NORTH CAROLINA
Department of Transportation

Superstreets in North Carolina

Board of Transportation Highways Committee

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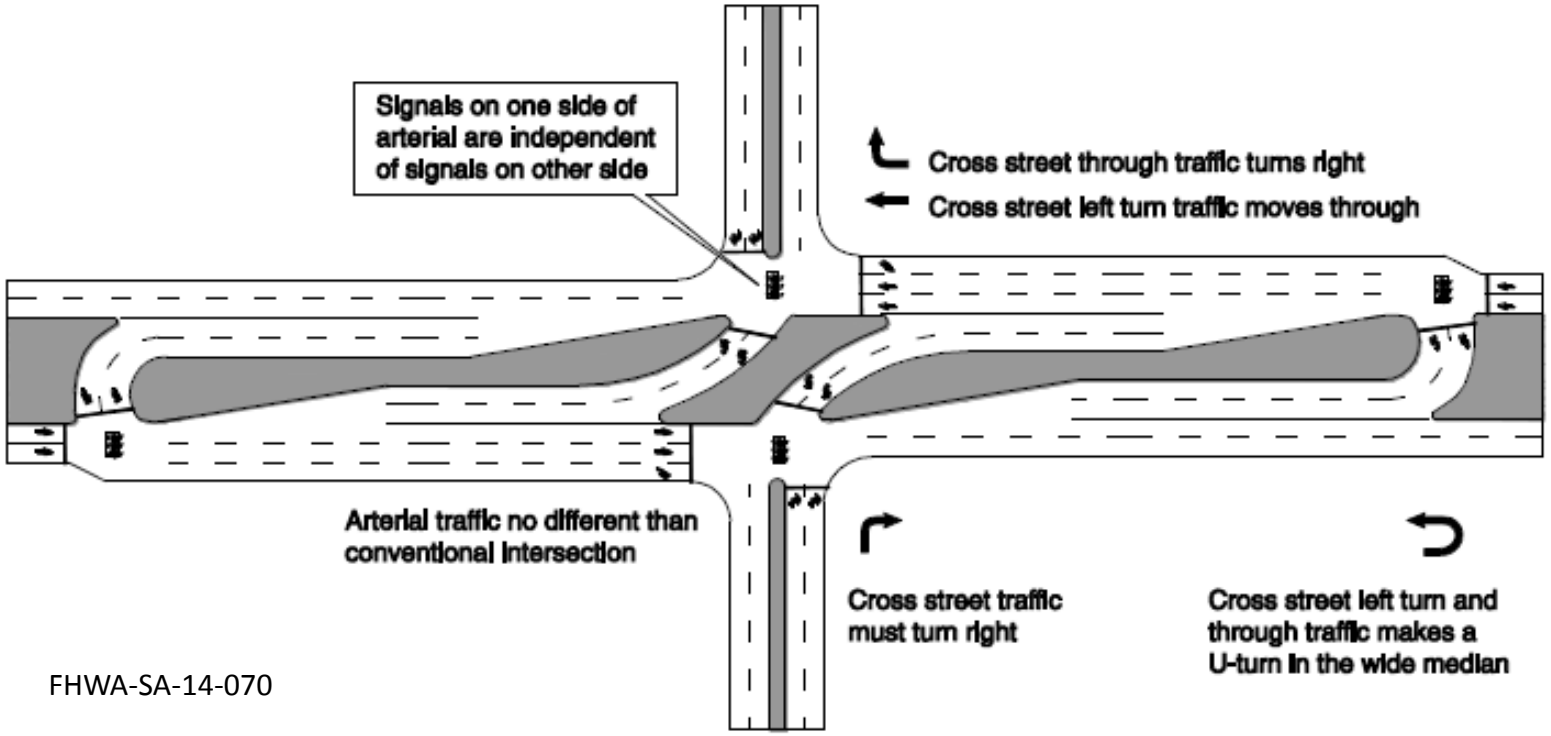
September 6, 2017

The Superstreet

A type of intersection in which minor cross-street traffic is restricted from going straight through or left at a divided highway intersection. *

Minor cross street traffic must turn right, but can then access a U-turn to proceed in the desired direction.



FHWA uses the term RCUT (Restricted Crossing U-Turn)
Some states use the term “J-Turn” or “Reduced Conflict Intersection”
For signalized corridors, some use the term “Synchronized Streets”

*Other configurations possible based on site specific conditions.

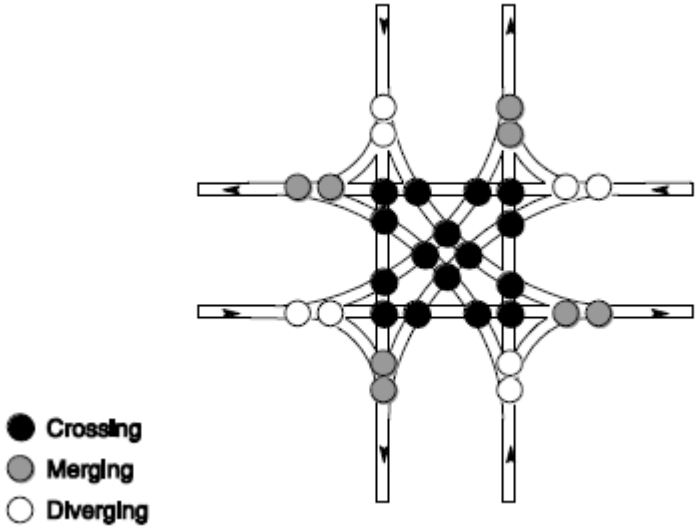
Superstreet Advantages

- SAFETY!!!!
  - 15 to 46 percent total crash reduction
  - 22 to 63 percent injury and fatal crash reduction
- Reduce delay
- Great progression through signals
- Speed control

- And superior pedestrian service

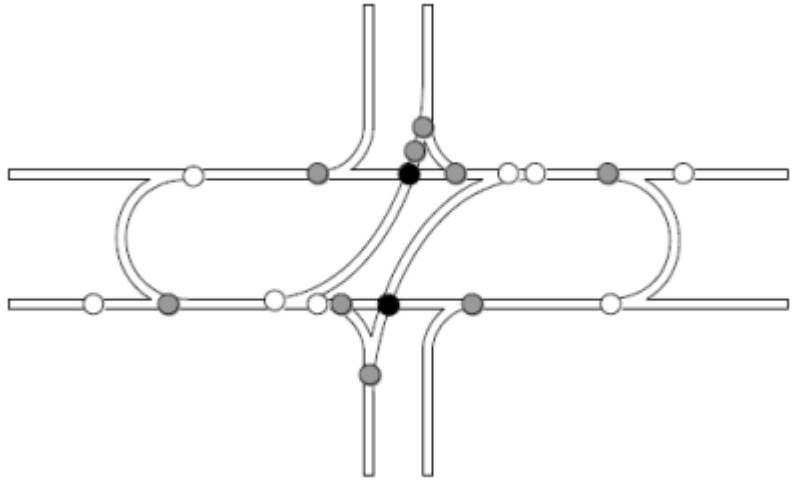
Safety - Vehicular Conflict Points

Conventional Intersection



Conflict Points = 32

Superstreet Intersection



Conflict Points = 14

FHWA-SA-14-070

Safety – Reduction in Crashes

Safety impact by collision type for unsignalized superstreets

Collision Type	Crash Reduction %
Total	-46
Fatal and injury	-63
Angle and right turns	-75
Rear ends	-1
Sideswipes	-13
Left turns	-59
Other	-15

Safety Study of Signalized Superstreets

FHWA sponsored study, to be published in 2017
11 treatment sites, good comparison sites
Crash Modification Factors (CMF)

Sites	CMF All Crashes	CMF Injury Crashes
All AL	0.44	0.41
All OH	0.98	1.06
All TX	0.88	0.88
AL, NC, and OH	0.71	0.63
All	0.85 (SD = 0.16)	0.78 (SD = 0.20)

Safety - US 17 Superstreet - Leland

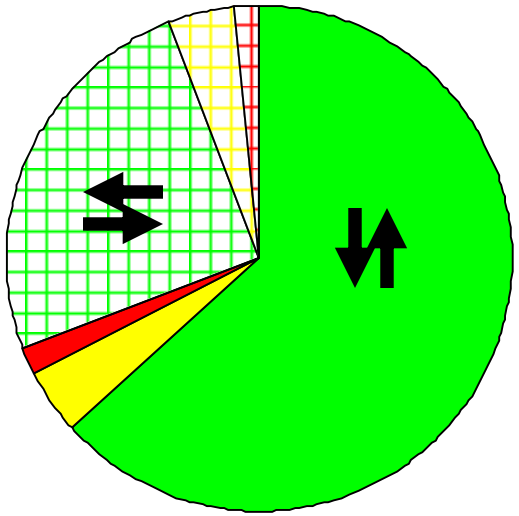
Comparison of Signalized Superstreet and Traditional Intersection Corridors	US 64 Cary Traditional	US 17 Leland Superstreet	Percent Difference +/-
	7/1/2006-6/30/2009		
Total Crash Rate	308.5	180.0	-41.7%
Total Crashes/Mile	125.1	84.8	-32.2%
Intersection Crashes	177.0	95.0	-46.3%
Total Crash Severity Index	4.6	5.0	8.2%
Fatal Injury Crashes/Mile	0.9	0.8	-11.1%
Class A Injury Crashes/Mile	1.8	0.8	-55.6%
Class B Injury Crashes/Mile	6.0	9.8	63.3%
Class C Injury Crashes/Mile	27.2	19.6	-27.9%
PDO Crashes/Mile	89.1	53.8	-39.6%
Frontal Impact Crashes/Mile	25.4	25.3	-0.4%
Rear End Crashes/Mile	80.3	40.0	-50.2%
AADT	37,000	43,000	16.2%
Intersection Density (/Mile)	3.7	3.3	n/a
Length (Miles)	2.2	1.2	n/a

Operations – Less Travel Time

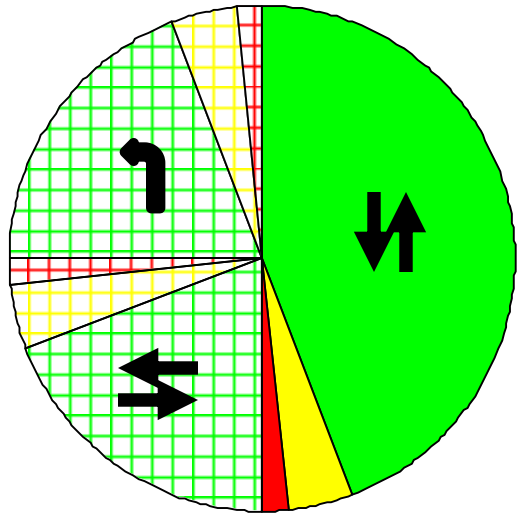
- Recapturing roadway capacity lost by installation of multi-phase signals
- Reduced “wait time” or delay
- Improved Signal Coordination
  (Synchronized Street Concept)

Main Street Green Time

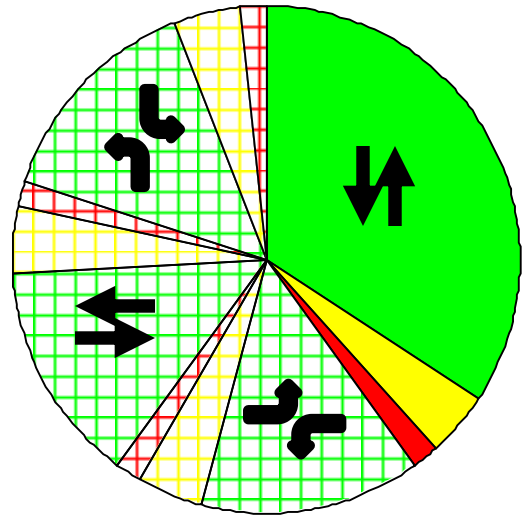
Signal Timing - Two Phase



Signal Timing - Three Phase

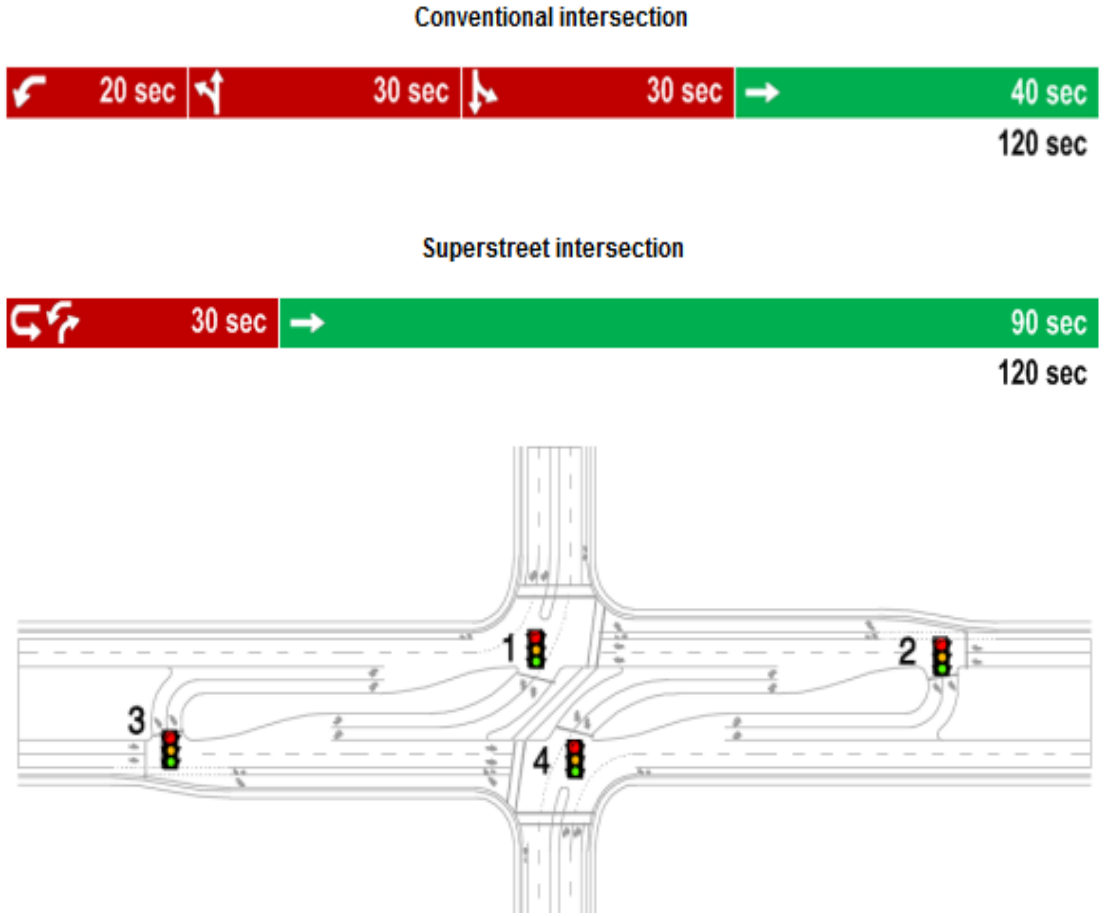


Signal Timing - Eight Phase

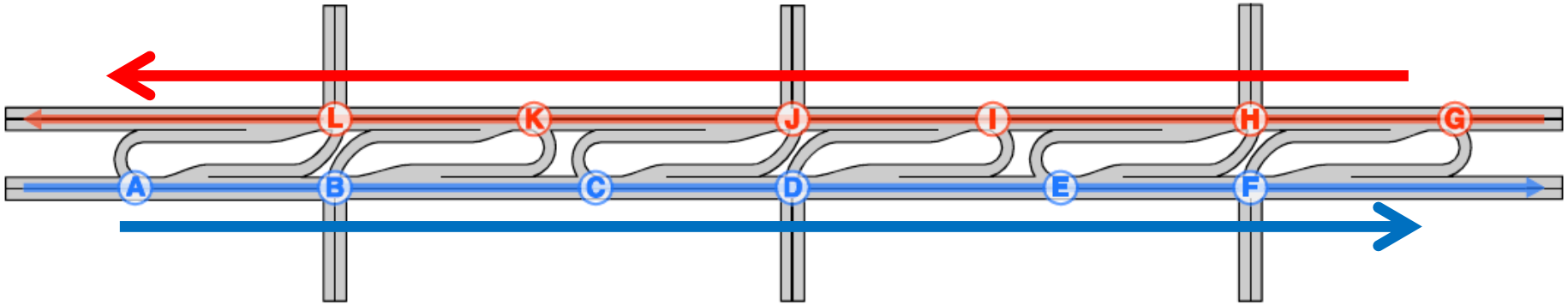


Signalized Superstreet Operation

- Two-phase signals allow more green time for the major street through movements
- Shorter cycle lengths
- Reduced delay for most vehicles and for pedestrians
- Can have different cycle lengths for each direction on the major street
- High capacity - side street volume can exceed 20,000 AADT



Superstreet Signal Progression



- Signals only affect one direction of main street travel
- One-Way Street – “Perfect” progression in both directions
- Maximized efficiency
- Effective at any speed or any signal spacing
- Can control speeds using progression – the progression speed can be adjusted by location, direction, time, day – drivers will adjust quickly
- No special signal equipment is needed

Superstreet - US 321 Hickory-Lenoir Corridor Operation

U-4700 - 2035 Full Network Delay Analysis (Traditional Build vs. Three-lane Superstreet Build)						
	AM			PM		
	Traditional	Superstreet	% Change	Traditional	Superstreet	% Change
Vehicles Exited (veh / hr)	31,760	35,618	12.15%	31,358	34,601	10.34%
Vehicles Entered (veh / hr)	33,730	37,283	10.53%	34,039	36,494	7.21%
Travel Distance (mi)	76,355	86,120	12.79%	73,721	82,465	11.86%
Travel Time (hr)	10,121	6,628	-34.52%	10,245	7,051	-31.17%
Total Delay (hr)	8,488	4,755	-43.98%	8,671	5,250	-39.45%
Total Stops (number)	111,713	122,511	9.67%	120,421	119,534	-0.74%
Fuel Usage (gal)	44,308	39,617	-10.59%	44,001	39,781	-9.59%
Per Veh. Distance (mi)	2.40	2.42	0.57%	2.35	2.38	1.38%
Per Veh. Time (hr)	0.32	0.19	-41.61%	0.33	0.20	-37.62%
Per Veh. Delay (hr)	0.27	0.13	-50.05%	0.28	0.15	-45.13%
Per Veh. Stops (number)	3.52	3.44	-2.21%	3.84	3.45	-10.04%
Per Veh. Fuel (gal)	1.40	1.11	-20.27%	1.40	1.15	-18.06%

Superstreet – US 17 in Leland (Brunswick County)

US 17 at Ploof Road/Old Waterford Way, Leland

US 281 Superstreet (San Antonio TX)

US 281 Superstreet Comments

As traffic congestion on U.S. Highway 281 eases due to the completion of the superstreet project, construction of new commercial and retail developments along the far North Central San Antonio corridor is ramping up.

“We are close to 90 percent leased with no pad sites left,” Elliott remarked. “We've had quite a bit of interest because of the market, which is in a high growth area. **And a lot of our tenants say they feel like business has increased since the superstreet was finished.**”

San Antonio Express-News March 17, 2011

Pedestrian and Bicycle Access

PEDESTRIAN AND BICYCLE ACCOMODATIONS ON SUPERSTREETS

by

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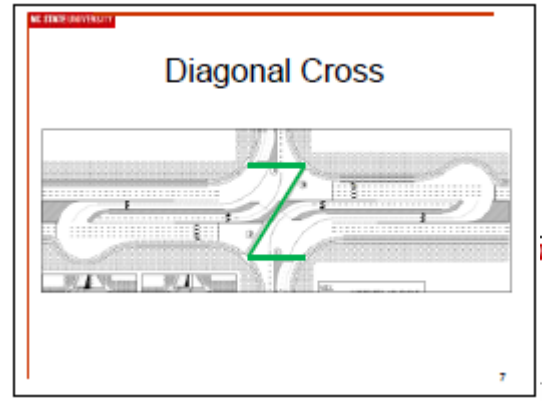
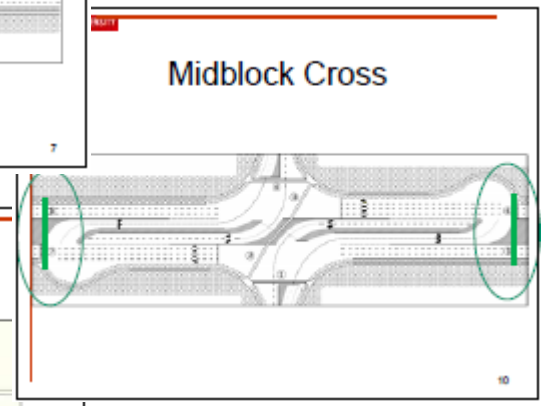
For the

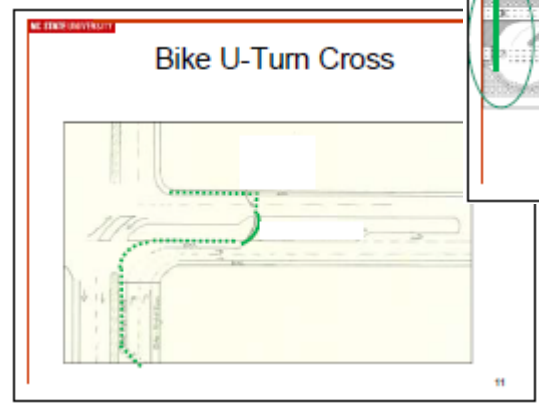
North Carolina Department of Transportation

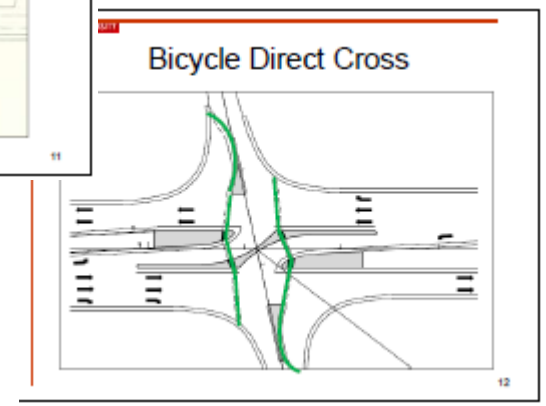
Final Report
Project: 2012 – 13

January, 2014

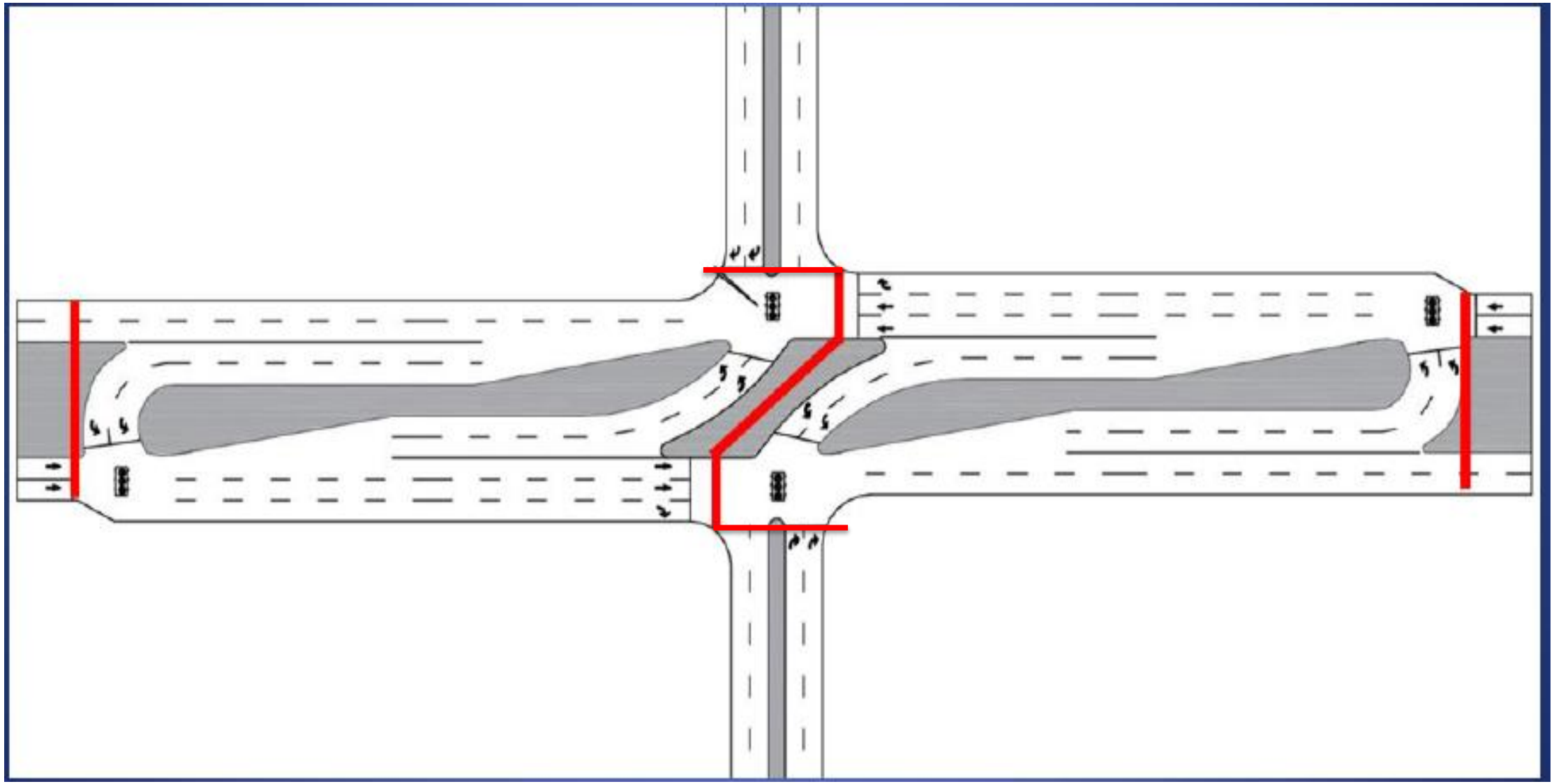




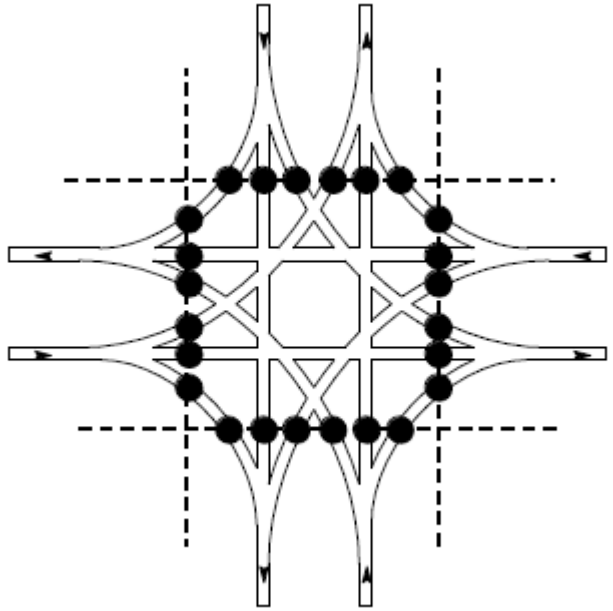




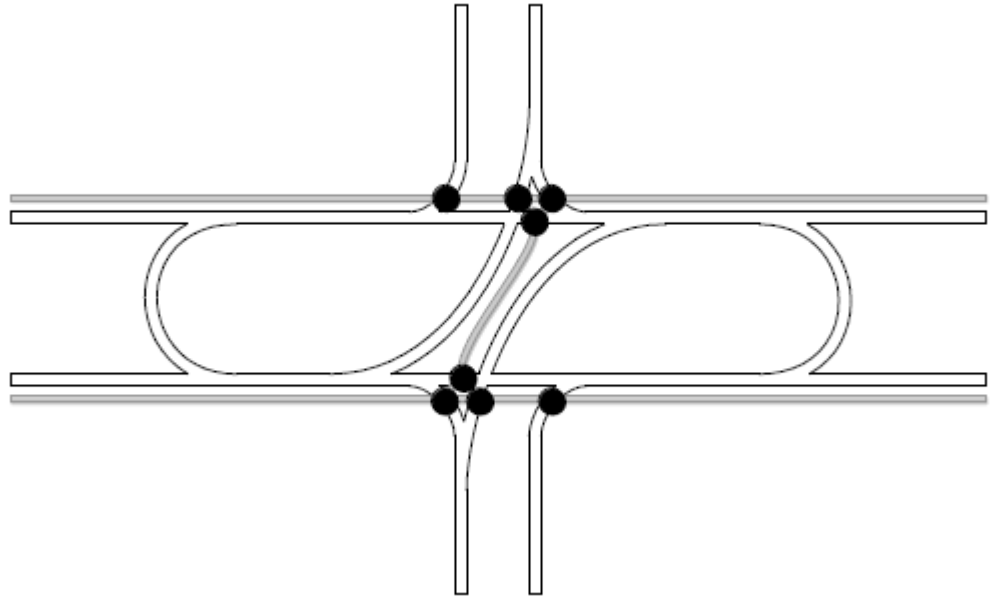
Superstreet Pedestrian Movements



Pedestrian Conflict Points



Conventional Intersection
24 Conflict Points

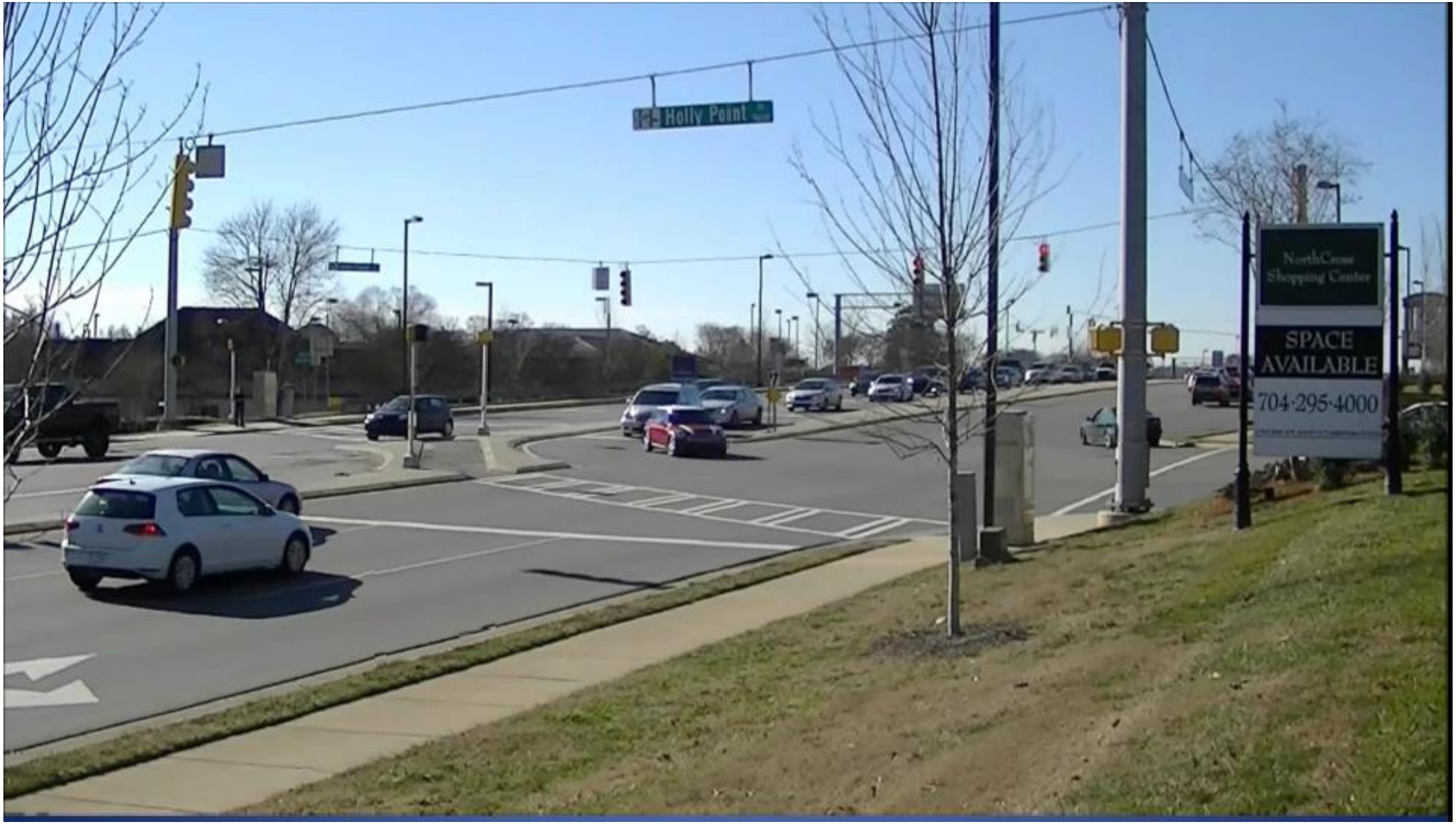


Superstreet Intersection
8 Conflict Points

Superstreet Ped Crossing in Center of Median

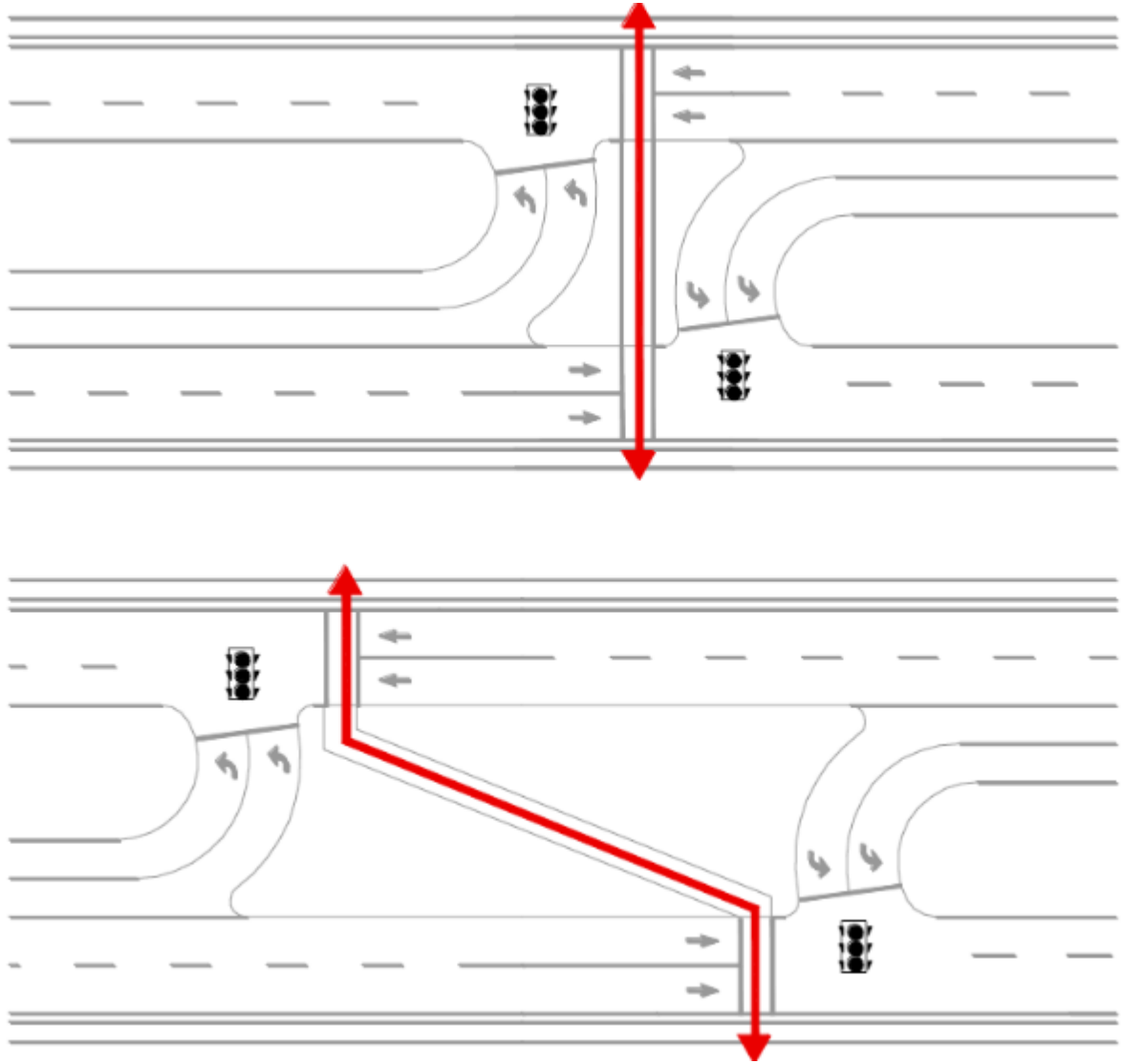
NC 55 Bypass at New Hill Road / Holly Springs Road, Holly Springs

Superstreet Ped Crossing – Street View

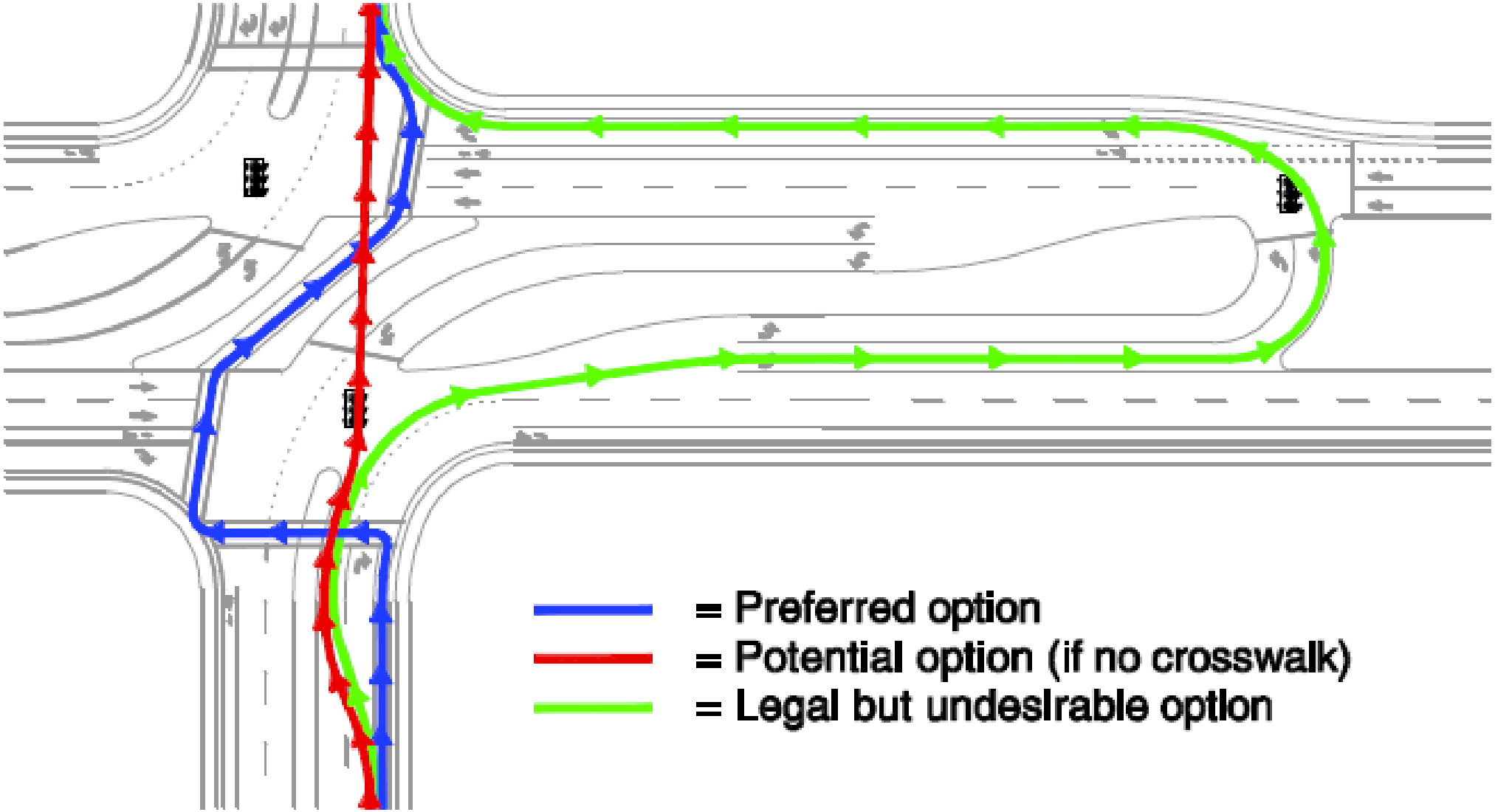


NC 73 at Holly Point Drive, Huntersville

Pedestrian and Bicycle Crossing – Midblock Detail



Bicycle Minor Street Crossing Options



Why Choose a Superstreet?

Performance Goals	Traditional	Superstreet
Improves safety by reducing conflict points		✓
Saves travel time		✓
Reduces congestion		✓
Reach businesses safely without delay		✓
Accommodates growth		✓
Safer for pedestrians and bicyclists		✓

Becoming the Default Arterial Design in North Carolina