Union County Critical Intersections Design and Cost Estimation Study

UNIONCOUNTY
north carolina

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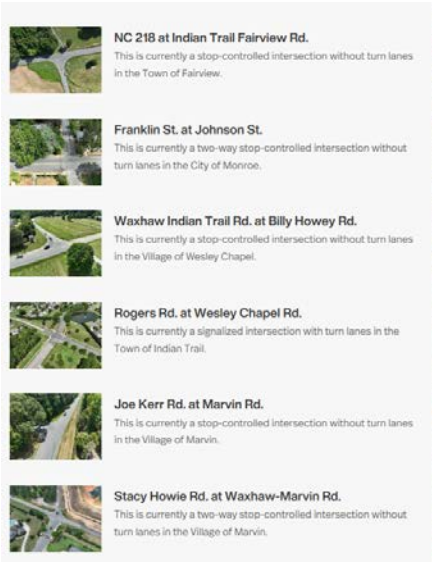
Project Background

- Partnership with Fairview, Indian Trail, Marvin, Monroe, and Wesley Chapel
- Six intersections included in the study effort
- Overall Study Goals:
  - Review existing safety and operational issues for each site
  - Perform traffic/safety analysis and concept design of multiple options
  - Develop costs for each, as well as relative benefits
  - Present two alternates to the public
  - Identify the preferred local design
  - Develop locally preferred alternative, cost estimate, and benefits for use in grant applications to the NCDOT or CRTPO



NC 218 at Indian Trail Fairview Rd.
This is currently a stop-controlled intersection without turn lanes in the Town of Fairview.

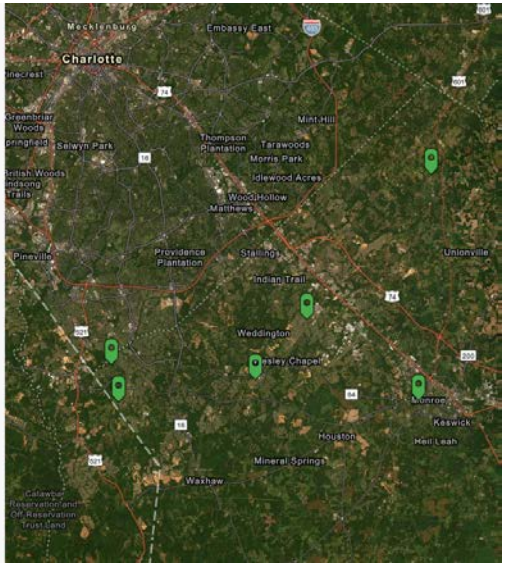
Franklin St. at Johnson St.
This is currently a two-way stop-controlled intersection without turn lanes in the City of Monroe.

Waxhaw Indian Trail Rd. at Billy Howey Rd.
This is currently a stop-controlled intersection without turn lanes in the Village of Wesley Chapel.

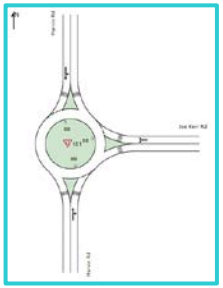
Rogers Rd. at Wesley Chapel Rd.
This is currently a signalized intersection with turn lanes in the Town of Indian Trail.

Joe Kerr Rd. at Marvin Rd.
This is currently a stop-controlled intersection without turn lanes in the Village of Marvin.

Stacy Howie Rd. at Waxhaw-Marvin Rd.
This is currently a two-way stop-controlled intersection without turn lanes in the Village of Marvin.

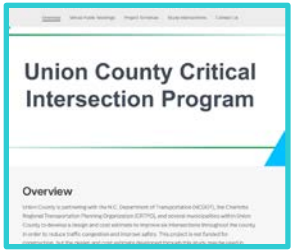


Process Overview

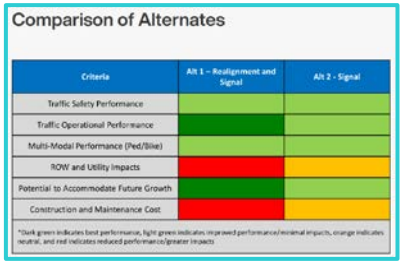


Data Collection & Traffic and Safety Analysis

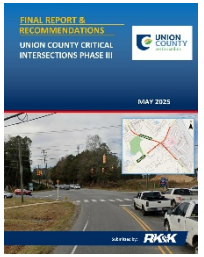
Develop and Refine Alternates & Estimates



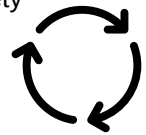
Public Outreach



Preferred Alternate Selection



Final Report & Recommendations

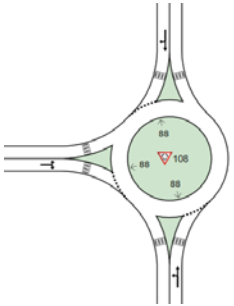


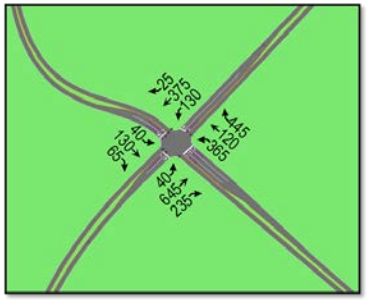
COMMITTEE MEETINGS:
MUNICIPAL REPRESENTATIVES
UNION COUNTY
NCDOT
CRTPO
DESIGN TEAM

Traffic Analysis

Traffic Analysis & Improvement Development

- Traffic count data collected - 2024
- Developed appropriate traffic growth rates
- Design Year – 2050
  - Assuming construction by 2030 for analysis
  - Design must be useful for at least 20 years
- Crash History Review
- Signal Warrant Analysis
- Site Specific Improvement Analysis
  - Expected crash reductions
  - Expected delays and queue lengths





Approach	2024 Existing	
	AM Peak	PM Peak
EB	B	A
WB	B	A
NB	F	F
SB	F	F
Overall	C	C

Option	Modification	CMF	Crash Types
1 – Unsignalized Intersection with Safety Enhancements	Rumble Strips	1.118	All
		0.903	K,A,B,C Crash Types
		0.798	Crash that involved vehicles running stop sign
	Large Stop Sign	0.81	All
	Other Warning Devices	0.917	All
	Left Turn Lane	0.51	All
2 – Single-lane Roundabout	Single-lane Roundabout	0.63	All
		0.28	Injury Crashes

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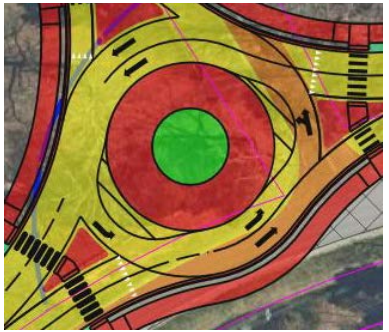
Concept Design

Concept Design Development

- Design layouts based on traffic analysis
- Conceptual Design Layout
  - Based on LiDAR Data
  - Future design phase would include detailed survey
  - Limits of construction will likely change in the detailed design phase
- Conceptual layouts help stakeholders and the public evaluate options and establish cost estimates



Public Outreach

- Online GIS Story Map
  - Program overview
  - Conceptual designs
  - 3D renderings
  - Cost estimates
  - Comparison of benefits and impacts
  - Survey for public to provide input on their design preferences
- Postcards mailed to nearby property owners with links to virtual public meetings and Union County's site
- Virtual Public Meeting held for each site
- Survey open March 1st to 31st
- Meeting held with municipalities, NCDOT, and County to review survey and public meeting results

Next Steps

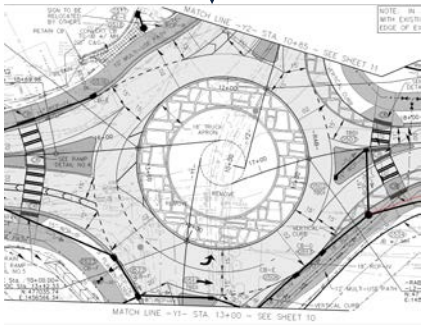
- Municipalities and Union County confirm preferred alternatives
- Apply for funding through NCDOT and CRTPO
  - Possibly Fall 2025, but up to local jurisdictions
  - Local match requirements vary by funding source
- Generally 3 to 4 years from funding award to construction
  - Detailed design
  - ROW & Easement acquisition
  - Utility relocations
  - Federal permitting requirements

ALTERNATE SELECTION & ADOPTION

CRTPO

Discretionary Grants Program
2024 Fall Call - Applying for Funds

FUNDING APPLICATION



DETAILED SURVEY & DESIGN

UTILITIES, ROW & PERMITTING

CONSTRUCTION

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Existing Conditions

Existing Conditions

- High frequency of Left Turn and Rear End crashes
- Heavy traffic volume for the WB Right and SB Left movements expected in 2050
- Significant delays expected on WB approach in 2050

Crashes Recorded (July 2019 to June 2024)

23

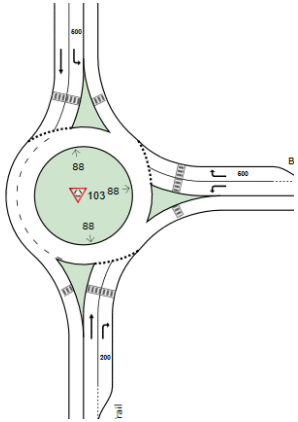
AM/PM Peak Hour

Traffic Volumes (Vehicles)

1,345 / 1,660

Design Options for the Six Intersections

- Many options were considered
  - Traffic Signal with Realignment
  - Traffic Signal
  - Roundabout
  - Split/offset intersection
  - Converting existing intersections to right in right out



Approach	2050 Build			
	AM Peak		PM Peak	
	LOS	V/C	LOS	V/C
WB	F	1.428	C	0.796
NB	B	0.695	E	0.934
SB	A	0.313	A	0.693
Overall	**F**	**1.428**	**C**	**0.934**

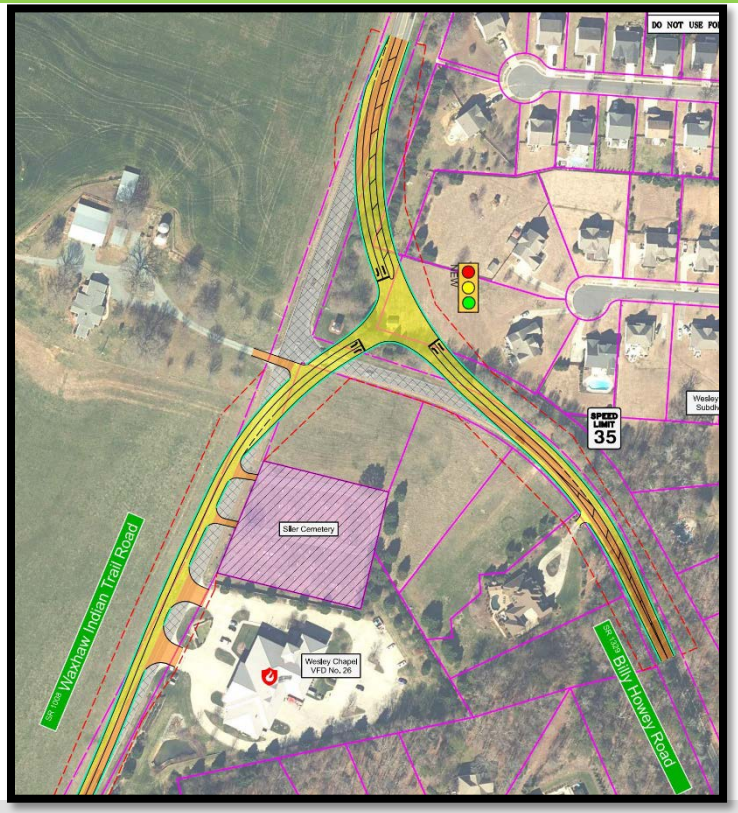
Example Design Option

Alternative 01 – Traffic Signal with Realignment

- Traffic Signal
- Realign to make Billy Howey the primary roadway
- Accommodates heaviest traffic volumes
- Exclusive turning lanes on all approaches

Anticipated Costs

TOTAL PROJECT COST 2025	TOTAL PROJECT COST 2030
$5,358,500	$6,211,970



Example Design Option

Alternative 02 – Traffic Signal

- Traffic Signal
- Channelized right-turns from Billy Howey
- No roadway realignments
- Exclusive turning lanes on all approaches

Anticipated Costs

TOTAL PROJECT COST 2025	TOTAL PROJECT COST 2030
$4,558,100	$5,284,087

Comparison Summary

ALTERNATE COMPARISON	
Existing Conditions: High frequency of Left Turn and Rear End crashes Heavy traffic volume for the WB Right and SB Left movements expected in 2050 Significant delays expected on WB approach in 2050	
ALTERNATE 01: REALIGNMENT	**ALTERNATE 02: TRAFFIC SIGNAL**
Both options will improve traffic flow and safety	
> Signalized intersection > Realign to make Billy Howey the primary roadway Accommodates heaviest traffic volumes > Exclusive turning lanes on all approaches	> Signalized intersection with channelized right-turns from Billy Howey > No roadway realignments > Turning lanes added to Waxhaw Indian Trail > Exclusive turning lanes on all approaches
Expected reduction in total crashes by over 30%	Expected reduction in total crashes by over 30% - Injury crashes reduced further
Significant reduction in delay for all movements as compared to 2050 no improvement scenario	Significant reduction in delay for all movements as compared to 2050 no improvement scenario

Cost Estimates

ALTERNATE 01: **REALIGNMENT**
ALTERNATE 02: **TRAFFIC SIGNAL**

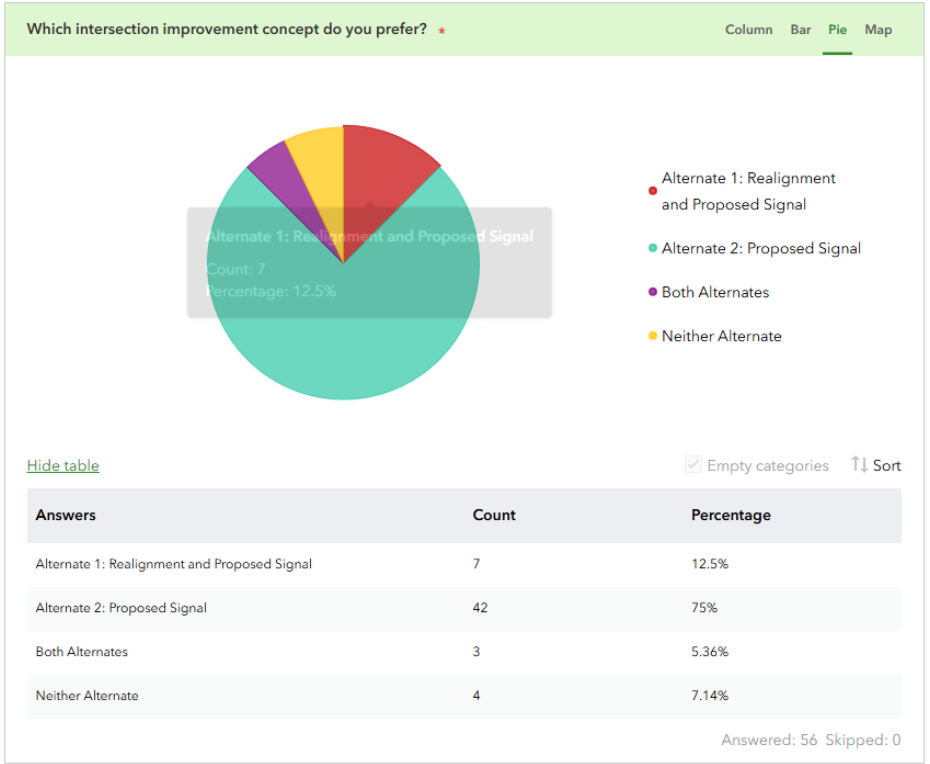
CONCEPT LEVEL PROJECT COST SUMMARY									
ALTERNATE	BASE CONSTR. COST	ENGINEERING / ENVIRON.	CEI	RIGHT-OF-WAY	UTILITY RELOCATION	CONTINGENCY (ALL CATEGORIES)	NCDOT ADMIN (ALL CATEGORIES)	TOTAL PROJECT COST 2025	TOTAL PROJECT COST 2030
		25%	20%			40%	10%		
1	$2,132,000	$533,000	$426,400	$313,200	$75,000	$1,391,800	$487,100	$5,358,500	$6,211,970
2	$1,812,400	$453,100	$362,500	$241,200	$90,600	$1,183,900	$414,400	$4,558,100	$5,284,087

CONTINGENCY - Applied to conceptual design projects to account for preliminary nature of design - applied to all categories
ENGINEERING / ENVIRON. - Detailed Survey, Design and Environmental Permitting
NCDOT ADMIN - NCDOT costs to manage and adminster the project
>NCDOT makes every effort to reduce admin costs to the project
CEI - Construction Engineering and Inspection
RIGHT-OF-WAY - Cost of acquiring easements and right-of-way
UTILITY RELOCATION - Cost of relocating utilites by utility owners
TOTAL PROJECT COST (2025) - Total project cost in the current year
TOTAL PROJECT COST (2030) - Total project cost at the anticipated construction year (2030)

Why are costs so high? Construction index has increased by 67% since 2021

Public Engagement

- March 1-31 public comment period
- Input primarily collected through online survey
- Social media posts
- Union County Horizons and employee newsletter
- Postcard mailings to properties near intersections
- Over 400 responses received for the six intersections
- Recommended designs align with public feedback



Answers	Count	Percentage
Alternate 1: Realignment and Proposed Signal	7	12.5%
Alternate 2: Proposed Signal	42	75%
Both Alternates	3	5.36%
Neither Alternate	4	7.14%

Answered: 56 Skipped: 0

Designs and Municipal Endorsements

Intersection	Municipality	Design	Cost (in 2025 dollars)	Date Approved
Waxhaw-Indian Trail and Billy Howey	Wesley Chapel	Signal with turn lanes	$4.6 million	May 12
NC 218 and Indian Trail Fairview	Fairview	Single lane roundabout	$2.0 million	May 13
Joe Kerr and Marvin	Marvin	Dual lane roundabout	$6.1 million	May 13
Stacy Howie and Waxhaw-Marvin	Marvin	Dual lane roundabout	$8.8 million	May 13
Franklin and Johnson	Monroe	Signal with turn lanes and median	$4.5 million	May 13
Rogers and Wesley Chapel	Indian Tail	Additional turn lanes	$4.6 million	May 27

Adoption

- May: All five municipalities endorsed designs
- June 2: Union County Board of Commissioners endorse the six designs
- By end of June: Consultants and staff complete review of report summarizing process