



SHELBY FARMS
GREENLINE


SHELBY FARMS PARK



CORDOVA

TRAFFIC STUDY

EXECUTIVE SUMMARY



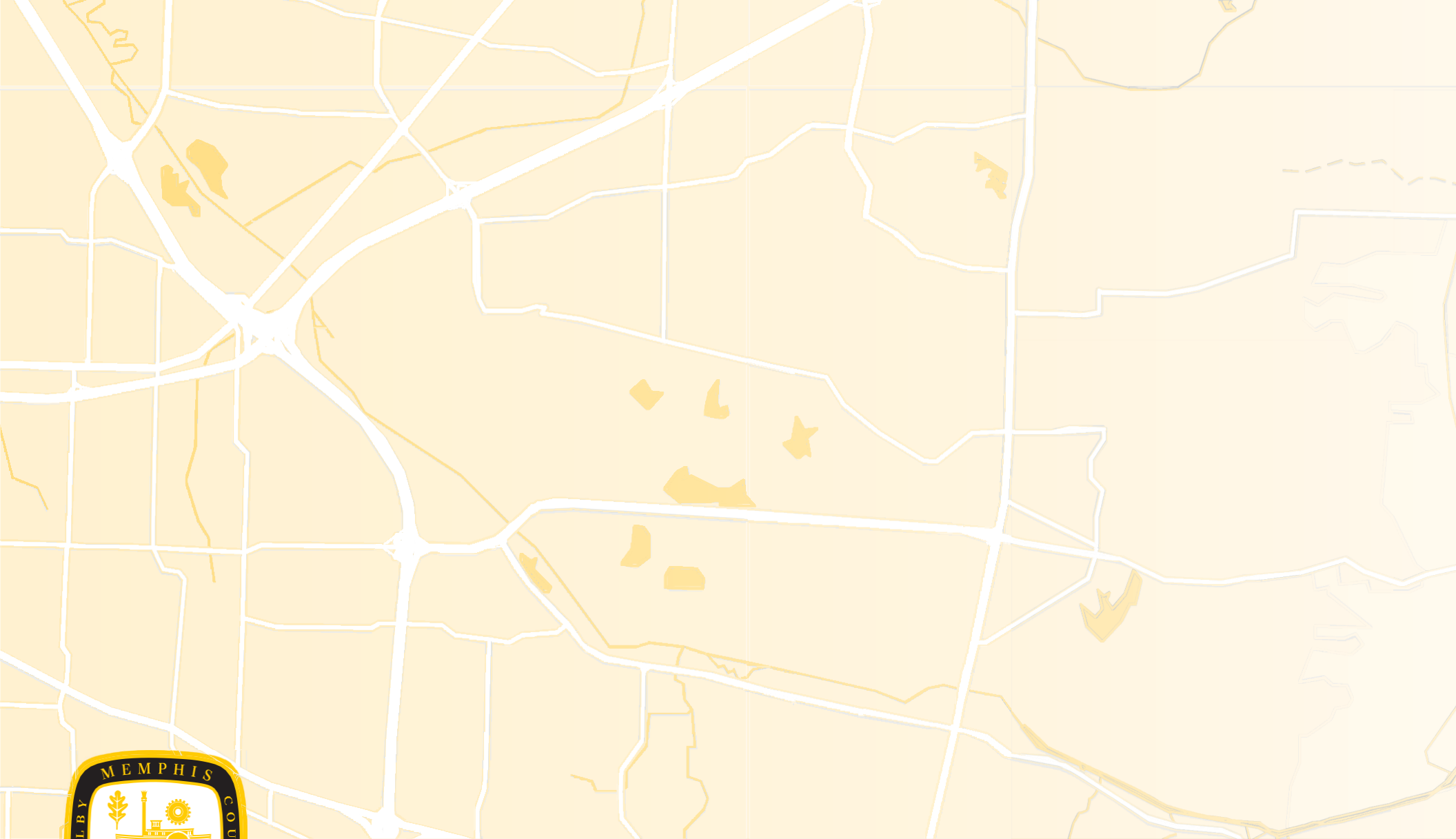


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INTRODUCTION

The **City of Memphis** conducted a traffic study for the area of Memphis and Shelby County called Cordova. The majority of the Cordova area has been annexed by the City of Memphis with the remainder of the area as unincorporated Shelby County. The Cordova area is generally bound by Wolf River on the south, Whitten Road on the west, I-40 and Highway 64 on the north, and Pisgah Road on the east. The Cordova area consists of various land uses with a significant amount of residential spread throughout the area and retail/commercial land uses located primarily along the major arterials.

The roadway network in Cordova consists of several major arterials such as Germantown Parkway, Stage Road, Walnut Grove Road, and Houston Levee Road which not only serve local traffic but are also used for through trips by vehicles starting and ending their trips outside of Cordova. The major roads throughout Cordova typically experience high levels of congestion during peak hours as commuters use these routes to travel to and from places of occupation both inside and outside of the Cordova area. Germantown Parkway experiences the highest levels of congestion due to the lack of other parallel north-south roads within the Cordova area. Over the years, the roadway network has been built out through public infrastructure projects as well as public improvement projects associated with residential, commercial, and industrial developments. These public improvement projects are typically only focused on the frontage of the subject development properties, leaving a disjointed and inconsistent roadway network.

The purpose of the Cordova Traffic Study is to evaluate the operations of the road network in Cordova and identify areas of the network that need improvement. The study consisted of a base year scenario using existing roadway conditions, a 2030 future year scenario, and a 2050 future year scenario. Both future scenarios used forecasted growth in and around the study area to analyze roadway and intersection operations.

There is also a substantial multimodal network within the Cordova area due to the location of Shelby Farms and the Greenline. The study evaluated the existing multimodal network and developed recommendations to improve connectivity to the existing multimodal network and other destinations within Cordova.

This Executive Summary provides a high-level summary of the recommendations developed as a part of the Cordova Traffic Study. **The full report can be provided upon request.**

STUDY AREA

2

The Cordova study area includes portions of Cordova in both the City of Memphis and in Shelby County. **Figure 1** displays the Cordova study area from a regional perspective. **Figure 2** zooms in to the study area and displays the portions in the City and County along with the existing roadway network.

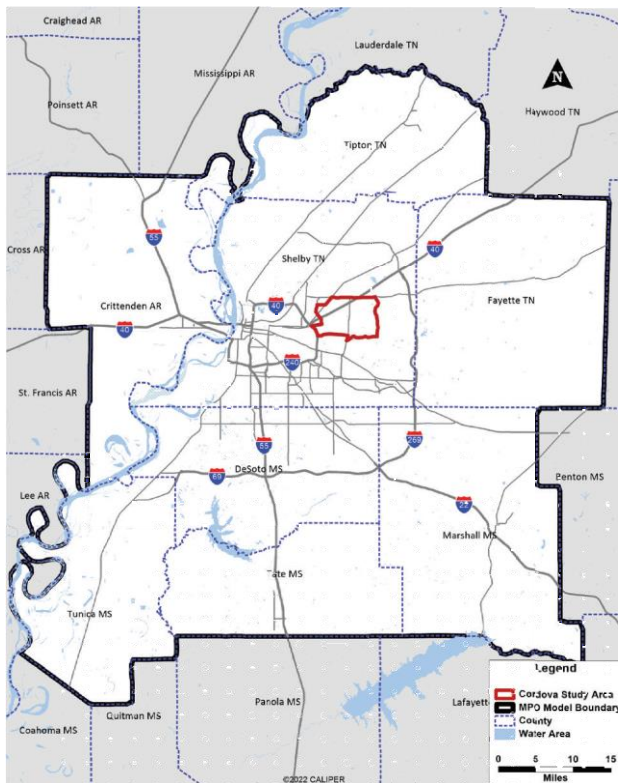


Figure 1: Regional View of the Cordova Study Area

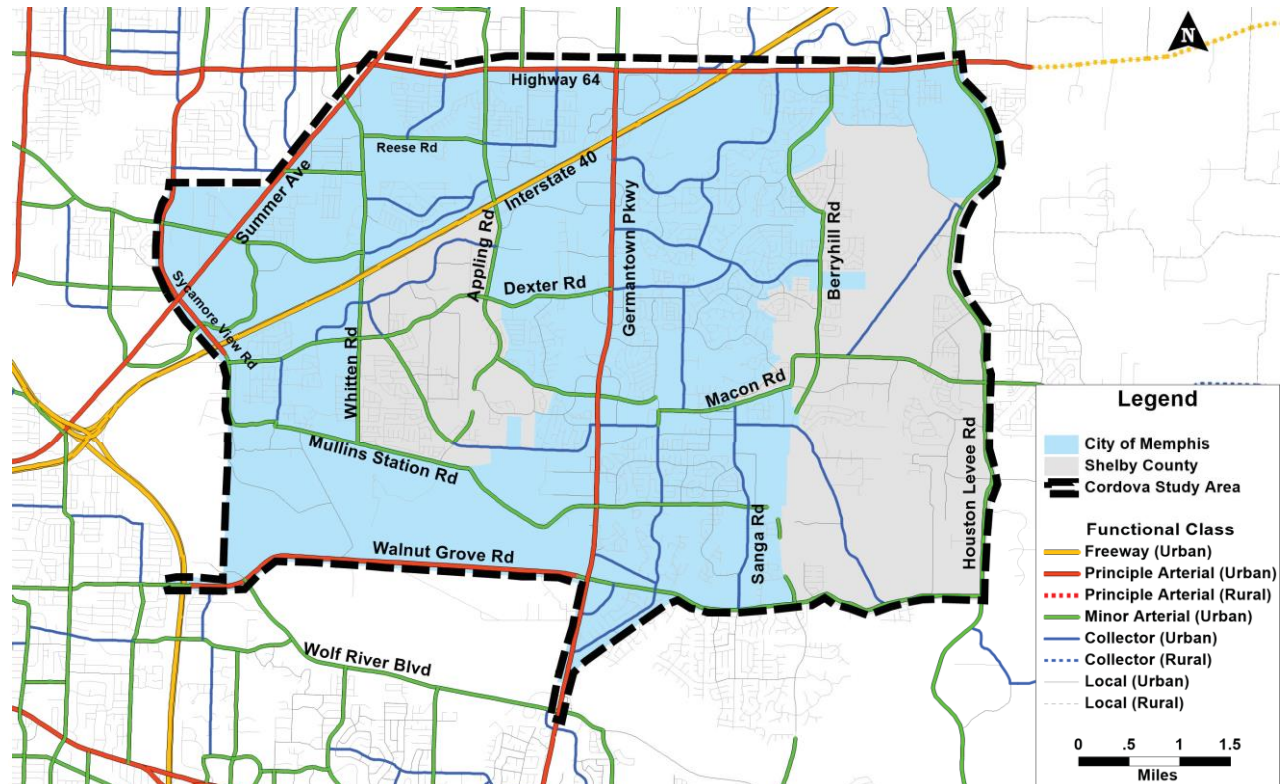


Figure 2: Cordova Study Area

EXISTING CONDITIONS ANALYSIS

The Existing Conditions Analysis task consisted of evaluating several areas of transportation within Cordova: traffic volumes, traffic speeds, intersection operations, roadway connectivity, traffic signal warrants, and traffic safety.

TRAFFIC VOLUMES

Intersection turning movement volumes were collected at 54 unsignalized intersections and 72 signalized intersections around Cordova. Bi-directional roadway volumes were collected at 47 locations around Cordova. These count locations are shown in **Figure 3**.

TRAFFIC SPEEDS

Vehicle speed data was collected at 21 locations around Cordova. Of the 21 locations evaluated, 18 locations had 85th percentile speeds exceeding the posted speed limit. Seven of the 18 locations had 85th percentile speeds exceeding the posted speed limit by 10 mph or more with Dexter Lane having the highest observed speeds exceeding the posted speed by 13 mph. The results of the speed analysis are shown in **Figure 4**.

TRAFFIC SIGNAL WARRANTS

Traffic Signal Warrants were conducted for each of the unsignalized intersections within the study area where the existing operational analysis indicated the intersections operated at LOS E or F. 37 intersections were evaluated as a part of the study for whether they met a traffic signal warrant in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and City of Memphis methodology and standards.

The only intersection that met signal warrants under the existing volumes was the intersection of Stage Road at I-40 WB utilizing the EBL volume as the minor street volume and the WBT volume as the major street volume. There are no other intersections that meet Warrant 1 Condition A or B for 8 hours under existing volumes. There were several intersections that were close to meeting Warrant 1 during the 8 hours of counts that were collected. These intersections are Sycamore View Road at I-40 WB, Dexter Road at Dexter Lane, Mullins Station at Whitten Road, and Whitten Road at Elmore Road. These intersections should be monitored for potential traffic signal warrant evaluations in the future.

ROADWAY CONNECTIVITY

The analysis considered two main aspects of connectivity: roadways that appear to be missing connections and roadways that are not fully widened at all locations. Roadway extension needs were determined by analyzing any roadways that are not fully connected and have gaps in the existing geometry. Examples of this category include Forest Hill-Irene Road throughout the study area, Cordova Road between Cully Road and Macon Road, and Appling Road between Dusty Lane and Cordova Club Drive.

Roadway widening needs were determined by analyzing sections of the roadway that are currently congested or have inconsistencies in roadway width. Examples of locations with inconsistent widths include Cordova Road between Country Village Drive and Garden Willow Lane and Walnut Grove Road between Sanga Road and Walnut Ridge Lane. An example of a congested roadway that could benefit from widening is Mullins Station Road from Farm Road to Raleigh LaGrange Road. The results from this analysis were used to help develop recommended roadway projects that will improve the connectivity and reduce congestion in the Cordova study area. The results of the connectivity analysis are shown in **Figure 5**.

INTERSECTION OPERATIONS

An existing Synchro model was developed to analyze existing conditions at intersections throughout the Cordova study area. This model was developed based on the existing roadway geometry, intersection control, signal timing and phasing, if signalized, and the traffic counts.

Level of Service (LOS) is used to describe the operating characteristics of an intersection or roadway under various traffic conditions. LOS is a qualitative measure based on the average delay per vehicle. The Highway Capacity Manual defines six levels of services, LOS A through LOS F, with A representing the shortest average delays and F representing the longest average delays.

This model was used to evaluate the LOS and intersection delay for each of the study intersections for both the AM and PM peak periods. There are 41 intersections out of the 125 study intersections that currently operate at LOS E or F in one or both peak hours under existing volumes and geometry. 11 of these 41 intersections are currently signalized with the remaining 30 unsignalized. The results of the existing intersection operations analysis can be found in **Section 4.5** of the full report.

TRAFFIC SAFETY

A crash data analysis was performed to identify common crash locations and factors and to develop a High Injury Network (HIN) for the Cordova study area. From 2019-2023, 15,195 crashes were reported (excluding crashes that occurred on interstate routes) within the Cordova study area. Out of the 15,195 crashes reported, 180 resulted in a serious injury or fatality. Additionally, 93 crashes involved a vulnerable road user with 23 resulting in a serious injury or fatality. A heat map of all crashes in Cordova is shown in **Figure 6**. Crash statistics for all crashes within the Cordova study area are shown in **Figure 7** while crash statistics for the fatal and serious injury crashes are shown in **Figure 8**.

The High-Injury Network for the Cordova study area is made up of both segments and intersections and was developed to identify locations with the highest instances of fatal and serious injury crashes as compared with other locations within the study area. Only crashes with a severity of fatal (K) or suspected serious injury (A) were considered in the HIN development. The High-Injury Network for Cordova is shown in **Figure 9**.

The High-Injury Network for Cordova consisted of the following segments and intersections:

HIN Roadway Segments

- Germantown Pkwy from Autumn Creek Dr to I-40
- Houston Levee Rd from north of Pisgah Rd to Stage Rd
- Macon Rd from Raleigh LaGrange Rd to Chickering Ln
- Rocky Point Rd from Walnut Grove Rd to Sanga Rd
- Sanga Rd from Walnut Grove Rd to Trinity Rd
- Stage Rd from Germantown Pkwy to New Brunswick Rd
- Summer Ave from Sycamore View to Elmore Rd
- Sycamore View Rd from I-40 to Summer Ave
- Walnut Grove Rd from west of Farm Rd to Walnut Trace Dr
- Walnut Grove Rd from Forest Hill Irene Rd to Houston Levee Rd
- Whitten Rd from Macon Rd to I-40

HIN Intersections

- Bellevue Pkwy at Germantown Pkwy
- Chimney Rock Blvd at Germantown Pkwy
- Club Parkway at Germantown Pkwy
- Dexter Rd at Germantown Pkwy
- Elmore Rd at Whitten Rd
- Fischer Steel Rd/ Walnut Run Rd at Germantown Pkwy
- Macon Rd at Germantown Pkwy
- Macon Rd at Mullins Station Rd
- Shelby Oaks Dr at Sycamore View Rd
- Stage Rd at Appling Rd/Brother Blvd
- Stage Rd at Houston Levee Rd
- Summer Ave at Munson Rd
- Summer Ave at Sycamore View Rd
- Walnut Grove Rd at Farm Rd
- Walnut Grove Rd at Timber Creek Dr

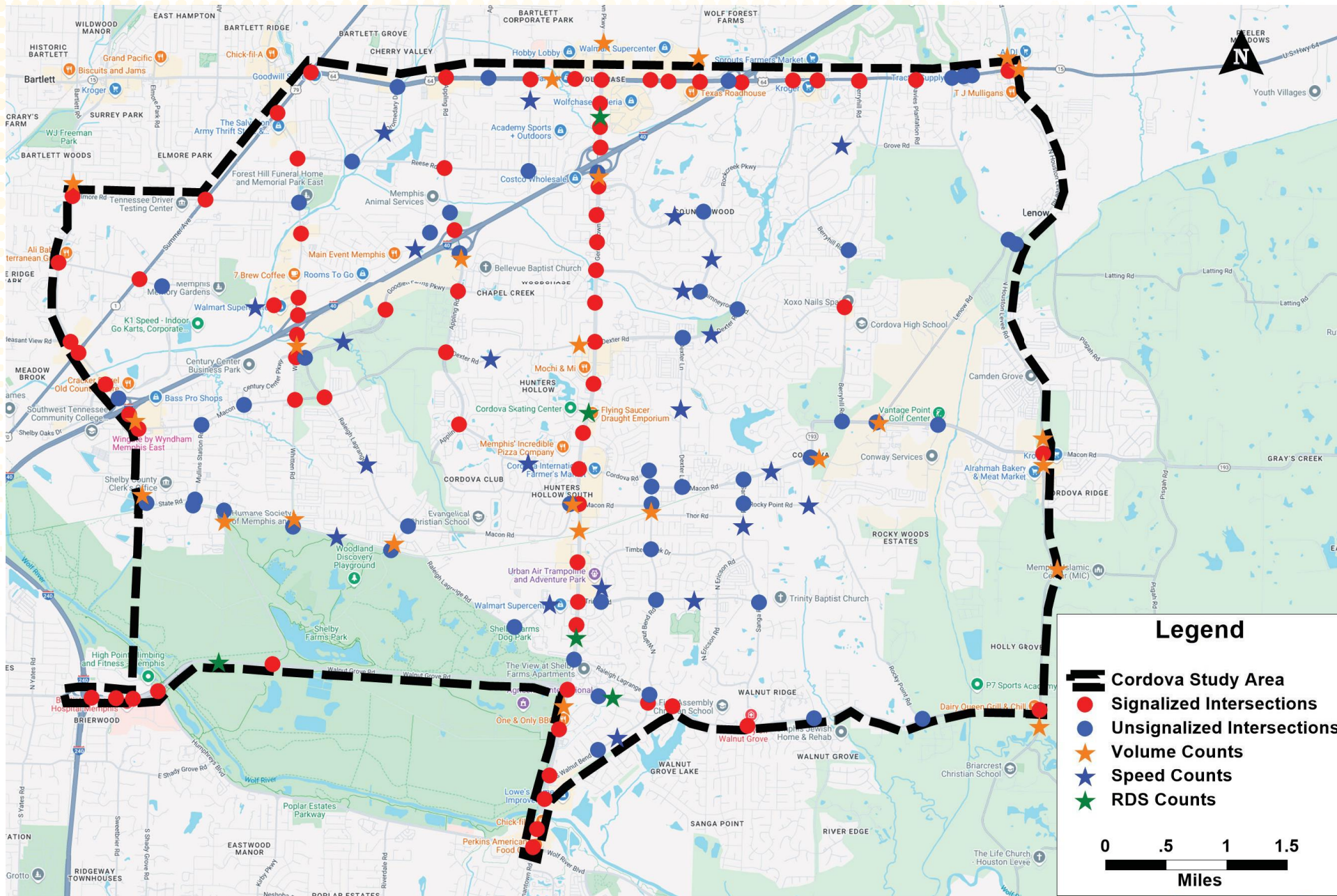


Figure 3: Traffic Count Locations

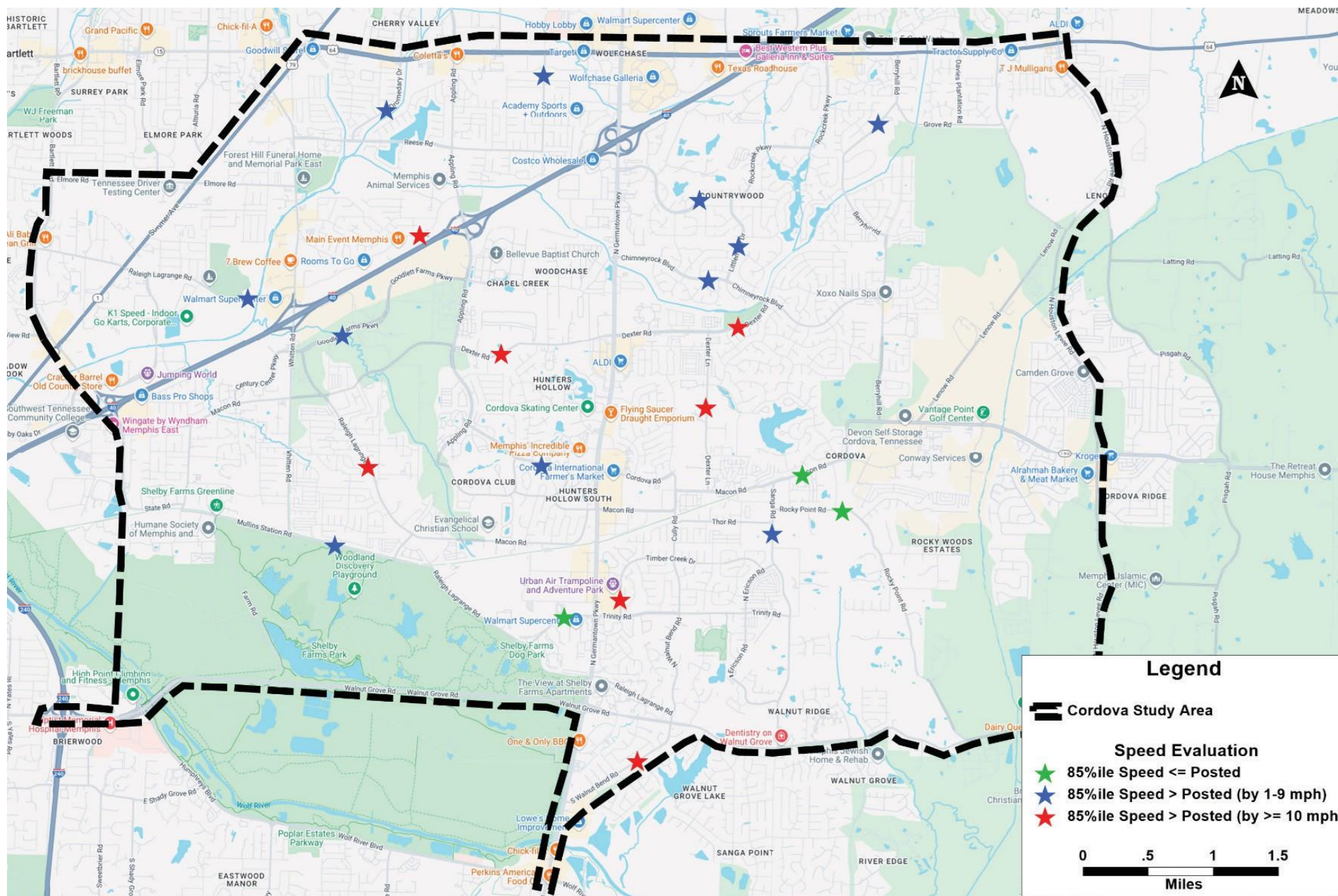
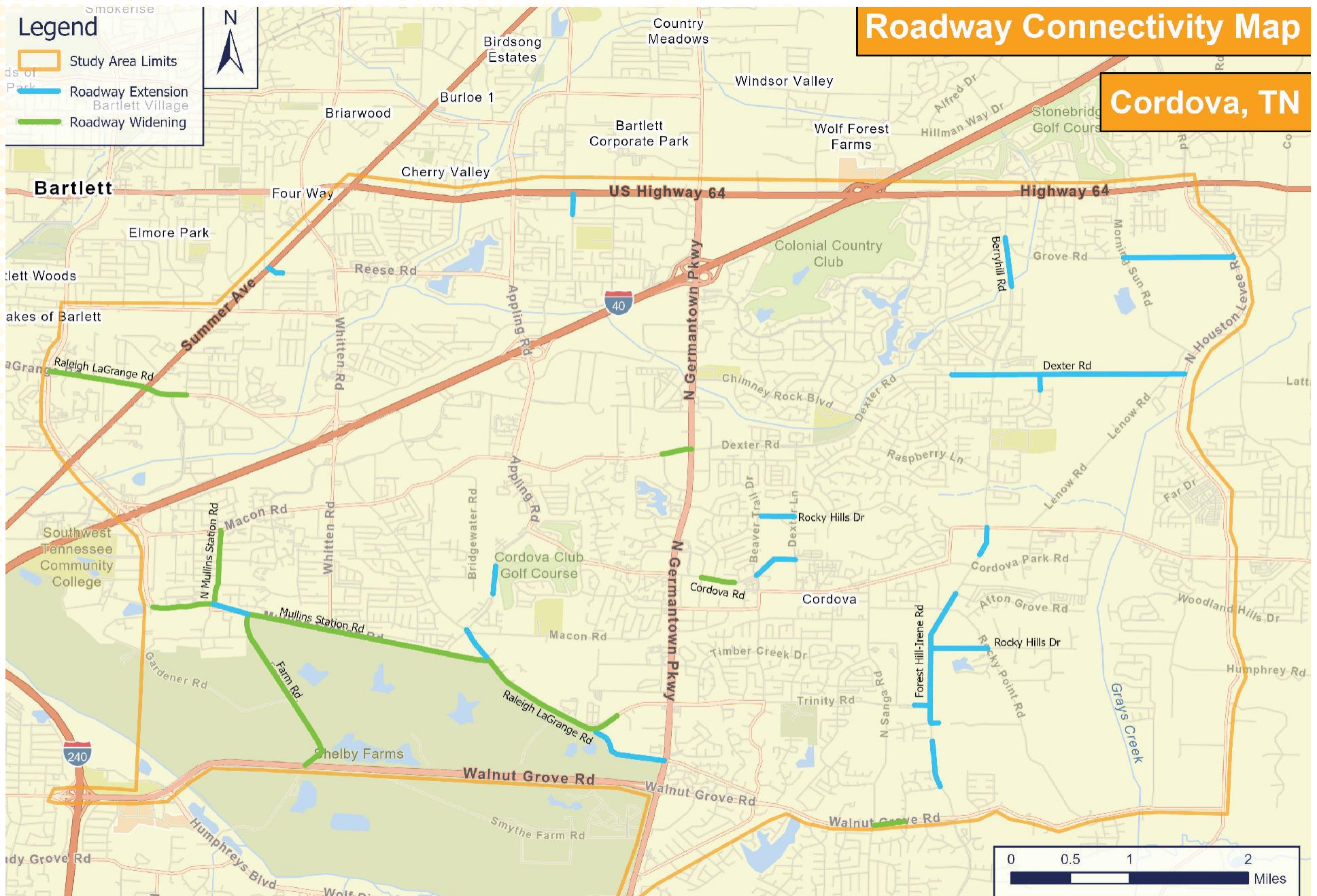


Figure 4: Speed Evaluation Locations



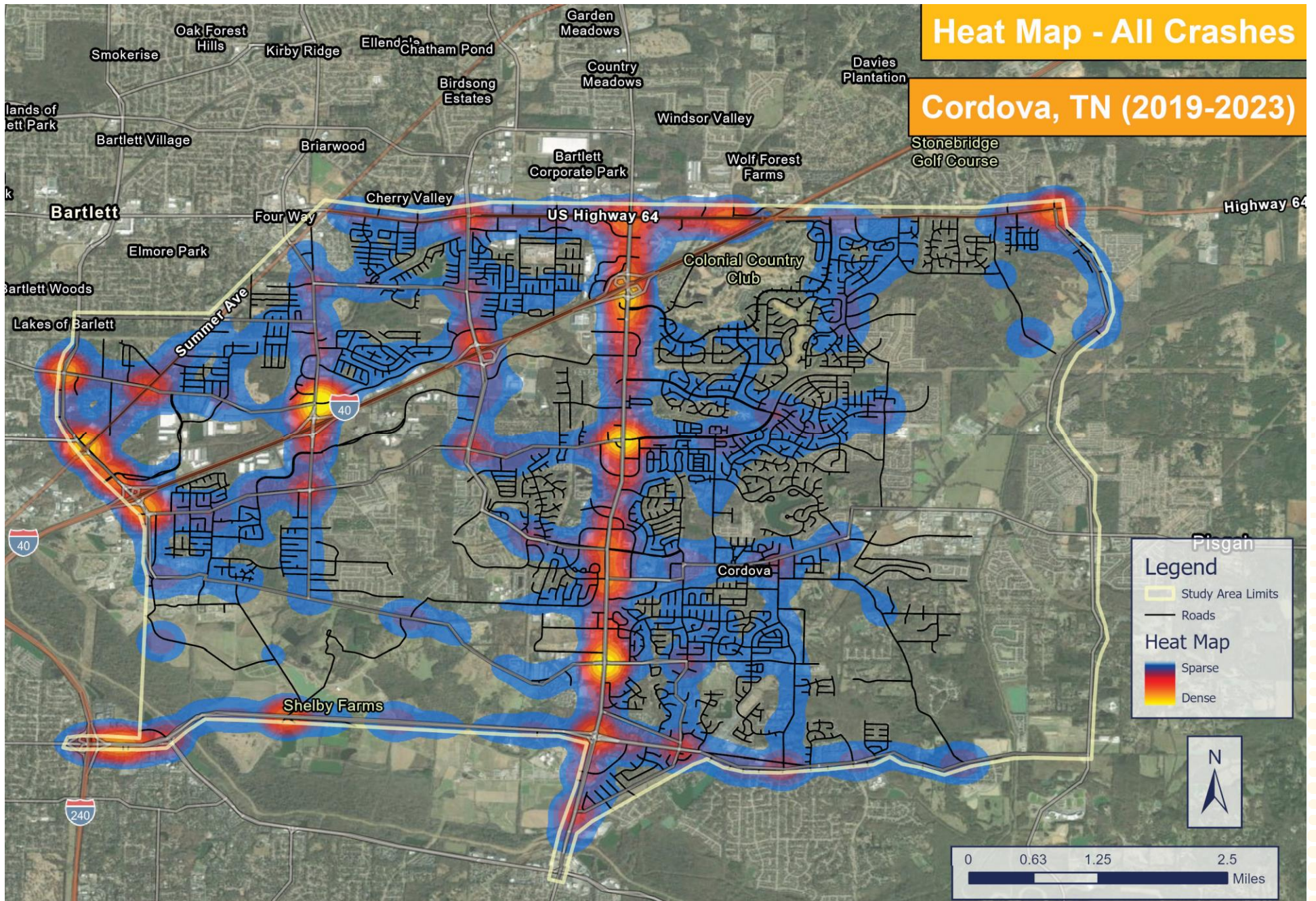
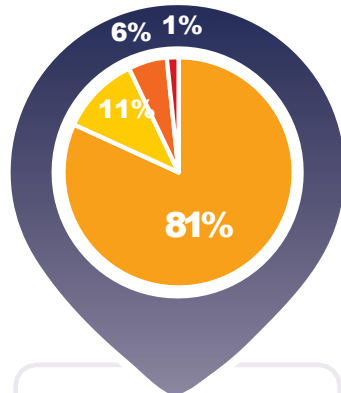


Figure 6: Crash Density Heat Map - All Crashes



ALL CRASHES DATA | 15,195 TOTAL



property damage only
possible serious injury
minor injury
suspected serious injury
fatal (<1%)

54% angle collisions
25% rear-end crashes
11% single vehicle crashes



33%

teen drivers (13-19)



10%

elderly drivers (65+)



13%
aggressive drivers



24%
distracted drivers



56%
occurred at intersections



70%

occurred in daylight conditions



5%

occurred in dawn or dusk conditions



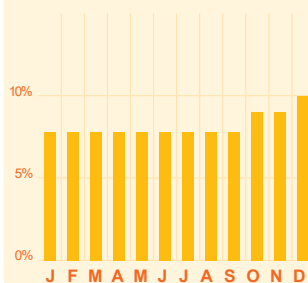
21%

occurred in dark, lit conditions

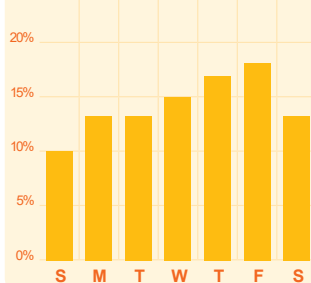
4%

occurred in dark, not lit conditions

Crashes, on average, were distributed across the following *months of the year*:



Crashes, on average, were distributed across the following *days of the week*:



Crashes, on average, were distributed across the following *hours of the day*:

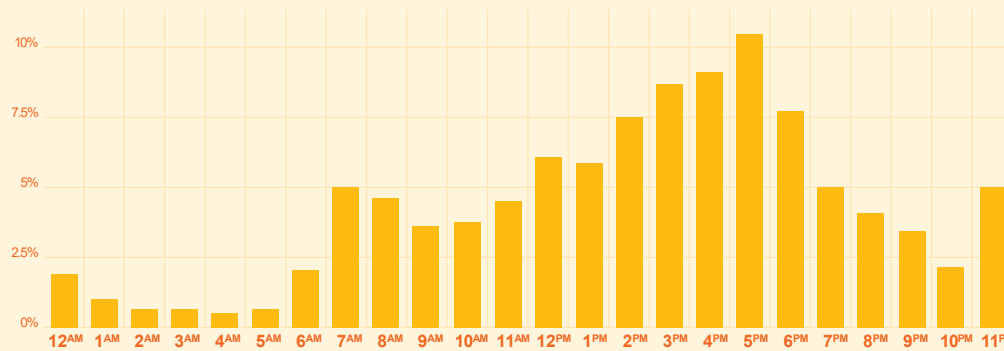
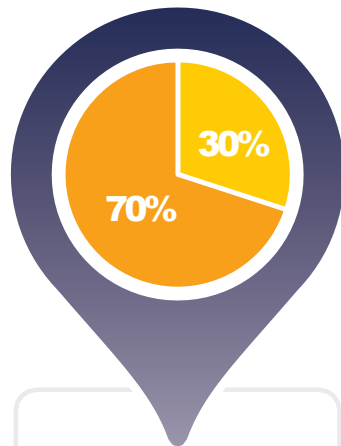


Figure 7: All Crashes Statistics



SERIOUS AND FATAL (KA) CRASH DATA POINTS | 180 TOTAL



■ suspected serious injury (126)
■ fatal (54)

51% angle collisions
30% single vehicle collisions
9% head-on collisions



10%
impaired drivers



14%
involved a motorcycle



10%
involved a pedestrian



24%
teen drivers (13-19)



18%
elderly drivers (65+)



17%
aggressive drivers



62%
occurred at intersections



48%
occurred in daylight conditions



35%
occurred in dark, lit conditions



8%
occurred in dawn or dusk conditions

9%

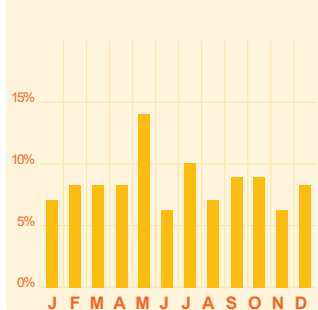
occurred in dark, not lit conditions

21.67% of all Segment KA Crashes were on 6.20% of the Network Road Length.

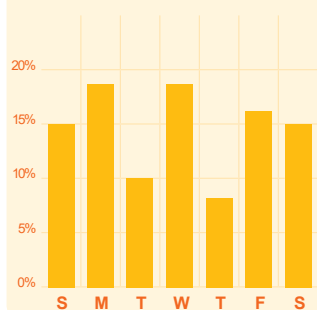
26.11% of all Intersection KA Crashes happen at 1.15% of the Total Intersections.

10.56% of all Segment KA Crashes happen on Walnut Grove Road (2.58% of Total Road Length).

Crashes, on average, were distributed across the following *months of the year*:



Crashes, on average, were distributed across the following *days of the week*:



Crashes, on average, were distributed across the following *hours of the day*:

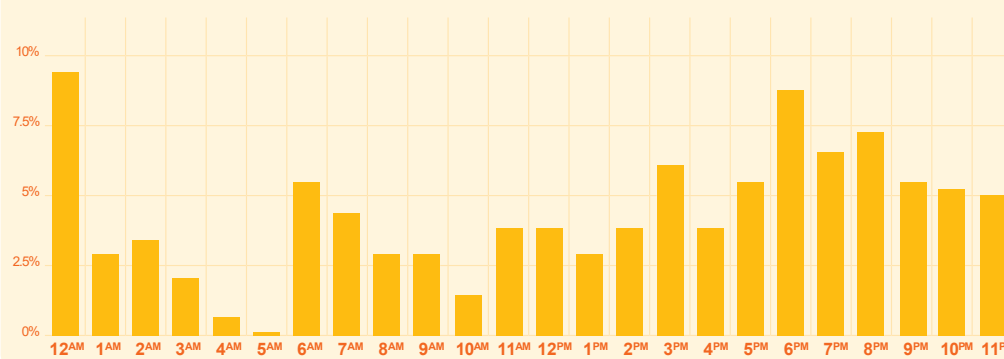


Figure 8: Fatal and Serious Injury Crash Statistics

High Injury Network Cordova, TN (2019-2023)

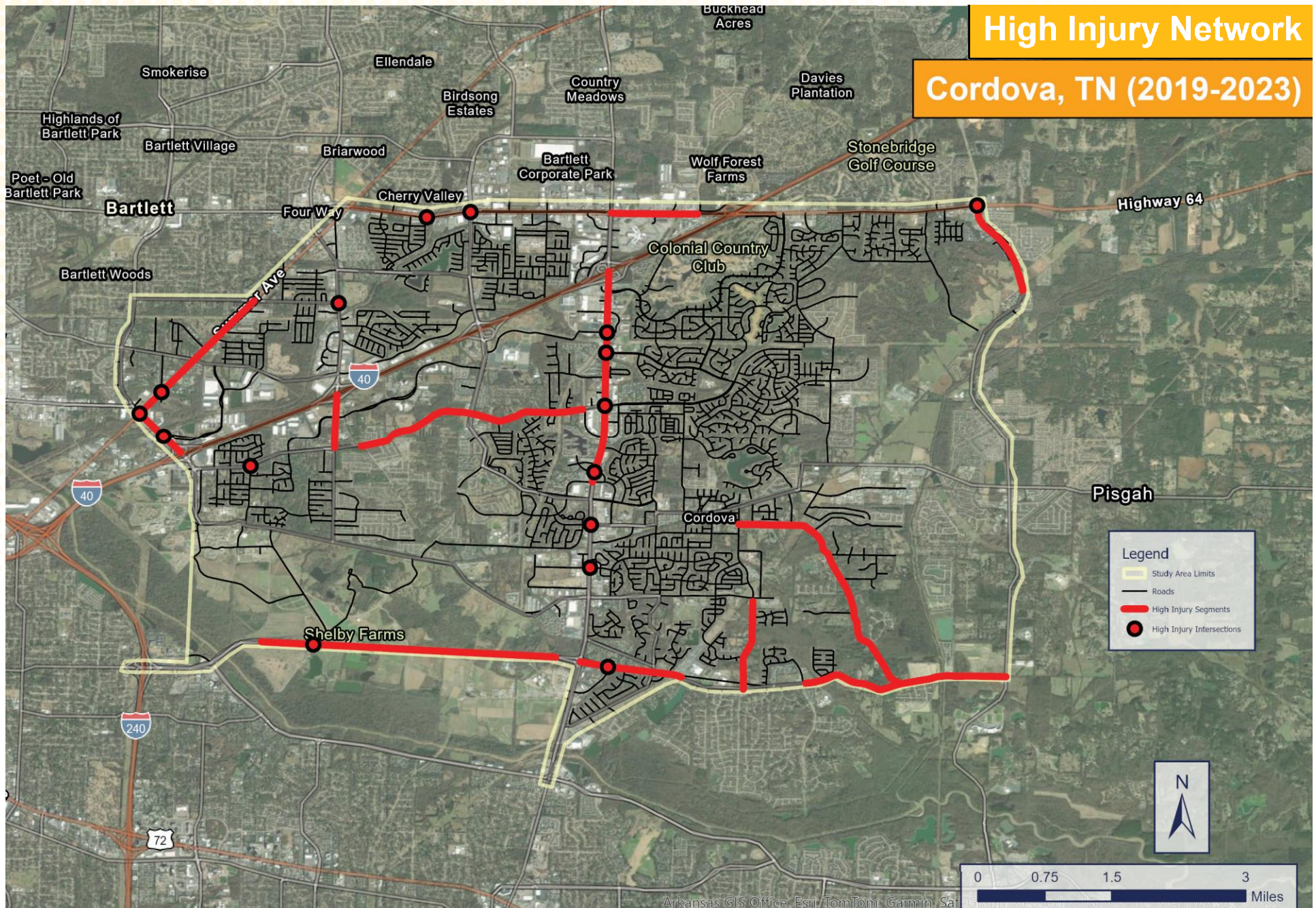


Figure 9: Cordova Study Area High Injury Network



PUBLIC INVOLVEMENT

Under the first phase of the Cordova Traffic Study, the City of Memphis conducted an online public engagement process to obtain feedback from the Cordova community. As part of public outreach, the City sent out approximately 51,700 postcards starting on April 11, 2022 to residents and businesses within the Cordova area. These postcards provided information about the project as well as links to the project website and interactive map.

An online project website was developed using the Esri ArcGIS StoryMap platform to provide residents and stakeholders with background information related to the goals and objectives of the Cordova Traffic Study. The StoryMap included an overview of the project and descriptions of various traffic calming measures suitable for implementation in the study area. The online StoryMap was made available to the public for input from April 11th, 2022 to August 2nd, 2022.

Google Analytics was used to track user activity on the project site and document the online traffic generated by the site. Between April 11th, 2022 and August 2nd, 2022, 1,445 unique users accessed the Cordova Traffic StoryMap.

1,445

total unique users
on the website

2,177

total page views

1,814

number of sessions

4/27/2022

date with the highest number
of users (101)

An online interactive mapping tool was developed to allow users to provide location specific input. A total of 1,232 comments were submitted through the online interactive map and by email. The elements of input users were prompted to enter were as follows in order of frequency of comments received per category:

OBSERVED TRANSPORTATION CONDITIONS

- | | |
|----------------------------------|--|
| 1. Speeding | 6. Excessive Traffic, Congestion |
| 2. Traffic Calming Device Needed | 7. Vehicles Cut-Through Neighborhood |
| 3. Unsafe Driving Conditions | 8. Signage or Markings Needed |
| 4. Other | 9. Dificult to Cross Street/Intersection |
| 5. Traffic Signal Needed | 10. Public Transit Issues |

RECOMMENDED CONNECTION

1. Widen Existing Road
2. Sidewalk Connection Needed
3. Multiuse Path
4. New or Improved Bike Facility
5. New Roadway Connection
6. Other

METHODOLOGY AND RECOMMENDATIONS

A Subarea Travel Demand Model (TDM) for the Cordova study area was developed for use in this Study. The Subarea Model is based on the official version of the Memphis Urban Area Metropolitan Planning Organization's (MPO) Regional TDM which has a base year of 2016 and was updated for the current 2050 Regional Transportation Plan. The Subarea Model inherited all the benefits and structure of the updated Regional Model such as more accurate regional demographic and economic forecasts and state-of-practice trip generation, distribution, and traffic assignment models. The Subarea Model is not a standalone model. Rather, it is still connected to the overall Regional TDM, just with more information and detail provided for the Cordova area.

The analysis scenarios evaluated for the study consisted of the following:

- Base Year
- Future Year 2030
- Future Year 2050

The model was used to forecast future traffic growth based on the future socioeconomic forecasts. A deficiency analysis was conducted to evaluate the existing and committed roadway network with the demand of the future 2050 scenario. This analysis identified deficiencies in the network where there will be insufficient capacity to meet the demand. Remaining deficiencies in the network were then addressed in the recommended roadway network.

The following roadways within the Cordova study area all have segments that are expected to operate over capacity under these forecasted future conditions:

- | | | |
|--------------------------|------------------------|----------------------|
| • Stage Road | • Macon Road | • Walnut Bend Road |
| • Summer Avenue | • Dexter Road | • Cully Road |
| • Germantown Parkway | • State Road | • Sanga Road |
| • Sycamore View Road | • Mullins Station Road | • Rocky Point Road |
| • Raleigh LaGrange Road | • Trinity Road | • Cordova Park Road |
| • Appling Farms Parkway | • Fischer Steel Road | • Berryhill Road |
| • Goodlett Farms Parkway | • Farm Road | • Houston Levee Road |
| • Whitten Road | • Walnut Grove Road | |
| • Appling Road | • Cordova Road | |

METHODOLOGY AND RECOMMENDATIONS

5.1 ROADWAY RECOMMENDATIONS

Roadway improvements were developed to help relieve future congestion based on the findings of the deficiency analysis. The recommended roadway network is shown in **Figure 10**.

The recommended roadway network was built into the model and evaluated to determine the effects that the recommended projects are expected to have on the network. Based on the results, congestion throughout the study area is expected to reduce, especially east of Germantown Parkway, where many segments that were experiencing LOS E or F in the deficiency analysis have improved to LOS D or better.

Estimated project costs were developed for each of the recommended roadway projects identified in the study using the TDOT project cost estimating tool. This tool develops planning level construction cost estimates based upon 2022 Tennessee statewide construction costs using high level project inputs. These inputs consist of existing and proposed cross-section information, multimodal elements, signalization and ITS components, bridge requirements, and drainage assumptions. The tool provides estimated project costs at a 2022 base year and then grows the costs to current 2025 using an assumed 7% inflation. The estimated project costs also account for preliminary and final engineering, construction engineering inspection, and a 30% contingency on the estimated construction costs. The estimated project costs do not account for any costs associated with right-of-way acquisition or utility relocation. **Table 1** shows each of the recommended roadway projects along with the estimated 2025 project cost. If a recommended multimodal project was identified along the same corridor as a recommended roadway project, the cost of the multimodal project is included in the project cost for the recommended roadway project.

Table 1: Recommended Roadway Project Costs

ID	Project Name	From	To	Est. Project Cost (\$)	RTP/TIP Est. Project Cost (\$)
1	Germantown Road	at Wolf River Blvd		-	\$12,146,564
2	Walnut Grove Road	Rocky Point Road	Houston Levee Road	-	\$13,118,839
3	I-40	SR-177 (Germantown Road)	1 mile E of Canada Road	-	\$54,000,000
4	SR-1 (Summer Avenue)	Near I-40	.01 mile N of Sycamore View Road	-	\$68,982,750
5	Macon Road	Berryhill Road	Houston Levee Road	-	\$44,125,637
6	SR-1 (Summer Avenue)	0.1 mile N of Sycamore View Road	0.1 mile N of Elmore Road	-	\$46,994,600
7	Houston Levee Road	Wolf River Bridge	Walnut Grove Road	-	\$23,660,557
8	Raleigh Lagrange Road Improvements	Sycamore View Road	Leicester Lane	-	\$17,261,878
9	Appling Road	Mullins Station Road	Cordova Club Drive E	-	\$9,208,660

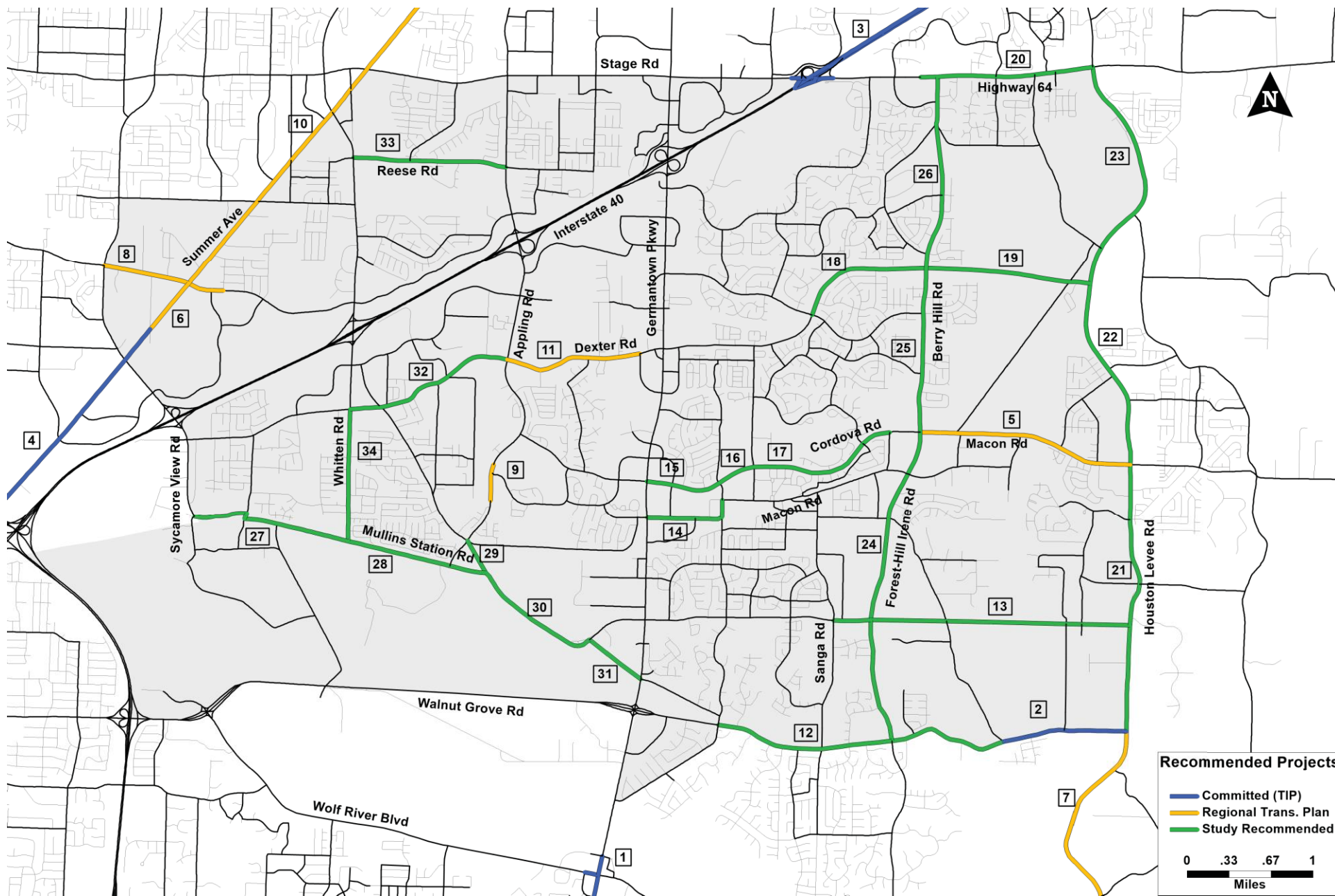


Figure 10: Recommended Roadway Projects

Table 1: Recommended Roadway Project Costs (cont.)

ID	Project Name	From	To	Est. Project Cost (\$)	RTP/TIP Est. Project Cost (\$)
10	US 70	Elmore Road	N Germantown Pkwy	-	\$95,262,000
11	Dexter Road Improvements	Appling Road	Chickering Lane	-	\$29,965,677
12	Walnut Grove Road	Walnut Bend Road	Rocky Point Bend	\$93,000,000	-
13	Trinity Road Extended	East of Sanga Road	Houston Levee Road	\$90,800,000	-
14	Macon Road	Germantown Pkwy	Cully Road	\$8,620,000	-
15	Cordova Road	Germantown Pkwy	Cully Road	\$4,730,000	-
16	Cordova Road	Cully Road	Dexter Lane	\$8,790,000	-
17	Cordova Road	Dexter Lane	Macon Road	\$17,800,000	-
18	Dexter Road	Dewberry Lane	Forest Hill Irene Road Extended	\$22,000,000	-
19	Dexter Road	Forest Hill Irene Road Extended	Houston Levee Road	\$39,000,000	-
20	Stage Road	Berryhill Road	Canada Road	\$8,940,000	-
21	Houston Levee Road	Walnut Grove Road	Macon Road	\$61,500,000	-
22	Houston Levee Road	Macon Road	Morning Sun Road	\$39,100,000	-
23	Houston Levee Road	Morning Sun Road	Highway 64	\$34,800,000	-
24	Forest Hill Rene Road	Walnut Grove Road	Macon Road	\$111,000,000	-
25	Berryhill Road/Forest Hill Irene	Macon Road	Huntington Oak Drive	\$23,500,000	-
26	Forest Hill Irene Road	Huntington Oak Drive	Highway 64	\$21,600,00	-
27	Mullins Station Road/Stage Road	Sycamore View Road	Whitten Road	\$31,400,00	-
28	Mullins Station Road	Whitten Road	Raleigh LaGrange Road	\$21,100,000	-
29	Raleigh LaGrange Road	Macon Road/Appling Road	Mullins Station Road	\$11,700,000	-
30	Raleigh LaGrange Road	Mullins Station Road	Trinity Road	\$30,400,000	-
31	Raleigh LaGrange Road	Trinity Road	Germantown Pkwy	\$37,000,000	-
32	Dexter Road	Whitten Road	Appling Road	\$37,200,000	-
33	Reese Road	Whitten Road	Appling Road	\$7,790,000	-
34	Whitten Road	Macon Road	Mullins Station Road	\$33,300,000	-
35	Dexter Lane	Macon Road	Dexter Road	\$12,300,000	-
TOTAL RECOMMENDED PROJECT COSTS				\$1,328,947,162	

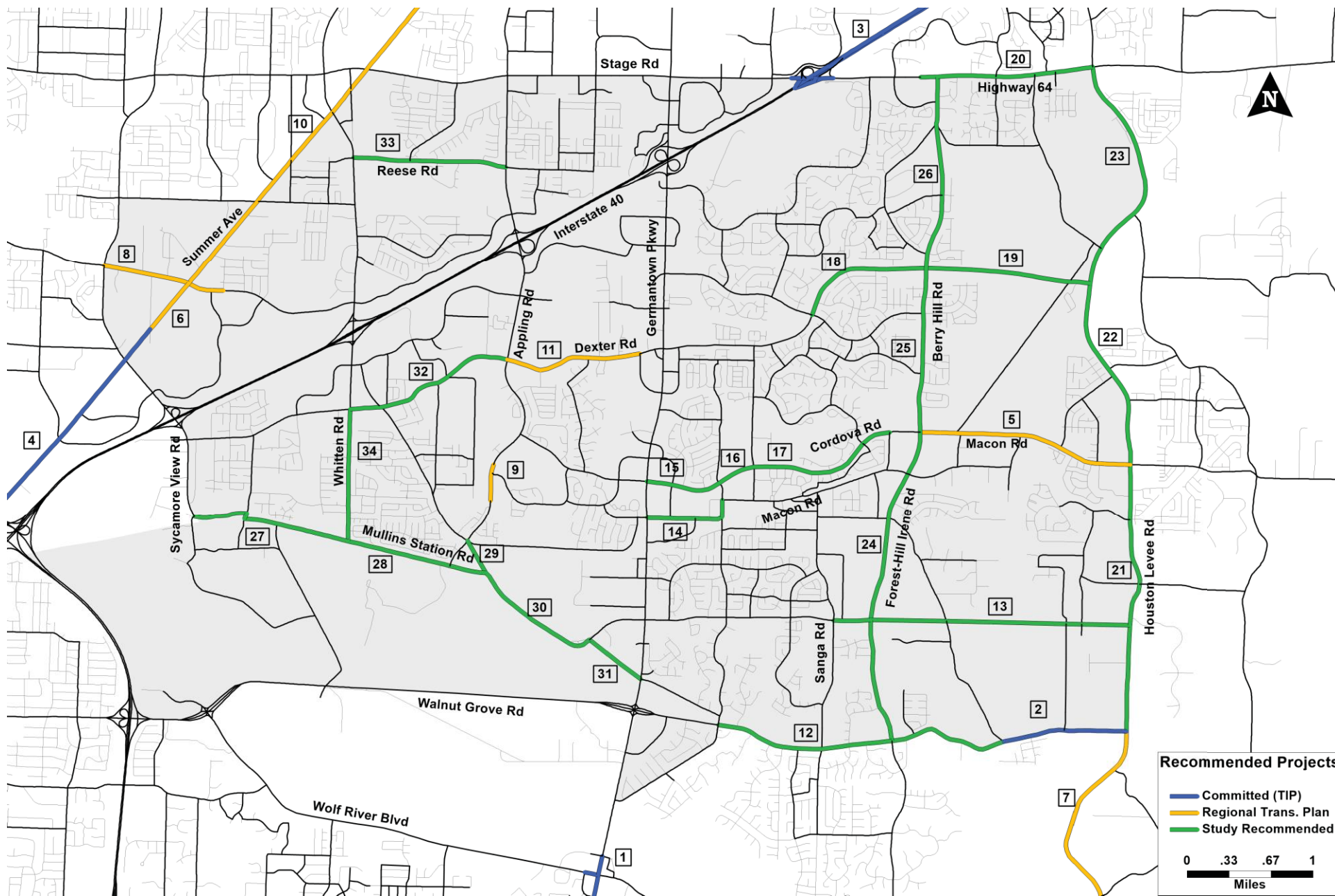


Figure 10: Recommended Roadway Projects

INTERSECTION ANALYSIS AND RECOMMENDATIONS

An intersection level analysis was performed to determine the existing and future operations for the study intersections using Synchro. The analysis will incorporate the future volume projections from the subarea model and identify potential recommendations in intersection control types or additional turn lanes. Intersections that are forecasted to operate at LOS E or F during at least one of the analysis scenario peak periods were selected for additional analysis.

The intersection analysis consisted of evaluating the AM and PM peak periods in the following scenarios: Existing, Future Baseline (2030 and 2050), and Future Proposed (2030 and 2050). A description of each scenario is found below:

Existing Conditions

This scenario consisted of an analysis of the turning movement counts collected in 2023 with existing intersection geometry and intersection control type.

Future Baseline Conditions

This scenario consisted of an analysis of the validated future turning movement projections using the future recommended roadway cross-sections and existing intersection control type.

Future Proposed Conditions

This scenario consisted of an analysis of the validated future turning movement projections using the future recommended roadway cross-sections with recommended improvements such as additional turn lanes and changes to intersection control. The primary intersection control types evaluated under this scenario were traffic signals and roundabouts. If an intersection was currently signalized, a roundabout was not evaluated under the Future Proposed Scenario. There were several intersections where additional alternatives were evaluated outside of a traffic signal or roundabout.

There were several intersections where additional alternatives were evaluated outside of a traffic signal or roundabout.

The future projected turning movement volumes were input into Synchro for each of the analysis scenarios. A summary of the future intersection analysis results can be found in **Section 8.0** of the full report. The intersections that were projected to operate at LOS E or F during one of the peak periods were identified as deficient and evaluated for potential improvements. These improvements consisted of the following alternatives: updating traffic signal phasing and/or timing plans to improve operations, adding turn lanes to provide additional capacity at each intersection, and changing intersection control type from stop control to either a traffic signal or roundabout.

The proposed new traffic signal improvements are based upon volume projections from the 2030 and 2050 Scenario future year traffic models assuming the land use growth as described in **Section 6.0** of the full report. A full traffic signal warrant analysis shall be conducted at each location based on actual turning movement counts prior to traffic signals being installed.

6.1 INTERSECTION IMPROVEMENT RECOMMENDATIONS (YEAR 2030)

Each of the potential recommended improvements at the intersection level were evaluated. A final recommended improvement for each deficient intersection was identified based on the resulting improvement to LOS and delay.

Based on the results of the intersection analysis, the recommended future intersection improvements for the 2030 Scenario are shown in **Figure 11**.

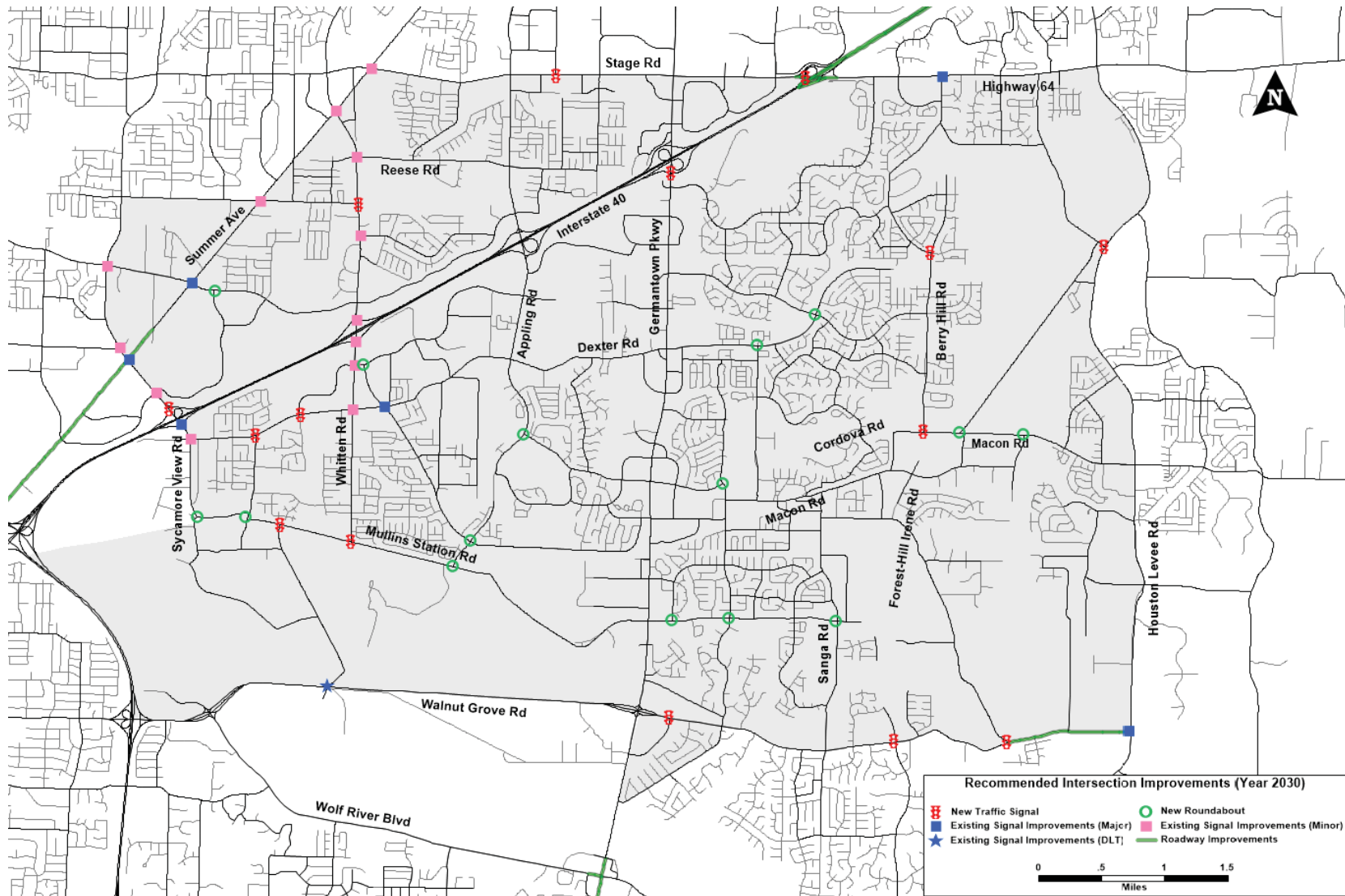


Figure 11: Future 2030 Recommended Intersection Improvements

Proposed New Traffic Signals

In the 2030 scenario, new traffic signals are proposed at the following intersections:

- Appling Farms Parkway at Appling Road
- Berryhill Road at Forest Hill-Irene Road
- Elmore Road at Whitten Road
- I-40 Eastbound at Germantown Parkway
- I-40 Westbound at Sycamore View Road
- Macon Road at Century Center Pkwy
- Macon Road at Mullins Station Road
- Morning Sun Road at Houston Levee Road
- Stage Road at Appling Road
- Stage Road at I-40 WB
- Trinity Road at Walnut Bend Road
- Walnut Grove Road at Forest Hill Irene Road
- Walnut Grove Road at Rocky Point Road
- Walnut Grove Road at Timber Creek Drive

Proposed New Roundabouts

In the 2030 scenario, new roundabouts are proposed at the following intersections:

- Chimneyrock Boulevard at Dexter Road
- Cordova Road at Appling Road
- Cordova Road at Beaver Trail Lane / Cully Road
- Dexter Road at Dexter Lane
- Macon Road at Big Orange Road
- Macon Road at Lenow Road
- Macon Road at Sanga Road
- Mullins Station Road at Appling Road
- Mullins Station Road at Farm Road
- Mullins Station Road at Whitten Road
- Raleigh LaGrange Road at Shelby Oaks Drive
- Raleigh LaGrange Road at Appling Road
- State Road at Mullins Station Road / Nixon Road*
- State Road at Sycamore View Road
- Trinity Road at Sanga Road
- Trinity Road at Timber Creek Drive

*This roundabout is recommended to combine the existing two intersection configuration for this area into a single 5-leg intersection utilizing the roundabout for traffic control.

Existing Traffic Signal with Major Improvements (Widening Required)

In the 2030 scenario, major improvements are proposed at the following existing signalized intersections. Major improvements require roadway widening to add left-turn or right-turn lanes at the intersection. Minor improvements, such as signal coordination or signal phasing changes, are also incorporated for these intersections.

- Dexter Road/Macon Road at Raleigh LaGrange Road (Add left turn lanes for northbound)
- I-40 Eastbound at Sycamore View Road (Dual SB LT lanes, dual EB RT lanes)
- Macon Road at Berryhill Road (Add right-turn storage lane for westbound)
- Raleigh LaGrange Road at Summer Avenue (Right-turn lanes for all approaches)
- Summer Avenue at Sycamore View Road (Dual left-turn lanes for northbound and southbound)
- Walnut Grove Road at Houston Levee Road (Southbound right-turn channelization, dual northbound left-turn lanes)

Existing Traffic Signal with Minor Improvements (No Widening Required)

In the 2030 scenario, minor improvements are recommended at the following existing signalized intersections. Minor improvements consist of adding signal coordination along major street or modifying signal equipment to enhance operations.

- Elmore Road at Summer Avenue
- Goodlett Farms Parkway at Whitten Road
- Hillshire Drive at Whitten Road
- I-40 Eastbound at Whitten Road
- I-40 Westbound at Whitten Road
- Macon Road at Sycamore View Road
- Macon Road at Whitten Road
- Pleasant View Road at Sycamore View Road
- Raleigh LaGrange Road at Sycamore View Road
- Reese Road at Whitten Road
- Shelby Oaks Drive at Sycamore View Road
- Stage Road at Summer Avenue
- Summer Avenue at Kirby Whitten Road

INTERSECTION ANALYSIS AND RECOMMENDATIONS

6.2 INTERSECTION IMPROVEMENT RECOMMENDATIONS (YEAR 2050)

Due to the widening of existing roads and the construction of new roads, each of the potential recommended improvements at the intersection level were reevaluated from the 2030 scenarios. A final recommended improvement for each deficient intersection was identified based on the resulting improvement to LOS and delay. The Future Proposed Conditions scenario incorporates all recommended intersection improvements throughout the study area.

Based on the results of the intersection analysis, the recommended future intersection improvements for the 2050 Scenario are shown in **Figure 12**.



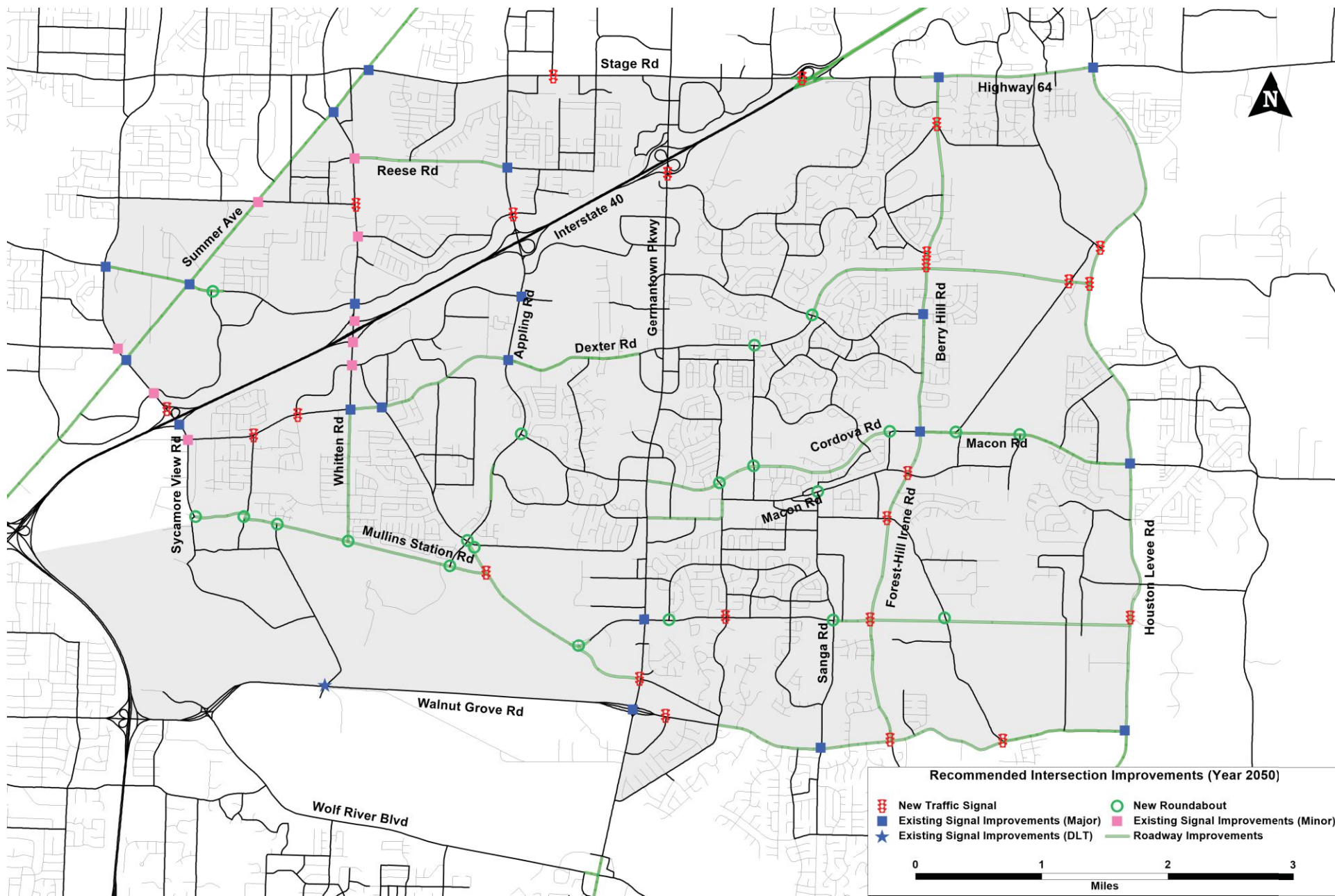


Figure 12: Future 2050 Recommended Intersection Improvements

Proposed New Traffic Signals

In the 2050 scenario, new traffic signals are proposed at the following intersections:

- Appling Farms Parkway at Appling Road
- Berryhill Road at Grove Road / Forest Hill-Irene Road (Future) (North)
- Berryhill Road at Forest Hill-Irene Road (South)
- Cordova Park Road at Forest Hill-Irene Road (Future)
- Dexter Road (Future) at Berryhill Road
- Dexter Road (Future) at Houston Levee Road
- Dexter Road (Future) at Lenow Road
- Elmore Road at Whitten Road
- I-40 Eastbound at Germantown Parkway
- I-40 Westbound at Sycamore View Road
- Macon Road at Century Center Pkwy
- Macon Road at Mullins Station Road
- Morning Sun Road at Houston Levee Road
- Mullins Station Road at Raleigh LaGrange Road
- Raleigh LaGrange Road at Germantown Parkway
- Rocky Point Road at Forest Hill-Irene Road (Future)
- Stage Road at Appling Road
- Stage Road at I-40 Westbound
- Trinity Road (Future) at Forest Hill-Irene Road (Future)
- Trinity Road (Future) at Houston Levee Road
- Trinity Road at Walnut Bend Road
- Walnut Grove Road at Forest Hill-Irene Road
- Walnut Grove Road at Rocky Point Road
- Walnut Grove Road at Timber Creek Drive

Proposed New Roundabouts

In the 2050 scenario, new roundabouts are proposed at the following intersections:

- Chimneyrock Boulevard at Dexter Road
- Cordova Road at Appling Road
- Cordova Road at Beaver Trail Lane / Cully Road
- Cordova Road at Dexter Lane
- Cordova Road (Future) at Macon Road
- Dexter Road at Dexter Lane
- Macon Road at Big Orange Road
- Macon Road at Lenow Road
- Macon Road at Raleigh LaGrange Road (Future)
- Macon Road at Sanga Road
- Mullins Station at Appling Road
- Mullins Station at Farm Road
- Mullins Station at Whitten Road
- Raleigh LaGrange Road at Appling Road
- Shelby Oaks Drive at Raleigh LaGrange Road
- State Road at Mullins Station Road / Nixon Road*
- State Road at Sycamore View Road
- Trinity Road at Raleigh LaGrange Road
- Trinity Road at Rocky Point Road
- Trinity Road at Sanga Road
- Trinity Road at Timber Creek Drive

*This roundabout is recommended to combine the existing two intersection configuration for this area into a single 5-leg intersection utilizing the roundabout for traffic control.

Existing Traffic Signal with Major Improvements (Widening Required)

In the 2050 scenario, major improvements are proposed at the following existing signalized intersections:

- Chimneyrock Road at Berryhill Road/Forest Hill Irene Road (Dual left-turn lanes for northbound)
- Dexter Road at Appling Road (Dual left-turn lanes for eastbound and westbound; right turn lanes for all approaches)
- Dexter Road/Macon Road at Raleigh LaGrange Road (Left-turn and right-turn lanes for all approaches)
- Forest Hill-Irene Road (Future) / Berryhill Road at Macon Road (Left storage lanes for all approaches; right storage lanes for eastbound and southbound)
- Goodlett Farms Parkway at Appling Road (Dual left-turn lanes for eastbound; Right-turn lanes for southbound)
- I-40 Eastbound at Sycamore View Road (Dual SB LT lanes, dual EB RT lanes)
- Macon Road at Houston Levee Road (Dual left-turn lanes for westbound and northbound)
- Macon Road at Whitten Road (Dual left-turn lanes for southbound)
- Raleigh LaGrange Road at Summer Avenue (Right-turn lanes for all approaches; Dual left-turn lanes for eastbound and westbound)
- Raleigh LaGrange Road at Sycamore View Road (Dual left-turn lanes for northbound)
- Raleigh LaGrange Road at Whitten Road (Dual left-turn lanes for northbound)
- Reese Road at Appling Road (Dual left-turn lanes for westbound)
- Stage Road at Berryhill Road (Dual left-turn lanes for westbound and northbound, right-turn lanes for eastbound)
- Stage Road at Houston Levee Road (Dual left-turn lanes for eastbound and northbound)
- Stage Road at Summer Avenue (Dual left-turn lanes for eastbound and westbound)
- Summer Avenue at Kirby Whitten Road (Dual left-turn lanes for eastbound and westbound; right turn lane for eastbound)
- Summer Avenue at Sycamore View Road (Dual left-turn lanes for northbound and southbound)
- Trinity Road at Germantown Parkway (Dual left-turn lane for southbound)
- Walnut Grove Road at Germantown Parkway (Triple left-turn lanes for eastbound)
- Walnut Grove Road at Houston Levee Road (Dual left-turn lanes for northbound and eastbound)
- Walnut Grove Road at Sanga Road (Dual left-turn lanes for eastbound and northbound; right turn lane for southbound)

Existing Traffic Signal with Minor Improvements (No Widening Required)

In the 2050 scenario, minor improvements are recommended at the following existing signalized intersections.

Minor improvements consist of adding signal coordination along major street or modifying signal equipment to enhance operations.

- Elmore Road at Summer Avenue
- Goodlett Farms Pkwy at Whitten Road
- Hillshire Drive at Whitten Road
- I-40 Eastbound at Whitten Road
- I-40 Westbound at Whitten Road
- Macon Road at Sycamore View Road
- Pleasant View Road at Sycamore View Road
- Reese Road at Whitten Road
- Shelby Oaks Drive at Sycamore View Road

INTERSECTION ANALYSIS AND RECOMMENDATIONS

Existing Traffic Signal with Innovative Approach

The intersection of Walnut Grove Road at Farm Road was analyzed using two innovative intersection types: Displaced Left Turn (DLT) and Continuous Green-T (CGT).

A Continuous Green-T is an intersection where one of the major street directions of travel can move through the intersection without stopping. The opposite direction of travel on the major street and the side street are controlled by a traffic signal. The side street left turn movement would use a channelized receiving lane within the median of the major street and then merge into the major street as they leave the intersection. A CGT intersection can only be installed at a T-intersection. Therefore, the south leg of this intersection would have to be relocated to accommodate this design type. The benefits of this type of intersection are improved safety by reducing the potential for angle crashes and improved operations with one direction of travel for the major street being free flow. Since one major street direction of travel is free flow, more green time can be provided to the other major street and minor street movements to improve intersection operations by reducing delays and queuing.

A Displaced Left Turn is an intersection where the left-turn vehicles cross over to the other side of the road upstream of the main intersection. This crossover is controlled by a signalized operation to allow the left-turn vehicles to cross the opposing through movement safely. The crossover and main intersection are signalized and timed together to minimize the impact on the major street through traffic. This intersection type allows for the major street throughs and lefts to progress through the main intersection at the same time without conflict. A typical intersection has 32 conflict points where a displaced left turn intersection may have as few as 28 conflict points. The benefits of this type of intersection are improved safety by reducing the potential for angle crashes and improved capacity for the left turn movement and through movements.

The CGT would provide improvement to intersection operations but would require the removal of the south leg of the intersection to implement. Due to the number of pedestrians and bicycles that use the intersection to access Shelby Farms Park, a dedicated pedestrian phase would have to be implemented with the CGT which would require the eastbound Walnut Grove Road movement to stop, reducing the potential benefit of the CGT alternative. The DLT alternative significantly improves the intersection operations while still maintaining the south leg of the intersection and providing the needed pedestrian and bicycle access. However, if the south leg of the intersection could be relocated, the DLT intersection would have even less conflict points and operate at better levels than with the south leg present. The DLT alternative is recommended for this location. **Figure 13** shows a conceptual sketch of what a DLT intersection could look at this location.

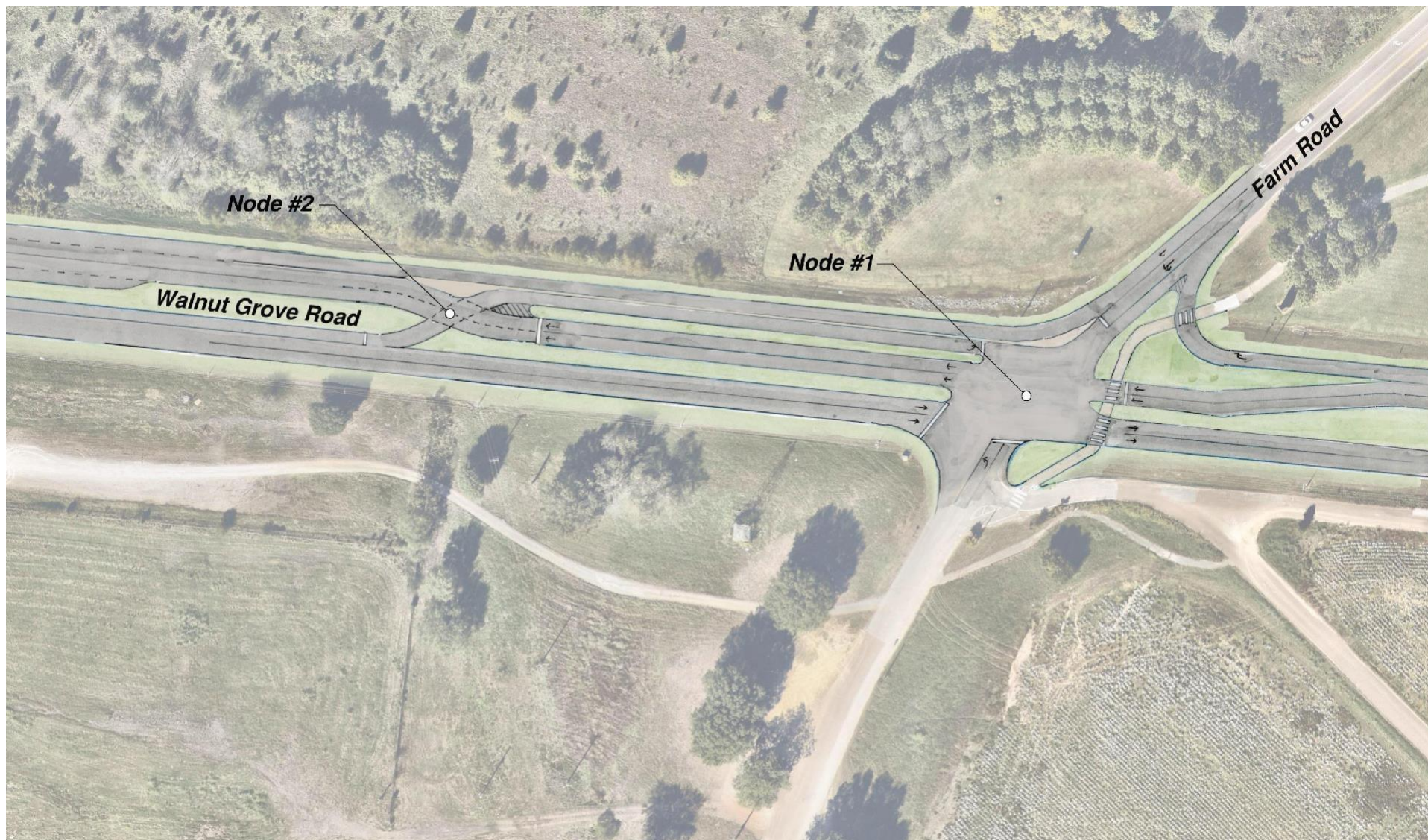


Figure 13: Concept Sketch of DLT at Intersection of Walnut Grove Road and Farm Road

MULTIMODAL EVALUATION AND RECOMMENDATIONS

With the proposed roadway network improvements, such as roadway widenings and extensions, comes opportunities for increased bike and pedestrian connections to be considered. Considering these improvements together allows for a balanced design that accommodates a variety of wants and needs. Additional improvements not associated with the Roadway Recommendations are included as well.

In general, multimodal recommendations were developed in five main categories: shared use paths, bike lanes, buffered bike lanes, greenways, and cycle tracks. Each of these categories is defined below.

A review of the existing roadway network was performed to characterize roads as primary, secondary, and tertiary based on their potential for bicycle and pedestrian connections. Pedestrian crash data and public input were overlaid to determine areas of increased significance. The existing roadway sections and available right-of-way were analyzed to determine the feasibility of the potential connections identified. The list of recommended roadway projects was also analyzed to determine bicycle and pedestrian improvements that could be implemented concurrently with the recommended roadway improvements. The recommended multimodal projects are shown in **Figure 14**. Recommended projects placed a strong emphasis on identifying gaps in pedestrian and bike infrastructure and connecting the existing infrastructure into the overall network. A full listing of the recommended projects and the associated project costs for ones not overlapping with recommended roadway network projects can be found in **Section 9.0** of the full report.



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