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# **Executive Summary**

Union County is an attractive place to live, work, and recreate. Its proximity to Charlotte combined with its rural small town character has resulted in traffic and other growth pressures that have stressed the road network. The NCDOT, along with the county and municipalities, have reacted to this growth with mixed success. Road widenings on improvements needed today can still take a decade to become reality, and Union County's congestion often pales in comparison to delays seen in Mecklenburg County, meaning that a strategy of focusing on wholesale corridor improvements will often fail to materialize for a generation or more. In the meantime, growth continues and motorists must travel on increasingly unsafe and congested roads.

Intersections can be considered the choke points of the transportation network, and improvements can offer significant benefits for a limited investment. This rationale has driven NCDOT and local strategies for several years, with many improved intersections throughout Union County. Funding agencies prioritize projects that are the result of analysis and planning, so having an adopted plan and concurrent project list will help project applications. This critical intersection analysis will serve as that document for Union County, as it works with its partners in improving the transportation network throughout the county.

A total of 54 intersections were identified by the stakeholders and public. These intersections were then evaluated for feasibility of necessary improvements, crash frequency and severity, traffic volumes, and growth rates. The result was a score for the intersections that represents a holistic assessment of need. The NCDOT does have a spot safety program, which looks only at safety issues and a benefit to cost ratio of reducing crash impacts compared to cost for those reductions. Several intersections were included in that list due to their safety issues, despite a lack of congestion or traffic volumes. The remaining projects may be appropriate for one or more funding sources.

Implementing improvements at the 15 locations identified later in this document will take several years of commitment and decisions about designs and costs. This work will ensure thought out applications are submitted and local funding is approved to help meet match requirements. Each community with a recommended intersection within its boundaries should allocate funding each fiscal year to allow them to quickly respond to project solicitations. These intersections are often the focal points for development pressure, and the plans for these intersections should be incorporated into adjacent site plans as appropriate.

The public was asked to comment on this report, the identified intersections and input results before the adoption process. After comments were addressed, the governing boards for affected municipalities and Union County were offered the opportunity to approve the report and its recommendations. This report was approved by Union County on August 19, 2019.

# **Existing Conditions**

Union County continues to be a rapidly developing county, with growth pressures in the areas adjacent to Mecklenburg County, and west-northwest of Monroe. The road network in this area is characterized by two-lane farm-to-market roads. The growth of the past 20+ years has resulted in several funded widening projects, but these total less than 20 miles of multi-lane improvements over the next decade. These widenings include:

- NC 16 from Rea Road south to the Waxhaw Parkway
- Rea Road Extension and NC 84 from NC 16 to Waxhaw-Indian Trail Road
- Monroe Road from Matthews to Wesley-Chapel Stouts

There are other funded widenings and corridor improvements on US 601 between US 74 and the Monroe Expressway and US 74 near the Monroe Mall. The Monroe Expressway opened in late 2018, and is expected to provide relief to existing US 74 and parallel routes.

Due to development and traffic volumes on two-lane farm-to-market roads, congestion and safety issues have been frequent issues, mainly at intersections. A lack of turning lanes, adequate sight distances, and appropriate intersection angles have resulted in unsafe and congested situations, with frequent calls by the community to address these issues. These concerns are justified, and the NCDOT, Union County, and multiple municipalities have responded by aggressively applying for funding grants through the Charlotte Regional Transportation Planning Organization (CRTPO) and the NCDOT for safety and congestion funds. Multiple intersections have been upgraded in the past five years, and over two dozen more intersections are scheduled for improvements in the next five years. At least a half-dozen high priority intersections, such as NC 16 and New Town Road, will be upgraded due to corridor widenings. Despite these improvements, many intersections remain unimproved, resulting in excessive congestion and safety issues for the travelling public.

The 2016 Critical Intersection Analysis remains a useful document for the municipalities and Union County as they identify funding opportunities to address the remaining intersections. The unfunded intersections are shown later in this report. This 2016 document established a process and list of projects to collectively focus efforts across the county. This 2019 document continues those efforts.

Union County and several municipalities have recently allocated local funds to help pay for local match for NCDOT or CRTPO-funded projects. Waxhaw, Marvin, Weddington, Wesley Chapel, and Indian Trail, along with Union County, have successfully partnered with the NCDOT in funding intersection projects. These commitments have increased the benefit/cost ratios for projects, and demonstrated local commitment to addressing issues. Through this process, the goal is for these partnerships to continue.

# **Plan Development Process**

This plan was developed over the course of seven months, starting in February 2019. The Union County Planning Department served as the lead organization to guide its development. The tasks and schedule are shown in the table below.

Table 1

Task	Feb	Mar	April	May	June	July	Aug	Sept
Kickoff and Process Confirmation								
Intersection Identification by Stakeholders								
Ranking Process								
Initial Public Outreach								
Prioritization								
Recommended Intersections								
Plan Preparation and Public Review								
Adoption								

# Stakeholders Committee

The work involved in identifying, analyzing, prioritizing, and endorsing a list of critical intersections was performed by a combination of county, municipal, and NCDOT staff. The group met monthly for a total of eight times. These members provided feedback on proposed intersections, evaluation criteria, outreach strategies, and document review. Their input throughout the process was invaluable and resulted in a better product.

Table 2

Member	Representing		
Bjorn Hansen	Union County		
Jim Loyd	Monroe		
Robyn Byers	Wesley Chapel		
Christopher Easterly	Stallings		
Dick Black	Union County		
Todd Huntsinger	Indian Trail		
Rick Becker	Mineral Springs		
Lisa Thompson	Weddington		
Kevin Parker	Waxhaw		
Patrick Niland	Wingate		
Scott Howard	Marshville		
Lee Ainsworth	NCDOT		
Tony Tagliaferri	NCDOT		
Sean Epperson	NCDOT		
Don Ogram	Union County Public Schools		
Evan Mozingo	Union County EDC		

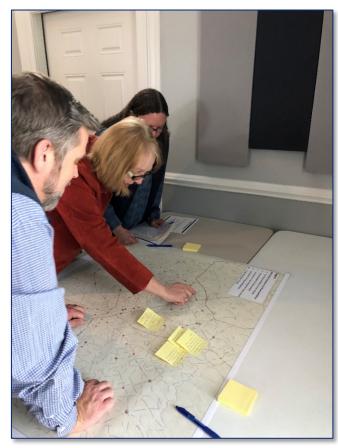
## **Public Outreach**

The public was offered the opportunity to provide input and comments at three points in the process: intersection identification, draft report, and adoption. Union County made use of social media to raise awareness of the analysis, and on-line engagement tools to both educate and solicit input from the public. Union County used a Metroquest account, made available from CRTPO, to solicit candidate intersections, as well as show where more than two dozen intersections are already funded for improvement. The County used an ArcMap slideshow presentation to present all evaluated and selected intersections as an outreach tool in

addition to the final report.

Traditional outreach through two rounds of community meetings were also employed, with a total of 33 citizens attending the meetings. These meetings were held March 26 in Lake Park and March 28 in Waxhaw.

While traditional outreach methods were not terribly successful at reaching large numbers of residents, online materials and outreach efforts were very effective. Union County issued a press release on March 15 for a 30-day input period. This press release was likewise posted on social media accounts for the county. Multiple municipalities, as well as CRTPO, shared this information on their web sites and social media accounts. Citizens were directed to the County's project web site, which contained a description of the plan process, on-line map of funded and proposed intersections, and contact information for questions. Over 1,000 people visited the project web site over the course of this input period.



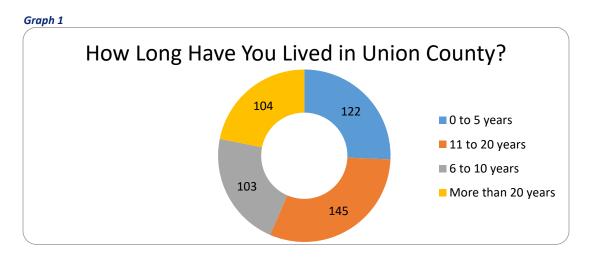


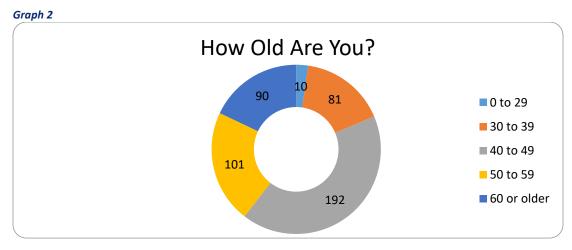
The primary tool for collecting citizen input was a Metroquest interactive survey. Metroquest is a public outreach company that helps organizations collect input through short, interactive on-line surveys. A total of 717 people took the survey over the 30 days it was open. This

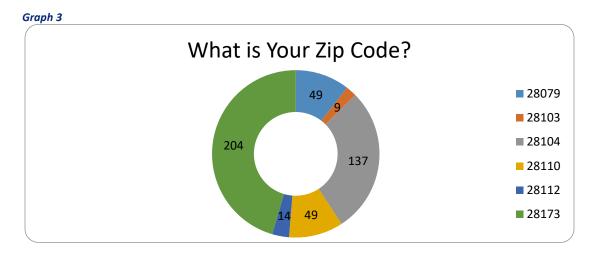
input provided a wealth of policy and site specific information about transportation planning and intersection issues. A list of the questions from the site and answers provided are on the following pages.

- 1. Did you know that Union County does not maintain or own roads? Fifty-seven percent did not know that Union County does not maintain roads.
- 2. Do you support county or municipal money being used to help accelerate project delivery? Seventy-seven percent said, "yes, if it gets them built sooner."
- 3. What is the most important issue we could address? Fifty-nine percent said safety is the most important issue. Thirty eight percent said congestion.
- 4. What is the second most important questions we should address? Fifty-seven percent said congestion. Twenty eight percent said safety.
- 5. Are you comfortable driving through a roundabout? Ninety two percent were comfortable driving through a roundabout.
- 6. Do you think roundabouts improve intersections? Eighty seven percent thought roundabouts improve intersections.

The composition of the people who participated in the survey represented a wide range of ages, location within the county, and length of residence within the county. This was important to ensure that the input did not represent only newcomers, longtime residents, specific age groups, or specific parts of the county.



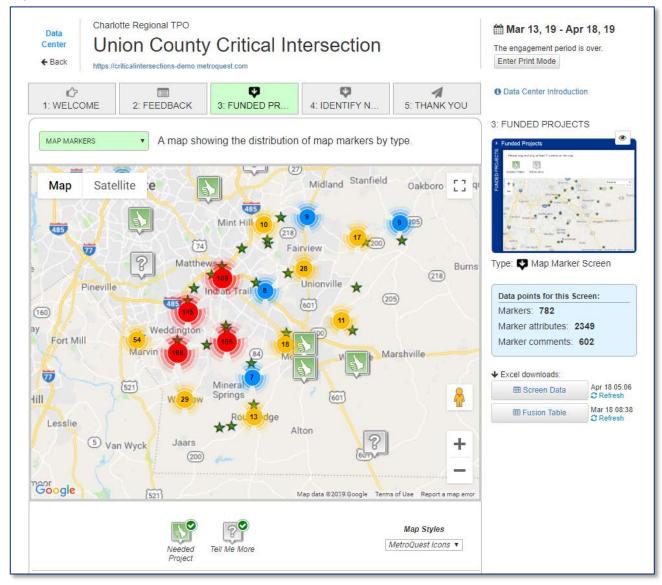




As shown by the distribution in the preceding charts, a range of constituencies were represented in this survey, although the geographic distribution of responses skewed towards the western part of the county. This may be due to the high percentage of residents who live in neighborhoods with homeowner associations, which can help disseminate word of outreach efforts such as this one.

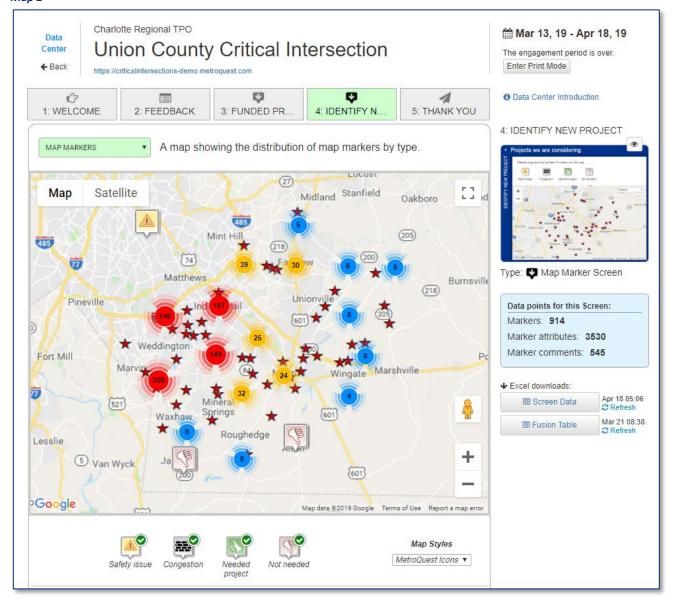
The comments and input on specific intersections were captured through two maps embedded within the Metroquest survey. Over 5,000 specific points of information were gathered between them. The intention of the two maps was to solicit feedback and raise awareness of the existing projects, which are shown as green stars. There was broad support for the already funded projects, but there were also frequent inputs for needed new projects at additional intersections.

#### Map 1

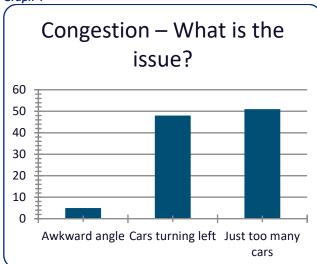


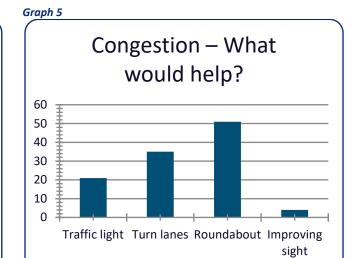
The second map, shown on the next page, asked participants to provide feedback on proposed new intersections, as well as suggest additional intersections. The proposed new intersections are shown as red stars. Combined, these two maps provided a wealth of information about locations of needed intersections, as well as feedback on why intersections were needed. Very few of the comments were submitted saying an intersection was not needed, although that did occur.

#### Map 2

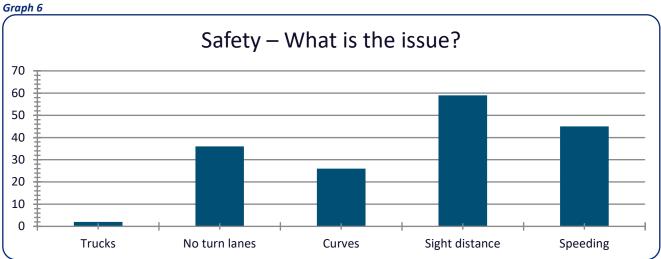






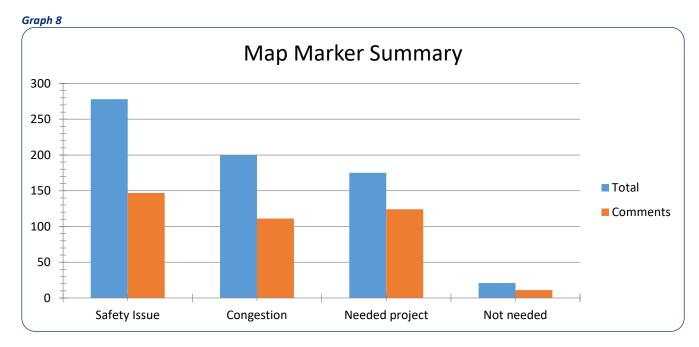


distance



Graph 7





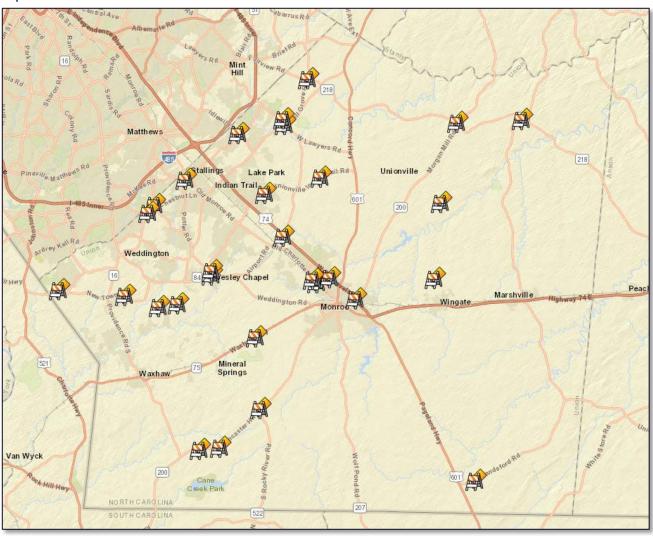
As shown by the results in these charts and maps, the participants in the survey gave many useful and practical pieces of information to help the stakeholders in evaluating intersections, as well as identifying new ones.

The second online outreach tool was an interactive map with funded intersection projects, remaining unfunded intersection projects from the 2016 critical intersection analysis and proposed intersections with tentative scores from the current process. Scores were based on the ranking process described in this document. Over 700 residents viewed this map, which was actively used by Union County staff and stakeholders to review projects and compared against feedback from the Metroquest survey. A goal of Union County Planning Department is to maintain a site like this into the future with funded and proposed intersections added as information becomes available.

# **Existing Conditions**

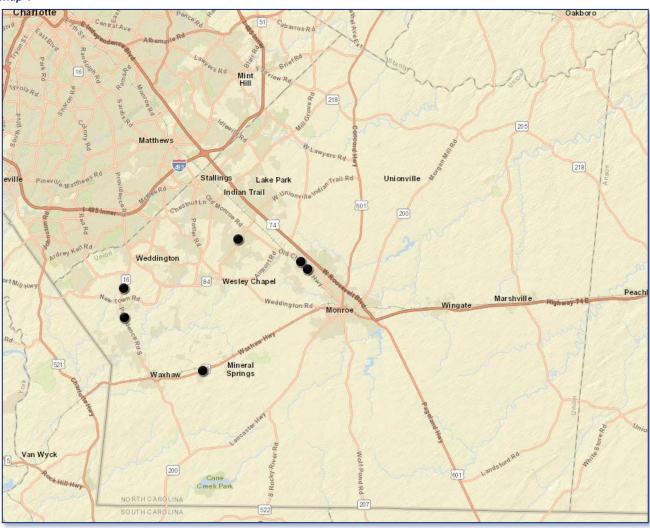
After two decades of tremendous growth, Union County has multiple corridors, and dozens of intersections, in need of upgrades. The focus of this process was to identify new intersections to focus efforts on developing projects, so part of the education component of this process was to raise awareness of existing funded projects. The map below depicts the known funded intersection projects as the start of this study and was included in materials for the 30-day input period. The NCDOT subsequently informed Union County that a roundabout was funded for the intersection of Sikes Mill and NC 218, but it is not shown in the map below.

Map 3



The map on the following page represents remaining unfunded intersection projects from the 2016 Critical Intersection Analysis. These locations are still considered supported projects, although they may not be as competitive for funding as other identified intersections.

#### Map 4



Together these two maps show the status of committed and previously identified intersection projects in Union County. The map on this page does not show projects supported by each of the municipalities through planning processes outside of the 2016 Critical Intersection Analysis. Additionally, it does not show any priority lists created by the NCDOT. The NCDOT is under no obligation to limit their candidate project list to those created by local governments, although it recognizes projects are often more competitive for funding when they have the support of local governments and come from an adopted plan, such as this document.

# **Adoption Process**

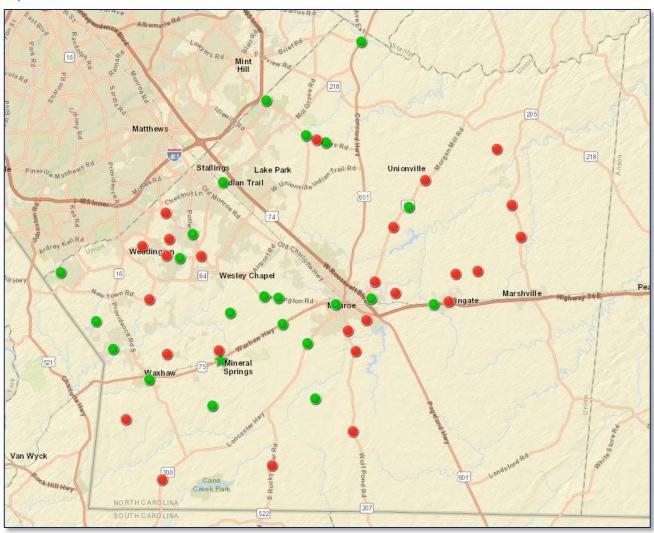
This overall analysis involved significant coordination and outreach with the public, municipalities, and the NCDOT. The process and recommendations were presented to the Town of Waxhaw on June 11, 2019 and the Town of Unionville on June 17, 2019. Both boards appreciated the process and recommendations. The public had the opportunity to comment on the process and recommendations during a three-week comment period in June 2019. Several hundred people reviewed the online report, with over a dozen calling or emailing with comments or questions. The input did not change the report itself, and was mainly questions about the status of specific intersections.

The Stakeholders Committee recommended this plan and list of intersections at its July 2, 2019 meeting. The Union County Board of Commissioners unanimously adopted the plan at its August 19, 2019 meeting.

## **Evaluation Process**

The stakeholder committee strove to identify intersections where improvement projects would be feasible, competitive, and effective. Each of the intersections were on the NCDOT system, so any recommended improvement would require their concurrence. In addition to support, for much of the county, the NCDOT would be the only available agency to implement the projects. Based on these realities, the stakeholder committee used a two-phase review process to select the final list of 15 intersections that have a high chance of becoming feasible and competitive projects to address identified deficiencies.

Map 5



The above map represents the initial results of intersection evaluation, with the locations in green representing the approximate top 50 percent of intersections, based on the scoring process on the following page. The green star represents Potter and NC 75 in Mineral Springs, which was evaluated based on municipal support. If a candidate intersection made it through Phase 1, it was then evaluated in Phase 2: Feasibility and Local Support.

#### Phase 1: Need

- 1. What is the total daily traffic volume at the intersection?
- 2. How may crashes have been reported in the past five years?
- 3. What is the crash rate compared to volumes?
- 4. How many serious injury or fatal crashes have been reported in the past five years?
- 5. What kind of congestion is seen at the intersection?
- 6. Is there truck traffic at this intersection?
- 7. What is the growth rate for traffic and nearby development?

The intersections were evaluated based on the scoring table shown below.

Table 3

	Scoring					
Intersection Evaluation Variables	0 points	5 points	10 points	15 points	20 points	25 points
Five Year Crashes / Daily Traffic	Less than one crash per 1,000 AADT	1 - 2 crash per 1,000 AADT	2 - 4 crash per 1,000 AADT	4+ crash per 1,000 AADT		
Total Daily Traffic Volume	0 - 5K	5K - 10K 10K - 15K		15K - 20K	20K - 25K	25K+
Growth Pressure (both traffic growth and anticipated adjacent development)	Low	Medium	High			
Serious or Fatal Crashes in Five Years	0	1	2+			
Total Crashes in Five Years	Less than 5	5 to 10	11 to 20	21 to 30	more than 30	
Truck Traffic	Low (SR routes)	Moderate (NC routes)	Significant (US routes)			
Congestion	Low (no backups for turning movements)	Moderate (backups for peak hour turning movements but otherwise free flowing)	Significant (backups occur throughout day)			

The variables and assigned weights reflected community input. When asked what were the two most important variables to consider when identifying and prioritizing intersections, safety was the most frequently mentioned attribute, with congestion second. Economic development, bicycle and pedestrians, and aesthetics were each seldom mentioned as the most important two criteria. The focus on safety was broadly shared throughout the county, and is consistent with <a href="NCDOT analysis">NCDOT analysis</a> showing Union County as having one of the highest crash rates in North Carolina.

Table 4

able 4			
		Final Critical	
Candidate Intersection	Score	Intersection	Details
		List	_ 5555
NC 16 and NC 75	70	Yes	
NC 75 and Old Providence	70	Yes	
NC 84 and Rocky River	65	Yes	
Indian Trail and Matthews-Indian Trail	65	No	Removed at request of Indian Trail
Poplin and Unionville-Indian Trail Road	60	Yes	Removed at request of mulan fram
Southerland and Walkup	60	Yes	
Lawyers and Rocky River	60	No	Funded in June 2019
Waxhaw-Marvin and Kensington	55	No	Future Millbridge mitigations will reduce remaining improvement options
Joe Kerr and Marvin	55	Yes	8
Lawyers and Stevens Mill	55	Yes	
Potter and Forest Lawn	55	Yes	
Potter and New Town	50	No	Stop signs have reduced crash totals
NC 84 and Willoughby	45	No	Low traffic volumes and crash totals
Franklin Street and Johnson Street	45	No	Possible signal project
Lawyers and Indian Trail Fairview	45	No	Funded in June 2019
Antioch Church and Beulah Church	40	No	Multiple public input comments saying not needed
US 74 and Edgewood	40	No	Crash rate too low
US 601 and Brief	40	Yes	Crash rate too low
Waxhaw-Marvin and Bonds Grove Church	40	Yes	
NC 200 and Plyler Mill	40	Yes	
NC 200 and Old Camden	40	Yes	
NC 218 and Love Mill	35	No	Wait on results of nearby roundabouts on NC 218
South Potter and Parkwood School	35	Yes	Trait on results of ficulty roundabouts of fice 220
NC 75 and Fletcher Broome	35	No	Recent turn lane added to intersection
Griffith and Plyler	30	Yes	Replacement for Lawyers and IT-Fairview
Waxhaw-Marvin and Gray Byrum	30	No	replacement for Early ero and it i an view
New Salem and New Hope Church	30	No	
Lawyers and Ridge/Duncan	30	No	
Sunset and Medlin	30	No	
12 Mile Creek and New Town	30	No	
Beulah Church and 12 Mile Creek	30	No	
Morgan Mill and Olive Branch	30	No	
NC 75 and Potter	30	Yes	
NC 200 and Baucom/ New Salem	30	No	
Potter and Beulah Church	25	No	
Antioch Church and Forest Lawn	25	No	Possible signal project
Walkup and Secrest	25	No	a constant and the cons
NC 205 and Ansonville	25	No	
Wolf Pond and Maurice	25	No	
South Rocky River and Tom Greene	20	No	
Monroe-Ansonville and McIntyre	20	No	
NC 200 and Lawyers	20	No	
Weddington-Matthews and Cox	20	No	
Waxhaw-Marvin and Pine Oak	15	No	
Wolf Pond and Stack	15	No	
Monroe-Ansonville, Mills Harris, and Austin Grove	15	No	
Potter and Pleasant Grove	15	No	
Rehobeth and Sims	15	No	
Waxhaw-Indian Trail and Pleasant Grove	15	No	
NC 200 and Davis	15	No	
North Main and West Wilson	15	No	
NC 207 and Sandy Ridge	15	No	
Antioch Church and Longleaf	5	No	
NC 205 and Olive Branch	5	No	
INC 203 and Olive Didikli	)	INU	

# Phase 2: Feasibility and Local Support

The process of identifying the highest scoring 15 projects would have ignored local support, as well as project feasibility. Based on the input from over 700 Union County residents, as well as from the affected municipalities and NCDOT, the following candidate projects were removed from consideration in Phase 2:

- 1. Indian Trail and Unionville-Indian Trail removed at the request of Indian Trail
- 2. Antioch Church and Beulah Church removed due to low technical score and multiple "not needed" comments
- 3. Weddington-Matthews and Cox removed due to low technical score and multiple "not needed" comments
- 4. Beulah Church and Potter removed due to low technical score and multiple "not needed" comments
- 5. Antioch Church and Longleaf Court removed due to low technical score and multiple "not needed" comments

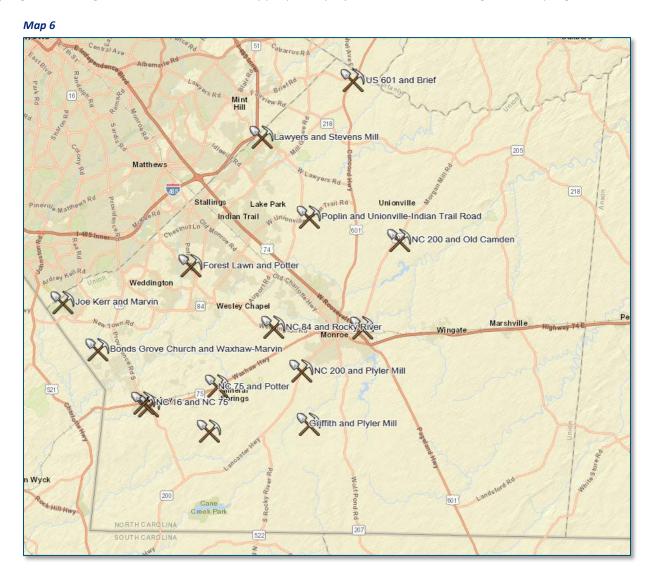
Several projects that didn't have especially strong technical scores from Phase 1 but were further evaluated based on community support and feasibility of improvements. Local support was based on the results of the 30-day public input period in March and April of 2019.

- 1. Antioch Church and Forest Lawn
- 2. Bonds Grove Church and Waxhaw-Marvin
- 3. New Town and Twelve Mile Creek

## **Recommended Intersections**

The stakeholder committee identified the following 15 intersections at their June 2019 meeting. These intersections were identified based on a combination of technical need, feasibility, and local support. Some intersections, such as Franklin and Johnson in Monroe or Antioch Church and Forest Lawn in Weddington, scored well in the process, but were not included in the recommended list because the likely improvement was a traffic signal, which would be a low cost project and not require physical modification to the road. The NCDOT is looking at these intersections for improvements as a result of this process.

While the projects listed below did receive scores as a result of this process, this list should not be interpreted as a rank order of need or priority. There are multiple funding sources available through CRTPO and the NCDOT, and each emphasizes different aspects of the issues with an intersection. Some candidate projects are only eligible for safety funds through the NCDOT, while others would be competitive for congestion-focused programs through CRTPO. Most would be appropriate projects to consider through several programs.



The critical intersections from this process are listed below with some background information about traffic, safety, and municipal impacts.

Table 5

Intersection	Municipality	Traffic	Safety (Total Crashes over Last Five Years)	
NC 16 and NC 75	Waxhaw	Significant	More than 30 crashes	
NC 75 and Old Providence	Waxhaw	Significant	More than 30 crashes	
NC 84 and Rocky River	Monroe	Moderate	More than 30 crashes	
Poplin and Unionville- Indian Trail	I Monroe I Moderate		21 to 30 crashes	
Southerland and Walkup	Monroe	Significant	More than 30 crashes	
Joe Kerr and Marvin	Marvin	Low	21 to 30 crashes	
Lawyers and Stevens Mill	Stallings	Moderate	21 to 30 crashes	
Potter and Forest Lawn	Weddington	Low	More than 30 crashes	
US 601 and Brief	Fairview	Low	11 to 20 crashes	
Waxhaw-Marvin and Bonds Grove Church	Marvin	Moderate	11 to 20 crashes	
NC 200 and Plyler Mill	None	Low	11 to 20 crashes	
NC 200 and Old Camden	Unionville	Low	More than 30 crashes	
South Potter and Parkwood School	None	Low	11 to 20 crashes	
Griffith and Plyler Mill	None	Low	21-30 crashes	
NC 75 and Potter	Mineral Springs	Moderate	5 to 10 crashes	

# **Implementation**

The ultimate goal of this work is to improve the road network in Union County. Nearly all of these intersections will require physical modification in order to address identified issues, meaning that construction funding will be required. Fortunately there are multiple funding programs available. As identified issues coming from an adopted plan, any of these intersections could be immediately submitted for funding through the NCDOT or CRTPO, but they would likely not score well. While this process has identified critical intersections, it has not identified the appropriate solution, the benefits of the solution, or the cost to implement that solution. This information is critical to allow them to be appropriately evaluated through the evaluation processes used by CRTPO and the NCDOT. The next step is to develop conceptual designs and cost estimates.

**Develop Designs and Cost Estimates:** The CRTPO regularly funds planning projects to help study transportation issues. They issue an annual call for projects to fund both construction and planning projects. The next call for projects will be in late 2019. Union County, ideally in coordination with the affected municipalities, is encouraged to submit eligible intersections for a grant to conduct traffic engineering analysis and develop cost estimates. The benefit of this process will be that the county, affected municipalities, and NCDOT will each have a design and cost estimate to jointly use for funding applications.

Commit Local Government Funds to Projects: All available funding sources (CMAQ, STBG-DA, spot safety, high hazard, high impact) consider local contributions in the scoring of the projects. The rationale is that increased local funding signals a commitment to the project, as well as allows the funding agency to "grow the pot" of available funding. Multiple municipalities, as well as the County itself, have successfully partnered with the NCDOT to acquire funding for specific projects. This trend of increased local match is only expected to increase, and communities with intersections on this list should set aside funds to allow them to quickly respond to grant applications and partnering opportunities.

**Apply for Funding:** With the exception of a handful of municipalities, only the NCDOT has the capacity to implement intersection projects from this study. It is therefore incumbent upon all affected municipalities and Union County to regularly consult with the NCDOT Division 10 staff on upcoming grant applications and opportunities for partnership. This requires regular participation in CRTPO meetings, as well as discussion at countywide planners and CRTPO members quarterly meetings. These forums facilitate coordination and information sharing for Union County, its municipalities, and the NCDOT and should be used to advance such efforts.

Integrate Mitigations from Proposed Developments into Funded Intersection Projects: Union County is a rapidly developing community, with larger developments frequently proposed. These developments are often required to address congestion and safety issues created by their development. While not required to mitigate or improve preexisting network deficiencies, coordinating any required or requested improvements into existing funded intersection projects can result in more streamlined project delivery and even additional network improvements.

# Conclusion

Union County has the fourth highest crash rate in North Carolina and continues to be one of the fastest-growing counties in the state. Safety was therefore a priority concern when identifying and prioritizing intersections. The residents have spoken and affirm the need to address safety issues, and support the recent funding arrangements between the municipalities, county, and NCDOT. They are comfortable driving through roundabouts, and believe they improve intersections. The community has spoken, and we have listened.

This critical intersection analysis process evaluated over 50 intersections throughout Union County. Stakeholders from throughout the county evaluated the data, community input, and feasibility to identify 15 intersections for future design and funding efforts. These intersections are found in seven municipalities, creating multiple opportunities for funding partnerships. Thirteen of these intersections are on the Federal Aid system, making them eligible for design and construction funding through CRTPO, and should therefore be included in any planning grant to design and estimate costs for each intersection.

Beyond the technical aspects of an intersection list coming out of this process is the community input and awareness raised through the outreach and adoption of the report. Over half of the respondents did not know Union County does not own or maintain streets. This may correlate with the fact that one quarter of the respondents have lived in Union County less than five years. Regardless of the length of time they have lived in the county, the respondents want transportation issues addressed. Effective actions on an issue as complicated as transportation requires focused efforts over a multi-year period.

The public, NCDOT, county, and municipalities are each better served when they are in agreement about priorities and means to address issues of common concern. Any follow on study to design intersections, as well as applications to fund intersection improvements, should be shared with the community. Their input has been helpful in identifying and evaluating intersections, and any appropriate decision point in the process to delivering improvements should likewise solicit their input and share recommendations.

Union County thanks the municipalities and the NCDOT for their participation in this process. Union County likewise thanks the over 700 Union County residents who gave their input on transportation planning.