Gresham Road Middle Road PLANNING STUDY

GARVER

50TH ANNIVERSARY 1967 2017
NORTHWEST ALABAMA COUNCIL OF LOCAL GOVERNMENTS
NACOLG

Northwest Alabama Council of Local Governments

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Middle Road
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ONE: INTRODUCTION

The Gresham Road (County Road 46) and Middle Road (County Road 61) study corridor provides connection between the City of Florence, Town of St. Florian, and Lauderdale County. The purpose of this study is to identify the issues that exist within the existing roadway network and to propose a solution that is in line with the project goals and local development plans. The study incorporates land use, transportation, and environmental screening into one project to cohesively examine the corridor.

The study area has seen considerable development occur recently, and is becoming congested at peak times. Traffic from this development is contributing to its use as a cut-through route to avoid the signals on Cox Creek Parkway as well as to access St. Florian.

The project team worked from Fall 2017 to Winter 2018 in developing the study, and was guided by a steering committee as well as ultimately the project owner, Northwest Alabama Council of Local Governments (NACOLG). Input was obtained from the steering committee at a kick-off meeting. Concepts developed by the consultant team were refined by public review and comment during the planning process.

Planning Process

The planning process consisted of three primary phases. The following details the work that was undertaken.

Phase 1

- *Kick-off*
  - Steering Committee formation
- *Stakeholder Input*
  - The kick-off meeting served a dual role to additionally allow input from stakeholders using public engagement techniques

Phase 2

- *Traffic Data*
  - Traffic data for the study area was developed and analyzed
- *Background Mapping*
  - Existing Conditions Mapping, Existing Land Use Survey

Phase 3

- *Scenario Plans*
  - 2-3 Alternative Development Scenarios were developed with visual concepts
- *Conceptual Design and Operational Analysis*
  - A conceptual design for the corridor's land use and proposed roadway improvements were prepared, as well as preliminary cost estimates and an operational analysis conducted to measure necessity of improvement
- *Policy Guidance*
- Zoning guidance, an access amangement framework developed to chart path forward

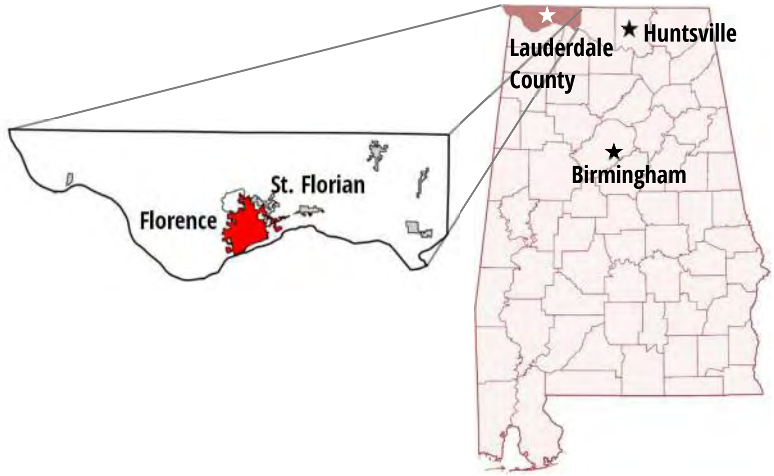
TWO: CONTEXT AND EXISTING CONDITIONS

2.1: Regional and Local Setting

Regional Setting

The Gresham and Middle Road corridor rests in Lauderdale County connecting the City of Florence and Town of St. Florian. Florence, the county seat of Lauderdale County, is located along the Tennessee River at the foothills of the Appalachian Mountains in the Shoals region. The two communities are within the northwest section of the state, approximately 75 miles west of Huntsville and 120 miles northwest of Birmingham. Other nearby cities include Muscle Shoals, Sheffield, Tuscumbia, and Killen.

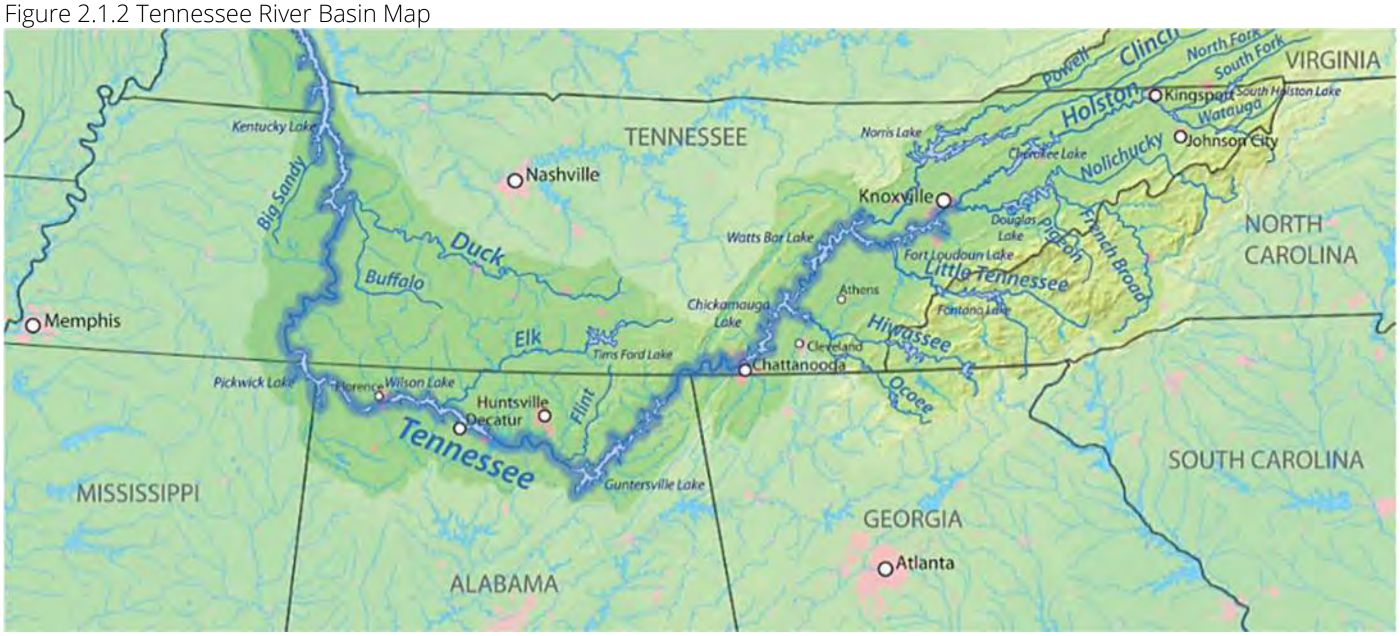
Figure 2.1.1 Regional Setting Map



The area has two major corridors running through it, U.S. Highway 72 and U.S. Highway 43. U.S. Highway 72 connects Chattanooga and Memphis, and was historically part of the Lee Highway National Auto Trail prior to U.S. Highway designation. It is also designated as Corridor V within the Appalachian Development Highway System. The corridor was slotted to become part of the Memphis-Atlanta Highway prior to construction of Interstate 22 in Mississippi. U.S. 43 has a southern terminus near Mobile with a northern terminus connecting to the Greater Nashville/Middle Tennessee region.

Not only is the area connected to the region through its roadways, but also by the nearby airport, railroad, and river, linking Lauderdale County to the country. The Northwest Alabama Regional Airport in Muscle Shoals, provides daily commercial service to Nashville and Atlanta. The area is also served by Class I rail through the Norfolk Southern Railroad. In addition, the Tennessee River runs along the south boundary of Lauderdale County.

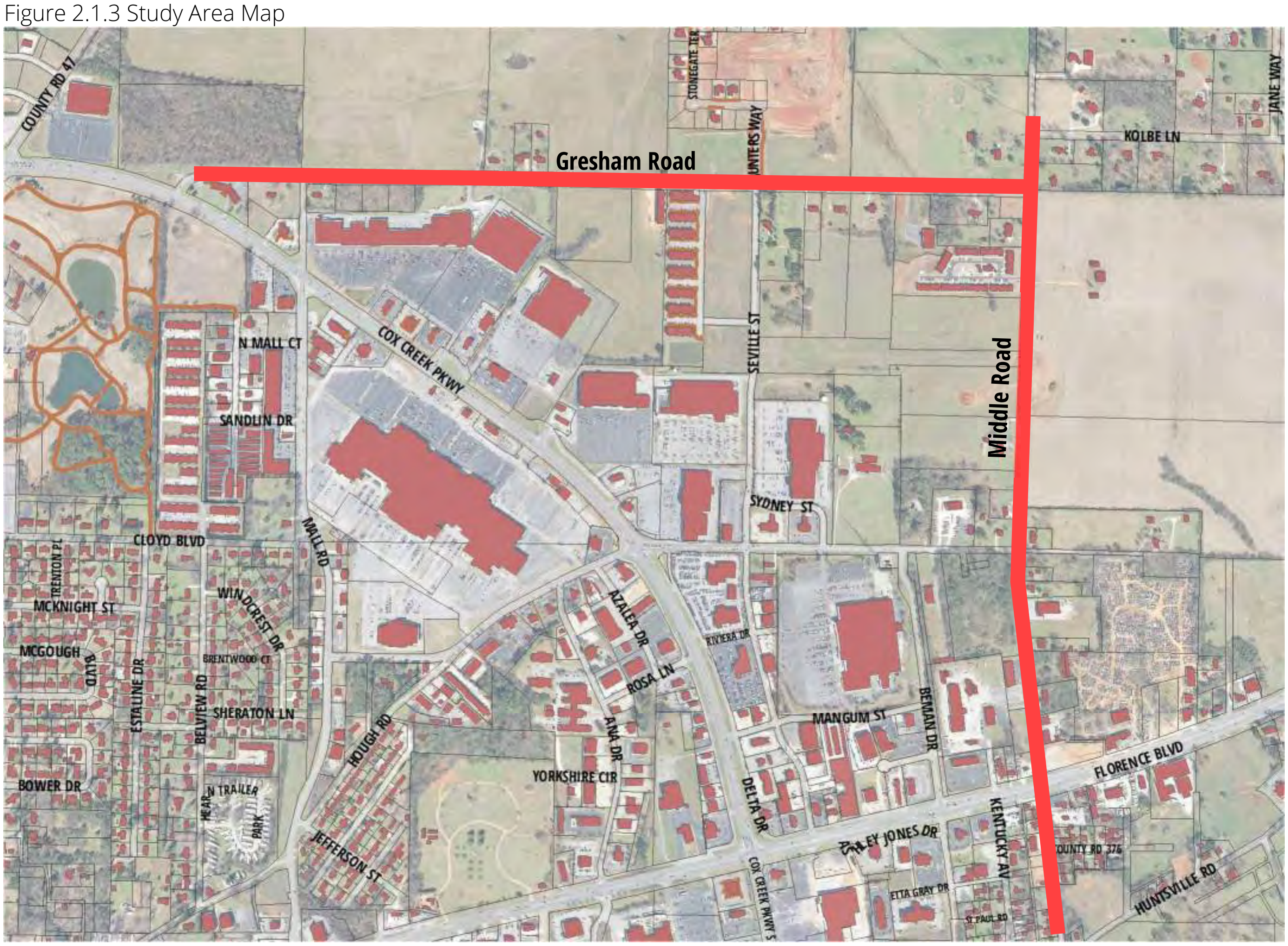
Figure 2.1.2 Tennessee River Basin Map



Local Setting

The Gresham Road and Middle Road study area stretches approximately 1.2 miles along Gresham Road from Cox Creek Parkway to Middle Road and 1.2 miles along Middle Road from Huntsville Road to Kolbe Lane. Both roadways are two-lane major collectors with a posted speed limit of 45 mph and include two (2) 10 foot lanes with no shoulders for the majority of the corridor. The eight (8) intersections located within the study area are all stop controlled only on the cross streets with the exception of the intersection at U.S. Highway 72 and Middle Road, which is signalized.

Figure 2.1.3 Study Area Map

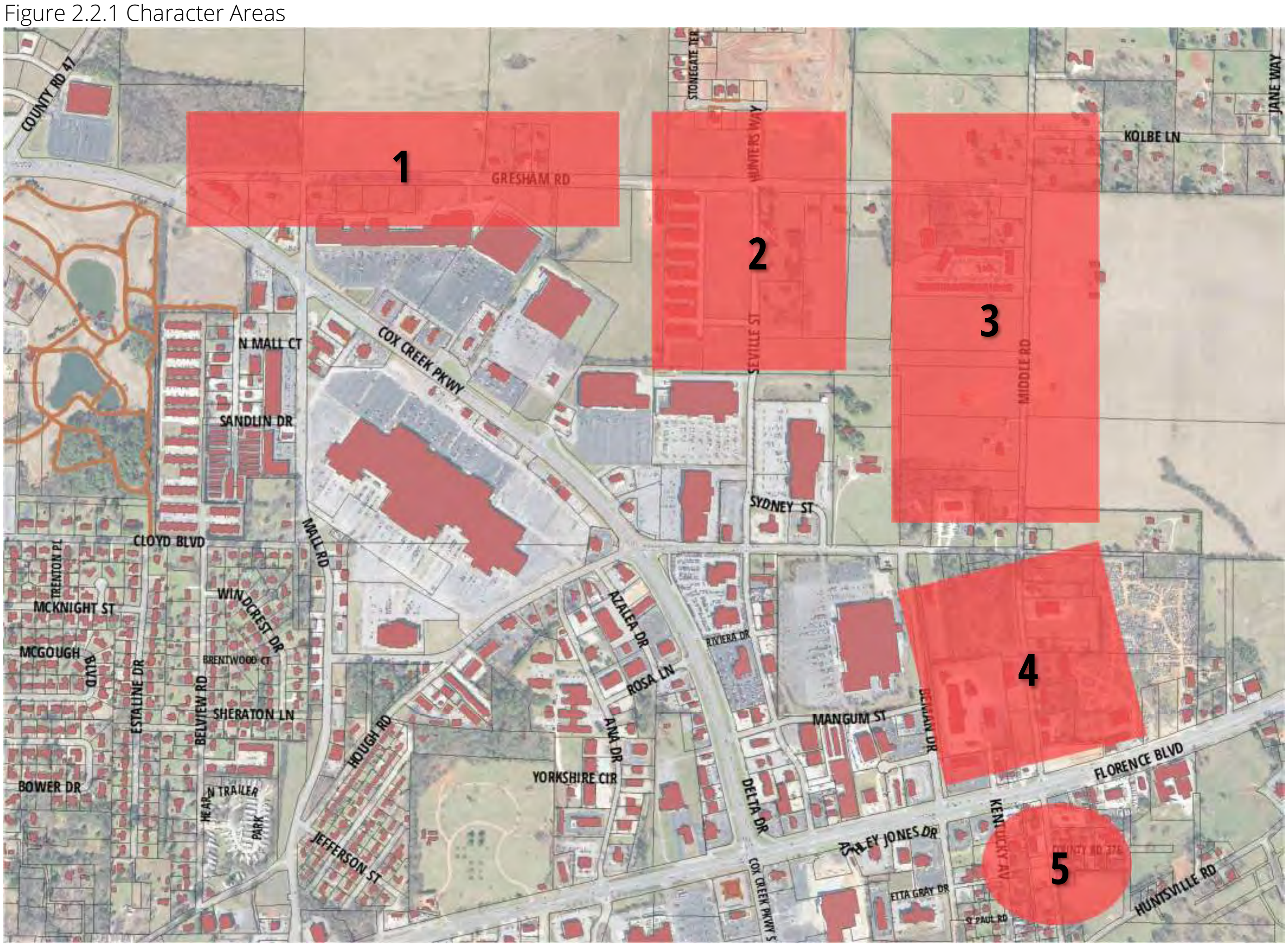


2.2: Character Area and Existing Land Use Survey

Character Area Survey

The following map indicates the distinct character areas within the study area. This data is important to understand the land use functions of distinct areas of the corridor, and how those functions may shape future land use demand. A description of each area follows.

Figure 2.2.1 Character Areas



1 - Gresham Rd: Cox Creek Parkway to Deerfield Apartments

This segment of the roadway represents the contrasts of the corridor. On the north side of the roadway, there is active pasture land and rural residential. On the south side is the fringe of the Cox Creek Shopping Center containing the region's retail hub. However, the character of the corridor is primarily rural with no development fronting onto Gresham Road except for a handful of homes. The area has significant future development potential, and is split between Lauderdale County to the north and Florence to the south.

2 - Gresham Rd: Seville Street Intersection Area

This segment is emerging as a key intersection/interface with the Cox Creek Parkway retail area. The area has seen the development of two large apartment complexes, a new subdivision, and a future church campus. Here, the corridor transitions to a distinctly suburban character. The prevailing land use pattern is one of strong intensity, but appears to be a step-down transition from the large box stores further to the south. Future development on the corridor will likely come in the form of lower intensity commercial such as office or light commercial uses that are not dependent on high visibility and traffic. This area rests mostly within Florence with the exception of the southeast portion of the intersection, which lies in St. Florian.

3 - Middle Rd: Gresham Road Intersection Area to Hough Road

This part contains the study area's intersection of greatest concern as well as one of St. Florian's key gateways. The area changes in character and feels somewhat separate from the identity of Gresham Road near Seville Street. This is likely due to the majority of the area resting in St. Florian with the exception of the southeast portion of the intersection, which is in the county. The area is a mix of agricultural uses, apartments, rural commercial, and rural residential. The southwest corner of Gresham and Middle Road is indicated for a future convenience store (currently under construction). The area is continuing to see development pressure, and will likely see additional development demand.

4 - Middle Rd: Hough Road to Florence Boulevard

The most significant asset within this area is the Lauderdale County School administration building and shop, and it rests almost entirely within Lauderdale County (outside of any city). The area transitions to a pattern of smaller parcel tracts than what is seen within other parts of the corridor. There is no prevailing land use pattern. Single-family lots within the area are parceled at a level that will make lot recombination difficult for larger developments. Development here does not appear to have been guided by zoning regulations.

A new self-storage facility along Middle Road.

5 - Middle Rd: Florence Boulevard to Hunstville Road

This area is substantially developed and appears to be in decline. Its character appears entirely distinct from the remainder of the corridor. The commercial and quasi-commercial uses appear to have a negative impact on the adjacent residential. The commercial uses include a payday lender and used car lots. The area rests solely within Lauderdale County and is not protected by zoning. Redevelopment is not likely, due to the lot sizes and the character of the area.

Existing Land Uses

The following map indicates land uses of property within the study area as of early 2018. This existing land use survey is used as a basis for all land use data in this study. A large version of the map is available. A description of each land use type follows.

Figure 2.2.2 Existing Land Uses

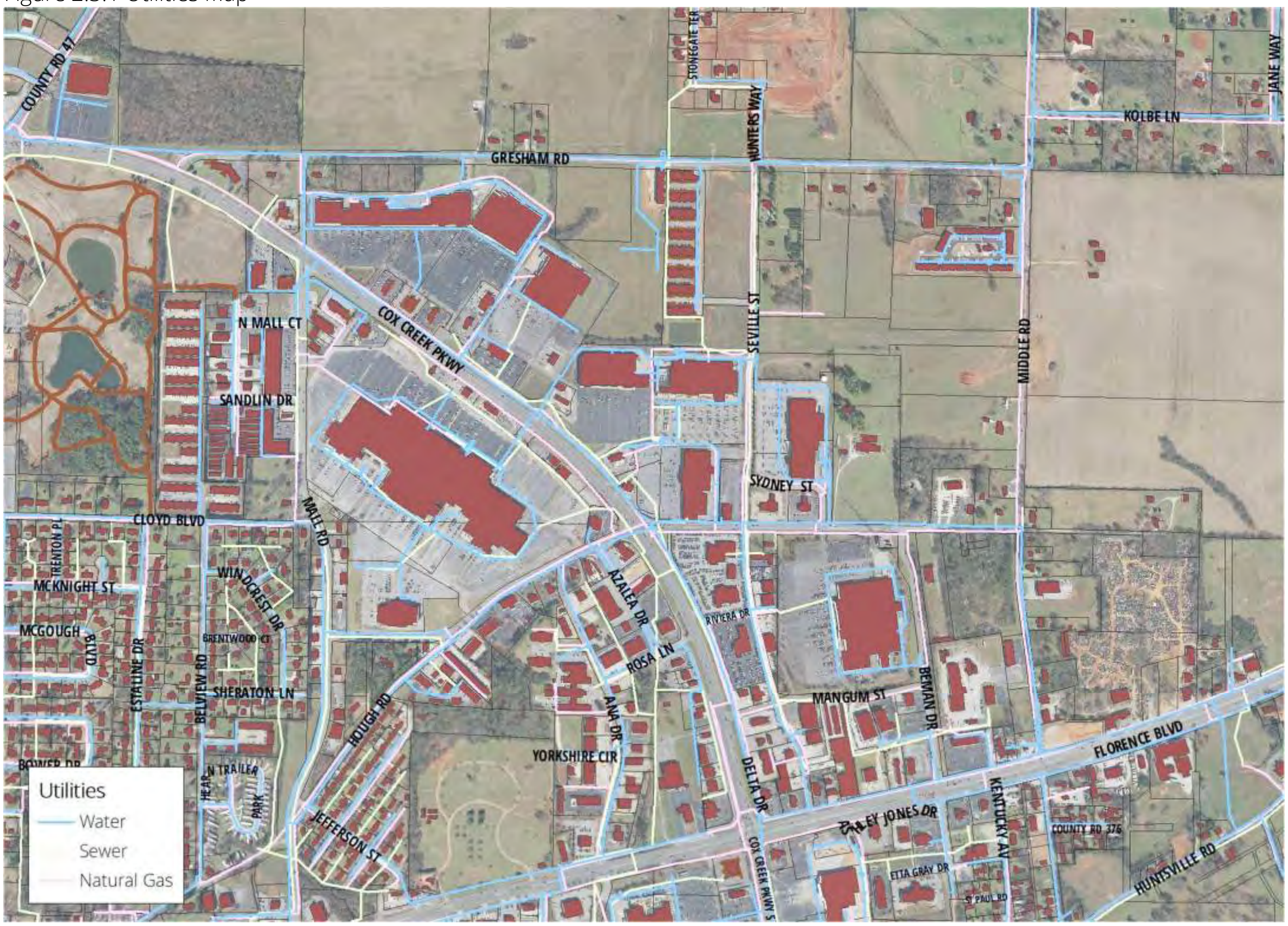
RURAL /AGRICULTURAL	Very large lot areas devoted to uses associated with the raising of crops, pasturage, or animal husbandry. May have access to city utilities.
APARTMENT	More than five units in a single structure or more than one structure on a lot. Found as suburban greenfield development with access to city utilities.
RURAL RESIDENTIAL	Primarily single-family residential uses within a rural context characterized by large unplatted lots and limited availability of sewer service.
INSTITUTIONAL /PUBLIC	Uses such as schools, hospitals, churches, or government offices. Large sites are typical with large buildings that can serve as major traffic generators. Also includes small-scale sites. Access to city utilities.
SINGLE-FAMILY RESIDENTIAL	Single-family residential uses within the context of a traditional platted subdivision with small to medium sized lots and access to all city utilities.
OFFICE	Commercial areas that are employment centers or where services are provided on-site. Typically quiet uses including lawyers, doctors, engineers, businesses, etc. Access to city utilities.
MANUFACTURED HOME RESIDENTIAL	Manufactured homes (after 1976) and mobile homes (prior to 1976) located on an individual lot or within a manufactured home park. Access to city utilities.
GENERAL COMMERCIAL	Areas of commercial development encompassing a variety of uses and contexts such as gas stations, hotels, or strip development centers. Business is conducted inside building. Access to city utilities.
RESTAURANT	Areas and sites devoted to food service that may include sit-down dining or drive-through fast food. Sites generate substantial traffic at peak times and often create access issues due to small site size. Access to city utilities.
INDUSTRIAL	Either large-scale or small-scale areas devoted to industrial uses such as warehousing, fabrication, manufacturing, processing of raw materials, etc. Access to city utilities is typical.

SMALL SCALE RETAIL	Retail uses within structures that typically range between 3,000 – 10,000 square feet and do not generate substantial amounts of traffic. Typical examples include pharmacies, stand-alone wireless stores, or specialty retail stores. Business is conducted inside building. Access to city utilities.	**UTILITY**	Sites for public and/or private utility providers such as electric substations, utility yards, treatment plants, etc.
LARGE BOX RETAIL	Retail uses within structures that typically range between 50,000 – 150,000 square feet and serve as major traffic generators. Typical examples include discount stores, multi-tenant retail centers, or department stores. Business is conducted inside building or within shielded storage areas. Access to city utilities.	**VACANT**	Areas within a suburban or urban context that do not appear to have any active uses on-site. Property may be cleared or wooded. City utilities may or may not be present.
OUTDOOR DISPLAY RETAIL	Areas of commercial development encompassing a variety of contexts. The defining characteristic is the display of merchandise outside the building. Access to city utilities	**RECREATIONAL**	Areas devoted to parks, whether public or private, or some type of recreational use. Sites are typically large with few structures. May locate on steep terrains or within floodplains.
QUASI-INDUSTRIAL	Areas of commercial use that are intensive with impacts that are similar to light industrial uses. Examples include auto repair shops, heating and air businesses, etc. Access to city utilities.		

2.3: Utilities Assessment

A high-level analysis of utility systems within the study area was conducted to understand development potential in the area and to gain a preliminary understanding of potential relocation needs. The following maps and narrative indicate utility conditions for the corridor. All existing utility data provided by the City of Florence.

Figure 2.3.1 Utilities Map



Water

Gresham Road

The entirety of Gresham Road is served by a 12-inch water line, and presumed to have adequate capacity to serve additional development. However, this depends on demands further to the northeast along Middle Road where active subdivision development is occurring. At Mall Road, it ties to a 24-inch transmission line. The Gresham Road line additionally serves the area of the Gresham/Middle intersection. It does not appear water utilities exist south of Alexander Village Apartments.

It is not anticipated that relocation of these utilities will be required with the proposed short term and long-term improvements to the roadway. However, survey data is necessary to make a definitive determination.

Middle Road

South of Hough Road, Middle Road is served by a 2-inch water line that connects to a 12-inch main on Florence Boulevard and a 6 inch line on Hough Road. Similarly, a 1.5-inch line serves the area south of Florence Boulevard to Huntsville Road. It is presumed these lines are not capable of providing fire service, and will need to be replaced to accommodate future development.

It is not anticipated that relocation of these utilities will be required with proposed short term and long-term improvements to the roadway. However, survey data is necessary to make a definitive determination.

Sewer

Gresham Road

The majority of the Gresham Road corridor does not currently have sewer services except the Seville Street intersection area. That area is served by two 8-inch PVC sewer lines. No information was available for sewer utilities in St. Florian east of Seville Street.

Preliminary analysis indicates three separate sewer basins exist along the corridor. The area east of Seville Street drains to the east and north. The area between Seville Street and Mall Road drains to the east and south and likely could be served by gravity sewer to the Seville Street line. The area west of Mall Road drains to the west and south and likely could be served by a gravity line extension from the Cox Creek Parkway line.

It is not anticipated that relocation of these utilities will be required with proposed short term and long-term improvements to the roadway. However, survey data is necessary to make a definitive determination.

Middle Road

No information was available for sewer utilities in St. Florian. However, based on development patterns, it appears sewer is present at Alexander Village Apartments.

It is does not appear sewer service exists along Middle Road south of Hough Road. The Lauderdale County School Administration building is served by an 8-inch gravity line. Elevation data appears to indicate that a lift station will be necessary to service the area unless a gravity line is ran from 1/4 mile away, east of the Florence Boulevard and Middle Road intersection.

It is not anticipated that relocation of these utilities will be required with proposed short term and long-term improvements to the roadway. However, survey data is necessary to make a definitive determination.

Natural Gas

Both Gresham and Middle Roads have existing natural gas service. The majority of the area is serviced by 2-inch low pressure lines. The area between Seville Street and Middle Road is served by a 4-inch low pressure line.

It is not anticipated that relocation of these utilities will be required with proposed short term and long-term improvements to the roadway. However, survey data is necessary to make a definitive determination.

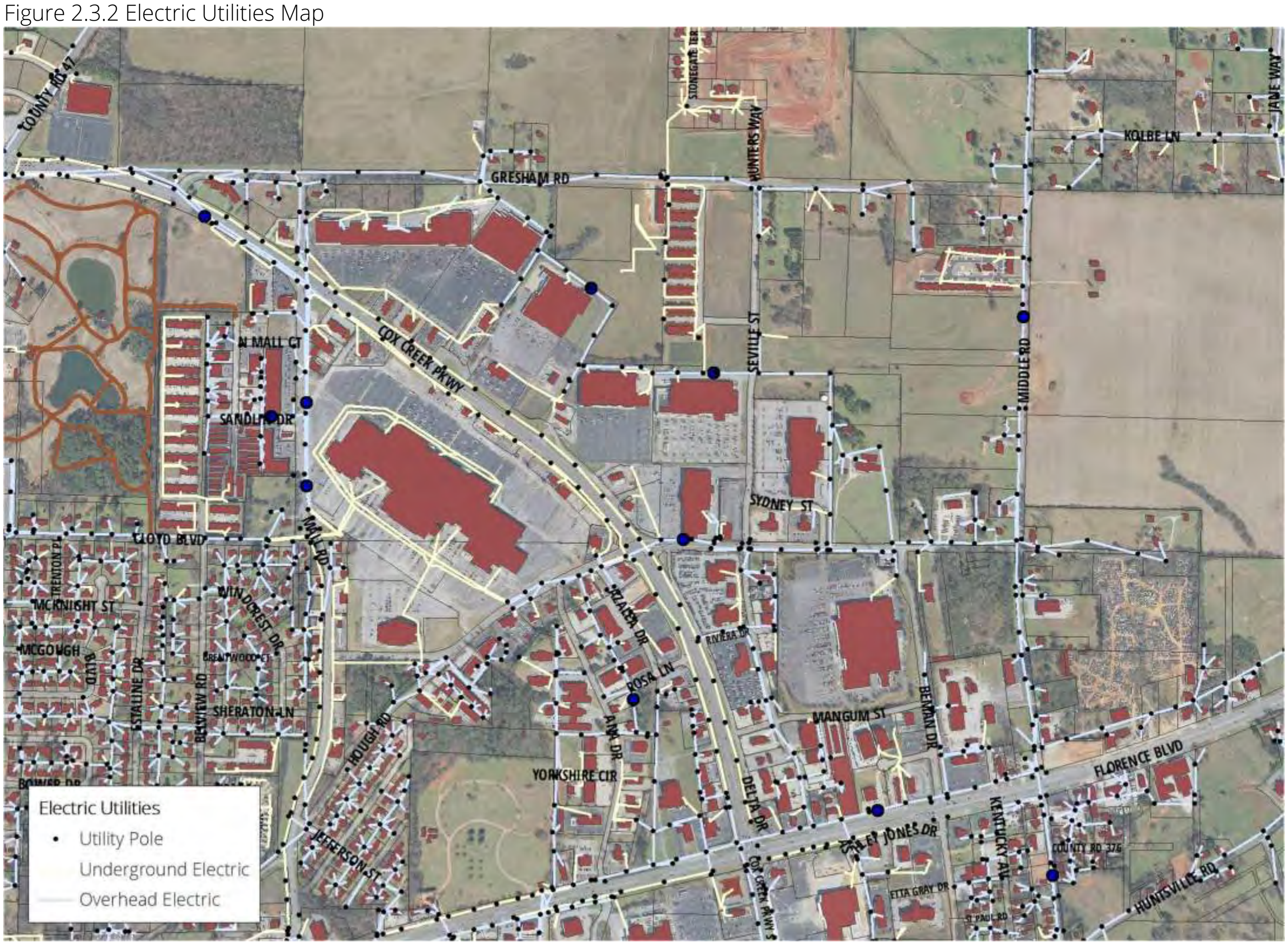
Electric

The map below indicates the location of electric lines throughout the study area. The study area is served primarily by overhead electric with recent developments having installed underground utilities. A significant 44kV transmission line runs along the north side of Gresham Road from Cox Creek Parkway to just east of the Seville Street intersecton.

It is possible relocation of these utilities will be required with the proposed short term and long-term improvements to the roadway. However, survey data is necessary to make a definitive determination.

The 44kV transmission line along Gresham Road.

Figure 2.3.2 Electric Utilities Map



2.4: Existing Transportation Conditions

The Gresham Road and Middle Road study area stretches approximately 1.2 miles along Gresham Road from Cox Creek Parkway to Middle Road and 1.2 miles along Middle Road from Huntsville Road to Kolbe Lane. Both roadways are two-lane major collectors with a posted speed limit of 45 mph and include two (2) 10-foot lanes with no shoulders for the majority of the corridor. The eight (8) intersections located within the study area are all stop controlled only on the cross streets with the exception of the intersection at U.S. Highway 72 and Middle Road which is signalized.

Garver conducted a site visit to each of the intersections to verify the existing conditions, note any existing safety and operational deficiencies, and ensure proper calibration of the Synchro models. During the site visit, no significant delays were observed in the AM peak hour at any of the study intersections. However, delays were observed for minor approaches in the PM peak hour at the Gresham Road and Middle Road intersection and at the U.S. Highway 72 and Middle Road intersection.

2.5: Evaluation of Existing Traffic Conditions

Turning movement traffic counts (24-hour in 15-minute increments) were performed for all study intersections on March 12, 2018. The existing 2018 traffic volumes for the AM and PM peak hours are shown in Figure 2.5.1.

Operational Analysis – Existing Conditions

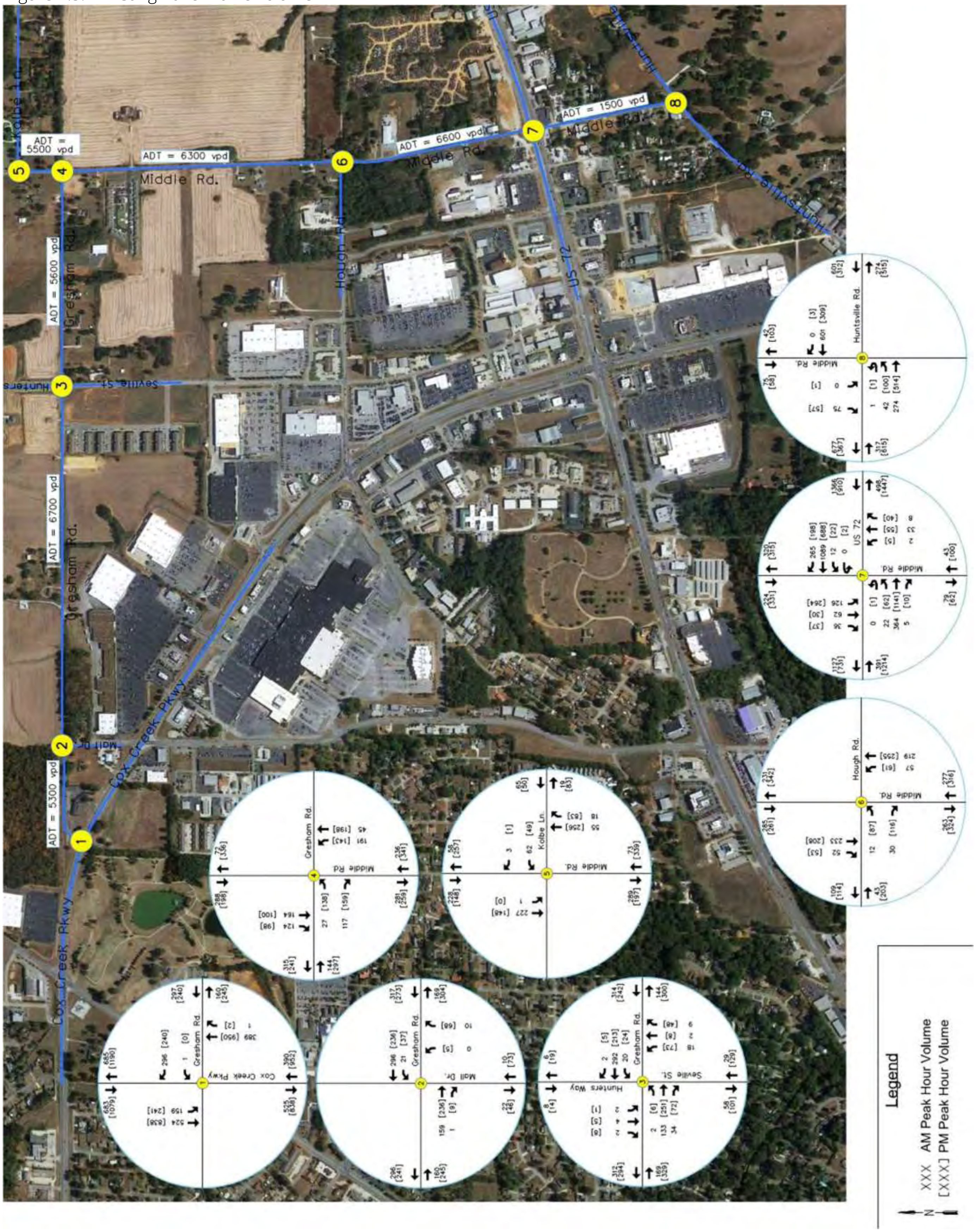
The study area was evaluated under 2018 existing conditions in order to identify the areas in greatest need of improvements. Level of Service (LOS) was the key measure of effectiveness (MOE) used for the analysis and was determined along the Gresham Road and Middle Road corridor as well as at key intersections within the study area.

LOS is a concept defined by the *Highway Capacity Manual (HCM)* to qualitatively describe operating conditions within a traffic stream. LOS is typically stratified into six categories (A through F). These range from LOS A indicating free-flow, low density, or nearly negligible delay conditions to LOS F where demand exceeds capacity and large queues are experienced. A brief description of each level of service is provided below.

- *Level of Service A: This LOS is a free flow condition, with vehicles acting nearly independently to one another. There is little or no delay.*
- *Level of Service B: This LOS is similar to LOS A, but drivers have slightly less freedom to maneuver.*
- *Level of Service C: At LOS C, density becomes more noticeable with the ability to maneuver limited by other vehicles. Speeds are at or near free flow speed.*
- *Level of Service D: This LOS is often a common goal for urban streets during peak periods and represents the lower end of stable flow. This LOS is typified by increased density and delay and severely restricted maneuverability.*
- *Level of Service E: At this LOS, the route approaches capacity where virtually no usable gaps in the traffic stream exist. Vehicle density increases such that traffic flow is unstable and speeds vary greatly.*
- *Level of Service F: At this LOS, the route has more demand than capacity. Flow is forced, and movement within the traffic stream is stop and go. Minor incidents or disruptions cause queuing that extends significant distances upstream along the roadway.*

The 2018 existing conditions were analyzed for the Gresham Road and Middle Road corridor as well as key intersections throughout the study area. These analyses are detailed in the following subsections.

Figure 2.5.1 Existing 2018 Traffic Volume



2018 Roadway Segment Analysis

Gresham Road and Middle Road are currently comprised of only two narrow lanes with no shoulders, no bicycle or pedestrian accommodations, and several driveways which disrupt the flow of traffic and generate conflict points. Under existing conditions, Gresham Road and Middle Road were analyzed as two-lane highways. Middle Road was broken into two segments: from Kolbe Lane through U.S. Highway 72, and from U.S. Highway 72 through Huntsville Road. The corridor was analyzed using Highway Capacity Software (HCS) according to the HCM methodology. For two lane highways, the LOS is defined based on percent free flow speed (PFFS) and volume-to-capacity (v/c) ratio. The results of this analysis are shown in Table 2.5.2. More detailed information is included in Appendix A.1 – Operational Analysis Results.

Table 2.5.2 Roadway Segment Analysis – 2018 Existing Conditions – *HCM* Results

Location	Segment Type	PFFS (%)				v/c Ratio				LOS			
		AM		PM		AM		PM		AM		PM	
		EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
Gresham Rd between Cox Creek Pkwy and Middle Rd	Two-Lane Highway	83.9	81.2	81.4	82.0	0.12	0.23	0.22	0.19	B	C	C	C
		NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
Middle Rd between Kolbe Ln and US-72	Two-Lane Highway	79.9	81.7	80.6	80.3	0.24	0.16	0.21	0.22	C	C	C	C
Middle Rd between US-72 and Huntsville Rd	Two-Lane Highway	90.9	90.9	89.9	88.8	0.03	0.06	0.07	0.05	B	B	B	B

According to the results of this analysis, roadway segments along Gresham Road and Middle Road performed sufficiently under existing conditions with LOS C or better during both the AM and PM peak periods. The segment analysis indicate that operational issues on Gresham Road and Middle Road are intersection related.

2018 Intersection Analysis

The key intersections within the study area were analyzed based on existing conditions using the *Synchro 10* software according to the *HCM* methodology. For signalized intersections, analysis was also performed according to the *Synchro* methodology. The delay and LOS results are summarized in Tables 2.5.3 and 2.5.4. More detailed information is included in Appendix A.1 – Operational Analysis Results.

Delay and LOS Results

Based on the 2018 intersection analysis, all intersections along Gresham Road and Middle Road experienced sufficient LOS conditions for all movements during the AM peak hour. In the PM peak hour, adequate LOS were also shown for all unsignalized intersections with the exception of the Gresham Road and Middle Road intersection. This intersection showed inadequate LOS E performance for the eastbound approach. Field observations confirmed that this approach experienced delays and queues up to 12 vehicles during the PM peak hour. It should be noted that the analysis were calibrated to accurately reflect this situation. The signalized intersection of Middle Road and U.S. Highway 72 showed LOS C or better for all movements in the PM peak hour according to the *HCM* methodology. However, as shown in Table 2.6.4, the southbound approach performed poorly with LOS E according to the *Synchro* methodology which better reflects the existing conditions. Delays and queues up to 17 vehicles were observed in the field during the PM peak hour.

Table 2.5.3 Intersection Analysis – 2018 Existing Conditions – *HCM* Results

Intersection	Time Period	Control	MOE	EB Movement Left	EB Thru	EB Right	WB Movement Left	WB Thru	WB Right	NB Movement Left	NB Thru	NB Right	SB Movement Left	SB Thru	SB Right	Overall
Gresham Road at Cox Creek Parkway	AM	One-Way Stop	LOS	A	n/a[1]			n/a[1]					B			A
			Delay	8.9	n/a[1]			n/a[1]					13.2			3.9
	PM		LOS	B	n/a[1]			n/a[1]					C			A
			Delay	13.8	n/a[1]			n/a[1]					19.7			3.6
Gresham Road at Mall Drive	AM	One-Way Stop	LOS		n/a[1]		A	A		A						A
			Delay		n/a[1]		7.7	0.0		9.3						0.5
	PM		LOS		n/a[1]		A	A		B						A
			Delay		n/a[1]		7.9	0.0		10.7						1.8
Gresham Road at Seville Street	AM	Two-Way Stop	LOS	A	n/a[1]		A	A		C	B		B			A
			Delay	8.0	n/a[1]		7.7	0.0		16.6	10.2		14.0			1.3
	PM		LOS	A	n/a[1]		A	A		C	B		B			A
			Delay	7.7	n/a[1]		8.0	0.0		19.4	11.1		12.1			3.4
Gresham Road at Middle Road	AM	One-Way Stop	LOS	C						A	A			n/a[1]		A
			Delay	17.7						8.8	0.0			n/a[1]		6.4
	PM		LOS	E						A	A			n/a[1]		B
			Delay	35.7						8.0	0.0			n/a[1]		14.1
Middle Road at Kolbe Lane	AM	One-Way Stop	LOS				B				n/a[1]		A	A		A
			Delay				13.4				n/a[1]		7.4	0.0		2.4
	PM		LOS				B				n/a[1]		A	A		A
			Delay				14.3				n/a[1]		0.0	0.0		1.3
Middle Road at Hough Road	AM	One-Way Stop	LOS	A						A	B			n/a[1]		A
			Delay	8.2						0.0	13.3			n/a[1]		1.7
	PM		LOS	C						A	A			n/a[1]		A
			Delay	19.7						8.0	0.0			n/a[1]		5.7
Middle Road at US-72	AM	Signal	LOS	B	B	n/a[2]	B	B	n/a[2]	B	A	A	C	A	A	B
			Delay	14.7	12.1	n/a[2]	10.4	19.2	n/a[2]	18.4	0.0	0.0	23.9	0.0	0.0	18.2
	PM		LOS	B	B	n/a[2]	B	B	n/a[2]	B	A	A	C	A	A	B
			Delay	11.6	19.2	n/a[2]	15.0	15.6	n/a[2]	19.7	0.0	0.0	30.1	0.0	0.0	19.5
Middle Road at Huntsville Road	AM	One-Way Stop	LOS	A	A			n/a[1]					B			A
			Delay	9.2	0.0			n/a[1]					14.7			1.5
	PM		LOS	A	A			n/a[1]					B			A
			Delay	8.3	0.0			n/a[1]					11.2			1.5

n/a[1]: Free movement; no delay reported
n/a[2]: HCM 6th Edition methodology does not calculate delay for yield-controlled channelized right at a signalized intersections

Table 2.5.4 Intersection Analysis – 2018 Existing Conditions – Synchro Results

Intersection	Time Period	Control	MOE	EB Movement Left	EB Thru	EB Right	WB Movement Left	WB Thru	WB Right	NB Movement Left	NB Thru	NB Right	SB Movement Left	SB Thru	SB Right	Overall
Middle Road at US-72	AM	Signal	LOS	A	B	A	A	C	A	C			C			B
			Delay	7.9	10.4	0.0	6.8	20.6	2.7	21.8			33.1			17.5
	PM		LOS	A	C	A	A	B	A	B			E			C
			Delay	8.9	21.0	0.0	8.4	18.6	2.9	19.0			57.5			23.1

Safety Analysis

Crash data from 2012 to 2016, was provided for Gresham Road and Middle Road within the study area. Based on the data provided, 18 crashes occurred during the four study years with 9 crashes along Gresham Road and 9 crashes along Middle Road. This averages to 2.25 crashes per year for each roadway. The crashes occurred due to various causes such as failure to yield, following too close, and DUI to name a few. Crash rates for the corridor were calculated using this data as described in the following section.

Crash Rates

Average crash rates were calculated for the four years of crash data in order to evaluate the safety performance of Gresham Road and Middle Road within the study area as compared with the statewide crash rate. The statewide crash rate for Alabama was determined based on crash data from the 2016 Crash Facts published by Alabama

Department of Transportation (ALDOT). Crash rates are expressed as crashes per million vehicle-miles traveled (MVM). For this analysis, Middle Road was broken into two segments: from Kolbe Lane through U.S. Highway 72, and from U.S. Highway 72 through Huntsville Road due to the significant difference in average daily traffic (ADT) volume between the two sections. As shown in Table 2.5.5, the corridor crash rate for Gresham Road and Middle Road were lower than the Alabama statewide crash rate.

Table 2.5.5 Gresham Road and Middle Road Corridor Crash Rates

Corridor	Length (miles)	ADT	Number of Crashes	Crash Rate	AL Crash Rate	Crash Rate/AL Crash Rate
			All Severity Types	All Severity Types (per MVM)	All Severity Types (per MVM)	All Severity Types
Gresham Rd between Cox Creek Pkwy and Middle Rd	1.20	6,700	9	0.77	2.24	0.34
Middle Rd between Kolbe Ln and US-72	0.80	6,600	8	1.04	2.24	0.46
Middle Rd between US-72 and Huntsville Rd	0.30	1,500	1	0.57	2.24	0.25

2.6: Traffic Conclusions

The traffic analyses showed poor operating conditions for the eastbound approach at Gresham Road and Middle Road intersection and for the southbound approach at Middle Road and U.S. Highway 72 intersection in 2018. Without improvements to the intersections, operating conditions will further deteriorate.

With continued population growth and development, the traffic demands on this corridor will only increase. Analysis of the future No Build conditions will need to be conducted to evaluate the existing transportation network with the preferred future land use and development concept along the corridor.

THREE: FUTURE ANALYSIS AND DESIGN CONCEPTS

3.1: Land Use and Development Plans

Corridor Development and Growth Assessment

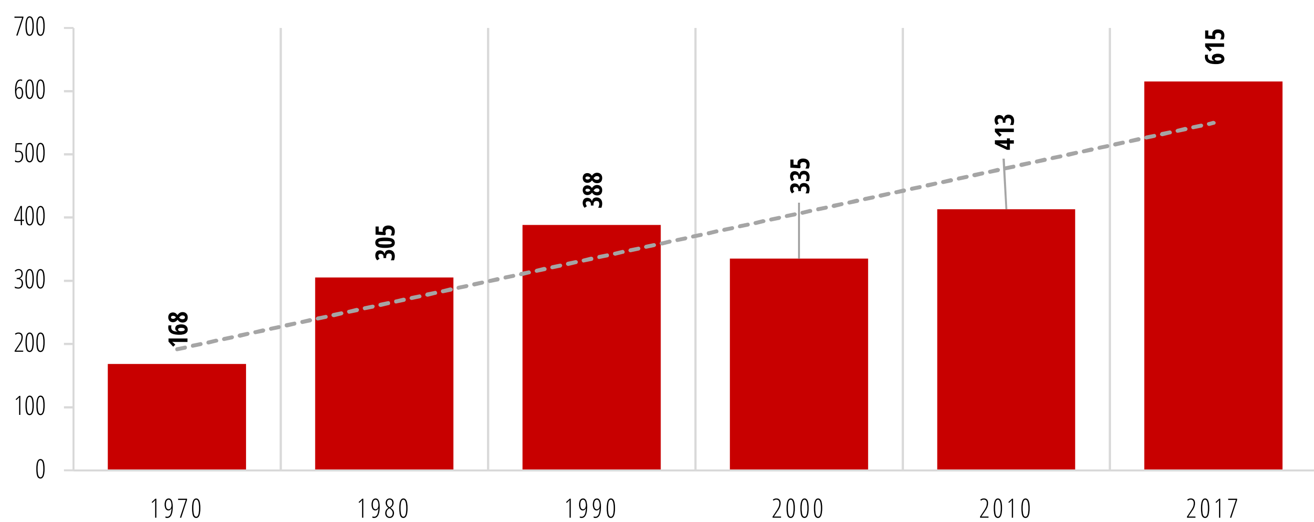
Development is popping up along the corridor.

Growth demand along the corridor is apparent. Recent development in the study area includes new market rate and senior apartments, a self-storage facility, and gas station among others. The area contains large tract greenfields in close proximity to the regional retail and dining hub, a magnet to pulling new development into the area. This is occurring at a rapid pace despite slow local and regional growth. This effect can be seen by observing regional growth trends.

Figure 3.1.1 indicates the population trends for St. Florian since 1970. The community has seen a large uptick in population growth since 2010. Florence has seen growth as well. This is despite near stagnation of population change in the Shoals region (Figure 3.1.2). This means growth in the study area is likely the result of population migration from within the region. This also makes predicting growth rates very difficult.

Because of this pattern of population shift, growth in the study area is largely dependent upon the availability of land and cost of development. If cost outlays for infrastructure and land are too high, development could easily stop and be absorbed elsewhere. Development also can't occur if property owners don't wish to make land available.

Figure 3.1.1 St. Florian Population Trends



Due to these cost and migration factors, growth will likely occur near the Seville Street intersection most quickly. Land in this area has ready access to water and sewer infrastructure. Gravity sewer is in very close proximity, and much of the land will not require costly lift stations to enable development.

Figure 3.1.2 Regional Population Trends

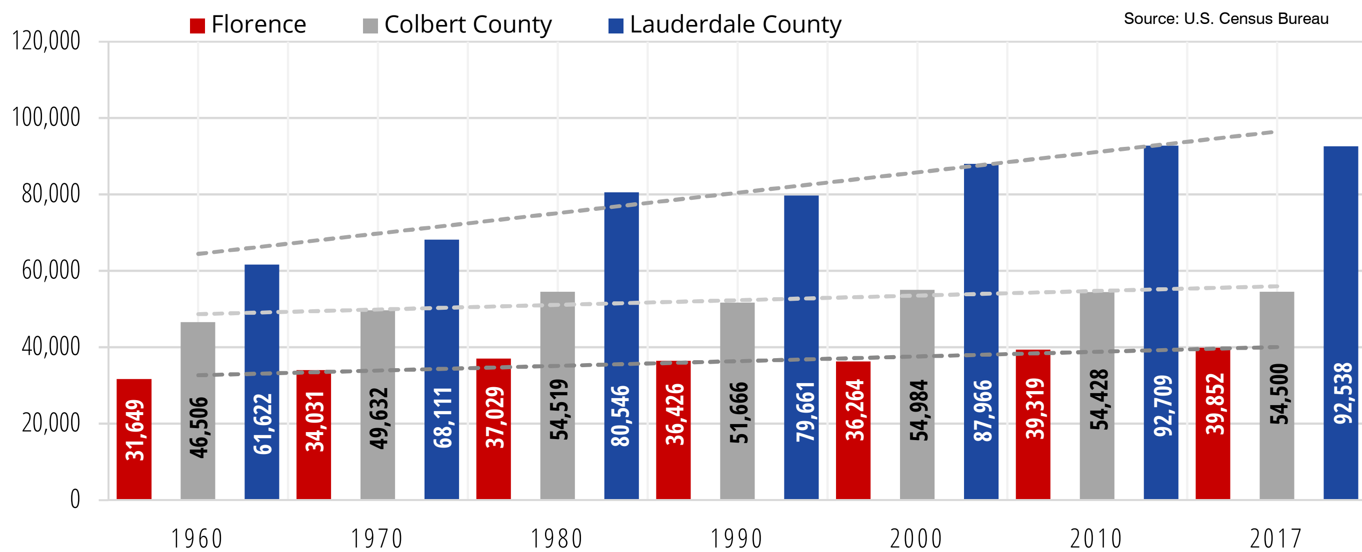
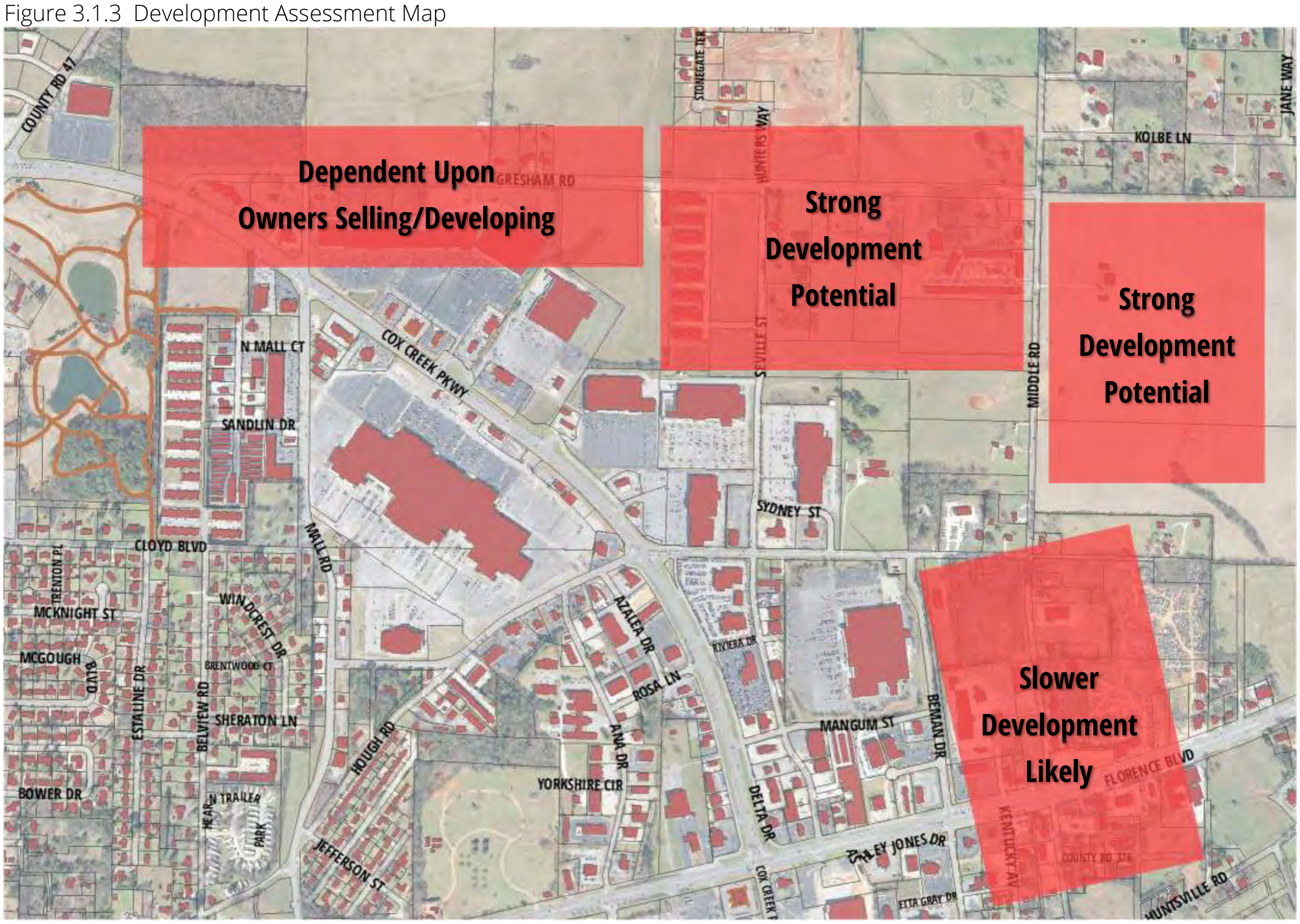


Figure 3.1.3 Development Assessment Map



In other parts of the study area, existing uses and lack of utilities will likely stunt growth potential. Middle Road south of Hough Road lacks easy access to sewer (1/4 mile to the east) that may require costly lift stations to service. Additionally, a junk yard in the county along the route discourages private investment. Negative externalities from the site as well as a lack of zoning protection has created uncertainty for investors, and will likely delay or drive away development. However, it may not discourage lower market value development like auto repair shops, etc.

Development on western portions of Gresham Road will be driven by land owner decisions. Nearly 200 acres near the corridor, part of larger land tracts, are held in ownership by two families. Market conditions, potential desires to retain family land, and other factors will dictate when and if these lands develop. Predicting these decisions is difficult. Any development is likely to be residential. As a result, overall market supply and supply within the potential segment, likely the $200,000-$300,000 range, will also drive those development decisions.

Land Use Scenarios and Development Concepts/Public Involvement

Three land use scenarios were developed to explore alternatives for how the study area could develop. The scenarios indicate land uses, building form types, development character, access, and regulatory approach. Developed as clear, differentiable alternatives, the land use alternatives were presented to the public. Community members were provided an opportunity to review the alternatives and voice preferences. Comment forms were provided and responses were collected at the meeting and electronically following the meeting. The input received resulted in a clear consensus choice of the Managed Growth Alternative as the preferred alternative. See Appendix A.2 – Public Involvement for the public involvement meeting comments.

Figure 3.1.4 Managed Growth Land Use Alternative

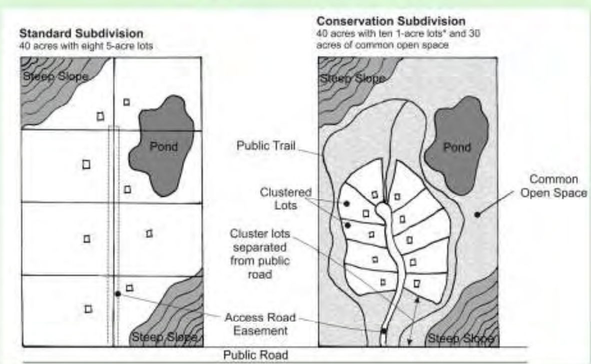
Figure 3.1.5 Rural Character Alternative

Rural Character Alternative

Character:

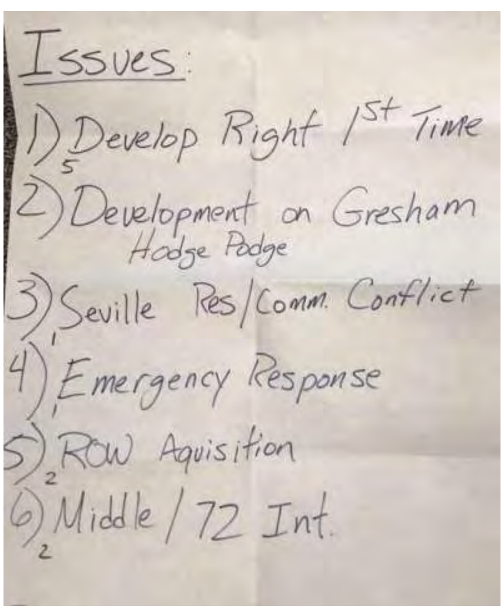
. Rural/Large Lot Single-Family Development (Septic)
. Conservation Development (Rural + Open Space Preservation)
. Little or no additional Commercial Development
. Little or no Access Management of Driveways (Shared Driveways)
. Extension of Sewer Strongly Discouraged
. Shared Regulation between Lauderdale County, St. Florian, Florence

Conservation Subdivisions



Agricultural/Rural Uses

Rural Single Family



The Managed Growth Alternative was selected as the preferred alternative. The alternatives presented were informed by input provided (left) early on at the project kickoff meeting involving numerous corridor stakeholders.

Figure 3.1.6 Market Driven Alternative

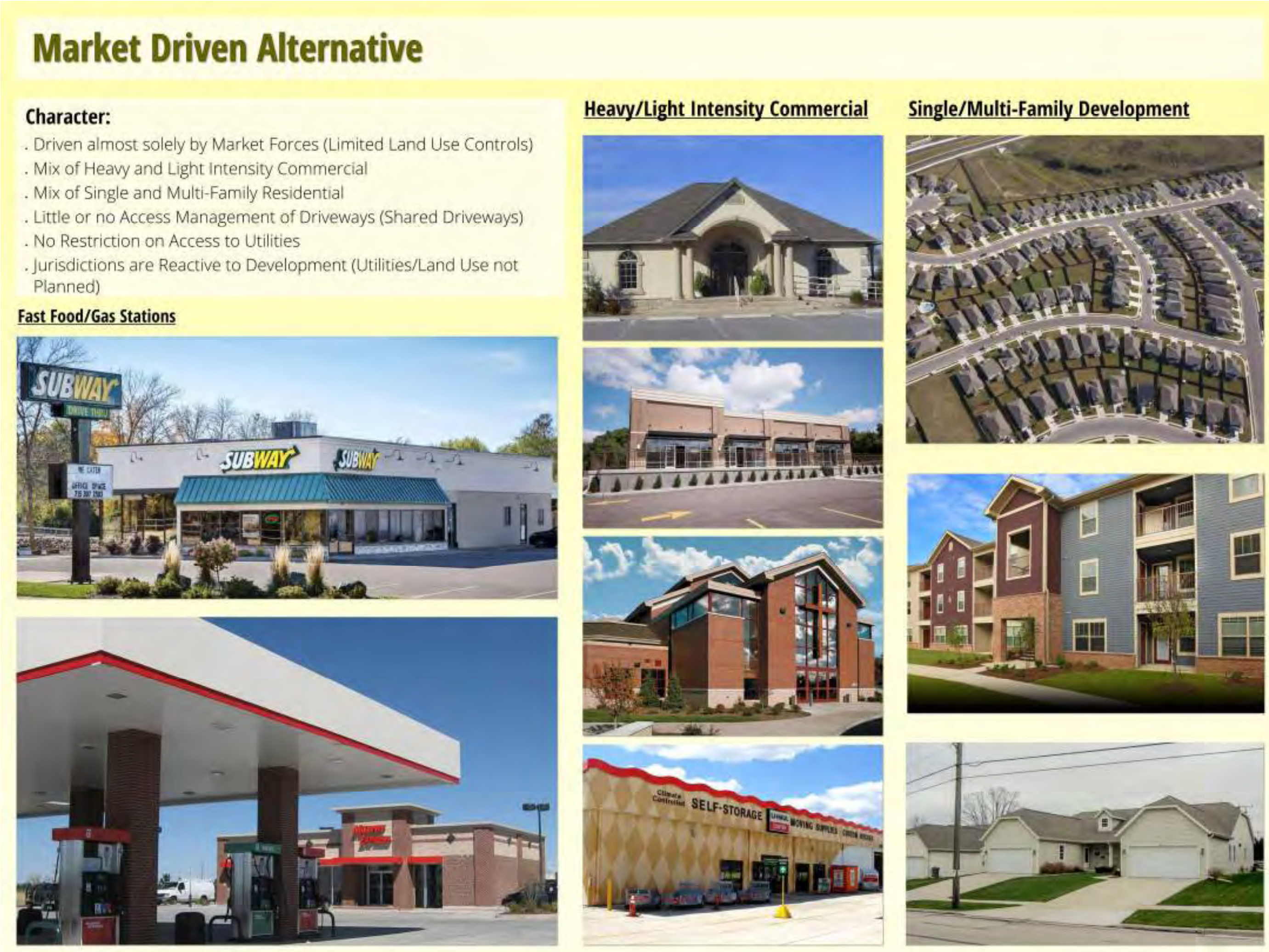
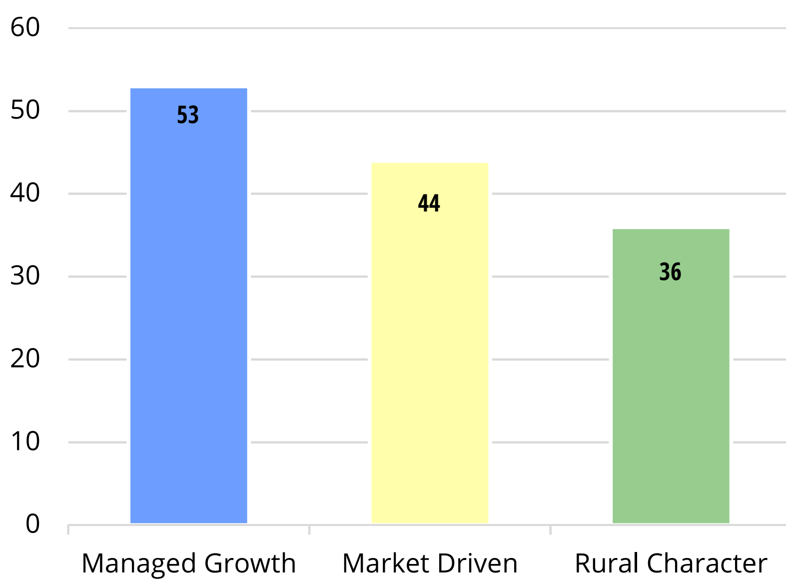


Figure 3.1.7 Land Use Scenario Voting Scores (Weighted)



Scores are weighted. (1st choice = 3, 2nd choice = 2, 3rd choice = 1)

Development Concepts

Based on the preferred alternative, a series of development concepts were assembled to demonstrate "real world proofing" of the scenario, indicating building forms, parking, and access controls.

Figure 3.1.8 Gresham Road – Eastern End

*Gas station site does not represent actual development plan. Development plans were not provided.

Figure 3.1.9 Gresham Road – Western End

Land Use Projections

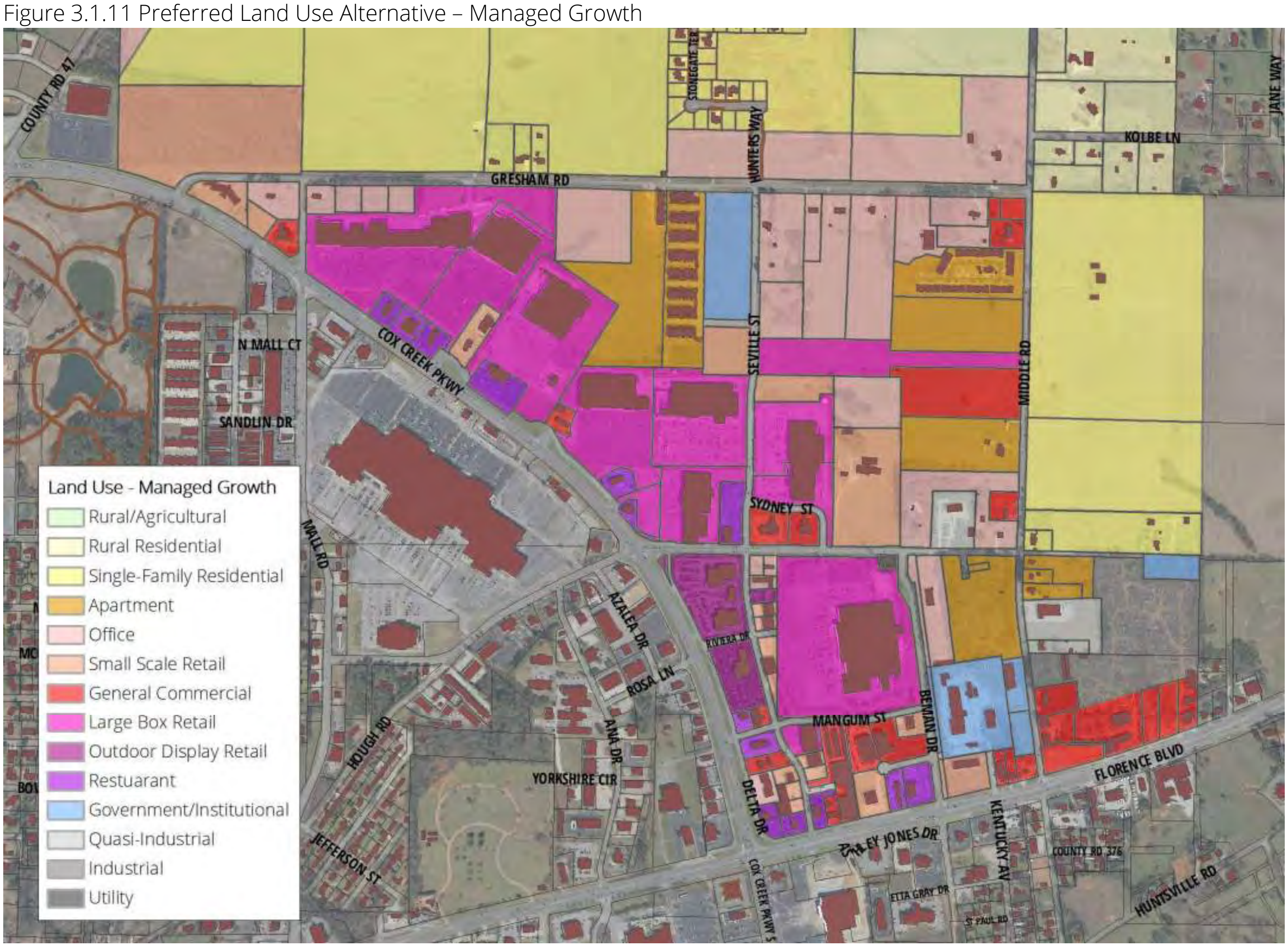
Build out analysis of the study area was conducted to determine development capacity. Table 3.1.10 indicates land use capacities for property along the corridor that is not already developed. It is anticipated the land supply for the corridor will extend beyond the 20-year horizon for this study. What is clear, the study area has a great deal of capacity to support additional development, including an additional 3,000 people. Much of the commercial space is indicated as low intensity commercial/office.

> *Build out projections for the corridor area indicate significant capacity for development that will likely take longer to absorb than the 20-year horizon of this study.*

Table 3.1.10 Land Use Calculations – Build Out

Land Use Type	New Square Footage	Dwelling Units
Commercial/Office	1,024,914 square feet	X
Institutional	53,800 square feet	X
Apartments	X	480 dwellings (1,056 people)
Single-Family Residential	X	703 dwellings (1,968 people)

Figure 3.1.11 Preferred Land Use Alternative – Managed Growth



3.2: Traffic Analysis of Future Conditions

Traffic Projections

An exponential growth rate of 1% was applied to the 2018 traffic volumes in order to develop 2038 background growth volumes. The growth rate was determined based on census information for the Florence area.

Trip Generation

Trips from the preferred land use option were generated based on the ITE Trip Generation Manual, 10th Edition. Table 3.2.1 displays the land uses which will impact the future traffic along Gresham Road and Middle Road and the associated trips generated for the land uses. These figures do not assume full build out, as build out is anticipated to exceed the 20-year study horizon.

Table 3.2.1 Projected Traffic Generation

Development Type	Size	Unit	ITE Land Use Code	Daily			AM			PM		
				Total	Entering	Exiting	Total	Entering	Exiting	Total	Entering	Exiting
Apartment	242	Dwelling Units	220 - Multifamily Housing (Low-Rise)	5,282	2,641	2,641	226	52	174	406	256	1
Office	21,644	Square Feet	710 - General Office	8,147	4,074	4,074	892	767	125	865	138	727
Single-Family Residential	310	Dwelling Units	210 - Single-Family Detached Housing	5,708	2,854	2,854	429	107	322	575	362	213
Government/Institutional	53,801	Square Feet	560 - Church	442	221	221	22	13	9	32	15	1
General Commercial	5,417	Square Feet	814 - Variety Store	5,954	2,977	2,977	345	205	140	385	197	189
Rural Residential	8	Dwelling Units	210 - Single-Family Detached Housing	102	51	51	10	3	8	9	6	
Large Box Retail	76,571	Square Feet	815 - Free-Standing Discount Store	4,067	2,034	2,034	90	62	28	307	153	153
Quasi-Industrial	4,394	Square Feet	110 - General Light Industrial	75	37	37	4	4	1	4	1	4

The trips generated from the preferred land use option were then distributed based on existing traffic patterns. The total trips generated were added to the 2038 background growth volumes to determine 2038 Design Volume shown in Figure 3.2.4. It should be noted that 60% build out of the land uses from the preferred land use option was assumed built by design year 2038.

Operational Analysis

No Build Conditions

For the 2038 No Build Conditions, no roadway improvements were assumed. The corridor was analyzed using Highway Capacity Software (HCS) and the intersections were analyzed using the Synchro 10 software according to the HCM methodology. The 2038 Design Volumes were used for the analysis. The results of the analysis are summarized in Tables 3.2.2 and 3.2.3. The complete results are provided in Appendix A.1 – Operational Analysis Results.

Table 3.2.2 Roadway Segment Analysis – 2038 No Build Conditions – HCM Results

Location	Segment Type	PFFS (%)				v/c Ratio				LOS			
		AM		PM		AM		PM		AM		PM	
		EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
Gresham Rd between Cox Creek Pkwy and Middle Rd	Two-Lane Highway	74.4	72.8	72.1	71.9	0.33	0.47	0.43	0.44	D	D	D	D
		NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
Middle Rd between Kolbe Ln and US-72	Two-Lane Highway	68.6	70.4	70.2	69.8	0.56	0.34	0.43	0.46	D	D	D	D
Middle Rd between US-72 and Huntsville Rd	Two-Lane Highway	84.9	87.7	85.5	83.3	0.07	0.11	0.11	0.08	B	B	B	B

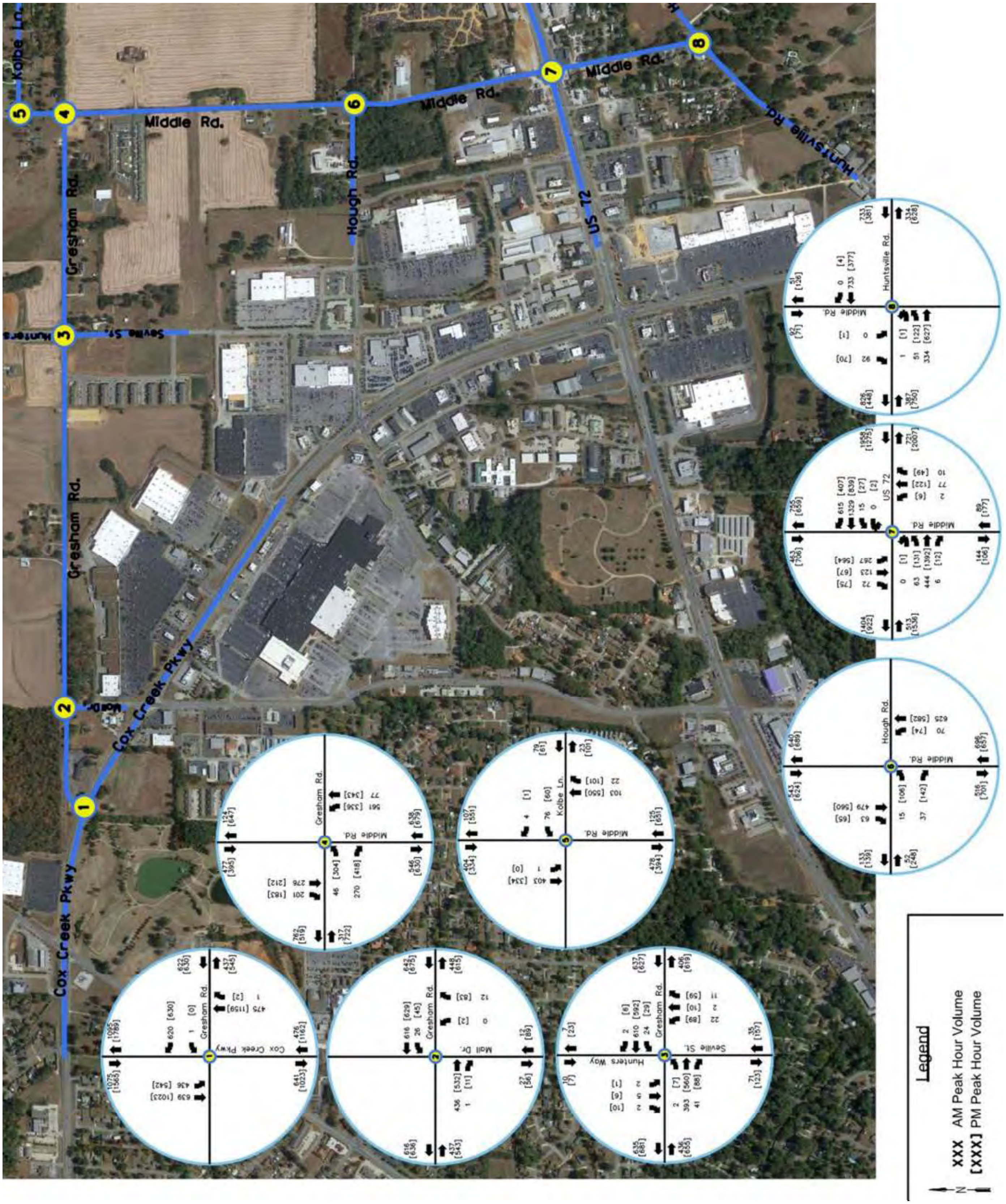
According to the results of the segment analysis, roadway segments along Gresham Road and Middle Road performed adequately in the 2038 No Build conditions with LOS D or better during both the AM and PM peak periods. However, the intersection analysis showed most of the study intersections experienced movements with inadequate performance. Several intersections experienced overall failing LOS F conditions during one or more peak periods. The intersections of Gresham Road at Cox Creek Parkway, Gresham Road at Seville Street, Gresham Road at Middle Road, and Middle Road at Hough Road showed significant delays for the stop-controlled movements.

Table 3.2.3 Intersection Analysis – 2038 No Build Conditions – HCM Results

Intersection	Time Period	Control	MOE	EB Movement			WB Movement			NB Movement			SB Movement			Overall
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Gresham Road at Cox Creek Parkway	AM	One-Way Stop	LOS	B	n/a[1]			n/a[1]					F			C
			Delay	11.8	n/a[1]			n/a[1]					50.0			16.7
	PM		LOS	F	n/a[1]			n/a[1]					F			F
			Delay	88.0	n/a[1]			n/a[1]					311.0			72.6
Gresham Road at Mall Drive	AM	One-Way Stop	LOS		n/a[1]		A	A		B						A
			Delay		n/a[1]		8.6	0.0		11.8						0.3
	PM		LOS		n/a[1]		A	A		C						A
			Delay		n/a[1]		8.9	0.0		18.4						1.6
Gresham Road at Seville Street	AM	Two-Way Stop	LOS	A	n/a[1]		A	A		F	B		D			A
			Delay	9.3	n/a[1]		8.6	0.0		70.0	14.9		34.3			2.0
	PM		LOS	A	n/a[1]		A	A		F	C		C			C
			Delay	8.9	n/a[1]		9.2	0.0		289.6	18.5		24.9			19.1
Gresham Road at Middle Road	AM	One-Way Stop	LOS	F						C	A			n/a[1]		F
			Delay	5376.3						19.4	0.0			n/a[1]		1194.8
	PM		LOS	F						A	A			n/a[1]		F
			Delay	3092.6						9.7	0.0			n/a[1]		1246.1
Middle Road at Kolbe Lane	AM	One-Way Stop	LOS				C				n/a[1]		A	A		A
			Delay				23.5				n/a[1]		7.6	0.0		3.1
	PM		LOS				E				n/a[1]		A	A		A
			Delay				38.8				n/a[1]		0.0	0.0		2.3
Middle Road at Hough Road	AM	One-Way Stop	LOS	E						A				n/a[1]		A
			Delay	47.8						9.3				n/a[1]		2.4
	PM		LOS	F						A				n/a[1]		F
			Delay	549.7						9.3				n/a[1]		89.6
Middle Road at US-72	AM	Signal	LOS	C	B	n/a[2]	A	C	n/a[2]	C	A	A	F	A	A	D
			Delay	20.0	10.9	n/a[2]	9.7	24.5	n/a[2]	26.1	0.0	0.0	117.6	0.0	0.0	39.7
	PM		LOS	B	C	n/a[2]	B	B	n/a[2]	C	A	A	F	A	A	F
			Delay	12.2	23.0	n/a[2]	17.6	15.9	n/a[2]	27.8	0.0	0.0	473.0	0.0	0.0	118.1
Middle Road at Huntsville Road	AM	One-Way Stop	LOS	A	A			n/a[1]					C			A
			Delay	9.9	0.0			n/a[1]					18.1			1.8
	PM		LOS	A	A			n/a[1]					B			A
			Delay	8.6	0.0			n/a[1]					12.2			1.6

These results show that improvements to the study intersections will be necessary in order to accommodate the anticipated future volumes.

Figure 3.2.4 Projected Traffic Generation



Build Conditions

In order to provide additional capacity, improve traffic flow, and improve safety, Gresham Road and Middle Road will be widened from a two-lane with no shoulders to a two-lane with a center turn lane and a four-lane with a center turn lane, respectively. Both corridors will have curb and gutter, sidewalks, and bike lanes along both sides. Along with these improvements, intersection improvements are recommended.

In the build conditions, Gresham Road will no longer tie to Cox Creek Parkway. Gresham Road traffic currently using the intersection of Gresham Road and Cox Creek Parkway is assumed to use the Cox Creek Parkway and Mall Road intersection to access Gresham Road.

For the build analysis, signal control and roundabouts were considered for the intersections of Gresham Road at Seville Street and Gresham Road at Middle Road. A roundabout was also analyzed for the intersection of Gresham Road at Mall Road

The intersections were analyzed using the *Synchro 10* software according to the *HCM* methodology. The 2038 Design Volumes were used for the analysis. The delay and LOS results are summarized in Table 3.2.3. The complete results are provided in Appendix A.1 – Operational Analysis Results.

The results of this analysis demonstrate that all intersections will operate at overall LOS D or better during both 2038 peak periods with the proposed improvements. For the intersection of Middle Road and US-72, several movements are shown to perform at LOS E during the PM peak hour. Results also show both the signal control and roundabouts proposed at the intersections of Gresham Road at Seville Street and Gresham Road at Middle Road to perform adequately. At the intersection of Gresham Road and Middle Road, the roundabout performed at a better overall LOS when compared to the signal control.

The traffic analyses showed poor operating conditions for the eastbound approach at Gresham Road and Middle Road intersection and for the southbound approach at Middle Road and US-72 intersection in 2018. Without improvements to the intersections, operating conditions will further deteriorate.

With continued population growth and development, the traffic demands on this corridor will only increase. Analysis of the No Build conditions was conducted to evaluate the existing transportation network with the preferred land use concept along the corridor. Results of the No Build analysis show poor level of service for the stop-controlled movements at intersections throughout the Gresham Road and Middle Road corridor. With the proposed improvements, the build alternative will provide overall LOS D or better for intersections throughout the study area through 2038.

Table 3.2.5 Intersection Analysis – 2038 Build Conditions – HCM Results

Intersection	Time Period	Control	MOE	EB Movement Left	EB Movement Thru	EB Movement Right	WB Movement Left	WB Movement Thru	WB Movement Right	NB Movement Left	NB Movement Thru	NB Movement Right	SB Movement Left	SB Movement Thru	SB Movement Right	Overall
Gresham Road at Mall Drive	AM	Roundabout	LOS		A			B			A					A
			Delay		7.1			10.3			6.8					8.7
	PM		LOS		B			B			B					B
			Delay		10.3			12.5			11.3					11.7
Gresham Road at Seville Street	AM	Signal	LOS	A	A	A	A	A	A	B	A	B	B	A	A	A
			Delay	8.9	0.0	4.9	6.3	0.0	6.5	10.5	0.0	10.5	10.4	0.0	0.0	6.0
	PM		LOS	A	A	A	A	A	A	B	A	B	B	A	A	A
			Delay	8.2	0.0	6.5	9.9	0.0	5.7	12.6	0.0	12.8	11.8	0.0	0.0	6.9
Gresham Road at Seville Street	AM	Roundabout	LOS		A			A			A			A		A
			Delay		6.3			9.3			4.6			6.1		8.0
	PM		LOS		B			B			A			A		B
			Delay		10.2			11.1			8.8			6.7		10.4
Gresham Road at Middle Road	AM	Signal	LOS	B		C				B	A			C	C	C
			Delay	17.9		31.3				16.2	4.4			23.7	24.4	21.0
	PM		LOS	B		D				B	A			C	C	C
			Delay	15.7		35.4				18.2	7.8			20.2	21.4	20.5
Gresham Road at Middle Road	AM	Roundabout	LOS	A	A					A	A		A	A		A
			Delay	4.1	6.1					8.6	3.2		9.6	8.9		7.9
	PM		LOS	A	A					A	A		A	A		A
			Delay	6.9	7.8					9.0	7.5		6.4	6.2		7.5
Middle Road at Kolbe Lane	AM	One-Way Stop	LOS					B			n/a[1]		A	A		A
			Delay					11.2			n/a[1]		7.5	0.0		1.4
	PM		LOS					C			n/a[1]		A	A		A
			Delay					16.5			n/a[1]		0.0	0.0		0.9
Middle Road at Hough Road	AM	One-Way Stop	LOS	C		B				A	n/a[1]			n/a[1]		A
			Delay	17.2		10.5				9.0	n/a[1]			n/a[1]		0.9
	PM		LOS	D		B				A	n/a[1]			n/a[1]		A
			Delay	26.2		12.5				9.5	n/a[1]			n/a[1]		3.3
Middle Road at US-72	AM	Signal	LOS	C	B	A	B	C	A	C	C	C	C	C	C	C
			Delay	21.2	14.1	0.0	12.9	32.3	0.0	26.1	28.8	26.6	30.4	24.5	23.6	27.5
	PM		LOS	C	E	A	D	D	A	E	E	E	E	C	C	D
			Delay	29.0	60.4	0.0	38.6	37.3	0.0	56.7	75.9	63.3	68.6	26.1	26.7	53.6
Middle Road at Huntsville Road	AM	One-Way Stop	LOS	A	A			n/a[1]					A		C	A
			Delay	9.8	0.0			n/a[1]					0.0		17.6	1.8
	PM		LOS	A	A			n/a[1]					D		B	A
			Delay	8.6	0.0			n/a[1]					32.1		11.4	1.6

3.3: Transportation Design Concept

Garver developed a series of conceptual corridor improvements for Gresham and Middle Roads based upon traffic analyses and anticipated land use(s). Proposed improvements were developed for both short and long term timeframes in an effort to address the corridor's most pressing transportation needs in a timely manner.

The improvements proposals are conceptualized, planning level documents intended to assist project stakeholders in identifying corridor assets and limitations, such as roadway widening alternatives, environmental effects, ROW impacts and utility conflicts. Maps and figures for the conceptual design improvements as presented at the Public Involvement Meeting are included as Appendix A.3 – Conceptual Design Improvements.

Short Term Improvements

Recommended short term improvements are proposed at intersections identified by the existing traffic analyses with poor operating conditions. These improvements are limited in scope, utilizing short segments of roadway, roadside drainage ditches and minimal ROW acquisition whenever possible. Subject intersections for short term improvements include those at Gresham Road/Middle Road and at Middle Road/U.S. Highway 72, both of which experience LOS "E" or worse under existing traffic volumes.

Proposed short term improvements at the Gresham Road/Middle Road intersection include the addition of left turn lanes to both roadways and the addition of a traffic signal. These improvements are intended to separate the left-turn movement from through traffic and reduce delay times during peak hours. Short term improvements for this intersection are shown on Figure 3.3.1.

Figure 3.3.1 Gresham/Middle Short Term Intersection Improvements

Short term improvements at the Gresham and Middle Roads intersection will include signalization with the addition of turn lanes.

Likewise, proposed short term improvements at the Middle Road/U.S. Highway 72 intersection include the addition of left turn lanes to both NB and SB Middle Road. Modifications to the existing signal will be required to accommodate the new turn lanes. Short term improvements for this intersection are shown on Figure 3.3.2.

Figure 3.3.2 Middle/U.S. Highway 72 Short Term Intersection Improvements

Long Term Improvements

In addition to the short term improvement proposals, long term roadway widening concepts were developed in order to provide additional capacity, facilitate better traffic flow and improve safety along Gresham and Middle Roads. Long term improvement widening concepts as presented were developed in such a manner to avoid large utility conflicts, such as the 44kV distribution lines on Gresham Road, and minimize impacts to existing residences and business located within the project corridor.

The improvement proposals call for Gresham Road to be widened to a three lane section with a single thru lane in each direction and a center two-way left turn lane. Middle Road will be widened to a five (5) lane section, two (2) thru lanes each direction and a center two-way left turn lane. Widening in both cases is generally symmetrical, with minor variations to avoid property and/or utility impacts. To better accommodate pedestrians and cyclists, it is recommended that both roadways include a combination of bicycle lanes, sidewalks and/or a multi-use path. To this end, two (2) alternatives were developed: one utilizing a 4' bicycle lane and 5' sidewalks on both sides of each roadway; and a second that utilizes a 12' wide multi-use path on the western side of Middle Road, in lieu of bike lanes and sidewalks. Representative typical cross sections for Gresham Road and Middle Road are presented as in Figures 3.3.3, 3.3.4, and 3.3.5.

A number of enhancements to the existing roadways are included as part of the long term improvement concepts. These include:

- Curb and gutter closed drainage system
- Pedestrian curb ramps and crosswalks at major intersections
- Slope paved traffic channelization at major intersections
- Hough Road intersection improvements, including left turn lane and traffic signal additions

Intersections will be further modified to improve operability and safety beyond those proposed as short term solutions. The most notable improvement is the inclusion of a double lane roundabout at the Gresham Road/Middle Road intersection. Traffic evaluations indicate a roundabout results in a better LOS when compared to a traffic signal at this location. The proposed roundabout includes a shared use path around the circumference to provide safe passage of pedestrians and bicyclists as well as a concrete truck apron within the diameter. The suitability of a roundabout at this location will be re-evaluated during the development of final construction plans based upon right-of-way availability and an updated review of land use in the immediate vicinity. Towards the completion of this planning study, it was revealed that the Town of St. Florian approved construction of a convenience store at the southwest corner of the Gresham Road/Middle Road intersection. A site layout for this development has not been provided so no evaluation of potential effects on the transportation design concept can be performed.

A second roundabout is proposed at the intersection of Gresham Road and Mall Drive to facilitate efficient traffic flow to the anticipated mixed-use development(s) planned for the parcels to the north of this intersection (see Chapter 3 for more information).

Based upon feedback gathered at the public involvement meeting, it is recommended that the intersection of Gresham Road and Hunter's Way be further evaluated for intersection improvements, either a traffic signal or roundabout. It should be noted that any intersection improvements considered in this location should include roadway profile adjustments to improve sight distance on the western intersection approach. Completion of the proposed long term improvements will provide adequate traffic flow for the 2038 design year traffic while improving safety and encouraging proper access management strategies as recommended in Section 4.3.

Figure 3.3.3 Gresham Road Cross Section

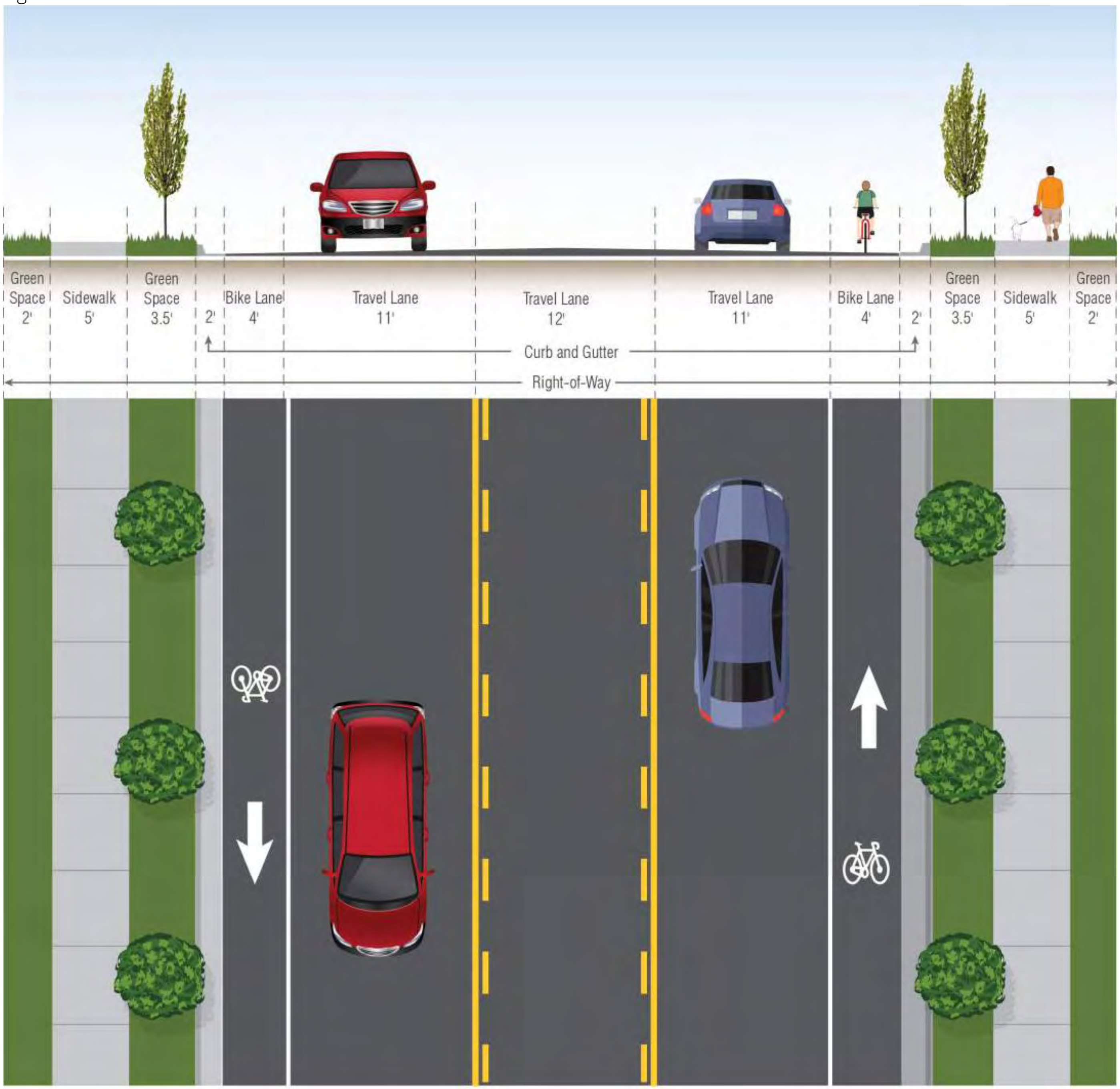


Figure 3.3.4 Middle Road Cross Section (Alternative A)

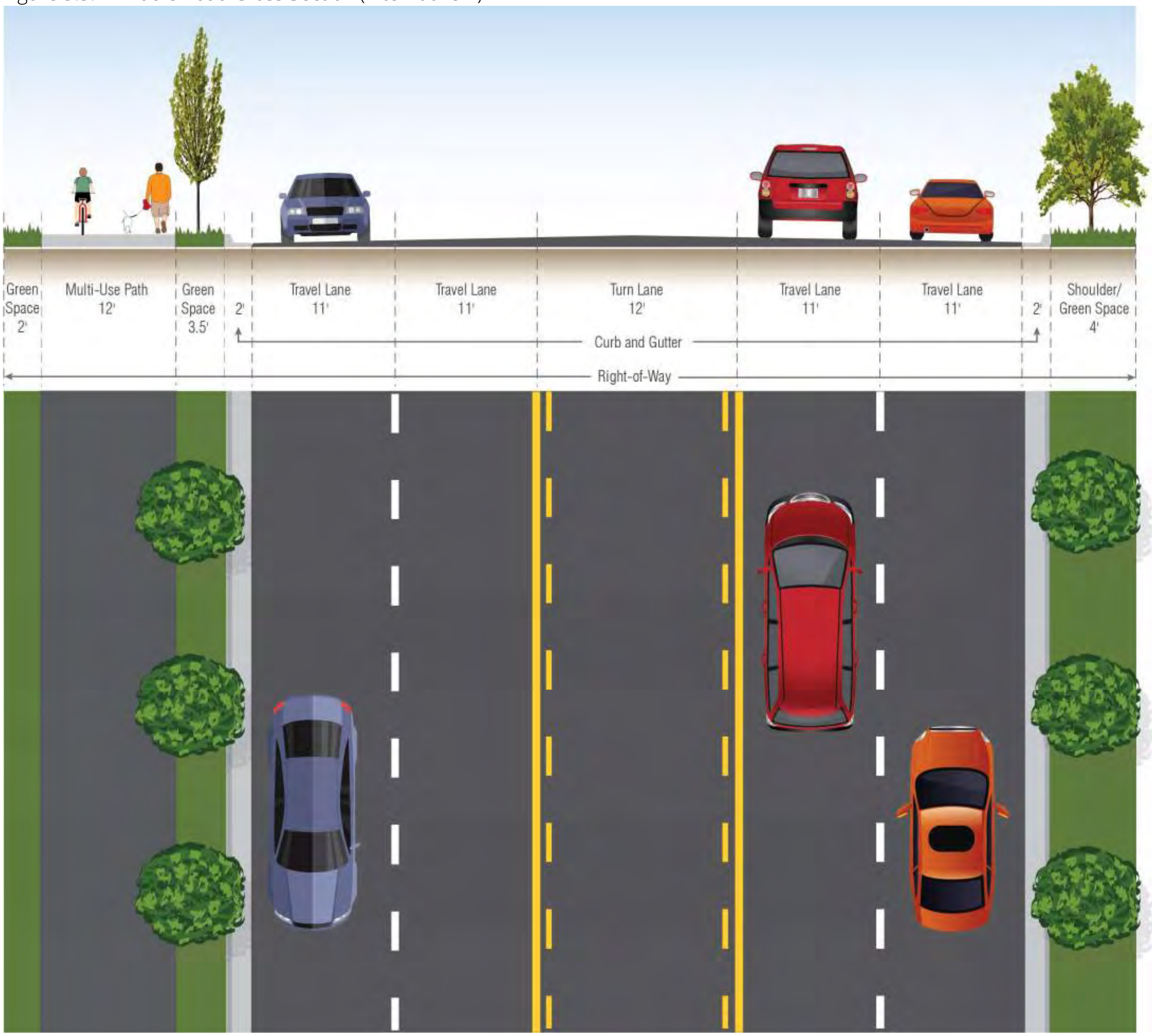
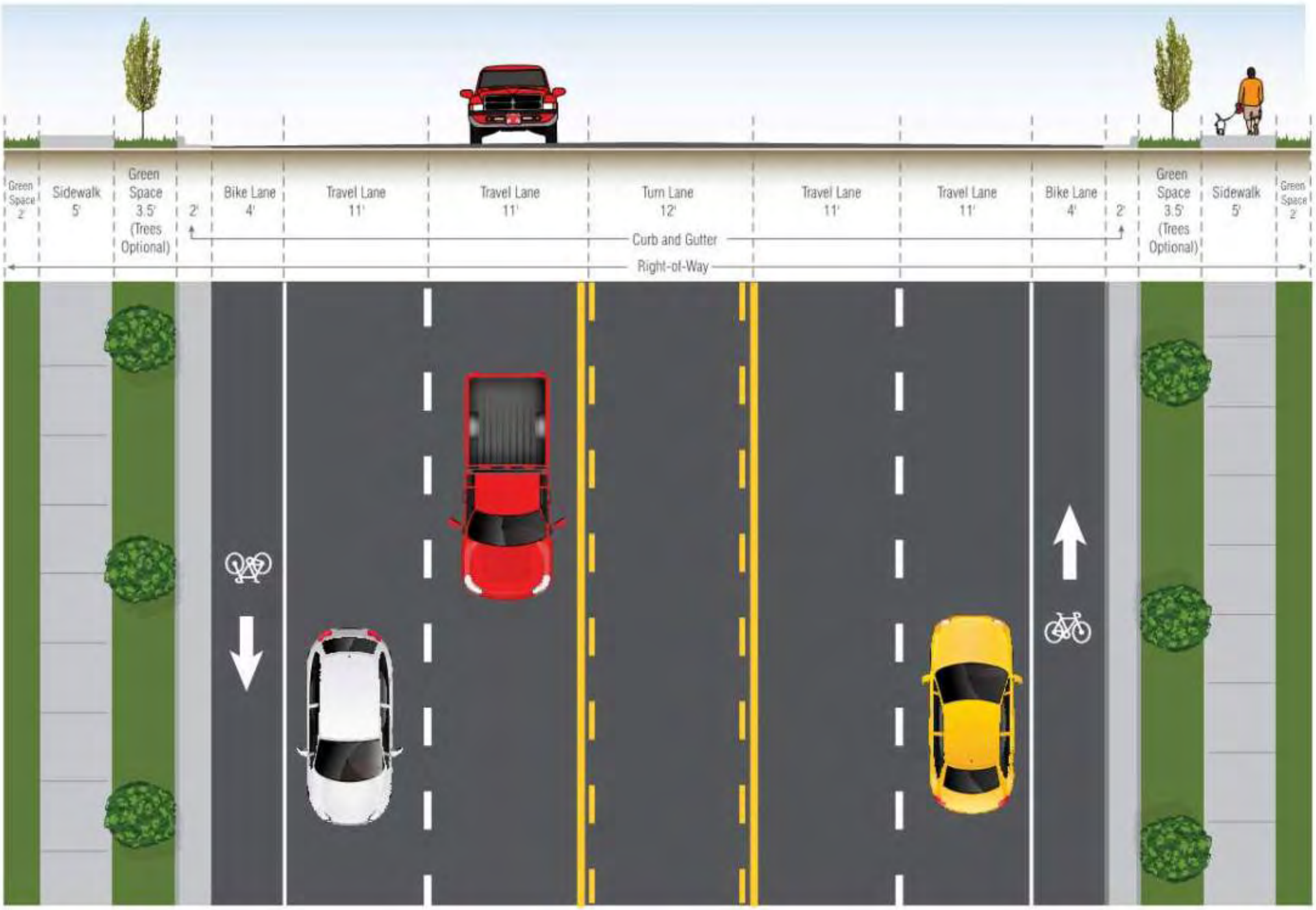


Figure 3.3.5 Middle Road Cross Section (Alternative B)



Preliminary Cost and Construction Needs

Funding is an important aspect of planning a transportation improvement project. Project sponsors must seek appropriate funding and finance options for transportation projects. To this end, detailed preliminary construction cost estimates for both short and long term improvement concepts were prepared as a part of this study. Table 3.3.5 summarizes preliminary cost estimates for the evaluated alternatives. The detailed estimates are available in Appendix A.4 – Preliminary Cost Estimates.

Table 3.3.5 Preliminary Cost Estimates

Improvement	Type	Cost
Long-Term	Intersection Improvements, Turn Lanes, Widening	*$8,423,148.55*
Short-Term	Intersection Improvements, Turn Lanes	*$850,624.94*

FOUR: POLICY RECOMMENDATIONS

4.1: Policy Recommendations

Based on the preferred land use alternative and the proposed long-term improvements the following policy recommendations are offered.

Gresham Road Overlay District

Gresham Road rests within both St. Florian and Florence. Coordination of zoning regulations and development standards is necessary to ensure the corridor develops efficiently and with a coherent visual aesthetic. It is recommended that an overlay district consistent with intent of the preferred land use alternative be drafted. The overlay district should address the following:

- *Landscaping: a coherent pattern of required buffering and landscaping should be put in place to protect the visual quality of the corridor.*
- *Building Design Standards: a unified building design standard should be included which discourages parking placement in front of buildings, prohibits corrugated metal structures, promotes the use of high quality/durable materials, incorporation of architectural detailing, and requires vertical and horizontal breaks in the structure's massing.*
- *Shared Parking Agreements: the allowance for required parking minimums to be met through off-street parking shared by adjacent sites and complementary uses should be adopted and encouraged for sites along the corridor.*
- *Cross Access Requirements: the granting of cross access through the platting process and parking lot construction should be a requirement for all new developments.*
- *Lighting: a consistent theme of street and parking lot lighting should be adopted along the corridor to maintain a consistent visual aesthetic. All lighting should be required to be fully shielded and cut-off to prevent light trespass onto adjacent residential property.*
- *Signage: a consistent set of signage limitation and requirements should be adopted for the corridor. Such regulation should be consistent with recent US Supreme Court rulings regarding free speech.*
- *Mechanical Screening: requirements should be put in place to require all ground and roof-mounted mechanical equipment be screened by durable, permanent structures such as parapet walls or masonry/rock walls.*
- *Traffic Impact Analysis: development site and land uses that will generate substantial amounts of traffic should be required to prepare traffic impact analysis to ensure location of the use can be safely accomplished, and that proposed improvements will not create traffic hazards. Sample language requiring Traffic Impact Analysis is included in the Appendix A.5 – Traffic Impact Analysis Sample.*

Interlocal Access Management Agreement

An interlocal access management agreement will be critical to preserving the function of the roadways, allowing the necessity of widening to be delayed.

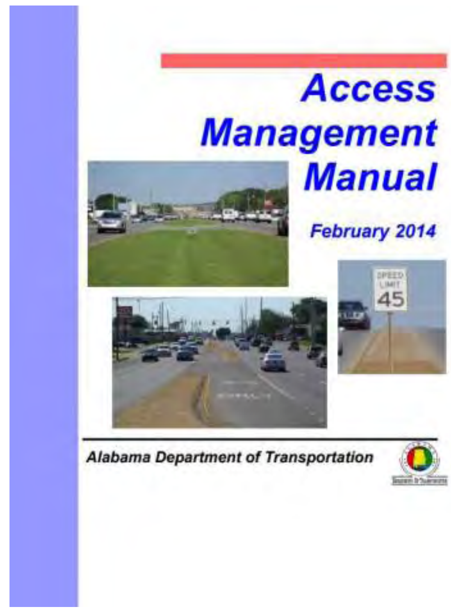
Development of a four-party access management agreement between NACOLG, Florence, St. Florian, and Lauderdale County should be pursued. Such agreements are highly successful when used at ensuring consistent access management standards are applied across a corridor as it develops. NACOLG's role would be to serve as an impartial facilitator and allow for third-party review of all driveway requests along the Gresham and Middle Road corridors. Modification of the plan would require approval of all parties, and would serve as a check against unwarranted requests to vary from the access management standards. A draft agreement is contained in the Appendix A.6 – Access Management Agreement.

4.3: Access Management Framework

Access management addresses the relationship between roads and adjacent land use. To provide the safest and highest capacity road it is necessary to manage the location of major intersections and spacing of connections. Any agreement should be developed based on research and derived from concrete standards. Alabama DOT provides such standards in its Access Management Manual. The Florida DOT is also an excellent resource for access management standards.

General Design Framework

Gresham and Middle Roads: Future 3-lane lane (Gresham Road) and 5-lane (Middle Road) roadways with major intersections spaced at 1/4 mile intervals and future traffic signals and/or roundabouts generally spaced at 1/2 mile intervals. Future signal/roundabout locations should be determined by meeting warrants, on a case by case basis and 1/4 mile spacing should serve as a minimum distance.



A minimum connection spacing of 300-440 feet (distance from inner edge of connection/street to inner edge of connection/street) should apply to new connections and intersections, and is based on a roadway speeds of 45 mph or lower (after future widening). Single-Family structures should be permitted one driveway connection regardless of spacing. Sites with no viable or reasonable means of access should be provided a mechanism to seek a waiver from these standards. The standard of review for such requests should be high, as access management agreements become much less valuable if broken.

4.4: Implementation Plan

The following table contains actionable steps that can be taken to implement recommendations from this study.

Table 4.4.1 Implementation Plan

Action	Responsible Entity
Adopt the Planning Study as an amendment or addendum to the City/Town Master Plan or Comprehensive Plan.	Florence St. Florian
Adopt the Planning Study as a Special Planning Study.	Lauderdale County NACOLG
Seek funding to accommodate short-term improvements.	All Parties/Stakeholders
Include planning study proposals into the Shoals Area 2045 Long Range Transportation Plan	NACOLG
Consider inclusion of the proposed long-term improvements in the Shoals Area 2045 Long Range Transportation Plan Financial Plan	NACOLG

Action	Responsible Entity
Consider drafting Overlay District regulations for the corridor	Florence St. Florian
Consider the development of an interlocal access management agreement for the corridor	Florence St. Florian Lauderdale County NACOLG

FIVE: ENVIRONMENTAL SCREENING

5.1: Introduction

The Gresham Road (County Road 46) and Middle Road (County Road 61) study corridor provides connection between the City of Florence, Town of St. Florian, and Lauderdale County. This Environmental Constraints Report provides information on current social features and environmental resources in the Gresham/Middle Road Planning study area based on existing data sources.

A constraints map (see Section 5.7) showing potential environmental constraints such as natural resources including water features, floodplains, threatened and endangered species, and soils were reviewed along with hazardous materials, land use, utilities, and community facilities within and adjacent to the project area accompanies this Report. Garver Environmental Staff performed a desktop environmental screening for the Gresham/Middle Road Planning Study. In addition, a windshield site visit of the project study area was conducted to field verify the information shown in the map.

Further investigations and avoidance, minimization and mitigation of environmental impacts would be conducted during subsequent preliminary engineering and National Environmental Policy Act studies.

5.2: Natural Resources

Streams and Wetlands

Streams in the area were mapped from the National Hydrography Dataset (NHD) via the United States Geologic Survey (USGS). There is one unnamed stream that crosses through the project limits on the western side of Gresham Road. There is also one unnamed stream that crosses at the northern tip of the project limits at Middle Road. There is one impaired waterbody within the vicinity, Sweetwater Creek. According to Alabama Department of Environmental Management, the stream is listed on the 303d list for habitat alteration. However, this stream does not cross through the project limits. It is located southwest of the project limits.

According to the US Fish and Wildlife (USFWS) National Wetlands Inventory, there are four wetland features within or adjacent to the project limits. There is a freshwater pond adjacent to the project limits on the western side of Gresham Road, just south of the right-of-way (ROW). There are two freshwater forested/shrub wetlands north of where Gresham Road and Middle Road meet. One crosses into the project limits, while the other is located just adjacent to the project limits. One freshwater forested/shrub wetland is adjacent to the project limits southeast of Gresham Road.

Floodplains

According to the National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM) Panel Numbers 01077C0484D, 01077C0505D, and 01077C482D (effective dates: September 11, 2009), there is 100-year floodplain located along Sweetwater Creek. However, there is no floodplain located within the project limits.

Stormwater

The project limits fall within the Municipal Separate Storm Sewer System (MS4) of Florence/Muscle Shoals.

Soils

The following soils are located within the project limits.

- *Decatur silty clay loam, 6 to 10 percent slopes, eroded*
- *Dewey silt loam, 2 to 6 percent slopes*
- *Dewey silt loam, 6 to 10 percent slopes*
- *Dewey silty clay loam, 6 to 10 percent slopes, eroded*
- *Dickson silt loam, 2 to 5 percent slopes*
- *Grasmere silty clay loam*
- *Guthrie silt loam, 0 to 2 percent slopes, frequently flooded*
- *Le Lee cherty silt loam*
- *Pruitton silt loam*

Threatened and Endangered Species

According to USFWS, 21 species are listed as threatened or endangered in Lauderdale County (September 19, 2018). No critical habitat for these species has been identified in the project limits.

Table 5.2.1 Threatened and Endangered Species

Common Name	Scientific Name	Status
Mammals		
Indiana Bat	Myotis sodalist	Endangered
Gray Bat	Myotis grisescens	Endangered
Northern Long-eared Bat	Myotis septentrionalis	Threatened
Fishes		
Alabama Cavefish	Speoplatyrhinus poulsoni	Endangered
Spotfin Chub	Erimonax monachus	Endangered
Slackwater darter	Etheostoma boschungi	Endangered
Boulder darter	Etheostoma wapiti	Endangered
Clams		
Cumberland monkeyface (pearlymussel)	Quadrula intermedia	Endangered
Pink Mucket (pearlymussel)	Lampsilis abrupta	Endangered
Dromedary pearlymussel	Dromus dromas	Endangered
Littlewing pearlymussel	Pegias fabula	Endangered
White wartyback (pearlymussel)	Plethobasus cicatricosus	Endangered
Rough pigtoe	Pleurobema plenum	Endangered
Orangefoot pimpleback (pearlymussel)	Plethobasus cooperianus	Endangered
Ring pink (mussel)	Obovaria retusa	Endangered
Spectaclecase (mussel)	Cumberlandia monodonta	Endangered
Slabside pearlymussel	Pleuronaia dolabelloides	Endangered
Fanshell	Cyprogenia stegaria)	Endangered
Rabbitsfoot	Pleuronaia dolabelloides	Threatened
Sheepnose Mussel	Plethobasus cyphyus	Endangered
Flowering Plants		
White fringeless orchid	Platanthera integrilabia	Threatened

5.3: Hazardous Materials

According to a GeoSearch Radius Report (Order 115080, September 24, 2018), there are two sites within or adjacent to the project limits and three sites within a quarter-mile that potentially contain hazardous materials. There are no water wells or oil and gas wells within or near the project limits.

Table 5.3.1 Potential Hazardous Materials Sites

Site Name	Location	Regulatory Status
Lauderdale County School Bus Garage	335 Middle Road	• *Resource Conservation Recovery Act – Non Generator – ignitable waste at site* • *Registered Aboveground Storage Tank – contains diesel* • *Registered Underground Storage Tank – permanently out of use*
Humphrie's Tires (R&B Body Shop)	310 Middle Road	• *Underground Leaking Storage Tank – reported as having no further action* • *Registered Underground Storage Tank – permanently out of use*
Fitts Construction (approximately 400 feet from the project limits)	3309 Hough Road	• *Leaking Underground Storage Tank - reported as having no further action* • *Registered Aboveground Storage Tank – contains diesel* • *Registered Underground Storage Tank – permanently out of use*
Red Eagle Auto Parts (approximately 500 feet from the project limits)	3007 Florence Boulevard	• *Integrated Compliance Information System – records show there was a letter of violation for this location, however, it is unknown what the violation was for*
Huntsville Road Station (approximately ¼ mile from the project limits)	4404 Huntsville Road	• *Registered Underground Storage Tank – permanently out of use*

5.4: Historical and Cultural Resources

According to the National Park Service National Register of Historical Places (September 19, 2018), there are no historical properties within or adjacent to the project area.

5.5: Land Use

Land use to the north of Gresham Road is predominantly rural/agriculture with a few rural residential parcels. To the south of Gresham Road, there is a mix of big box retail, rural residential, multi-family residential, and some vacant land.

West of Middle Road is mix of rural/agriculture, rural residential, multi-family residential, outdoor display retail, and institutional/public. To the east of Middle road is rural/agriculture, rural residential, outdoor display retail, and single family residential.

Community Facilities

Parkway Methodist Church is located within the project limits at the western end of Gresham Road. There are several other churches in the vicinity, but they are not located within the project limits. The Lauderdale County Board of Education office is located within the project limits, southwest of Middle Road. There is one cemetery in the vicinity, Tri-Cities Memorial Gardens, but it is outside the project limits.

Utilities

Gas, sewer, and water lines run the entire length of Gresham Road and Middle Road, within the project limits. A utilities map can be found in Section 5.7.

5.6: References

Alabama Department of Environmental Management. 2018. 303 (d) Information and Map. Final 2018 303(d) list. Adem.alabama.gov/programs/water/303d.cnt. Accessed August 2018.

Federal Emergency Management Agency (FEMA). 2018. Flood Insurance Rate Maps (FIRM). Website: https://msc.fema.gov/portal. Accessed August 2018.

GeoSearch. 2018a. Radius Report: #115080. September 24, 2018.

GeoSearch. 2018b. Oil and Gas Report: #115080. September 24, 2018.

GeoSearch. 2018c. Water Well Report: #115080. September 24, 2018.

National Park Service. 2018. National Register of Historic Places. http://www.nps.gov/subjects/nationaregister/index.htm. Accessed September 2018.

Outdoor Alabama. 2018. Threatened and Endangered Species. www.outdooralabama.com/endangered-and-threatened-species. Accessed September 2018.

U.S. Department of Agriculture WEB Soil Survey (http://websoilsurvey.nrcs.usda.gov) Soil Survey Area Version, August 2018. United States Department of Agriculture Soil Conservation Service and Natural Resource Conservation Service.

U.S. Fish and Wildlife Service (USFWS). 2018. National Wetlands Inventory. Wetland Report for Hydrologic Unit Code 8_06030005. Accessed August 2018.

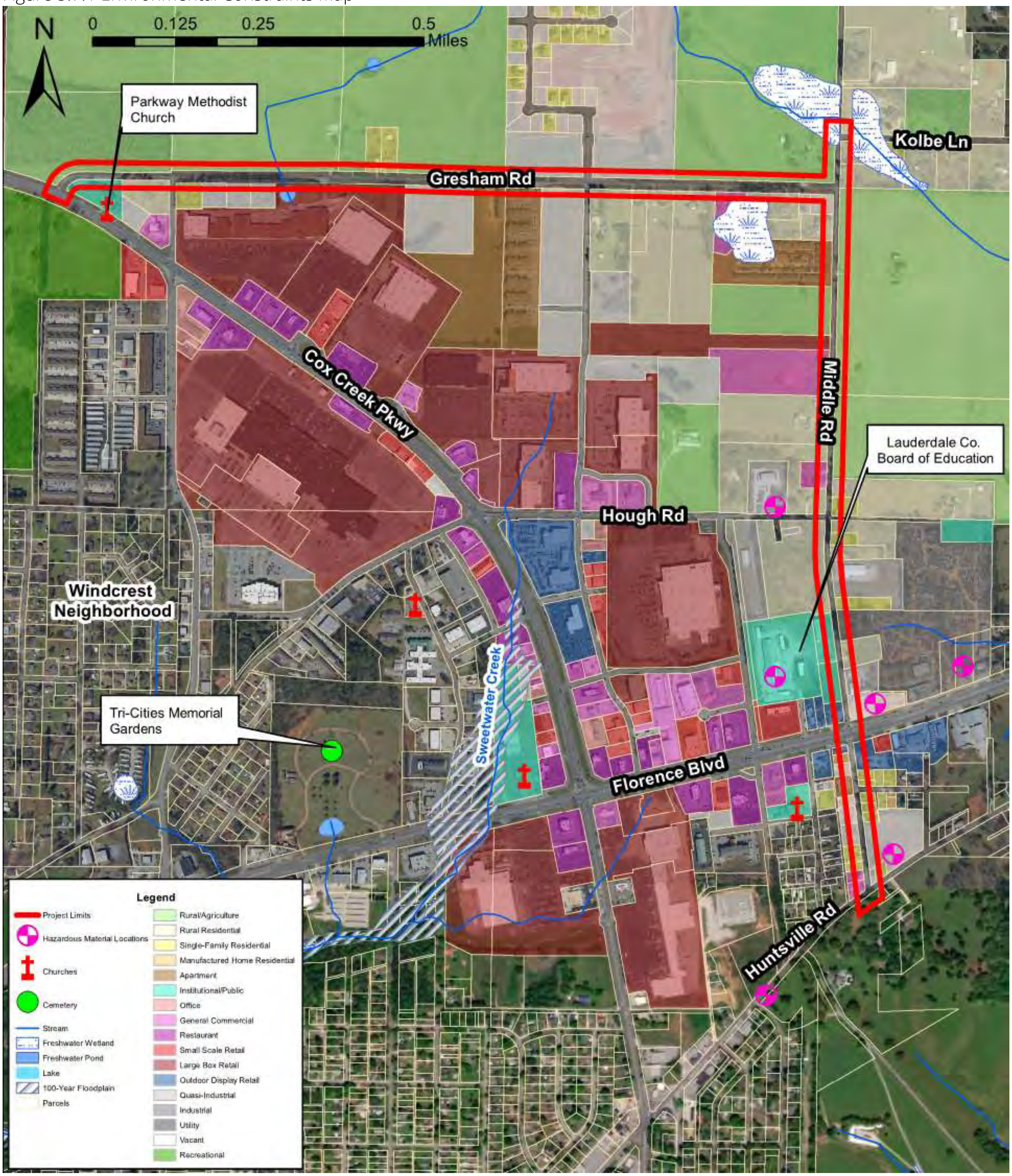
U.S. Fish and Wildlife Service (USFWS). 2018. Species by County Report for Lauderdale County, Alabama. Accessed September 2018.

U.S. Geological Survey. National Hydrography. https://www.usgs.gov/core-science-systems/ngp/national-hydrography. Accessed July 2018.

5.7: Maps

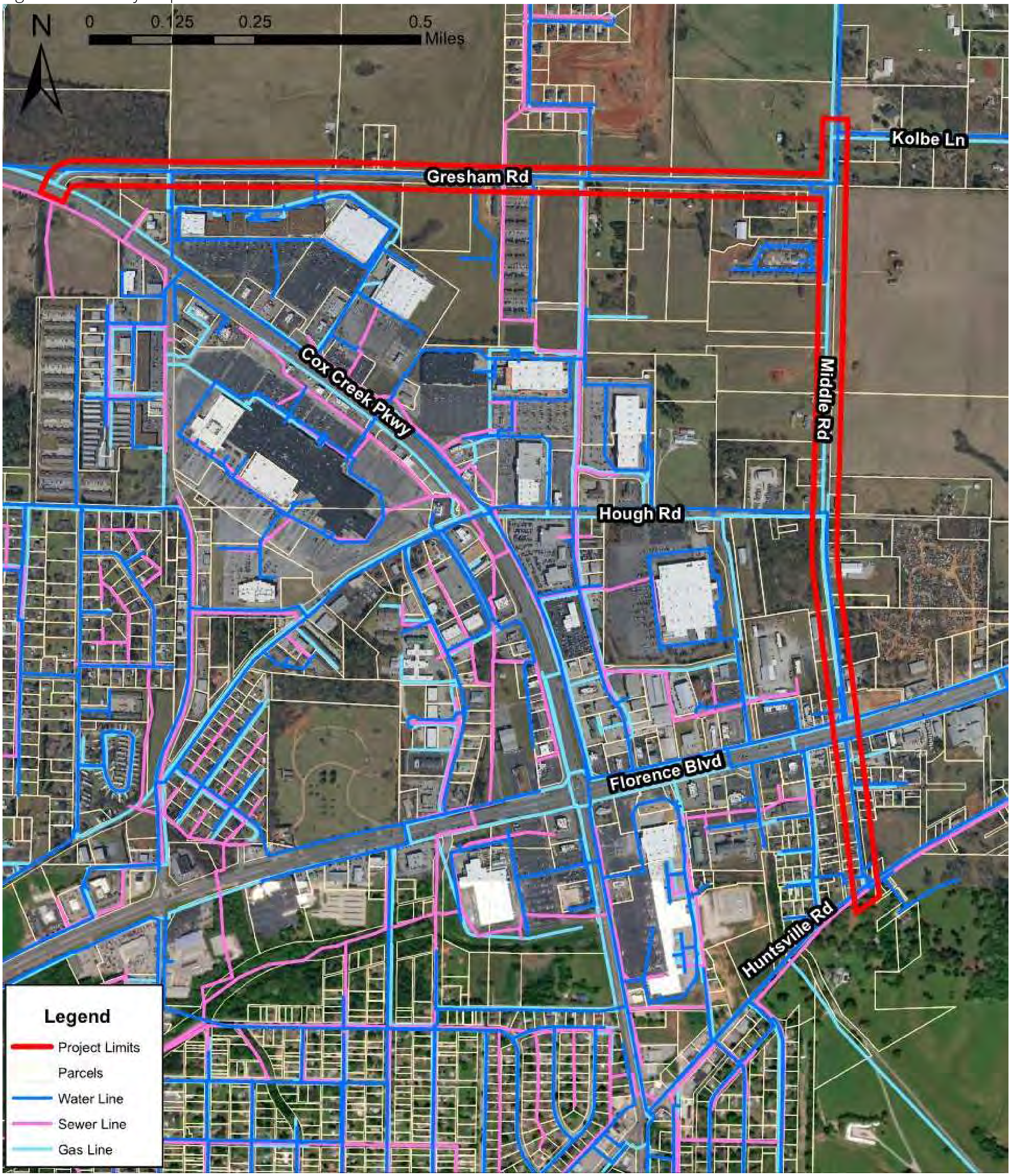
Environmental Constraints Map

Figure 5.7.1 Environmental Constraints Map



Utility Map

Figure 5.7.2 Utility Map



APPENDICES

A.1: Operational Analysis

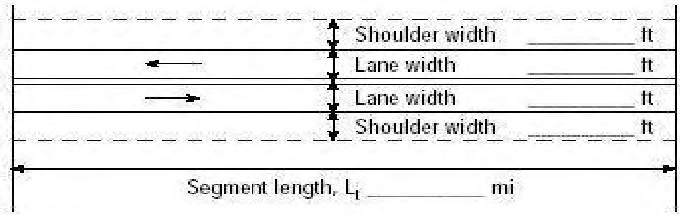
Appendix A – Operational Analysis Results

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*PEC*	Highway / Direction of Travel	*Gresham Road*
Agency or Company	*Garver*	From/To	*Cox Creek Pkwy to Middle Rd*
Date Performed	*5/18/2018*	Jurisdiction	*EB*
Analysis Time Period	*AM*	Analysis Year	*2018*

Project Description: *Gresham Rd Corridor Study*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*169*veh/h
Opposing direction vol., V_o	*317*veh/h
Shoulder width ft	*0.0*
Lane Width ft	*10.0*
Segment Length mi	*1.2*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.80*
No-passing zone	*100%*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*14*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.5*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.990*	*0.994*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF*f_{g,ATS}*f_{HV,ATS})$	*213*	*399*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*3.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.7 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*46.2 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*38.7 mi/h*
		Percent free flow speed, PFFS	*83.9 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.998*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*212*	*397*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*26.7*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*50.1*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*44.1*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.12*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*83.9*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*211.3*
Effective width, Wv (Eq. 15-29) ft	*10.00*
Effective speed factor, S_t (Eq. 15-30)	*4.42*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.05*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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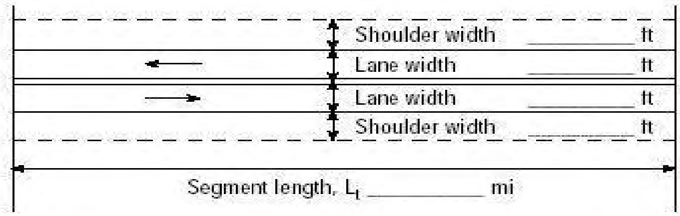
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*PEC*	Highway / Direction of Travel	*Gresham Road*
Agency or Company	*Garver*	From/To	*Cox Creek Pkwy to Middle Rd*
Date Performed	*5/18/2018*	Jurisdiction	*WB*
Analysis Time Period	*AM*	Analysis Year	*2018*

Project Description: *Gresham Rd Corridor Study*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Analysis direction vol., V_d	*317*veh/h
Opposing direction vol., V_o	*169*veh/h
Shoulder width ft	*0.0*
Lane Width ft	*10.0*
Segment Length mi	*1.2*
Peak-hour factor, PHF	*0.80*
No-passing zone	*100%*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*14*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.994*	*0.990*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*399*	*213*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*3.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.9 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*46.2 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*37.5 mi/h*
		Percent free flow speed, PFFS	*81.2 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.998*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}*f_{g,PTSF})$	*397*	*212*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*37.2*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*50.1*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*69.9*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, v/c	*0.23*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*81.2*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*396.3*
Effective width, Wv (Eq. 15-29) ft	*10.00*
Effective speed factor, S_t (Eq. 15-30)	*4.42*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.36*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If $v_i(v_d$ or $v_o)$ >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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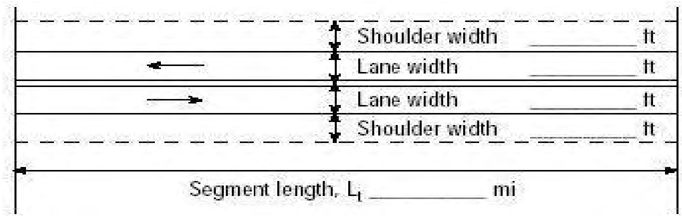
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*PEC*	Highway / Direction of Travel	*Gresham Road*
Agency or Company	*Garver*	From/To	*Cox Creek Pkwy to Middle Rd*
Date Performed	*5/18/2018*	Jurisdiction	*EB*
Analysis Time Period	*PM*	Analysis Year	*2018*

Project Description: *Gresham Rd Corridor Study*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.90*
No-passing zone	*100%*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*14*/mi
Analysis direction vol., V_d	*329*veh/h
Opposing direction vol., V_o	*294*veh/h
Shoulder width ft	*0.0*
Lane Width ft	*10.0*
Segment Length mi	*1.2*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.4*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))$	*0.994*	*0.992*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i / (PHF* f_{g,ATS} * f_{HV,ATS})$	*368*	*329*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0* *mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3* *mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/ f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*3.5* *mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.2* *mi/h*	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	*46.2* *mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS} + v_{o,ATS}) - f_{np,ATS}$	*37.6* *mi/h*
		Percent free flow speed, PFFS	*81.4* *%*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))$	*0.998*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}* f_{g,PTSF})$	*366*	*327*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*38.8*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*51.0*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{o,PTSF})$	*65.7*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.22*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*81.4*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*365.6*
Effective width, Wv (Eq. 15-29) ft	*10.00*
Effective speed factor, S_t (Eq. 15-30)	*4.42*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.32*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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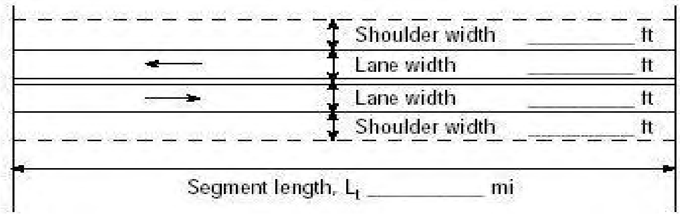
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*PEC*	Highway / Direction of Travel	*Gresham Road*
Agency or Company	*Garver*	From/To	*Cox Creek Pkwy to Middle Rd*
Date Performed	*5/18/2018*	Jurisdiction	*WB*
Analysis Time Period	*PM*	Analysis Year	*2018*

Project Description: *Gresham Rd Corridor Study*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*294*veh/h
Opposing direction vol., V_o	*329*veh/h
Shoulder width ft	*0.0*
Lane Width ft	*10.0*
Segment Length mi	*1.2*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.90*
No-passing zone	*100%*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*14*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.4*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.992*	*0.994*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) v_i=V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*329*	*368*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*3.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.9 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*46.2 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*37.9 mi/h*
		Percent free flow speed, PFFS	*82.0 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.998*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) v_i=V_i/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*327*	*366*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*36.9*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*51.0*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*61.0*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.19*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*82.0*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*326.7*
Effective width, Wv (Eq. 15-29) ft	*10.00*
Effective speed factor, S_t (Eq. 15-30)	*4.42*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.27*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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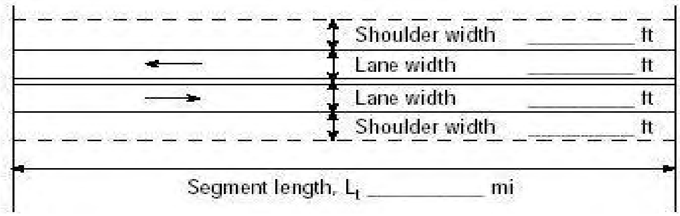
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*PEC*	Highway / Direction of Travel	*Middle Rd*
Agency or Company	*Garver*	From/To	*Kolbe Ln to US 72*
Date Performed	*5/18/2018*	Jurisdiction	*NB*
Analysis Time Period	*AM*	Analysis Year	*2018*

Project Description: *Gresham Rd Corridor Study*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*320*veh/h
Opposing direction vol., V_o	*224*veh/h
Shoulder width ft	*0.0*
Lane Width ft	*10.0*
Segment Length mi	*0.9*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.80*
No-passing zone	*100%*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*24*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.4*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.994*	*0.992*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF* f_{g,ATS} * f_{HV,ATS})$	*402*	*282*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0* *mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3* *mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*6.0* *mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.5* *mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*43.7* *mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*34.9* *mi/h*
		Percent free flow speed, PFFS	*79.9* *%*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.998*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*401*	*281*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*40.2*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*49.6*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*69.4*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.24*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*79.9*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*400.0*
Effective width, Wv (Eq. 15-29) ft	*10.00*
Effective speed factor, S_t (Eq. 15-30)	*4.42*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.37*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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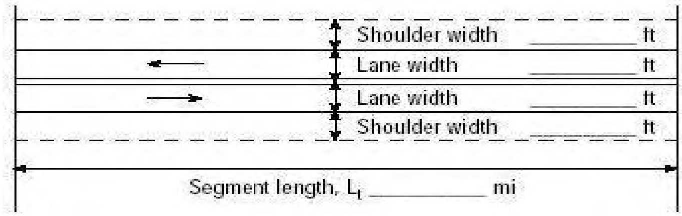
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*PEC*	Highway / Direction of Travel	*Middle Rd*
Agency or Company	*Garver*	From/To	*Kolbe Ln to US 72*
Date Performed	*5/18/2018*	Jurisdiction	*SB*
Analysis Time Period	*AM*	Analysis Year	*2018*

Project Description: *Gresham Rd Corridor Study*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*224*veh/h
Opposing direction vol., V_o	*320*veh/h
Shoulder width ft	*0.0*
Lane Width ft	*10.0*
Segment Length mi	*0.9*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.80*
No-passing zone	*100%*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*24*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.4*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T (E_T -1)+P_R (E_R -1))	*0.992*	*0.994*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) v_i=V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*282*	*402*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*6.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.7 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*43.7 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*35.7 mi/h*
		Percent free flow speed, PFFS	*81.7 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.998*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) v_i=V_i/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*281*	*401*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*33.0*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*49.6*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*53.4*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.16*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*81.7*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*280.0*
Effective width, Wv (Eq. 15-29) ft	*10.00*
Effective speed factor, S_t (Eq. 15-30)	*4.42*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.19*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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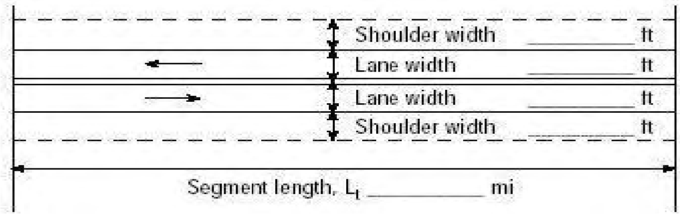
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*PEC*	Highway / Direction of Travel	*Middle Rd*
Agency or Company	*Garver*	From/To	*Kolbe Ln to US 72*
Date Performed	*5/18/2018*	Jurisdiction	*NB*
Analysis Time Period	*PM*	Analysis Year	*2018*

Project Description: *Gresham Rd Corridor Study*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*315*veh/h	
Opposing direction vol., V_o	*331*veh/h	
Shoulder width ft	*0.0*	
Lane Width ft	*10.0*	
Segment Length mi	*0.9*	
Grade Length mi		Up/down
Peak-hour factor, PHF	*0.90*	
No-passing zone	*100%*	
% Trucks and Buses , P_T	*2* %	
% Recreational vehicles, P_R	*0%*	
Access points *mi*	*24*/mi	

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.994*	*0.994*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*352*	*370*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*6.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.9 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*43.7 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*35.2 mi/h*
		Percent free flow speed, PFFS	*80.6 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.998*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*351*	*369*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*38.9*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*50.2*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*63.4*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.21*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*80.6*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*350.0*
Effective width, Wv (Eq. 15-29) ft	*10.00*
Effective speed factor, S_t (Eq. 15-30)	*4.42*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.30*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

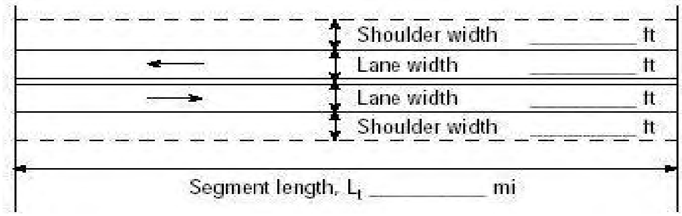
 HCS7™ TwoLane Version 7.4 Generated: 5/18/2018 3:09 PM

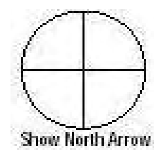
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*PEC*	Highway / Direction of Travel	*Middle Rd*
Agency or Company	*Garver*	From/To	*Kolbe Ln to US 72*
Date Performed	*5/18/2018*	Jurisdiction	*SB*
Analysis Time Period	*PM*	Analysis Year	*2018*

Project Description: *Gresham Rd Corridor Study*

Input Data





☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.90*
No-passing zone	*100%*
% Trucks and Buses, P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*24*/mi
Analysis direction vol., V_d	*331*veh/h
Opposing direction vol., V_o	*315*veh/h
Shoulder width ft	*0.0*
Lane Width ft	*10.0*
Segment Length mi	*0.9*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.994*	*0.994*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF*f_{g,ATS}*f_{HV,ATS})$	*370*	*352*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*6.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.0 mi/h*	Free-flow speed, FFS ($FSS=BFFS-f_{LS}-f_A$)	*43.7 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*35.1 mi/h*
		Percent free flow speed, PFFS	*80.3 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.998*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*369*	*351*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*39.5*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*50.2*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*65.2*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	C
Volume to capacity ratio, *v/c*	0.22

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*80.3*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*367.8*
Effective width, Wv (Eq. 15-29) ft	*10.00*
Effective speed factor, S_t (Eq. 15-30)	*4.42*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.33*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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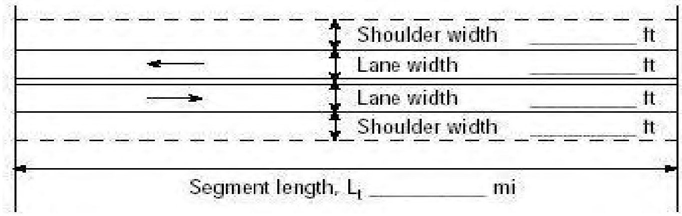
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*PEC*	Highway / Direction of Travel	*Middle Rd*
Agency or Company	*Garver*	From/To	*US 72 to Huntsville Rd*
Date Performed	*5/18/2018*	Jurisdiction	*NB*
Analysis Time Period	*AM*	Analysis Year	*2018*

Project Description: *Gresham Rd Corridor Study*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF	*0.80*
No-passing zone	*100%*
% Trucks and Buses , P_T	*2 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*40*/mi

Analysis direction vol., V_d	*43*veh/h
Opposing direction vol., V_o	*79*veh/h
Shoulder width ft	*0.0*
Lane Width ft	*10.0*
Segment Length mi	*0.3*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.9*	*1.9*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.982*	*0.982*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*55*	*101*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(v/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*10.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.4 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*39.7 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*36.1 mi/h*
		Percent free flow speed, PFFS	*90.9 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.998*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*54*	*99*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*6.6*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*51.4*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*24.7*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.03*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*90.9*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*53.8*
Effective width, Wv (Eq. 15-29) ft	*17.85*
Effective speed factor, S_t (Eq. 15-30)	*4.42*
Bicycle level of service score, BLOS (Eq. 15-31)	*3.26*
Bicycle level of service (Exhibit 15-4)	*C*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

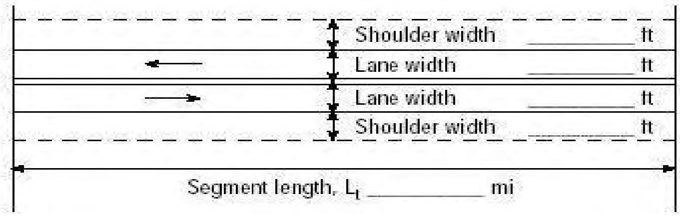
 HCS7™ TwoLane Version 7.4 Generated: 5/18/2018 3:11 PM

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*PEC*	Highway / Direction of Travel	*Middle Rd*
Agency or Company	*Garver*	From/To	*US 72 to Huntsville Rd*
Date Performed	*5/18/2018*	Jurisdiction	*SB*
Analysis Time Period	*AM*	Analysis Year	*2018*

Project Description: *Gresham Rd Corridor Study*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*79veh/h*
Opposing direction vol., V_o	*43veh/h*
Shoulder width ft	*0.0*
Lane Width ft	*10.0*
Segment Length mi	*0.3*
Grade Length mi Up/down	
Peak-hour factor, PHF	*0.80*
No-passing zone	*100%*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*40*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.9*	*1.9*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.982*	*0.982*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF*f_{g,ATS}*f_{HV,ATS})$	*101*	*55*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*10.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.4 mi/h*	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	*39.7 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*36.1 mi/h*
		Percent free flow speed, PFFS	*90.9 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.998*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*99*	*54*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*11.5*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*51.4*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*44.8*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.06*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*90.9*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*98.8*
Effective width, Wv (Eq. 15-29) ft	*16.05*
Effective speed factor, S_t (Eq. 15-30)	*4.42*
Bicycle level of service score, BLOS (Eq. 15-31)	*3.87*
Bicycle level of service (Exhibit 15-4)	*D*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

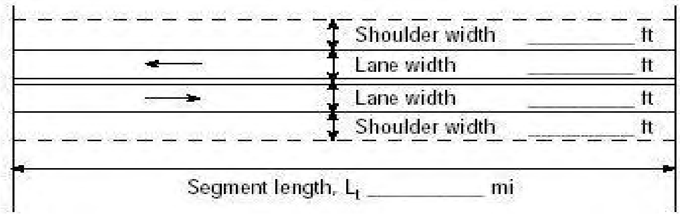
 HCS7™ TwoLane Version 7.4 Generated: 5/18/2018 3:12 PM

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*PEC*	Highway / Direction of Travel	*Middle Rd*
Agency or Company	*Garver*	From/To	*US 72 to Huntsville Rd*
Date Performed	*5/18/2018*	Jurisdiction	*NB*
Analysis Time Period	*PM*	Analysis Year	*2018*

Project Description: *Gresham Rd Corridor Study*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*100*veh/h
Opposing direction vol., V_o	*62*veh/h
Shoulder width ft	*0.0*
Lane Width ft	*10.0*
Segment Length mi	*0.3*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.80*
No-passing zone	*100%*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*40*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.8*	*1.9*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.984*	*0.982*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*127*	*79*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*10.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.4 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*39.7 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*35.7 mi/h*
		Percent free flow speed, PFFS	*89.9 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.998*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}{}^* f_{g,PTSF})$	*125*	*78*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*14.2*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*52.8*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*46.7*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.07*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*89.9*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*125.0*
Effective width, Wv (Eq. 15-29) ft	*15.00*
Effective speed factor, S_t (Eq. 15-30)	*4.42*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.16*
Bicycle level of service (Exhibit 15-4)	*D*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

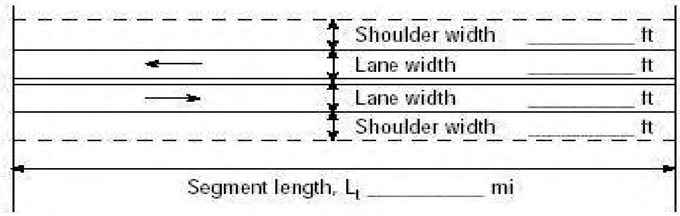
 HCS7™ TwoLane Version 7.4 Generated: 5/18/2018 3:33 PM

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		**Site Information**	
Analyst	*PEC*	Highway / Direction of Travel	*Middle Rd*
Agency or Company	*Garver*	From/To	*US 72 to Huntsville Rd*
Date Performed	*5/18/2018*	Jurisdiction	*SB*
Analysis Time Period	*PM*	Analysis Year	*2018*

Project Description: *Gresham Rd Corridor Study*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Analysis direction vol., V_d	*62*veh/h
Opposing direction vol., V_o	*100*veh/h
Shoulder width ft	*0.0*
Lane Width ft	*10.0*
Segment Length mi	*0.3*
Peak-hour factor, PHF	*0.80*
No-passing zone	*100%*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*40*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.9*	*1.8*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.982*	*0.984*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) v_i=V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*79*	*127*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*10.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.8 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*39.7 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*35.3 mi/h*
		Percent free flow speed, PFFS	*88.8 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.998*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) v_i=V_i/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*78*	*125*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{a v_d^b}$)	*9.3*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*52.8*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*29.6*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.05*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*88.8*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*77.5*
Effective width, Wv (Eq. 15-29) ft	*16.90*
Effective speed factor, S_t (Eq. 15-30)	*4.42*
Bicycle level of service score, BLOS (Eq. 15-31)	*3.61*
Bicycle level of service (Exhibit 15-4)	*D*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If $v_i(v_d$ or $v_o)$ >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	30	57	219	233	52
Future Vol, veh/h	12	30	57	219	233	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	37	70	267	284	63

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	723	316	347	0	-	0
Stage 1	316	-	-	-	-	-
Stage 2	407	-	-	-	-	-
Critical Hdwy	8	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	286	724	1212	-	-	-
Stage 1	739	-	-	-	-	-
Stage 2	672	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	267	724	1212	-	-	-
Mov Cap-2 Maneuver	267	-	-	-	-	-
Stage 1	689	-	-	-	-	-
Stage 2	672	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.3	1.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1212	-	486	-	-
HCM Lane V/C Ratio	0.057	-	0.105	-	-
HCM Control Delay (s)	8.2	0	13.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	364	5	12	1089	265	2	33	8	126	62	36
Future Volume (veh/h)	22	364	5	12	1089	265	2	33	8	126	62	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1695	1695	1695	1695	1695	1695	1709	1709	1709	1723	1723	1723
Adj Flow Rate, veh/h	25	414	0	14	1238	0	2	38	9	143	70	41
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	4	4	4	4	4	4	3	3	3	2	2	2
Cap, veh/h	199	1554		508	1522		53	435	99	325	152	78
Arrive On Green	0.03	0.48	0.00	0.02	0.47	0.00	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	1615	3221	1437	1615	3221	1437	16	1330	303	772	463	238
Grp Volume(v), veh/h	25	414	0	14	1238	0	49	0	0	254	0	0
Grp Sat Flow(s),veh/h/ln	1615	1611	1437	1615	1611	1437	1649	0	0	1473	0	0
Q Serve(g_s), s	0.6	5.9	0.0	0.3	25.6	0.0	0.0	0.0	0.0	9.2	0.0	0.0
Cycle Q Clear(g_c), s	0.6	5.9	0.0	0.3	25.6	0.0	1.6	0.0	0.0	10.8	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.04		0.18	0.56		0.16
Lane Grp Cap(c), veh/h	199	1554		508	1522		588	0	0	555	0	0
V/C Ratio(X)	0.13	0.27		0.03	0.81		0.08	0.00	0.00	0.46	0.00	0.00
Avail Cap(c_a), veh/h	311	2212		637	2212		588	0	0	555	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	14.4	12.0	0.0	10.4	17.6	0.0	18.2	0.0	0.0	21.2	0.0	0.0
Incr Delay (d2), s/veh	0.3	0.1	0.0	0.0	1.6	0.0	0.3	0.0	0.0	2.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.8	0.0	0.1	8.0	0.0	0.6	0.0	0.0	3.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.7	12.1	0.0	10.4	19.2	0.0	18.4	0.0	0.0	23.9	0.0	0.0
LnGrp LOS	B	B		B	B		B	A	A	C	A	A
Approach Vol, veh/h		439	A		1252	A		49			254	
Approach Delay, s/veh		12.2			19.1			18.4			23.9	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	30.0	5.8	42.1	30.0	6.6	41.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	7.5	53.5	25.5	7.5	53.5
Max Q Clear Time (g_c+I1), s	3.6	2.3	7.9	12.8	2.6	27.6
Green Ext Time (p_c), s	0.2	0.0	2.6	1.0	0.0	9.2

Intersection Summary	
HCM 6th Ctrl Delay	18.2
HCM 6th LOS	B

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection						
Int Delay, s/veh	2.4					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	62	3	55	18	1	227
Future Vol, veh/h	62	3	55	18	1	227
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	85	4	75	25	1	311

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	401	88	0	0	100	0
Stage 1	88	-	-	-	-	-
Stage 2	313	-	-	-	-	-
Critical Hdwy	8	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	507	970	-	-	1493	-
Stage 1	935	-	-	-	-	-
Stage 2	741	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	506	970	-	-	1493	-
Mov Cap-2 Maneuver	506	-	-	-	-	-
Stage 1	934	-	-	-	-	-
Stage 2	741	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	517	1493	-
HCM Lane V/C Ratio	-	-	0.172	0.001	-
HCM Control Delay (s)	-	-	13.4	7.4	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0	-

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	27	117	191	45	164	124
Future Vol, veh/h	27	117	191	45	164	124
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	35	152	248	58	213	161

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	848	294	374	0	-	0
Stage 1	294	-	-	-	-	-
Stage 2	554	-	-	-	-	-
Critical Hdwy	8	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	229	745	1184	-	-	-
Stage 1	756	-	-	-	-	-
Stage 2	575	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	180	745	1184	-	-	-
Mov Cap-2 Maneuver	180	-	-	-	-	-
Stage 1	593	-	-	-	-	-
Stage 2	575	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.7	7.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1184	-	469	-	-
HCM Lane V/C Ratio	0.21	-	0.399	-	-
HCM Control Delay (s)	8.8	0	17.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.8	-	1.9	-	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	159	524	389	1	1	296
Future Vol, veh/h	159	524	389	1	1	296
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	181	595	442	1	1	336

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	443	0	-	0	1103	222
Stage 1	-	-	-	-	443	-
Stage 2	-	-	-	-	660	-
Critical Hdwy	4.14	-	-	-	8	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	1113	-	-	-	144	782
Stage 1	-	-	-	-	614	-
Stage 2	-	-	-	-	476	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1113	-	-	-	121	782
Mov Cap-2 Maneuver	-	-	-	-	221	-
Stage 1	-	-	-	-	514	-
Stage 2	-	-	-	-	476	-

Approach	EB	WB	SB
HCM Control Delay, s	2.1	0	13.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1113	-	-	-	775
HCM Lane V/C Ratio	0.162	-	-	-	0.435
HCM Control Delay (s)	8.9	-	-	-	13.2
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.6	-	-	-	2.2

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	133	34	20	292	2	18	2	9	2	4	2
Future Vol, veh/h	2	133	34	20	292	2	18	2	9	2	4	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	168	43	25	370	3	23	3	11	3	5	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	373	0	0	211	0	0	622	619	190	625	639	372
Stage 1	-	-	-	-	-	-	196	196	-	422	422	-
Stage 2	-	-	-	-	-	-	426	423	-	203	217	-
Critical Hdwy	4.12	-	-	4.12	-	-	8	6.52	6.22	8	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1185	-	-	1360	-	-	343	404	852	341	394	674
Stage 1	-	-	-	-	-	-	806	739	-	609	588	-
Stage 2	-	-	-	-	-	-	606	588	-	799	723	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1185	-	-	1360	-	-	332	393	852	328	384	674
Mov Cap-2 Maneuver	-	-	-	-	-	-	332	393	-	328	384	-
Stage 1	-	-	-	-	-	-	804	737	-	607	574	-
Stage 2	-	-	-	-	-	-	585	574	-	783	721	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.5	14.2	14
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	332	703	1185	-	-	1360	-	-	411
HCM Lane V/C Ratio	0.069	0.02	0.002	-	-	0.019	-	-	0.025
HCM Control Delay (s)	16.6	10.2	8	-	-	7.7	0	-	14
HCM Lane LOS	C	B	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0.1	0	-	-	0.1	-	-	0.1

Intersection						
Int Delay, s/veh	0.5					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	159	1	21	296	0	10
Future Vol, veh/h	159	1	21	296	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	196	1	26	365	0	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	197	0	614	197
Stage 1	-	-	-	-	197	-
Stage 2	-	-	-	-	417	-
Critical Hdwy	-	-	4.12	-	8	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1376	-	348	844
Stage 1	-	-	-	-	836	-
Stage 2	-	-	-	-	665	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1376	-	340	844
Mov Cap-2 Maneuver	-	-	-	-	340	-
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	665	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	844	-	-	1376	-
HCM Lane V/C Ratio	0.015	-	-	0.019	-
HCM Control Delay (s)	9.3	-	-	7.7	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0.1	-

Intersection						
Int Delay, s/veh	1.5					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Vol, veh/h	42	274	601	0	0	75
Future Vol, veh/h	42	274	601	0	0	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	6	6	6	6	3	3
Mvmt Flow	47	304	668	0	0	83

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	668	0	-	0	1066	668
Stage 1	-	-	-	-	668	-
Stage 2	-	-	-	-	398	-
Critical Hdwy	4.16	-	-	-	8	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.254	-	-	-	3.527	3.327
Pot Cap-1 Maneuver	903	-	-	-	154	456
Stage 1	-	-	-	-	508	-
Stage 2	-	-	-	-	676	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	903	-	-	-	144	456
Mov Cap-2 Maneuver	-	-	-	-	144	-
Stage 1	-	-	-	-	476	-
Stage 2	-	-	-	-	676	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	14.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	903	-	-	-	456
HCM Lane V/C Ratio	0.052	-	-	-	0.183
HCM Control Delay (s)	9.2	0	-	-	14.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.7

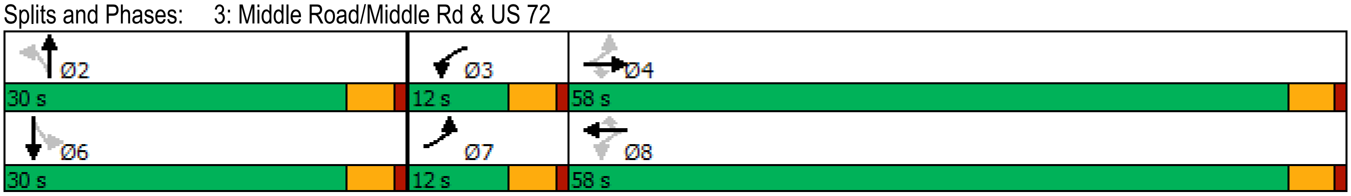
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	364	5	12	1089	265	2	33	8	126	62	36
Future Volume (vph)	22	364	5	12	1089	265	2	33	8	126	62	36
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	10	10	10	10	10	10
Storage Length (ft)	60		300	90		300	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	150			150			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.975			0.978	
Flt Protected	0.950			0.950				0.998			0.973	
Satd. Flow (prot)	1599	3197	1430	1599	3197	1430	0	1543	0	0	1524	0
Flt Permitted	0.111			0.509				0.991			0.798	
Satd. Flow (perm)	187	3197	1430	856	3197	1430	0	1532	0	0	1250	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			65			301		9			9	
Link Speed (mph)		50			50			45			45	
Link Distance (ft)		763			635			1253			1723	
Travel Time (s)		10.4			8.7			19.0			26.1	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	3%	3%	3%	2%	2%	2%
Adj. Flow (vph)	25	414	6	14	1238	301	2	38	9	143	70	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	414	6	14	1238	301	0	49	0	0	254	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.21	1.21	1.21	1.21	1.21	1.21
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5		22.5	22.5	
Total Split (s)	12.0	58.0	58.0	12.0	58.0	58.0	30.0	30.0		30.0	30.0	
Total Split (%)	12.0%	58.0%	58.0%	12.0%	58.0%	58.0%	30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	7.5	53.5	53.5	7.5	53.5	53.5	25.5	25.5		25.5	25.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None	None	Max	Max		Max	Max	
Act Effct Green (s)	42.4	41.2	41.2	41.0	39.0	39.0		26.6			26.6	
Actuated g/C Ratio	0.54	0.52	0.52	0.52	0.49	0.49		0.34			0.34	
v/c Ratio	0.11	0.25	0.01	0.03	0.78	0.35		0.09			0.59	
Control Delay	7.9	10.4	0.0	6.8	20.6	2.7		21.8			33.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Delay	7.9	10.4	0.0	6.8	20.6	2.7		21.8			33.1	
LOS	A	B	A	A	C	A		C			C	
Approach Delay		10.1			17.0			21.8			33.1	
Approach LOS		B			B			C			C	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 78.9
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 17.5 Intersection LOS: B
Intersection Capacity Utilization 60.3% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Middle Road/Middle Rd & US 72



Intersection	
Int Delay, s/veh	5.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	87	116	61	255	208	53
Future Vol, veh/h	87	116	61	255	208	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	95	126	66	277	226	58

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	664	255	284	0	-	0
Stage 1	255	-	-	-	-	-
Stage 2	409	-	-	-	-	-
Critical Hdwy	8	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	318	784	1278	-	-	-
Stage 1	788	-	-	-	-	-
Stage 2	671	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	299	784	1278	-	-	-
Mov Cap-2 Maneuver	299	-	-	-	-	-
Stage 1	740	-	-	-	-	-
Stage 2	671	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.7	1.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1278	-	462	-	-
HCM Lane V/C Ratio	0.052	-	0.478	-	-
HCM Control Delay (s)	8	0	19.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	2.5	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱		✣			✣	
Traffic Volume (veh/h)	63	1141	10	24	688	198	5	55	40	264	30	37
Future Volume (veh/h)	63	1141	10	24	688	198	5	55	40	264	30	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1695	1695	1695	1695	1695	1695	1709	1709	1709	1723	1723	1723
Adj Flow Rate, veh/h	68	1240	0	26	748	0	5	60	43	287	33	40
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	4	4	4	3	3	3	2	2	2
Cap, veh/h	372	1523		200	1453		55	306	207	444	41	50
Arrive On Green	0.05	0.47	0.00	0.03	0.45	0.00	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	1615	3221	1437	1615	3221	1437	20	937	633	1104	127	154
Grp Volume(v), veh/h	68	1240	0	26	748	0	108	0	0	360	0	0
Grp Sat Flow(s),veh/h/ln	1615	1611	1437	1615	1611	1437	1589	0	0	1385	0	0
Q Serve(g_s), s	1.7	25.8	0.0	0.7	13.0	0.0	0.0	0.0	0.0	14.3	0.0	0.0
Cycle Q Clear(g_c), s	1.7	25.8	0.0	0.7	13.0	0.0	3.8	0.0	0.0	18.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.05		0.40	0.80		0.11
Lane Grp Cap(c), veh/h	372	1523		200	1453		567	0	0	535	0	0
V/C Ratio(X)	0.18	0.81		0.13	0.51		0.19	0.00	0.00	0.67	0.00	0.00
Avail Cap(c_a), veh/h	448	2207		310	2207		567	0	0	535	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.4	17.6	0.0	14.7	15.3	0.0	19.0	0.0	0.0	23.5	0.0	0.0
Incr Delay (d2), s/veh	0.2	1.6	0.0	0.3	0.3	0.0	0.7	0.0	0.0	6.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.9	12.7	0.0	0.4	7.2	0.0	2.5	0.0	0.0	10.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.6	19.2	0.0	15.0	15.6	0.0	19.7	0.0	0.0	30.1	0.0	0.0
LnGrp LOS	B	B		B	B		B	A	A	C	A	A
Approach Vol, veh/h		1308	A		774	A		108			360	
Approach Delay, s/veh		18.8			15.6			19.7			30.1	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	30.0	6.7	41.4	30.0	8.4	39.7
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	25.5	7.5	53.5	25.5	7.5	53.5
Max Q Clear Time (g_c+I1), s	5.8	2.7	27.8	20.1	3.7	15.0
Green Ext Time (p_c), s	0.4	0.0	9.2	1.0	0.0	5.1

Intersection Summary	
HCM 6th Ctrl Delay	19.5
HCM 6th LOS	B

Notes

User approved ignoring U-Turning movement.

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	49	1	256	83	0	148
Future Vol, veh/h	49	1	256	83	0	148
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	53	1	278	90	0	161

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	484	323	0	0	368	0
Stage 1	323	-	-	-	-	-
Stage 2	161	-	-	-	-	-
Critical Hdwy	8	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	438	718	-	-	1191	-
Stage 1	734	-	-	-	-	-
Stage 2	868	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	438	718	-	-	1191	-
Mov Cap-2 Maneuver	438	-	-	-	-	-
Stage 1	734	-	-	-	-	-
Stage 2	868	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	441	1191	-
HCM Lane V/C Ratio	-	-	0.123	-	-
HCM Control Delay (s)	-	-	14.3	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.4	0	-

Intersection						
Int Delay, s/veh	14.1					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	138	159	143	198	100	98
Future Vol, veh/h	138	159	143	198	100	98
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	150	173	155	215	109	107

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	688	163	216	0	-	0
Stage 1	163	-	-	-	-	-
Stage 2	525	-	-	-	-	-
Critical Hdwy	8	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.5	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	306	882	1354	-	-	-
Stage 1	870	-	-	-	-	-
Stage 2	596	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	266	882	1354	-	-	-
Mov Cap-2 Maneuver	266	-	-	-	-	-
Stage 1	757	-	-	-	-	-
Stage 2	596	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	35.7	3.4	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1354	-	425	-	-
HCM Lane V/C Ratio	0.115	-	0.76	-	-
HCM Control Delay (s)	8	0	35.7	-	-
HCM Lane LOS	A	A	E	-	-
HCM 95th %tile Q(veh)	0.4	-	6.3	-	-

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	241	838	950	2	0	240
Future Vol, veh/h	241	838	950	2	0	240
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	262	911	1033	2	0	261

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1035	0	-	0	2014	518
Stage 1	-	-	-	-	1034	-
Stage 2	-	-	-	-	980	-
Critical Hdwy	4.14	-	-	-	8	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	667	-	-	-	27	502
Stage 1	-	-	-	-	304	-
Stage 2	-	-	-	-	324	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	667	-	-	-	16	502
Mov Cap-2 Maneuver	-	-	-	-	48	-
Stage 1	-	-	-	-	185	-
Stage 2	-	-	-	-	324	-

Approach	EB	WB	SB
HCM Control Delay, s	3.1	0	19.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	667	-	-	-	502
HCM Lane V/C Ratio	0.393	-	-	-	0.52
HCM Control Delay (s)	13.8	-	-	-	19.7
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	1.9	-	-	-	3

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	251	72	24	213	5	73	8	48	1	5	8
Future Vol, veh/h	6	251	72	24	213	5	73	8	48	1	5	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	273	78	26	232	5	79	9	52	1	5	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	237	0	0	351	0	0	620	615	312	644	652	235
Stage 1	-	-	-	-	-	-	326	326	-	287	287	-
Stage 2	-	-	-	-	-	-	294	289	-	357	365	-
Critical Hdwy	4.12	-	-	4.12	-	-	8	6.52	6.22	8	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1330	-	-	1208	-	-	344	407	728	330	387	804
Stage 1	-	-	-	-	-	-	687	648	-	720	674	-
Stage 2	-	-	-	-	-	-	714	673	-	661	623	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1330	-	-	1208	-	-	329	394	728	294	375	804
Mov Cap-2 Maneuver	-	-	-	-	-	-	329	394	-	294	375	-
Stage 1	-	-	-	-	-	-	682	643	-	715	657	-
Stage 2	-	-	-	-	-	-	683	656	-	601	619	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.8	15.8	12.1
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	329	649	1330	-	-	1208	-	-	525
HCM Lane V/C Ratio	0.241	0.094	0.005	-	-	0.022	-	-	0.029
HCM Control Delay (s)	19.4	11.1	7.7	-	-	8	0	-	12.1
HCM Lane LOS	C	B	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.9	0.3	0	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	236	9	37	236	5	68
Future Vol, veh/h	236	9	37	236	5	68
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	262	10	41	262	6	76

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	272	0	611	267
Stage 1	-	-	-	-	267	-
Stage 2	-	-	-	-	344	-
Critical Hdwy	-	-	4.12	-	8	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1291	-	350	772
Stage 1	-	-	-	-	778	-
Stage 2	-	-	-	-	718	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1291	-	337	772
Mov Cap-2 Maneuver	-	-	-	-	337	-
Stage 1	-	-	-	-	749	-
Stage 2	-	-	-	-	718	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	10.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	709	-	-	1291	-
HCM Lane V/C Ratio	0.114	-	-	0.032	-
HCM Control Delay (s)	10.7	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	101	514	309	3	1	57
Future Vol, veh/h	101	514	309	3	1	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	6	6	6	6	3	3
Mvmt Flow	110	559	336	3	1	62

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	339	0	-	0	1117	338
Stage 1	-	-	-	-	338	-
Stage 2	-	-	-	-	779	-
Critical Hdwy	4.16	-	-	-	8	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.254	-	-	-	3.527	3.327
Pot Cap-1 Maneuver	1198	-	-	-	140	702
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	451	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1198	-	-	-	121	702
Mov Cap-2 Maneuver	-	-	-	-	121	-
Stage 1	-	-	-	-	624	-
Stage 2	-	-	-	-	451	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	11.2
HCM LOS			B

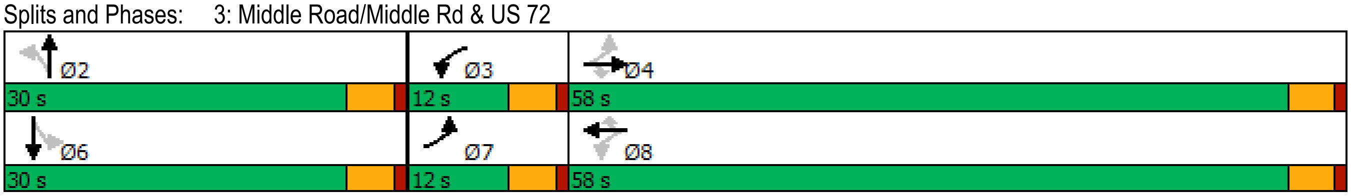
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1198	-	-	-	648
HCM Lane V/C Ratio	0.092	-	-	-	0.097
HCM Control Delay (s)	8.3	0	-	-	11.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	1141	10	24	688	198	5	55	40	264	30	37
Future Volume (vph)	63	1141	10	24	688	198	5	55	40	264	30	37
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	10	10	10	10	10	10
Storage Length (ft)	60		300	90		300	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	150			150			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.946			0.985	
Flt Protected	0.950			0.950				0.998			0.962	
Satd. Flow (prot)	1599	3197	1430	1599	3197	1430	0	1497	0	0	1517	0
Flt Permitted	0.253			0.120				0.984			0.725	
Satd. Flow (perm)	426	3197	1430	202	3197	1430	0	1476	0	0	1144	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			65			215		32			6	
Link Speed (mph)		50			50			45			45	
Link Distance (ft)		763			635			1253			1723	
Travel Time (s)		10.4			8.7			19.0			26.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	3%	3%	3%	2%	2%	2%
Adj. Flow (vph)	68	1240	11	26	748	215	5	60	43	287	33	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	68	1240	11	26	748	215	0	108	0	0	360	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.21	1.21	1.21	1.21	1.21	1.21
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5		22.5	22.5	
Total Split (s)	12.0	58.0	58.0	12.0	58.0	58.0	30.0	30.0		30.0	30.0	
Total Split (%)	12.0%	58.0%	58.0%	12.0%	58.0%	58.0%	30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	7.5	53.5	53.5	7.5	53.5	53.5	25.5	25.5		25.5	25.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.5			4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None	None	Max	Max		Max	Max	
Act Effct Green (s)	40.0	37.6	37.6	36.9	32.1	32.1		26.5			26.5	
Actuated g/C Ratio	0.52	0.49	0.49	0.48	0.42	0.42		0.34			0.34	
v/c Ratio	0.21	0.80	0.02	0.12	0.56	0.30		0.20			0.91	
Control Delay	8.9	21.0	0.0	8.4	18.6	2.9		19.0			57.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Delay	8.9	21.0	0.0	8.4	18.6	2.9		19.0			57.5	
LOS	A	C	A	A	B	A		B			E	
Approach Delay		20.2			14.9			19.0			57.5	
Approach LOS		C			B			B			E	

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 77.1	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 23.1	Intersection LOS: C
Intersection Capacity Utilization 76.4%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: Middle Road/Middle Rd & US 72



A.2: Public Involvement

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Gresham Road and Middle Road Planning
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______ Alternate A: Market Driven Land Use

______ Alternate B: Rural Character Land Use

X Alternate C: Managed Growth Land Use

COMMENTS:

at the intersection of Seville & Gresham Rd would like it to be a consideration of a turn-a-bout because of the church that will be built within 2 years

(Please use additional sheets as needed)

Please return within ten (10) days by mailing to either:

Scott C. Leach, PE
Garver, LLC
5125-A Research Drive, NW
Huntsville, AL 35805

Jesse Turner
NACOLG
103 Student Drive
Muscle Shoals, AL 35661

OR

E-mail to:
SCLeach@GarverUSA.com

E-Mail to:
jturner@nacolg.org

Vicki Sledge
(Name)
220 Plantation Springs Dr
(Mailing Address)
Florence AL 35630
(City, State, ZIP)

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_____ Alternate B: Rural Character Land Use

X Alternate C: Managed Growth Land Use

COMMENTS:

at the intersection of Seville & Gresham Rd would like it to be a consideration of a turn-a-bout because of the church that will be built within 2 years and the Hunters Ridge Subd. Lots of traffic is already backing up there at certain times of the day.

(Please use additional sheets as needed)

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NACOLG
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E-Mail to:
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Michael Sledge
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(Mailing Address)
Florence Al 35630
(City, State, ZIP)

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✓ Alternate C: Managed Growth Land Use

COMMENTS:

- Traffic Flow is critical issue - Traffic circles should be considered - Gresham/MR traffic is largely people avoiding the congestion on Cox Creek's retail centers.
- IF we have the $$, do the 5-lane now. IF not, 3 Lane but with 5 Lane ROW. MOVE UTILITIES ONLY ONCE for the next 50 YRS!
- The Undeveloped Land North of Gresham is the last, Large, close-in Land available for development. IT should not be squandered on piece-meal development, apts + houses. IT should be saved + targeted for clean light industry, e.g. a server farm like Google in Scottsboro, or High tech assembly plants, Tech services, etc.

(Please use additional sheets as needed)

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Huntsville, AL 35805

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Muscle Shoals, AL 35661

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(Mailing Address)

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(City, State, ZIP)

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3 Alternate A: Market Driven Land Use
1 Alternate B: Rural Character Land Use
2 Alternate C: Managed Growth Land Use

COMMENTS:
I would like to see a traffic light at Hunters Ridge S/D, Gresham Rd + Seville St intersection. I live in Hunters Ridge S/D

(Please use additional sheets as needed)

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Scott C. Leach, PE
Garver, LLC
5125-A Research Drive, NW
Huntsville, AL 35805

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OR
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E-Mail to:
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Kathy McCormack
(Name)
830 Summerfield Trail
(Mailing Address)
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(City, State, ZIP)

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2 Alternate B: Rural Character Land Use
1 Alternate C: Managed Growth Land Use

COMMENTS:

4 or 5 Lane option is a better choice

· Right + Left Turn Lanes needed at 72 intersection

· Like Roundabout

(Please use additional sheets as needed)

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Huntsville, AL 35805

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Tim Tubbs
(Name)

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(Mailing Address)

Killen AL 35645
(City, State, ZIP)

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COMMENTS:

- Roundabout @ Hunter's Ridge
- Roundabout @ Mall Rd
- Directed Intersection @ Middle Rd

(Please use additional sheets as needed)

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Huntsville, AL 35805

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Florence AL 35634
(City, State, ZIP)

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✓ Alternate A: Market Driven Land Use

_____ Alternate B: Rural Character Land Use

_____ Alternate C: Managed Growth Land Use

COMMENTS:

NO ROUND ABOUT –

Right TURN only at S.W. End Gresham Rd at Cox Creek –

(Please use additional sheets as needed)

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J. W. Northington MD
1945 Florence Blvd
Florence, AL 35630-2729

(City, State, ZIP)

COMMENT SHEET

NORTHWEST ALABAMA COUNCIL OF LOCAL GOVERNMENTS
in cooperation with
THE CITY OF FLORENCE, LAUDERDALE COUNTY
and THE TOWN OF ST. FLORIAN

Gresham Road and Middle Road Planning
and Corridor Study

PUBLIC INVOLVEMENT MEETING
Thursday, August 16, 2018

This Comment Sheet, with your written comments, along with your name & address and any other information you provide hereon will become a part of the Official Record of this meeting and, as such, is available to the general public for inspection upon request.

PLEASE RANK THE PROPOSED LAND USE ALTERNATES IN ORDER OF YOUR PREFERENCE FROM BEST TO WORST (1 = PREFERRED ALTERNATE; 3 = LEAST PREFERRED ALTERNATE)

3 Alternate A: Market Driven Land Use

2 Alternate B: Rural Character Land Use

1 Alternate C: Managed Growth Land Use

COMMENTS:

At The insection of Gresham Rd. + Middle Rd., on The Southwest corner, The weeds are so high That Traffic stopped on Gresham Rd cannot see Traffic coming on middle Rd. I am not sure whose Responsibility it is to clear These weeds.

I would prefer Round Abouts over Traffic Signals

(Please use additional sheets as needed)

Please return within ten (10) days by mailing to either:

Scott C. Leach, PE
Garver, LLC
5125-A Research Drive, NW
Huntsville, AL 35805

Jesse Turner
NACOLG
103 Student Drive
Muscle Shoals, AL 35661

OR
E-mail to:
SCLeach@GarverUSA.com

E-Mail to:
jturner@nacolg.org

Bill Wallace
(Name)

107 Karley LN.
(Mailing Address)

Florence, Ala. 35630
(City, State, ZIP)

COMMENT SHEET

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2 ~~3~~ Alternate A: Market Driven Land Use
3 ~~2~~ Alternate B: Rural Character Land Use
#1 ✓ Alternate C: Managed Growth Land Use

COMMENTS:
We see a real need for a traffic light or round-about at both the Gresham + Middle Rd insersection, as well as
– the entrance to Hunter's Ridge: Gresham and Seville intersection.
The Gresham Road needs to widened the entire length.

We would prefer a round about at both intersections.

(Please use additional sheets as needed)

Please return within ten (10) days by mailing to either:

Scott C. Leach, PE
Garver, LLC
5125-A Research Drive, NW
Huntsville, AL 35805

Jesse Turner
NACOLG
103 Student Drive
Muscle Shoals, AL 35661

OR
E-mail to:
SCLeach@GarverUSA.com

E-Mail to:
jturner@nacolg.org

Gary Hester, Bonnie Hester
(Name)
2130 Hickory Hills Rd.
(Mailing Address)
Florence, AL 35630
(City, State, ZIP)

COMMENT SHEET

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3 Alternate A: Market Driven Land Use
2 Alternate B: Rural Character Land Use
1 Alternate C: Managed Growth Land Use

COMMENTS:

- Round abouts are great if everyone uses them properly.
- [illegible]
- [illegible] Deerfield Place - Exiting - traffic control?
Seville Place onto Gresham - traffic control?
- Keep semi traffic off of Gresham Rd. + Middle Rd.

(Please use additional sheets as needed)

Please return within ten (10) days by mailing to either:

Scott C. Leach, PE
Garver, LLC
5125-A Research Drive, NW
Huntsville, AL 35805

Jesse Turner
NACOLG
103 Student Drive
Muscle Shoals, AL 35661

OR

E-mail to:
SCLeach@GarverUSA.com

E-Mail to:
jturner@nacolg.org

Barbara Schwindaman
(Name)
139 Cox Creek Pkwy S., #238
(Mailing Address)
Florence 35630
(City, State, ZIP)

COMMENT SHEET

NORTHWEST ALABAMA COUNCIL OF LOCAL GOVERNMENTS
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THE CITY OF FLORENCE, LAUDERDALE COUNTY
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_______ Alternate A: Market Driven Land Use
✓ Alternate B: Rural Character Land Use
_______ Alternate C: Managed Growth Land Use

COMMENTS:

WHY IS THIS MEETING BEING HELD?
ST. FLORIAN AND FLORENCE PLANNING COMMISSIONS HAVE DOCUMENTS CONCERNING LAND USE IN THIS CORRIDOR. WHY CAN THEY NOT JUST SUBMIT THEIR DOCUMENTS TO NACOLG? EVERYONE HAS ALWAYS BEEN ENCOURAGED TO ATTEND THESE PLANNING MEETINGS AND GIVE THEIR IMPUT. WHY IS NACOLG GOING AROUND THE PLANNING COMMISSIONS? IS ~~THERE~~ THERE A PLAN TO PRODUCE A PROJECT TO SEND TO THE LEGISLATURE AND SAY THAT IT IS IMPORTANT TO TAKE SOME LAND? PLEASE NO ROUNDABOUTS, AND TRAFFIC LIGHTS ARE NOT THE ANSWER TO EVERYTHING.
(SEE OTHER SIDE)

(Please use additional sheets as needed)

Please return within ten (10) days by mailing to either:

Scott C. Leach, PE
Garver, LLC
5125-A Research Drive, NW
Huntsville, AL 35805

Jesse Turner
NACOLG
103 Student Drive
Muscle Shoals, AL 35661

OR
E-mail to:
SCLeach@GarverUSA.com

E-Mail to:
jturner@nacolg.org

LOUIS STUMPE
(Name)

3567 COUNTY RD 61
(Mailing Address)

FLORENCE, AL 35634
(City, State, ZIP)

COMMENT SHEET

NORTHWEST ALABAMA COUNCIL OF LOCAL GOVERNMENTS
in cooperation with
THE CITY OF FLORENCE, LAUDERDALE COUNTY
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3 Alternate A: Market Driven Land Use

1 Alternate B: Rural Character Land Use

2 Alternate C: Managed Growth Land Use

COMMENTS:

Stop lights at Middle Road and Gresham AND Middle Road and Hough - NOW! Don't delay for years and years and years like in St Florian. If you come out, sit and watch the 5PM traffic you'll see the ROUNDABOUT idea is ridiculous for Middle Rd. Stop Signs at Hunleis Way, Seville St on Gresham - ASAP! Somebody going to get killed there any day.

No more Apartments on Gresham or Middle Road.

Florence, St. Florian and Lauderdale County Please get your act together on this. You are already 10yrs behind.

(Please use additional sheets as needed)

Please return within ten (10) days by mailing to either:

Scott C. Leach, PE
Garver, LLC
5125-A Research Drive, NW
Huntsville, AL 35805

Jesse Turner
NACOLG
103 Student Drive
Muscle Shoals, AL 35661

OR

E-mail to:
SCLeach@GarverUSA.com

E-Mail to:
jturner@nacolg.org

Bowlin
(Name)

3408 Kelbe Lane
(Mailing Address)

Florence, Al 35634
(City, State, ZIP)

COMMENT SHEET

NORTHWEST ALABAMA COUNCIL OF LOCAL GOVERNMENTS
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1 Alternate A: Market Driven Land Use

____ Alternate B: Rural Character Land Use

____ Alternate C: Managed Growth Land Use

COMMENTS:
Please forward a copy of road easement for Middle Road (CR 61) and Gresham Road (CR 46). Property is in St. Florian. Thanks.

(Please use additional sheets as needed)

Please return within ten (10) days by mailing to either:

✓ Scott C. Leach, PE
Garver, LLC
5125-A Research Drive, NW
Huntsville, AL 35805

Jesse Turner
NACOLG
103 Student Drive
Muscle Shoals, AL 35661

OR

E-mail to:
SCLeach@GarverUSA.com

E-Mail to:
jturner@nacolg.org

E. M. Hammond
(Name)
3613 Jane Way
(Mailing Address)
Florence, Al. 35634
(City, State, ZIP)
8/19/18

COMMENT SHEET

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_______ Alternate B: Rural Character Land Use

_______ Alternate C: Managed Growth Land Use

COMMENTS:

At least you could put a 3 way stop if you are not going to put a red light there any way soon. at the Gresham Road and Middle Road, intersection

(Please use additional sheets as needed)

Please return within ten (10) days by mailing to either:

Scott C. Leach, PE
Garver, LLC
5125-A Research Drive, NW
Huntsville, AL 35805

Jesse Turner
NACOLG
103 Student Drive
Muscle Shoals, AL 35661

James + Linda Lewis
(Name)

402 Mauldin Ave
(Mailing Address)

Florence, Al. 35634
(City, State, ZIP)

OR

E-mail to:
SCLeach@GarverUSA.com

E-Mail to:
jturner@nacolg.org

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1 Alternate A: Market Driven Land Use
2 Alternate B: Rural Character Land Use
3 Alternate C: Managed Growth Land Use

COMMENTS:

add turn lanes at middle Rd & Gresham road for immediate relief.

Later make Gresham Rd 3 lanes, no more
leave off sidewalks and swales (NOT NEEDED)
add light signals at middle Rd & Gresham Rd

(Please use additional sheets as needed)

Please return within ten (10) days by mailing to either:

Scott C. Leach, PE
Garver, LLC
5125-A Research Drive, NW
Huntsville, AL 35805

Jesse Turner
NACOLG
103 Student Drive
Muscle Shoals, AL 35661

OR
E-mail to:
SCLeach@GarverUSA.com

E-Mail to:
jturner@nacolg.org

L. J. SPECKER
(Name)

6305 County Rd 41
(Mailing Address)

FLORENCE AL 35633
(City, State, ZIP)

COMMENT SHEET

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3 Alternate A: Market Driven Land Use

2 Alternate B: Rural Character Land Use

1 Alternate C: Managed Growth Land Use

COMMENTS:

A. 5 lanes with bicycle lane seems excessive.
B. 2 lane with bicycle lane would be sufficient.
C. Stormwater run-off volume is greater for a 5 lane roadway. Areas to the north of parts of Gresham Road where known to locals as Wilsom Swamp. This would increase the potential for flooding of residents with homes on the golf course. An extensive stormwater run-off management plan would be needed.

(Please use additional sheets as needed)

Please return within ten (10) days by mailing to either:

Scott C. Leach, PE
Garver, LLC
5125-A Research Drive, NW
Huntsville, AL 35805

Jesse Turner
NACOLG
103 Student Drive
Muscle Shoals, AL 35661

OR

E-mail to:
SCLeach@GarverUSA.com

E-Mail to:
jturner@nacolg.org

B. Paul Bernauer
(Name)

4950 County Road 47
(Mailing Address)

Florence, AL 35634
(City, State, ZIP)

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3 Alternate A: Market Driven Land Use
2 Alternate B: Rural Character Land Use
1 Alternate C: Managed Growth Land Use

COMMENTS:

A. Maybe 5 lanes w/bicycle lanes is a little excessive
B. I think a 2 Lane w/bicycle lanes/acess would be perfect
C. I think speeds approaching a Round-A-Bout would need to be "controlled"/slowed until people were used to it being there - speed bumps, flashing signs, etc...
There is a LOT of water that is on this area of the road in bad weather. It is a problem NOW, and needs to be looked at if/when more cars travel this.
D. Traffic along this road is a problem

(Please use additional sheets as needed)

Please return within ten (10) days by mailing to either:

Scott C. Leach, PE
Garver, LLC
5125-A Research Drive, NW
Huntsville, AL 35805

Jesse Turner
NACOLG
103 Student Drive
Muscle Shoals, AL 35661

OR
E-mail to:
SCLeach@GarverUSA.com

E-Mail to:
jturner@nacolg.org

Anne L. Bernauer
(Name)
4950 CR 47
(Mailing Address)
Florence AL 35634
(City, State, ZIP)

COMMENT SHEET

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_____ Alternate A: Market Driven Land Use
__X__ Alternate B: Rural Character Land Use
_____ Alternate C: Managed Growth Land Use

COMMENTS:

Improvements to Gresham Rd can't wait 5 or 10 yrs. There are numerous close calls at the intersection of Gresham and Seville. There are dangerous blind hills at all intersections.

- There needs to be a limit on number of apartments which can be built. There should be none on north side of Gresham. There are too many now.

- As the agricultural fields are developed there should be plans for greenways and park type areas. Single family housing should be priority to accommodate workers from industry to the east of the Shoals.

(Please use additional sheets as needed)

Please return within ten (10) days by mailing to either:

Scott C. Leach, PE
Garver, LLC
5125-A Research Drive, NW
Huntsville, AL 35805

Jesse Turner
NACOLG
103 Student Drive
Muscle Shoals, AL 35661

OR

E-mail to:
SCLeach@GarverUSA.com

E-Mail to:
jturner@nacolg.org

Ronnie Moore
(Name)
1214 Woodridge Ct
(Mailing Address)
Florence AL 35630
(City, State, ZIP)

Burgess, James M. (Matthew)

From: Leach, Scott, C.
Sent: Friday, August 24, 2018 2:05 PM
To: Burgess, James M. (Matthew); Walden, James P.
Subject: FW: Comments on Public Information Meeting

Follow Up Flag: Follow up
Flag Status: Flagged

FYI

Thanks,
Scott

Scott Leach, PE
Garver
256-679-5588

From: David (Dave) Kennebeck <djkennebeck@att.net>
Sent: Friday, August 24, 2018 1:49 PM
To: Leach, Scott, C. <SCLeach@GarverUSA.com>; jturner@nacolg.org
Cc: Andy Betterton <andy@abetterton.com>
Subject: Comments on Public Information Meeting

Regarding the Public Information Meeting held on Aug 16, 2018 which I was unable to attend...

COMMENT SHEET

Alternate preferences ranking:

2 Alt A (MDLU)
3 Alt B (RCLU)
1 Alt C (MGLU)

Comments:

--Support grass/shrub cutting to ensure visibility to all directions.
--Support round-about at intersection of Gresham & Seville (entrance to Hunter's Ridge subdivision). If no roundabout, at least a stoplight (preferred) or stop sign.
--Support 3-lanes on Gresham (eastbound, turn lane, and westbound); with future possibility of expanding to five lanes.
--Stoplight at Middle Road and Gresham is supported, with a yield lane off eastbound 46 onto southbound Middle. However, I think consideration should be given to re-routing Rt 46 by eliminating the north and south intersections of Rt 46 (Gresham) and Middle Road (circles 5 and 4 on Figure 2 by Garver) by making an S curve to connect southern 46 to northern 46 and putting a stoplight at the new, single intersection of 46 and Middle Road. Or build a roundabout on 46 between northern and southern 46 so that eastbound traffic on southern 46 enters the roundabout near the south side and westbound traffic on northern 46 enters the roundabout near the north side.

David Kennebeck
847-949-1810
606 Whitetail Lane
Florence, AL 35630

Gresham Road and Middle Road Planning and Corridor Study

Comments:

1. The intersection of Middle Road and U.S. 72 is very dangerous. The intersection needs to be enlarged with a double Left Turn Lane from Middle Road to U.S. 72. Most of the time it is necessary to go through 2-4 light cycles at 4:00-6:00 P. M. daily.
2. A Round-About at the Middle Road Gresham Road intersection would be ideal.
3. Gresham Road and Middle Road each need to be 5 Lanes for the amount of traffic they carry.
4. Please make the land use a Managed Growth Land Project. U.S. 72 and Middle Road are the first exposure for visitors to the City of Florence. Currently, the businesses around U.S. 72 and Middle Road are not attractive and actually give a very bad impression upon entrance to the city.
5. The intersection at Cox Creek and Gresham needs improvement as well. the middle turn lane onto Cox Creek Parkway is very narrow. It is a dangerous place to wait to turn left onto Gresham Road.

Dr. Alvin L. Sago
311 Center Point Lane
Florence, AL 35634

256-740-9178

Burgess, James M. (Matthew)

From: Leach, Scott, C.
Sent: Saturday, August 18, 2018 12:42 PM
To: Burgess, James M. (Matthew)
Cc: Walden, James P.
Subject: Fwd: Greshad Road and Middle Road Planning and Corridor Study

FYI

Thanks,
Scott

Scott C. Leach, PE
Garver
256-679-5588

Begin forwarded message:

From: "Jimmy Burns" <chs76er@comcast.net>
To: "Leach, Scott, C." <SCLeach@GarverUSA.com>
Cc: "jturner@nacolg.org" <jturner@nacolg.org>
Subject: Greshad Road and Middle Road Planning and Corridor Study

Mr. Leach –

Attached you will find a copy of my completed comment sheet. In case it is not clear here are my comments:

3 – Alternate A: Market Driver Land Use
1 – Alternate B: Rural Character Land Use
2 – Alternate C: Managed Growth Land Use

Immediate need: Turn lanes definitely need to be added on both Middle Rd and Gresham Rd at the intersection. In addition, a red light with left turn signals on both Middle Rd and Gresham Rd would be a great improvement to traffic flow. Turn lanes should also be added to Middle Rd at the Florence Blvd intersection and the red light should have left turn signals for the Middle Rd traffic as it currently does for the Florence Blvd traffic.

Future: I am still uncertain as to whether a roundabout at the Middle Rd/Gresham Rd intersection would work better than a traffic light. Improvement to the Kolbe Ln/Middle Rd intersection will be needed.

Thank you for allowing us to provide feedback as a part of this study.

Jimmy Burns
3428 Kolbe Lane
Florence AL 35634

Burgess, James M. (Matthew)

From: Judith Stutts <pugmillie@bellsouth.net>
Sent: Sunday, August 26, 2018 12:20 PM
To: Jesse Turner
Subject: Gresham Road

Gresham road is being used mainly as a short cut by people instead of using the main highways. They are not shopping as was suggested in a recent newspaper article. I have lived in this area for 40 years and I travel these roads every day. I'm all for growth but these traffic problems in this area have gotten ridiculous. There needs to be a red light at the intersection of Gresham and Middle road and one at the Seville St and Gresham road intersection. The people that live in the Regency Acres subdivdsion as you turn off middle road onto Kolbe Lane have terrible traffic at times. People are using that area as a short cut also. Most people do not obey the speed limit and a lot of them never stop at the stop signs. I've almost been hit several times turning off Janeway onto Kolbe. We need some speed bumps on that road to slow people down. I know our law enforcement are busy but we need more traffic enforcement in that area. Thank you for your time.

Burgess, James M. (Matthew)

From: Leach, Scott, C.
Sent: Sunday, August 19, 2018 1:46 PM
To: Burgess, James M. (Matthew); Walden, James P.
Subject: Fwd: Gresham Road

FYI

Thanks,
Scott

Scott C. Leach, PE
Garver
256-679-5588

Begin forwarded message:

> **From:** Melanie Holt <mholt1970@gmail.com>
> **Date:** August 19, 2018 at 1:44:16 PM CDT
> **To:** SCLeach@garverusa.com, jturner@nacolg.org
> **Subject: Gresham Road**
>
> Hello,
> Thank you for making the information easily accessible.
>
> I drive this road often and considered purchasing a lot on which to build a house in Hunter's Ridge but would not because there wasn't a light at the intersection. I look forward to having a traffic light at that intersection.
>
> Of the manage growth alternatives, I think the access management is the best idea. The rural character alternative is easing into the past.
>
> I think the three lanes with the possibility of five lanes in the future is the best alternative. That roadway is going to continue the have traffic increases. If utilities have to be moved, one move now to allow for future growth as opposed to moving them now for a three lane road and having to move them again in the future for a five lane road.makes better fiscal sense.
>
> Thank you for your attention.
> Regards,
> Melanie Holt
> Florence resident
>
> 
>
> __
> Melanie

Burgess, James M. (Matthew)

From: Leach, Scott, C.
Sent: Monday, August 27, 2018 10:10 PM
To: Burgess, James M. (Matthew); Walden, James P.
Subject: FW: Florence Gas Existing Utilities on Gresham Rd./Middle Rd. (Co. Rd. 61) Project (Corridor/Planning Study)
Attachments: 0241_001.pdf

FYI

Thanks,
Scott

Scott Leach, PE
Garver
256-679-5588

From: Roger Pope <RPope@florenceal.org>
Sent: Monday, August 27, 2018 4:32 PM
To: Leach, Scott, C. <SCLeach@GarverUSA.com>; jturner@nacolg.org
Cc: Tim Truitt <TTruitt@florenceal.org>; Mike Doyle <MDoyle@florenceal.org>; ehill@lauderdalecountyal.gov; Melissa Bailey <MBailey@florenceal.org>; Bill Batson <BBatson@florenceal.org>
Subject: Florence Gas Existing Utilities on Gresham Rd./Middle Rd. (Co. Rd. 61) Project (Corridor/Planning Study)

Scott and Jesse,

In regards to submitting comments on the referenced Study we offer the following:

Attached is a brief map showing approximate locations of our existing natural gas facilities on the indicated roadways?

All of our facilities can be located through contacting Alabama 811. Also, we would be happy to provide you with GIS mapping indicating the size and material type of all requested gas mains.

An Estimate for gas main and service line relocation/replacement should be included in the final project for reimbursement for our department to complete all required work.

Please let me know if you have any questions or need additional information during the course of this Corridor/Planning Study or related Engineering planning and design.

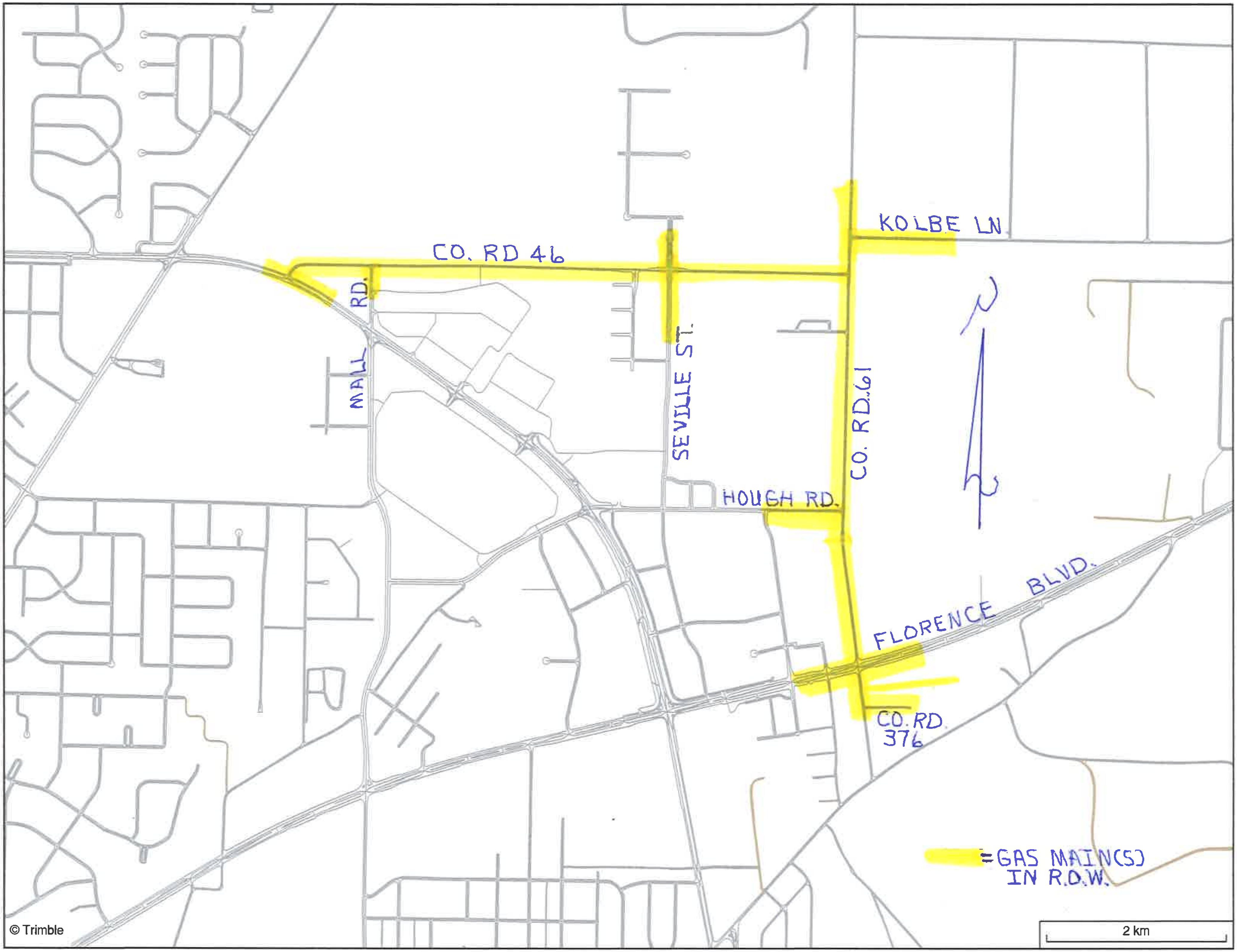
Thank you,

Roger

Roger Pope
Design Supervisor-Gas
Florence Gas & Water/WW Dept.
650 Rickwood Road

Florence, AL 35630

256-718-5108 (O)
256-760-6387 (Fax)
rpope@florenceal.org



KOLBE LN
CO. RD 46
RD.
MALL
SEVILLE ST.
CO. RD. 61
HOUGH RD.
FLORENCE BLVD.
CO. RD 376
= GAS MAIN(S) IN R.O.W.
© Trimble
2 km

Ronnie Moore 1214 Woodridge Ct Florence AL 2 of 2

Bike paths and sidewalks should be included in design. Intersections on Cox Creek should include pedestrians crosswalks especially at Seville St. While I understand this doesn't include other streets, Florence should provide pedestrian crosswalks at all intersections near the mall of shopping district.

Burgess, James M. (Matthew)

From: Leach, Scott, C.
Sent: Wednesday, August 22, 2018 9:46 AM
To: Burgess, James M. (Matthew); Walden, James P.
Subject: Fwd: Gresham Road and Middle Road Planning and Corridor Study - feedback

FYI

Thanks,

Scott

Scott C. Leach, PE

Garver

256-679-5588

Begin forwarded message:

From: "Sherea Burns" <dsfb24@comcast.net>
Date: August 22, 2018 at 9:41:04 AM CDT
To: <SCLeach@GarverUSA.com>
Cc: <jturner@nacolg.org>
Subject: Gresham Road and Middle Road Planning and Corridor Study - feedback

THE PROPOSED LAND USE ALTERNATES IN ORDER OF MY PREFERENCE FROM BEST TO WORST:

__3__ Alternate A: Market Driven Land Use

__1__ Alternate B: Rural Character Land Use

__2__ Alternate C: Managed Growth Land Use

COMMENTS:

Proposed short term improvements:

Turn lanes and a red light definitely need to be added at Middle Road and Gresham Road at the intersection. Please consider adding a right-hand turn lane from Middle Road to Gresham Road. I often witness heavy traffic coming from St. Florian, and with the addition of the red light I'm concerned traffic will back up and cause us trouble at Kolbe Lane.

Add speed limit signs on Middle Road from Hwy 72 to Locker Lane, and consider lowering the speed limit to 35 or 40 mph.

Turn lanes should be added to Middle Road at the Florence Blvd intersection and the red light should have left turn signals on Middle Road. Consider working on the timing of the traffic lights on Hwy 72. If Hwy 72 traffic has to stop at Middle Road, Beman Road, and Cox Creek they will find a different route (likely Bailey Springs to Kolbe Lane to Gresham).

The proposed addition of a red light and turn lanes at Middle Road and Hough Road are definitely needed.

Proposed long term improvements:

I'm uncertain as to whether a roundabout at the Middle Road/Gresham Road intersection would work better than a red light. Improvement to the Kolbe Lane/Middle Road intersection will be needed.

Thank you,

Sherea Burns
3428 Kolbe Lane
Florence, AL 35634

Burgess, James M. (Matthew)

From: Leach, Scott, C.
Sent: Monday, August 27, 2018 10:09 PM
To: Walden, James P.; Burgess, James M. (Matthew)
Subject: FW: Florence Water and Sanitary Sewer Utilities in the Gresham Rd (CR-46) and Middle Rd (CR-61) Planning and Corridor Study Area
Attachments: Florence Water & Sanitary Sewer Utility Map-Gresham Rd (CR-46) & Middle Rd (CR-61).pdf

FYI

Thanks,
Scott

Scott Leach, PE
Garver
256-679-5588

From: Tim Truitt <TTruitt@florenceal.org>
Sent: Monday, August 27, 2018 4:43 PM
To: Leach, Scott, C. <SCLeach@GarverUSA.com>; jturner@nacolg.org
Cc: Mike Doyle <MDoyle@florenceal.org>; EHill@lauderdalecountyal.gov; Bill Batson <BBatson@florenceal.org>; Melissa Bailey <MBailey@florenceal.org>; Roger Pope <RPope@florenceal.org>; Robert Pride (Robert@engineersofthesouth.com) <Robert@engineersofthesouth.com>
Subject: Florence Water and Sanitary Sewer Utilities in the Gresham Rd (CR-46) and Middle Rd (CR-61) Planning and Corridor Study Area

Scott & Jesse,

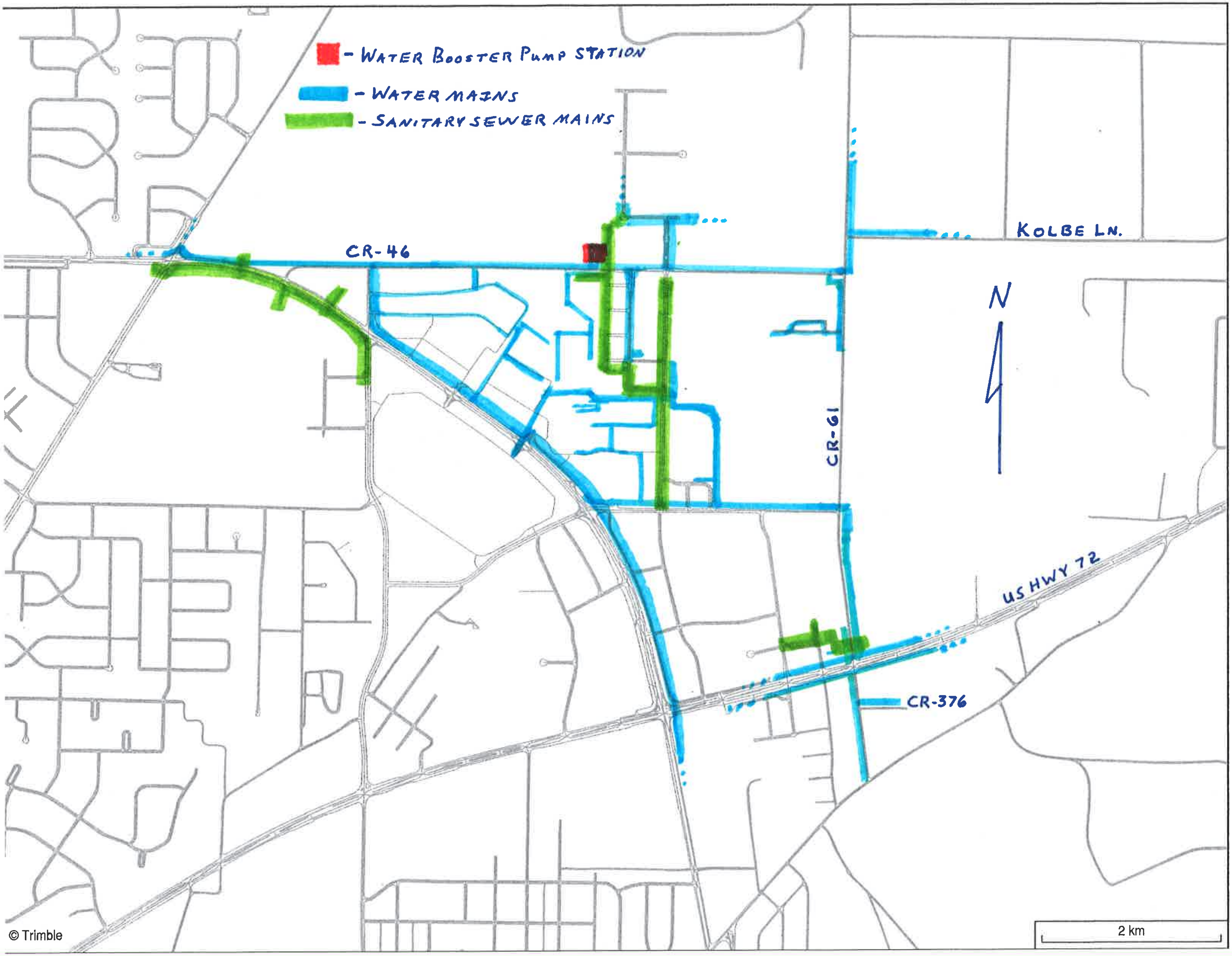
It was good to speak with you at the Gresham Rd and Middle Rd Planning and Corridor Study Public Meeting held August 18, 2018. Regarding the request for comments on the meeting, we are attaching a highlighted map of the existing Water and Sanitary Sewer Utilities in the vicinity of the Study Area.

Please note the Florence Water/Wastewater Department has a major Water Booster Pumping Station on Gresham Rd which serves St. Florian to the north up Middle Rd. and also our eastern distribution system via Kolbe Lane. The map is not detailed, but represents the areas served via water mains (blue) and sanitary sewer mains (green).

Because the road R.O. W. and intersection improvements may conflict with our exiting utilities, please ensure the cost of relocating/replacing our utilities (and/or the option of betterment, if needed) are incorporated into the project design to accommodate the growth model selected.

If you need additional information, please contact us.

Thanks,
Tim Truitt, PE
Florence Gas & Water/WW Depts.
ttruitt@florenceal.org
256-718-5113



- WATER BOOSTER PUMP STATION
- WATER MAINS
- SANITARY SEWER MAINS
CR-46
KOLBE LN.
N
CR-61
US HWY 72
CR-376
© Trimble
2 km

Town of St. Florian
4508 County Road 47
Florence, AL 35634
(256)-767-3690

August 22, 2018

Keith Jones, Executive Director
Northwest Alabama Council of Local Governments
103 Student Drive
Muscle Shoals, AL 35661

NORTHWEST ALABAMA COUNCIL OF LOCAL GOVERNMENTS (NACOLG) - GRESHAM ROAD AND MIDDLE ROAD PLANNING AND CORRIDOR STUDY

Dear Mr. Jones:

On August 16, 2018 at the Public Involvement Meeting a statement was made by a member of the Lauderdale County Commission to the affect that the City of Florence Planning Commission had final approval authority for this project.

Whether misspoken or misinterpreted by those present, it is important to clarify Florence Planning Commission has no authority within the town limits of the Town of St. Florian impacted by this proposed project. Since there are three entities involved, it would appear to be advantageous to have a consensus for the path forward related to this proposed project.

The Town of St. Florian and the Town's Planning Commission look forward to working inclusively and concurrently with all involved parties to ensure future development plans are mutually beneficial to all.

For your information, on August 21, 2018, The Town of St. Florian Planning Commission voted to recommend acceptance of the NACOLG Master Plan Proposal, provided by Nathan Willingham, to the Town Council for final approval.

Sincerely,

Mayor and Town Council and Planning Commission Members
Advance Copy
Signed Copy to Follow

Burgess, James M. (Matthew)

From: Trish Blaxton <tbla@bellsouth.net>
Sent: Thursday, August 23, 2018 6:03 PM
To: Jesse Turner
Subject: Gresham Road

My comments are on the Gresham Rd and Middle Rd project. I have lived in this are over 40 years and have seen all the growth taking place. Gresham Rd - Middle Rd intersection is an accident waiting to happen (and accidents happen there very often), it needs a traffic light and turning lanes and needs to be 5 lanes for the entire road (Gresham). Middle road needs 4 lanes.

Thank you

NACOLG , City of Florence, Lauderdale County & Town of St .Florian

Gresham Road and Middle Road Planning & Corridor Study
Public Involvement Meeting
August 16, 2018

Name	Address	City, State & Zipcode
1. Nancy Bowlin	3408 Kalke Lane	35634
2. Wanda Putman	218 Plantation Springs Dr	35630
3. Johnny Putman	" " "	"
4. Michael Sledge	220 Plantation Spring Dr	35630
5. Vicki Sledge	" " " "	"
6. Bill Wallace	107 Karley Ln.	35630
7. Gary Hudson		
8. Dan Smith		
9. Bill Batson		
10. Ronnie Roberts	108 Harris Dr. Florence	35634
11. Gail Roberts	Same	
12. Danny & Connie Clark	571 Co. Rd. 46 Florence, Al	35634
13. William A. Krieger	910 Co Rd 46 Florence, AL,	35634
14. Ernest A Fite	212 Harrington Ln Florence AL	35630
15. J. Bullard		

NACOLG , City of Florence, Lauderdale County & Town of St .Florian

Gresham Road and Middle Road Planning & Corridor Study

Public Involvement Meeting

August 16, 2018

	Name	Address	City, State & Zipcode
16.	Randy & Susan Meyer	3621 Lockland Rd	Florence, AL 35634
17.	Nathan Willingham	910 Tyler Ave	Muscle Shoals, AL 35661
18.	Jason Brewer	516 Rivermont Rd	Florence, Al 35634
19.	Joseph E. Holt	706 Beverly Dr	Muscle Shoals Al 35661
20.	[illegible]	1539 Melton Dr	Florence, Al 35630
21.	[illegible]	1630 State St.	Florence, AL
22.	David Craig	434 Robinhood Dr.	FC., AL 35633
23.	LOUIS STUMPE	3567 COUNTY RD. 61	FL AL 35634
24.	[illegible]	311 CENTER POINT LN	FLORENCE 35634
25.	Ronnie & Stephanie Moore	1214 Woodridge Ct	Florence Al 35630
26.	Paul [illegible]	4950 CR 47	Florence AL 35634
27.	[illegible]	235 Brushcreek Rd	Killen, AL 35645
28.	[illegible]	310 C. Rd 31	Killen AL 35645
29.	Gene Thompson	203 Treetop Dr	Florence AL 35630
30.	Glenn + Kathy McCormack	830 Summerfield Trail	Florence AL 35630

NACOLG , City of Florence, Lauderdale County & Town of St .Florian

Gresham Road and Middle Road Planning & Corridor Study
Public Involvement Meeting
August 16, 2018

	Name	Address	City, State & Zipcode
1.	James Lewis	402 Mauldin Ave	Florence, Al 35634
2.	Linda Lewis	402 Mauldin Ave	Florence Al. 35634
3.	Joseph Meyer	601 Co Rd 46	Florence Ala 35634
4.	Joan Meyer	601 Co. Rd. 46	Florence Al. 35634
5.	Henry King	401 S. Pine St	Florence Al 35630
6.	Jimmy Burns	3428 Kolbe Ln	Florence AL 35634
7.	Sherea Burns	3428 Kolbe Ln	Florence AL 35634
8.	Mayor Dam Stumpe		St. Florian, AL.
9.	Lucy L. Crosby	3452 CR. 47	Florence, AL. 35630
10.	John Locker	3402 CR 47	Florence, AL 35630
11.	Greg Montgomery	300 Golden Pond Road	Florence AL 35633
12.	Brad Jones	7314 Trailwood St	Florence, AL 35634
13.	Justin Bishop	164 Ava Dr.	Florence, AL 35630
14.	Marie Hammond	3613 Jane Way	Florence, AL 35634
15.	Garvin Daily	" "	" " "

NACOLG , City of Florence, Lauderdale County & Town of St .Florian

Gresham Road and Middle Road Planning & Corridor Study

Public Involvement Meeting

August 16, 2018

	Name	Address	City, State & Zipcode
16.	Charles Kriege	1050 Co Road 46	35634
17.	L J Specker	6385 County Rd 41	35633
18.	Gary + Bonnie Hester	835 Summerfield Dr	35630
19.	Barbara Schwindaman	105 Deerfield	35630
20.	James Northington MD	290 Maury Lane	35634
21.	Lloyd W. Love Jr.	125 Riverman Rd	35634
22.	Janice Gautney	511 Stonegate Terrace (Hunter's Ridge)	Flo., AL 35630
23.	Tim Truitt	Florence Water/WW/Gas Dept.	
24.	Brad Holmes	Lauderdale Co. Commission	35634
25.	J B Webb	– Beaman	
26.	Joyce Fedeczko	1206 WoodRidge Ct.	35630 (Hunter's Ridge)
27.	Anne L Bormann	4950 CR47 Florence AL	35634
28.	CLINT BAKER		
29.	Chip Kasmeier	380 Kasmeier Rd	
30.	Marguerite Eckl	1480 Co. Rd. 30	Florence, Al. 35634

NACOLG , City of Florence, Lauderdale County & Town of St .Florian

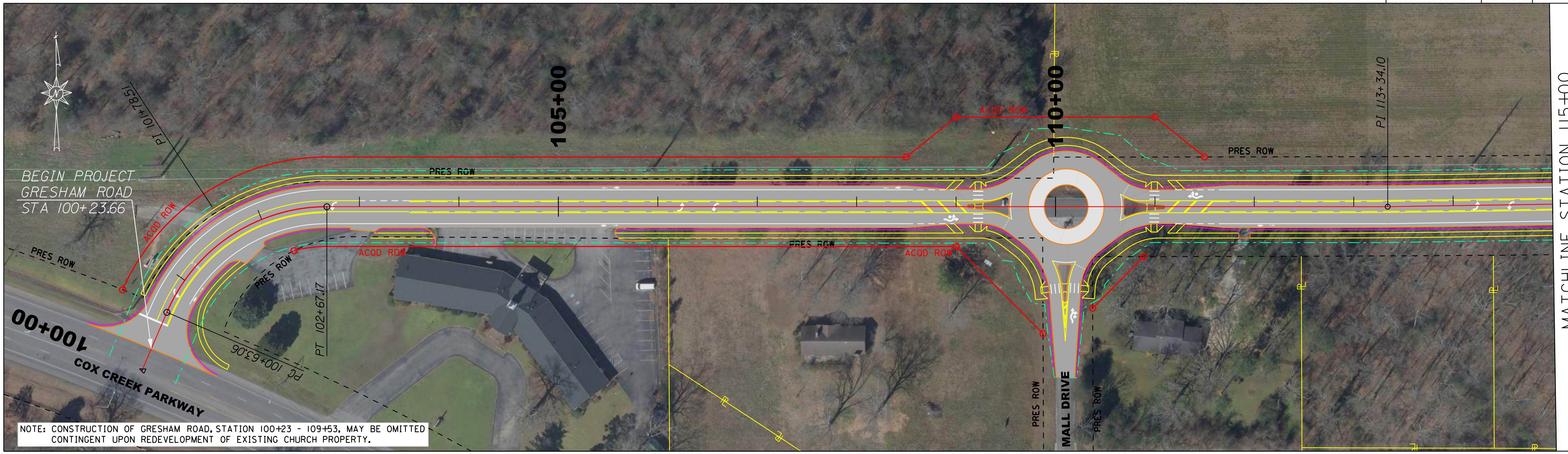
Gresham Road and Middle Road Planning & Corridor Study
Public Involvement Meeting
August 16, 2018

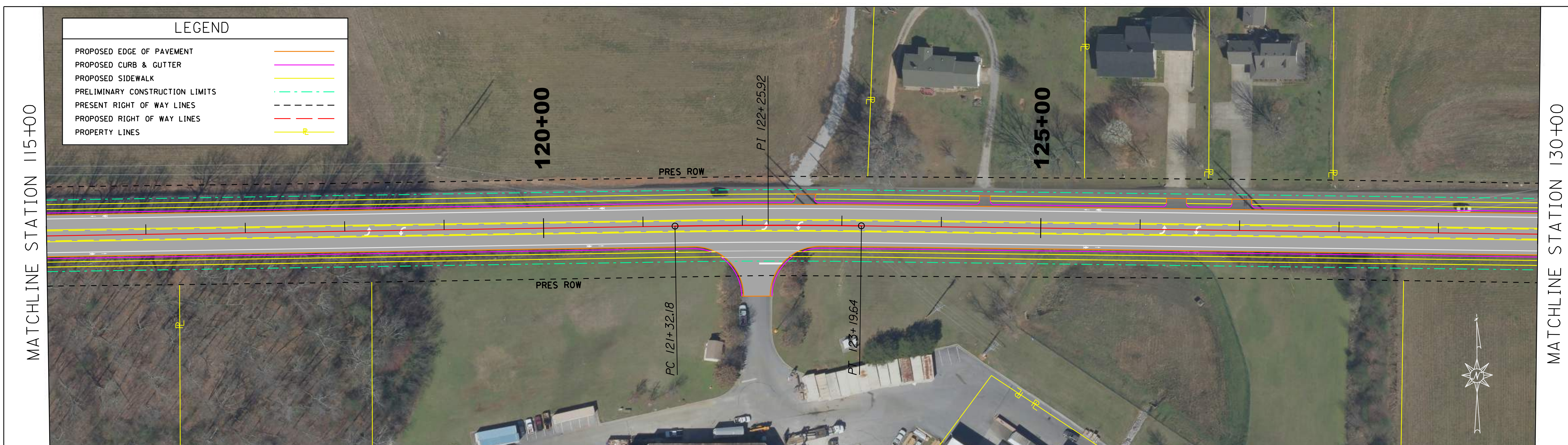
	Name	Address	City, State & Zipcode
1.	Scott Leach	5125 Research Dr	Huntsville, AL 35805
2.	Andy Betterton	302 Bainbridge Rd 35634	Florence City Council
3.	Keith Jones	117 Kensington Pl 35633	NACOLG
4.	Joe Hackworth	5700 CR 16 FL 35633	Lauderdale Cty Commission
5.	Jesse E. Turner		NACOLG
6.	Matthew Burgess	5125 Research Drive	Huntsville AL 35805
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

A.3: Conceptual Design Improvements

PROPOSED IMPROVEMENTS MAP

REFERENCE PROJECT NO	FISCAL YEAR	SHEET NO
	2018	1



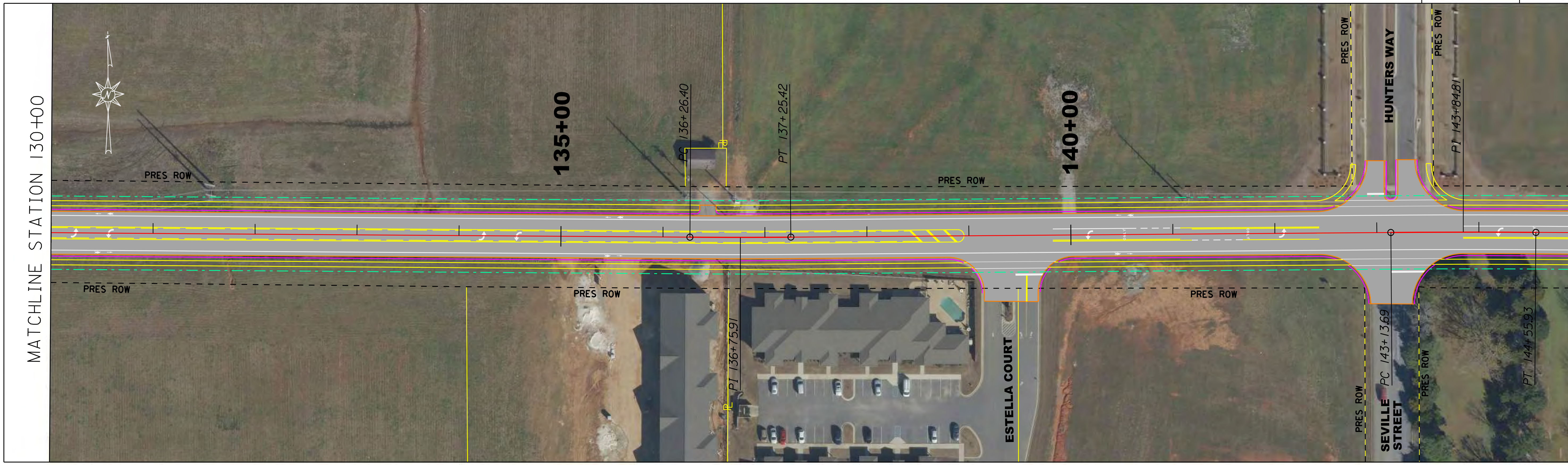


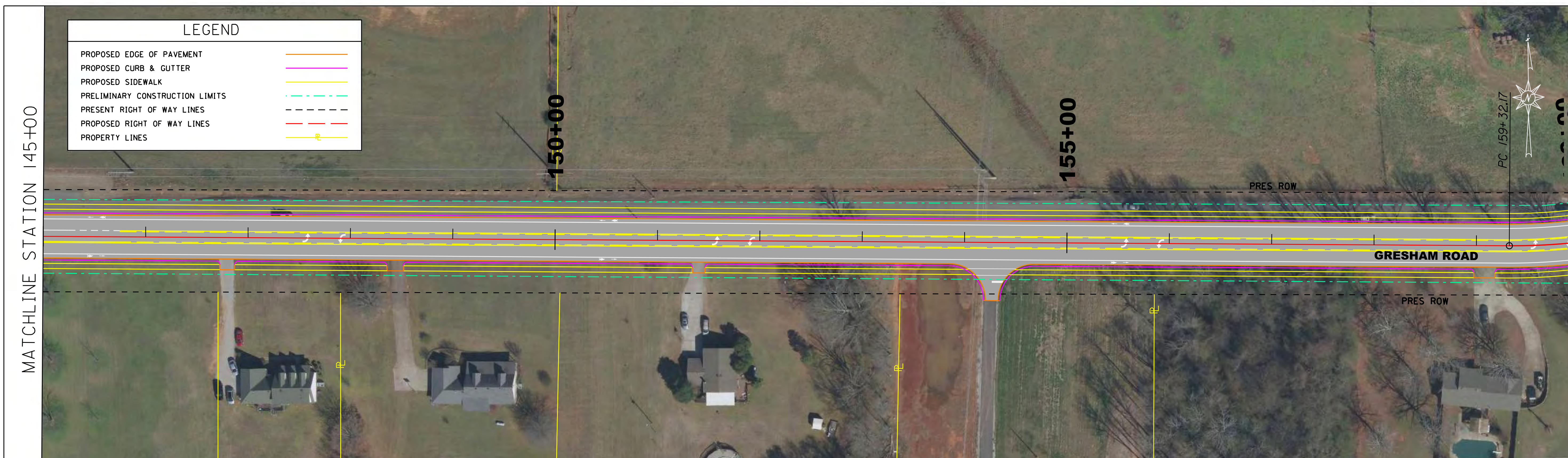
HORIZ 50 0 50 100 SCALE (FEET)

SHEET TITLE	ROUTE
PROPOSED IMPROVEMENTS AERIAL MAP	GRESHAM ROAD

PROPOSED IMPROVEMENTS MAP

REFERENCE PROJECT NO	FISCAL YEAR	SHEET NO
	2018	2





HORIZ 50 0 50 100 SCALE (FEET)

SHEET TITLE	ROUTE
PROPOSED IMPROVEMENTS AERIAL MAP	GRESHAM ROAD

PROPOSED IMPROVEMENTS MAP

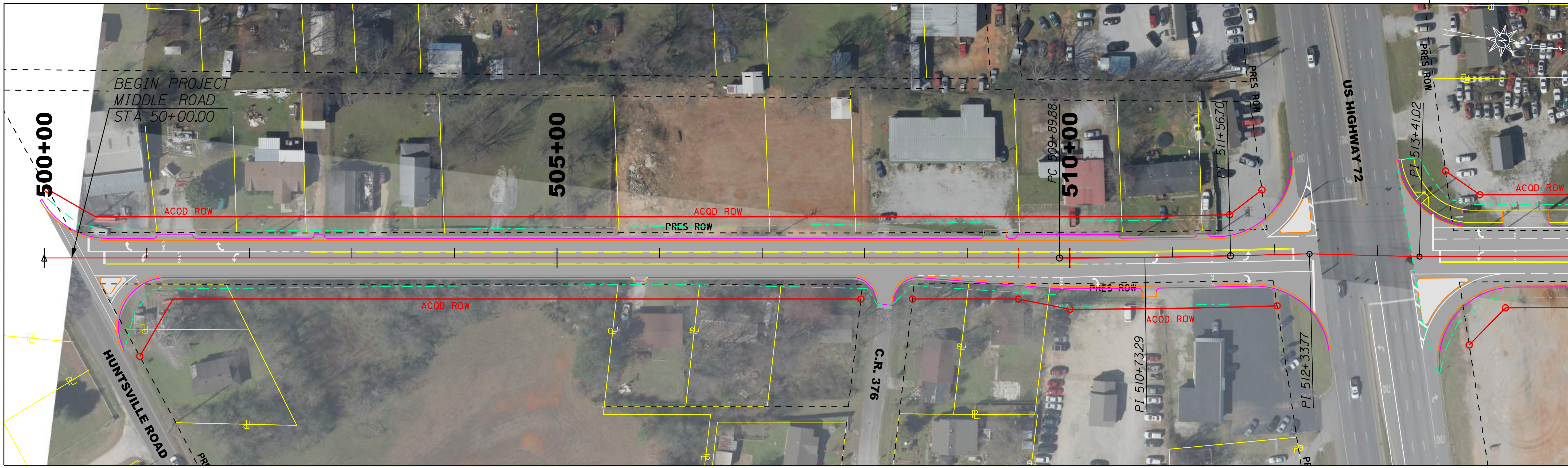
REFERENCE PROJECT NO	FISCAL YEAR	SHEET NO
	2018	3

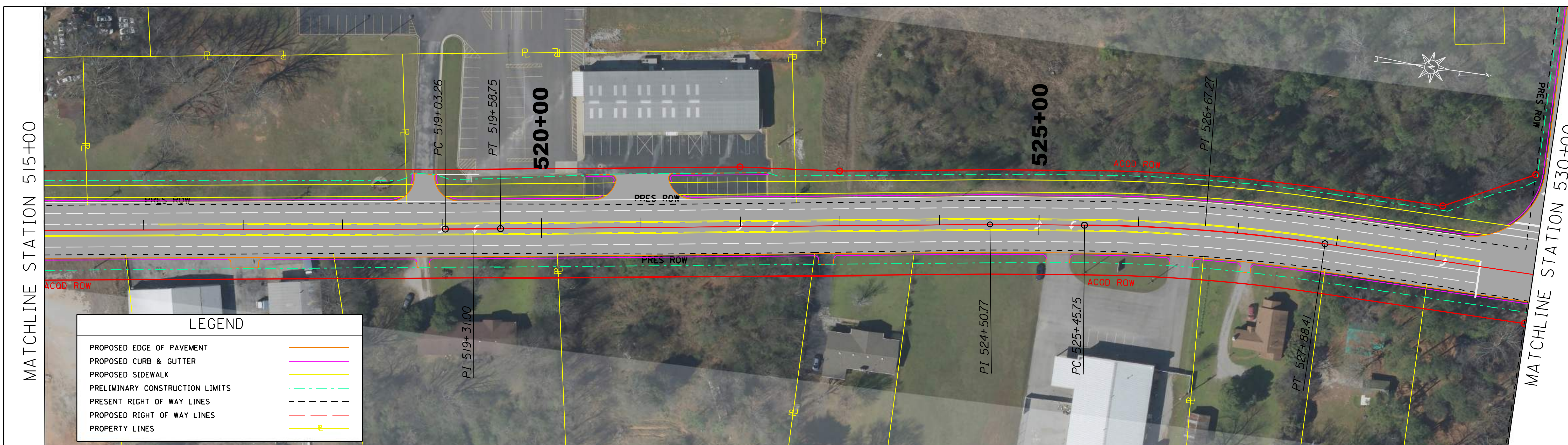
HORIZ 50 0 50 100 SCALE (FEET)

SHEET TITLE	ROUTE
PROPOSED IMPROVEMENTS AERIAL MAP	GRESHAM ROAD

PROPOSED IMPROVEMENTS MAP

REFERENCE PROJECT NO	FISCAL YEAR	SHEET NO
	2018	4





LEGEND

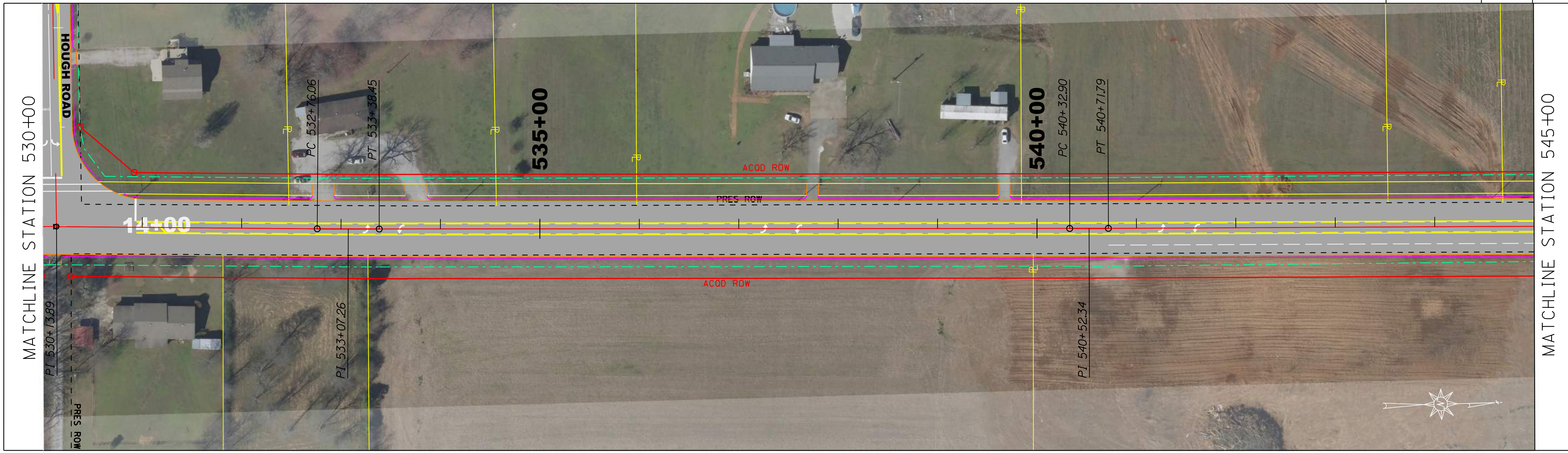
PROPOSED EDGE OF PAVEMENT	
PROPOSED CURB & GUTTER	
PROPOSED SIDEWALK	
PRELIMINARY CONSTRUCTION LIMITS	
PRESENT RIGHT OF WAY LINES	
PROPOSED RIGHT OF WAY LINES	
PROPERTY LINES	

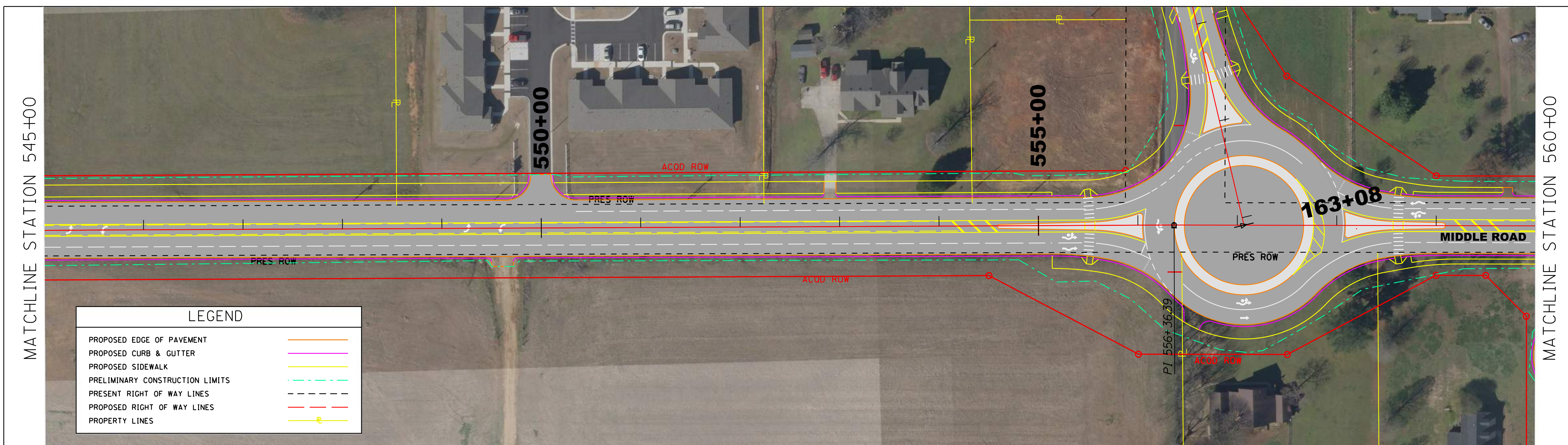
HORIZ 50 0 50 100 SCALE (FEET)

SHEET TITLE	ROUTE
PROPOSED IMPROVEMENTS AERIAL MAP	MIDDLE ROAD

PROPOSED IMPROVEMENTS MAP

REFERENCE PROJECT NO	FISCAL YEAR	SHEET NO
	2018	5





HORIZ 50 0 50 100 SCALE (FEET)

SHEET TITLE	ROUTE
PROPOSED IMPROVEMENTS AERIAL MAP	MIDDLE ROAD

PROPOSED IMPROVEMENTS MAP

REFERENCE PROJECT NO	FISCAL YEAR	SHEET NO
	2018	6

LEGEND	
PROPOSED EDGE OF PAVEMENT	
PROPOSED CURB & GUTTER	
PROPOSED SIDEWALK	
PRELIMINARY CONSTRUCTION LIMITS	
PRESENT RIGHT OF WAY LINES	
PROPOSED RIGHT OF WAY LINES	
PROPERTY LINES	

HORIZ 50 0 50 100 SCALE (FEET)

SHEET TITLE	ROUTE
PROPOSED IMPROVEMENTS AERIAL MAP	MIDDLE ROAD

A.4: Preliminary Cost Estimates

Estimate Gresham-Middle

Estimated Cost:$773,295.40

Contingency: 10.00%

Estimated Total: $850,624.94

Base Date: 10/11/18

Spec Year: 18

Unit System: E

Work Type: Intersection Improvements, Turn Lanes

Highway Type:

Urban/Rural Type: FLORENCE

Season: SUMMER

County: LAUDERDALE

Latitude of Midpoint: 0

Longitude of Midpoint: 0

District: 02

Federal Project Number:

State Project Number:

Prepared by Garver

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension

Group 0001: GRESHAM ROAD - MIDDLE ROAD INTERSECTION

Line #	Item Number / Description	Quantity	Units	Unit Price	Extension
0006	201A000 Clearing & Grubbing (Approximately 3 acres) ($4000 per acre)	1.000	LS	$12,000.00000	$12,000.00
0007	206D000 Removing Pipe	100.000	LF	$13.00000	$1,300.00
0008	210A000 Unclassified Excavation	2,200.000	CUYD	$10.00000	$22,000.00
0009	210D001 Borrow Excavation (Loose Truckbed Measurement)	5,000.000	CUYD	$14.00000	$70,000.00
0010	231B004 Roadbed Stabilizing Material, ALDOT #57	396.000	Ton	$20.00000	$7,920.00
0011	301A012 Crushed Aggregate Base Course, Type B, Plant Mixed, 6" Compa cted Thickness	2,382.000	SQYD	$7.50000	$17,865.00
0012	401A000 Bituminous Treatment A	2,007.000	SQYD	$1.00000	$2,007.00
0013	405A000 Tack Coat	395.000	Gal	$4.60000	$1,817.00
0014	407B000 Joint Sealant For Hot Mix Asphalt Pavement	1.000	Mile	$500.00000	$500.00
0015	408A051 Planing Existing Pavement (Approximately 0.00" Thru 1.0" Thi ck)	4,282.300	SQYD	$2.00000	$8,564.60
0016	424A360 Superpave Bituminous Concrete Wearing Surface Layer, 1/2" Ma ximum Aggregate Size Mix, ESAL Range C/D	470.000	Ton	$100.00000	$47,000.00
0017	424B650 Superpave Bituminous Concrete Upper Binder Layer, 3/4" Maxim um Aggregate Size Mix, ESAL Range C/D	161.000	Ton	$100.00000	$16,100.00
0018	424B681 Superpave Bituminous Concrete Lower Binder Layer, 1" Maximum Aggregate Size Mix, ESAL Range C/D	332.000	Ton	$95.00000	$31,540.00
0019	430B003 Aggregate Surfacing (ALDOT #57)	250.000	Ton	$35.00000	$8,750.00
0020	535A002 24" Side Drain Pipe	164.000	LF	$47.00000	$7,708.00
0021	600A000 Mobilization	1.000	LS	$40,000.00000	$40,000.00

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0023	610D003 Filter Blanket, Geotextile	784.000	SQYD	$3.20000	$2,508.80
0024	618B003 Concrete Driveway, 6" Thick (Includes Wire Mesh)	82.000	SQYD	$60.00000	$4,920.00
0025	619A102 24" Side Drain Pipe End Treatment, Class 1	6.000	Each	$950.00000	$5,700.00
0026	650A000 Topsoil	1,046.000	CUYD	$15.00000	$15,690.00
0027	652A100 Seeding	2.000	Acre	$1,000.00000	$2,000.00
0028	654A001 Solid Sodding (Bermuda)	1,000.000	SQYD	$4.50000	$4,500.00
0029	656A010 Mulching	2.000	Acre	$600.00000	$1,200.00
0030	665A000 Temporary Seeding	2.000	Acre	$425.00000	$850.00
0031	665B001 Temporary Mulching	18.000	Ton	$275.00000	$4,950.00
0032	665I000 Temporary Riprap, Class 2	28.000	Ton	$30.00000	$840.00
0033	665J002 Silt Fence	3,250.000	LF	$3.25000	$10,562.50
0034	665N000 Temporary Coarse Aggregate,ALDOT Number 1	100.000	Ton	$25.00000	$2,500.00
0035	665O001 Silt Fence Removal	3,225.000	LF	$0.75000	$2,418.75
0036	665Q002 Wattle	528.000	LF	$7.00000	$3,696.00
0037	680A001 Geometric Controls	1.000	LS	$7,500.00000	$7,500.00
0038	701A227 Solid White, Class 2, Type A Traffic Stripe (5" Wide)	1.000	Mile	$3,350.00000	$3,350.00

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0039	701A230 Solid Yellow, Class 2, Type A Traffic Stripe (5" Wide)	1.000	Mile	$3,350.00000	$3,350.00
0040	701B207 Dotted, Class 2, Type A Traffic Stripe (5" Wide)	200.000	LF	$2.00000	$400.00
0041	701C001 Solid Temporary Traffic Stripe	2.000	Mile	$900.00000	$1,800.00
0042	701F000 Dotted Temporary Traffic Stripe	200.000	LF	$0.75000	$150.00
0043	703A002 Traffic Control Markings, Class 2, Type A	1,018.000	SQFT	$4.00000	$4,072.00
0044	703B002 Traffic Control Legends, Class 2, Type A	68.000	SQFT	$4.25000	$289.00
0046	705A030 Pavement Markers, Class A-H, Type 2-C	30.000	Each	$4.50000	$135.00
0047	705A032 Pavement Markers, Class A-H, Type 1-B	219.000	Each	$4.50000	$985.50
0048	705A037 Pavement Markers, Class A-H, Type 2-D	21.000	Each	$4.50000	$94.50
0049	705A038 Pavement Markers, Class A-H, Type 2-E	110.000	Each	$4.50000	$495.00
0050	710A115 Class 4, Aluminum Flat Sign Panels 0.08" Thick Or Steel Flat Sign Panels 14 Gauge (Type III Or Type IV Background)	29.000	SQFT	$19.25000	$558.25
0051	710B021 Roadway Sign Post (#3 U Channel, Galvanized Steel or 2 ", 14 Ga Square Tubular Steel)	70.000	LF	$12.50000	$875.00
0053	730C000 Furnishing And Installing Traffic Control Unit (GRESHAM / MIDDLE INTERSECTION)	1.000	LS	$65,000.00000	$65,000.00
0054	740B000 Construction Signs	405.000	SQFT	$6.00000	$2,430.00
0055	740D000 Channelizing Drums	125.000	Each	$28.50000	$3,562.50
0056	740E000 Cones (36 Inches High)	50.000	Each	$9.25000	$462.50

Line #	Item Number / Description / *Supplemental Description*	Quantity	Units	Unit Price	Extension
0057	740M001 Ballast For Cone	50.000	Each	$5.00000	$250.00
0058	741C010 Portable Sequential Arrow And Chevron Sign Unit	1.000	Each	$2,000.00000	$2,000.00
0059	742A001 Portable Changeable Message Sign, Type 2	2.000	Each	$3,750.00000	$7,500.00

Total for Group 0001:$462,666.90

Group 0002: MIDDLE ROAD - US72 INTERSECTION

Line #	Item Number / Description	Quantity	Units	Unit Price	Extension
0060	201A000 Clearing & Grubbing (Approximately 2 acres) ($4000 per acre)	1.000	LS	$8,000.00000	$8,000.00
0061	210A000 Unclassified Excavation	3,416.000	CUYD	$10.00000	$34,160.00
0063	210D001 Borrow Excavation (Loose Truckbed Measurement)	2,040.000	CUYD	$14.00000	$28,560.00
0064	231B004 Roadbed Stabilizing Material, ALDOT #57	274.000	Ton	$20.00000	$5,480.00
0065	301A012 Crushed Aggregate Base Course, Type B, Plant Mixed, 6" Compa cted Thickness	1,644.000	SQYD	$7.50000	$12,330.00
0066	401A000 Bituminous Treatment A	1,401.000	SQYD	$1.00000	$1,401.00
0067	405A000 Tack Coat	275.000	Gal	$4.75000	$1,306.25
0068	407B000 Joint Sealant For Hot Mix Asphalt Pavement	1.000	Mile	$500.00000	$500.00
0069	408A051 Planing Existing Pavement (Approximately 0.00" Thru 1.0" Thi ck)	3,075.000	SQYD	$2.00000	$6,150.00
0070	424A360 Superpave Bituminous Concrete Wearing Surface Layer, 1/2" Ma ximum Aggregate Size Mix, ESAL Range C/D	366.000	Ton	$100.00000	$36,600.00
0071	424B650 Superpave Bituminous Concrete Upper Binder Layer, 3/4" Maxim um Aggregate Size Mix, ESAL Range C/D	111.000	Ton	$100.00000	$11,100.00
0072	424B681 Superpave Bituminous Concrete Lower Binder Layer, 1" Maximum Aggregate Size Mix, ESAL Range C/D	116.000	Ton	$95.00000	$11,020.00

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0073	430B003 Aggregate Surfacing (ALDOT #57)	100.000	Ton	$35.00000	$3,500.00
0074	600A000 Mobilization	1.000	LS	$35,000.00000	$35,000.00
0076	610D003 Filter Blanket, Geotextile	514.000	SQYD	$3.25000	$1,670.50
0077	614A000 Slope Paving	25.000	CUYD	$400.00000	$10,000.00
0079	623C003 Combination Curb & Gutter, Type C (Modified)	482.000	LF	$12.50000	$6,025.00
0080	650A000 Topsoil	665.000	CUYD	$15.00000	$9,975.00
0081	652A100 Seeding	1.000	Acre	$1,000.00000	$1,000.00
0082	654A001 Solid Sodding (Bermuda)	1,530.000	SQYD	$4.50000	$6,885.00
0083	656A010 Mulching	1.000	Acre	$600.00000	$600.00
0084	665A000 Temporary Seeding	2.000	Acre	$425.00000	$850.00
0085	665B001 Temporary Mulching	18.000	Ton	$275.00000	$4,950.00
0086	665G000 Sand Bags	150.000	Each	$4.75000	$712.50
0087	665J002 Silt Fence	2,240.000	LF	$3.25000	$7,280.00
0088	665N000 Temporary Coarse Aggregate,ALDOT Number 1	200.000	Ton	$25.00000	$5,000.00
0089	665O001 Silt Fence Removal	2,240.000	LF	$0.75000	$1,680.00
0090	665Q002 Wattle	368.000	LF	$7.00000	$2,576.00

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0091	680A001 Geometric Controls	1.000	LS	$6,000.00000	$6,000.00
0092	701A227 Solid White, Class 2, Type A Traffic Stripe (5" Wide)	1.000	Mile	$3,350.00000	$3,350.00
0093	701A230 Solid Yellow, Class 2, Type A Traffic Stripe (5" Wide)	1.000	Mile	$3,350.00000	$3,350.00
0094	701B207 Dotted, Class 2, Type A Traffic Stripe (5" Wide)	150.000	LF	$2.00000	$300.00
0095	701C001 Solid Temporary Traffic Stripe	2.000	Mile	$900.00000	$1,800.00
0096	701F000 Dotted Temporary Traffic Stripe	150.000	LF	$0.75000	$112.50
0097	703A002 Traffic Control Markings, Class 2, Type A	913.000	SQFT	$4.00000	$3,652.00
0098	703B002 Traffic Control Legends, Class 2, Type A	45.000	SQFT	$4.25000	$191.25
0100	705A030 Pavement Markers, Class A-H, Type 2-C	28.000	Each	$4.50000	$126.00
0101	705A032 Pavement Markers, Class A-H, Type 1-B	118.000	Each	$4.50000	$531.00
0102	705A037 Pavement Markers, Class A-H, Type 2-D	17.000	Each	$4.50000	$76.50
0103	705A038 Pavement Markers, Class A-H, Type 2-E	57.000	Each	$4.50000	$256.50
0104	710A115 Class 4, Aluminum Flat Sign Panels 0.08" Thick Or Steel Flat Sign Panels 14 Gauge (Type III Or Type IV Background)	18.000	SQFT	$19.25000	$346.50
0105	710B021 Roadway Sign Post (#3 U Channel, Galvanized Steel or 2 ", 14 Ga Square Tubular Steel)	42.000	LF	$12.50000	$525.00
0106	730C000 Furnishing And Installing Traffic Control Unit (Middle Road at US72 Modifications)	1.000	LS	$25,000.00000	$25,000.00
0108	740B000 Construction Signs	350.000	SQFT	$6.00000	$2,100.00

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0109	740D000 Channelizing Drums	75.000	Each	$28.50000	$2,137.50
0110	740E000 Cones (36 Inches High)	50.000	Each	$9.25000	$462.50
0111	740M001 Ballast For Cone	50.000	Each	$5.00000	$250.00
0112	741C010 Portable Sequential Arrow And Chevron Sign Unit	1.000	Each	$2,000.00000	$2,000.00
0113	742A001 Portable Changeable Message Sign, Type 2	1.000	Each	$3,750.00000	$3,750.00

Total for Group 0002:$310,628.50

Estimate Gresham-Middle

Estimated Cost:$8,423,148.55

Contingency: 0.00%

Estimated Total: $8,423,148.55

Base Date: 12/24/18

Spec Year: 18

Unit System: E

Work Type: Intersection Improvements, Turn Lanes

Highway Type:

Urban/Rural Type: FLORENCE

Season: WINTER

County: LAUDERDALE

Latitude of Midpoint: 0

Longitude of Midpoint: 0

District: 02

Federal Project Number:

State Project Number:

Prepared by Garver on 12/24/18

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension

Group 0001: GRESHAM ROAD

Line #	Item Number / Description	Quantity	Units	Unit Price	Extension
0005	201A000 Clearing & Grubbing (Approximately 9 acres) ($4000 per acre)	1.000	LS	$36,000.00000	$36,000.00
0006	206B009 Removal Of Old Box Culvert, Partial, Station 155+00)	1.000	LS	$10,000.00000	$10,000.00
0007	206D000 Removing Pipe	494.000	LF	$11.00000	$5,434.00
0008	206D002 Removing Curb	70.000	LF	$14.50000	$1,015.00
0009	206D003 Removing Curb And Gutter	213.000	LF	$11.00000	$2,343.00
0010	206E001 Removing Inlets	4.000	Each	$500.00000	$2,000.00
0011	210A000 Unclassified Excavation	9,180.000	CUYD	$10.00000	$91,800.00
0012	210D000 Borrow Excavation	37,617.000	CUYD	$11.15000	$419,429.55
0013	214A000 Structure Excavation	8,498.000	CUYD	$9.25000	$78,606.50
0014	214B001 Foundation Backfill, Commercial	2,551.000	CUYD	$40.00000	$102,040.00
0015	231B004 Roadbed Stabilizing Material, ALDOT #57	3,395.000	Ton	$20.00000	$67,900.00
0016	301A012 Crushed Aggregate Base Course, Type B, Plant Mixed, 6" Compa cted Thickness	22,099.000	SQYD	$12.25000	$270,712.75
0017	401A000 Bituminous Treatment A	20,963.000	SQYD	$1.25000	$26,203.75
0018	405A000 Tack Coat	4,104.000	Gal	$3.75000	$15,390.00
0019	407A000 Joint Sealant For Hot Mix Asphalt Pavement	5.000	Gal	$500.00000	$2,500.00
0020	408A051 Planing Existing Pavement (Approximately 0.00" Thru 1.0" Thi ck)	12,409.000	SQYD	$2.00000	$24,818.00

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0021	424A360 Superpave Bituminous Concrete Wearing Surface Layer, 1/2" Ma ximum Aggregate Size Mix, ESAL Range C/D	2,575.000	Ton	$85.00000	$218,875.00
0022	424B650 Superpave Bituminous Concrete Upper Binder Layer, 3/4" Maxim um Aggregate Size Mix, ESAL Range C/D	1,679.000	Ton	$85.00000	$142,715.00
0023	424B681 Superpave Bituminous Concrete Lower Binder Layer, 1" Maximum Aggregate Size Mix, ESAL Range C/D	3,415.000	Ton	$70.00000	$239,050.00
0024	430B003 Aggregate Surfacing (ALDOT #57)	500.000	Ton	$38.00000	$19,000.00
0025	502A000 Steel Reinforcement	8,339.000	LB	$1.35000	$11,257.65
0026	524B010 Culvert Concrete Extension	59.000	CUYD	$1,150.00000	$67,850.00
0027	530A002 24" Roadway Pipe (Class 3 R.C.)	76.000	LF	$75.00000	$5,700.00
0028	530A003 30" Roadway Pipe (Class 3 R.C.)	168.000	LF	$70.00000	$11,760.00
0029	530A004 36" Roadway Pipe (Class 3 R.C.)	55.000	LF	$85.00000	$4,675.00
0030	533A098 18" Storm Sewer Pipe (Class 3 R.C.)	7,723.000	LF	$35.00000	$270,305.00
0031	533A099 24" Storm Sewer Pipe (Class 3 R.C.)	1,586.000	LF	$50.00000	$79,300.00
0032	533A100 30" Storm Sewer Pipe (Class 3 R.C.)	513.000	LF	$75.00000	$38,475.00
0033	600A000 Mobilization	1.000	LS	$330,000.00000	$330,000.00
0034	610C001 Loose Riprap, Class 2	125.000	Ton	$55.00000	$6,875.00
0035	610D003 Filter Blanket, Geotextile	2,507.000	SQYD	$2.90000	$7,270.30
0036	614A000 Slope Paving	40.000	CUYD	$430.00000	$17,200.00

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0037	618A000 Concrete Sidewalk, 4" Thick	6,284.000	SQYD	$45.00000	$282,780.00
0038	618B003 Concrete Driveway, 6" Thick (Includes Wire Mesh)	193.000	SQYD	$67.50000	$13,027.50
0039	619A002 18" Roadway Pipe End Treatment, Class 1	1.000	Each	$1,000.00000	$1,000.00
0040	619A003 24" Roadway Pipe End Treatment, Class 1	1.000	Each	$1,100.00000	$1,100.00
0041	619A004 30" Roadway Pipe End Treatment, Class 1	4.000	Each	$1,250.00000	$5,000.00
0042	621A011 Junction Boxes, Type 1 Or 1P	3.000	Each	$3,250.00000	$9,750.00
0043	621C001 Inlets, Type B	5.000	Each	$2,850.00000	$14,250.00
0044	621C015 Inlets, Type S1 Or S3 (1 Wing)	65.000	Each	$3,800.00000	$247,000.00
0045	621C016 Inlets, Type S2 Or S4 (1 Wing)	2.000	Each	$4,600.00000	$9,200.00
0046	621C017 Inlets, Type S1 Or S3 (2 Wing)	2.000	Each	$4,050.00000	$8,100.00
0047	621C018 Inlets, Type S2 Or S4 (2 Wing)	4.000	Each	$4,500.00000	$18,000.00
0048	621C109 Inlets, Type PD	5.000	Each	$5,200.00000	$26,000.00
0049	621D015 Inlet Units, Type S1 Or S3	7.000	Each	$635.00000	$4,445.00
0050	623C003 Combination Curb & Gutter, Type C (Modified)	11,731.000	LF	$16.00000	$187,696.00
0051	636A000 Barbed Wire Fence, 4 Strands, 4 Feet High	1,022.000	LF	$7.00000	$7,154.00
0052	638D000 Wood Fence	242.000	LF	$20.00000	$4,840.00

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0053	650A000 Topsoil	4,441.000	CUYD	$12.00000	$53,292.00
0054	654A001 Solid Sodding (Bermuda)	40,009.000	SQYD	$3.50000	$140,031.50
0055	665A000 Temporary Seeding	9.000	Acre	$250.00000	$2,250.00
0056	665B001 Temporary Mulching	81.000	Ton	$200.00000	$16,200.00
0057	665I000 Temporary Riprap, Class 2	63.000	Ton	$55.00000	$3,465.00
0058	665J002 Silt Fence	12,390.000	LF	$2.60000	$32,214.00
0059	665N000 Temporary Coarse Aggregate,ALDOT Number 1	300.000	Ton	$40.00000	$12,000.00
0060	665O001 Silt Fence Removal	12,390.000	LF	$0.60000	$7,434.00
0061	665P005 Inlet Protection, Stage 3 Or 4	86.000	Each	$390.00000	$33,540.00
0062	665Q002 Wattle	3,320.000	LF	$5.75000	$19,090.00
0063	680A001 Geometric Controls	1.000	LS	$50,000.00000	$50,000.00
0064	701A227 Solid White, Class 2, Type A Traffic Stripe (5" Wide)	3.000	Mile	$3,375.00000	$10,125.00
0065	701A230 Solid Yellow, Class 2, Type A Traffic Stripe (5" Wide)	3.000	Mile	$35,600.00000	$106,800.00
0066	701A244 Broken Yellow, Class 2, Type A Traffic Stripe (5" Wide)	3.000	Mile	$1,850.00000	$5,550.00
0067	701B207 Dotted, Class 2, Type A Traffic Stripe (5" Wide)	307.000	LF	$1.85000	$567.95
0068	701C001 Solid Temporary Traffic Stripe	9.000	Mile	$900.00000	$8,100.00

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0069	701F000 Dotted Temporary Traffic Stripe	307.000	LF	$1.00000	$307.00
0070	703A002 Traffic Control Markings, Class 2, Type A	1,788.000	SQFT	$4.40000	$7,867.20
0071	703B002 Traffic Control Legends, Class 2, Type A	90.000	SQFT	$5.00000	$450.00
0072	703D001 Temporary Traffic Control Markings	316.000	SQFT	$2.25000	$711.00
0073	705A030 Pavement Markers, Class A-H, Type 2-C	37.000	Each	$5.00000	$185.00
0074	705A037 Pavement Markers, Class A-H, Type 2-D	151.000	Each	$5.00000	$755.00
0075	710A115 Class 4, Aluminum Flat Sign Panels 0.08" Thick Or Steel Flat Sign Panels 14 Gauge (Type III Or Type IV Background)	68.000	SQFT	$19.25000	$1,309.00
0076	710A126 Class 8, Aluminum Flat Sign Panels 0.08" Thick Or Steel Flat Sign Panels 14 Gauge (Type IX Background)	26.000	SQFT	$20.75000	$539.50
0077	710B021 Roadway Sign Post (#3 U Channel, Galvanized Steel or 2 ", 14 Ga Square Tubular Steel)	266.000	LF	$12.00000	$3,192.00
0078	711A000 Roadway Sign Relocation	1.000	LS	$5,000.00000	$5,000.00
0079	740B000 Construction Signs	711.000	SQFT	$7.35000	$5,225.85
0080	740D000 Channelizing Drums	285.000	Each	$27.25000	$7,766.25
0081	740E000 Cones (36 Inches High)	50.000	Each	$9.25000	$462.50
0082	740M001 Ballast For Cone	50.000	Each	$5.00000	$250.00
0083	740F002 Barricades, Type III	8.000	Each	$200.00000	$1,600.00
0084	740I002 Warning Lights, Type B	4.000	Each	$300.00000	$1,200.00

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0085	741C010 Portable Sequential Arrow And Chevron Sign Unit	2.000	Each	$2,000.00000	$4,000.00
0086	742A001 Portable Changeable Message Sign, Type 2	2.000	Each	$3,750.00000	$7,500.00

Total for Group 0001:$4,014,822.75

Group 0002: MIDDLE ROAD

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0087	201A000 Clearing & Grubbing (Approximately 15 acres) ($4000 per acre)	1.000	LS	$60,000.00000	$60,000.00
0088	206C002 Removing Concrete Slope Paving	26.000	SQYD	$40.00000	$1,040.00
0089	206D000 Removing Pipe	1,129.000	LF	$9.80000	$11,064.20
0090	206D003 Removing Curb And Gutter	879.000	LF	$9.50000	$8,350.50
0091	206E000 Removing Headwalls	6.000	Each	$300.00000	$1,800.00
0092	210A000 Unclassified Excavation	9,500.000	CUYD	$10.25000	$97,375.00
0093	210D000 Borrow Excavation	32,773.000	CUYD	$11.50000	$376,889.50
0094	214A000 Structure Excavation	9,141.000	CUYD	$9.00000	$82,269.00
0095	214B001 Foundation Backfill, Commercial	2,744.000	CUYD	$39.50000	$108,388.00
0096	231B004 Roadbed Stabilizing Material, ALDOT #57	6,424.000	Ton	$20.00000	$128,480.00
0097	301A012 Crushed Aggregate Base Course, Type B, Plant Mixed, 6" Compa cted Thickness	28,284.000	SQYD	$12.00000	$339,408.00
0098	401A000 Bituminous Treatment A	26,704.000	SQYD	$1.15000	$30,709.60
0099	405A000 Tack Coat	5,254.000	Gal	$3.75000	$19,702.50

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0101	407A000 Joint Sealant For Hot Mix Asphalt Pavement	7.000	Gal	$500.00000	$3,500.00
0102	408A051 Planing Existing Pavement (Approximately 0.00" Thru 1.0" Thi ck)	17,650.000	SQYD	$1.75000	$30,887.50
0103	424A360 Superpave Bituminous Concrete Wearing Surface Layer, 1/2" Ma ximum Aggregate Size Mix, ESAL Range C/D	3,564.000	Ton	$80.00000	$285,120.00
0104	424B650 Superpave Bituminous Concrete Upper Binder Layer, 3/4" Maxim um Aggregate Size Mix, ESAL Range C/D	2,132.000	Ton	$85.00000	$181,220.00
0105	424B681 Superpave Bituminous Concrete Lower Binder Layer, 1" Maximum Aggregate Size Mix, ESAL Range C/D	4,093.000	Ton	$70.00000	$286,510.00
0106	430B003 Aggregate Surfacing (ALDOT #57)	500.000	Ton	$38.00000	$19,000.00
0108	530A002 24" Roadway Pipe (Class 3 R.C.)	72.000	LF	$75.00000	$5,400.00
0109	530A003 30" Roadway Pipe (Class 3 R.C.)	165.000	LF	$70.00000	$11,550.00
0110	530A102 24" Roadway Pipe (Class 3 R.C.) (Extension)	60.000	LF	$80.00000	$4,800.00
0111	530A103 30" Roadway Pipe (Class 3 R.C.) (Extension)	106.000	LF	$150.00000	$15,900.00
0112	533A098 18" Storm Sewer Pipe (Class 3 R.C.)	7,444.000	LF	$35.00000	$260,540.00
0113	533A099 24" Storm Sewer Pipe (Class 3 R.C.)	2,364.000	LF	$50.00000	$118,200.00
0114	533A100 30" Storm Sewer Pipe (Class 3 R.C.)	729.000	LF	$70.00000	$51,030.00
0115	600A000 Mobilization	1.000	LS	$400,000.00000	$400,000.00
0116	610C001 Loose Riprap, Class 2	150.000	Ton	$55.00000	$8,250.00
0117	610D003 Filter Blanket, Geotextile	2,549.000	SQYD	$2.90000	$7,392.10

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0118	614A000 Slope Paving	242.000	CUYD	$360.00000	$87,120.00
0119	618A000 Concrete Sidewalk, 4" Thick	1,091.000	SQYD	$70.00000	$76,370.00
0120	618B003 Concrete Driveway, 6" Thick (Includes Wire Mesh)	429.000	SQYD	$65.00000	$27,885.00
0121	619A002 18" Roadway Pipe End Treatment, Class 1	1.000	Each	$1,000.00000	$1,000.00
0122	619A003 24" Roadway Pipe End Treatment, Class 1	2.000	Each	$1,100.00000	$2,200.00
0123	619A004 30" Roadway Pipe End Treatment, Class 1	4.000	Each	$1,250.00000	$5,000.00
0124	619A203 30" Roadway Pipe End Treatment, Class 1 (Double Line)	2.000	Each	$2,500.00000	$5,000.00
0125	621A011 Junction Boxes, Type 1 Or 1P	2.000	Each	$3,250.00000	$6,500.00
0126	621C001 Inlets, Type B	3.000	Each	$2,850.00000	$8,550.00
0127	621C015 Inlets, Type S1 Or S3 (1 Wing)	66.000	Each	$3,800.00000	$250,800.00
0129	621C017 Inlets, Type S1 Or S3 (2 Wing)	8.000	Each	$4,050.00000	$32,400.00
0131	621C109 Inlets, Type PD	4.000	Each	$5,750.00000	$23,000.00
0132	621D015 Inlet Units, Type S1 Or S3	7.000	Each	$635.00000	$4,445.00
0133	623B000 Concrete Curb, Type N	94.000	LF	$32.50000	$3,055.00
0134	623C003 Combination Curb & Gutter, Type C (Modified)	13,108.000	LF	$15.75000	$206,451.00
0135	636A000 Barbed Wire Fence, 4 Strands, 4 Feet High	1,294.000	LF	$6.50000	$8,411.00

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0136	650A000 Topsoil	4,591.000	CUYD	$12.00000	$55,092.00
0137	652A100 Seeding	6.000	Acre	$750.00000	$4,500.00
0138	654A001 Solid Sodding (Bermuda)	15,521.000	SQYD	$3.75000	$58,203.75
0139	656A010 Mulching	6.000	Acre	$600.00000	$3,600.00
0140	665A000 Temporary Seeding	6.000	Acre	$250.00000	$1,500.00
0141	665B001 Temporary Mulching	54.000	Ton	$200.00000	$10,800.00
0142	665I000 Temporary Riprap, Class 2	112.000	Ton	$53.00000	$5,936.00
0143	665J002 Silt Fence	14,106.000	LF	$2.50000	$35,265.00
0144	665N000 Temporary Coarse Aggregate,ALDOT Number 1	300.000	Ton	$40.00000	$12,000.00
0145	665O001 Silt Fence Removal	14,106.000	LF	$0.60000	$8,463.60
0146	665P005 Inlet Protection, Stage 3 Or 4	83.000	Each	$390.00000	$32,370.00
0147	665Q002 Wattle	3,294.000	LF	$5.70000	$18,775.80
0148	680A001 Geometric Controls	1.000	LS	$55,000.00000	$55,000.00
0149	701A227 Solid White, Class 2, Type A Traffic Stripe (5" Wide)	3.000	Mile	$3,375.00000	$10,125.00
0150	701A230 Solid Yellow, Class 2, Type A Traffic Stripe (5" Wide)	3.000	Mile	$35,600.00000	$106,800.00
0151	701A239 Broken White, Class 2, Type A Traffic Stripe (5" Wide)	2.000	Mile	$1,950.00000	$3,900.00

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0152	701A244 Broken Yellow, Class 2, Type A Traffic Stripe (5" Wide)	3.000	Mile	$1,850.00000	$5,550.00
0153	701B207 Dotted, Class 2, Type A Traffic Stripe (5" Wide)	1,129.000	LF	$1.50000	$1,693.50
0154	701C001 Solid Temporary Traffic Stripe	11.000	Mile	$900.00000	$9,900.00
0155	701F000 Dotted Temporary Traffic Stripe	1,129.000	LF	$0.50000	$564.50
0156	703A002 Traffic Control Markings, Class 2, Type A	3,173.000	SQFT	$4.25000	$13,485.25
0157	703B002 Traffic Control Legends, Class 2, Type A	180.000	SQFT	$5.00000	$900.00
0158	703D001 Temporary Traffic Control Markings	526.000	SQFT	$2.15000	$1,130.90
0159	705A030 Pavement Markers, Class A-H, Type 2-C	64.000	Each	$5.00000	$320.00
0160	705A031 Pavement Markers, Class A-H, Type 1-A	104.000	Each	$4.50000	$468.00
0161	705A032 Pavement Markers, Class A-H, Type 1-B	38.000	Each	$5.00000	$190.00
0162	705A037 Pavement Markers, Class A-H, Type 2-D	151.000	Each	$5.00000	$755.00
0163	705A038 Pavement Markers, Class A-H, Type 2-E	27.000	Each	$5.00000	$135.00
0164	710A115 Class 4, Aluminum Flat Sign Panels 0.08" Thick Or Steel Flat Sign Panels 14 Gauge (Type III Or Type IV Background)	92.000	SQFT	$19.25000	$1,771.00
0165	710A126 Class 8, Aluminum Flat Sign Panels 0.08" Thick Or Steel Flat Sign Panels 14 Gauge (Type IX Background)	16.000	SQFT	$21.00000	$336.00
0166	710B021 Roadway Sign Post (#3 U Channel, Galvanized Steel or 2 ", 14 Ga Square Tubular Steel)	294.000	LF	$12.00000	$3,528.00
0167	711A000 Roadway Sign Relocation	1.000	LS	$15,000.00000	$15,000.00

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension
0168	730C000 Furnishing And Installing Traffic Control Unit (Middle Road at Hough Road)	1.000	LS	$200,000.00000	$200,000.00
0169	740B000 Construction Signs	711.000	SQFT	$7.35000	$5,225.85
0170	740D000 Channelizing Drums	285.000	Each	$27.25000	$7,766.25
0171	740E000 Cones (36 Inches High)	50.000	Each	$9.25000	$462.50
0172	740M001 Ballast For Cone	50.000	Each	$5.00000	$250.00
0173	740F002 Barricades, Type III	6.000	Each	$200.00000	$1,200.00
0174	740I002 Warning Lights, Type B	3.000	Each	$300.00000	$900.00
0175	741C010 Portable Sequential Arrow And Chevron Sign Unit	2.000	Each	$2,000.00000	$4,000.00
0176	742A001 Portable Changeable Message Sign, Type 2	2.000	Each	$3,750.00000	$7,500.00

Total for Group 0002:$4,408,325.80

A.5: Traffic Impact Analysis Sample

SECTION 4

4.0 TRAFFIC IMPACT STUDIES

4.1 TRAFFIC IMPACT STUDY REQUIREMENTS

The City has established Traffic Impact Study (TIS) requirements for the purpose of ensuring that both the quantitative and qualitative aspects of traffic circulation impact on the citizens, neighborhoods and businesses of the City are considered and properly mitigated. Application of these standards is intended to appropriately regulate and balance the increased traffic flow generated by development with the need to reasonably preserve the quality of life and the environment within our community and to reasonably ensure pedestrian and bicycle safety as alternate modes of transportation.

4.1.1 General

The transportation impact report shall identify the traffic impacts and potential problems to be generated by a proposed use, and improvements required to insure safe ingress and egress from a proposed development, maintain street capacity, and eliminate hazardous conditions. The following requirements have been established for the preparation of TIS for development proposals of all land use types. These policies exist to ensure consistent and proper traffic planning and engineering practices are followed when land use actions are being considered. The requirements provide a standard process, set of assumptions, set of analytic techniques, and a presentation format to be used in the preparation of the TIS.

4.1.2 Applicability

Developers and/or property owners shall be required to conduct TIS, as described herein, for all proposed development that meet any or all of the following:

- When traffic generated by the proposed development would cause the daily or peak hour traffic volumes on adjacent streets that serve as access for the development to exceed the limits outlined in this Manual in Section 5.0 "Roadway Design" in Table 5.1 "Maximum Roadway Volumes by Classification";
- When a development proposes to access a collector or arterial roadway and the proposed development is larger than the thresholds shown in Table 4.1 "Traffic Impact Study Thresholds by Land Use". The threshold shall be determined by the full buildout of the project, not by individual phases of the project. If a developer completes a project that does not meet the threshold established in Table 4.1, and later either builds subsequent phases of that project or builds a separate project on an adjacent or contiguous parcel of land to the previous project, the combined development size shall be used to determine if a TIS is required; or
- When in the opinion of the City Engineer, significant operational deficiencies, capacity deficiencies, and/or safety concerns on the surrounding roadways and intersections currently exist or would be created as a result of the development's

expected project.

TABLE 4.1
Traffic Impact Study Thresholds by Land Use

Land Use	Size
Residential – Single Family	70 dwelling units
Residential – Townhomes/Condos	120 dwelling units
Residential – Apartments	100 dwelling units
Residential – Assisted Living	285 beds
Shopping Center	17,500 SF
Fast Food Restaurant with drive-thru	1,500 SF
High Turnover Sit-down Restaurant	5,900 SF
Quality Restaurant	8,300 SF
Gas/Service Station w/ convenience market	5 fueling positions
Bank with drive-thru	2,200 SF
Pharmacy with drive-thru	8,500 SF
Hotel/Motel	95 rooms
General Office	45,500 SF
Medical/Dental Office	21,000 SF
General Light Industrial	102,000 SF
Manufacturing	137,000 SF

The thresholds for land uses that are not depicted in Table 4.1 shall be based upon the level of development expected to generate approximately one hundred (100) peak hour trips or seven hundred fifty (750) daily trips, whichever is less.

Developers who are proposing projects are strongly encouraged to contact the City to discuss traffic impact requirements prior to submitting a rezoning application or subdivision/site plans to determine the TIS requirements for each project.

4.1.3 Applicant Responsibility

The responsibility for conducting a TIS and assessing the traffic impacts associated with an application for development approval rests with the Applicant. The assessment of these impacts shall be contained within a TIS report as specified herein. It shall be prepared under the supervision of, and sealed by, a licensed professional engineer in the State of Alabama with experience in traffic engineering and transportation planning/engineering.

For all State Highways within the study area, the Applicant is required to meet the requirements of ALDOT in addition to those of the City.

4.1.4 Capacity and Safety Issues

Development of property has a direct impact on transportation, including vehicular, transit, bicycle, and pedestrian traffic. In order to meet capacity and safety needs as they relate to the traffic generated from a particular land use, specific traffic circulation improvements should be made. The goal of the TIS is to address traffic related issues that result from development and to determine the improvements required to address and mitigate those issues such that street maximum capacities are not exceeded and traffic and pedestrian safety is maintained. The competing objectives of vehicular movement, pedestrians, bicyclists, and others must be balanced in the development review process. The TIS will provide information and guidance as plans are developed and decisions made for the proposed development plan.

4.1.4.1 Vehicular Traffic Improvements

Examples of traffic capacity and safety improvements to mitigate development impacts include: road widening, turn lanes, deceleration lanes, intersection through lanes, traffic signals, stop signs, design speed adjustments, modifications to access points, roundabouts and other traffic calming techniques as approved by the City.

4.1.4.2 Pedestrian Traffic Considerations and Improvements

Examples of street conditions that promote safe, comfortable and convenient pedestrian environments include: short blocks; lower prevailing travel speeds; sidewalks; well-defined crosswalks, median refuge areas and islands at street intersections. Walkway tunnels and overhead structures are examples of safety improvements that afford maximum protection for pedestrians.

4.1.4.3 Bicycle Traffic Improvements

The addition of on-street bicycle lanes or off-street bicycle paths may be needed to achieve connectivity between the proposed project and the existing bikeway system.

4.2 TRAFFIC IMPACT STUDY PROCEDURES AND CRITERIA

The following procedures have been established to outline the manner in which a TIS is to be conducted in the City.

4.2.1 Scoping Meeting/Telephone Conference

A scoping meeting/telephone conference prior to the submittal of a request for rezoning or site/development plan will be required and used to determine the study area, study parameters and documentation requirements for conducting a TIS for specific development proposals. The parameters determined in the scoping meeting/telephone conference represent general agreement between the City and the Applicant's consulting engineer, but they may not be all-inclusive. The City retains the right to require additional information and/or analysis to complete an evaluation of the proposed development project.

The Applicant is required to contact the City to arrange for a scoping meeting/telephone conference to discuss the TIS requirements and determine the base assumptions. It is incumbent upon the Applicant to discuss the following:

- Previous TIS prepared for the site, if any;
- Location of the site;
- Proposed access and its relationship to adjacent properties and their existing/ proposed access;
- Preliminary estimates of the site's trip generation and trip distribution at build-out;
- Identification of proposed year of build-out;
- Anticipated growth in traffic volumes between current and build-out conditions;
- Anticipated roadway improvements required to mitigate development impact;
- Phasing plan proposed, if any;
- Special analysis needs; and
- Other developments within the study area.

The scoping meeting/telephone conference shall conclude with the City and Applicant in mutual agreement with regard to determining the level of detail and extent to which the TIS will need to address each of the following:

- Study area for the impact analysis;
- Other developments within the study area;
- Existing intersection counts;
- Intersections and roadway segments to be studied in detail;
- Existing traffic volume forecasts;
- Anticipated growth in traffic from existing to build-out conditions;
- Location of the nearest bicycle and pedestrian facilities; and
- Special analysis needs (non traditional peak hour volumes for some uses, neighborhood impacts, access management plans, etc.).

4.2.2 Evaluation Elements

The key elements of the project TIS shall be specified by the City from the following list:

- Conformity with the transportation related policies of the City, including any other adopted access plans.
- Peak hour intersection and roadway level of service.
- Appropriateness of access locations;
- Location and requirements for left turn lanes or deceleration lanes at accesses or intersections. Taper lengths, storage length and deceleration lengths for turn lanes shall be designed as outlined in this Manual in Section 5.0 "Roadway Design";
- Sight distance evaluations and recommendations (intersection, stopping, passing);
- Continuity and adequacy of pedestrian and bike facilities;
- Recommended traffic control devices for intersections which may include two (2) way stop control, four (4) way stop control or yield signs, school flashers, school crossing guards, crosswalks, traffic signals or roundabouts.
- Traffic signal and stop sign warrants.
- Other items as requested by the City Engineer and agreed to in the scoping meeting/telephone conference.
- Neighborhood and public input issues.
- Classify streets within a development.
- Internal site circulation and flow.

4.2.3 Roadway Traffic Volumes/Traffic Counts

Current morning and afternoon commuter peak hour (7-9 A.M. and 4-6 P.M.) traffic counts as specified by the City Engineer shall be obtained for the roadways and intersections within the study area for one (1), non-holiday Tuesday, Wednesday, or Thursday. Each peak hour count shall be conducted over the designated hours (or as specified by the City Engineer) and shall include fifteen (15) minute count data to clearly identify the peak hours.

Weekend counts and/or average daily counts may also be required where appropriate and when required by the City Engineer. ALDOT Average Weekday Traffic (AWT) counts may be used when available. Pedestrian counts and bike usage should be obtained. Vehicle classification counts may be required.

In any case, these volumes shall be no more than two (2) years old (from the date of application submittal) unless otherwise deemed acceptable by the City Engineer. In areas that have experienced significant growth, the volumes shall be no more than one (1) year old from the date of application submittal.. The source(s) of each of the existing traffic volumes shall be explicitly stated (ALDOT counts, new counts by Applicant, etc.). Summaries of current traffic counts shall be provided. The City will require counts while both Auburn

University and Auburn City Schools are in normal school operation. If this cannot be done it must be approved by the City Engineer. The City will require the use of adjustment factors for data collected when either of these facilities is not in operation. Adjustment factors proposed for use in any TIS shall be submitted along with all supportive data to the City Engineer for review and approval. If in the opinion of the City Engineer, the proposed adjustment factors will not accurately reflect traffic conditions that would be in place during school operations, traffic count data will not be accepted and will require collection during those periods when the educational facilities are in operation.

In most cases, the actual completion of developments will occur at some time in the future. As part of the TIS, an annual growth rate of adjacent roadways and intersections will be developed. Growth rates utilized in the preparation of a TIS must be based on historical traffic growth, use of a regional travel demand model or other methods as approved by the City Engineer. Application of traffic growth shall be applied for buildout conditions and other interim development levels as required and approved by the City Engineer.

4.2.4 Intersection and Approach Level of Service

As a minimum, A.M. and P.M. peak hour intersection and approach Levels of Service (LOS) shall be determined for the existing signalized and unsignalized intersections at all study intersections and roadways. Additional intersections should be included in the analysis where post development conditions are considered by the City to be significant. The analysis shall use procedures as described in the *Highway Capacity Manual*, latest edition. Capacity analyses for intersections shall be based on individual approach LOS whereas impacts on roadways shall be based on daily traffic volumes and the specific roadway classification.

4.2.5 Trip Generation Rate

Trip generation rates utilized for conducting TIS in the City should be taken from actual rates developed and generated from land uses in the Auburn area. When data is not available for a proposed land use or for a land use unique to the Auburn area (University housing served by transit, etc.) is proposed, the Applicant must conduct a local trip generation study following procedures prescribed in the ITE *Trip Generation Handbook* and provide sufficient justification for the proposed generation rate. This rate must be approved by the City Engineer prior to its use in the TIS.

Dr. Brian Bowman, a professor at Auburn University, has conducted several studies to determine trip generation rates based on existing off-campus student housing within the City. The analysis included counting ingress and egress trips at existing developments and obtaining information about the ridership of Tiger Transit service to develop rates for student housing with transit service. The rates for apartment developments with no transit service were derived from the same developments, based on the assumption that if no transit service were available each transit rider would generate one (1) trip. The trip generation rates summarized in Table 4.2 “Trip General Rates for Off-Campus Student Apartments in Auburn” are based on previous studies from 2001 – 2006 and may be used as trip generation rates for student apartment developments within the City. Trip generation rates must be approved by the City Engineer prior to use in the TIS.

TABLE 4.2
Trip Generation Rates for Off-Campus Student Apartments in Auburn

Description	Trip Generation Rates*					
	AM Peak			PM Peak		
	Total	% In	% Out	Total	% In	% Out
Apartment development with no transit service	*0.24*	*17%*	*83%*	*0.49*	*54%*	*46%*
Apartment development with Tiger Transit service	*0.18*	*21%*	*79%*	*0.40*	*50%*	*50%*

* Trip Generation Rates based on number of beds in the Apartment development

If, in the opinion of the City Engineer, trip generation rates found in the ITE *Trip Generation Handbooik*, latest edition, or other industry publications accurately reflect the trip generation characteristics of a particular land use proposed, that trip generation rate may be used in forecasting traffic to be generated by a development.

The ITE *Trip Generation Handbook* reports the weighted average rate and minimum and maximum observed rates, in addition to fitted curve equations for the various land uses. Typically, either the weighted average rate or the fitted curve equation is utilized. The development intensity should be compared to the minimum and maximum values to ensure the data falls within the range of information in the ITE *Trip Generation Handbook*, latest edition. The guidance provided by the ITE *Trip Generation Handbook* (2004) for selecting between the average rate and equation are summarized below.

Use the fitted curve equation when:

- A fitted curve equation is provided;
- The independent variable is within the range of data; or
- Either the data plot has at least twenty (20) points or the correlation coefficient R^2 is greater than or equal to 0.75, equation falls within the data cluster in the plot, and standard deviation is greater than one hundred ten (110%) percent of the weighted average rate.

Use the weighted average rate when:

- There are at least three (3) (preferably six (6)) data points;
- The independent variable is within the range of data;
- The standard deviation is less than or equal to one hundred ten (110%) percent of the weighted average rate;
- R^2 is less than 0.75 or no equation is provided; or
- The weighted average rate falls within the data cluster in the plot.

4.2.6 Preliminary Land Use Assumptions

The trip generation values contained in studies submitted prior to the establishment of a site development plan shall be based on the maximum number of dwelling units permitted by the Zoning Ordinance for the approved land uses, and/or the maximum trip generation rates for the nonresidential development proposed land use action. When a TIS is being developed for a project with an established site development plan, trip generation shall be based on actual dwelling unit counts and square footage(s) proposed on the final plan.

4.2.7 Trip Generation Table

The Applicant shall prepare a Trip Generation Table, listing at a minimum, each type of land use within the site at build-out, the size and unit of measure for each land use, trip generation rates (total daily traffic, A.M. and P.M. peaks), and the resultant total trips generated.

4.2.8 Trip Distribution

The distribution of site generated traffic must be documented in the TIS. The procedures and rationale used in determining the trip distributions for proposed developments must be fully explained and documented. It is recommended the Applicant coordinate with the City to establish an acceptable distribution pattern.

4.2.9 Requirements for Additional Lanes

Within the study area of a TIS, as established by agreement between the City and the Applicant, additional lanes may be required on streets where minimum LOS are exceeded for existing cross sections based on post development conditions. If such additional lanes are required, as established as part of the TIS, they can include general purpose through lanes, left turn lanes and right turn lanes. Additional lanes, when determined by a TIS and in the opinion of the City Engineer of the need for such lanes is established, shall be provided by the Applicant. Such improvements must be designed and constructed to City and/or ALDOT standards. Generally, the cost of such improvements will be borne entirely by the Applicant.

During the design phase of providing additional lanes on public streets and roadways, if it is determined that additional right-of-way is required to construct such additional lanes, the Applicant shall provide additional right-of-way along their property frontage as directed by the City Engineer. If the construction of such additional lanes requires right-of-way beyond the property frontage of the Applicant, the Applicant shall work with the City to devise a method to provide the additional right-of-way and related roadway improvements or modify their development plan to remove the requirement for such additional lanes.

4.2.10 Intersection Delay

An A.M. and P.M. commuter peak hour intersection LOS analysis shall be conducted for each intersection analyzed in the TIS for existing conditions and those that reflect post development conditions. This analysis shall be based on procedures specified in the *Highway Capacity Manual*, latest edition. In those areas adjacent to or in close proximity to City schools or Auburn University, additional peak hour analyses shall be conducted for those afternoon hours which reflect the peaks for those facilities. The intent of this analysis is to establish the existing and post development intersection delays and related LOS for comparison and determination of impacts on operations.

4.2.11 Driveway Access

Site driveways shall be analyzed to determine the LOS for each access point. If a driveway capacity analysis demonstrates a LOS of a "D" or worse, the TIS shall address this issue by analyzing if a traffic signal is warranted or if an operational change is acceptable (such as a turn restriction), and whether it will interfere with the adjacent street traffic.

Driveway plan concepts for a development shall be submitted to the City for approval prior to development of construction plans. An access permit is required on those routes maintained by ALDOT. The City shall be copied on all ALDOT permit applications within the City and its planning jurisdiction. Because frequent curb cuts and driveways providing access to numerous adjoining properties are an impediment to the proper functioning of major streets, on-site circulation and cross-access agreements between lots are encouraged. Minimum spacing of driveways and other curb cuts shall conform to the minimum standards outlined in this Manual in Section 5.0 "Roadway Design".

4.2.12 Traffic Signals

Any traffic signals proposed for installation on City streets shall meet the minimum criteria as outlined in the MUTCD, latest edition. A signal warrant analysis for potential signal locations shall consist of a review of the applicable signal warrants contained in the MUTCD. On roadways controlled by ALDOT, procedures for meeting traffic signal warrants as established by the Department shall be followed.

Proposed and existing access points, proposed intersections, and existing intersections effected by the land use that have any potential for traffic signalization will be reviewed and discussed during the scoping meeting/telephone conference. During the scoping meeting/telephone conference, an outline of locations for signal warrant analysis will be agreed upon. Alternatives to signalization at potential signal locations will be discussed in the scoping meeting/telephone conference and the TIS report. The alternatives to adding new intersections would include added access points, limited movements at access points, frontage roads, joint use access points, roundabouts and other such designs as required and/or approved by the City.

If any signal timing and/or phasing changes are proposed as a mitigation measure of a TIS, an appropriate analysis of the intersection where the signal exists shall be conducted to demonstrate the potential implications of the suggested modifications. Such modifications to existing traffic signals shall require submittal of a request for such change with supportive documentation of analysis and findings and shall not be undertaken without approval from the City Engineer.

Sight distance concerns that are anticipated or observed which may impact driveway, intersection, or roadway operation and safety need to be discussed in the TIS. Recommendations regarding stopping sight distance, intersection sight distance, and passing sight distance needs should be provided by the Applicant's traffic engineer for detailing on the final development, site plan, or final construction plans. Intersection sight distance requirements for driveways and intersections shall meet the criteria as set forth in this Manual in Section 5.0 "Roadway Design".

4.2.13 Mitigation Thresholds and Measures

The City has determined that the daily and peak hour traffic volumes on all streets designated as a collector, local commercial, local residential or alley shall not have a LOS below a "C". Arterials shall not have a daily or peak hour LOS below a "D".

When the TIS indicates the roadway(s) within the study area exceed the minimum acceptable LOS standard, the TIS shall include feasible measures which would mitigate the project's impacts. Additionally, if the analysis included in a TIS establishes the LOS for an intersection, intersection approach or roadway dropping one (1) level, however, not below the minimum criteria for a specific roadway classification, mitigation will not be required. If for any reason, the TIS illustrates the reduction in LOS for an intersection, intersection approach or roadway dropping two (2) LOS, mitigation will be required.

An appropriate measure of traffic mitigation would be the ability of roadway, intersection and traffic control improvements to maintain acceptable LOS for the impacted facility. Mitigation measures include the addition of through lanes (roadway widening), left turn lanes, right turn lanes, improved traffic control, access management and other such measures as deemed appropriate by analysis and in accordance with the City.

4.2.14 Traffic Signal Operations Improvements

Traffic signal improvements shall include upgrading signals to include additional signal phases and timing plans, signalization of an unsignalized intersection and/or implementation of a coordinated traffic system. Signal improvements and/or installations on City streets must be approved by the City Engineer. Traffic signals recommended to be installed on ALDOT roadways shall be jointly approved by ALDOT and the City. Generally, the cost of such improvements will be borne entirely by the Applicant.

4.2.15 Geometric Improvements

Mitigation measures, which include street widening, and other physical improvements must be demonstrated to be physically feasible and must meet minimum City standards for both on-site and off-site improvements. As part of the basic TIS analysis, a determination of the need for left and right turn lanes as a result of development generated traffic should be undertaken. The analysis techniques utilized shall include procedures and methods outlined in this Manual in Section 5.0 "Roadway Design" or other methodologies as approved by the City Engineer.

The needs for turn lanes and other auxiliary lanes shall be determined for each development access and study intersection included in the TIS. The basis of design for such devices shall be as outlined in this Manual in Section 5.0 "Roadway Design", AASHTO or ALDOT as applicable. All proposed project entrances onto arterial and collector streets shall be evaluated as to whether they require deceleration lanes as outlined in this Manual in Section 5.0 "Roadway Design".

4.2.16 Pedestrian/Bicycle Improvements

If high pedestrian and/or bicycle traffic is expected to be generated by a development, as determined by the City Engineer, the TIS must consider improvements and connectivity to existing and proposed facilities. The *Highway Capacity Manual* contains LOS criteria for various pedestrian and bicycle facilities. Similar to roadways and intersections, pedestrian and bicycle facilities shall not have a LOS below a "C". When a project's impacts are determined to exceed the minimum acceptable LOS standard, the TIS shall include feasible measures to improve pedestrian and bicycle safety within the study area.

4.3 TRAFFIC IMPACT STUDY REPORT CONCLUSIONS

The findings of the TIS should be provided in summary format, including the identification of any areas of significant impacts and recommended improvements/mitigation measures to achieve the maximum volume standards for all modes.

4.3.1 Geometric Improvements

The TIS shall include recommendations for all geometric improvements such as pavement markings, signs, adding through or turn lanes, adding project access and assorted turn lanes and changes in medians. Sufficient dimensions/data shall be identified to facilitate review. Anticipated right-of-way needs shall also be identified. This information shall be made available to the project civil engineer for use in preparing engineering plans.

4.3.2 Responsibility

The TIS shall describe the location, nature and extent of all transportation improvements required to achieve the required post development LOS within the study area. The responsibility for implementation of the post development mitigation measures shall rest with the Applicant.

4.4 TRAFFIC IMPACT STUDY REPORT OUTLINE

The following outline has been developed to serve as a guide for the organization of the Traffic Impact Study report.

- ☐ INTRODUCTION (Purpose of report and study objectives)

- ☐ PROPOSED DEVELOPMENT
  - ☐ Site Description (include small version of site plan in appendices)
  - ☐ Site Location (include site location map)
  - ☐ Zoning (Current and proposed)
  - ☐ Time Frame of Development (include any phasing of development which is anticipated)

- ☐ BACKGROUND INFORMATION
  - ☐ Background Traffic Growth Rate (include projected traffic growth rate for the development time frames included in the proposed development and include method for traffic growth projections)
  - ☐ Off-Site Developments (description of other significant development in the vicinity which could impact traffic conditions in the study area)
  - ☐ Planned and Programmed Roadway Improvements (description of any Planned or Programmed Roadway Improvements within the study area which could impact traffic conditions within the study area during the time frame for development of the proposed project)

- ☐ EXISTING TRAFFIC CONDITIONS
  - ☐ Traffic Count Data (introduce and illustrate current traffic counts for the study area roadways and intersections)
  - ☐ Existing Conditions Capacity Analysis (evaluate study area roadways and/or intersections based upon industry standard capacity analysis methods)
  - ☐ Summary of Existing Traffic Conditions in the study area

- ☐ FUTURE TRAFFIC CONDITIONS
  - ☐ Background Traffic Growth (apply the background growth rate for the time frame for a give phase of development)
  - ☐ Inclusion of Planned or Programmed Improvements (in the event any of the Planned or Programmed improvements are to be included in the analysis of future traffic conditions, a status of the projects and time frame of the projects should be demonstrated)
  - ☐ Trip Generation Estimates (estimate trip generation potential for each level of development)
  - ☐ Trip Distribution (describe the anticipated routes for traffic expected to be generated by the proposed development and illustrate the findings in graphic format)

- ☐ Traffic Assignment (assign traffic expected by the proposed development to the study area roadways based upon the distribution patterns established)
- ☐ Future Conditions Capacity Analysis (evaluate the study area roadways and intersections as well as site accesses with post-development traffic volumes)
- ☐ Identify Capacity Deficiencies (identify roadways and/or intersections in which capacity deficiencies are expected for future traffic conditions)
- ☐ Recommended Roadway and Traffic Control Improvements (develop and test potential improvements for the study area roadways and intersections aimed at mitigation of traffic impacts resulting from development traffic)
- ☐ Internal Circulation (demonstrate the ability of the site's internal circulation pattern to handle site generated traffic that includes trucks)
- ☐ Capacity Analysis with Recommended Improvements (demonstrate the effectiveness of Recommended Roadway and Traffic Control Improvements and resultant levels of service)

Note: These steps should be taken for each level of development within the corresponding time frame.

☐ SUMMARY AND CONCLUSIONS – Provide a summary of the findings of the study effort to include existing traffic conditions, future traffic conditions for each level of development, and the recommended improvements aimed at mitigating potential traffic impacts resulting from the proposed development for each level of development.

A.6: Access Management Agreement

ACCESS MANAGEMENT AGREEMENT

Gresham and Middle Roads

I. PARTIES – This agreement is made between the City of Florence (Florence), Town of St. Florian (St. Florian), Lauderdale County (the County), and the Northwest Alabama Council of Local Governments (NACOLG or MPO) as the designated metropolitan planning organization for the Shoals region under federal transportation regulations (the MPO).

II. ROUTE – This access management agreement pertains to Gresham Road, from Cox Creek Parkway to Middle Road, and Middle Road, from Kolbe Lane to Huntsville Road (the roadway). See Figure 1 for a map of the route.

III. STATEMENT OF PURPOSE – Gresham and Middle Roads are an Urban Collector in the NACOLG functional classification system for 2035 Shoals Area Long Range Transportation Plan and serves as an intra-regional roadway connecting the area to its economic region. The purpose for this agreement is to protect the capacity of the roadway to carry significant local and intra-regional traffic, and to increase safety for drivers and pedestrians that use this facility. It is the intent of this agreement to provide access to abutting properties consistent with these objectives.

IV. AUTHORITY – Florence, St. Florian, and Lauderale County have specific legal authority to regulate access to public roads through the subdivision process. In the case of the City and County, it is found in Alabama Code § 11-52-31 and § 11-24-2, respectively. The MPO is hereby granted standing in this access management agreement in recognition of its role in transportation planning within the metropolitan area.

V. ACCESS PLAN – Management of access to the roadway is necessary to achieve the objectives of the agreement. The Access Management Plan is detailed in Appendix B. The Plan is a Specific Access Management Plan in which all potential future signalizaton/roundabouts are specifically identified. Standards for connections are established to be applied during plat and development review approval or connection permit process. In addition, local street networks, property interconnect agreements and requirements, new local roadways to be developed, and land use regulations that are necessary to achieve the objectives of this agreement are specified.

VI. AGREEMENT ADOPTION/TERMINATION/MODIFICATION – This agreement will be deemed adopted when passed in identical form by the Florence City Council, St. Florian Town Council, the Lauderdale County Commission, and the NACOLG Policy Committee and signed by their proper representatives. This agreement may be terminated or modified, in whole or in part, only by mutual agreement of the parties as evidenced by resolutions adopted by each governing body.

VII. PLAN ADMINISTRATION –

A. Permit Application. A permit issued by Florence, St. Florian, or Lauderdale County is required for new connection access to the roadway. Any legal person or their duly authorized agent owning property abutting the roadway may request a connection access permit. The permit will be initially requested through a designated administrative process from Florence, St. Florian, or Lauderdale County, depending on which jurisdiction the permit request is located in. The applicant is required to submit a detailed plan for the connection including a map showing its exact location and a design that shows the curb radii, driveway throat width and length, and information that specifies the projected volume of turns into and out of the connection (under peak conditions). Any joint access agreements with other property owners should also be submitted.

Provision of joint access via easement and a shared use agreement may be required as a condition of driveway approval.

After review of the application, Florence, St. Florian, or Lauderdale County determines whether the request is within the allowable parameters established by the Access Management Plan. If so, Florence, St. Florian, or Lauderdale County stamps the detailed plan with a review signature block (Appendix C), signs it indicating approval, enters any approval conditions in the comments section. If the permit is requested in Lauderdale County's jurisdiction, review shall be considered complete and the permit shall be granted or denied.

If the permit is located in Florence or St. Florian's jurisdiction, the plans will then be sent to the County. The County shall review the permit to determine whether the request is within the allowable parameters established by the Access Management Plan. If so, the County will sign the signature block before returning to the Florence or St. Florian. St. Florian or Florence shall then grant or deny the permit request. If the signature of the County is missing from the permit application, a permit shall not be issued.

The County shall inform the applicant for which a permit it denied and instruct the applicant how they may amend the request to receive approval, appeal the decision, seek a variance, or seek an amendment to the Plan pursuant to the following section. The Lauderdale County Engineer shall be responsible for carrying out all actions required on behalf of the County. The St. Florian Planning Commission shall be responsible for carrying out all required actions on behalf of the Town. The Florence City Engineer shall be responsible for carrying out all required actions on behalf of the City.

B. Amending the Plan. A Plan amendment will be considered at the request of any of the parties to this agreement or at the request of an applicant whose permit request has been denied by any of the parties. The proposed amendment must be adopted in identical form by the Florence City Council, St. Florian Town Council, the Lauderdale County Commission, and the NACOLG Policy Committee to become effective.

VIII. APPEALS –

The standard of review for appeals shall be determining if the appropriate body correctly interpreted the provisions of this agreement. Appeals shall not be granted that shall have the effect of violating the provisions of this agreement.

A. Lauderdale County Appeals. Appeals of decisions of Lauderdale County Engineer shall be appealed to Lauderdale County Commission.

B. St. Florian/Florence Appeals. Appeals of decisions of St. Florian or Florence shall be handled by the St. Florian Town Council or Florence Planning Commission, as appropriate.

IX. VARIANCES –

Variances from the minimum connection spacing standards contained in Appendix B may be permitted when the provisions of this Agreement create undue burdens on an individual applicant. Variances shall not be permitted to changes in the spacing or location of median breaks or alterations to the specific design elements of the roadway. Variances shall be permitted with unanimous consent of the St. Florian or Florence as well as the County and be supported by a written finding of fact. The variance shall be subject to following standard of review:

A. The provisions of the agreement would result in no provision of access to an existing platted lot of record.

B. There are unique topographic or environmental conditions that would prevent conformance to this Agreement.

C. Granting of the variance would not confer special privileges otherwise denied to others by the provisions of this Agreement.

D. Cost shall not be included as a consideration in determining the granting of a variance to this Agreement.

X. AGREEMENT ACCEPTANCE –

Acceptance of this Agreement is indicated by the following signatories:

Pursuant to Ordinance 20XX-X of the Town of St. Florian Town Council approved on XXth day of ___________.

____
Pam Stumpe, Mayor

Pursuant to Ordinance 20XX-X of the City of Florence City Council approved on XXth day of ___________.

____
Steve Holt, Mayor

Pursuant to Ordinance 0-00-XX of the Lauderdale County Commission approved on XXth day of ___________.

____
Danny Pettus, County Commission Chairman

Pursuant to Resolution No. XX-XX of the NACOLG Policy Committee approved on the XXth day of ____________.

____
Keith Jones, Executive Director

APPENDIX A

GRESHAM AND MIDDLE ROADS DESIGN CONCEPT

As an urban collector, the proposed design for the roadway is intended to balance the need to provide for through travel and reasonable access to abutting properties while at the same time maintaining the capacity of the roadway to operate in a safe and efficient manner. Consequently, access to abutting property is subordinate to the goal of traffic movement and subject to necessary management of entrances and exits.

Definitions –

Major Intersection - intersections that are either currently signalized/roundabouts or may be eligible for future signalization/roundabout treatment.

(See Figure 1 -route map- on following page)

Figure 1: Route Map

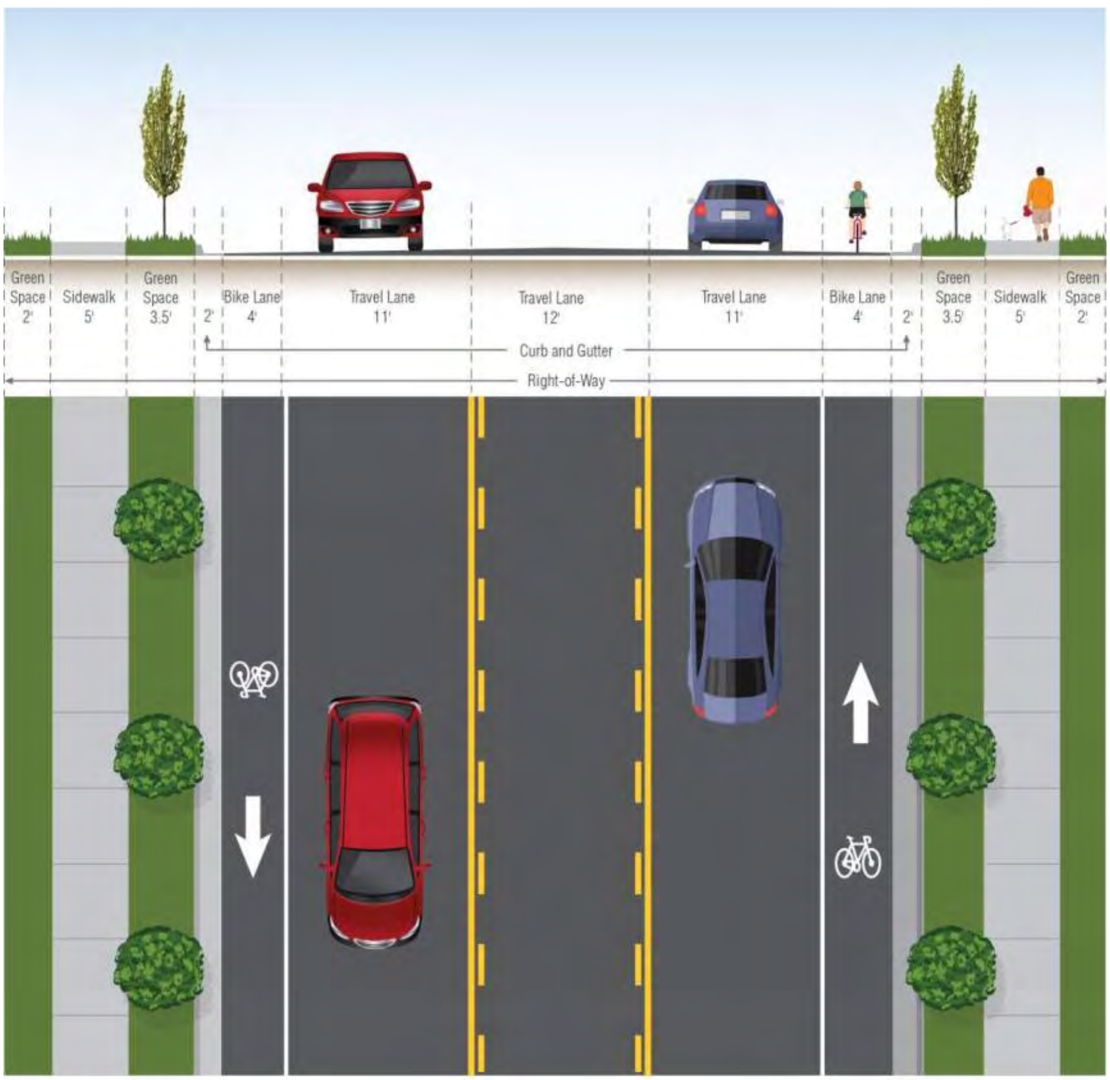
APPENDIX B

Specific Access Management Plan
Gresham and Middle Roads

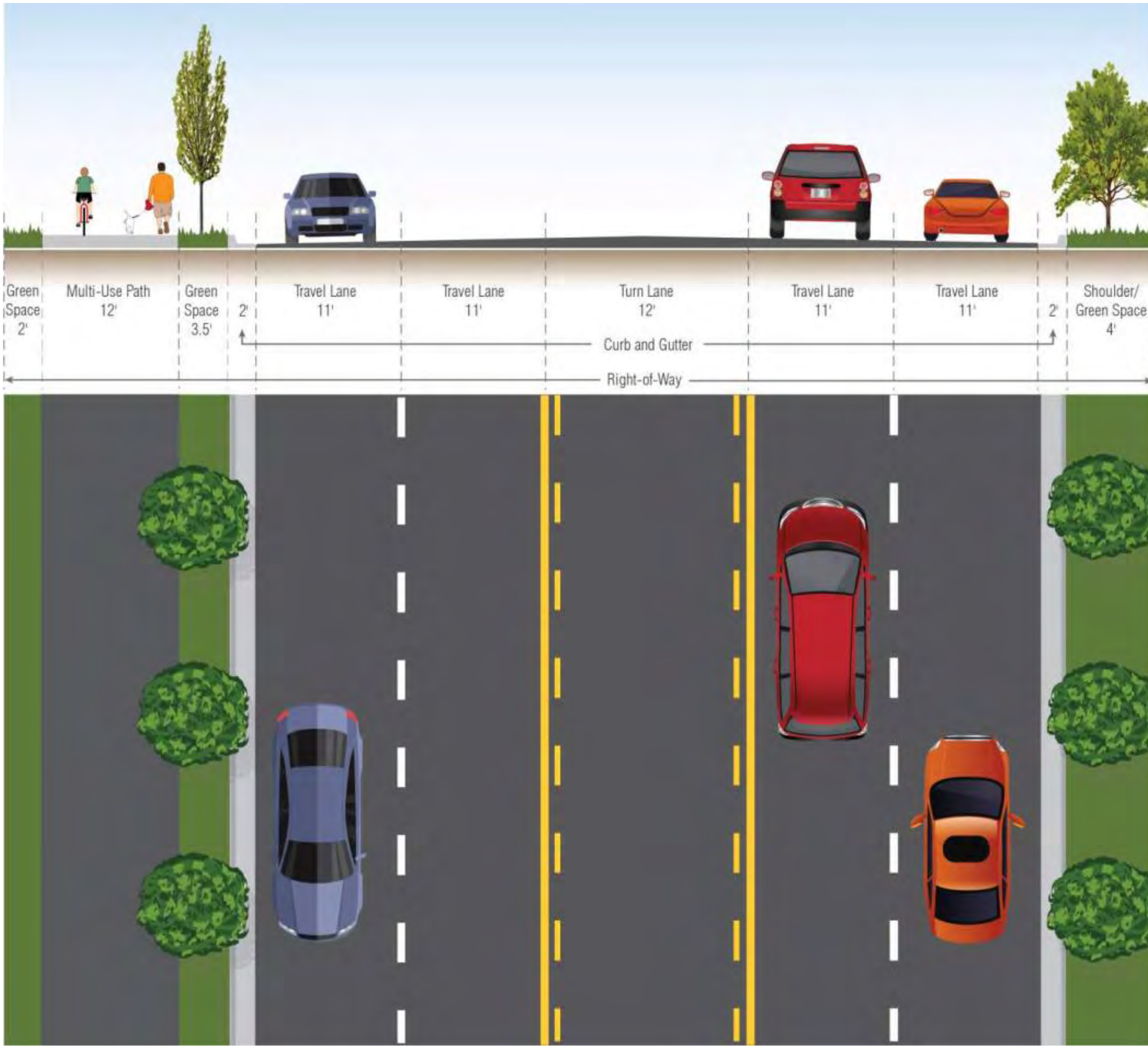
Access management addresses the relationship between roads and adjacent land use. To provide the safest and highest capacity road it is necessary to manage the location of major intersections and spacing of connections. The access management plan for the roadway was developed using standards set forth for in the Gresham Road and Middle Roads Planning Study. These standards were developed through research and are derived from standards developed by the Florida DOT.

General design framework:

Gresham Road from Cox Creek Parkway to Middle Road: Future three lane roadway with a traversable median with major intersections spaced at 1/4 mile intervals and future traffic signals and/or roundabouts generally spaced at 1/2 mile intervals. Future signal/roundabout locations will be determined by meeting warrants, on a case by case basis. A minimum connection spacing of 300 feet (distance from inner edge of connection/street to inner edge of connection/street) applies to new connections and intersections and is based on a roadway speeds of 45 mph or lower (after future widening). Typical Cross Section is indicated below.



Middle Road from Kolbe Lane to Huntsville Road: Future five lane roadway with a traversable median with major intersections spaced at 1/4 mile intervals and future traffic signals and/or roundabouts generally spaced at 1/2 mile intervals. Future signal/roundabout locations will be determined by meeting warrants, on a case by case basis. A minimum connection spacing of 300 feet (distance from inner edge of connection/street to inner edge of connection/street) applies to new connections and intersections and is based on a roadway speeds of 45 mph or lower (after future widening). Typical Cross Section is indicated below.



No land along the roadway shall be platted into lots too small to meet the minimum connection spacing requirement unless a written easement agreement is executed between adjacent properties. Property fronting the roadway which abuts an intersecting lower classification street shall obtain primary access from the intersecting street.

Existing connections that do not conform with the Plan's standards and which are in place at the date of adoption of the Access Management Agreement by all parties are designated as nonconforming. These connections shall be brought into compliance with the Plan's standards under the following conditions: 1) When new connection permits are requested; 2) Upon redevelopment of the property; 3) As improvements to the roadway may allow.

Specific Design Elements

Gresham Road from Cox Creek Parkway to Middle Road:

Three-lane roadway with a traversable median
Minimum Connection Spacing of 300 feet
Minimum Traffic Signal/Roundabout Spacing of ¼ mile, ½ mile preferred spacing.

Middle Road from Kolbe Lane to Huntsville Road:

Five-lane roadway with a traversable median
Minimum Connection Spacing of 300 feet
Minimum Traffic Signal/Roundabout Spacing of ¼ mile, ½ mile preferred spacing.

Eight (8) Major Intersections (identified by number on the attached map and eligible for signalization upon meeting signal warrants):

MB#1- Gresham Road/Mall Road –
Rationale – Intersection serves the existing street network.

MB#2- Gresham Road: 1,975 ft east of Mall Road -
Rationale – Proposed intersection to serve future development and future street network.

MB#3- Gresham Road/Seville Street -
Rationale – Intersection serves the existing street network.

MB#4- Gresham Road/Middle Road –
Rationale – Intersection serves the existing street network at a major intersection.

MB#5- Middle Road: 1,320 ft south of Gresham Road –
Rationale – Proposed intersection to serve future development and future street network.

MB#6- Middle Road/Hough Road –
Rationale – Intersection serves the existing street network at a major intersection.

MB#7- Middle Road/Florence Boulevard –
Rationale – Intersection serves the existing street network at a major intersection.

MB#8- Middle Road/Huntsville Road –
Rationale – Intersection serves the existing street network at a major intersection.

APPENDIX C

Connection Review Approval Signature Blocks

GRESHAM AND MIDDLE ROADS ACCESS MANAGEMENT
CITY OF FLORENCE Approves this connection(s) ____ Disapproves this connection(s) ____ Signature____________________________Date_____________ Title____ Comments/Conditions_________________________________ ____
TOWN OF ST. FLORIAN Approves this connection(s) ____ Disapproves this connection(s)____ Signature____________________________Date_____________ Title____ Comments/Conditions_________________________________ ____
LAUDERDALE COUNTY Approves this connection(s) ____ Disapproves this connection(s) ____ Signature____________________________Date_____________ Title____ Comments/Conditions_________________________________ ____