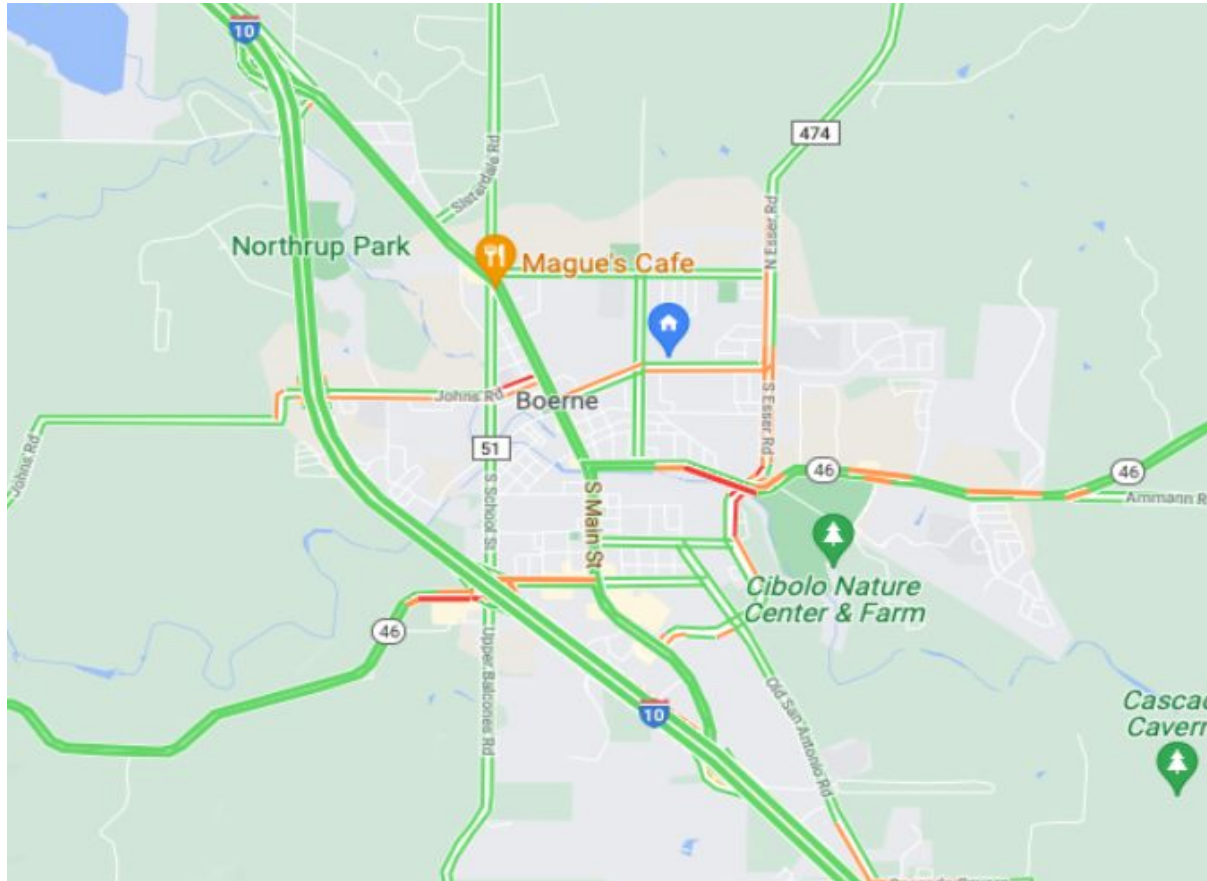


# Maximizing roadway efficiency through improved intersections



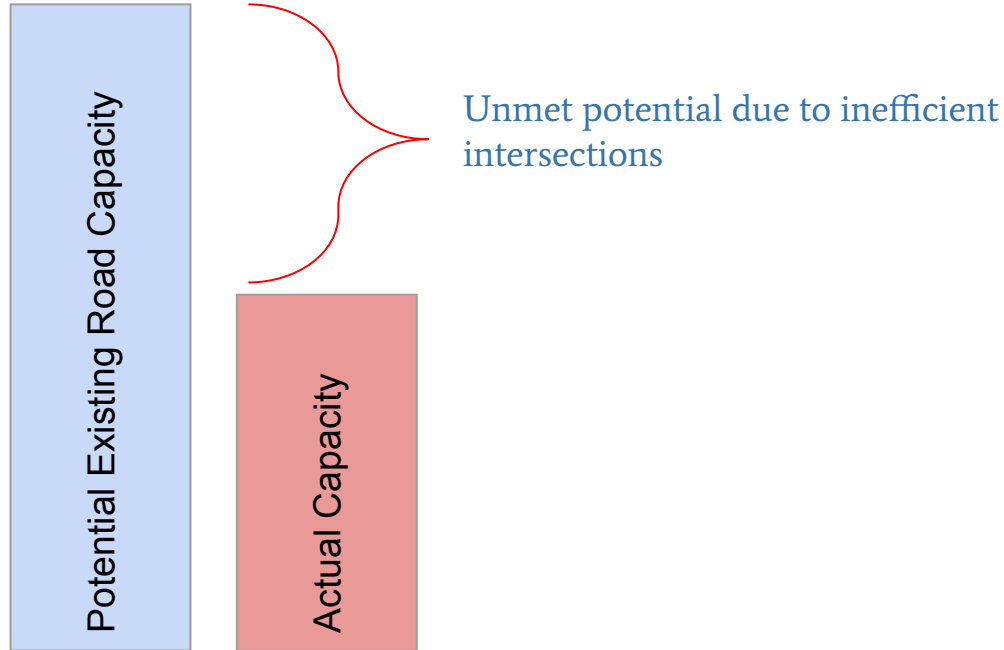
# Where is Congestion Occurring?



# Thoughts

- Roads are very expensive
  - 2-lane road can cost up to \$5 million per mile
  - Maintaining roads can be tens of thousands of dollars/yr (*a long term financial burden*)
- Roads have a lot of capacity (~1,900/hr per lane)
- Intersections have much less capacity
- This results in a significant underutilization of existing infrastructure
  - Urban Intersection Design Guide: *“The capacity of urban roadways... is generally limited by the capacity at intersections rather than on the links between the intersections.”*
- Can we improve capacity limiting intersections, and make better use of our investment in our existing roads?

# Inefficient Intersections = Lost Capacity



# How do we fix intersections?

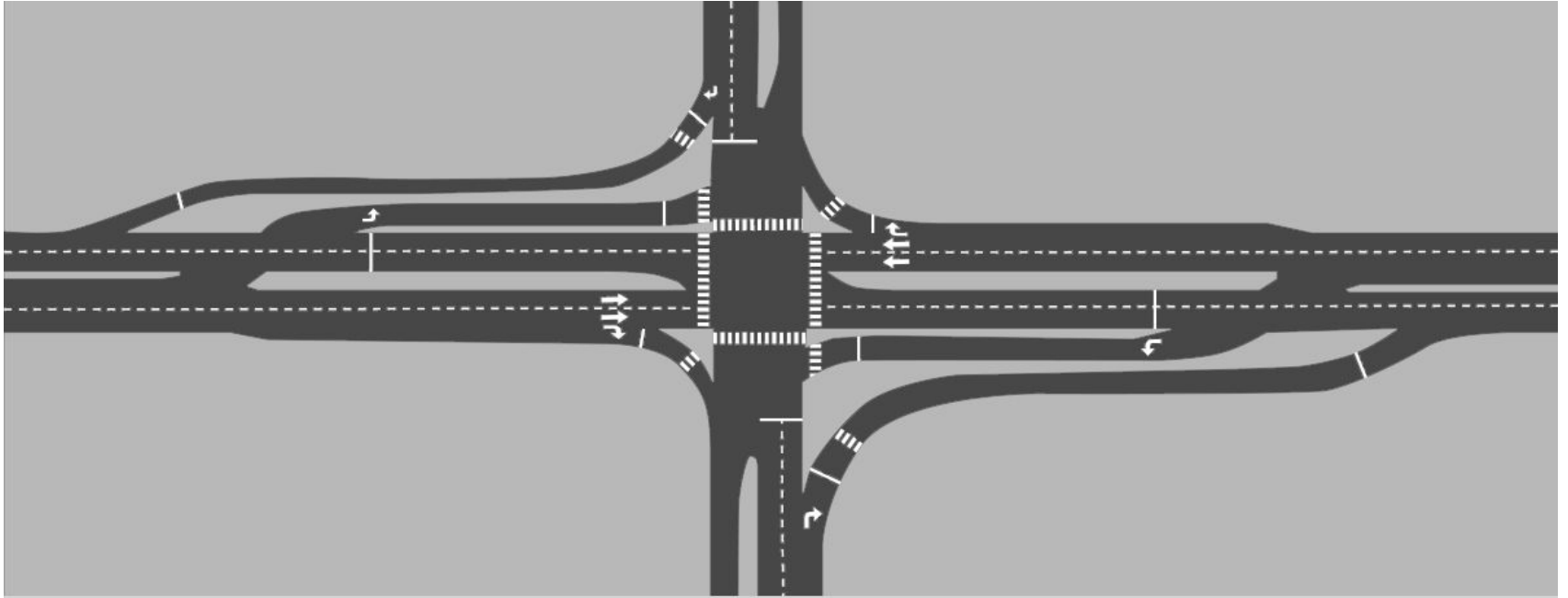
## Alternative and Innovative Intersection Design

- Roundabouts
- Continuous Flow (Displaced Left Turn)
- Double Crossover Diamond
- Continuous “T”
- Restricted Crossing & Median U-turn



1. <https://www.fhwa.dot.gov/publications/research/safety/09060/09060.pdf>
2. <https://ftp.dot.state.tx.us/pub/txdot-info/aus/us290/continuous-flow.pdf>
3. <https://www.sehinc.com/news/amazing-world-alternative-intersection-designs>
4. <https://stride.ce.ufl.edu/wp-content/uploads/2020/12/Project-F-Brief-Rouphail.pdf>
5. <https://static.tti.tamu.edu/tti.tamu.edu/documents/0-4365-P2.pdf>

# Continuous Flow Intersection



Dedicated left-turn lane on to side street before intersection.



Standard right- and left-turn on to main road.  
Standard forward movement on side street.

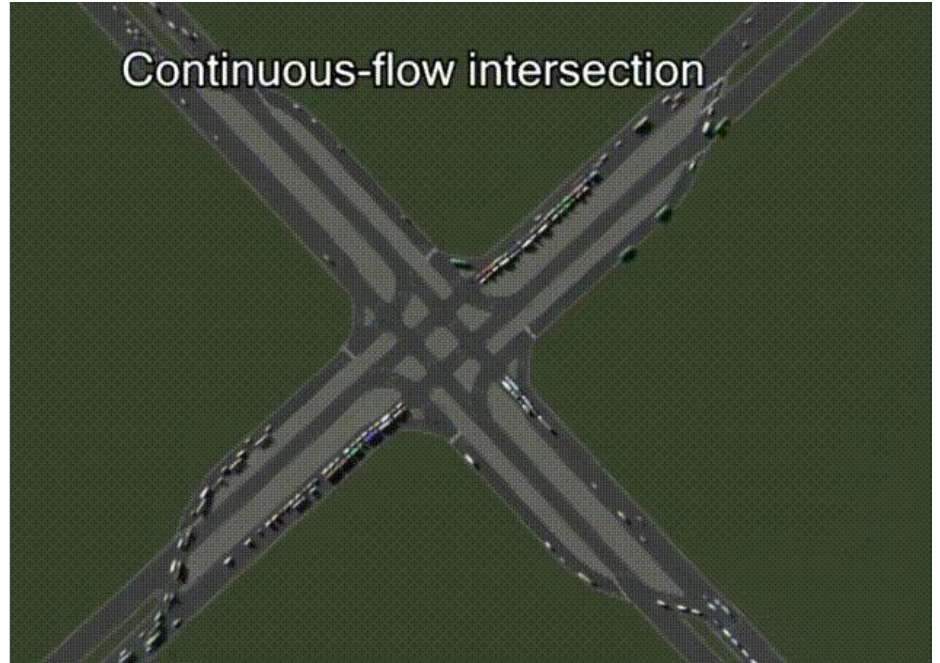


Standard right-turn on to side street.  
Standard forward movement on main road.

# Benefits of Continuous Flow Intersections

- 20-90% improved capacity
- Reduces the number of locations where a crash can occur.
- **Works better with junctions that have heavy demand for left-turning traffic.**
- Ensures that **most motorists stop no more than once** going through the intersection.
- **Only a bridge yields a better traffic capacity** than a continuous flow intersection.

<https://www.ncdot.gov/initiatives-policies/Transportation/safety-mobility/continuous-flow-intersection/Pages/default.aspx>

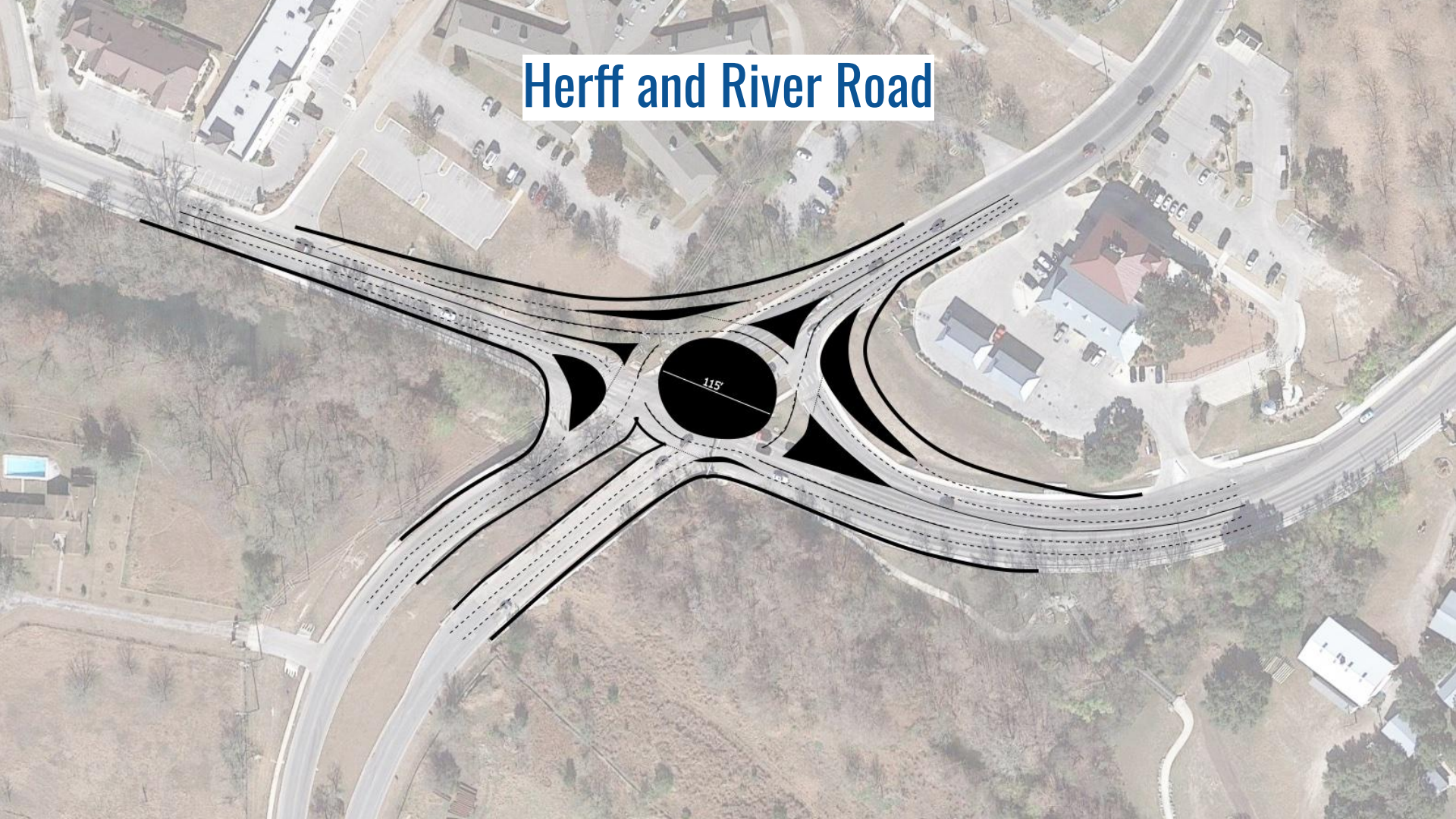


# Herff and River Road





# Herff and River Road



# Roundabouts

Studies by the IIHS in three states found that **roundabouts contributed to an 89 percent reduction in delays and 56 percent reduction in vehicle stops.**

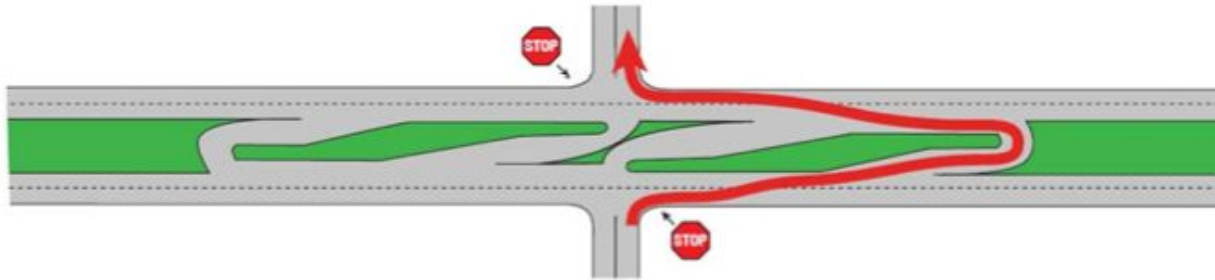
**Reduced injury crashes by 75 percent** at intersections where stop signs or signals were previously used.... Studies by the IIHS and Federal Highway Administration have shown:

- **A 37 percent reduction in overall collisions**
- **A 75 percent reduction in injury collisions**
- **A 90 percent reduction in fatality collisions**
- **A 40 percent reduction in pedestrian collisions**

<https://wsdot.wa.gov/Safety/roundabouts/benefits.htm>



### Crossing a rural divided highway using a Reduced Conflict Intersection



### Left hand turn onto a divided highway using a Reduced Conflict Intersection

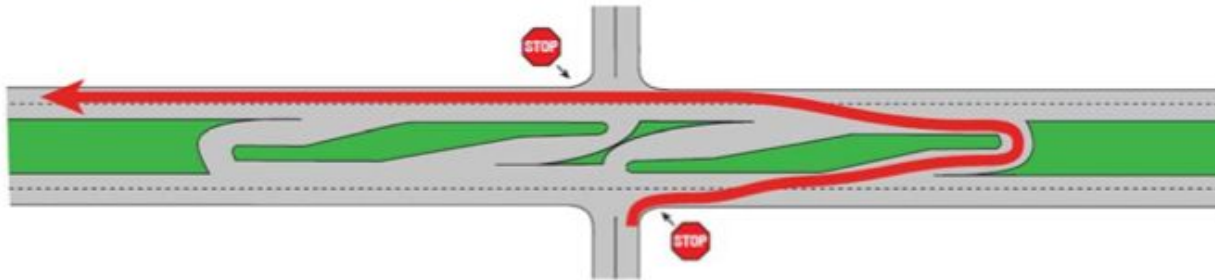


Figure 21. Reduced Conflict Intersection Diagram. *Source: MNDOT*

## DIVERGING DIAMOND

The new style interchange is designed to allow continuous flow onto the interstate without having to wait for a light.

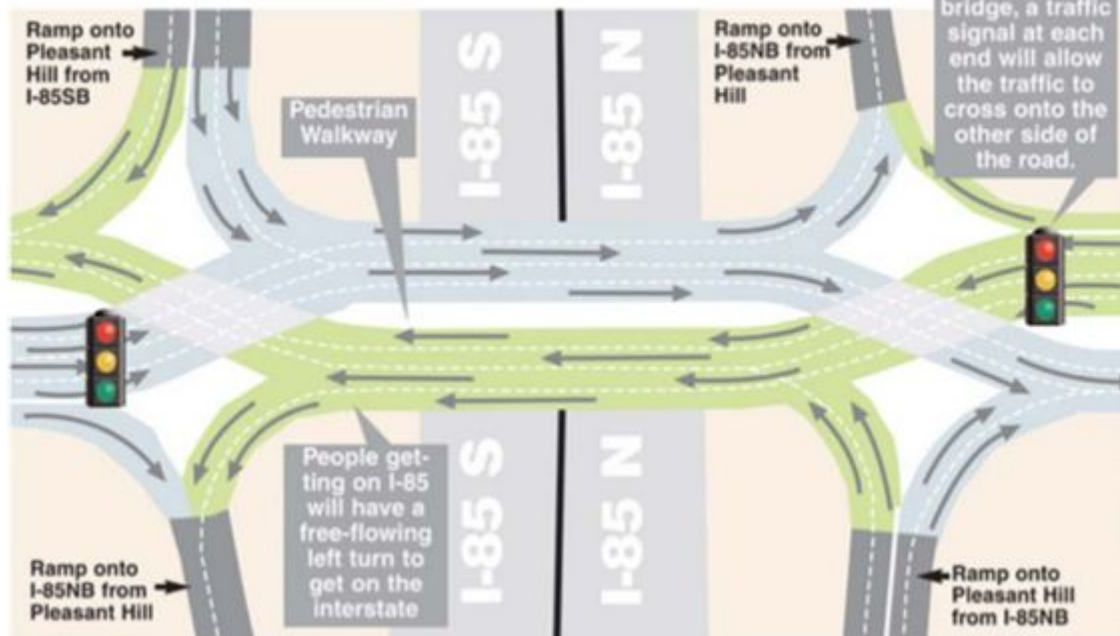
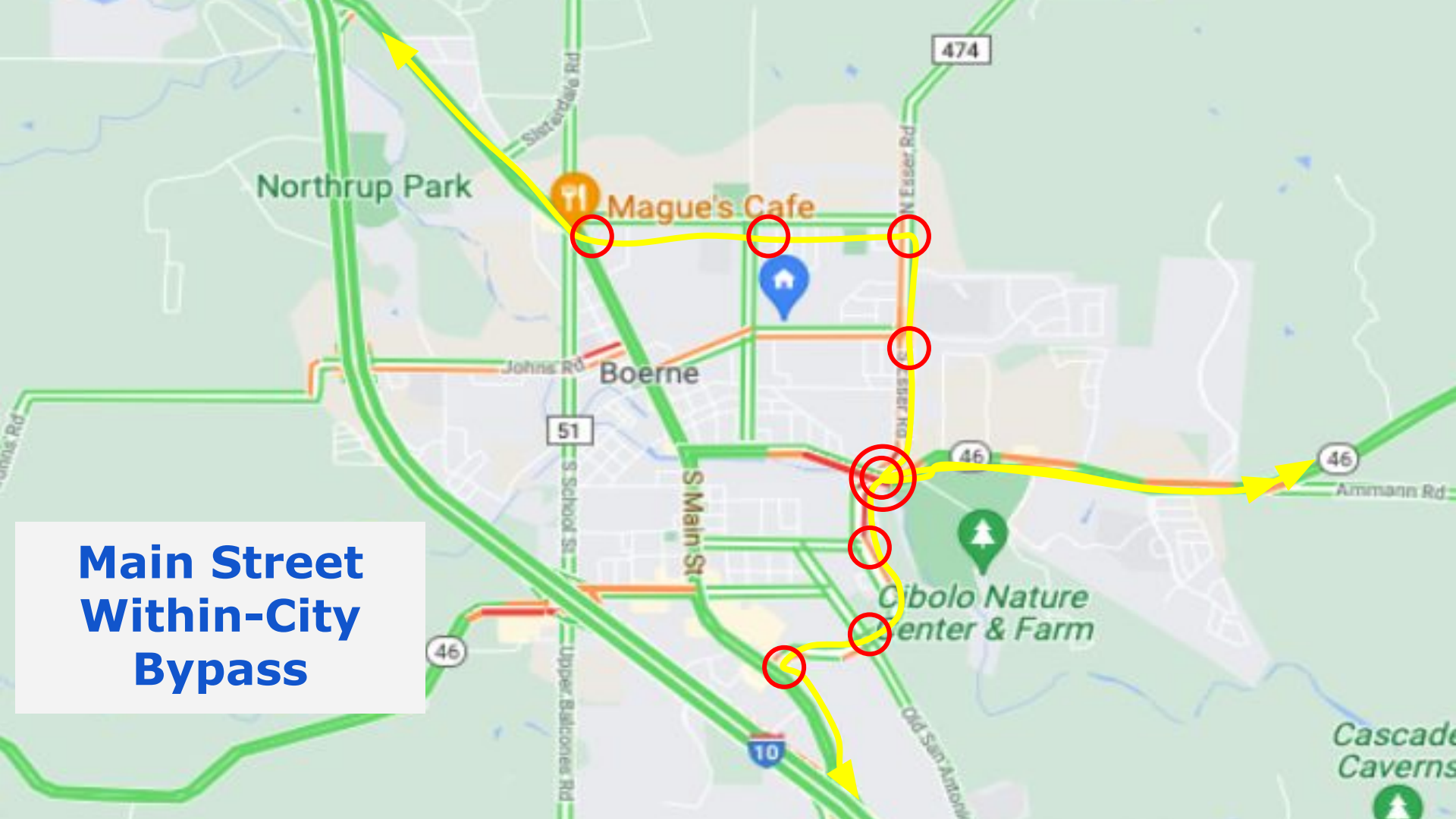
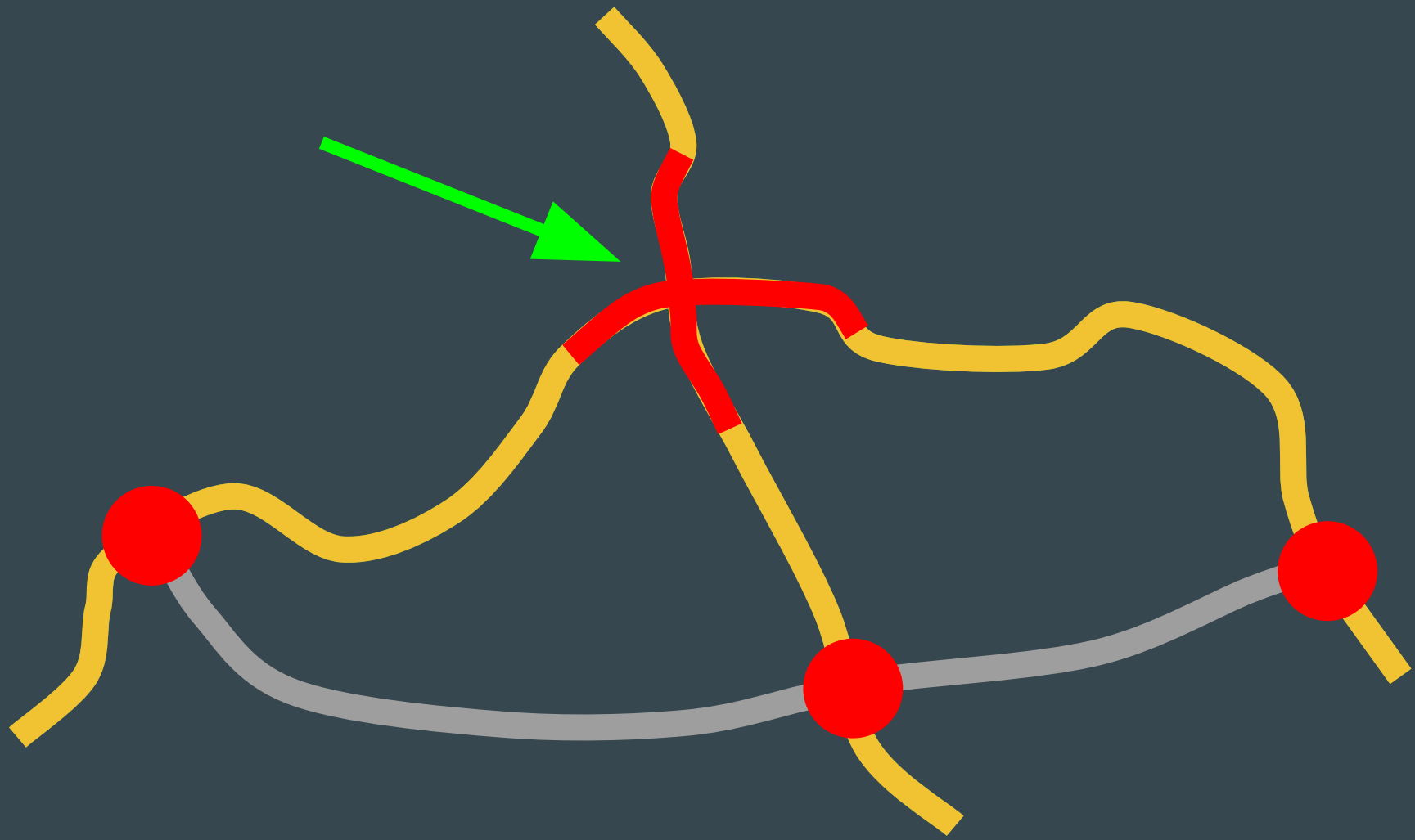


Figure 31. DDI Operations Diagram. *DDI graphic courtesy of Nicole Puckett/Gwinnett Daily Post*

**Main Street  
Within-City  
Bypass**





# Ideas

- Building new roads is expensive, disruptive, and environmentally destructive. But some new roads will likely be needed.
- Focusing on improving inefficient intersections:
  - Makes use of our investment in existing infrastructure
  - Reduces long term financial obligations
  - Reduces transportation footprint
  - Better for the environment
- Work with a consultant with expertise with alternative intersection designs to audit the cities existing intersections and propose modifications to increase efficiency.