CARY

LIVE INSPIRED™

Dynamic Left Turn Intersections

Reducing Tradeoffs And Creating Opportunities

2024 ITS Carolinas Annual Meeting

March 12, 2024

The Challenge

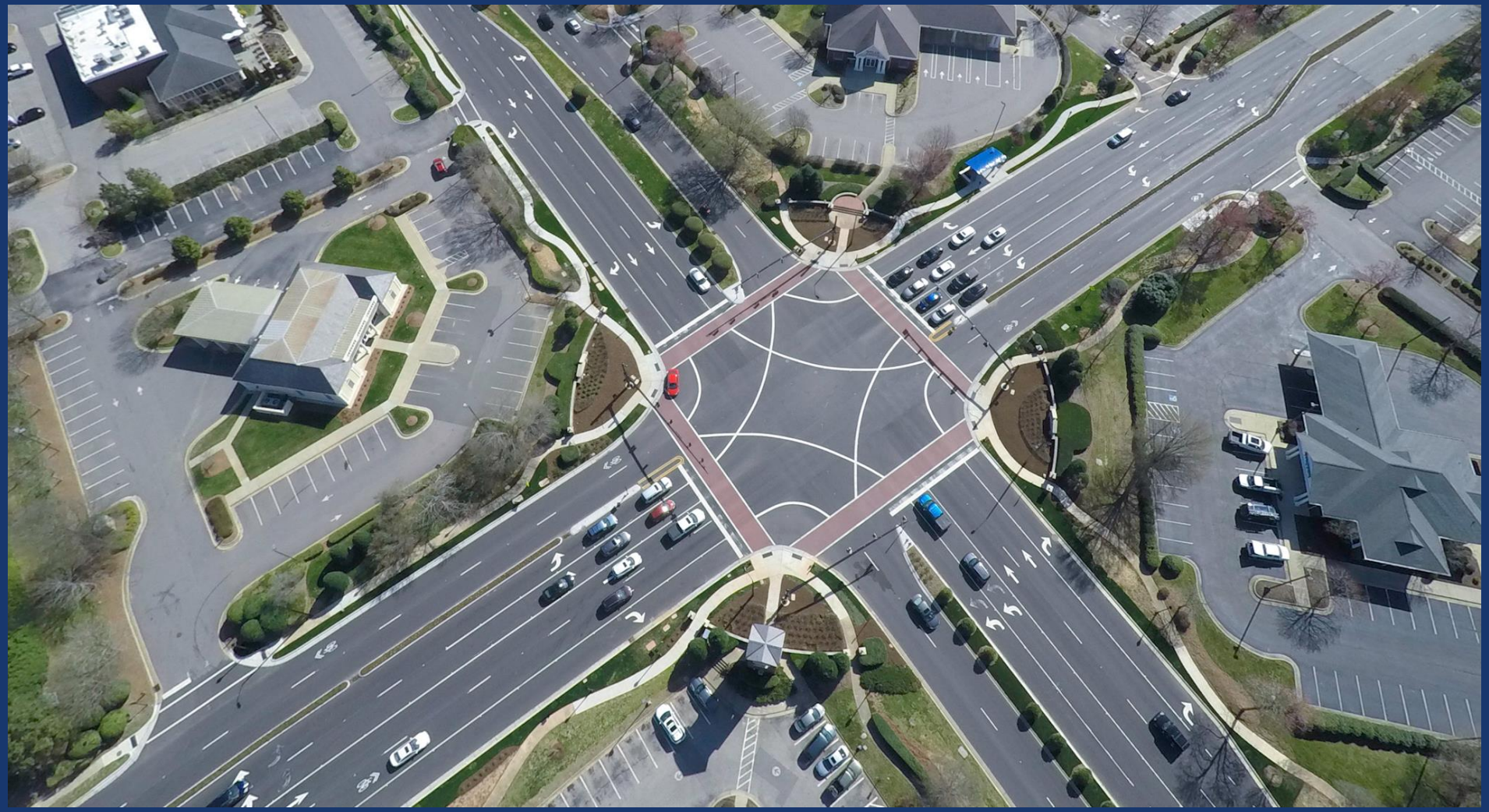
Left-turn Conflicts

High left-turn volumes challenge how we:

- Improve efficiency
- Create safe movements
- Accommodate capacity demand

Background and Objective

Elevated Left-turn Volumes



Dual Protected Left-turn Lanes

GOOD

- No conflicts
- Clear direction to motorist
- Coordination/Platooning benefits during peaks

BAD

- Increased delay
- Serve phase regardless of demand
- Can increase cycle lengths

UGLY

- Inefficient during non-peak hours
- Driver complaints/frustration
- Career shame

OBJECTIVE

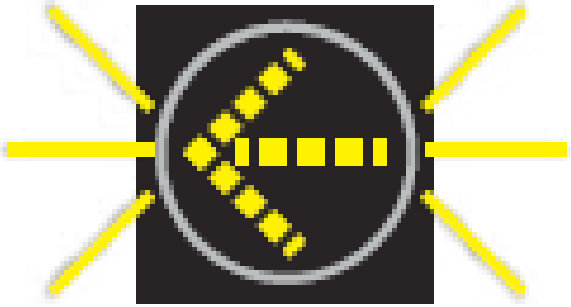
Create a dynamic, permitted phase opportunity for movements with two available left turn lanes at signalized intersections

Steady Red Arrow

Drivers turning left must stop and wait.

Steady Yellow Arrow

Stop, if you can do so safely.



Flashing Yellow Arrow

Proceed with left turn after yielding to oncoming traffic and pedestrians.

Steady Green Arrow

Proceed with left turn.

Dual Flashing Yellow Arrows

- Alleviates the Bad and the Ugly
  - Permits TOD operation
  - Reduces delay
  - Phases can be skipped
- Introduces increased safety concerns
- Requires adequate sight lines

LIMITED APPLICATION SITES

CARY

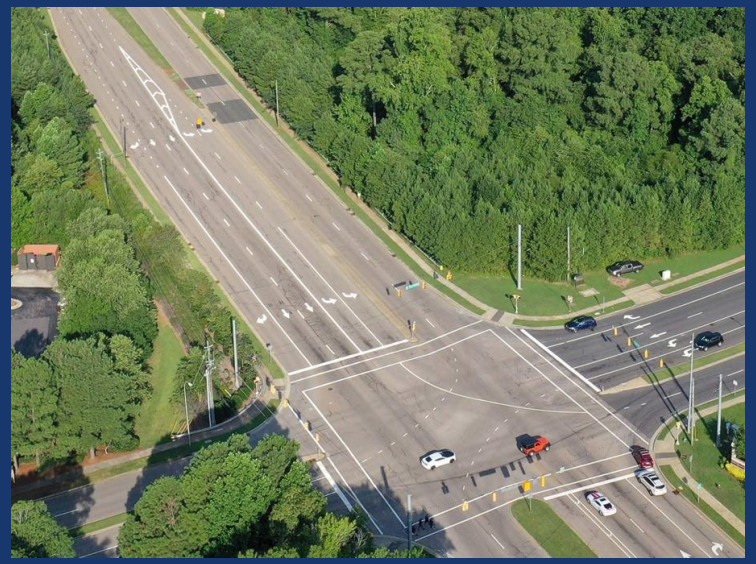
The Dynamic Left Turn Intersection

DLTi Dynamic Left Turn intersection

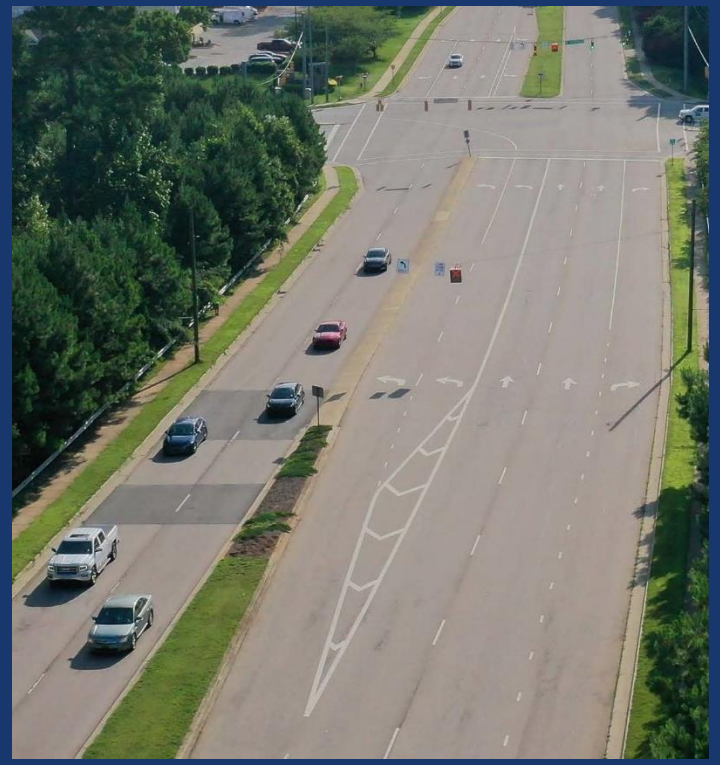
- Create a single left-turn lane for off-peak
  - Easily permits permissive phasing
  - Reduces sight line conflicts
- Time of day operation
  - Fully protected
  - Permissive + Protected
- Uses existing approved devices
  - Changeable lane control signs
  - MUTCD complaint lane markings

DLTi Implementation

Solid Lane Extension



Turn Lane Taper



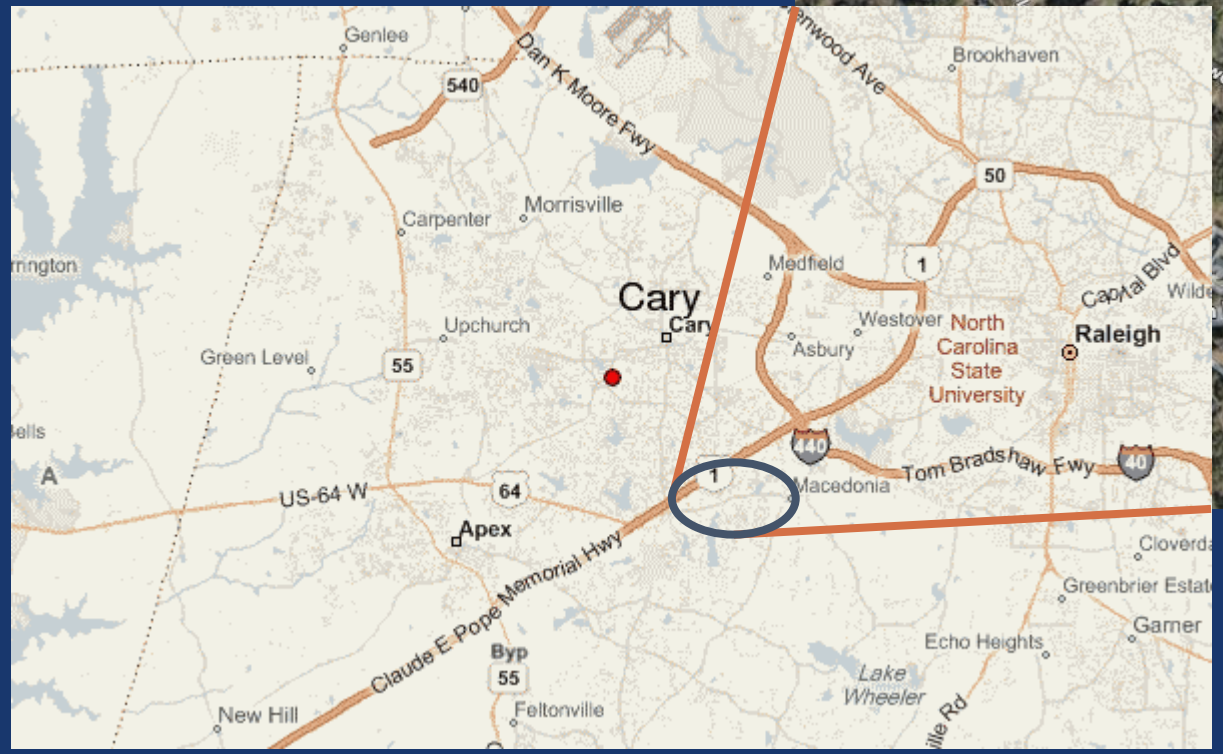
LED Lane Signs

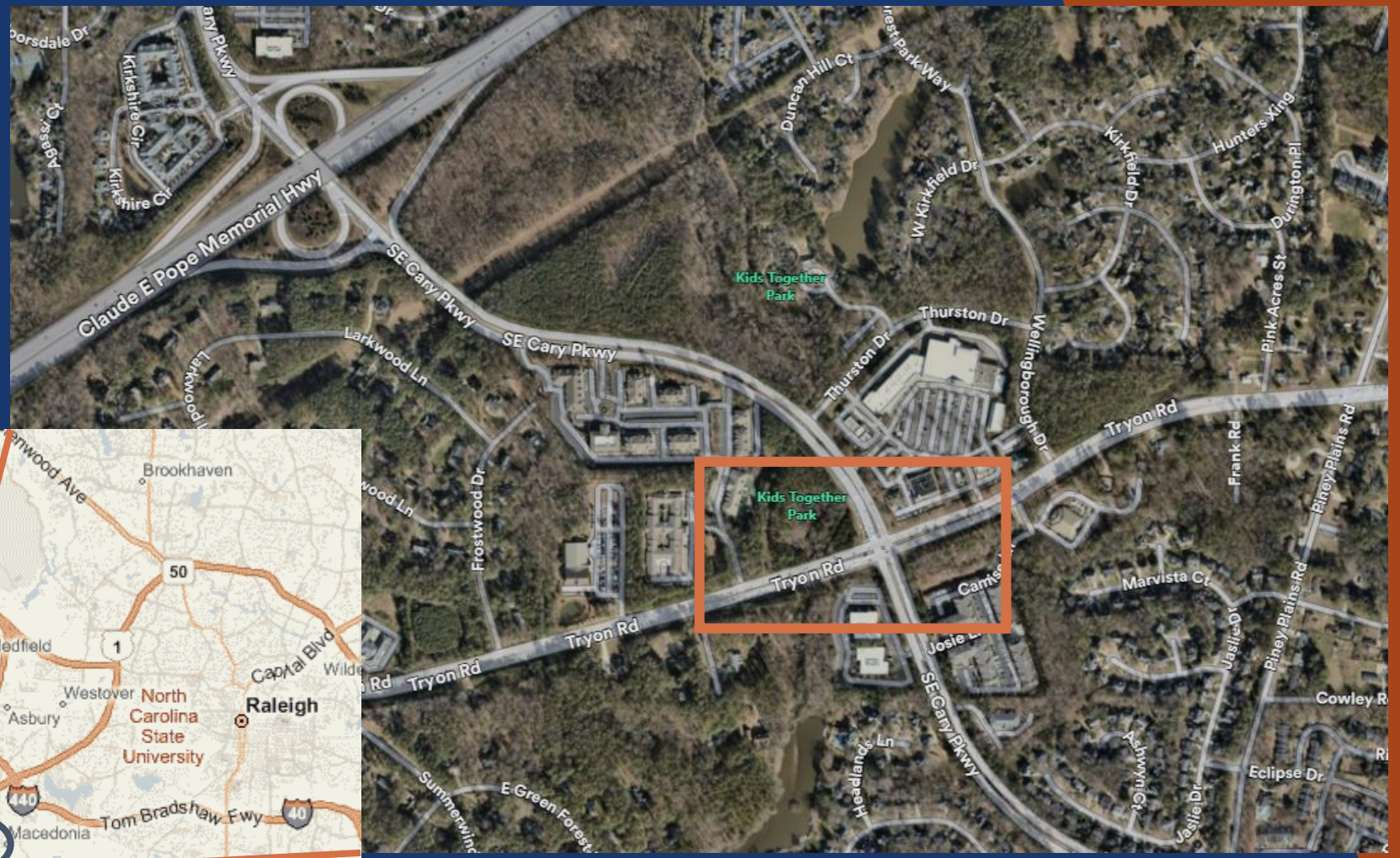
Dual Lane
Protected Phasing

Single Lane
P+P Phasing

Pilot Location

Cary Pkwy at Tryon Rd





DLTi pilot

- **Site selection criteria for initial pilot, and future pilots**
  - Sufficient volume during peak periods across two left turn lanes
  - Sufficient variation in left turning volume during day
  - Adequate sight distance for both left turn lanes
  - Receptive partners

- **First pilot site implemented: EB Tryon at Cary Pkwy., Cary**
  - Installed February 14, 2020 – about one month prior to pandemic impacts
  - Initial peak periods 7:15 - 9 AM and 3:45 - 6:45 PM
  - 24/7 off-peak phasing during pandemic (i.e., “100% DLTi”)
  - Peak periods 7:15 AM – 6:45 PM since February 23, 2023

DLTi pilot

- Open in Town of Cary for more than 4 years
- Some drivers saved up to 2 minutes of travel time each cycle
- Based on estimated time savings and typical assumed value of time, DLTi paid for itself within 6 months of opening
- Operational framework has varied as pandemic, travel, experience has evolved
- Some crash types elevated, so P/P hours reduced to 13 per day in early 2023

What’s Next?

DLTi:

Compliance, Lessons Learned

- Prior to pilot: most (65%) of turning vehicles used right-most left turn lane
- DLTi active: ~85% using left-most left turn lane
- *This is a change from 65% to 15% usage of right-most turn lane*
- LED lane controls signs to be installed in left-most left turn lanes

Making it Happen - Costs

Installation Costs

- DLTi is $20k - $40k
- Dual FYA installation is lower cost

Funding

- Either option should compete well for Spot Mobility project funding

Flexibility

- Can install as DLTi and operate as DLTi, Dual Left FYA, or Dual Left protected-only

Current Status of DLTi

- NCDOT Mobility and Safety considers the Cary Parkway / Tryon Road site a successful, ongoing pilot
- Updating pilot location with additional LEDs (vs. static signs) in left-most left turn lane
- NCDOT examining other potential sites for 3-5 additional pilots
- DLTi treatment is eligible for consideration at other locations in N.C.

Thank You!

CONTACT:
David Spencer, PE
Transportation Engineering Manager
(919) 673-6698
david.spencer@carync.gov