Nolensville Major Thoroughfare Plan

Adopted: August 9, 2016

Prepared by
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INTRODUCTION

The purpose of this Major Thoroughfare Plan (MTP) is to provide a tool for the Town of Nolensville that helps in the decision making process resulting in informed decisions relative to transportation improvements. Along with providing the Town with an analysis of existing traffic conditions for 2016, this MTP also provides an assessment of expected traffic conditions for the year 2040 based upon anticipated growth within the region, the Town, and the resulting increases in traffic, as projected by the Nashville Area MPO travel demand model. This analysis provides the Town with the necessary data to develop and prioritize road improvements to accommodate forthcoming increases in population growth that will drive increased demand throughout the Town's transportation network.

A broader goal of the MTP is to offer a safe and connected transportation system that will meet the present and future mobility and access needs for the Town of Nolensville to enable it to continue to grow. The following are guiding principles that helped with the development of the MTP:

- Provide an efficient, safe, and connected transportation system that is coordinated with existing and projected needs and takes into consideration future growth.
- Provide a transportation system that is economical and responsive to future land use polices.
- Consider planned development patterns, accessibility, and mobility needs.

Implementing the guiding principles of this MTP and maintaining an acceptable level of mobility for people and goods in the future will require implementation of designated roadway improvements proposed in this document. These proposed improvements will help maintain a desirable level of service (LOS) and help provide an efficient means of transportation throughout Nolensville. The MTP establishes recommendations for roadway improvements, offers an opinion of probable cost their implementation, and provides facility guidelines for Nolensville's transportation system, based on functional classification.

View of a historic marker in the Village along Nolensville Road

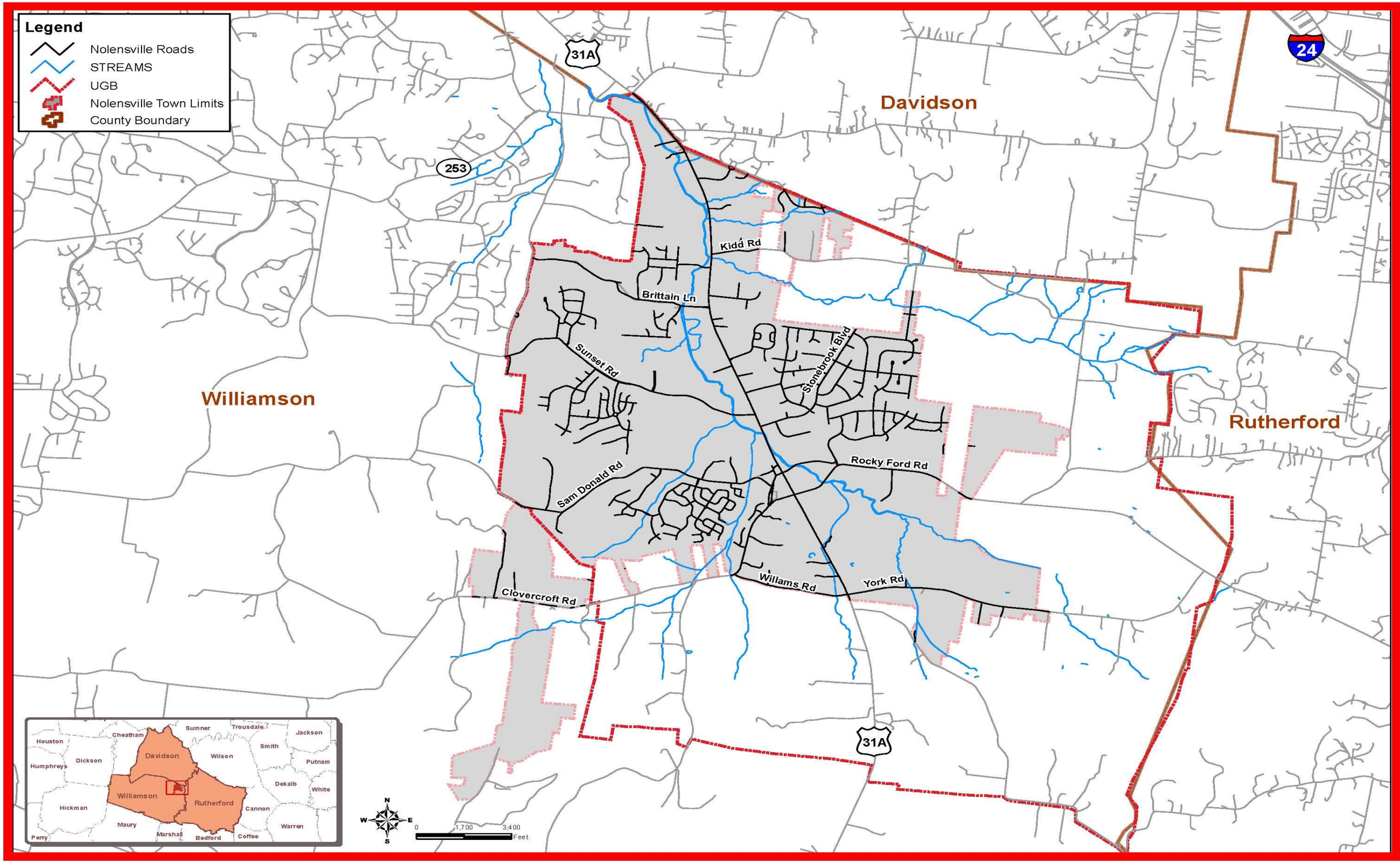
SECTION 1: EXISTING CONDITIONS

This chapter provides an overview of existing conditions within the Town of Nolensville study area. This information is the baseline data that enables Town Staff, the Board of Mayor and Aldermen, the Planning Commission, Town Citizens, the development community, and other stakeholders to better understand the current function of the Town's transportation system and to plan for its future growth. Existing land use, population, employment, and congestion levels have all been evaluated to assess opportunities for improvement to the transportation system for Nolensville residents. A thorough inventory of the current transportation network is a required first step to gauge which future improvements can be recommended by highlighting those areas in need of improvement, deficient traffic conditions, or other inadequacies.

STUDY AREA

The study area for this Major Thoroughfare Plan includes the Town of Nolensville and its urban growth boundary (UGB). The Town of Nolensville is located in the northeast corner of Williamson County and the Town limits border both Davidson and Rutherford Counties. The Town is approximately 14 miles east of Franklin and 18 miles south of downtown Nashville. A Study Area Map is shown in Map 1. Nolensville has an incorporated area of 9.5 square miles inside the Nolensville town limits. US Highway 31-A (Nolensville Road) is the primary north/south route within the Town, forming the spine of the Town and the only Major Arterial. The Town also has a number of Minor Arterial and Collector Streets, which are described in greater detail below, with the rest of the street network functioning as local access roads.

View from along Williams Road



Map 1- Study Area

POPULATION AND EMPLOYMENT

This section highlights current population and employment data obtained from the U.S. Census Bureau, Nashville Area MPO, and the Town of Nolensville. The base year for all population and employment data utilized for this Major Thoroughfare Plan is 2010. The year 2010 is used in order to more closely correlate any transportation improvements with the Nashville Area Metropolitan Planning Organization's Long Range Transportation Plan, which also utilizes 2010 as the base year for planning purposes. However, in any instance where more up-to-date data is available, it is incorporated into both the Existing Conditions and Future Conditions Analyses and Reports included in this Plan.

View of the intersection of Nolensville Road and Clovercroft Road

The data is configured by UGB, Town, and Traffic Analysis Zone (TAZ). TAZs are geographic areas defined by roadways or other physical features and represent land uses and activity centers in each defined area, which help assess and predict existing and future traffic conditions and Levels of Service (LOS). TAZs are described in greater detail later in this Chapter.

Population

Nolensville, due to its location and high quality of life, has experienced rapid growth since incorporation in 1996. The 2010 US Census certified a population of 5,861 persons within the Town of Nolensville. A Special Census, certified by the State of Tennessee Economic and Community Development Department, found a population of 7,936 persons in 2015. This equates to a growth of 2,075 persons in only five years, indicating that the growth of the Nashville MSA is impacting the Town of Nolensville.

The following information focuses on the 2010 Base Year information and is drawn from the U.S. Census Bureau. It is also depicted in Figure 1. Indicative of the youthful make-up of the Town, the 2010 Median Age was 35.1. The racial and ethnic

make-up of the Town is reflective of Williamson County, with a majority of the population constituted by white persons (85%). Asians are the second highest racial category (6.3%), followed by blacks (5.3%). Hispanics constitute a total of 166 persons (2.85) within the Town. In 2010, there were 1,831 households in Nolensville, with 88.9% of those being Family Households. The Average Family Size is 3.42 persons. The owner-occupied rate in the Town is extremely high (96%). While the Homeowner Vacancy Rate is extremely low (2.1%). The Rental Vacancy rate is even lower (1.8%).

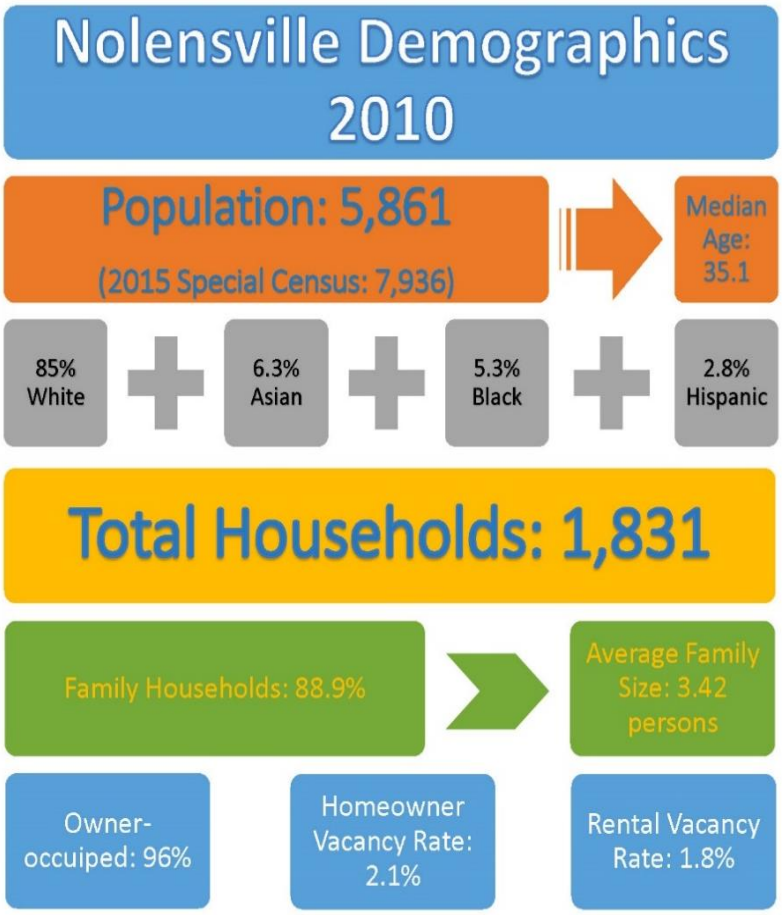


Figure 1: Nolensville Base Year Demographics

Historic population data from the U.S. Census Bureau and Special Censuses illustrate substantial growth that the Town has experienced from 1990 to 2015. As shown in Figure 2, the Town's population more than quintupled between 1990 and 2015. This level of growth puts additional strains on the Town's existing transportation network and presents many challenges as the Town continues to experience growth pressures.

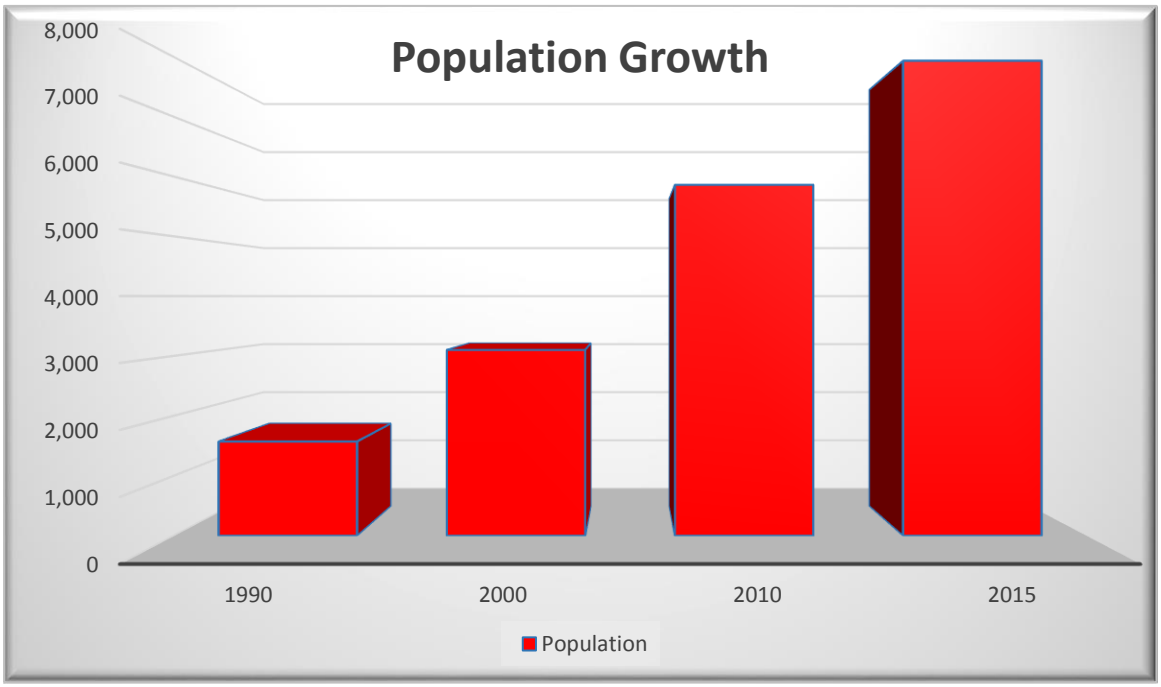


Figure 2: Nolensville Historic Population Growth 1990-2015

Level of Service

The population and employment within the Nolensville area has a significant impact on commuting patterns, travel mode choice, daily traffic volumes, and levels of service (LOS) on area roadways. LOS is a term that is used to describe how well traffic operates on a roadway segment, and is based on the capacity of a roadway and the actual traffic volume for the roadway. LOS is determined by the ratio of a road's volume to capacity. Capacity is defined by the functional class, which is described in greater detail later in this Chapter, and number of lanes on a particular roadway. Volume is the actual number of vehicles on a roadway. LOS utilizes a letter grading system to indicate how well a roadway operates with letters ranging from "A" to "F" – "A" being excellent and "F" failing (see Figure 3). LOS C is generally acceptable for typical roadway function while some communities with larger traffic volumes consider LOS D satisfactory.

Following is a graphic depiction of the Level of Service Concept:

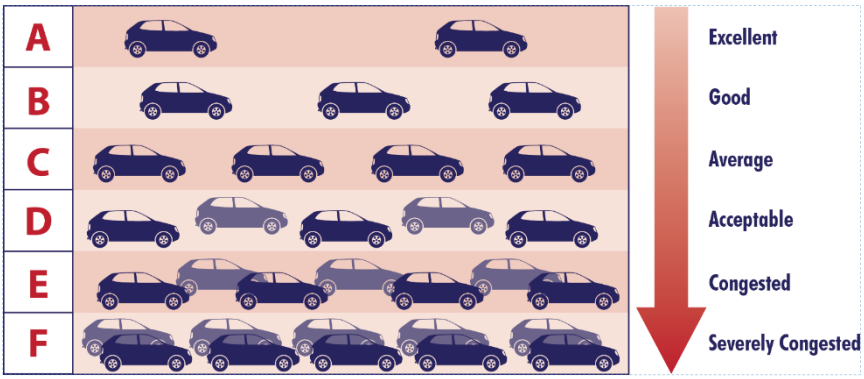


Figure 3: Level of Service

The Highway Capacity Manual generally describes each LOS as follows:

A	Free flow
B	Reasonably free flow
C	Stable flow
D	Approaching unstable flow
E	Unstable flow
F	Forced or breakdown flow

Figure 4: LOS Defined

Evaluating existing population, employment, and commuting characteristics of the Nolensville area reveals information about the demand for transportation throughout the study area and establishes the basis for future traffic flow projections.

Travel Demand Model

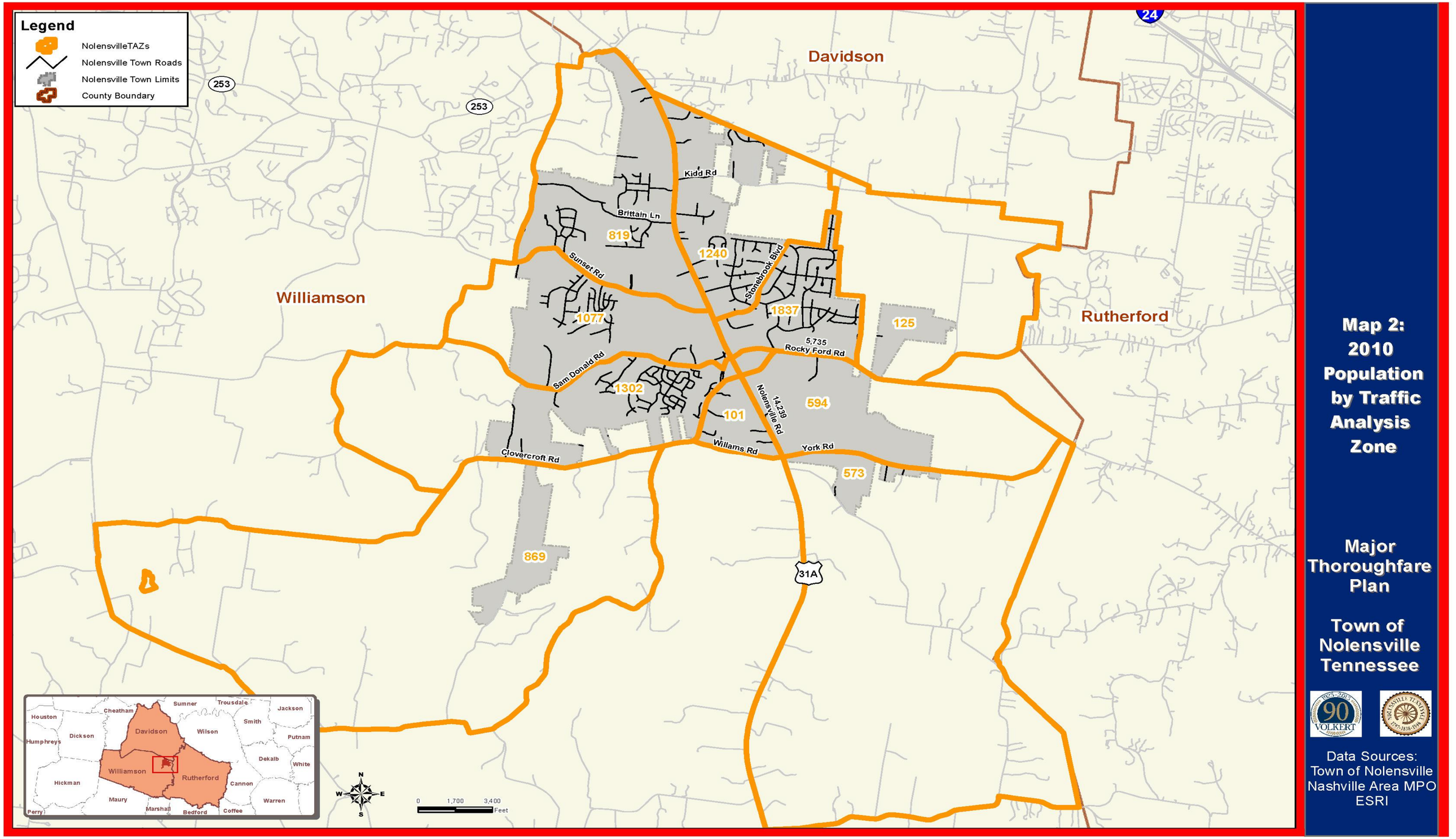
For the purposes of transportation planning, a travel demand model (TDM) is used to provide projected future traffic volumes for a given year (2040 in this case). The TDM utilizes population and employment data as its primary data inputs. The TDM is a tool developed by the Nashville Area Metropolitan Planning Organization (MPO) to model traffic volumes for a 7 county region in Middle Tennessee. The Town of Nolensville falls within the region modeled by the MPO, therefore, the model is used to project future traffic volumes for the study area.

Traffic Analysis Zones (TAZs)

The TDM area is made up of Traffic Analysis Zones or TAZs that the MPO develops for the MPO study area, which includes the Town of Nolensville. The TDM uses the socioeconomic data contained in the TAZs to assess and predict existing and future traffic conditions. Traffic analysis zones are defined by roadways or other physical features and represent land uses and activity centers in each defined area. The MPO relies on the TDM as one of its tools to develop its Long Range Transportation Plan for the region.

TAZ Population

In general, the majority of the population is fairly evenly distributed along each side of Nolensville Road. There are roughly 1,000 more individuals on the eastern side of US 31A, which contains some of the larger and older subdivisions within the Town. Map 2 shows the distribution of the Town population by TAZ.



Map 2 Population by TAZ

EXISTING TRANSPORTATION SYSTEM

In order to produce an accurate depiction of existing and future transportation conditions in the study area, an inventory of the roadways and other transportation facilities was conducted to determine the roadway's classification, number of lanes and lane widths, roadway width, and pedestrian and bicycle facility availability. This information was incorporated into the travel demand model.

The existing transportation facilities in the Nolensville study area are each classified according to the amount of access and mobility the roadway provides, or how it functions. According to the Federal Highway Administration (FHWA), functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide. As land access increases, traffic movement decreases on the lower classified roadways and vice versa – as land access decreases, traffic movement increases along the higher classified roads.

The functional classification of existing facilities is significant because it specifies the desired amount of access control or locations where vehicles can enter or leave a roadway. When there is no access control, intersecting roads or driveways may connect to the main road at any point. Typically, local roads have no access control. With partial control of access, points of access to the main road are more limited. With full control of access, connections are only allowed at major crossroads, such as interchanges along an interstate. Full or partial control of access helps reduce traffic conflicts and allows traffic to move more freely.[1]

Figure 5 shows schematically how various street classifications relate to each other in terms of movement and access. As land access increases, traffic movement decreases on the lower classified roadways and vice versa – as land access decreases, traffic movement increases along the higher classified roads.

[1] http://www.tdot.state.tn.us/sr475/glossary.htm

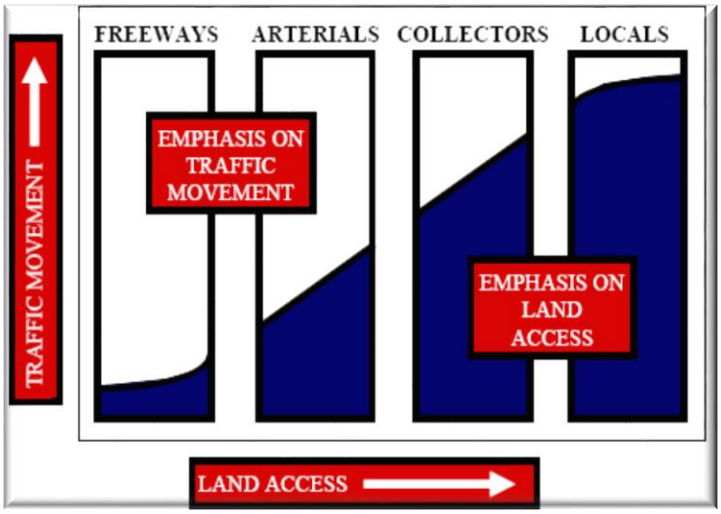


Figure 5: Functional Classification Graphic

Following is a brief description of the three primary functional classes of roadways within the study area.

Major Arterial

A class of roads serving major traffic movements (high-speed, high volume) for travel between major points of interest. Major Arterials emphasize a high level of mobility for through movement. While they may provide access to abutting land, their primary function is to serve traffic moving through the area; therefore arterials require a much higher level of access control than collectors or local streets. **US 31-A (Nolensville Road) is the Major Arterial within this study area.**

Minor Arterial

A class of roads serving larger traffic movements (medium-high-speed, medium-high volume) for travel between points of interest. Minor Arterials emphasize a medium-high level of mobility for through movement. While they may provide access to abutting land, their primary function is to serve traffic moving through the area. Minor arterials require a higher level of access control than collectors or local streets. **Sam Donald Road, York Road, Clovercroft Road, Sunset Road, Rocky Fork Road, and Kidd/McFarlin Road are classified as Minor Arterials within the study area.**

Collector

As the name suggests, collector roadways have the primary purpose of collecting traffic from local roadways and distributing it to its destination or to an arterial roadway. **Collectors offer a compromise between mobility and access. Within the Town-limits, Britain Lane and Williams Road are classified as a collectors. Split Log Road and Fly Road, both roads within the Town's UGB, are also classified as collectors within the study area.**

Local

Local streets are not considered major roadways, as their primary function is to provide direct access to land with little emphasis on the movement of through traffic so are, therefore, not classified. **Any roadways not listed above as a Major Arterial, Minor Arterial, or Collector is classified as a Local Street by this Plan.**

As indicated in Figure 6 below, a functional roadway system facilitates a progressive transition in the flow of traffic from the provision of access to the provision of movement. Interstate (or Freeways) and arterial facilities primarily provide the function of moving vehicles while collector and local streets concentrate more on providing access to property.

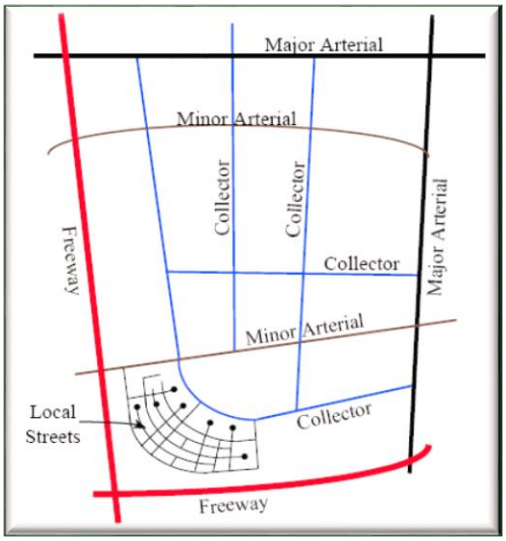


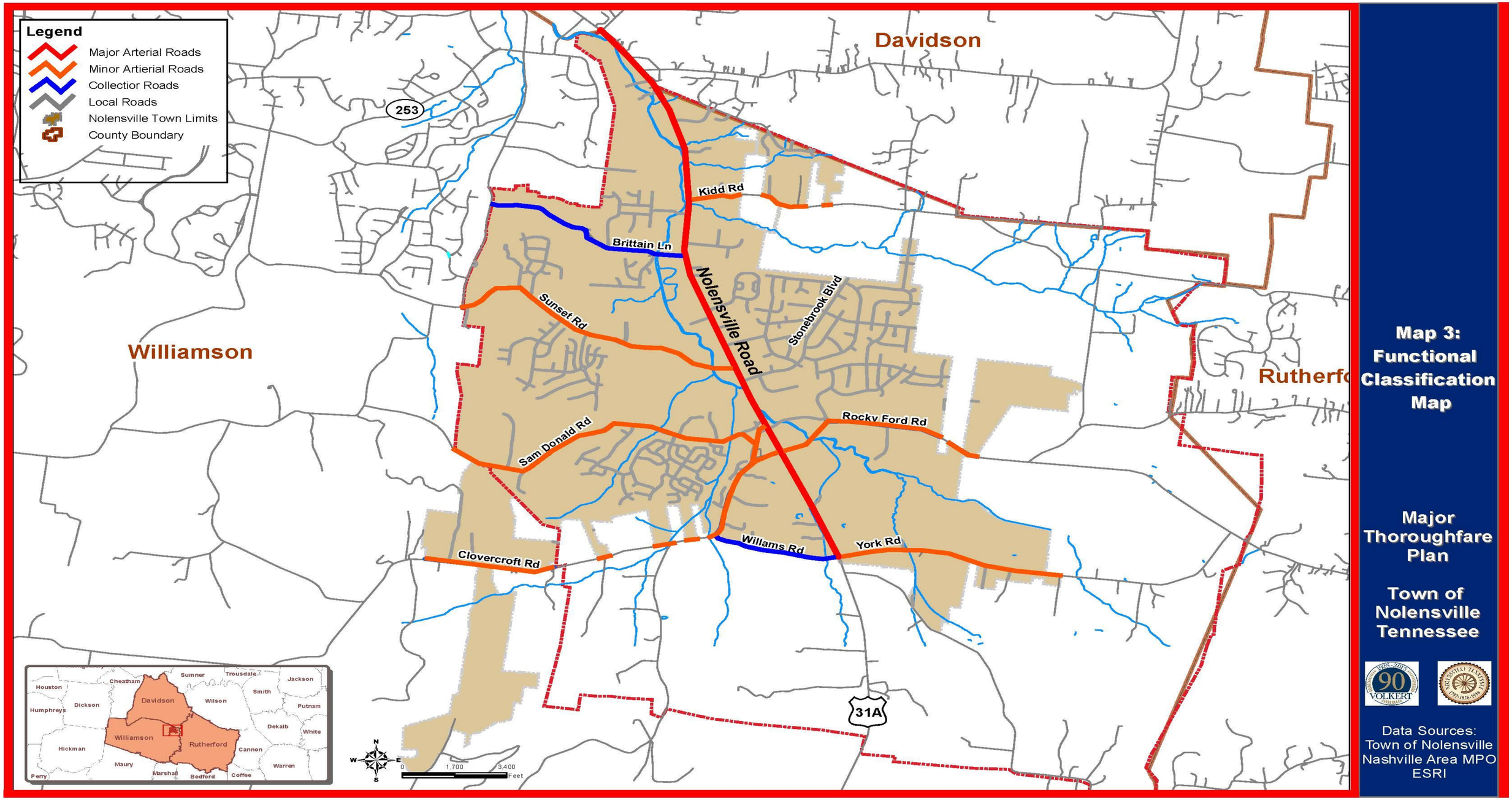
Figure 6: Roadway Functional Class System

Figure 6 depicts a list of the Functionally Classified Roadways with the Town and the Town's Urban Growth Boundary. Map 3, on the following page, shows the functionally classified roadways within the Nolensville Study Area.

Major Arterial	Minor Arterial	Collector
• Nolensville Road	• Clovercroft Road • Kidd Road • Rocky Fork Road • Sam Donald Road • Sunset Road • York Road	• Baronswood Drive • Maxwell Lane/ Britain Lane • Stonebrook Boulevard • Williams Road • Burke Hollow Road* • Fly Road* • Rocky Springs Road* • Sanford Road* • Split Log Road*

**Road is entirely within the Town's Urban Growth Boundary*

Figure 7: List of Functionally Classified Roadways



Map 3 Functional Classification Map

Current Annual Average Daily Traffic Volumes (AADT)

The current Annual Average Daily Traffic (AADT) volumes for roadways within the study area were gathered from annual counts conducted by TDOT. There are 2 TDOT count stations located within the Nolensville Study Area: one is located on Nolensville Road, just south of the intersection with Stonebrook Boulevard at Mill Creek and the other is located on Rocky Fork Road, just east of Nolensville Elementary School. Figure 8 is a map from the TDOT website and shows the locations of the traffic count stations. Figure 9 shows the traffic counts from 2010-2014. As demonstrated by the traffic counts at these two locations, traffic has continued to increase as a result of a growing population and employment base.

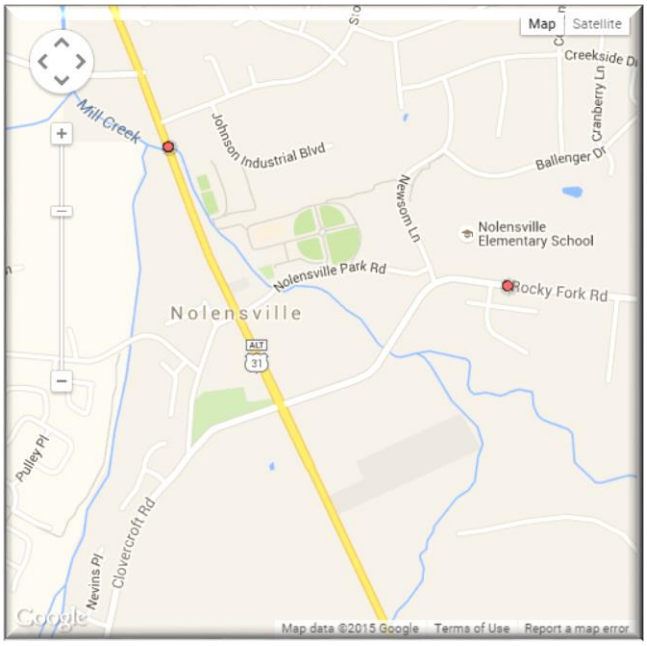


Figure 8: TDOT Map of Traffic Counts Stations

Nolensville Road Station 000051 Traffic Counts	
2014	14,239
2013	12,402
2012	10,487
2011	11,300
2010	10,495

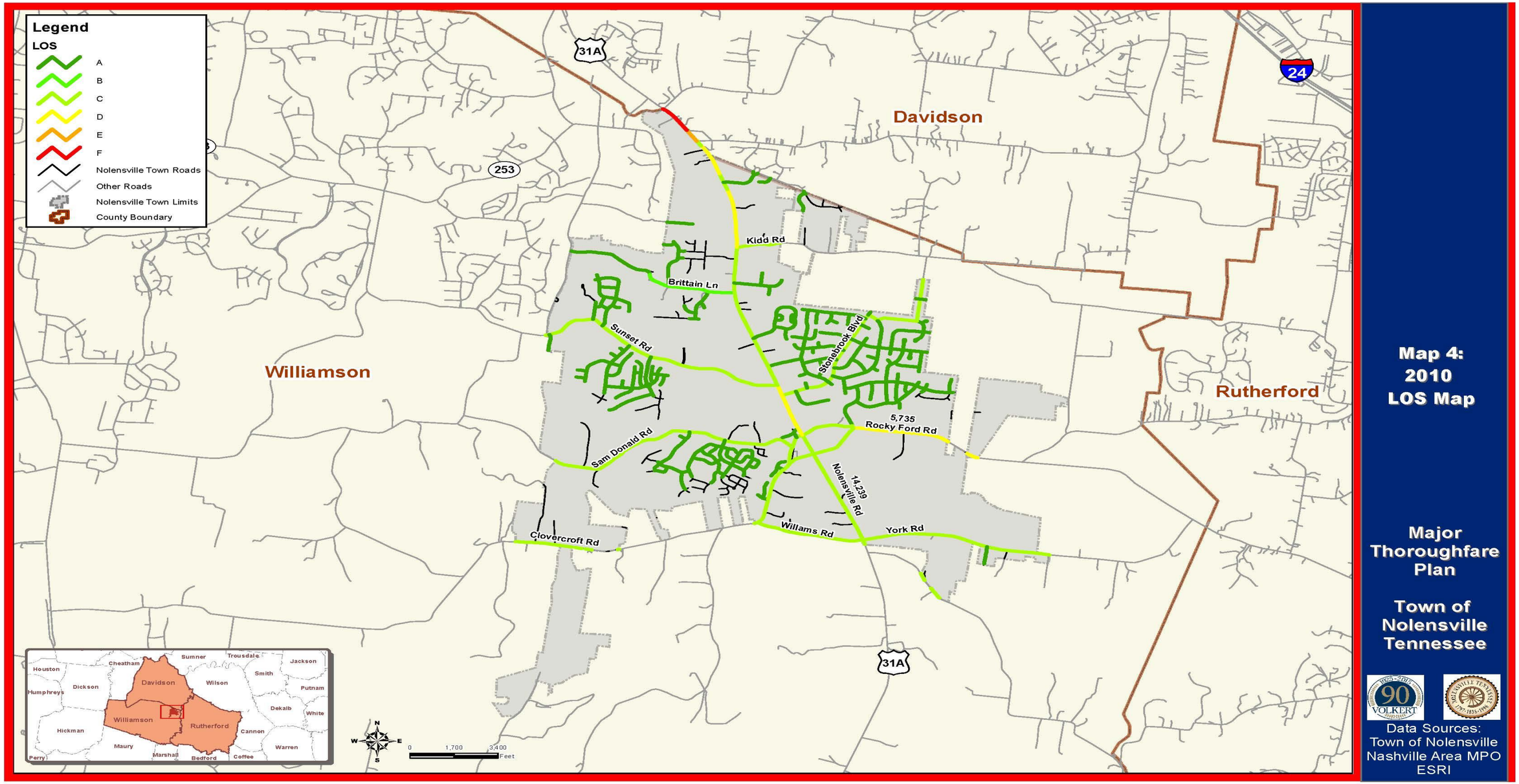
Rocky Fork Road Station 000052 Traffic Counts	
2014	5,735
2013	5,958
2012	5,361
2011	4,472
2010	4,870

Figure 9: Study Area Traffic Counts Stations

Existing Transportation System Capacity

In order to determine the 2010 LOS, the Nashville Area MPO travel demand model was utilized. The 2010 base year Levels of Service for Nolensville are displayed in Map 4. Map 4 reveals that 2010 peak hour roadway conditions result in the majority of corridors operating at LOS C or better. Peak hour volume represents traffic conditions during the traditional rush hour periods from 6 to 9 A.M. and 3 to 6 P.M. Only a small percent of the study area network operates at LOS D or worse, with these locations being located on several blocks of Nolensville Road. Nolensville Road operates at LOS D north of Kidd Road and between Rocky Fork Road and Stonebrook Road. Rocky Fork Road from Nolensville Road through the Town-limits also operates at a LOS D. A segment of Nolensville Road at the north end of the Town-limits operates at a LOS F.

While other roads within the Town may experience intermittent congestion, the MPO data indicates that they operate at LOS C or better. It should be noted that the Map 4: 2010 LOS, as shown on the following page, depicts the worst case scenario of the AM and PM peak hour roadway conditions.



Map 4 2010 LOS Map

Existing Transportation Plans and Other Town Growth Guidelines

To get a complete picture of Nolensville's existing transportation system, it was necessary to review the Town's previous Major Thoroughfare Plans, the Land Use Plan, current development regulations, recently approved developments, as well as other pertinent information. This information was also reflected in the travel demand model.

Existing Pedestrian Facilities and Bicycle Facilities

Existing pedestrian and bicycle facilities, such as sidewalks and paved trails, are currently limited throughout the Town of Nolensville. There are sidewalk and trail facilities provided in several of the new residential subdivisions. A further refinement and additional planning efforts are recommended in order to allow the Town to plan for a full array of multimodal transportation options for citizens, business owners, and stakeholders within Nolensville.

LAND USE

Coordinating land use and transportation decisions is important to meeting the Town of Nolensville's access and mobility needs. Future roadway extensions, new alignments, and the location and design of major intersections influence future development patterns across the Town. For this reason, it is important to coordinate transportation improvements with desired land use patterns to ensure the efficient use of infrastructure such as roads, bridges, and municipal services while reducing the impact on the environment.

Thoroughfare planning aims to ensure the orderly and progressive development of roadways to serve mobility and access needs, but is also critical to future land use, housing, the environment, and public utilities management. Roadway functional classifications and design and access management strategies must all be geared toward the prospective development to be served. Likewise,

View of construction in the Summerlyn Subdivision, with the new Nolensville High School in the background

types of land uses and their intensity impact traffic demands and patterns. By integrating land use and transportation planning, decision makers take a holistic approach to development by considering its effects on residents' quality of life, the transportation network, and the economy as a whole. With better access and less congestion, an efficient transportation system can decrease traffic noise, improve mobility, and create more jobs. With the help of this Major Thoroughfare Plan along with other development tools, such as the Town's *Subdivision Regulations*, *Zoning Ordinance*, and *Land Use Plan*, this plan can shape development patterns and influence the natural environment to improve the economy and the quality of life for Nolensville residents.

Existing Land Use Plan

Land use and growth patterns within the Nolensville UGB have played an integral role in the demand for and development of the Nolensville transportation system. The adopted Land Use Plan guides all land use and zoning policy decisions for the Town of Nolensville and is included in this report in order to better link transportation and land use decisions for the Town. Figure 10 is a map of the Town's Land Use Plan.

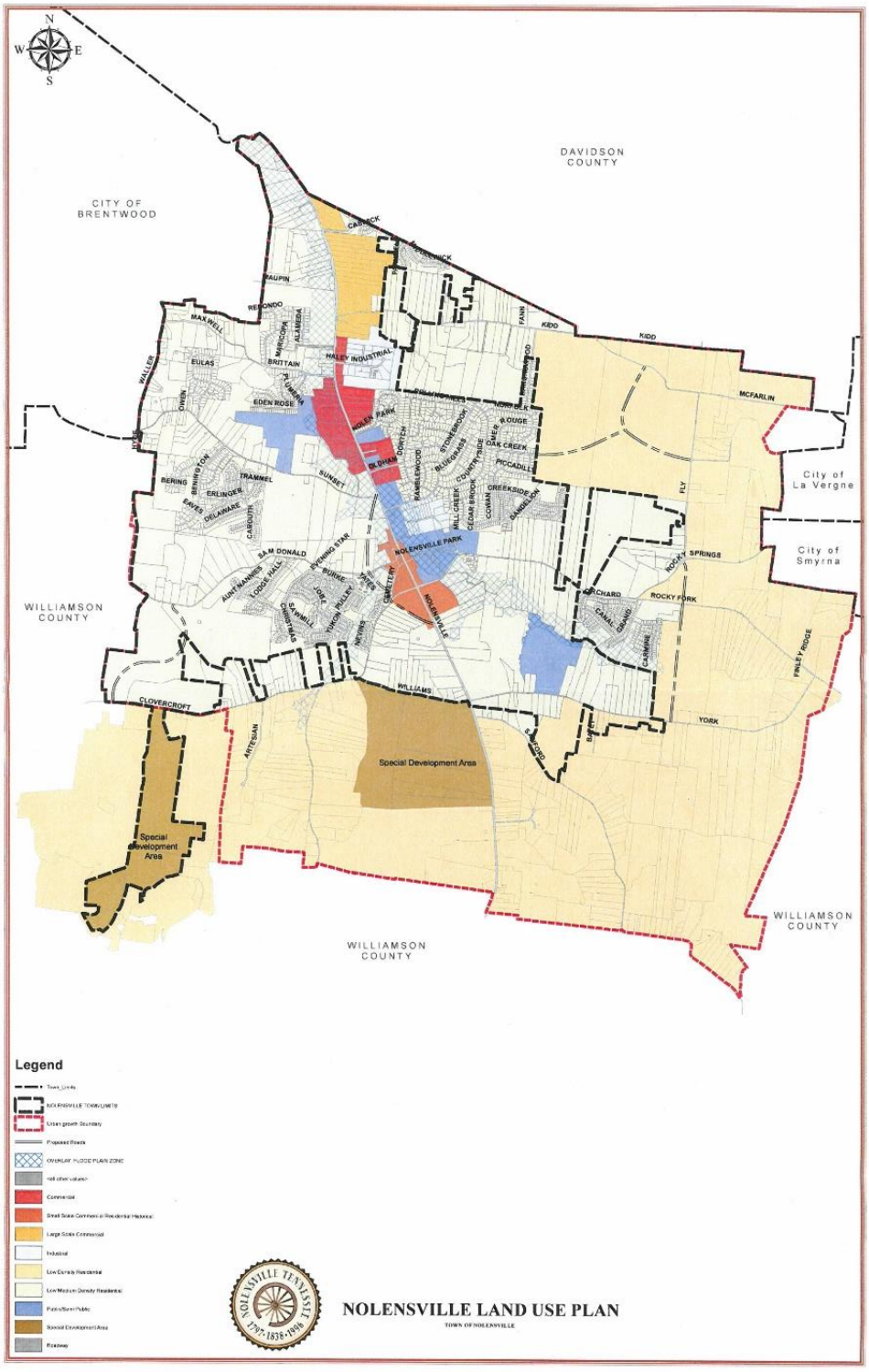


Figure 10: Nolensville Land Use Plan Map

CONCLUSION

In order to prepare for future growth in the Nolensville area, the condition of the existing transportation system has been analyzed to determine areas in need of improvement and assess potential impacts from features such as land use, population, employment, and the condition of transportation infrastructure. In Chapter 2 projected traffic volumes will be analyzed to complete the picture of the transportation systems' needs. It is through an in-depth understanding of the Town's current and existing conditions that a more complete view of the needed improvements to Nolensville's transportation network can be reached.

View of Nolensville Road near the Clovercroft Road / Rocky Fork Road Intersection

SECTION 2: FUTURE CONDITIONS

In order to identify the future transportation needs of the Town, it is necessary to analyze projected traffic volumes in comparison with the ability of the roadways to handle projected traffic. This analysis will not only indicate roads with potential congestion issues, it also identifies corridors where additional facilities and connections could benefit the overall network. In order to accomplish this, 2040 traffic projections from the Nashville Area MPO travel demand model for the region are utilized.

View of Nolensville Road and Sunset Road intersection

Projected population and employment data for 2040 is based on the information detailed in the Existing Conditions Chapter, projections established by the MPO, and supplemented by the growth policies outlined within the Town's *Land Use Plan*.

This information is utilized along with planned roadway improvements within the study area to provide the Existing plus Committed (E+C) transportation network. The E+C transportation network utilizes the projected population and employment data and roadway improvement projects that are currently funded for construction, and assigns projected traffic volumes to the various roadways in the Town. This process is explained in more detail later in this chapter. Roadway segments that are projected to be congested in 2040 (LOS D or lower) are identified and highlight. These areas within the network that will in need

improvement. Specific improvements to address the area's anticipated transportation deficiencies are discussed in the Recommendations chapter.

NASHVILLE AREA METROPOLITAN PLANNING ORGANIZATION (MPO)

The Nashville area Metropolitan Planning Organization (MPO) is a regional transportation planning organization that serves 7 counties within the Middle Tennessee region, including Williamson County and the Town of Nolensville. The MPO is responsible for the distribution and supervision of federal and state funding for transportation projects in the Nashville region. The MPO maintains a Regional Transportation Plan (RTP), a 25-year multi-modal transportation vision that helps guide the investment of public funds in transportation projects to manage congestion and increase regional mobility options. The MPO's current RTP, adopted in 2010 and amended in 2011 & 2012, extends through the year 2035. The MPO will soon adopt the 2040 RTP. This Plan, and particularly the Recommendations chapter, will be key to ensuring that the Town of Nolensville's priority projects are consistent with the goals and objectives of the MPO while identifying strategies to best prepare the Town for anticipated growth.

View of Street Signs at Nolensville Road and Nolensville Park Road intersection

The MPO also maintains a Transportation Improvement Program (TIP), which consists of projects for which funding has already been allocated. The current TIP identifies projects that are programmed for the years 2014 through 2017.

Projects included in the TIP are typically the most immediate projects to be completed and can include vehicular, pedestrian, and transit improvements.

There is currently only one project in the TIP for the Town of Nolensville. Figure 11 shows the project. This improvement project is the "committed" transportation improvement of the "Existing plus Committed" transportation network discussed later in this chapter.

Figure 11: MPO TIP Projects

TIP PROJECT	LENGTH	LENGTH	DESCRIPTION
Small Town Connections/Greenway	Off-road facility between Nolensville Park Road, Nolensville Road, & Stonebrook Boulevard	0.81 miles	Trail plus a pedestrian bridge 65-85 foot in length crossing Mill Creek to parking lot/trailhead.

View of the crosswalk in the Village along Nolensville Road

NASHVILLE AREA METROPOLITAN PLANNING ORGANIZATION

Transportation Improvement Program for FYs 2014-2017

Project Name	**Small Town Connections**			**TIP #**	2012-66-187
Improvement Type	Greenway			**Lead Agency**	Nolensville
County	Williamson County	**Length**	0.80	**Regional Plan ID**	1086-601
Air Quality Status	Exempt	**TDOT PIN**	117347.00	**Project Cost**	$620,000.00
Route	Small Town Connections				
Location	Off road facility between Nolensville Park Road, Nolensville Rd and Stonebrook Blvd				
Project Description	The project consists of 4,270 linear feet of asphalt trail plus a pedestrian bridge 65-85 foot in length crossing Mill Creek to a paved parking lot/trailhead.				

Fiscal Year	Type of Work	Funding Type	Total Funds	Federal Funds	State Funds	Local funds
2014	PE-D, ROW, CONSTRUCTION	U-STP	$586,250.00	$469,000.00	$0.00	$117,250.00

REVISION HISTORY

PROJECT NOTES

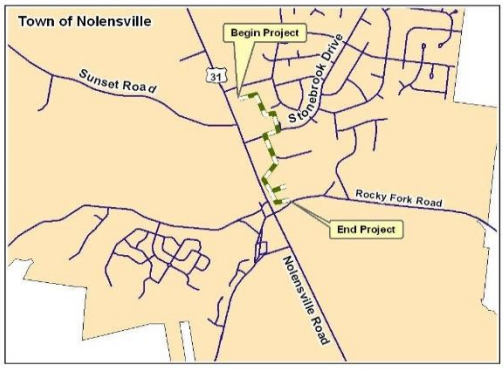


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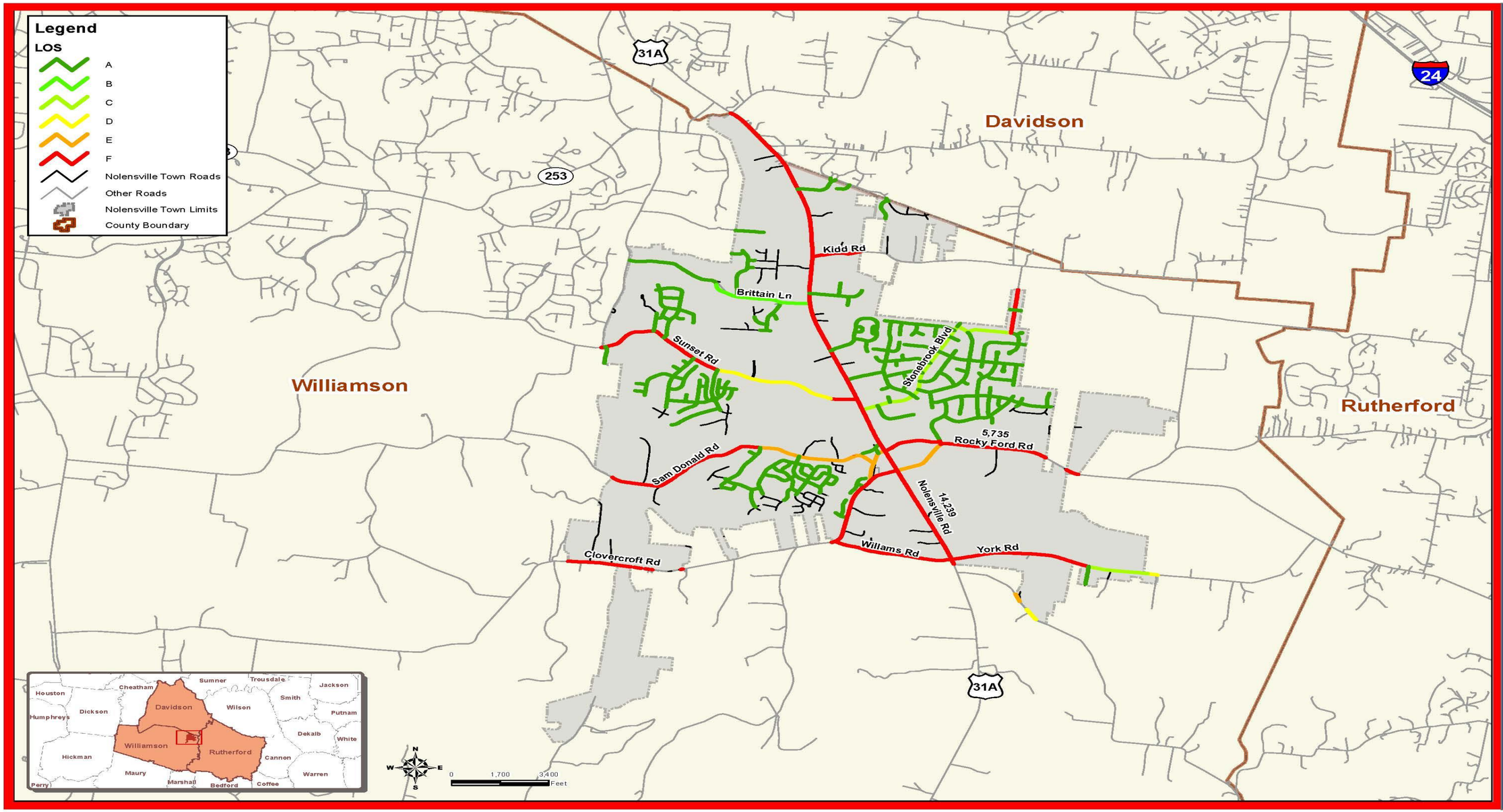
Figure 12: Greenway TIP Project in Nolensville

EXISTING PLUS COMMITTED (E+C) TRANSPORTATION NETWORK

The Existing plus Committed (E+C) transportation network for the year 2040 was generated using the MPO travel demand model as a basis. The travel demand model used the projected socio-economic data for the year 2040 to produce trip forecasts and estimate traffic conditions in the study area for the year 2040. The E+C network analysis is based on the completion of the committed projects listed in Table 3.1 in addition to the existing roadway network and does not account for any other road or transportation improvements.

The results of the E+C travel demand model analysis are presented in Map 5, which shows the expected Level of Service (LOS) for the 2040 E+C network . As shown, traffic operations in the study area are expected to deteriorate through the planning horizon year of 2040, with traffic operations falling below acceptable levels during the peak hours on several segments of the area's major roadways. Poor peak hour LOS (LOS D, E, and F shown in the dark orange and red colors) can be expected on segments of Nolensville Road, Kidd Road, Sunset Road, Sam Donald Road, Rocky Ford Road, Clovercroft Road, Williams Road, and York Road. This would indicate a potential need for capacity-adding projects in the future for these roads.



Map : 2040 LOS Map

Major Thoroughfare Plan

Town of Nolensville Tennessee

Data Sources:
Town of Nolensville
Nashville Area MPO
ESRI

Map 5- 2040 LOS Map

Table 2 shows the length of road miles by LOS for the 2010 network and the E+C 2040 network. As shown the number of road miles operating at or below LOS D will increase dramatically. For example, in 2010, there is less than three-tenths of a road mile operating at LOS F, but by 2040, the amount balloons to more than 15 miles. In effect, the roads operating at LOS C degrade to LOS F, with little other changes in roads operating at LOS A or B. These results show that traffic operations on the roadways within the study area, are expected to significantly deteriorate unless additional roadway improvements are made.

Figure 13 LOS Comparison 2010 and 2040 (in miles)

LOS	Base Year 2010	E+C Year 2040
A	25.52	25.52
B	0.69	0.69
C	17.91	1.83
D	2.64	1.41
E	0.12	2.02
F	0.26	15.67

PROJECTED DAILY TRAFFIC VOLUMES FOR THE EXISTING PLUS COMMITTED (E+C) TRANSPORTATION NETWORK

The existing roadway system plus the committed project listed in Table 3.1 represent the existing plus committed roadway network for the year 2040. LOS for the existing plus committed transportation system were obtained using the travel demand model results from the MPO. The model produces estimated LOS, based on projected vehicle productions and attractions to and from the TAZs within the study area. The projected daily LOS for the existing plus committed transportation system are shown in **Map 5.**

Analysis of the E+C transportation network indicates that completion of the committed projects will not be enough to maintain acceptable traffic operations on the area's roadways in the year 2040. Additional improvements will be

needed to address the area's anticipated transportation deficiencies. Specific improvements to address these deficiencies are discussed in detail in the Recommendations chapter.

CONCLUSION

Thorough analysis of the 2040 Existing plus Committed (E+C) transportation network reveals the need for future transportation improvements in the Nolensville study area. Projected population and employment data along with planned roadway improvements from the Nashville Area MPO's Transportation Improvement Program make up the committed network and reveal future Levels of Service (LOS) on area roadways that are below an acceptable level. The increases in projected traffic are largely the result of a growing and vibrant community within the rapidly growing Nashville metropolitan region.

The Nolensville Study Area in 2040 will experience significant roadway congestion according to the MPO model. The roadways that currently operate at LOS C will become increasingly congested and move to LOS E and F. These increases are significant and result in increased pressures and demands on the roadway network in the Nolensville study area. Specific improvements to address the area's anticipated transportation deficiencies are discussed in the Recommendations chapter.

View looking South along Nolensville Road

SECTION 3: RECOMMENDATIONS

This section takes the information gathered in the Existing and Future Conditions sections of this Plan and uses that information to establish the transportation network projects recommended for the Town in order to improve the coming growth and congestion. In order to identify the future transportation needs of the Town, it is necessary to analyze projected LOS. The proposed projects included in this section are meant to address transportation related deficiencies in the Nolensville Study Area by providing safe, interconnected, and efficient traffic operations. The recommended projects are based on connectivity and congestion relief, focusing on providing a balanced transportation system for the Town through the year 2040.

View of the Town Limit sign along the Northern Town Limits

Analysis of existing conditions and the projected Existing plus Committed (E+C) network helped determine specific improvements to address the area's anticipated transportation deficiencies, resulting in an Existing plus Committed plus Improved (E+C+I) transportation network. The E+C+I network consists of the existing roadway network, plus the completion of the committed project (see the E+C analysis in the Future Conditions Section), plus the completion of the proposed projects (Figure 15 and Map 6). A planning level opinions of probable cost and potential funding sources have also been identified.

RECOMMENDED IMPROVEMENTS

This Plan includes 24 roadway projects that consist of reconstruction and widening of existing routes, re-alignments, and new roads that provide connectivity and offer congestion relief to the existing network. While the total cost of these improvements might seem overwhelming at first, it should be

noted that transportation funding and budgeting will not be the sole responsibility of the Town. Both federal and state monies, as well as impact fees, related to development and redevelopment, will be available to help the Town build out these recommended projects. A list of funding sources is also included within this section. The list of recommended improvements is identified in Figure 14 and illustrated on Map 6.

An opinion of probable cost was also prepared for each of the projects to assist in long range budget / capital improvement project planning. The opinion of probable cost for each recommended project was developed using TDOT's planning level cost estimating methodology, which adds the cost of Right of Way (ROW) to the cost of construction. Volkert used this methodology and modified it based on the difference in ROW costs of new alignments versus reconstruction/widening projects. The base per mile ROW cost was estimated to be $1,180,000 for roads on new alignments and $400,000 for reconstruction/widening on existing alignments. The base per mile construction cost was estimated to be $6,200,000 for state routes and $4,650,000 for non-state routes. The cost of ROW is figured by multiplying the ROW cost per mile, area factor, and distance of the recommended improvement. The construction cost is determined by multiplying the construction cost per mile, terrain factor, construction factor, and distance, resulting in the formula below (note: Preliminary Engineering is included, which is assumed to be 10% of construction cost):

(ROW Cost per Mile x Area Factor x Distance) + (Construction Cost per Mile x Terrain Factor x Construction Factor x Distance) = Opinion of Probable Cost

The construction factor is based on the number of lanes that will need to be built, while the terrain factor adjusts the costs of construction based on the topography of the location. For example, the factor is higher for rugged terrain, since it is more costly to develop on steep topography.

It is important to note that the opinion of probable cost estimates are subject to change based on the many variables involved in calculating project costs.

Finally, the 2040 travel demand model assumes certain natural increases in traffic resulting from factors such as increases in population, employment, and commuter traffic. The travel demand model also assumes that all proposed roadways will be built by the year 2040. However, constructing all improvements may not occur as presented in this plan; therefore, the model represents the best case scenario in terms of LOS improvements.

In addition to the roadway projects, the following intersections have been identified as needing additional study to assess their LOS and safety related issues. These intersection-specific studies may result in new signalization, modifications to existing signals, addition of turn lanes, modifications to existing turn lanes, and/or reconstruction/realignment of intersections (among other strategies). It should be noted that the proposed projects listed above and shown on the Major Thoroughfare Plan Recommended Project Map are conceptual in nature. The Town Staff, Planning Commission, and Board of Mayor and Aldermen will review each individual project at the time it is either proposed by a property owner/developer or by the Town through the Capital Improvements Budget process.

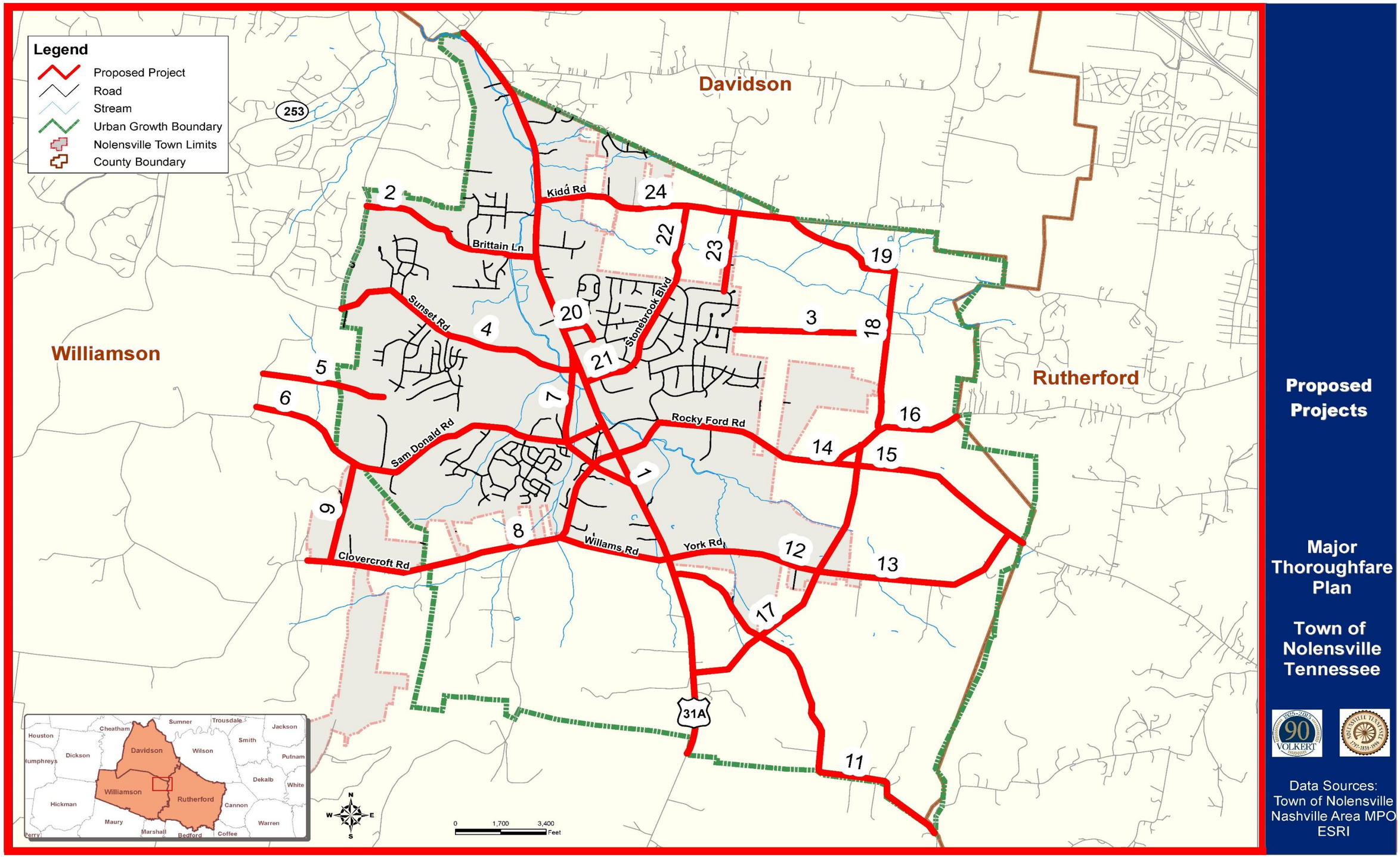
Figure 14 Intersections to be Studied

Intersections to be Studied
Sunset Road at Split Log Road
Sunset Road at Nolensville Road
Sam Donald Road at Old Clovercroft Road
Clovercroft Road at Old Clovercroft Road
Clovercroft Road at Williams Road
Clovercroft Road at Burke Hollow Road
Nolensville Road at Williams Road and York Road
Nolensville Road at Old Clovercroft Road and Nolensville Road
Kidd Road at Baronswood Drive
Kidd Road at McFarlin Road

PROJECT ID NUMBER	STREET	TERMINI	PROPOSED IMPROVEMENT	OPINION OF PROBABLE COST	OPINION OF PROBABLE COST WITH BICYCLE / PEDESTRIAN NETWORK
1	**Nolensville Road**	**Davidson Co. to southern UGB**	Construct improved 2 lane typical section	**$39,660,000**	**$40,770,000**
2	**Maxwell Lane / Britain Lane**	**UGB to Nolensville Road**	Construct improved 2 lane typical section	**$7,100,000**	**$7,350,000**
3	**Oak Creek Drive Extension** *(Eastern E-W Connector)*	**Oak Creek Drive termini to Fly Road**	Extend Oak Creek Drive as a 2 lane collector	**$7,480,000**	**$7,690,000**
4	**Sunset Road**	**UGB to Nolensville Road**	Widen to a 3 lane typical section	**$12,420,000**	**$12,780,000**
5	**Benington Place Extension** *(Western E-W Connector)*	**Benington Place termini to Split Log Road**	Extend Benington Place as a 2 lane collector	**$2,040,000**	**$2,090,000**
6	**Sam Donald Road**	**UGB to Nolensville Road (through Sam Donald Court)**	Widen to a 3 lane typical section	**$15,010,000**	**$15,420,000**
7	**Alternative Alignment of Highway 31-A (A 31-A)** *(Central N-S Connector)*	**.3 miles south of Rocky Fork Rd. to Oldham Dr.**	Construct alternative alignment Highway 31-A to include 4 lane median divided Major Arterial	**$12,170,000**	**$12,420,000**
8	**Clovercroft Road**	**Town Limits to Nolensville Road**	Widen to a 3 lane typical section	**$18,590,000**	**$19,090,000**
9	**Clovercroft to Sam Donald Connector** *(Western N-S Connector)*	**Unnamed Road /drive off of Clovercroft terminus to Sam Donald Road**	Construct improved 2 lane typical section	**$4,370,000**	**$4,520,000**
10	**Willams Road**	**Clovercroft Road to Nolensville Road**	Widen to a 3 lane typical section	**$5,720,000**	**$5,870,000**
11	**Sanford Road**	**Nolensville Road to UGB**	Construct improved 2 lane typical section	**$16,930,000**	**$17,530,000**
12	**York Road**	**Nolensville Road to Batey Road**	Widen to a 3 lane typical section	**$7,860,000**	**$8,070,000**
13	**York Road**	**Batey Road to Rocky Fork Road**	Construct improved 2 lane typical section	**$8,190,000**	**$8,480,000**
14	**Rocky Fork Road**	**Nolensville Road to Rocky Springs Road**	Widen to a 4 lane typical section	**$14,650,000**	**$15,020,000**
15	**Rocky Fork Road**	**Rocky Springs Road to Rutherford Co.**	Widen to a 4 lane typical section	**$10,800,000**	**$11,060,000**
16	**Rocky Springs Road**	**Rocky Fork Road to Rutherford Co.**	Widen to a 4 lane median divided typical section	**$7,710,000**	**$7,900,000**
17	**Rocky Springs Road / Carmine Street Extension** *(Eastern N-S Connector)*	**Carmine Street terminus to Nolensville Road**	Extend Grand Street as a 2 lane collector	**$15,650,000**	**$16,090,000**
18	**Fly Road**	**Rocky Springs Road to McFarlin Road**	Construct improved 2 lane typical section	**$6,000,000**	**$6,230,000**
19	**McFarlin Road**	**Kidd Road to Fly Road**	Construct improved 2 lane typical section	**$4,910,000**	**$5,090,000**
20	**Sheldon Valley Drive Extension** *(Town Center Connection)*	**Connect termini of Sheldon Valley Drive to Oldham Drive**	Extend Sheldon Valley Drive as a 2 lane collector	**$2,150,000**	**$2,210,000**
21	**Stonebrook Boulevard**	**Nolensville Road to Stonebrook Boulevard termini**	Construct improved 2 lane typical section	**$9,220,000**	**$9,530,000**
22	**Stonebrook Boulevard Extension** *(Eastern N-S Connector)*	**Stonebrook Boulevard termini to Kidd Road**	Extend Stonebrook Boulevard as a 2 lane collector	**$4,080,000**	**$4,190,000**
23	**Baronswood Drive**	**Norfolk Lane to Kidd Road**	Construct improved 2 lane typical section	**$3,270,000**	**$3,390,000**
24	**Kidd Road / Battle Road**	**Nolensville Road to Davidson Co.**	Widen to a 3 lane typical section	**$12,870,000**	**$13,210,000**

* Note: The proposed projects listed above and shown on the Major Thoroughfare Plan Recommended Project Map are conceptual in nature. The Town Staff, Planning Commission, and Board of Mayor and Aldermen will review each individual project at the time it is either proposed by a property owner/developer or by the Town through the Capital Improvements Budget process.

Figure 15 2016 MTP Recommended Projects



Map 6: Proposed Projects

FUNDING SOURCES

A transportation project is typically funded from a combination of federal, state, and local funding. There are four primary elements to transportation funding: (1) Federal transportation funding comes primarily from the Highway Trust Fund; (2) State funding comes primarily from gasoline and motor fuel taxes, as well as motor vehicle registration fees; (3) local funding sources that could potentially supply revenue for the roadway recommendations come from the issuance of bonds or tax levies, such as property tax; and (4) impact fees from private developments. This four-part partnership is shown in Figure 16. A description of various potential sources of budgetary funds for the roadway recommendations is provided below.

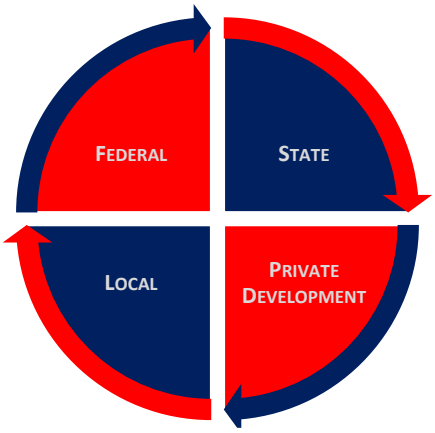


Figure 16: Funding for transportation is a four-part partnership.

FEDERAL FUNDING SOURCES

Federal funding is available from the Highway Trust Fund, which was established by the Highway Revenue Act of 1956 during the development of the interstate highway system. Motor fuel taxes imposed by the Federal Government provide for the Highway Trust Fund. Highway Trust Fund allocations to transportation projects are administered by the U.S. Department of Transportation through the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA).

National Highway System (NHS)
NHS funds provide funding for rural and urban roads and highways, including the interstate highway system, international border crossings, intelligent transportation system capital improvements, expressways, and connections to major multimodal terminals that are of national significance. These funds may be used for all types of transportation improvements including construction,

reconstruction, operational improvements, and planning. NHS has an 80 percent federal funding ratio, except when funds are used for interstate projects to add high occupancy vehicle or auxiliary lanes, in which case, the federal funding ratio may be 90 percent. The State of Tennessee covers the remaining proportion.

Surface Transportation Program (STP)
STP funds provide funding for projects on functionally classified roadways, including the NHS, bridge projects on any public road, transit capital projects, and bus terminals and facilities. STP funds can also be used to fund ridesharing, ITS, bikeway, and sidewalk programs. A portion of funds reserved for rural areas may be spent on rural minor collectors. STP is funded 80 percent federally and 20 percent by either the State of Tennessee or local funds.

Bridge Replacement & Rehabilitation Program (BRR)
BRR funds provide funding for the rehabilitation and replacement of any public road bridge that exceed 20-feet in length. The BRR does not currently provide funding for bridge repair. Tennessee prioritizes bridge projects based on a point system using the following criteria: two axle load limit 45 percent, ADT 40 percent, functional obsolescence 10 percent, and detour effect 5 percent. In addition, only bridges with a sufficiency rating less than 50 and load rating less than H-15 are considered when choosing projects. BRR is funded 80 percent federally and 20 percent by either the State of Tennessee or local funds.

Recreational Trails (RC TR)
Provides funding for the creation, rehabilitation, and maintenance of multi-use recreational trails that is funded 80 percent Federal and 20 percent Non-Federal.

Safe Routes to School (SRTS)
SRTS funds are intended to enable and encourage children to walk and bicycle to school. The funds are 100 percent Federal thus requiring no local match.

Spot Safety Improvement
Funds used to improve deficient intersections with new signalization, intersection modifications, adding turn lanes, etc. The improvements are

typically funded with a minimum of 80 percent Federal funds. The funds are only eligible for projects that are on state routes.

Transportation Enhancement (TE)
These funds are used to enhance or make improvements to alternative types of transportation projects. These include bicycle and pedestrian paths, landscaping and scenic beautification, and historic transportation structures.

Railroad Rehabilitation and Investment Financing Program (RRIF)
The Federal Railroad Administration (FRA) administers the Railroad Rehabilitation and Investment Financing Program (RRIF) that offers various loan enhancements to public or private sponsors of intermodal and rail capital projects, including acquisition, development, improvement, or rehabilitation of intermodal or rail equipment and facilities.

Transportation Infrastructure Finance and Innovation Act Program (TIFIA)
The Federal Highway Administration also administers the Transportation Infrastructure Finance and Innovation Act Program (TIFIA) which is available for some rail related projects, including Highway Rail Grade Crossing Programs.

STATE FUNDING SOURCES

The State of Tennessee funds transportation projects by the imposition of gasoline and motor fuel taxes and from motor vehicle registration fees which are administered by the Tennessee Department of Transportation.

LOCAL FUNDING SOURCES

Local funding sources that could potentially supply revenue for the roadway recommendations come from local bonds and developers. Local bonds are typically used by the Town when there is a large project that will require long term borrowing to fund the construction. Developers also help fund the projects

by donating the right-of-way, escrowing funds, or actually building the roadway project as part of their development.

ANALYSIS OF THE E+C+I TRANSPORTATION NETWORK

The Nashville Area MPO travel demand model (TDM) was used to evaluate the 2040 transportation network with the proposed improvement projects. The results of the Existing plus Committed plus Improvements (E+C+I) travel demand model analysis are shown in Map 7.

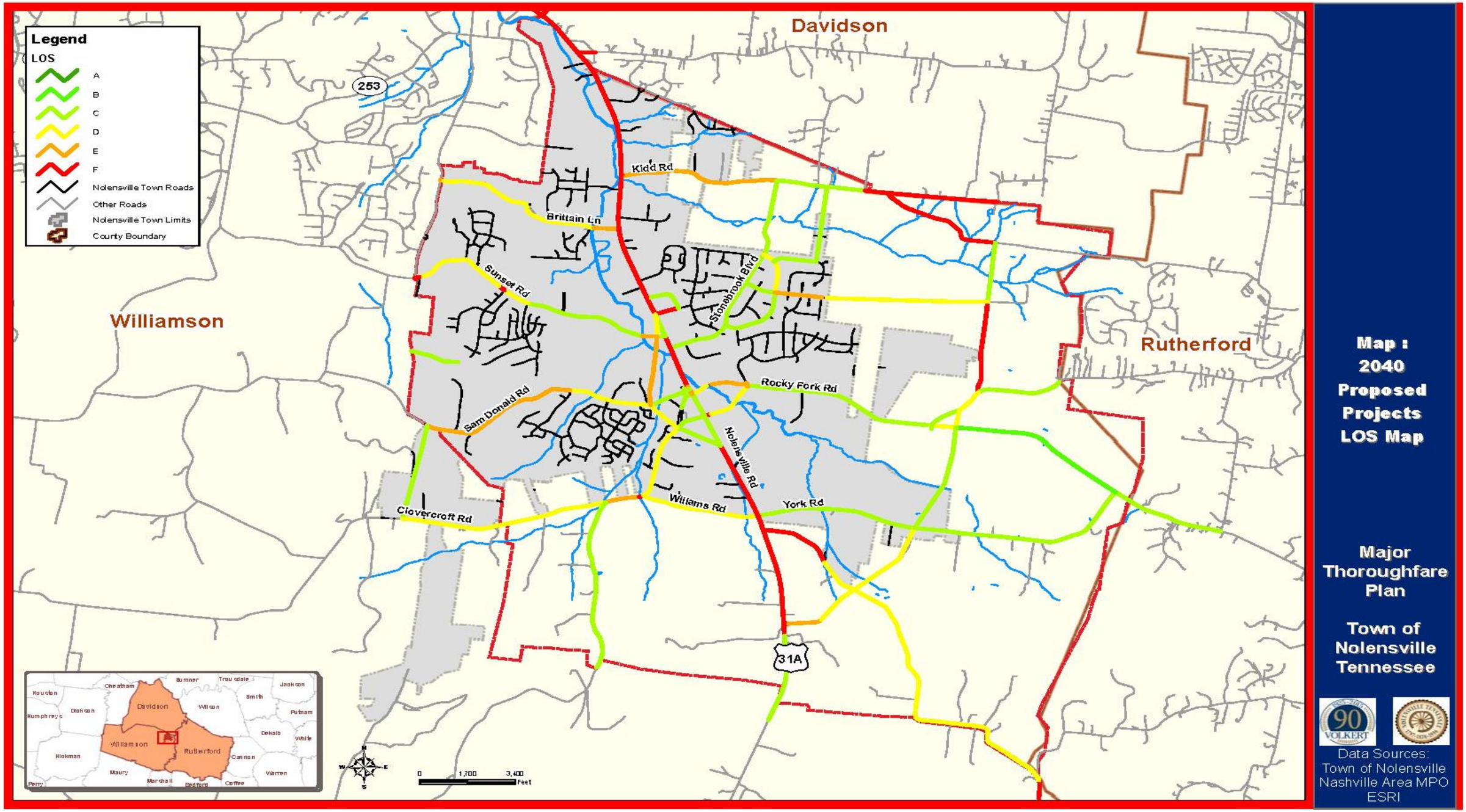
As depicted, with the completion of the recommended improvements, almost all of the area's roadways will operate at an acceptable LOS (LOS C or better) during the peak hours. Roadway segments that are expected to operate at LOS E or worse during the peak hours consist of roadways along most segments of Nolensville Road, along a portion of Fly Road, along a portion of McFarlin Road, along a portion of Brittain Lane, along a portion of Sam Donald Road, a portion of Oak Creek Drive, a portion of Clovercroft Road, a portion of Williams Road, and at the intersection of Sunset Road and Benington Place. Nolensville Road, since it is a major thoroughfare that moves people and goods at a regional level is consistently shown at a severely congested LOS. Otherwise, the Town's transportation network will function at a LOS D or higher.

Figure 17 describes the impact of the recommended improvements to the Town's transportation network by providing comparisons for LOS in 2010, 2040 E+C, and 2040 E+C+I. The Town's total roadway miles will increase from 32.1 miles currently to 46 miles in 2040. The E+C+I scenario results in improvement to the existing network, significantly improves traffic flow, and reduce congestion throughout the Town. In all, 30.5 miles of the Town's roadways will function at D or higher in 2040 with the proposed improvements. This compares to 27.9 miles projected to function at D or lower in the 2040 E + C scenario.

Figure 17: LOS Comparisons

LOS	2010 (Miles)	2040 E + C (Miles)	2040 with Improvements (Miles)
A	0.7	0	0
B	0.7	0	1.2
C	25.5	4.2	17.6
D	4.1	3.2	11.7
E	0.1	4.4	4.2
F	1	20.3	11.3

View along Burke Hollow Road



Map 7 2040 LOS Map

CONCLUSION AND PLAN POLICIES

Plan Policies

The overall goal of this plan is simple: an improved transportation network for the Town. To achieve this goal, the following policies are presented. These policies are meant to shape and guide the Town's decisions related to the transportation network and to positon this Plan in context with the other Plans utilized by the Town:

Comprehensive: ***Improvements proposed in this Plan shall be considered comprehensive in scope and inclusive of all modes (as applicable for each project): sidewalks, trails, greenways, and/or bike routes in addition to roadways.***

Integrated: ***This Plan shall be considered aligned with all other Town Plans and shall be considered an element of the Town's comprehensive planning efforts.***

Partnerships: ***Require development to pay its way. Leverage all Federal and State funding and grant opportunities.***

Fiscally responsible: ***Utilize a Capital Improvement Program in budgeting for the projects recommended by this Plan.***

This Plan is presented to offer the Town an organizing effort around transportation related improvements through the year 2040. However, transportation does not exist in a vacuum. Land use is closely linked to transportation impacts. Therefore, this Plan should be used as a tool in Land Use decisions just as closely as the Town's Land Use Plan in making future decisions about growth and development within the Town. While the total potential cost for all 24 recommended projects may seem overwhelming, the Town should not look at the totality of the recommended projects, but at each individual project as a way to embrace the coming growth, while not becoming overwhelmed by it.

View of the Village along Nolensville Road