Town of Marshville – US 74 Corridor Study

Prepared for

Town of Marshville and Union County

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Introduction & History

The Town of Marshville and eastern Union County haven't experienced the rapid growth like most towns in Union County or the Charlotte region. At a 2016 population estimated at 2,484 people, Marshville remains a small town and cherishes that character. With US 74 running through the middle of town, it brings both economic benefit in the form of traffic and exposure, but also divides the town as a wide roadway carrying 16,000-20,000 vehicles per day, including approximately 2,000-2,600 trucks.

In 2016, the Union County Planning staff completed a planning document called the Union County Critical Intersection Analysis. During that planning process, nearly 70 candidate locations were considered for study, of which 15 were chosen as "critical intersection locations" to be analyzed further. One of those locations was the intersection of US 74 and Elm Street in Marshville. Upon further examination of this location, it became clear that a corridor study was needed of US 74 through Marshville to address the vehicular and pedestrian needs at multiple intersections and along the corridor.

An analysis of the US 74 corridor through Marshville is still a focus of this study. Near term improvements at the signalized intersections with an emphasis on streetscape improvements and encouraging pedestrian movement along and across the highway was examined, all in coordination with existing and proposed land uses. However, with the opening of the Monroe Expressway in 2018 just a short distance to the west of Marshville, Marshville's leadership has expressed concern whether a bypass of their town will help or hurt the business district. The long-term solution for traffic on US 74 through Marshville is a proposed bypass that would effectively extend the Monroe Expressway south of the town and tie back into existing US 74 east of the town limits. This concept is included the Comprehensive Transportation Plan (CTP) for the Charlotte Regional Transportation Planning Organization. The leadership in Marshville asked that the bypass be removed from the CTP in the spring of 2017. At the request of Union County, CRTPO, and the North Carolina Department of Transportation, this study assessed the request to determine if and when the bypass is needed, as well as supported by the community.

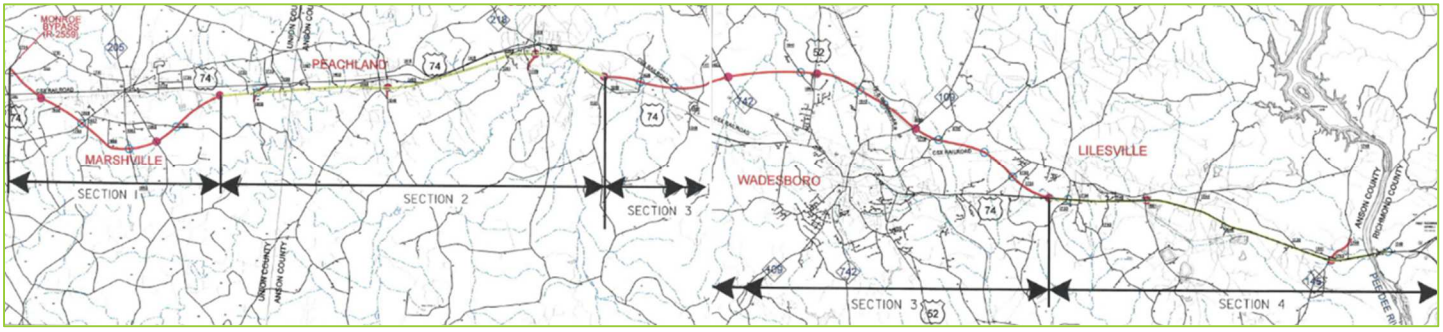


Figure 1. R-4441 Feasibility Study

The Marshville Bypass was actually first identified in the mid-1980s as a part of a larger Monroe Bypass, but the Monroe Bypass was shortened and the bypass of Marshville was shifted to the south of town. A southern bypass of Marshville was identified in its 1992 Thoroughfare Plan, while the bypass was refined as part of a feasibility study conducted by NCDOT in 2003. This study examined the proposed freeway upgrade of US 74 from the then Monroe Bypass to the proposed bypass of Rockingham in Richmond County. In this process a proposed freeway south of Marshville was identified with a proposed interchange at Landsford Road. In 2010, Marshville adopted its first Comprehensive Transportation Plan (CTP) that included a proposed bypass south of Marshville. Marshville became a member of the Charlotte Regional Transportation Planning Organization, and this bypass was reaffirmed in 2017 as part of their CTP[1]. (See Appendix A – Town of Marshville CTP).

[1] http://crtpo.org/plans-programs/comprehensive-transportation-plan/view

Other relevant plans and studies include two projects currently being done by NCDOT: the Wadesboro Bypass Toll Study and the Strategic Transportation Corridor US 74 Study. The Wadesboro Toll Study is looking at the feasibility of tolling that proposed bypass which could influence decisions on the possible funding for the Marshville bypass. The Strategic Transportation Corridor US 74 Study is being done to identify a broad range of improvements alternatives for US 74 from Asheville to Wilmington. NCDOT considers US 74 a primary corridor from the mountains to the sea in North Carolina and a major freight route to and from the Port of Wilmington . Possible improvements that will be considered include possible bypasses as well as no-build options that emphasize Transportation System Management and Travel Demand Management.

Study Area

The project study area map shown here includes all of Marshville and surrounding Union County. The area outside of the Town's municipal limits are Extra-Territorial Jurisdiction (ETJ), and are under the land use regulations of the Town. This map demonstrates that the Marshville Bypass and consideration of the Monroe Expressway is a part of this planning effort. However, the primary study area for this project is along US 74 through Marshville from Stegall Road to Chambers Street.

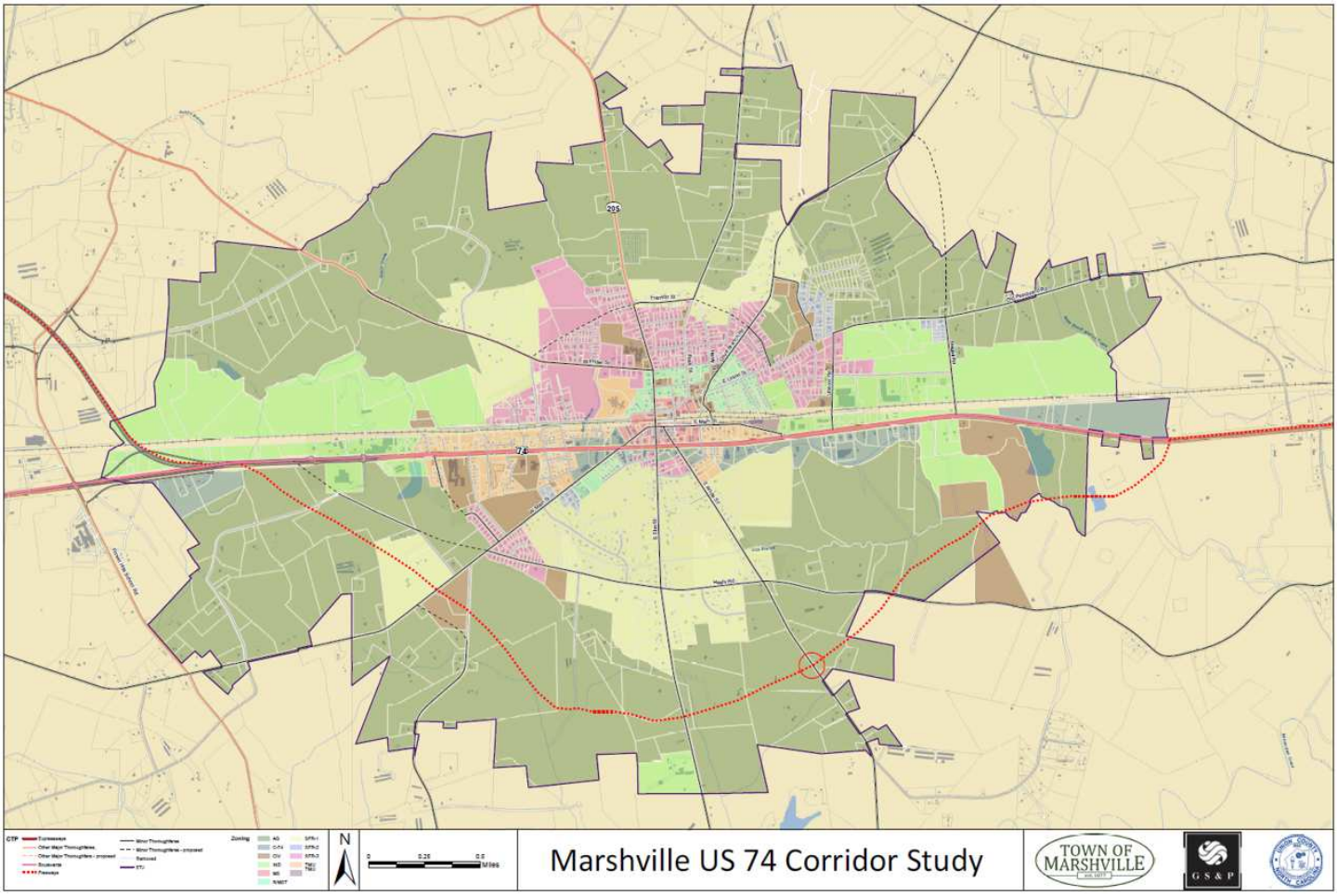


Figure 2. Study Area Map

Existing Conditions

Monroe Expressway

The NCDOT is building a fully tolled expressway extending nearly 20 miles from U.S. 74 near I-485 in Mecklenburg County to U.S. 74 between the towns of Wingate and Marshville in Union County. U.S. 74 serves as an important commercial corridor for residents and businesses in Union and Mecklenburg counties as it gives retail, commercial and employment centers in the area direct access to and from the route.

The Monroe Expressway will improve mobility and capacity in the U.S 74 corridor by allowing for high-speed regional travel while maintaining access to properties along existing U.S. 74. Once complete, the Monroe Expressway will be operated by the North Carolina Turnpike Authority. The Expressway is expected to open in late 2018.

Traffic Forecasting & Analysis

In order to determine the current operations of the study area intersections, a base traffic model was developed. Traffic intersection operations and capacity analyses were performed using the Highway Capacity Manual (HCM) procedures through the use of the Synchro 9 computer program. The methodology uses the average delay per vehicle to determine the level of service (LOS) for each intersection.

In determining the traffic growth, projected traffic volumes were established based on background growth of traffic in the project vicinity. The existing conditions were projected to future years, 2025 and 2045, for analysis.

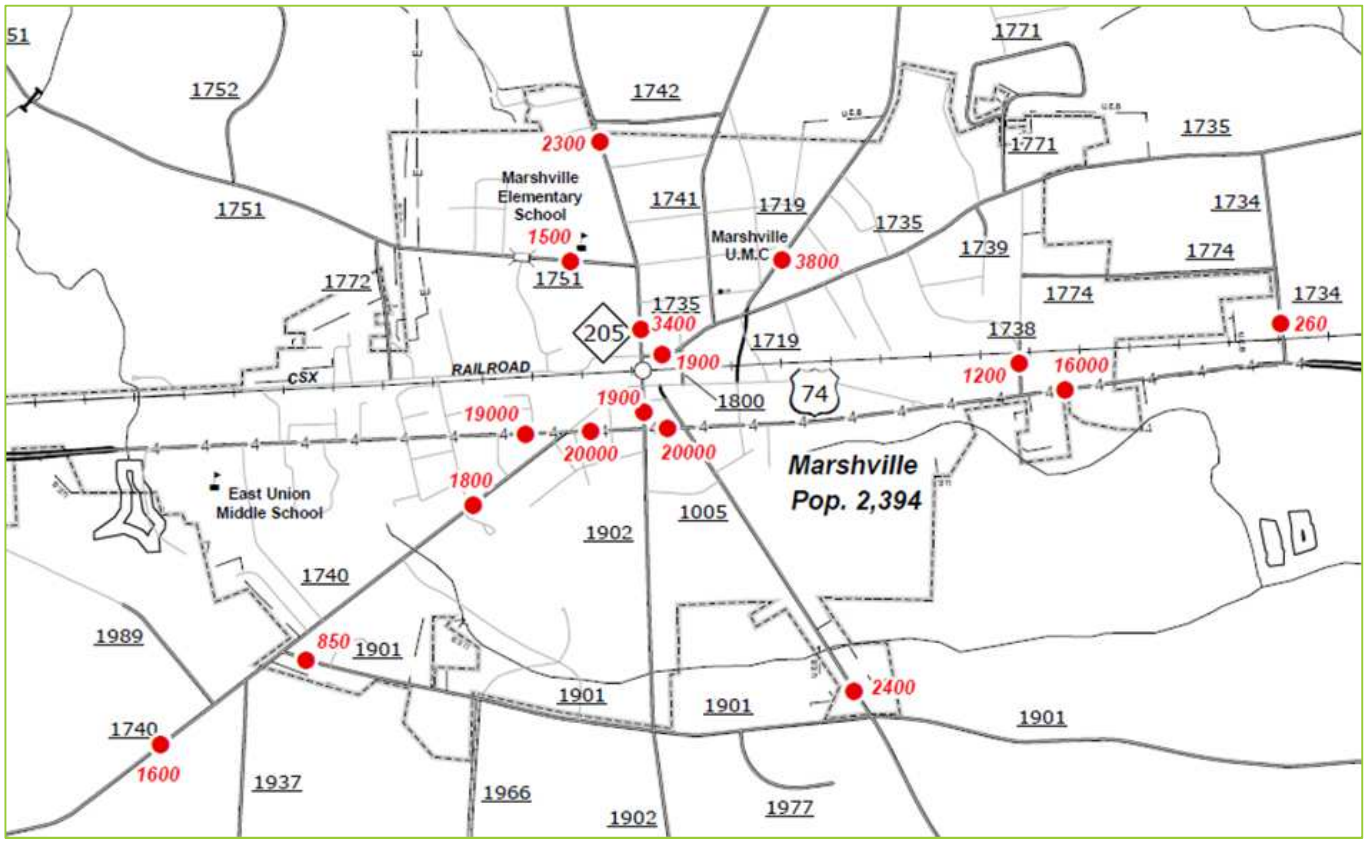


Figure 3. 2016 Existing Daily Traffic Volumes

Anticipated background growth was developed based on a review of data from the Metrolina Regional Travel Demand Model, maintained by the Charlotte Department of Transportation. The total projected daily traffic volumes for the years 2025 and 2045 are presented in Appendix F. US 74 through Marshville has not experienced

much, if any, growth over the previous 16 years. NCDOT data indicates an ADT of approximately 21,000 vehicles per day (vpd) in 2002, and yearly ADT volumes between 18,000 and 22,000 vpd over the years in between. Forecasts indicate expected growth will outpace these numbers, with an expected ADT of approximately 26,500 vpd in 2025 and an expected ADT of 31,500 vpd in 2045. In addition, traffic forecasts for the Marshville Bypass scenario, in which a bypass of US 74 in Marshville is constructed, were developed for the year 2045. Projected daily traffic volumes for 2045 – Marshville Bypass Scenario are also presented in Appendix F. These forecasts project approximately 14,000 vpd on existing US 74 and between 18,000 and 21,000 vpd on the Marshville Bypass.

To determine the operation of the study area intersections under projected conditions, capacity analyses were performed for the AM and PM peak hours. Peak hour turning movement counts were collected, and grown to 2025 and 2045 based on the forecast projections. These capacity analyses were used to evaluate the need for roadway and traffic control improvements at the intersections studied. Initial analyses were performed assuming no improvements had been made to the study intersections from the year 2018 to the projected future years 2025 and 2045. Additional analyses were performed assuming selected improvements along the corridor. These analysis considered a no-build scenarios and the Marshville Bypass scenario. Further detail on existing and future no-build analysis results can be found in Appendix F.

Crash History & Analysis

Crash records from 2013-2017 were obtained from NCDOT's Traffic Safety Unit for the 7 intersections and 6 segments in the study area. A total of 97 crashes were reported at or near a study area intersection or along US 74 between intersections during this period. The illustration below shows the number of crashes at the intersections and segments within the study area.

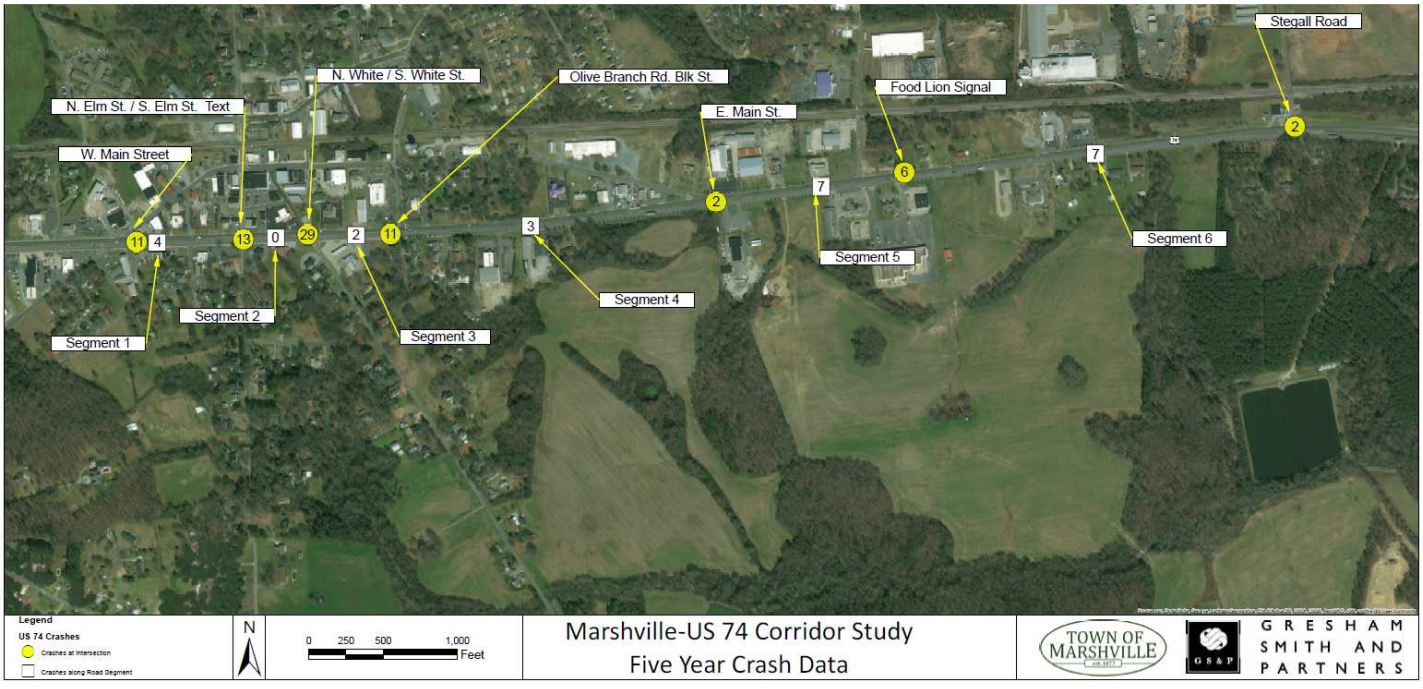


Figure 4. Five Year Crash Data

The highest crash location in the study area was at the intersection of US 74 and White Street, with a total of 29 crashes over the five year period. As a contiguous segment of approximately 1.59 miles, the study area has a crash rate of approximately 166.93 per 100 million vehicle miles of travel along the segment. The most recent

statewide crash rate for US routes is approximately 192.29 crashes per 100 million vehicle miles of travel, indicating that this segment of existing US 74 is slightly below the average crash rate for a similar facility across the state.

Of the crashes analyzed, 24 included heavy vehicles, for a rate of approximately 12%. Based on NCDOT data, the average statewide crash rate for heavy vehicles is just over 2%. The increased volume of heavy vehicles along this segment of US 74 appears to contribute to a proportionately higher heavy vehicle crash rate.

Crash data for the study area is presented in Appendix F.

Access Management

Access management is a comprehensive approach for controlling the location, spacing, design and operation of driveways, signalized and unsignalized intersections, and median openings. The objective is to limit and separate driveways, intersections, median openings, and traffic signals to maintain and improve the flow and safety of current and future traffic conditions.

Existing US 74 contains an excessive number of driveways in many of the fronting properties with little control of left turn movements either in or out of the parcels. There are approximately 21 full driveway cuts or intersections between West Main Street and Olive Branch Road along the north side of US 74 alone, for an average spacing of approximately 85 feet. The majority of these allow full access movements. Average spacing on the southern side of US 74 is approximately 94 feet. Standard NCDOT policy recommends 300 feet between right-in / right-out access points and 600 feet between full access points. The conflicts created by the numerous opportunities for turning movements is a main contributor to accidents along the corridor.

Land Use

There is a combination of existing land uses along US 74 through Marshville. In the section described as the Town Center character area is made up predominately of commercial uses and is mostly zoned as Main Street or Commercial. This area is the connecting point of Marshville Boulevard and Elm Street which connects this commercial district to residential areas to the south of US 74 and north of the railway.

Figure 5. Character Areas

The Residential Character area is on the western end of the study area corridor. This character area is defined by the lower density land uses and transitional mixed-use zoning. Few properties front directly onto Marshville Boulevard. This character area is adjacent to commercial uses and the middle school that are strong destination points for pedestrians and others. (See Appendix E – Existing Land Use Map)

The eastern end of the corridor is the Industrial/commercial character area. It is made up mostly of large industrial tracts of land with a Food Lion grocery store anchored shopping center within it. These uses are typically less conducive to pedestrian activities.

Existing zoning along the US 74 corridor is a combination of highway commercial, industrial, Main Street, transitional mixed use and institutional. The highway retail and industrial zones are spread along much of the US 74 corridor through Marshville with large tracts zoned industrial on either end of Marshville. Main Street zones are focused in the center of the corridor flanked by Transitional mixed-use designations. Institutional zoning is sprinkled along the corridor. (See Appendix C – Existing Zoning Map)

Streetscape & Pedestrian Improvements

Existing conditions in the corridor expose the issues and opportunities facing streetscape improvements and pedestrian needs. The map below shows existing conditions in the western side of the corridor.

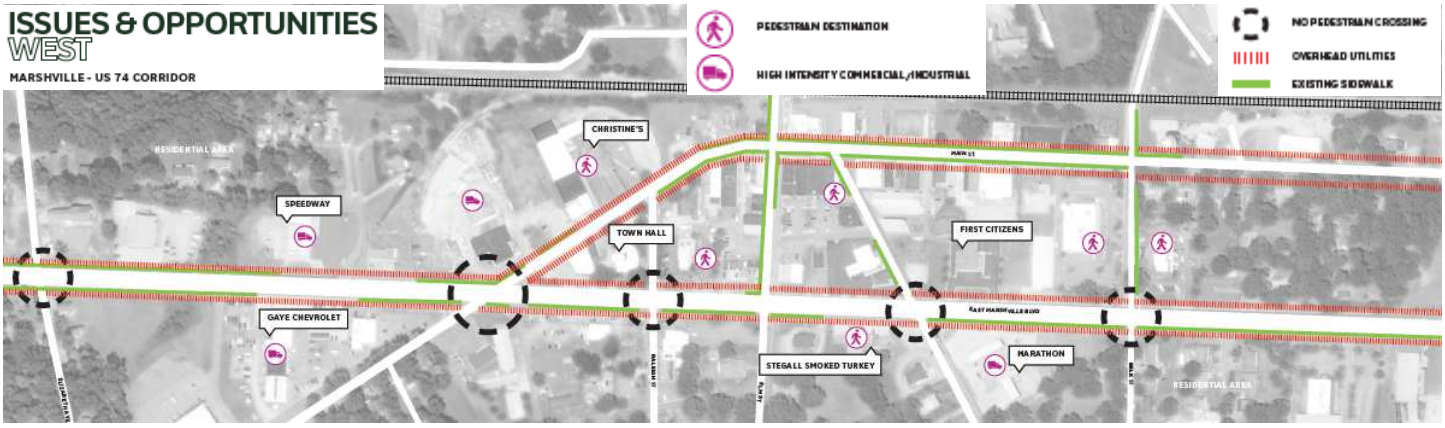


Figure 6. Issues and Opportunities - West

As the diagram shows, much of the western portion of the study area, including the Town Center character area, has sidewalks. However, the system is not complete, creating a patchwork of pedestrian facilities that push users into parking lots, grass verges (the area between the street and sidewalk or parking areas) or on to streets.

There is also a lack of crosswalks, both painted and signalized in the corridor. The only signalized crossing is at Elm Street and US 74. A system of crosswalks would help the pedestrian system function and create a more visible and balanced mobility network. Adding crossings may be an opportunity to encourage people to park in a central location and walk to other destinations thereby helping to reduce multiple short distance vehicular trips.

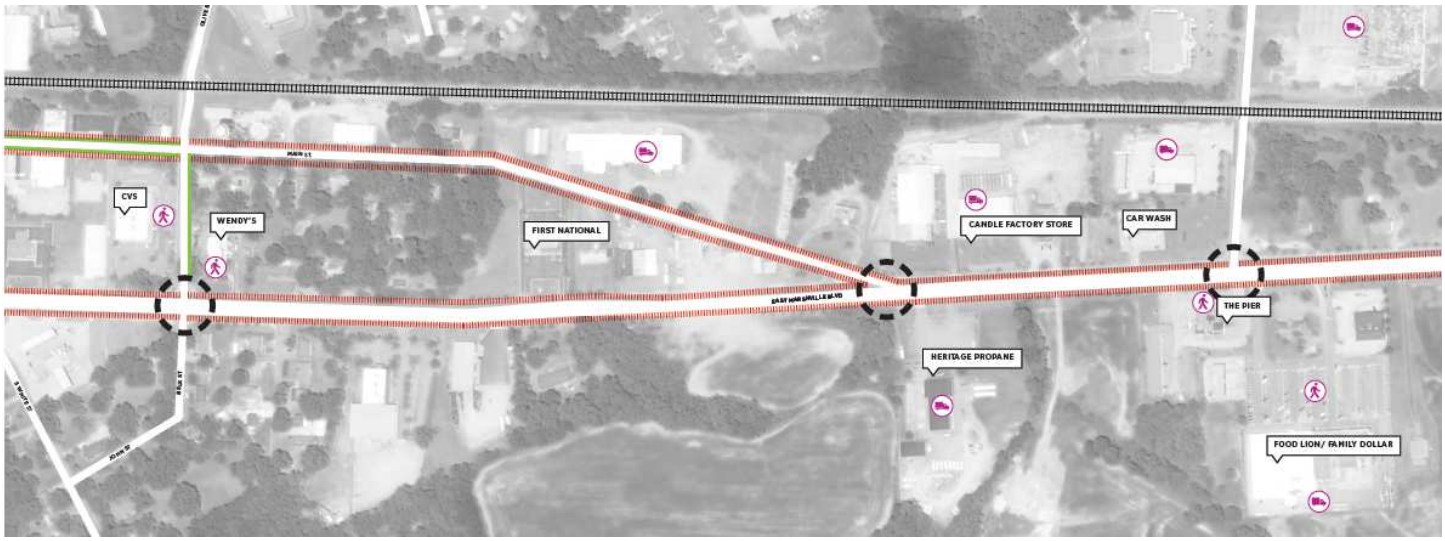


Figure 7. Issues and Opportunities - East

The eastern half of the study area has few, if any, sidewalks along Marshville Boulevard. Considering the adjacent land uses, priority locations may be identified such as key commercial nodes and restaurants while sidewalks along the heavy industrial areas may warrant less need.

Issues and opportunities for streetscape improvements are also identified. Overhead utilities throughout the corridor create conflicts for streetscape amenities, namely street trees. Trees are a critical component of successful and functional streets.

INCOMPLETE SIDEWALK NETWORK


LACK OF SIDEWALKS

MODAL BALANCE

Given the industrial land uses and truck traffic on the corridor, striking a balance that functions for freight, vehicles and pedestrians will be a critical component to Marshville streetscape improvements. Fortunately, existing right-of-way along Marshville Boulevard is significant and will allow space for additional pedestrian and streetscape improvements to be introduced. Approximately 150' of ROW exists along this section of US 74 with the existing curb, gutter and roadway using less than one half of that distance. Many streetscape improvements will be possible within the 35' of ROW on both sides of US 74.

Public Involvement

This study began in December 2017. An advisory committee was appointed by the Town of Marshville and Union County that was made up of citizens and business owners in Marshville, representatives from the planning Boards of both Union County and Marshville, NCDOT, the Marshville Town manager and Mayor. The committee was charged with reviewing the work developed throughout the study process and give feedback and direction. The committee met four times during the plan development.

Additionally, the public engagement plan consisted of two open house engagement forums held at the Marshville Community Center (118 E. Union Street) and a survey made available in digital and print form. The first open house was held on April 19, 2018 and introduced the public to the purpose of the study and identified issues and opportunities. The second open house held on August 23, 2018 presented alternative improvement recommendations and gathered an additional layer of feedback. (See Appendix D – Public Involvement Results)

Recommendations & Implementation

Signal Coordination

Analyses were performed to assess the operations of the corridor with the implementation of the recommended improvements. These recommendations were groups into two phases of improvements. Phase 1 includes the addition of a coordinated signal system and signal modifications to the signalized intersections at:

- West Main Street
- Elm Street
- White Street
- Olive Branch Road
- Food Lion Signal

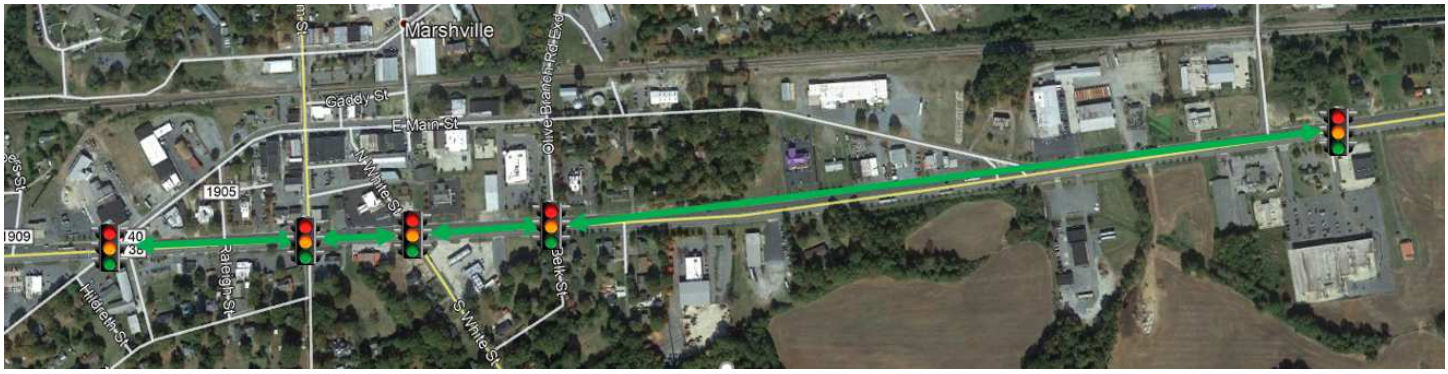


Figure 8. Signal Coordination

This improvement allows intersections to "talk" to each other; coordinate through movements through town to reduce delays on US 74, and reduce travel time but help control speeds. Similar operations would be expected for minor street approaches with implementation of this improvement.

The results of travel time analyses for the Phase 1 improvement scenario with implementation of a coordinated signal system are presented below. Analysis is presented for the 2025 interim year.

Table 1. Projected Model Travel Times – 2025 Coordinated Signal System

Route	2025 Travel Time (s)		2025 Travel Time Coordinated System (s)	
	AM	PM	AM	PM
Eastbound US 74 - West Main Street to Stegall Road	182.4	191.9	172.9	182.2
Westbound US 74 - Stegall Road to West Main Street	176.5	183.3	174.3	181.8

As illustrated above, a coordinated signal system will help to mitigate future increases in travel time through the corridor. This improvement would coordinate through movements along US 74, reducing stops and helping to provide progression along US 74.

In addition, potential emissions benefits in the interim year 2025 are presented below, and based on SimTraffic microsimulation runs. Implementation of a coordinated signal system is expected to reduce HC, CO, and NOx emissions.

Table 2. Projected Emissions – 2025 Coordinated Signal System

Emission Measure	2025 Emissions (g)		2025 Coordinated System Emissions (g)		Emissions Savings (g)	
	AM	PM	AM	PM	AM	PM
HC	3,071	2,704	2,783	2,587	288	117
CO	72,083	72,157	64,470	67,158	7,613	4,999
NOx	9,388	8,764	8,660	8,373	728	391

Intersection Improvement

Increased queuing on the northbound approach of White Street at US 74 in the design year, combined with the location of driveway access points to the existing gas station on the southeast corner of the intersection, indicate the need for a left turn lane at this location. Phase 2 includes this left turn lane which would provide additional storage for northbound left turning vehicles, reducing the peak hour queues and preventing blockage of the gas station driveway access.

Capacity analysis results for this intersection in the design year (2045) with a proposed 100 foot left turn lane are illustrated in the table below.

Figure 9: White Street @ US 74

Table 3. Projected Intersection Peak Hour Levels of Service – 2045 With Left Turn Lane

Route	LOS & Average Delay (seconds/veh)	
	AM	PM
US 74 and White Street	8.4 A	7.4 A

Analysis results indicate 95th percentile queue reductions of approximately 60 feet in the AM peak hour (reduced to 79 feet) and 35 feet in the PM peak hour (reduced to 59 feet).

Access Management

Phase 2 recommendations also include the construction of access management improvements along US 74 from approximately 300 feet west of West Main Street to approximately 210 feet east of Olive Branch Road. Proposed median improvements include construction of monolithic concrete median along the length of the area within these limits, with the exception of the existing signalized intersections and the unsignalized intersection of US 74 and Raleigh Street. This median would be two feet wide, and 5" tall along the proposed installation area – aiming to restrict normal vehicular traffic, but traversable for emergency vehicles. These safety improvements are proposed as a response to the large density of full access commercial and residential driveways in this area.

Construction of this median section is expected to be able to be completed within existing right-of-way without additional impacts to the remainder of the road.

Refer to Appendix C for an illustration of the location and length of the proposed access management improvements in this area. Analyses indicate that proposed left turn storages will accommodate queues expected in the 2045 design year.

Land Use

The existing and proposed land uses along the US 74 corridor in Marshville are conducive to the regional character and operations of US 74. The recommended land use includes Highway retail, Transitional mixed use, Industrial and Civic uses. These recommendations are consistent with the existing and future character of Marshville Blvd. No changes are recommended to the land use plan unless US 74 bypass of Marshville is funded and built. Traffic forecasts with the bypass in place show a significant reduction in traffic on existing US 74 including, and most importantly, truck traffic. Total traffic volumes are projected to decrease by more than 50% on existing US 74 through Marshville if the Bypass is built. As a result the future land use plan should reflect:

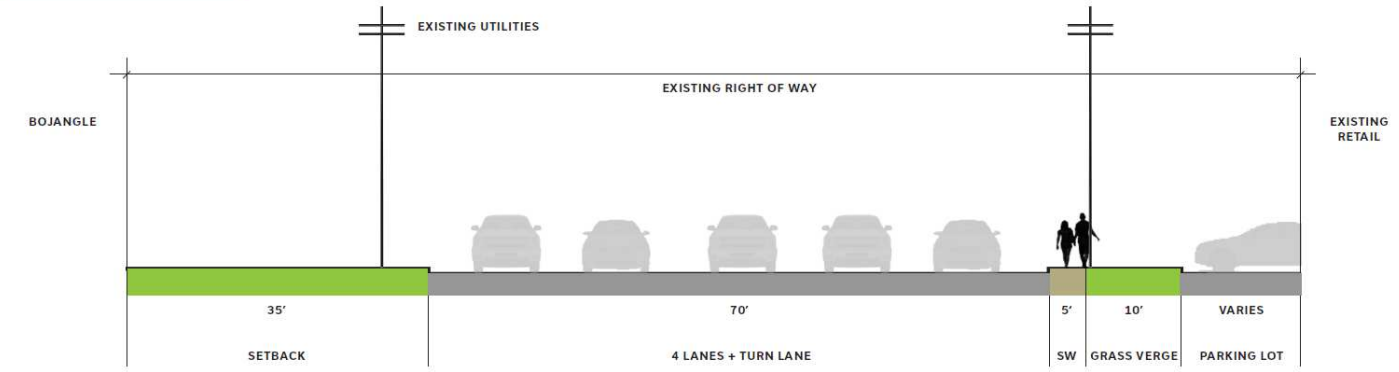
- Less highway retail
- Additional transitional mixed use in the Town center area
- Focus the uses along existing US 74 to foster a more pedestrian friendly corridor

Pedestrian & Streetscape

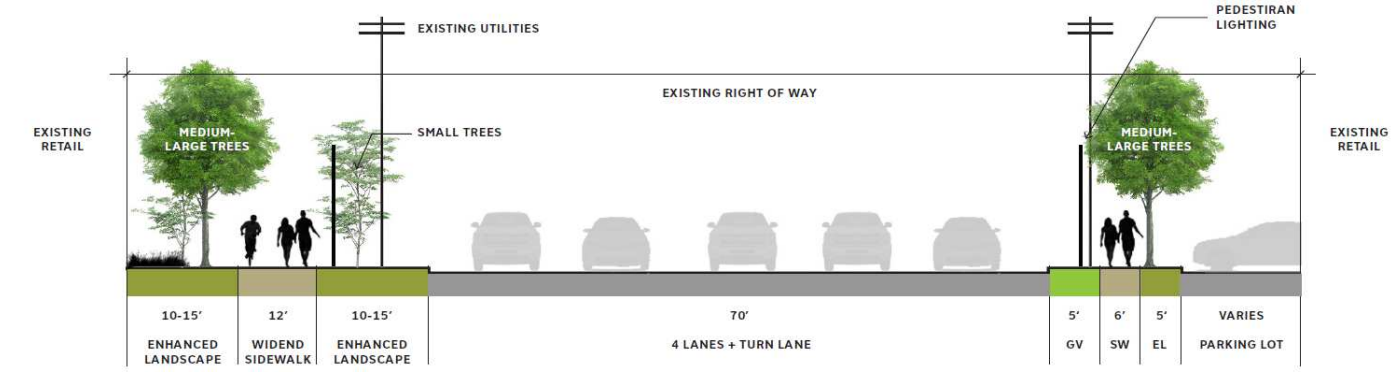
The inconsistency and lack of sidewalks throughout the study area beckon for those types of improvements. A complete street approach to the corridor is necessary to create a welcoming streetscape and comfortable pedestrian environment. Specific recommendations include:

1. Complete sidewalks along both sides of US 74 except in the industrial area
2. Priority should be given to key commercial nodes and destinations in the Town Center and Neighborhood character areas.
3. Sidewalks should be separated by a minimum 5 feet grass verge from the roadway.
4. Sidewalks should be a minimum of 6 feet in width.
5. Sidewalks adjacent to retail uses in the Town Center section should be 12 feet wide if possible.
6. Pedestrian lighting is recommended for the Town Center and Residential character areas.
7. Add pedestrian crossings, both painted and signalized, at intersections along the corridor.
8. Medium to large trees should be planted along the corridor where utilities will allow. Small trees should be planted all along the corridor as well.
9. Improvements in access management, such as driveway consolidation, should be done in coordination with the various streetscape improvements recommended for sidewalks and tree plantings.

TOWN CENTER EXISTING

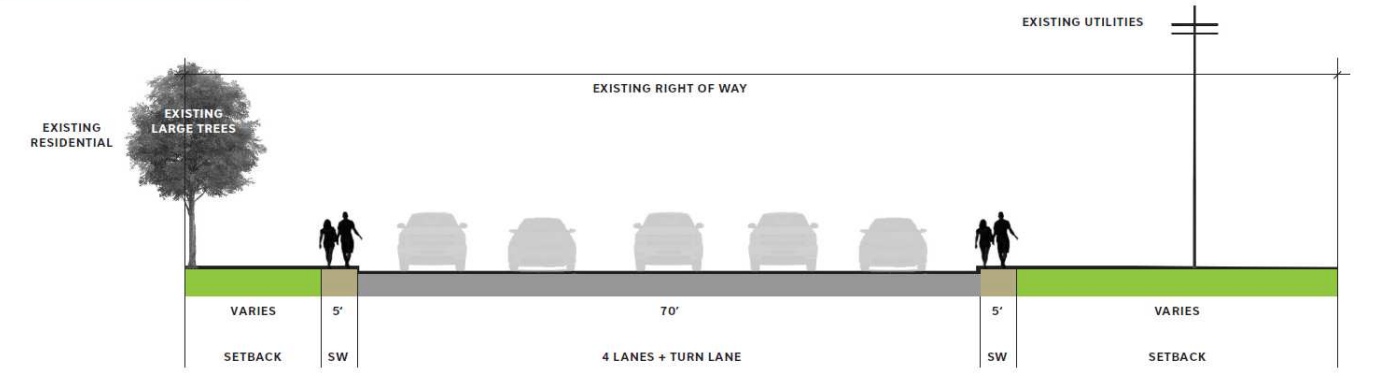


TOWN CENTER CONCEPT



ALL MEASUREMENTS ARE APPROXIMATE AND BASED ON PUBLICLY AVAILABLE DATA

RESIDENTIAL EXISTING



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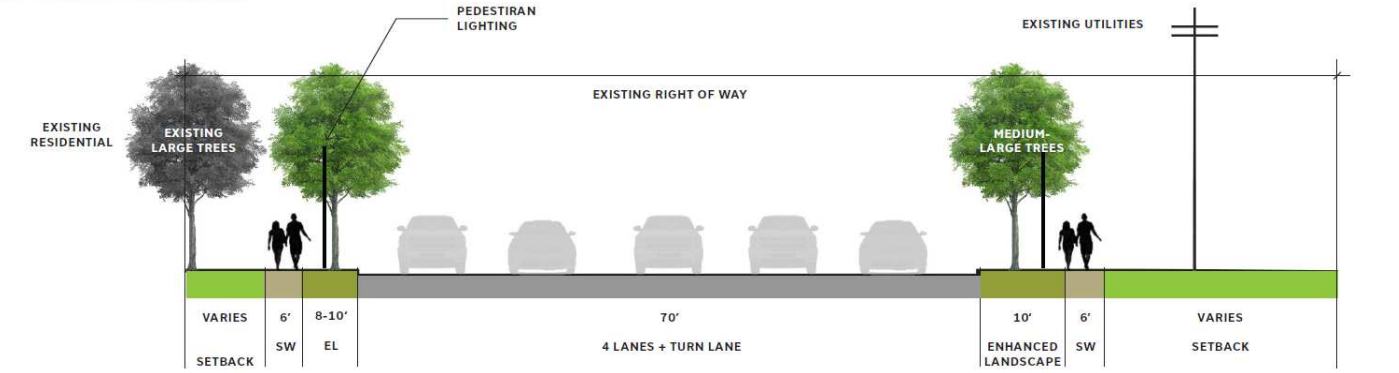

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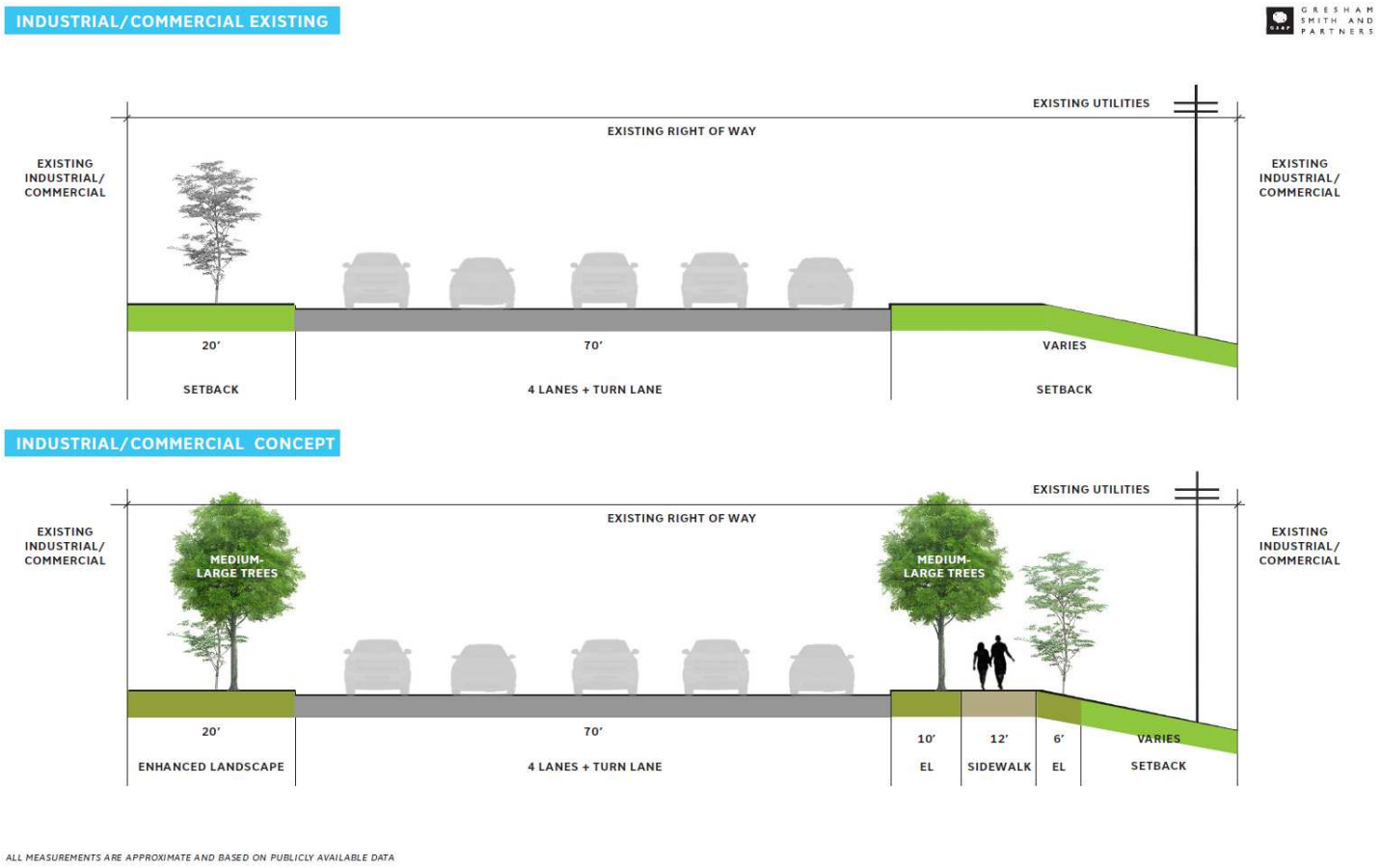

Conclusion

The Marshville-US 74 Corridor Study was first identified as a project to evaluate the corridor for operational and safety improvements in that area and at intersections along the way. A secondary charge was to consider the impact on existing Marshville Boulevard if the proposed Marshville bypass is built. A thorough analysis identified needed improvements in the short and long term for US 74 to sufficiently improve and maintain safety and operation of US 74 until a bypass is funded and built in the long term. Pedestrian and streetscape improvements were also recommended to enhance pedestrian mobility and safety along US 74 as well as its visual environment. This report should serve as the basis for requesting various intersection, sidewalk, streetscape and access management improvement projects through partnerships with the Town of Marshville, Union County, CRTPO and NCDOT.