Georgia Department of Transportation

Alternative Intersections & GDOT's ICE Policy

Chris Raymond, P.E.

State Traffic Operations Manager



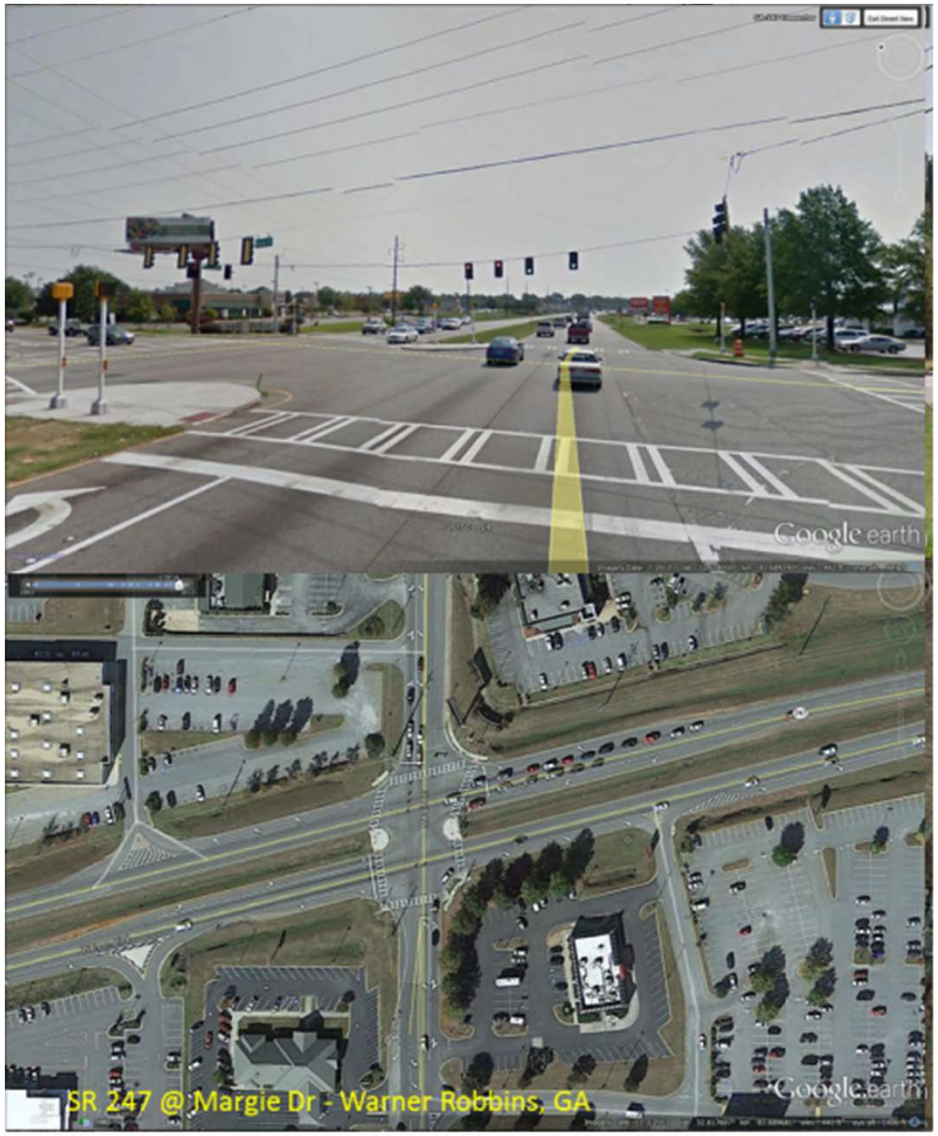



Overview

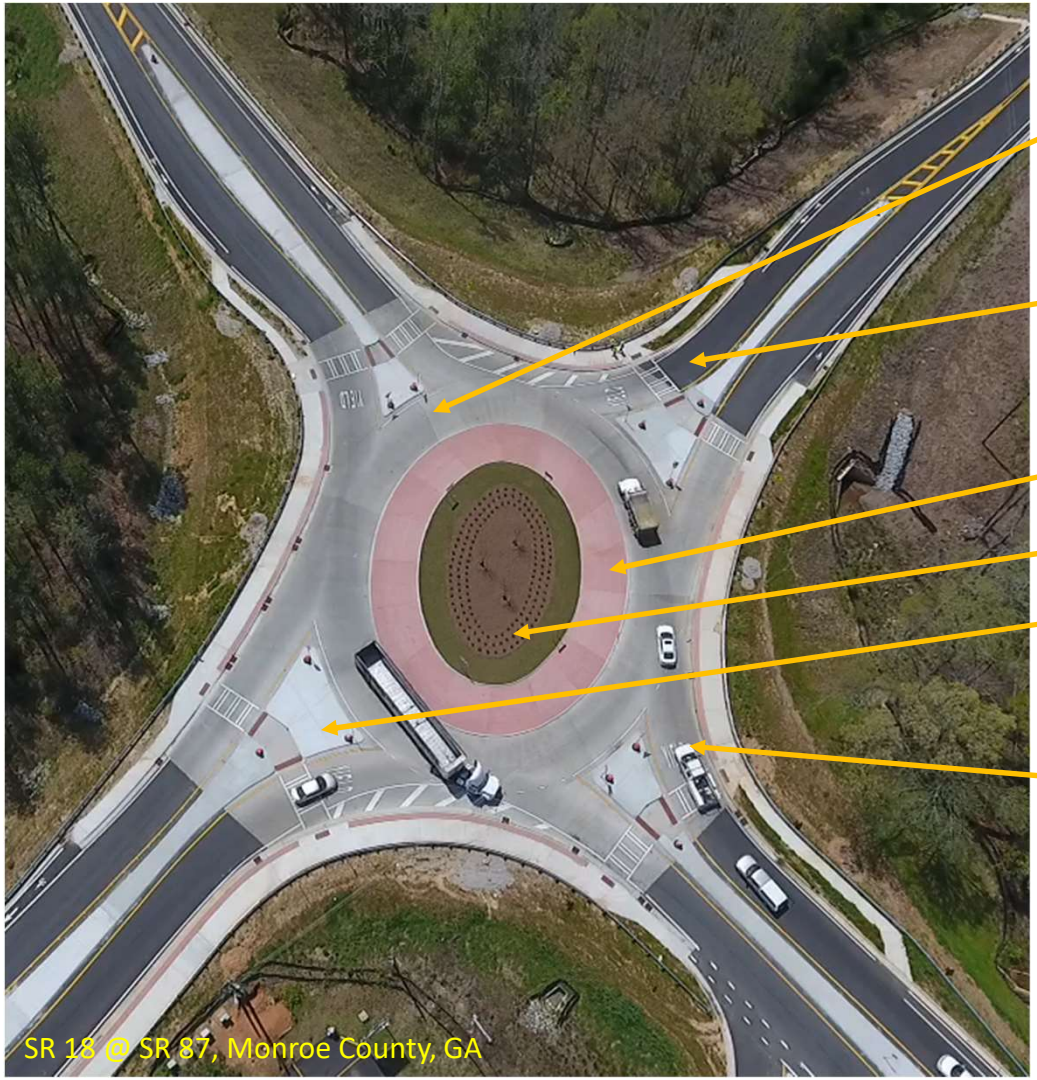
- Alternative Intersections
  - Types
  - Benefits & Applicability
  - Examples
- GDOT's ICE Policy
  - Policy
  - Process

Intersection Control Types

- Minor Stop / Two-Way Stop Control
- All-Way Stop Control
- Signalized Intersection
- Roundabout
- RCUT
- MUT
- RIRO
- Jug Handle
- Quadrant Roadway
- Continuous Green T
- Displaced Left Turn (DLT, CFI)
- Innovative Interchanges (SPUI, DDI, roundabouts)



Roundabouts

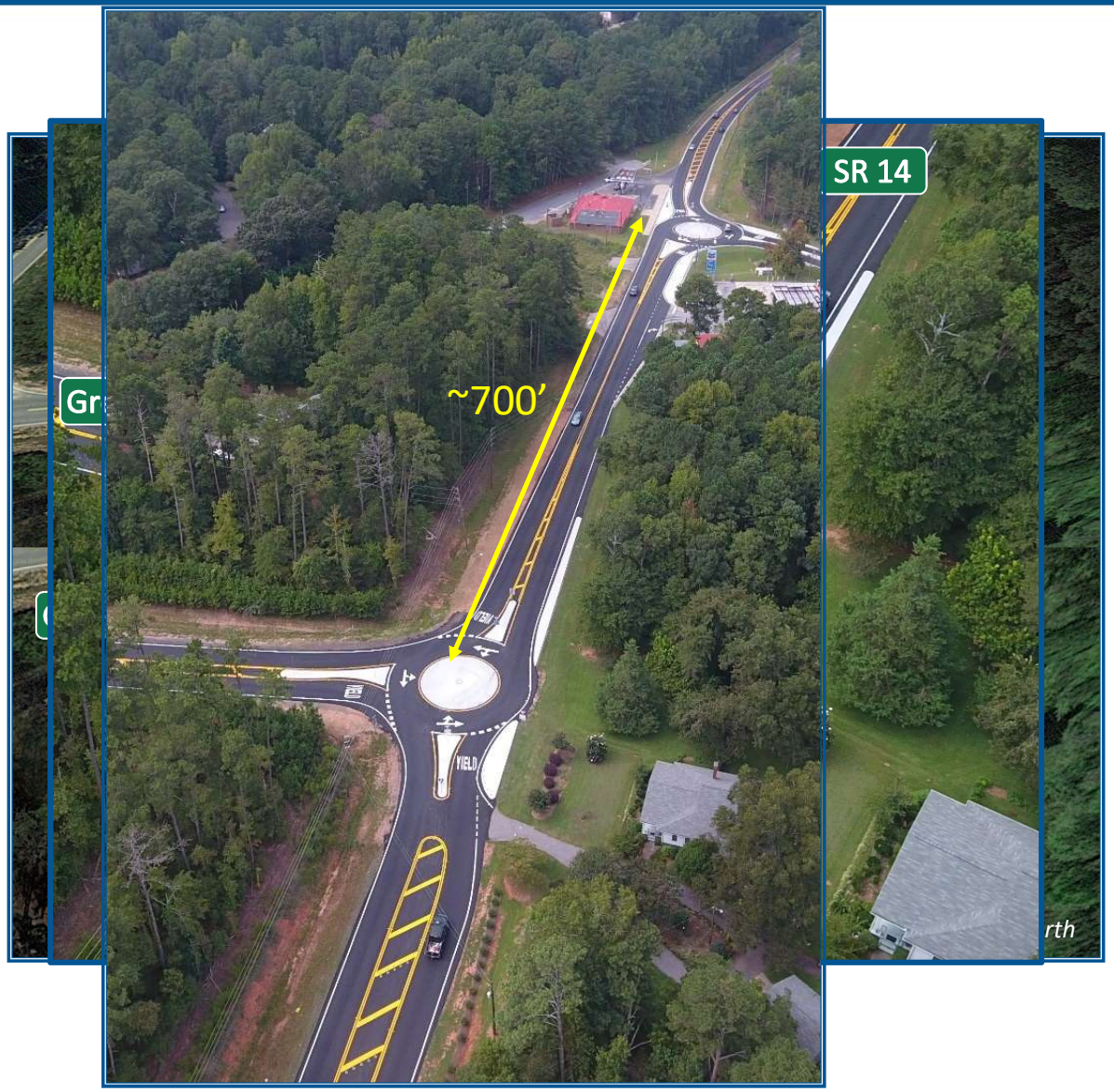


- Circulatory roadway
  - Slow Speed
  - Entry Deflection
- Central island
  - Truck Apron
  - Landscaping
- Splitter islands
  - Pedestrian refuge
- Yield on approaches
- Mini, Single-Lane or Multi-Lane

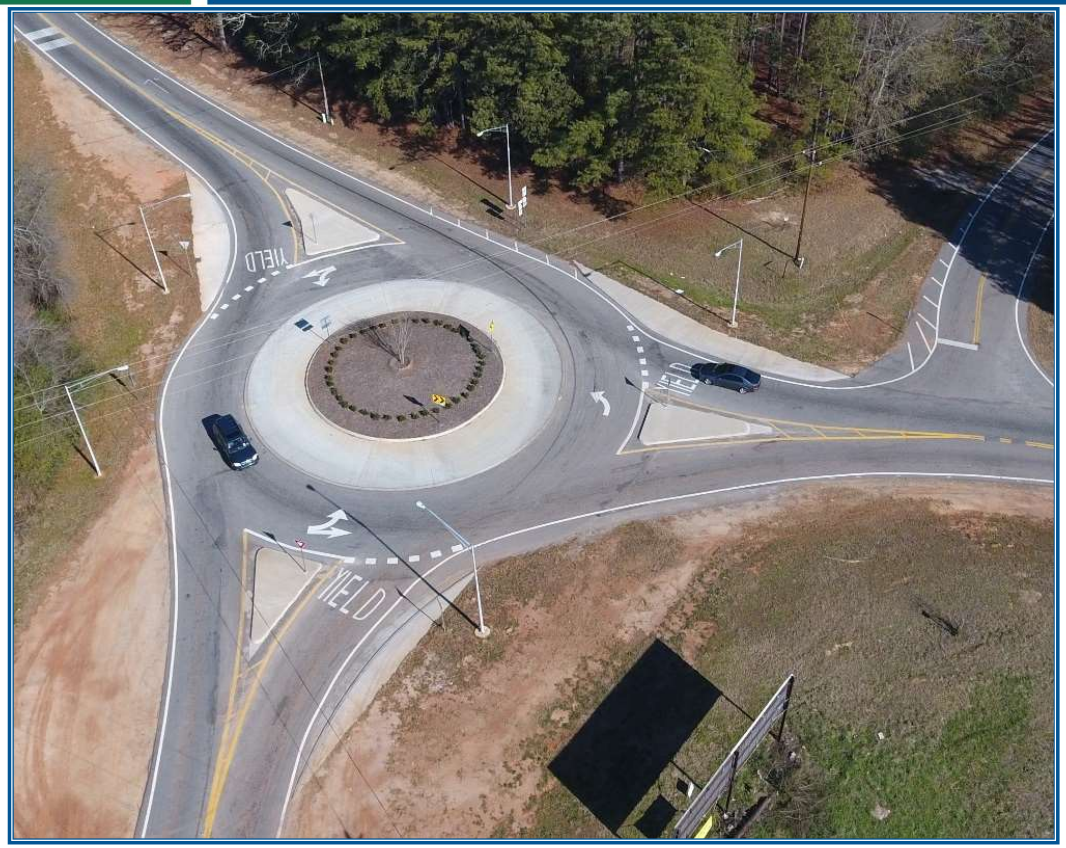
- Open to traffic = August 2016
- ICD = 70’

$189,400 Quick Response Project

- Open to traffic = August 2018
- ICD = 74’



For both: $398,818 Quick Response Project



- GDOT Maintenance: $41,800
- Quick Response: Grading work $199,900
  - Included Lighting: $37,560
- Open to traffic = March 2015
- ICD = 120’
- Landscaping = Spring 2017 (additional $3,445)

$241,669 Quick Response/Maintenance Funds

- Raised concrete central island + splitters added in April 2016 through Quick Response Project
- ICD = 90’

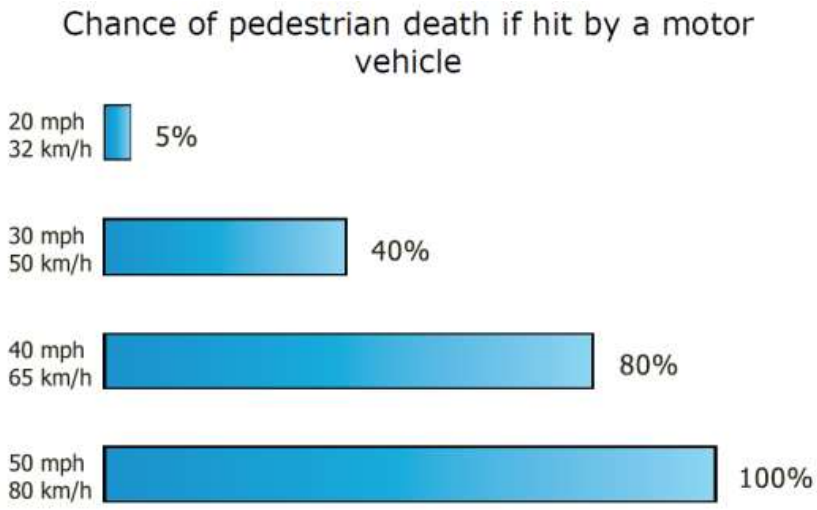
$152,430 Quick Response Project

Benefits

- Can improve safety
  - Vehicle
  - Pedestrian/Bicyclists
- Can improve operations
  - Higher capacity, less delay
- Can reduce footprint

Traffic Control Prior to RBT	% Reduction in Injury Crashes
Signalized	78
All-Way Stop	46
Two-Way Stop	82

NCHRP 672, Exhibit 5-15

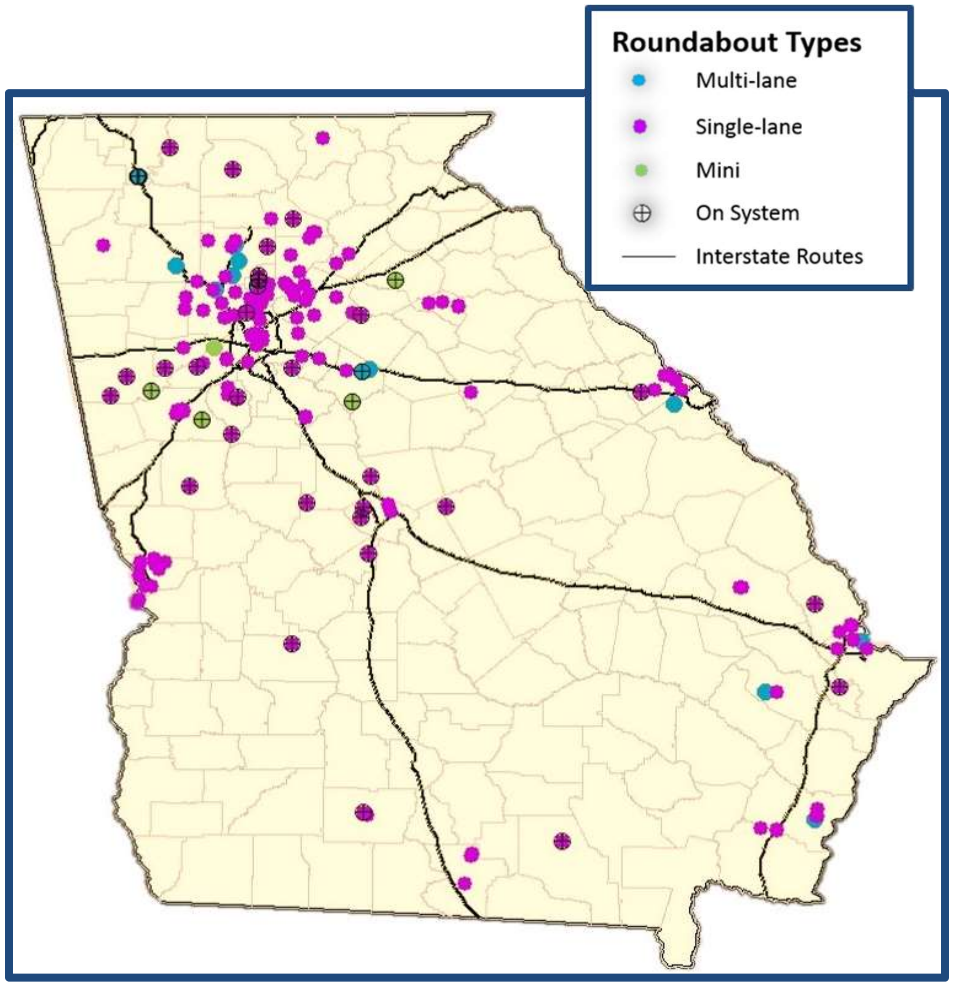


NCHRP 572, Table 28

Status in GA

- **60+ On state routes/ built with GDOT $$**
  - 45+ single lane/compact
  - 5+ multi-lane/hybrid
  - 10+ mini
- 20+ under construction
- 70+ in design
- 90+ in concept

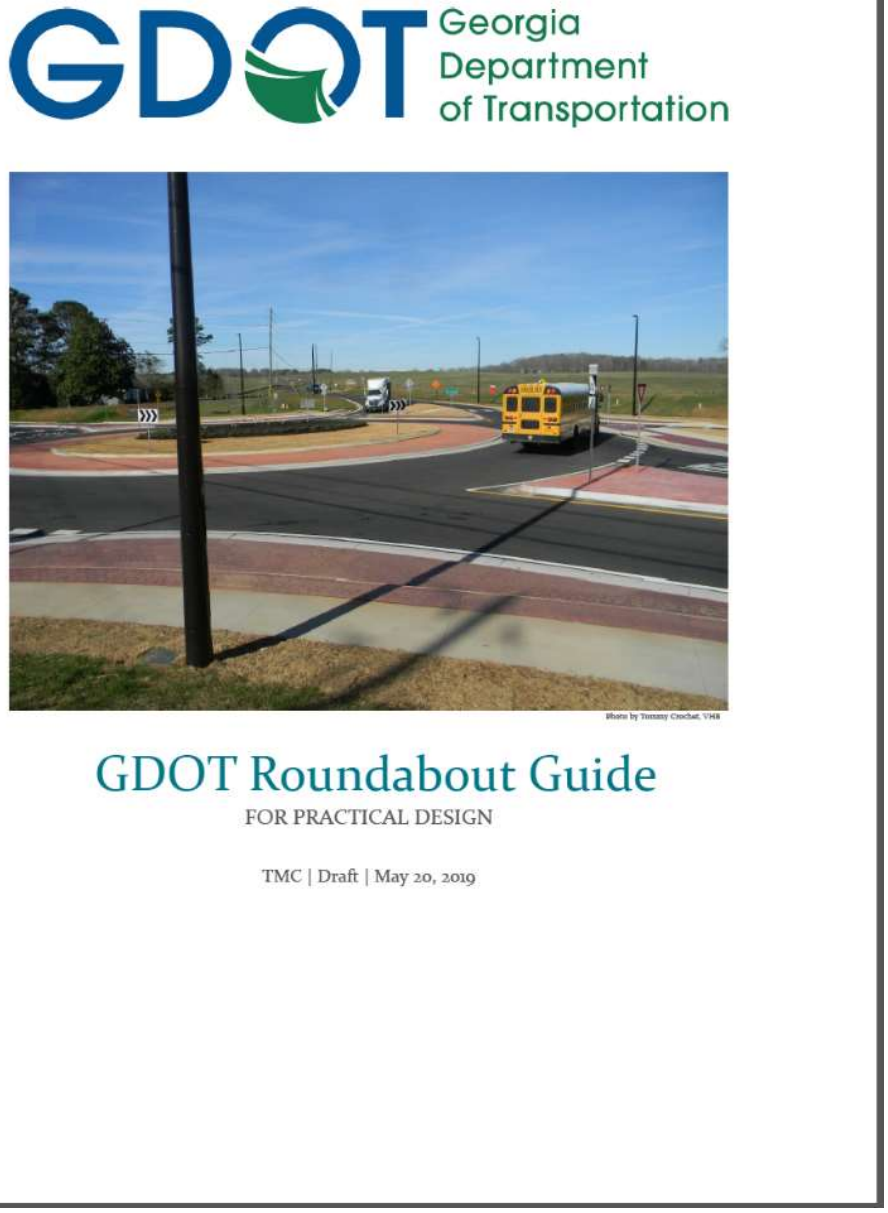
- **165+ On local roads**
- 250+ Other circular intersections



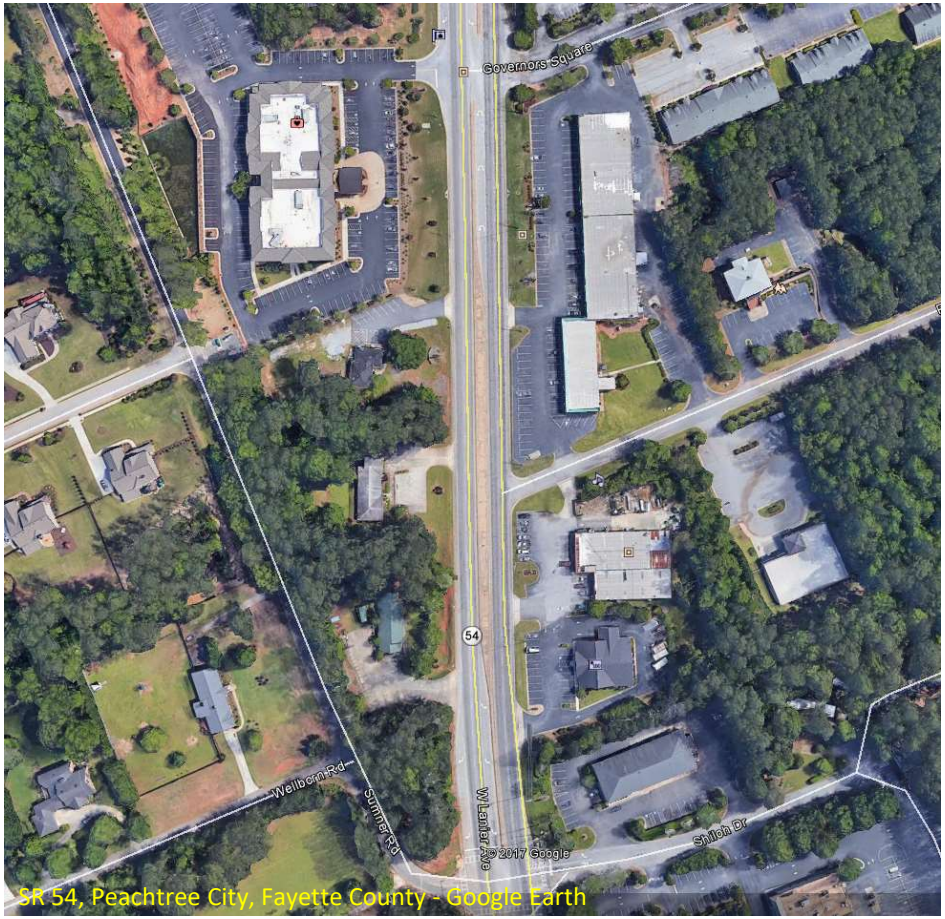
Georgia Department of Transportation

Roundabouts@dot.ga.gov

http://www.dot.ga.gov/DS/SafetyOperation/Roundabouts



Right-in Right-out (RIRO) with Downstream U-Turns



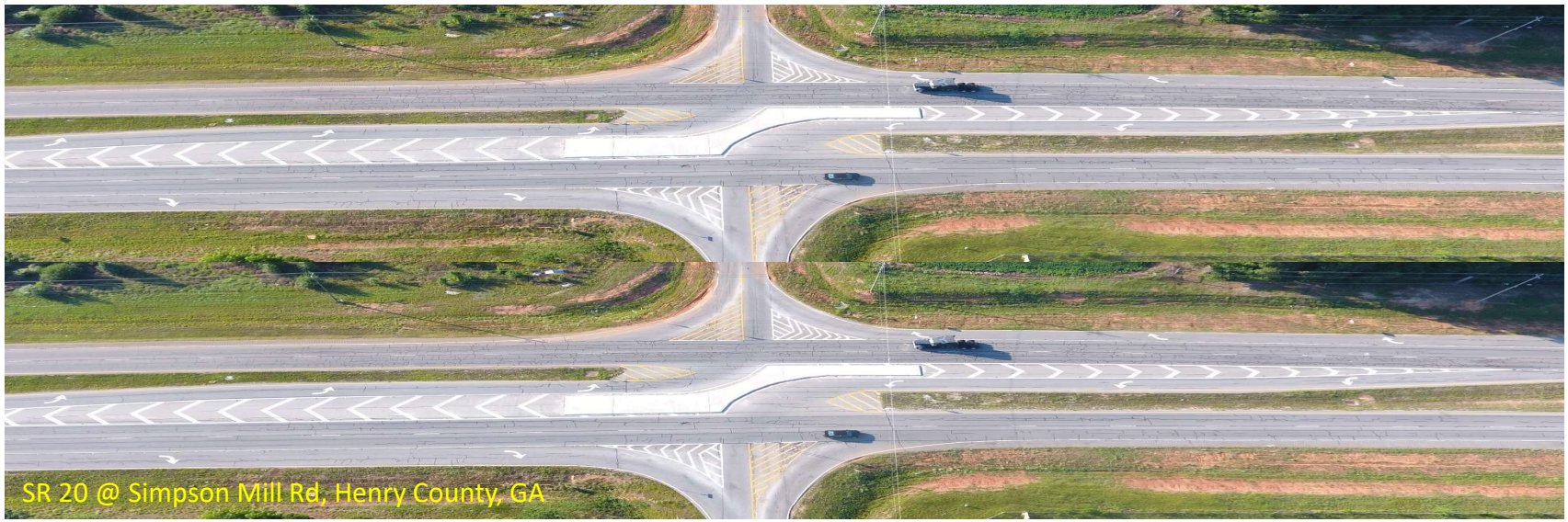
- No left turns or through movements from side street
- Make right turn then U-turn instead
- No left turns into side street, also use U-turn

Benefits

- Improved safety
- Reduces queueing on side street

Reduced Conflict U-Turn (RCUT)

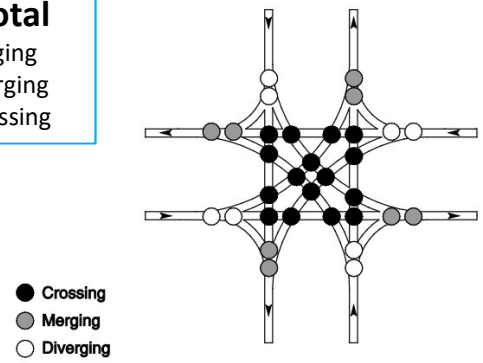
- Prevents left turns and through movements from side street
- Make right turn and use U-turn instead
- Allows left turns into side street



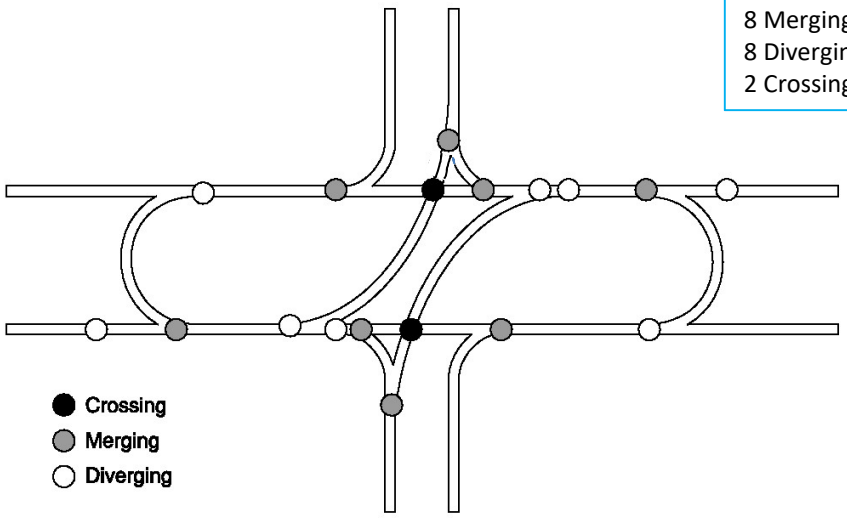
SR 20 @ Simpson Mill Rd, Henry County, GA

Benefits

32 Total
8 Merging
8 Diverging
16 Crossing



18 Total
8 Merging
8 Diverging
2 Crossing



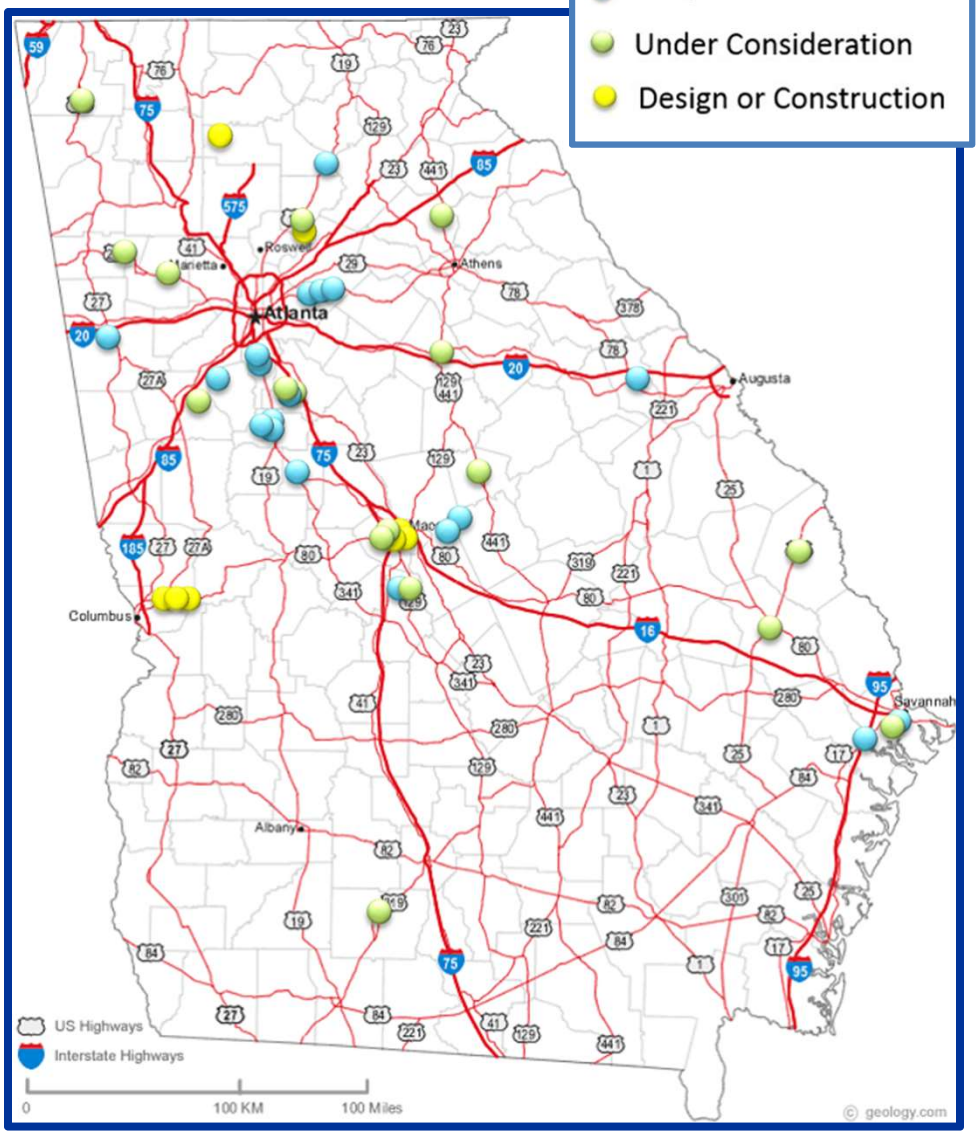
FHWA RCUT Informational Guide,
Exhibit 4-3. Vehicular conflict points

- Improved safety over TWSC
- Reduces queueing on side street
- Often easy retrofit - cheaper

Status in GA

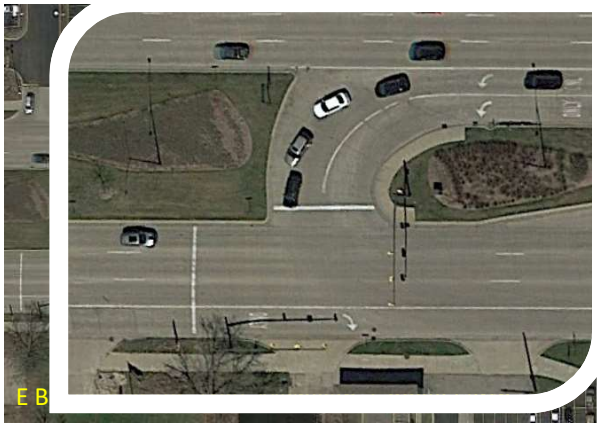
- **35+ Existing**
- **15+ Design/under construction**
- **25+ Under consideration**
  - 1 signalized

Total: 70+



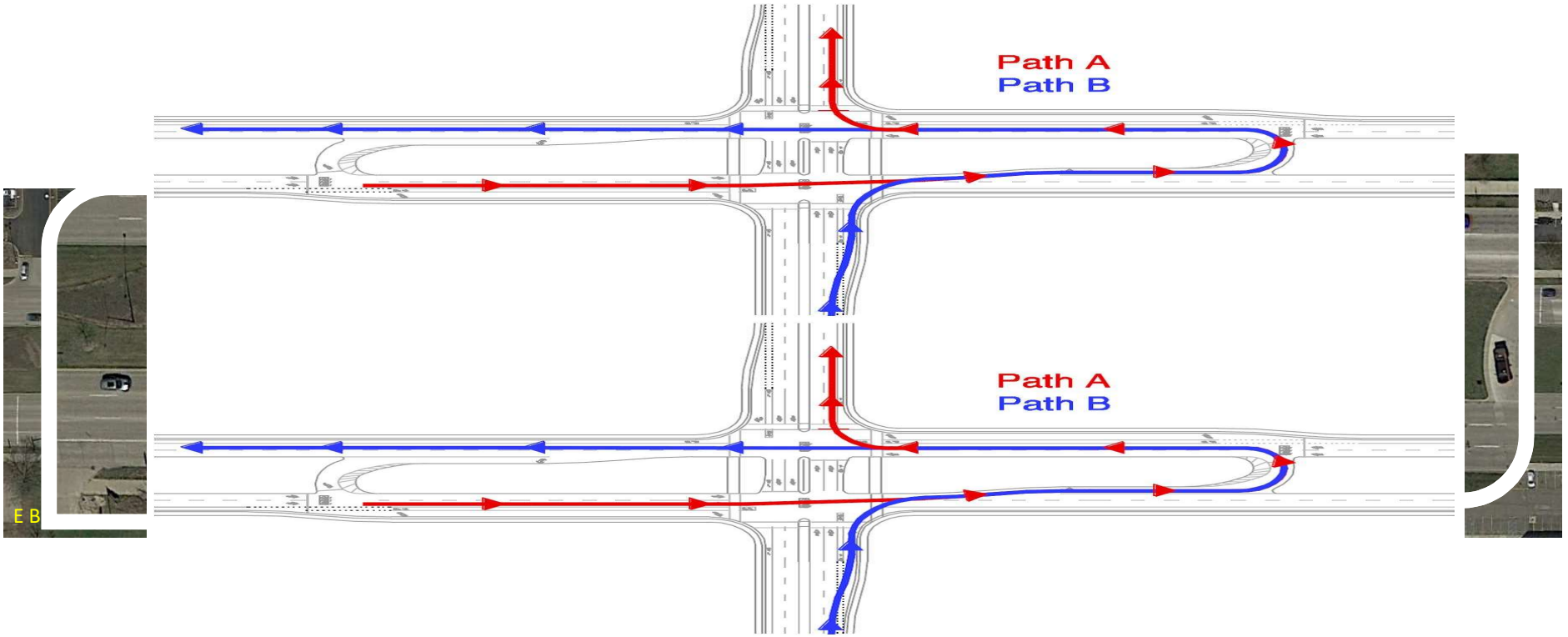
Median U-Turn (MUT)

- No left turns, only throughs and right turns
- Make right then use U-turn
- U-turns signalized/unsignalized



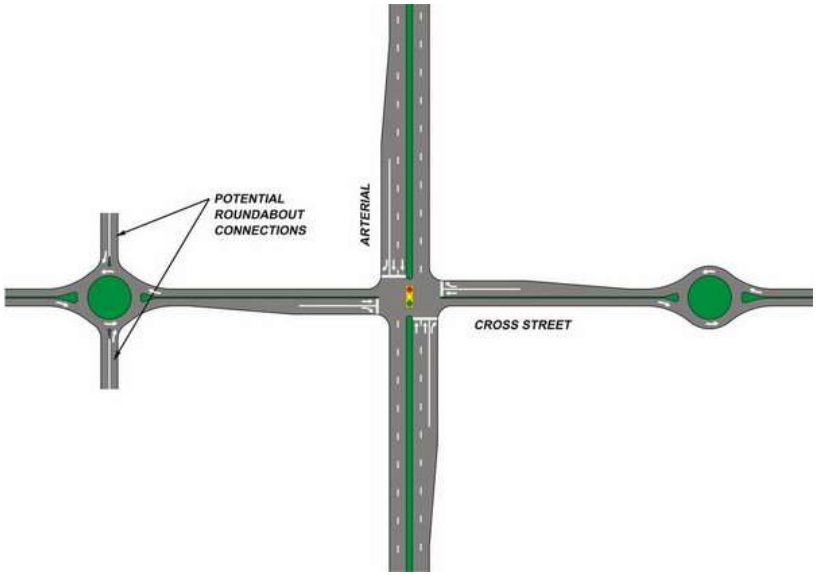
Median U-Turn (MUT)

- No left turns, only throughs and right turns
- Make right then use U-turn
- U-turns signalized/unsignalized



FHWA: https://safety.fhwa.dot.gov/intersection/innovative/uturn/

Benefits

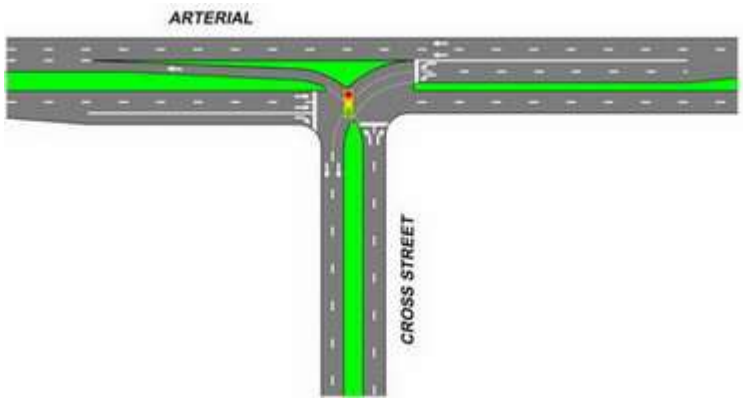


Maryland ATTAP MUID. Bowtie

Maryland ATTAP MUID. Paired Intersections

- Improved safety over traffic signal & AWSC
- Reduced signal phases
- Good alternative with existing wide medians
- Easily used in corridor with other alt. intersections
  - Roundabouts
  - RCUTs
  - RIRO

High-T/Continuous Green-T



FHWA AIIR. Fig. 149

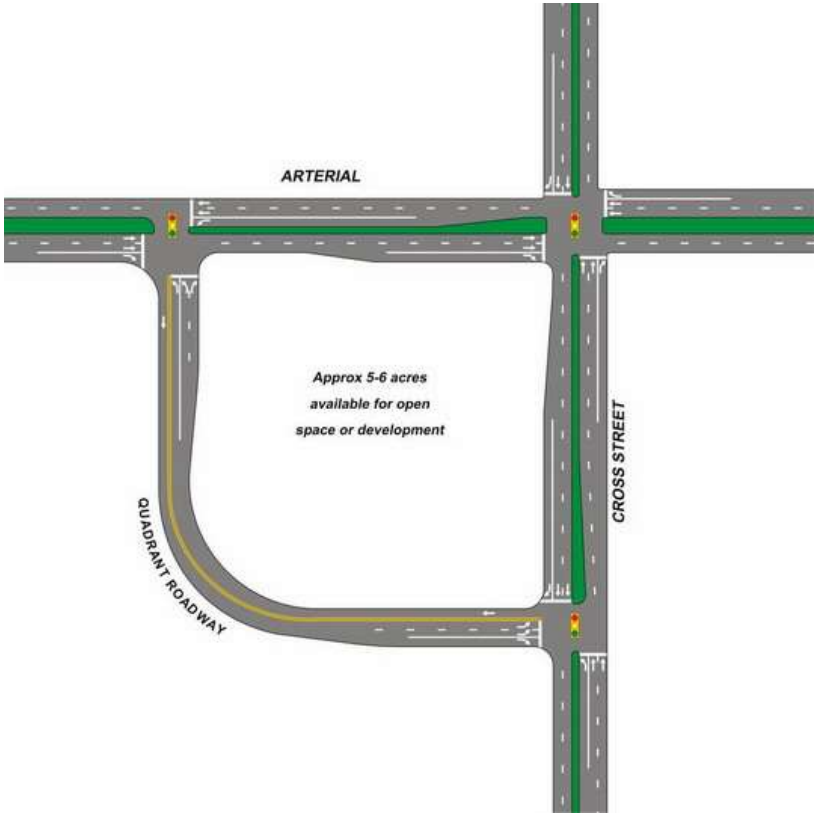
- "Top" through movement separated from other, operates continuously
- Channelized left turn from side street

Benefits & Applicability

- Good alternative when high through volumes in one particular direction
- Relatively easy conversion with existing wide median

SR 120 @ John Ward Rd SW, Cobb County, GA

Quadrant Roadway



Maryland ATTAP MUID Quadrant Roadway

- No direct left turns at main intersection
- All left turns rerouted to connector, quadrant roadway
- Both junctions of connector road typically signalized
- All signals coordinated

Benefits & Applicability

- Good where there are heavy through volumes
- Reduces delay at severely congested intersections
- Simple two phase signal at main intersection
- More appropriate as a spot treatment

Quadrant Roadway

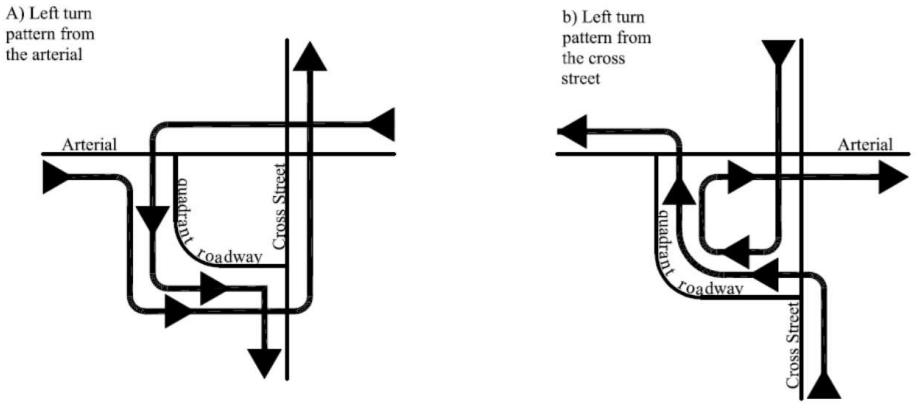


Figure 126. Illustration. Left-turn movements at a QR intersection.

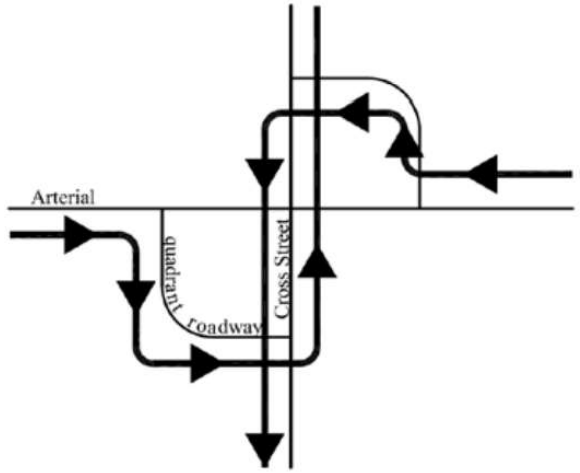


Figure 127. Illustration. Intersection with connector roadways in two quadrants.

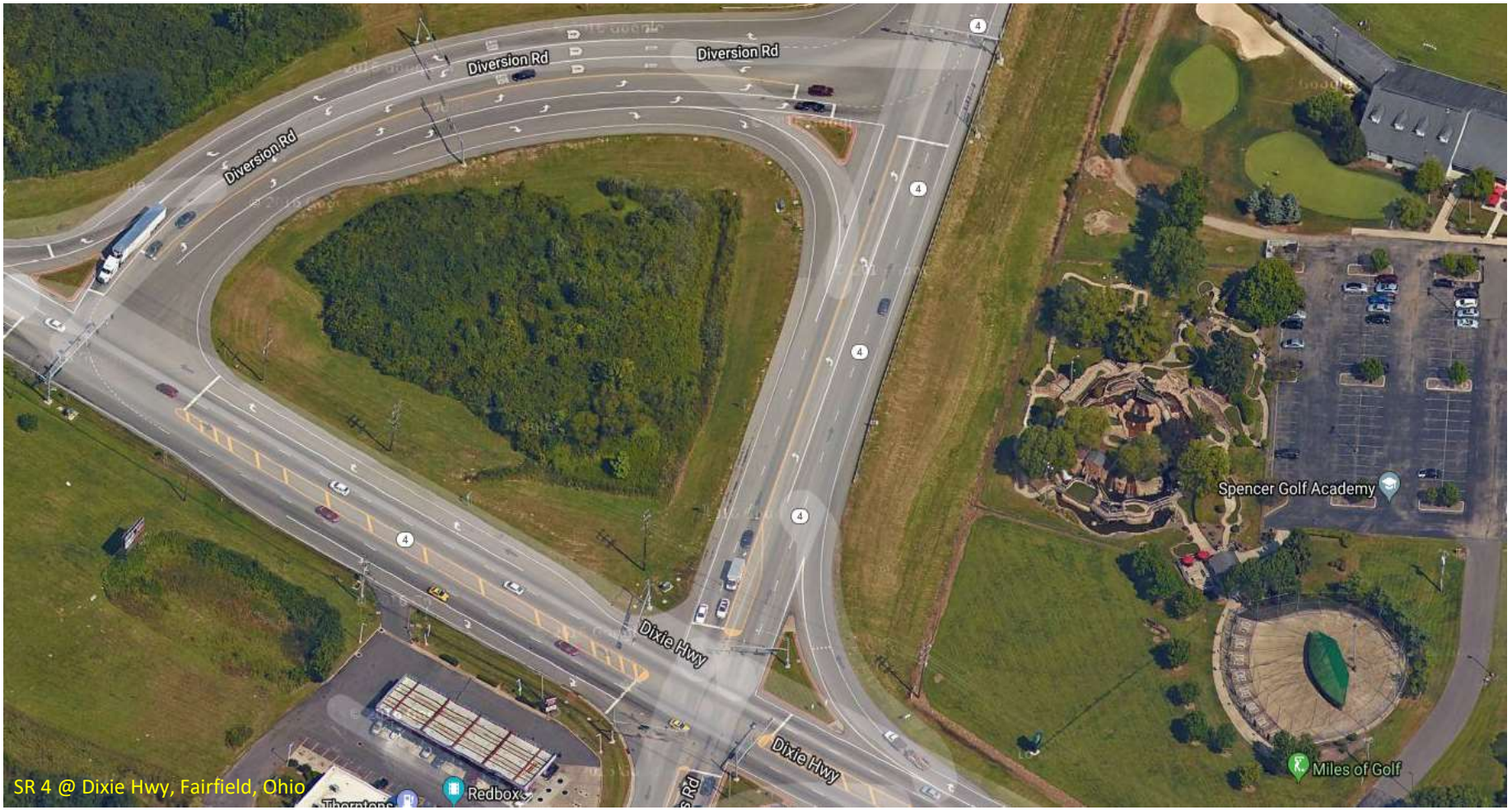
FHWA AIIR Chpt 5. Quadrant Roadways

- No direct left turns at main intersection
- All left turns rerouted to connector, quadrant roadway
- Both junctions of connector road typically signalized
- All signals coordinated

Benefits & Applicability

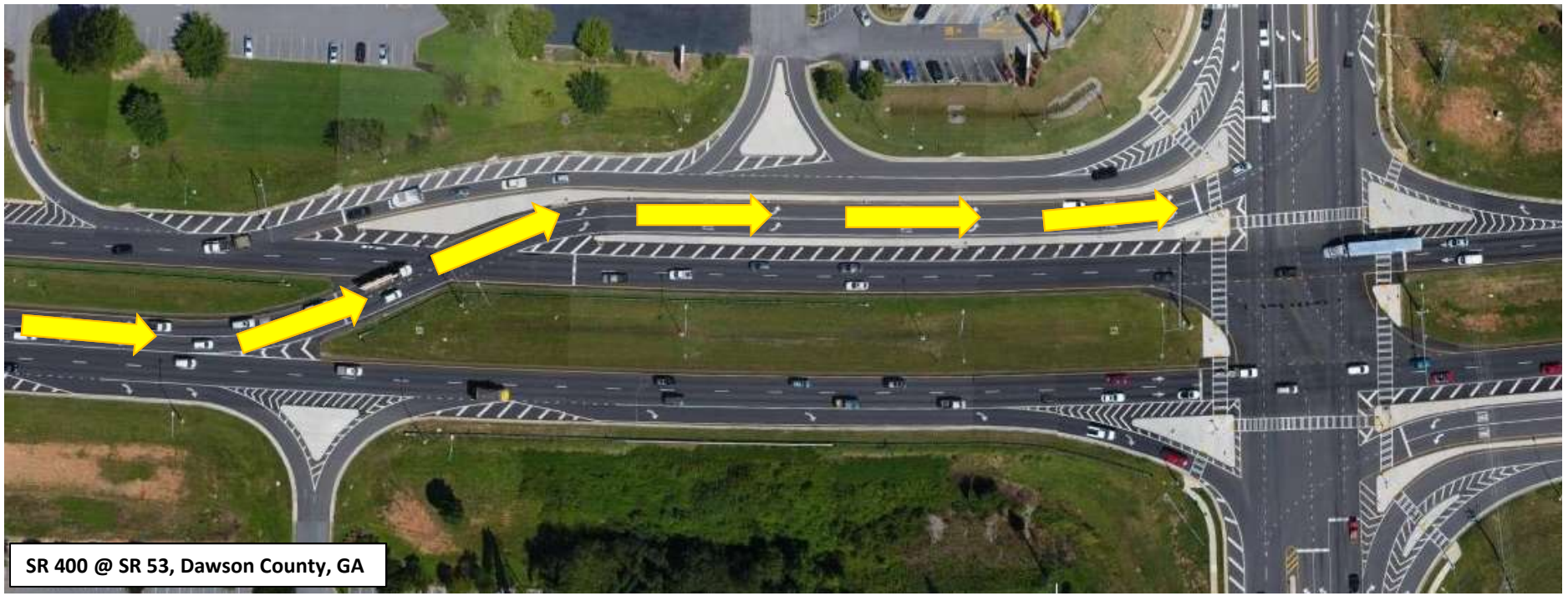
- Good where there are heavy through volumes
- Reduces delay at severely congested intersections
- Simple two phase signal at main intersection
- More appropriate as a spot treatment

Georgia Department of Transportation



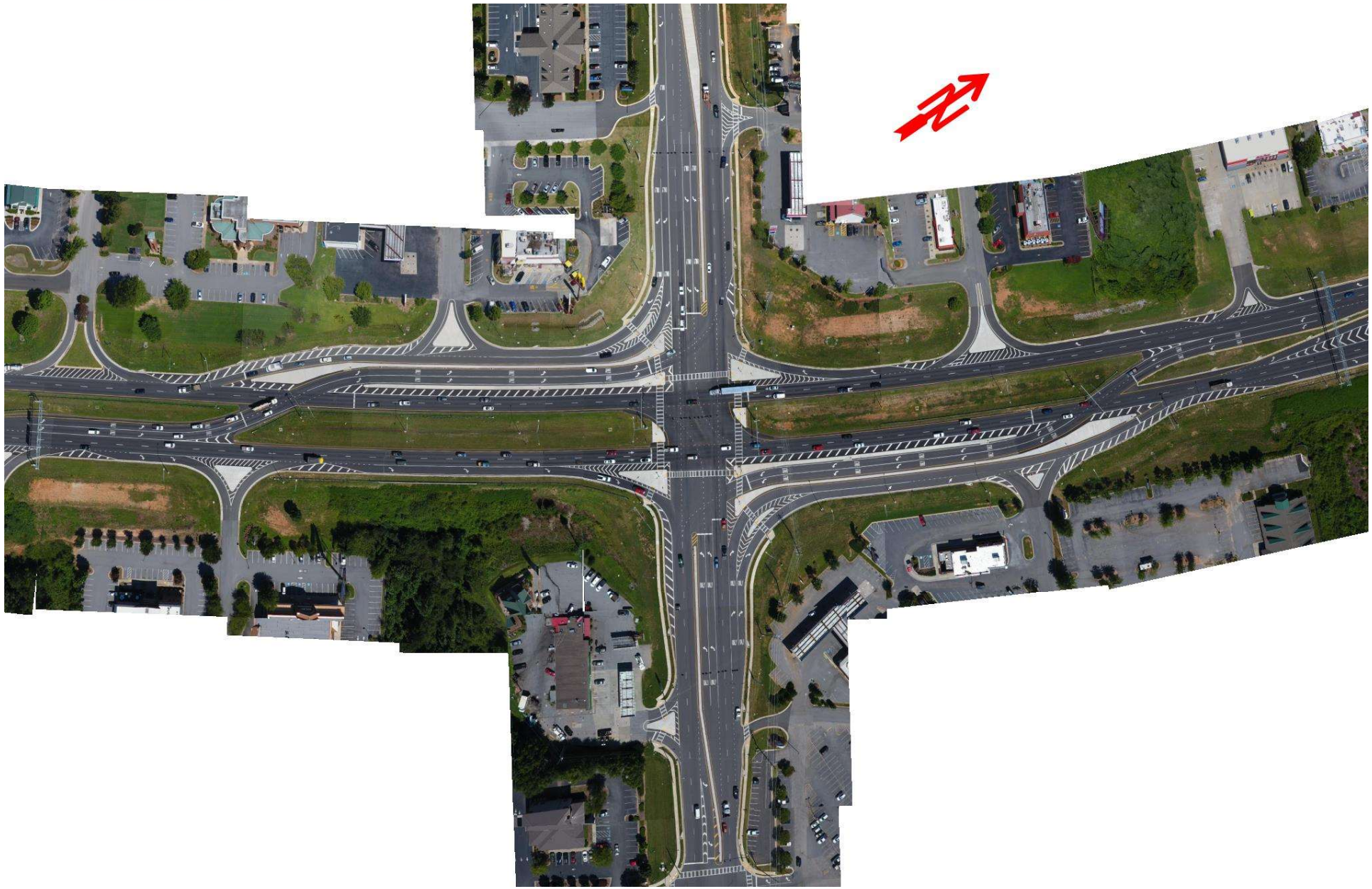
Continuous Flow Intersection (CFI)

- Left turning traffic crosses opposing lanes in advance of main intersection at a signalized cross-over intersection
    - Displaced Left Turn (DLT)
- Left turns at same time as through movements
- Can have varying # of displaced left turns



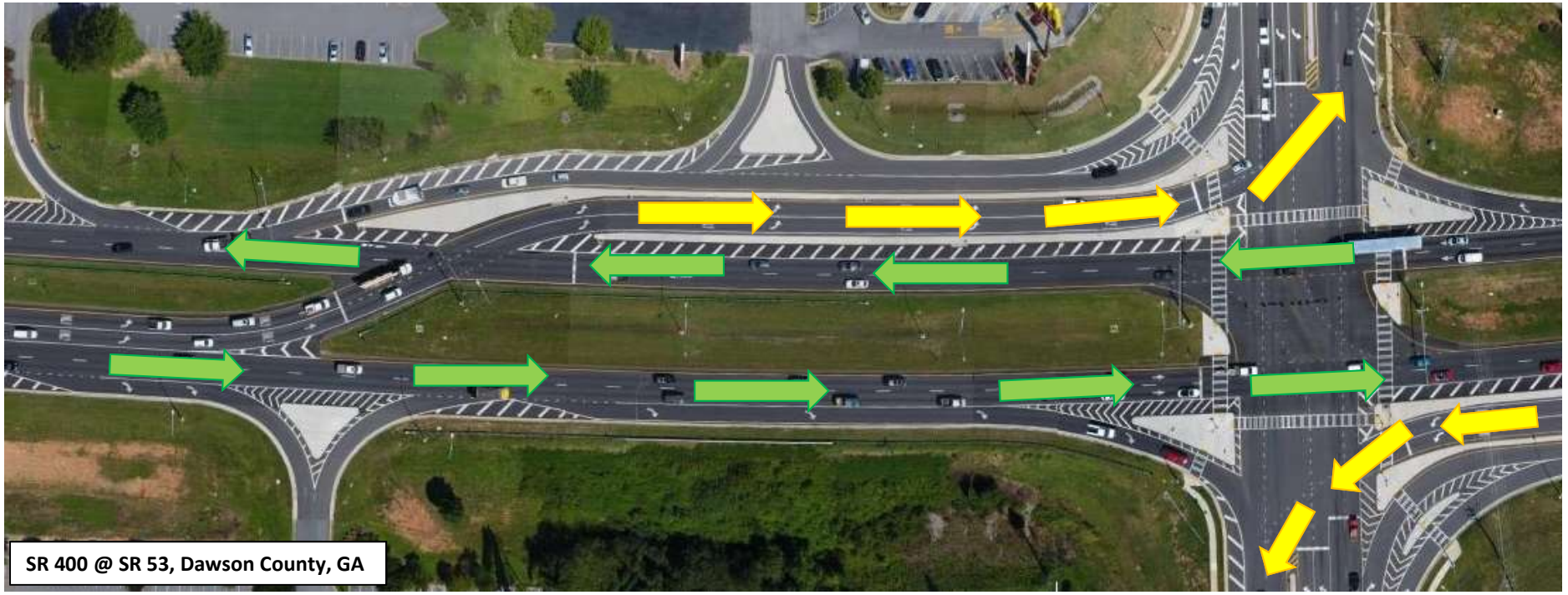
SR 400 @ SR 53, Dawson County, GA

GDOT
Georgia Department
of Transportation



Continuous Flow Intersection (CFI)

- Left turning traffic crosses opposing lanes in advance of main intersection at a signalized cross-over intersection
    - Displaced Left Turn (DLT)
- Left turns at same time as through movements
- Can have varying # of displaced left turns



SR 400 @ SR 53, Dawson County, GA

Benefits

- Reduced # signal phases
- Good alternative on high volume roadways
- Improved safety over conventional traffic signal

32 Total
8 Merging
8 Diverging
16 Crossing

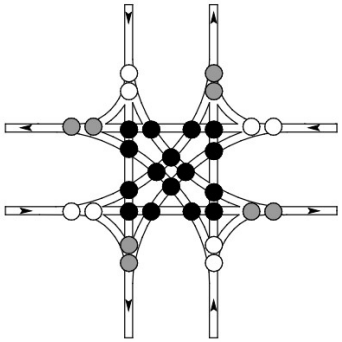


Exhibit 4-2. Conflict point diagram for conventional intersection

30 Total
8 Merging
8 Diverging
14 Crossing

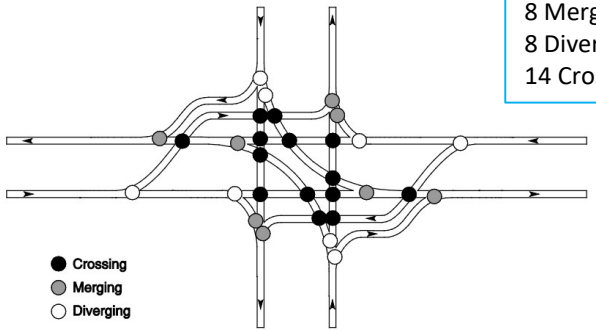


Exhibit 4-3. Conflict diagram for CFI on one street

28 Total
8 Merging
8 Diverging
12 Crossing

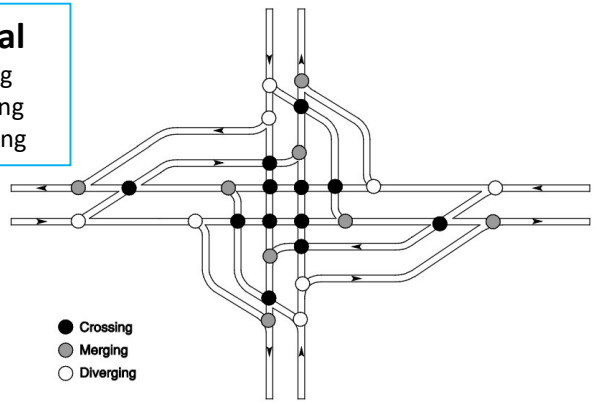
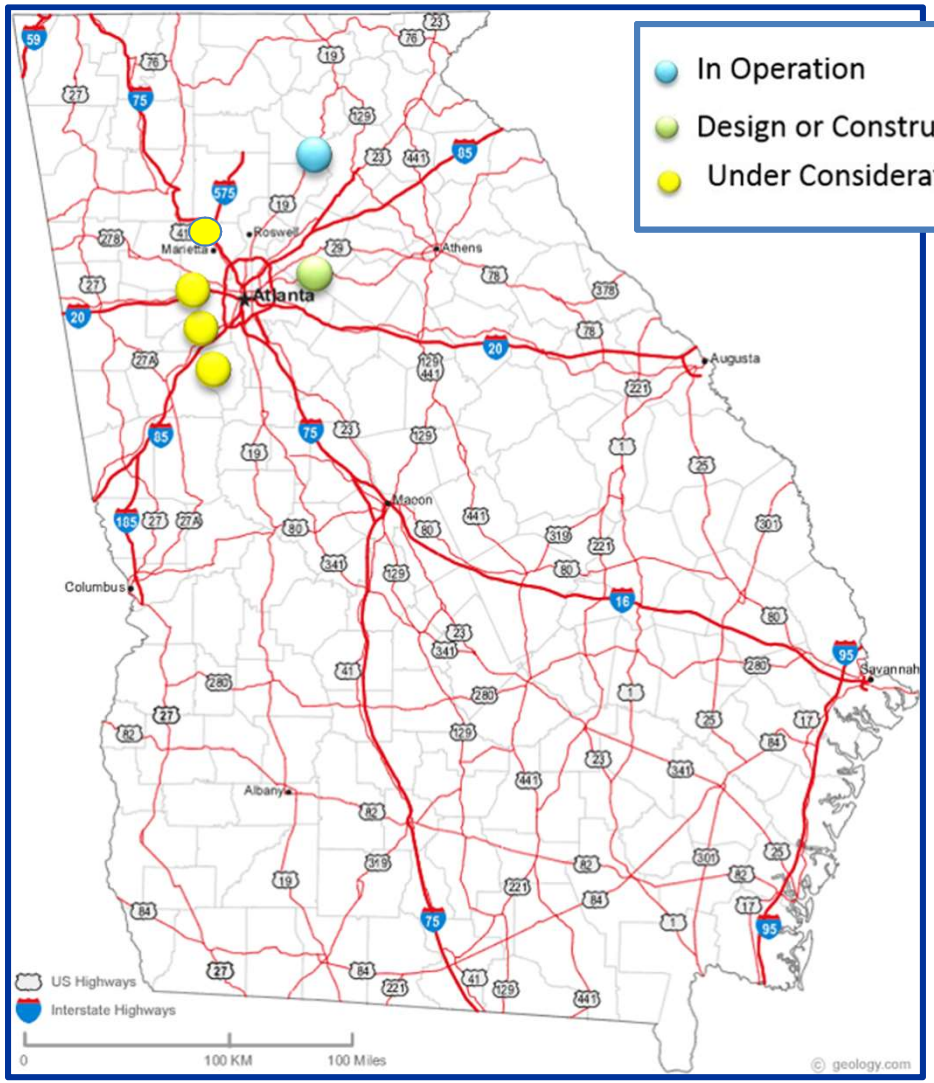


Exhibit 4-4. Conflict diagram for CFI on all streets

FHWA Displaced Left Turn Intersection Informational Guide

Status in GA

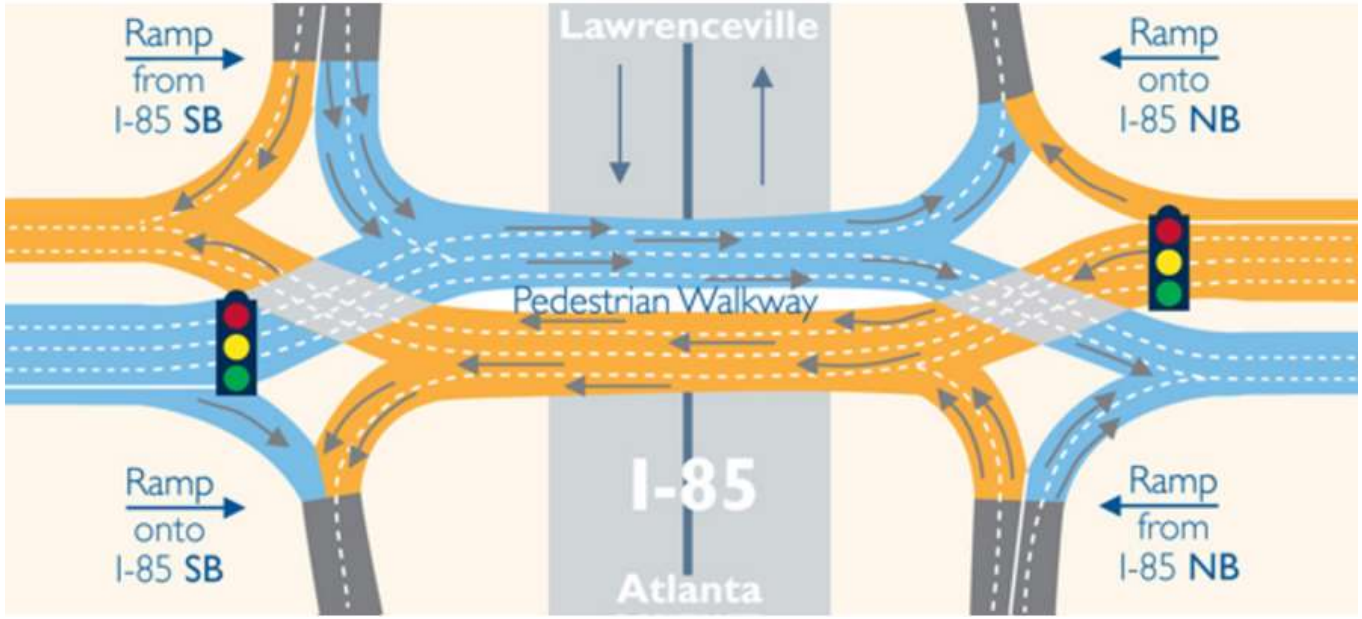


- **1 Existing**
- **1 Design/under construction**
- **4 Under consideration**

Total: 6

Diverging Diamond Interchange (DDI)

- Vehicles shifted to left side of road
- Allows free flow lefts on to freeway
- Allows partial free flow lefts off of freeway



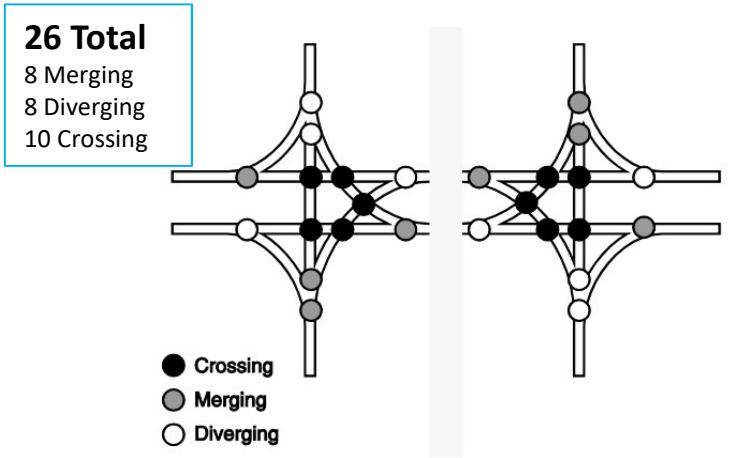
Gwinnet County website

GDOT
Georgia Department of Transportation

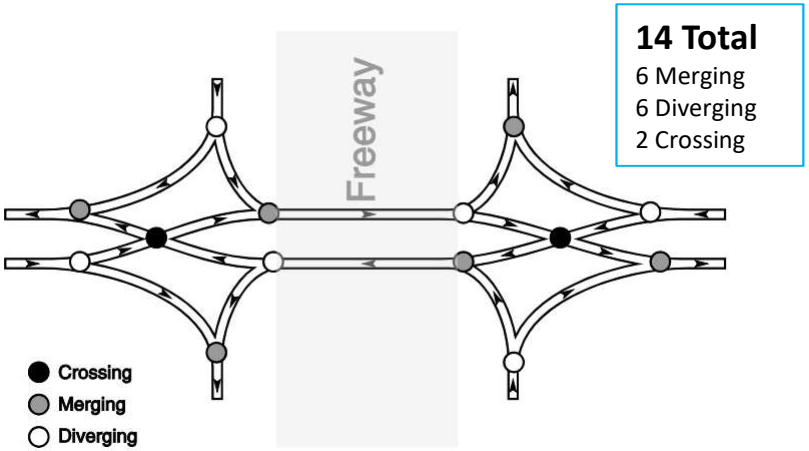
I-85 @ Jimmy Carter Blvd, Gwinnett County, GA

Benefits

- Especially good where left turning volume high
- Reduce # signal phases
- Improved safety over conventional interchange
- Viable alternative to bridge widening for capacity increase



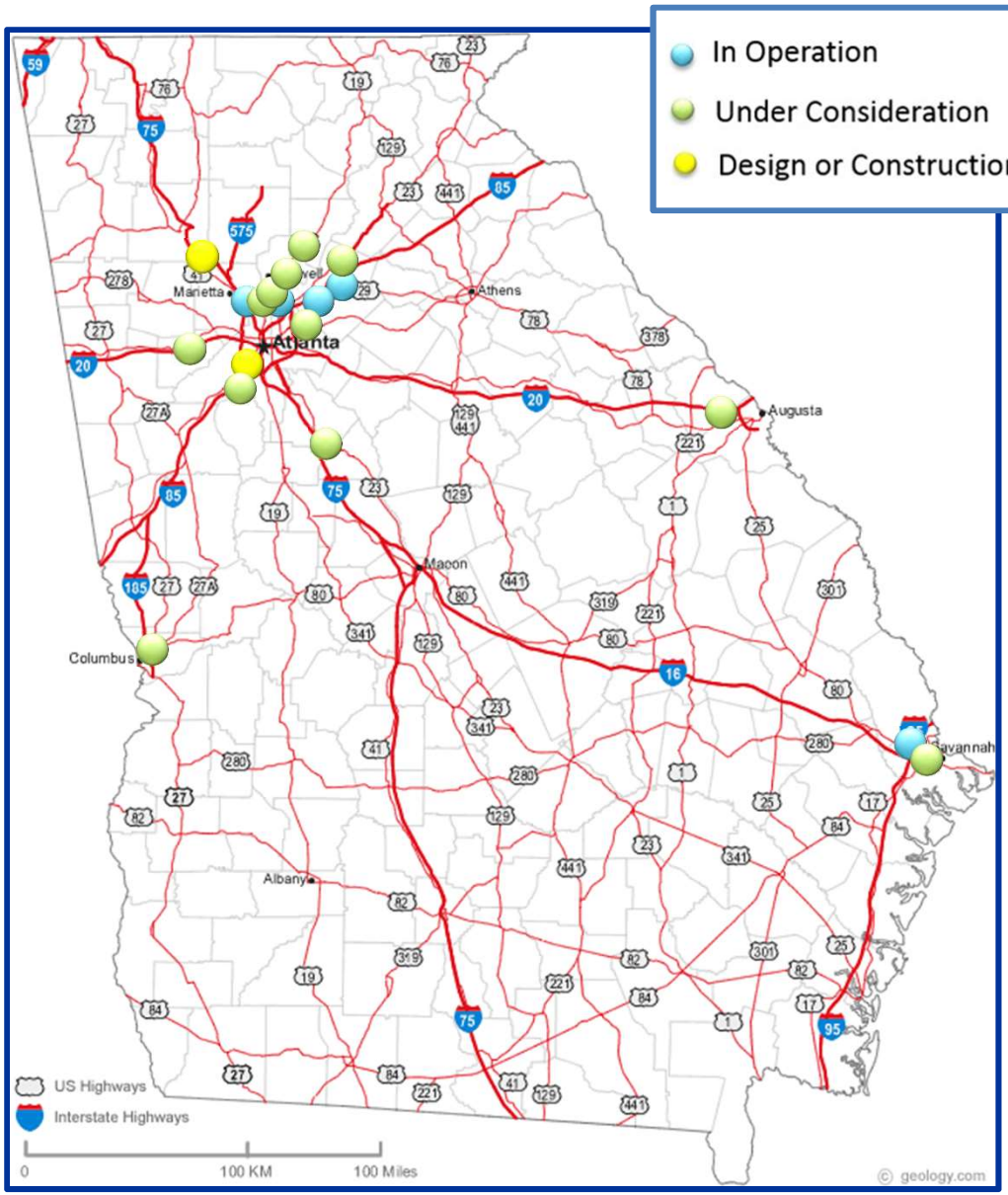
FHWA Diverging Diamond Interchange Information Guide
Exhibit 4-2. Conflict point diagram for conventional diamond



FHWA Diverging Diamond Interchange Information Guide
Exhibit 4-1. Conflict point diagram for DDI

I-85 @ Pleasant Hill Rd, Gwinnett County, GA

Status in GA



- 6 Existing
- 2 Design/under construction
- 10+ Under consideration

Total: 17+

Single-Point Urban Interchange (SPUI)

- One signalized intersection
- Left turns onto freeway can be simultaneous

Benefits

- Simpler sequence phasing for signal
- Increased capacity
- Easier to coordinate with upstream/downstream signals
- Requires less right-of way than conventional diamond interchange , DDI or roundabout interchange

Georgia Department of Transportation

Intersection Control Evaluation

ICE

GDOT Mission Statement

Deliver a transportation system focused on innovation, safety, sustainability and mobility

http://alphastockimages.com/

Why ICE??

Integrate safety into our decision making process for intersection control on **ALL** projects

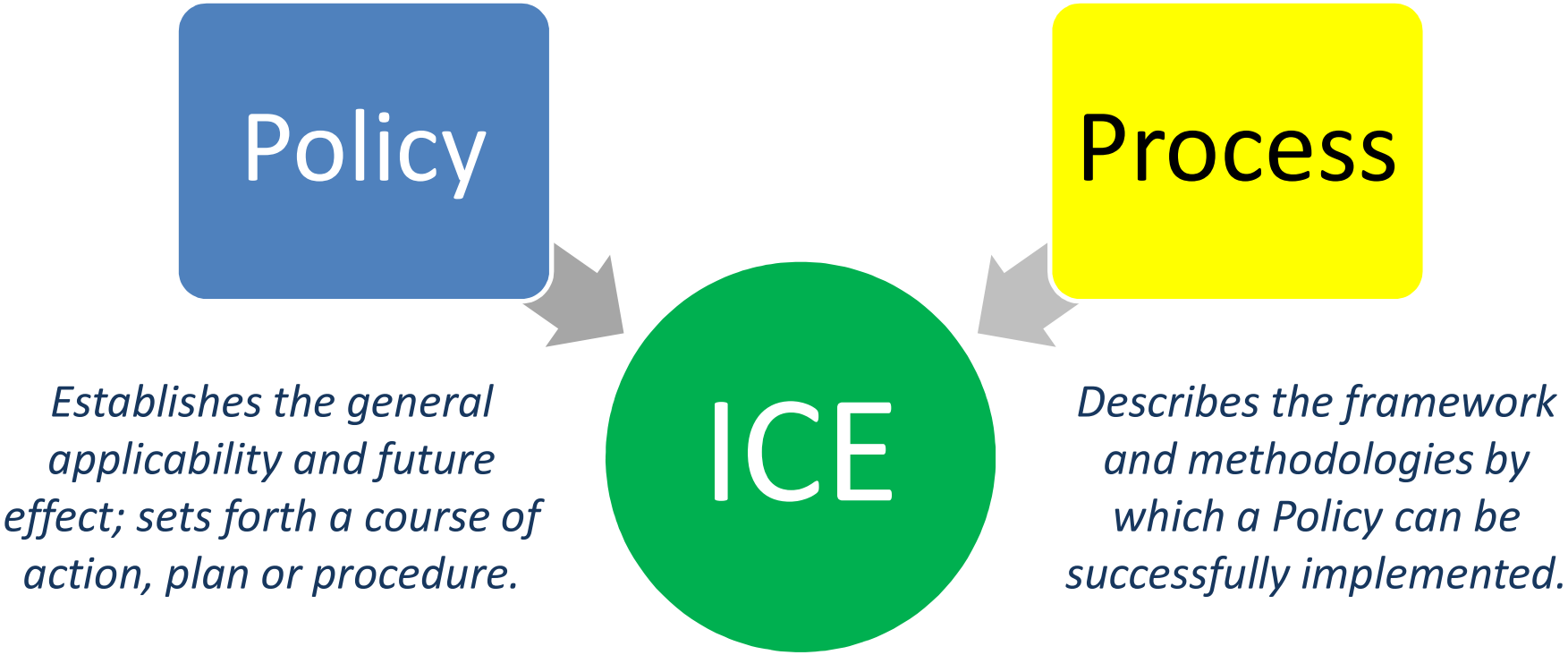
Purpose of ICE

The purpose of ICE is to provide:

- **Traceability**
- **Transparency**
- **Consistency**
- **Accountability**

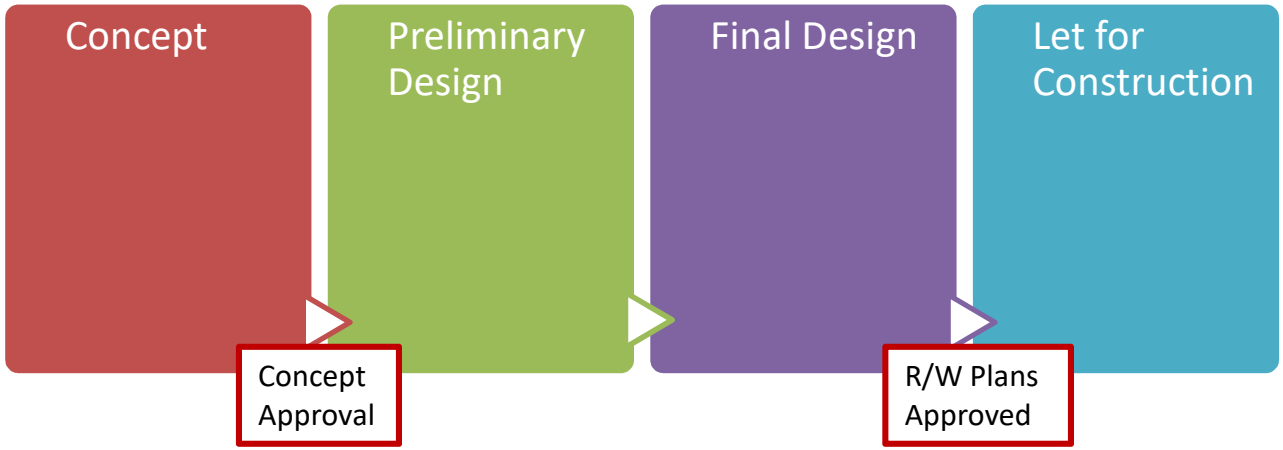
Policy & Process

ICE is a policy and a process



Implementation

- ICE is required for all projects that do not have concept approval by **July 1, 2017**



Georgia Department of Transportation

Intersection Control Evaluation

THE POLICY

Requirements & Waiver

Not Required	Required	Waiver
No changes to intersection footprint or control	Project is on State route/NHS and/or uses State or Federal money	ICE ***may*** be waived based on appropriate evidence and a written request

Approvals

Level 1: Chief Engineer (or Designee)

- Projects going through Plan Development Process
- New or revised signal permits
- New median openings

Level 2: District Engineer with notification to Chief Engineer

Projects that are not level 1 where:

- Leg is added to intersection
- Intersection control will be changed

Level 3: District Engineer

- QR, Driveway Permits, Maintenance Work that does not qualify as level 2

Georgia Department of Transportation

Intersection Control Evaluation

THE PROCESS

ICE – The Process

Screening effort to eliminate non-competitive options and identify alternatives for further consideration

Detailed evaluation of the alternatives identified in Stage 1 in order to support the selection of the preferred alternative that will be advanced to detailed design

Stage 1 - Screening

Unsignalized

- Minor Stop
- All-Way Stop
- Mini Roundabout
- Single Lane Roundabout
- Multilane Roundabout
- RCUT
- RIRO w/Downstream U-Turn
- High-T (unsignalized)
- Offset-T Intersections
- Diamond Interchange (Stop)
- Diamond Interchange (RAB)
- Turn Lane Improvements
- Other

Stage 1 - Screening

Signalized

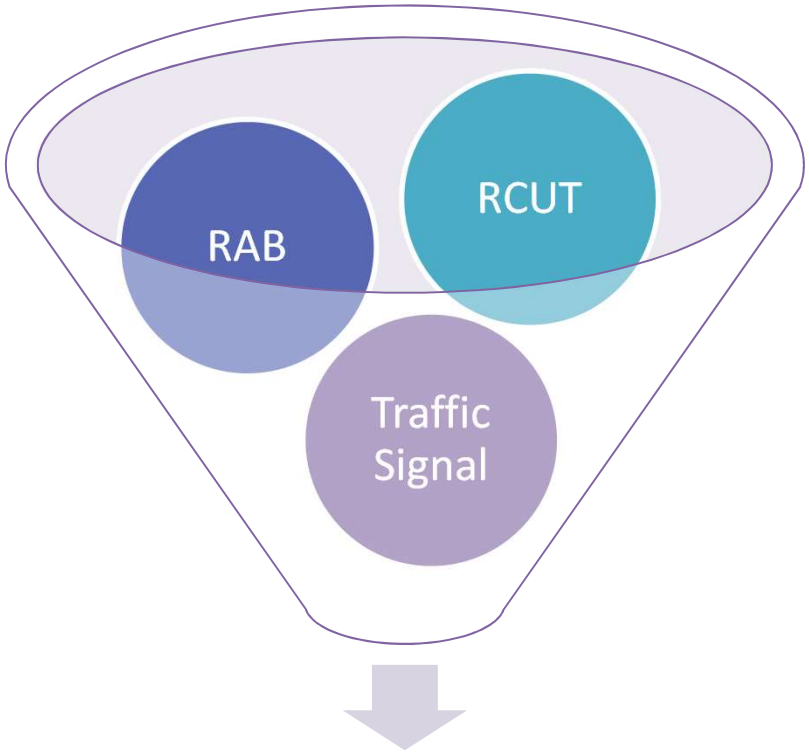
- Signal
- Median U-Turn
- RCUT
- Displaced Left Turn (CFI)
- Continuous Green-T
- Jughandle
- Diamond Interchange (signal)
- Quadrant Roadway
- Diverging Diamond
- Single Point Interchange
- Turn Lane Improvements
- Other

Stage 1 - Screening

1. Does alternative address the **project need** in a **balanced manner** and **in scale** with the project?
2. Does alternative **improve safety performance** in terms of reducing severe crashes?
3. Does alternative incorporate **safety**, **convenience** and **accessibility** for **pedestrians and/or bicyclists**
4. Does alternative **improve (or preserve) traffic operations** (congestion, delay, reliability, etc.)?
5. Does alternative **appear feasible** given the site **characteristics, constrains and location context**?
6. Does alternative **appear feasible** with respect to **other project factors**?
7. **Overall feasible alternative?**

Stage 2 - Alternative Selection

Shortlist of Alternatives from Stage 1



Preferred Alternative

- Total Project Cost
- Traffic Operations
- Safety Analysis
- Environmental Impacts
- Stakeholder Posture

Chris Raymond, P.E.

State Traffic Operations Manager

(Plan/Concept Review & RAID)

GDOT Office of Traffic Operations

Office #: 404-635-2809

Email: craymond@dot.ga.gov

Daniel Trevorrow, P.E.

Alternative Intersections Supervisor

(RAID Team Supervisor)

GDOT Office of Traffic Operations

Office #: 404-635-2967

Email: dtrevorrow@dot.ga.gov

Questions??