Spalding County
FREIGHT CLUSTER PLAN

Executive Summary

December 2020

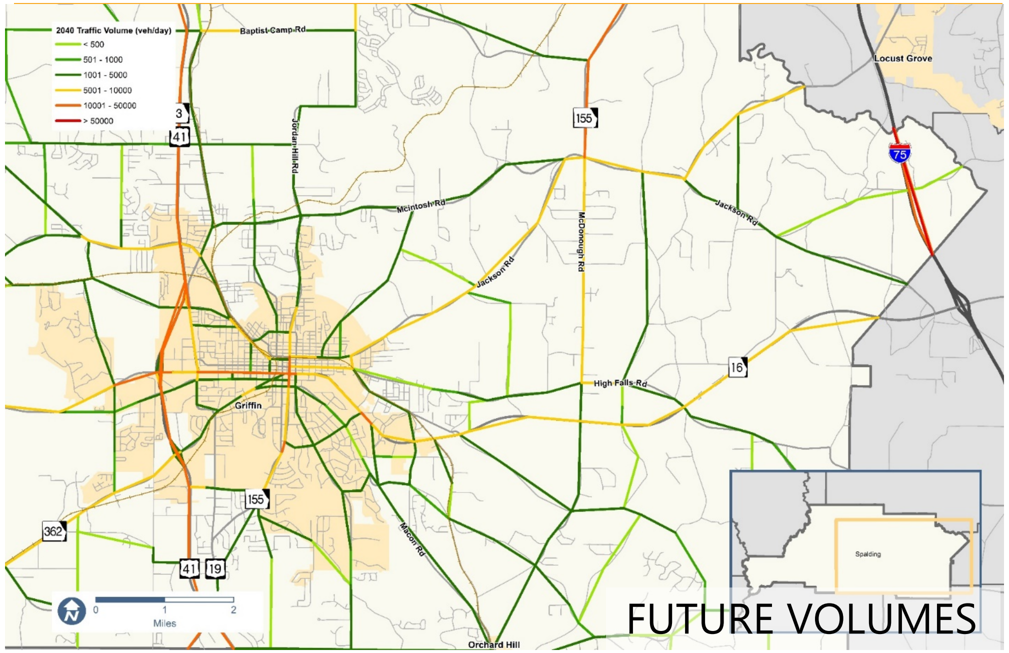
PREPARED FOR:

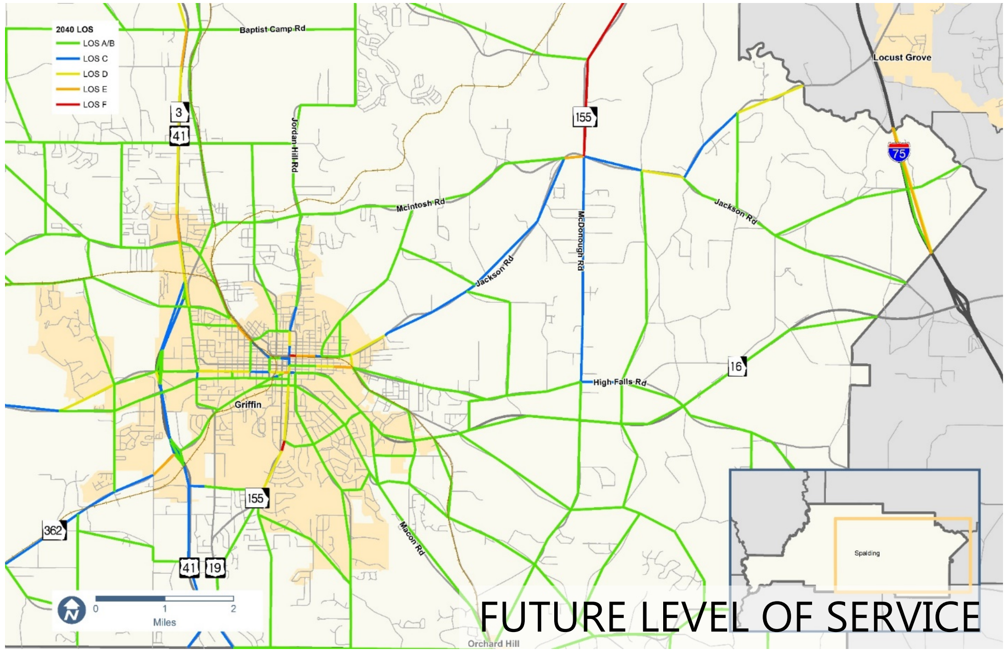
Spalding COUNTY

In cooperation with

ARC ATLANTA REGIONAL COMMISSION

Griffin Growing TOGETHER





Overview of Freight Cluster Plan

The Spalding County Freight Cluster Plan (FCP), developed through the Atlanta Regional Commission (ARC) FCP Program, served to improve the transportation infrastructure and freight mobility within industrial clusters throughout the Atlanta region. The FCP was developed through a partnership between Spalding County, the City of Griffin and ARC. In the case of the Spalding County FCP, the study served to develop a vision to serve existing industrial development as well as develop recommendations on how to serve the future demand for industrial development.

Given the lack of overall congestion projected for the County in 2040 (shown on left), short-term strategies focused on lower-cost improvements such as signalization and intersection improvements

The major milestones of the Plan development process are as follows:

- **Stakeholder Engagement and Outreach Strategy –** The overall approach to gathering meaningful input into the Plan development process.
- **Best Practices Report -** Review of best practices from throughout the state and the US for the effective planning for freight-related infrastructure that would apply to Spalding County.
- **Inventory and Assessment Report -** Thorough inventory of relevant data and factors that influence freight mobility and industrial development throughout Spalding County.
- **Traffic Study –** Detailed assessment of Spalding County's roadway network to identify specific improvements that will best serve freight mobility and promote economic development.
- **Recommendations and Work Program -** Recommendations to be carried forward concerning transportation, land use and economic development that includes a detailed, prioritized work program based on anticipated revenues and cost estimates based on recent expenditures for similar projects.

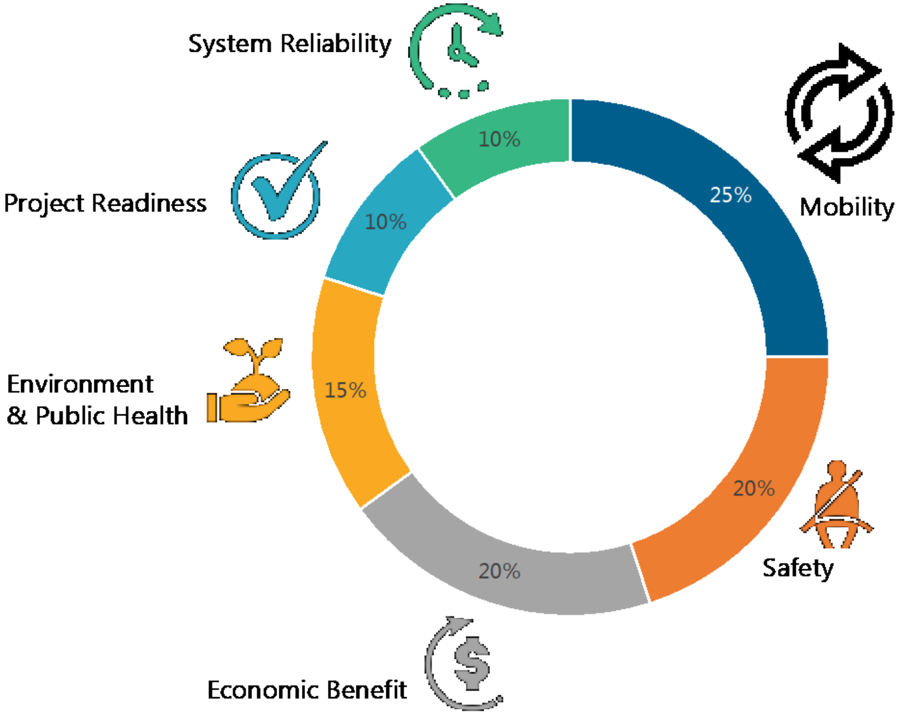
FCP Outreach and Input Received

A variety of outreach activities were completed as part of the Spalding County FCP. Major activities completed include the selection of a Steering Committee, multiple Steering Committee meetings, stakeholder interviews, and surveys. The outreach also included periodic briefings to the Griffin-Spalding Area Transportation Committee.

Major highlights included:

- A major focus of the study should be to reduce the freight moving through downtown Griffin. The redesignation of McDonough Road to SR 155 and the eventual construction of a truck bypass around Griffin as an alternative to SR 16 for east-west truck movement.
- The area surrounding the I-75 and SR 16 will be an attractive location for future warehouse and distribution (as has happened in Henry County). While much of this development will take place in Butts County, the County needs to identify policies and procedures to responsibly accommodate future development and avoid the situation at SR 155 and I-75 in Henry County.
- Preserving freight mobility along SR 16 in the eastern portion of the County is a critical need since many of the industrial uses along the roadway depend on the Port of Savannah for its materials. Increasing freight mobility through Griffin in the interim (prior to the construction of a bypass).
- Spalding County currently has programs for workforce training at the Griffin Region College & Career Academy and Southern Crescent Technical College. The stakeholders confirmed the importance of keeping residents employed within the County through means of training for the jobs that are created with new industrial developments. Workforce development resources need to be allocated toward jobs and positions within Spalding County (i.e., training for local manufacturing, logistics coordination, warehouse management/production, etc.).
- The Plan should accommodate new technologies for freight mobility, including signal improvements and real time information for truckers.
- The implementation of transit, micromobility, and/or other last-mile connections are needed to better connect the population centers of Griffin to local opportunities as they arise. Furthermore, GA Commute Options also provides commute opportunities for workers throughout the Atlanta region.
- As future industrial development in the eastern portions of the County occurs, the potential interchange at Jenkinsburg Road needs to remain a viable option to accommodate future truck traffic.

Project Development Process



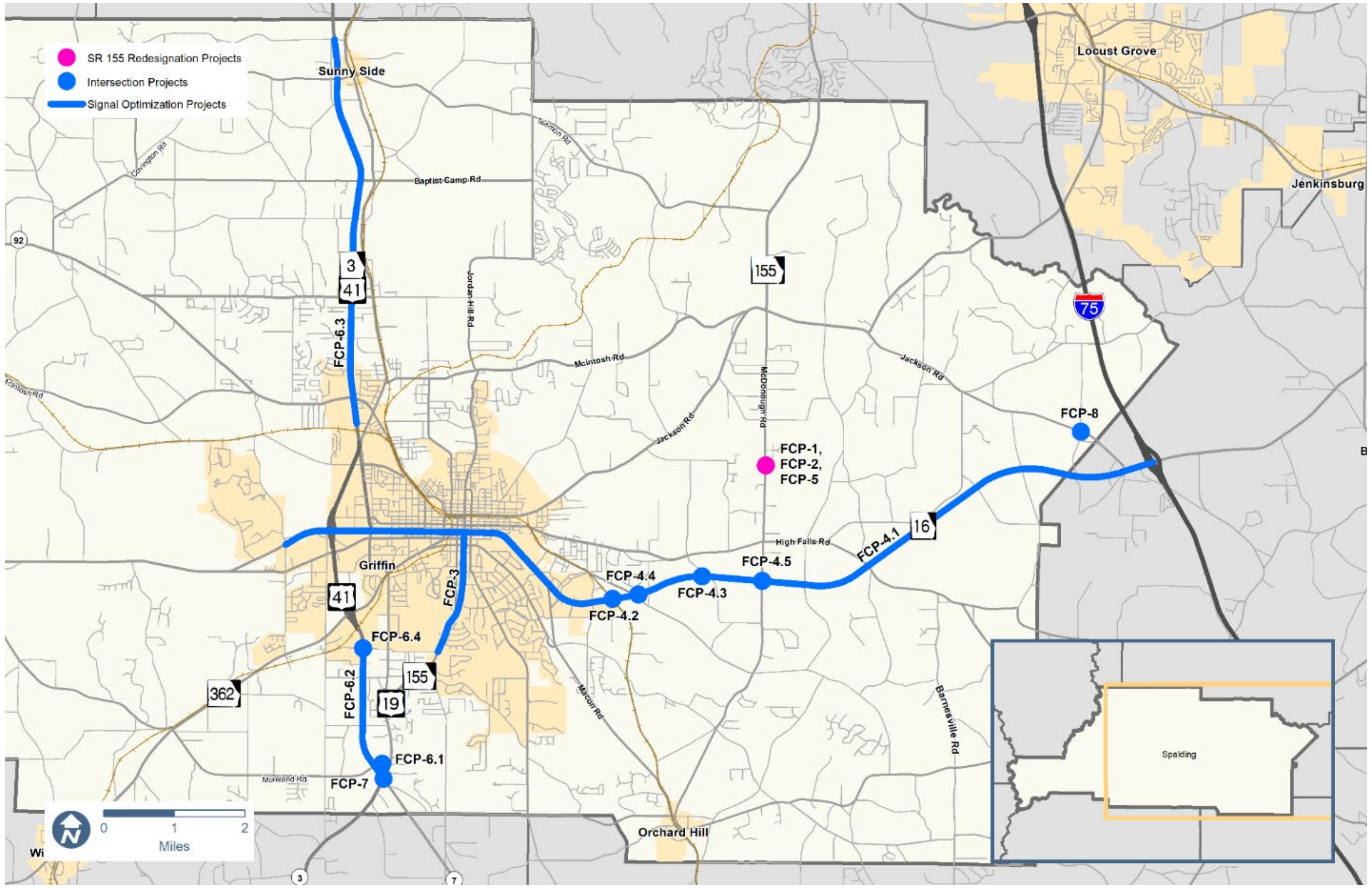
The prioritization of projects focused on project goals and weighted per input from the Freight Cluster Plan Stakeholder Committee, as shown above.

The process of developing the FCP project list was a culmination of the following efforts:

1. **Identification of a Universe of Projects:** A universe of initial projects was identified through: 1) the analysis within the Inventory and Assessment Report; 2) the completion of Traffic Study to identify more detailed issues at problem intersections; 3) an inventory of projects identified through previous studies; and 4) input from stakeholders.
2. **Development of a Project Prioritization Tool:** A project evaluation tool was developed specifically for this Plan based on: 1) factors utilized by the ARC in their project evaluation process; and 2) goals set forth for this Freight Cluster Plan. This tool was specifically designed to assess projects in a manner consistent with the ARC TIP prioritization to ensure compatibility with the regional process.
3. **Initial Evaluation** All proposed projects were assessed within the tool to provide insight on the potential for projects to meet the overall goals of the project.
4. **Refinement of Project Prioritization:** The initial priorities developed within the tool were vetted with Spalding County staff and refined based on local knowledge, previous project development efforts, and well-known needs historically voiced from Spalding County community members.
5. **Development of Project Costs:** Detailed cost estimates were developed based on the ARC Costing tool, specific project details, and input from Spalding County staff.
6. **Development of Projected Local Revenues:** Historical SPLOST revenues provided from Spalding County staff were utilized to determine realistic revenue forecasts for local funds available for the short-term work program through 2025.
7. **Definition of Improvements** In order to be better positioned for ARC and grant opportunities, projects that would be mutually beneficial along US 19/41 and SR 16 have been bundled to present greater collective benefits as they would individually.

Overview of Short-Range Recommendations

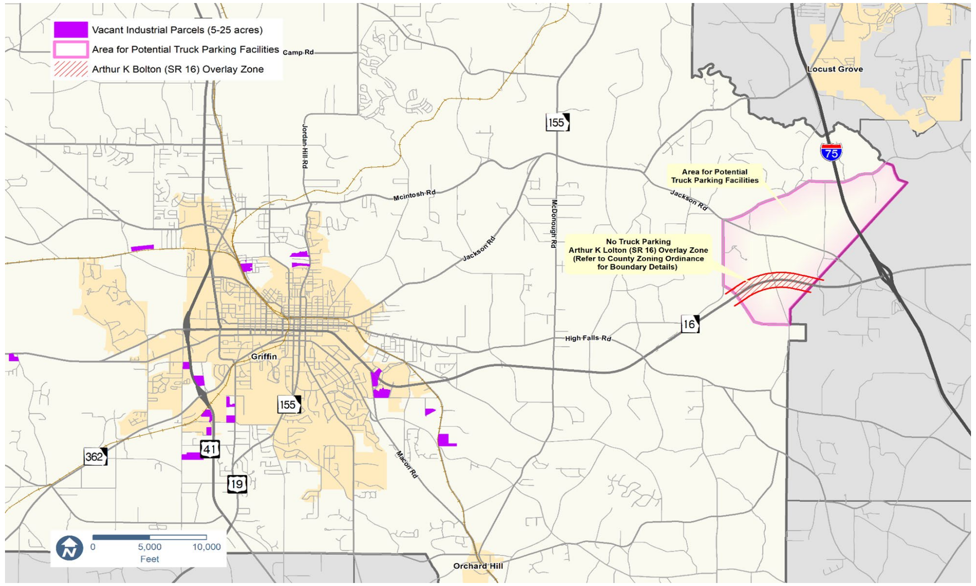
Project ID	Project Name	Total Project Cost	Primary Responsible (Lead) Agency	Federal/ State Funding	Total Local Match Required
FCP-1	SR 155 Concept Study	$312,500	GDOT, Spalding County, City of Griffin	$250,000	$62,500
FCP-2	Griffin Bypass Alternatives Analysis	$350,000	Spalding County, City of Griffin	$280,000	$70,000
FCP-3	S. Hill Street (SR 155) Signal Optimization and Advanced Dilemma-Zone Detection System (E. Taylor Street to Airport Road)	$1,370,000	GDOT, Spalding County, City of Griffin	$1,096,000	$274,000
FCP-4	SR 16 Freight Cluster Plan Corridor Improvements	$6,420,000	Spalding County	$5,136,000	$1,284,000
FCP-5	SR 155 Design for Redesignation	$1,000,000	GDOT, Spalding County, City of Griffin	$800,000	$200,000
FCP-6	US 19/41 Freight Cluster Plan Corridor Improvements	$22,330,000	Spalding County	$17,864,000	$4,466,000
FCP-7	CTP03 - Tri-County Crossing: Moreland Road Extension to Zebulon Rd (SR 155)	$1,200,000	Spalding County	$-	$1,200,000
FCP-8	Jackson Road at Wallace Road Intersection Improvement	$70,000	Spalding County	$-	$70,000
		$13,052,500		**$9,426,000**	**$3,626,500**



Projects and recommendations included in the short-term fiscally constrained project list consist of 1) intersection improvements that address capacity, safety, and operational issues: and 2) preliminary engineering and scoping projects for the development of long-term goals. In addition, $2 million were dedicated to improve sidewalks and implement transit needs. Furthermore, policy recommendations that address work force access and transit connectivity issues were developed. The map presents short-term fiscally constrained roadway project locations.

Short-Term Policy Recommendations

The short-range policy recommendations shown were developed to foster responsible development as the demand for industrial development continues to increase – particularly around I-75. A major component to developing a healthy industrial district is managing the demand for truck parking as well. The graphic below shows potential locations that need further study (Projects P-1, P-2). All of the other recommendations noted to the left are policy recommendations that apply throughout the County. Strategies were also developed to increase workforce access and better connect Spalding citizens and potential workers from throughout the Atlanta region to potential employers within the County.



Short-Term Fiscally Constrained Roadway Projects

Project ID	Recommendation Type	Project Description	Implementing Agencies
LU-1	Land Use/ Development	Prioritize development of high-ranking freight clusters	Spalding County, City of Griffin, ARC
LU-2	Land Use/ Development	Zoning incentives	Spalding County, City of Griffin
LU-3	Land Use/ Development	Innovative site design.	Spalding County, City of Griffin
LU-4	Land Use/ Development	Mixed-use developments	Spalding County, City of Griffin
LU-5	Land Use/ Development	Preserve agricultural and open lands	Spalding County, City of Griffin, ARC
LU-6	Land Use/ Development	Industrial Retention	Spalding County, City of Griffin, ARC
P-1	Truck Parking	Identify Truck Parking Locations	Spalding County, City of Griffin, ARC, GDOT
P-2	Truck Parking	Adopt Truck Parking Ordinance	Spalding County
P-3	Truck Parking	Truck Parking Technologies	Spalding County, City of Griffin
WF-1	Transit/Workforce Access	Prioritize projects in census-designated urbanized areas	Spalding County, City of Griffin, ARC
WF-2	Transit/Workforce Access	Georgia Commute Options	Spalding County, City of Griffin
WF-4	Transit/Workforce Access	New mobility	Spalding County, City of Griffin, ARC
WF-5	Transit/Workforce Access	Reverse commute	Spalding County, City of Griffin, ARC
E-1	Economic Development	Workforce development with Employer Engagement	Spalding County, City of Griffin

Overview of Long-Term Recommendations

Long term roadway recommendations are higher cost improvements that are not cost feasible within the next five years. Many of them, such as the bypass alternatives and transit implementation, are contingent on the studies recommended in the short-term work program.

Long-Term Policy Strategies

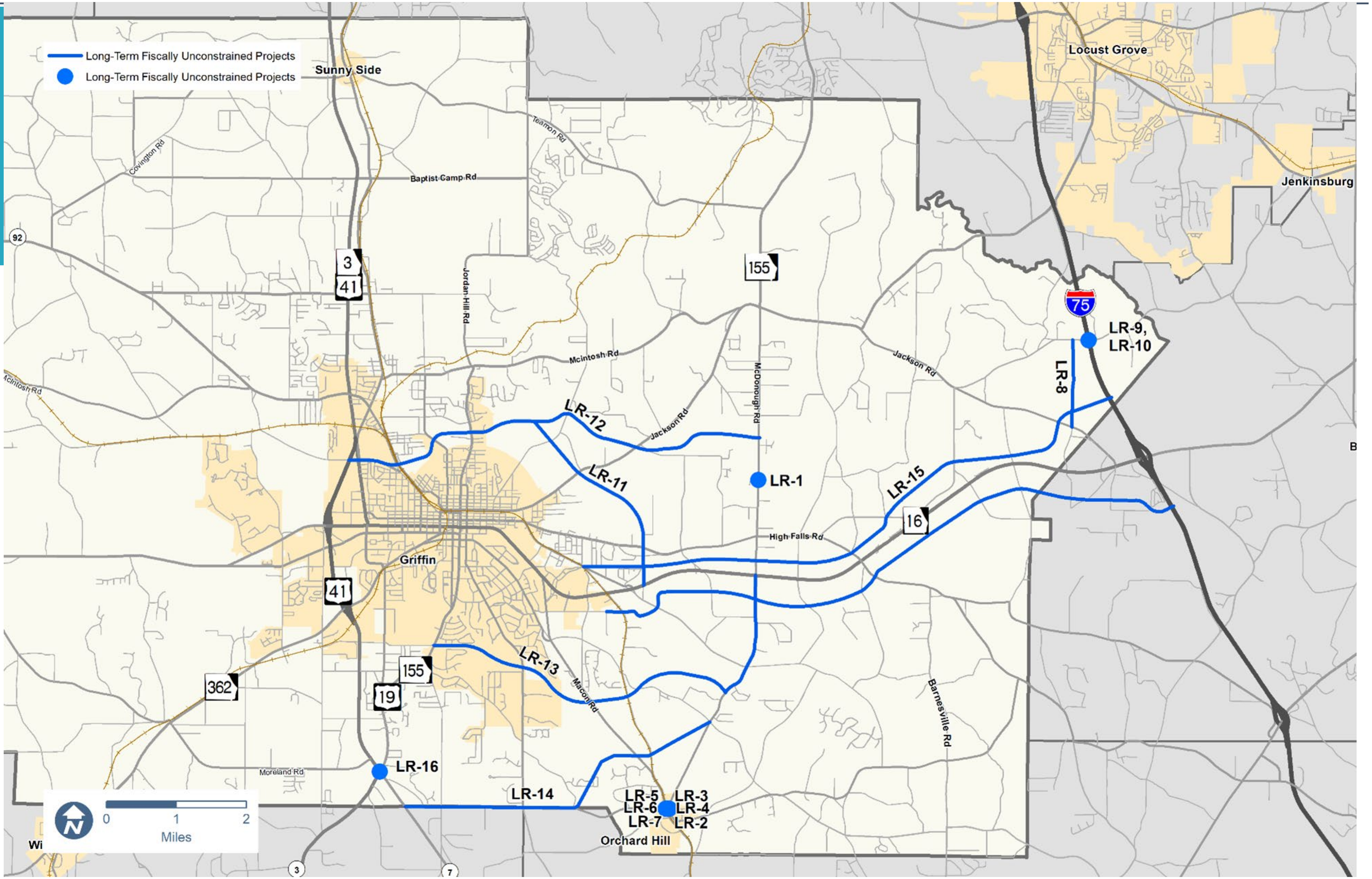
Project ID	Recommendation Type	Project Description	Implementing Agencies
LU-8	Land Use/Development	Minimize residential land use conflicts	Spalding County, City of Griffin
LU-9	Land Use/Development	Affordable housing for workforce	Spalding County, City of Griffin, ARC
LU-10	Land Use/Development	Preparing for electrification of freight fleets and autonomous vehicles.	Spalding County, City of Griffin, ARC, GDOT
LU-11	Land Use/Development	Require green stormwater infrastructure in large industrial sites	Spalding County, City of Griffin
WF-6	Transit/Workforce Access	Establish public transit	Spalding County, City of Griffin, ARC
WF-7	Transit/Workforce Access	Last mile solutions	Spalding County, City of Griffin
E-2	Economic Development	Workforce development and training in times of automation	Spalding County, City of Griffin

Long-Term Vision Roadway Projects

Project ID	Project Name	From	To	Estimated Total Project Cost
LR-1	McDonough Road SR 155 Designation Improvements	Jackson Road	SR 16	TBD
LR-2	Johnston Road at S. McDonough Road Intersection Roundabout	N/A	N/A	$4,000,000
LR-3	Johnston Road at Macon Road Roundabout	N/A	N/A	$4,000,000
LR-4	Green Valley Road Realignment	N/A	N/A	$2,300,000
LR-5	Johnston Road at Macon Road Reconstruction and Improvement	N/A	N/A	$70,000
LR-6	Johnston Road at Green Valley Road Improvements and Repave	N/A	N/A	$10,000
LR-7	Johnston Road at S. McDonough Road Intersection Improvements and Repave	N/A	N/A	$10,000
LR-8	Wallace Road Upgrades	South of SR 16	Indian Creek Road	$40,000
LR-9	Jenkinsburg Road Interchange Federally Required Studies	N/A	N/A	$450,000
LR-10	Jenkinsburg Road Interchange	N/A	N/A	$40,000,000
LR-11	Northern Bypass Alternative 2 (Airport Dr to US 41)	Airport Drive	US 41	$102,000,000
LR-12	Northern Bypass Alternative 1 (McDonough to US 41)	McDonough Road	US 41	$113,000,000
LR-13	Southern Bypass Alternative 2 (McDonough to Airport Rd)	McDonough Road	Airport Drive	$93,000,000
LR-14	Southern Truck Bypass Alternative 1 (US 41 to McDonough Rd to SR 16)	US 41	SR 16	$77,000,000
LR-15	SR 16 Backage Roads	Green Valley Road	I-75	$95,000,000
LR-16	Martin Luther King, Jr. Parkway (US 19/41) at Zebulon Road (SR 155) Intersection Improvement (Displaced Left Turn Lanes)	NA	NA	$20,000,000

Long-Term Fiscally Unconstrained Projects

The graphic to the right highlights the potential roadway projects within the long-term recommendations (listed on the previous page). As shown, the primary objectives are 1) constructing a truck bypass around Griffin, 2) preserving SR 16 for freight mobility ,and 3) enhancing the I-75 corridor for future industrial development.



Spalding County Freight Cluster Plan

Best Practices Review Technical Memorandum

Prepared by

metro analytics

For

Spalding County

In cooperation with

ATLANTA REGIONAL COMMISSION

Griffin Growing TOGETHER

October 2019

Table of Contents

1. Overview and Purpose of Report

The purpose of this document is to present a snapshot of freight research, techniques and best practices that have been implemented recently throughout the U.S. that represent the state of the practice in their respective areas. The ideas and initiatives expanded on in this narrative are not all-inclusive, but have been chosen for their particular applicability to Spalding County and to understand the opportunity to leverage these best practices for potential implementation to ultimately improve logistics and freight transport efficiency, safety, optimization, and access throughout the study area. The following sections evaluate freight technology trends, freight-oriented land use and development impacts, and other ideas including rightsizing of transportation investments and the benefits of grade separation along heavy rail corridors.

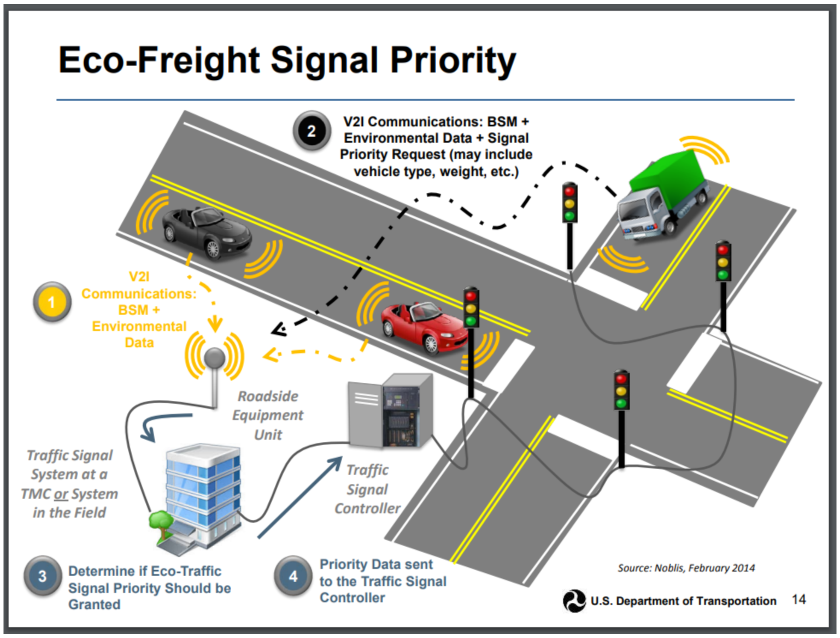
2. Technology Advances and Trends for Goods Movement

While the advances of technology have a wide range of applications, this analysis serves to identify and investigate aspects of goods movement technology most applicable to the policy makers of Spalding County. For example, while many real-time and freight tracking applications such as radio frequency identification (RFID) tags, PrePass weight enforcement, and complex urban delivery models are being advanced in the logistics industry, Spalding County officials and staff will have very little influence on development and implementation; and/or very little access to the proprietary data that it generates. Furthermore, Spalding County is a relatively undeveloped and uncongested freight environment and the region's current issues are related to operational deficiencies at specific locations and/or conflicts with at-grade rail crossings. As such, two of the primary goals of this Plan identified by the Plan's Stakeholder Committee were to develop industrial properties in the County in a planned, organized manner and identify strategies to mitigate potential truck bottlenecks as smart growth occurs. Two areas of technological advances that can advance study goals are:

1) Developments in traffic signalization – I-75 is a major freight corridor, but the most influential freight travel in Spalding County occurs along three primary state roadways - SR 16, US 19/41, and SR 155 or rail lines adjacent to those roadways. A key to maintaining freight mobility in the County is ensuring efficient first and last mile connections to and from the region's freight generating facilities.
2) Truck parking technologies – As the Spalding County industrial base continues to develop, the opportunities to provide truck parking can be a useful tool to assist in business recruitment and retention. Understanding the overall influences on truck parking presented by related technologies helps Spalding County and ARC better identify truck parking strategies for the future.

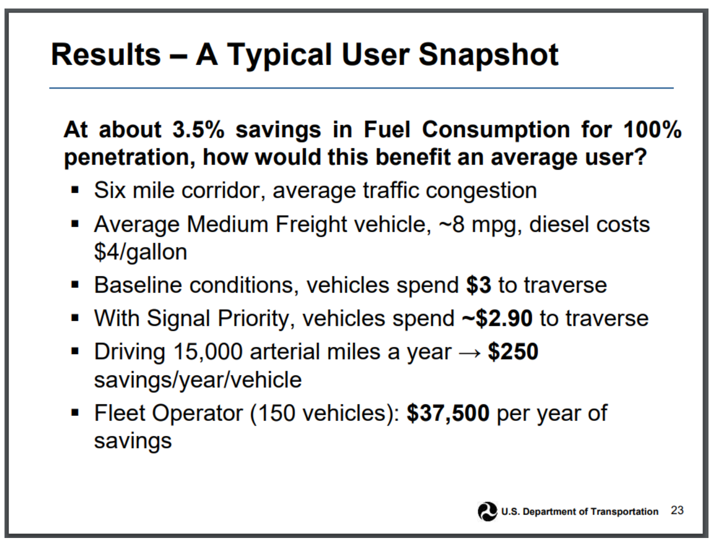
2.1. Freight Signal Priority

Freight Signal Priority provides precedence to freight and commercial vehicles traveling in a signalized network along a defined corridor. The goal of freight signal priority is to reduce stops and delays to increase travel time reliability specifically for freight traffic by improving on-time deliveries, enhance intersection safety, and increase overall network efficiency. Freight signal priority could be applied in conjunction with other intelligent transportation systems or integrated corridor management (ICM) strategies in order to maximize operational benefits for trucks, perhaps near the entrance/exit of major freight generators or specialized industrial land use clusters throughout the study area.



As part of the Dynamic Mobility Applications program, the USDOT is exploring the possibilities for smarter traffic signal timing using vehicle-to-infrastructure (V2I) communications. The Multi-Modal Intelligent Traffic Signal Systems (MMITSS) is a bundle of applications that allows traffic signals to be monitored and adjusted in real-time to maximize traffic flows or to accommodate specific user groups, such as freight, transit, emergency vehicles, and pedestrians.[1]

A similar application is being explored under the USDOT ITS Joint Program Office's Applications for the Environment: Real-time Information Synthesis program. The Eco-Freight Signal Priority application gives signal priority to freight vehicles approaching a signalized intersection, taking into consideration the vehicle's location, speed, type, and weight. Signal priority decisions are based on real-time traffic and emissions data to produce the least amount of emissions at signalized intersections. Preliminary modeling results showed that freight signal priority provides up to 4 percent fuel reduction benefits for freight vehicles, which equates to up to $649,000 annual savings for a fleet of 1,000 city delivery vehicles driving 30,000 miles on arterials each year. For a large fleet of 80,000 vehicles, this would result in annual savings of $51 million.[2]



[1] U.S. Department of Transportation. *Dynamic Mobility Applications (DMA) Program – Multimodal Intelligent Traffic Safety System (MMITSS).* Available online at: https://www.its.dot.gov/research_archives/dma/bundle/mmitss_plan.htm

[2] USDOT, Office of the Assistant Secretary for Research and Technology, Combined Modeling of Eco-Signal Operations Applications, Applications for the Environment: Real Time information Synthesis (AERIS) Program

Freight signal priority is an innovative strategy that Spalding County could consider as part of their long-term version for the implementation of corridor management strategies in the region, particularly if the SR 16, US 41, and SR 155 corridors continue to experience growth of heavy freight traffic. Although some technology applications may not be immediately implementable in Spalding County since it will take time for roadside infrastructure and freight vehicles to be equipped with V2I communication technology; the applications may offer an incentive for freight shippers as the technology will improve overall corridor efficiency. With less delay at intersections, drivers would be better equipped to make on-time deliveries, and fuel consumption and emissions due to idling at intersections could be reduced.[3]

2.2. Truck Parking

Truck drivers must follow Federal hours-of-service (HOS) rules that limit them to driving a total of 11 hours during a 14-hour period. However, driving is not permitted if more than 8 hours have passed since the end of the driver's last off-duty or sleeper-berth period of at least 30 minutes. In order to take these mandated breaks, drivers need to be able to find safe and legal parking spaces to rest. Several states have been successful in evaluating truck parking availability and distributing that information to trucking companies and drivers with advance notice to make routing and delivery timing decisions.

Currently, few systems exist for commercial drivers to access truck parking availability information. Although some private parking facilities offer parking availability information through mobile phone applications, these systems rely on cumbersome manual data collection and are not widely deployed. In addition, the National Association of Truck Stop Operators maintains a directory of private truck stop operators. However, these services do not provide real-time information on truck parking availability.

ITS-based truck parking systems are in operation in Minnesota, Florida, Michigan, and California, among others under development. As these systems evolve, they continue to strive to provide operational information directly to the truck driver, whether in response to an incident or congestion ahead on the drivers route; or by allowing the driver to interact with the truck parking application to reserve a parking space in advance of arriving at the parking lot. Directly providing this information to the driver before they need it may reduce instances where the driver violates HOS requirements. It may also contribute to improved efficiency since drivers could travel directly to the parking facility where spaces are available without having to venture off their routes.

2.2.1. Florida Truck Parking Availability System (TPAS)

Florida’s truck stops experience overflow parking at some locations while others remain underutilized; demonstrating a need for stronger parking information management. In a proactive approach to address the issue of truck parking shortage, the Florida Department of Transportation (FDOT) initiated a research project with Florida International University (FIU) to determine the supply and demand characteristics for commercial truck parking in Florida. The research determined that a technology solution could be used to improve parking management. As part of the research, a test project was deployed to review rest area parking data and to test the technology and determine the feasibility of providing real-time parking availability information. The project tested in-pavement wireless detection sensors (WDS) at the I-10 rest area in Leon County, west of Tallahassee, and utilized closed circuit

Summer Webinar Series, 25 June 2015. Available online at: https://www.its.dot.gov/aeris/pdf/Eco-Signal_Operations_Combined_Modeling_webinar_final_062414.pdf

[3] USDOT. *Integrated Corridor Management and Freight Opportunities.* December, 2015.

television (CCTV) cameras for verification of the availability data. A second test project deployment in a rest area in St. Johns County on I-95 south of Jacksonville tested the use of microwave vehicle detection sensors (MVDS) to count the vehicles as they entered and exited the rest area.

An embedded dynamic message sign approximately one mile ahead of the rest area notified commercial vehicle operators of the availability of parking spaces. In 2015, FDOT applied for and received a $1 million Accelerated Innovation Deployment (AID) grant for a demonstration project on a Truck Parking Availability System (TPAS). The AID grant supplemented FDOT funding to deploy the TPAS at seven public parking sites located along I-4 and I-95 in FDOT District 5.

Additionally, as part of the initial AID project, the FDOT undertook project development to deploy TPAS throughout the entire Florida interstate system public parking areas: welcome centers, rest areas and weigh stations. The effort included concept plan development, cost estimates, environmental evaluation, utility coordination and right-of-way requirements. Leveraging the exhaustive efforts and the level of preparedness, an application for the inaugural FASTLANE grant application was submitted. In September 2016, FDOT was awarded an additional $10.7 million in Federal funding for the full deployment of TPAS throughout Florida's interstate system, in supplement of state funding.

2.2.2. Minnesota Truck Parking Information System

The American Transportation Research Institute (ATRI) and the Minnesota Department of Transportation (MnDOT) implemented a truck parking management system in Minnesota. The SmartPark system employs an automated network of cameras that uses software and vision algorithms to identify available parking spaces. Using pixel-level information, the system determines the presence or absence of a vehicle to create a dynamic count of truck parking availability which is then communicated through a series of distribution systems, including roadside variable message signs (VMS), a direct, in-cab data feed and the SmartPark4Trucks website. The SmartPark system was tested at three public rest stops along the I-94 corridor in Minnesota.[4]

The truck parking system in Minnesota is bundled with the USDOT Smart Roadside Initiative (SRI). For the SRI prototype, trucks have an onboard unit equipped with an application that monitors the driver's duty status and records driver HOS. Trucks enter a geo-fenced region that automatically exchanges information with the truck's on-board unit, notifying the driver that the remaining HOS have reached a predefined threshold and that there is available parking at upcoming facilities, designated by exit ramp numbers. At pre-designated distance points, the system automatically and wirelessly queries the truck parking server for local parking availability. When a truck approaches a facility, the system provides a final notification regarding availability so that the driver can avoid entering and searching the facility if all spaces have been filled. When a truck enters a space, the system reduces the available count by one. When a truck exits a space, the system increases the space-available count by one. In each case, the

[4] USDOT. *Integrated Corridor Management and Freight Opportunities.* December, 2015.

central server appropriately modifies the space-available calculation.

Source: Minnesota Department of Transportation

3. Freight-Oriented Land Use and Development

Given the amount of relatively undeveloped land with great potential for industrial development within Spalding County, sound practices for managing land use and development will be critical for creating a successful, sustainable business environment. The creation of clustered freight intensive businesses in the County supported by a coordinated land use and infrastructure development policy will catalyze regional economic development activity, improve the efficient distribution of goods, create new jobs, and promote efficient development of existing greenfields in the study area.

3.1. Innovative Zoning

The following are examples of innovative zoning practices for consideration by Spalding officials to help develop freight-intensive industrial land throughout the County.

3.1.1. Area Distinction - Rickenbacker District, Columbus, Ohio

Development around Columbus' Rickenbacker District, defined as a corridor along Alum Creek Drive from I-270 to a Norfolk Southern yard, began to occur in the 1970s and 1980s. The decommissioning of the Lockbourne Air Force Base led to its reuse as the freight-only Rickenbacker International Airport. Around the same time, the City of Columbus established the Rickenbacker District as a Community Reinvestment Area and provided tax abatements and utility hookups to help develop it. Logistics and warehousing activity began to shift to the Alum Creek Drive corridor south of I-270 from western Columbus. In 2007 and 2008, the Airport Authority and Duke Realty facilitated the development of Rickenbacker Global Logistics Park around the Airport and NS yard. Located in the southern half of the Rickenbacker District, the Park's four campuses offer over 40 million square feet of logistics space across 40 buildings. The Port boasts several major corporations, including Cardinal Health and the Limited, and 29 third-party logistics providers (3PLs). Logistics and warehousing development in the Rickenbacker area has had a major economic impact in the form of new investment and jobs. According to a study by the Airport Authority, the NS yard and firms in the Logistics Park directly and indirectly support 15,798 jobs, $515.2million in annual payroll, and $1.9 billion in total economic output. Most development has been custom built in large warehouses that reflect their function as distribution centers for a large section of the country.

3.1.2. Legacy Manufacturing Districts - Indianapolis, Indiana

Legacy manufacturing districts in Indianapolis have faced sustained disinvestment and high rates of vacancy and underutilization. In an attempt to revitalize these districts, the city modified its existing zoning policy to allow for easier process for a zoning variance for vacant industrial properties. The revisions focused on incentivizing complementary uses to existing manufacturing firms, such as food production and artisan manufacturing. Advancing industrial redevelopment and retaining industrial uses in the city is a joint effort involving public, private and civic partners. For example, the City of Indianapolis, in partnership with the Indianapolis Chamber of Commerce and the economic development organization Develop Indy, is re-positioning its existing economic development incentive programs to advance equitable economic opportunity. Among the strategies that have emerged from this process are establishing baseline criteria related to worker wages and benefits in order for projects to be eligible for tax abatement and other incentives.

3.1.3. Economic Development Precertification Program – Minnesota DEED

A “certified ready” industrial site program or “precertification program” can help expedite development and raise the profile of the region’s industrial properties. Certified site programs also give local governments a tool to direct development to places where they would like economic growth to occur in order to achieve public goals such as the creation of jobs in low-income neighborhoods, the reduction of truck mileage to achieve environmental objectives, the restoration of brownfields into productive land, or the realization of local land use plans. Certification or pre-certification programs help mitigate the flaws that many sites currently have, especially in older industrial districts, which make it difficult for private firms to redevelop them. Many of these sites, with proactive action, could return to the market as strong candidates. These include properties without clear ownership title, properties that are suspected of having or actually contain environment contamination, or properties fragmented into numerous small parcels. By establishing an inventory of certified ready sites, economic development officers can respond immediately to many corporate searches and other industrial attraction opportunities as they arise. Certification programs are becoming more popular as a tool for public agencies to cultivate and direct economic development. Minnesota’s Department of Employment and Economic Development (DEED) has certified over 30 sites statewide since 2009 through a program that includes planning, zoning, surveys, title work, environmental studies, soils analysis and public infrastructure engineering. Indiana and North Carolina, as well as other states also offer certified site programs. Class I railroads, including BNSF, have existing site certification programs; however, the focus of these programs is more narrowly defined for rail-served uses.

3.1.4. Public Private Partnerships - Will County, Illinois

Will County has experienced unprecedented growth in the freight industry. The County is now the largest inland port in North America, connecting west coast ports by rail to the Midwest, and serves a key role in the Chicago regional freight economy. While this has resulted in more jobs and a stronger economy, it has strained local infrastructure and resources. To ensure that future improvements reduce conflicts and support safe, livable communities, Will County and the Will County Center for Economic Development (CED) formed an innovative public-private partnership to develop a Community Friendly Freight Mobility Plan (Freight Plan). This Freight Plan identifies and provides guidance for local freight policies, programs, and investments, while also creating a mechanism for evaluating and prioritizing freight-related projects, recognizing six key areas: safety, mobility, preservation enhancement, workforce, economic competitiveness, and community livability. With support from state, county, and local organizations and input from the public and other stakeholders, this comprehensive Freight Plan provides recommendations to:

- Improve freight mobility and access
- Embrace new trends, such as e-commerce
- Grow the local economy and skilled workforce
- Enhance the quality of life for Will County residents Comply with federal rules to ensure funding eligibility

3.2. Identifying Potential Market Sectors for Development

The Albuquerque metro area, served by the Mid-Region Council of Governments (MRCOG) has access to regional, national, and international production and consumption markets through its connections via the junction of I-40 and I-25, access to the BNSF Railway Trans-continental line, and cargo and passenger service offered by the Albuquerque International Sunport. While the region does face challenges, such as an overall industrial base smaller than the national average, the region's research and technology sector- centered on multiple national laboratories and the University of New Mexico - is robust. To capitalize on these strengths, MRCOG commissioned this Transportation and Logistics Hub Study to more precisely assess the region's competitiveness and ability to attract freight-related industries and identify policies, projects, and strategies to improve the region's overall economic competitiveness and position it as an international transportation and logistics hub. This study included industry-specific assessments illustrating how corporate decisionmakers in four sectors: distribution, food manufacturing, aerospace and photonics might weigh locating in the MRCOG region versus competitor regions. The report identified near and long-term strategies to build on the area's competitive strengths, particularly the reliability of the transportation network, total land costs, shovel-ready land assets and robust labor force.

3.3. Industrial Development Practices

For many cities like Griffin that are located on the urban fringe, adopting smart-growth sprawl-containing strategies is associated with the conversion of relatively inexpensive industrial-zoned land to land zoned for mixed-use commercial and residential redevelopment. This can weaken the urban economic base, reduce the supply of good-job producing land, and contribute to industrial-sector suburban sprawl. Spalding County should consider local industrial policies, in coordination with local economic development and other agencies, to protect appropriate industrial growth while promoting smart growth solutions.

3.3.1. Northern Stacks Industrial Park - Fridley, Minnesota

Beginning in 1940, the Naval Industrial Reserve Ordnance Plant (NIROP) and FMC Corp. (Fridley Plant) Superfund sites in Fridley, Minnesota, designed and manufactured advanced naval weapons. The two sites played an important role during World War II by supplying the U.S. Navy with weapons and equipment. Site activities contaminated site groundwater, surface waters and soils. Collaboration between the EPA, local government, and private industry resulted in the redevelopment of this facility into the Northern Stacks Industrial Park, which occupies the two sites plus additional land in between the two. The industrial park supports a variety of commercial and industrial businesses and includes LEED certified infrastructure to reduce utility costs for tenants.

3.3.2. Murphy Warehouses - Minneapolis, Minnesota

Murphy Warehouses 12 warehouse sites in the Twin Cities area mix different approaches to sustainability, ranging from native gardens to solar panels to LED lighting to white roofs that reflect the sun. The company — which operates 2.7 million square feet and manages 120,000 trucks annually — incorporates sustainability into many facets of its business. These efforts have resulted in significant cost savings as well as reducing the environmental impact of the facilities. For example, by replacing the company's lawns with native prairie at one facility the company saved total of $947,000 on fertilizer, watering, and maintenance. Retention ponds at the company's Minneapolis headquarters eliminated a $68,000 city stormwater fee. The return on investment was seven years, after accounting for federal tax credits. Another facility utilizes LED lights and a 40-kilowatt solar array, partially supported by a low interest Small Business Administration loan.

4. Other Relevant Best Practices

4.1. Engaging Private Sector Stakeholders in Freight Planning

The importance of engaging the private sector in freight planning is significant in order to understand the issues and context of the study area. The private sector can lend local knowledge of the systems and market in receiving inputs and distributing goods to serve local and regional markets. Early in the planning process the team with the lead public agencies should identify the representatives and existing partnerships to engage for the project and potentially an extended duration through implementation. This section describes those key perspectives to seek out when designing an outreach strategy and methods of engaging the private sector with examples of successful techniques.

4.1.1. Who are Freight Stakeholders?

The stakeholders to consider are broad and comprehensive for a freight planning process. Government partners from local, regional, state and possibly federal scopes should be considered. Private sector stakeholders are much more extensive than the most obvious of participants. The National Academies Press[5], the recommended parties to consider are:

- Private Freight Stakeholders:
  - Beneficial Cargo Owners
  - Logisticians
  - Motor Carriers
  - Railroads
  - Industrial Real Estate Developers
  - Chamber of Commerce and other business associations
- Additional Freight Stakeholders:
  - Economic Development Agencies
  - Ports and Airports
  - Local Governments
  - Transportation Agencies
  - Other Stakeholders – Environmental and community groups, general public

After researching successful examples and other recommendations, an additional important perspective to engage are the organized membership associations, such as the:

- American Trucking Association
- National Minority Trucking Association
- American Transportation Research Institute
- Council of Supply Chain Management Professionals
- National Association of Industrial Office Parks
- Georgia Motor Trucking Association

[5] National Academies Press, *Integrating Freight Considerations into the Highway Capacity Planning Process: Practitioner's Guide (2013)*; Chapter 4: "Engaging Freight Stakeholders"

These organizations can assist in identifying active voices from the private sector and help to communicate the plan activities. The organization may also be able to provide guidance on high-level issues and concerns that the private sector has already identified for the region or state. As stated by the American Transportation Research Institute (ATRI): [6]

"Each state will have differing and scaled definitions of who makes up the "freight community" within any given region. For those states interested in producing an exemplary freight plan, it is not only a system's physical infrastructure that must be inventoried, but also the state-specific people, companies, and organizations whose knowledge, work, and input are vital to the feedback necessary for a successful planning process."

4.1.2. Methods Used to Engage the Private Sector

Several engagement methods have been used successfully to bring the public and private sectors together to discuss freight. The most common are advisory committees, one-on-one interviews, focus groups, forums and surveys. The important factor to increase efficacy of any private freight stakeholder outreach is to begin early in the planning process and develop a custom outreach approach for the study area. The freight stakeholders can identify and prioritize needs to inform transportation improvements and economic development initiatives. The examples below outline which outreach techniques were used to engage the private sector.

- **Triangle Region Freight Plan** (2016-2018) was a collaboration of Durham-Chapel-Hill-Carrboro Metropolitan Planning Organization (MPO), Capital Area MPO and North Carolina Department of Transportation (NCDOT). The stakeholder outreach strategically utilized existing partners and relationship, as well as leveraging events organized by other parties external to the planning process. Outreach consisted of a Regional Freight Stakeholder Advisory Council, a Public Sector/Economic Development Officials Workshop, an Online Survey for Shipper/Receivers, Stakeholder Interviews, site visits to freight-intensive facilities and Strategic Freight Corridors Prioritization Workshops. The Council of Supply Chain Management Professionals (CSCMP) hosted a Raleigh Roundtable at their conference in 2016. Tompkins International organized and hosted a Supply Chain Consortium and in 2017 conducted a Business Outlook Survey that informed the study.
- **Florida DOT Freight Mobility and Trade Plan** (2013) sponsored by the Florida Department of Transportation (FDOT). The stakeholder outreach had an extensive industry-led approach statewide to include six Regional Listening Forums, the first Florida Freight Leadership Program and three Business Forums focused on scenario planning, plan development and plan review. The outreach objective was to be more proactive, responsive and streamline freight investments. The planning process and outreach took a few years to complete but engaged over 750 members of Florida's private businesses and agency partners. Numerous industries, shippers, carriers, associations, and other private sector groups represented every geographical location in the state.
- **Iowa DOT Freight Advisory Council** (2012-2019) The Iowa Department of Transportation (DOT) created a Freight Advisory Council in 2012 consisting of private sector members with

[6] American Transportation Research Institute (ATRI) for Identifying State Freight Plan Best Practices (February 2018)

government representatives as Ex-Officio members. The FAC has met consistently three to four times a year since its inception to present day. Its mission statement is "Through education, discussion and review, the Freight Advisory Council will assist and advise the Iowa DOT on freight mobility policies, programs, and investments."

These are a few examples of freight supportive private sector engagement methods. The strategy should be designed to fit the context of the study area and the types of industry, partnerships and network existing for that community in order to define the "freight community" for a freight planning process.

4.2. Rightsizing of Infrastructure Investments

In 2019, the National Cooperative Highway Research Program (NCHRP) published it's NCHRP 19-14 Guidebook: *Right-Sizing Transportation Investments: A Guidebook for Planning and Programming*. "Rightsizing" transportation infrastructure is repurposing, re-using or fundamentally re-sizing (either larger or smaller) an existing asset (or in some cases, plans for a future asset) for a newly understood economic function or purpose. As transportation and land markets have shifted over the decades, transportation infrastructure has often remained rigid — standing as long as a century or more but no longer generating the economic benefits which justified its construction. While transportation agencies have consistent investment cycles and processes for preserving existing assets, and for identifying and treating deficiencies through modernization and expansion, there are not processes in place to detect and evaluate opportunities to right-size assets that are no longer in alignment with changing needs over time.

The benefits of implementing rightsizing can include millions of dollars in life-cycle cost savings, enhanced land value and economic development from re-used land or assets, and delivery of more efficient overall system performance. Methods to identify and evaluate right-sizing opportunities can be applied within cyclical transportation agency processes such as asset management, programming, and long-range planning. Rightsizing methods can also be applied in project development when considering the purpose and need of projects or later when considering performance based practical design options. The rightsizing guidebook offers practical elements for an agency to include in a right-sizing policy as well as technical methods for identifying, evaluating and implementing right-sizing solutions.

Beginning in 2019, GDOT, ARC, and the Atlanta Beltline Inc. (ABI) will begin a joint effort over the next year to identify the most appropriate applications of rightsizing throughout the state and Atlanta region. In the interim, the Spalding County Freight Cluster Plan will look to serve the principles of rightsizing by:

- Developing a work program focused on minimizing the creation of new infrastructure (and, thus, minimize future life-cycle costs) during the development of the work program.
- Identify roadways and infrastructure that may need to be repurposed due to changing economics and travel demand
- Assess the overall benefits to the economy by the proposed work program and related strategies

5. Major Findings and Implications

Through our research, the project team identified a strong correlation from several freight planning practices and their application to Spalding County. The team was able to identify several common themes and identify key overarching findings summarized below.

A coordinated corridor management approach along with a smart-growth focused infrastructure and land use development plan will lead to improved freight transportation operations in Spalding County. As congestion continues to grow and regional industrial development pressures intensify, local agency capability to expand the roadway network will be increasingly limited by both resources and right-of-way. Thankfully, freight technology and land use planning policies and tools can be utilized to maximize the capacity of existing roadway infrastructure through multi-modal, active asset-based management.

Private sector stakeholders can be reluctant to engage in public sector initiatives. It can be difficult to convince the private sector of their role in a public sector project or how they are benefited. Quantifying the benefits of participation can be difficult due to the varying time horizons under which public and private sector entities operate. Public sector agencies often evaluate projects on a continuum spanning 5-10 years, while a long-term outlook for private sector freight businesses may be 6-18 months. Perseverance, trust, and continuous relationship building are the key components to a successful private sector outreach program.

Freight technology applications are not currently widespread and projects that require accessing data from multiple private trucking companies can be difficult to implement. However, the cost for this data could potentially be split between public agencies and private sector businesses; and big data is driving private sector firms such as TomTom, HERE, INRIX, and others to evaluate opportunities to apply data to real-time navigation and dynamic routing software that could have significant impacts on incident avoidance, congestion mitigation, and emissions reduction in Spalding County in the future.

Technical Memorandum

To: William Wilson, County Manager
Brian Upson, Paragon Consulting

From: Metro Analytics

Date: June 2, 2020

Re: Spalding County Freight Cluster Plan -Truck Origin and Destination Analysis

Introduction

The purpose of this technical memorandum is to document the origins and destinations of truck trips to and from the eastern portion of Spalding County as part of the Spalding County Freight Cluster Plan. The purpose of the Plan is to provide detailed insight into the county's current and future freight activity in order to address transportation planning, traffic operations, and related planning. This analysis is associated with the Inventory and Assessment task of the Plan Scope of Services.

Methodology for Origin-Destination Analysis

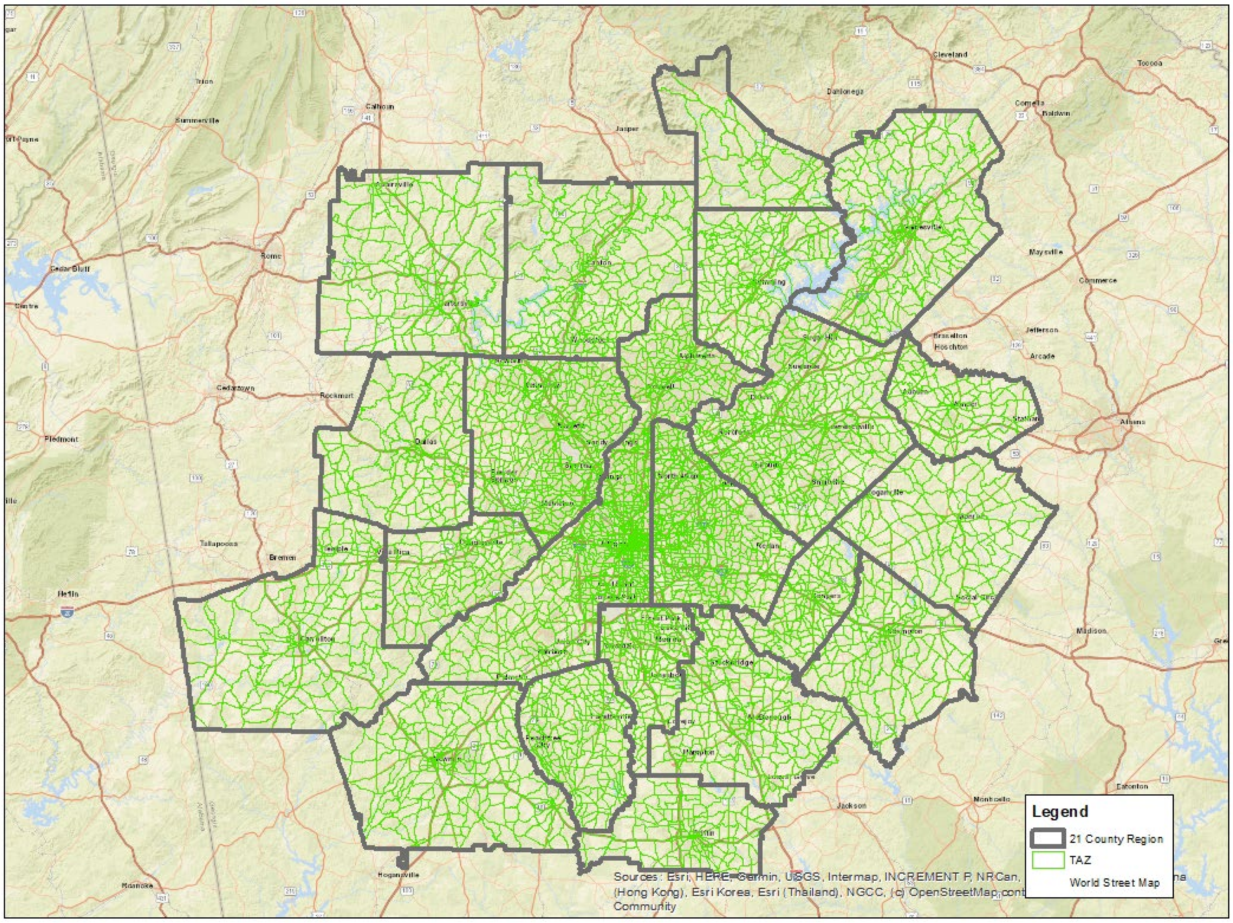
Data Source

To estimate the truck trips, the Atlanta Regional Commission's (ARC) Activity Based Model (ABM) was utilized. ABM is ARC's Regional Travel Demand Model associated with the current Regional Transportation Plan (RTP) and has been developed to forecast travel under new socioeconomic environments and for meeting emerging planning challenges. It forecasts typical weekday travel undertaken by residents of the ARC region. The ABM modeling boundary consists of 21-county region and consists of 6,031 Traffic Analysis Zones (TAZ), including 5,922 internal zones and 109 external zones. The modeling boundary is shown in **Figure 1**.

The ABM has a Regional Plan Forecast available for the year 2020 which was appropriate for the current analysis. It includes the truck trips developed as a part of trip generation and distribution process of the model. The truck trips include commercial, medium, and heavy trucks by following five time periods used in the ABM.

- Early A.M. (3:00 AM to 5:59 AM)
- A.M. peak (6:00 AM to 9:59 AM)
- Midday (10:00 AM to 2:59 PM)
- P.M. peak (3:00 PM to 6:59 PM)
- Evening (7:00 PM to 2:59 AM)

Figure 1: ARC's ABM Modeling Boundary and TAZ



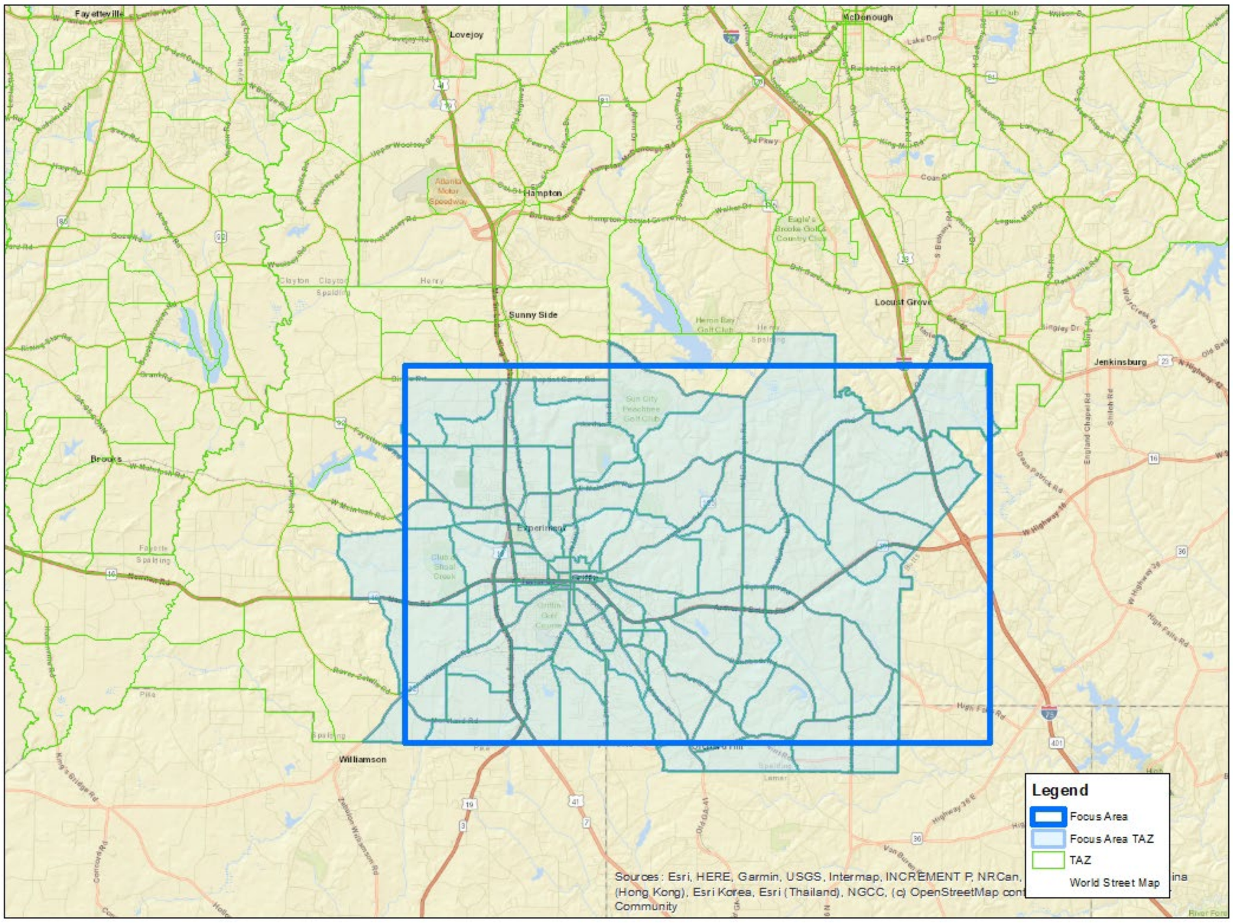
Study Area

The study area was defined by the focus area as shown in **Figure 2**. The ABM TAZs that could most closely represent the focus area, were selected and shown in the **Figure 2**. The total number of TAZs selected were 116.

Development of Origin-Destination Trips

For the current analysis, only medium and heavy trucks are considered. Additionally, daily trip tables were calculated and analyzed instead of trips by period. One of the reasons is that the trip tables by period were developed by first developing the daily truck trip tables and then applying suitable factors to develop the trip tables by period. Therefore, validation for trips by period was not performed to a high level of accuracy.

Figure 2: Study Area TAZ



The ABM combines the internal-internal (II), internal-external (IE), external- internal (EI) and external-external (EE) trips and then develops the TAZ to TAZ trip tables by period for each truck type, medium and heavy. The daily trips were calculated by summing up the trips for the five time periods. As mentioned earlier, there are 6,103 total TAZs including external TAZs in the trip tables. The trip tables were processed and trips by following two types were estimated:

- ***Trips by Origin*** – These are heavy and medium truck trips that start at any of the zones within the 21-county region and the externals, but end at TAZs in Spalding focus area. The total trips by each origin zone are combined and maps were developed and presented in the next section.
- ***Trips by Destination*** – These are heavy and medium truck that start at TAZs in Spalding focus area, and end at any of the zones within the 21-county region and the externals. The total trips by each destination zone are combined and maps were developed and presented in the next section.

Summary of total trips by origin and tot total trips by destination, are shown in Table 1 and Table 2, respectively. As can be seen from the two tables, the origin/destination trips are well-balanced at the daily level.

Table 1: Total Daily Truck Trips to Spalding by Origin

Region	Heavy	Medium	Sum
Spalding study area (Internal)	14 (1%)	193 (11%)	207 (8%)
ARC region outside of study area	76 (7%)	429 (25%)	505 (18%)
External to ARC	997 (92%)	1,062 (63%)	2,059 (74%)
Total	**1,086**	**1,684**	**2,771**

Table 2: Total Daily Truck Trips from Spalding by Destination

Region	Heavy	Medium	Sum
Spalding study area	14 (1%)	193 (12%)	207 (8%)
ARC region outside of study area	76 (8%)	429 (26%)	504 (19%)
External to ARC	874 (91%)	1,011 (62%)	1,885 (73%)
Total	**963**	**1,633**	**2,596**

In addition to the tables above, the total trips to and from the Spalding County Focus Area were illustrated in the figures below. **Figure 3** shows the total daily truck trips originating from the study area, while **Figure 4** shows the daily trucks trips destined for the study area by each TAZ. **Figure 3** also identifies the daily truck trips originating from the study area and leaving the ARC's ABM Modeling Boundary for external destinations. Conversely **Figure 4** also identifies daily truck trips destined for the study area from outside the ARC's ABM Modeling Boundary from external origins.

Figure 3: Total Daily Trips Originating from Spalding County

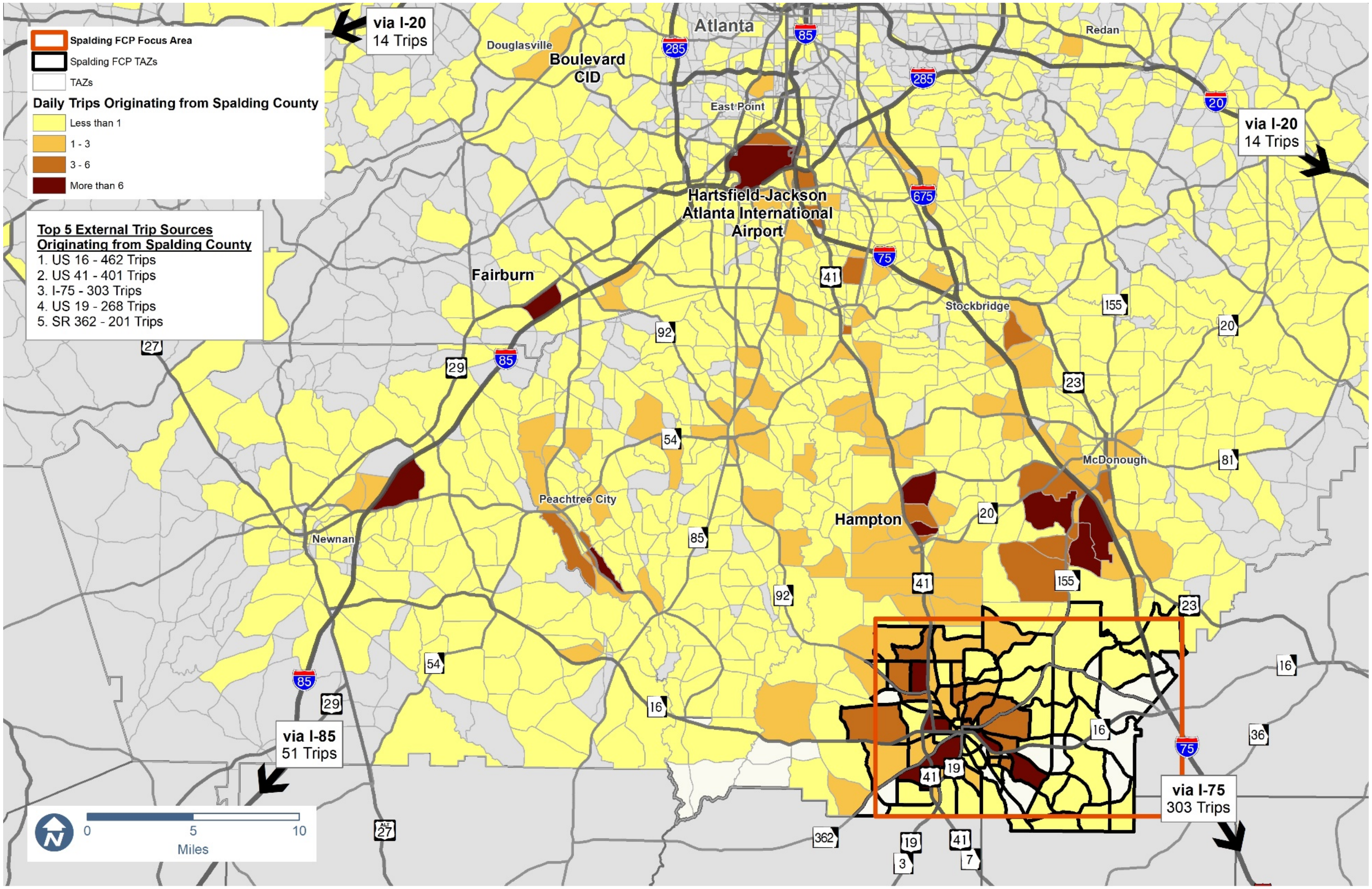
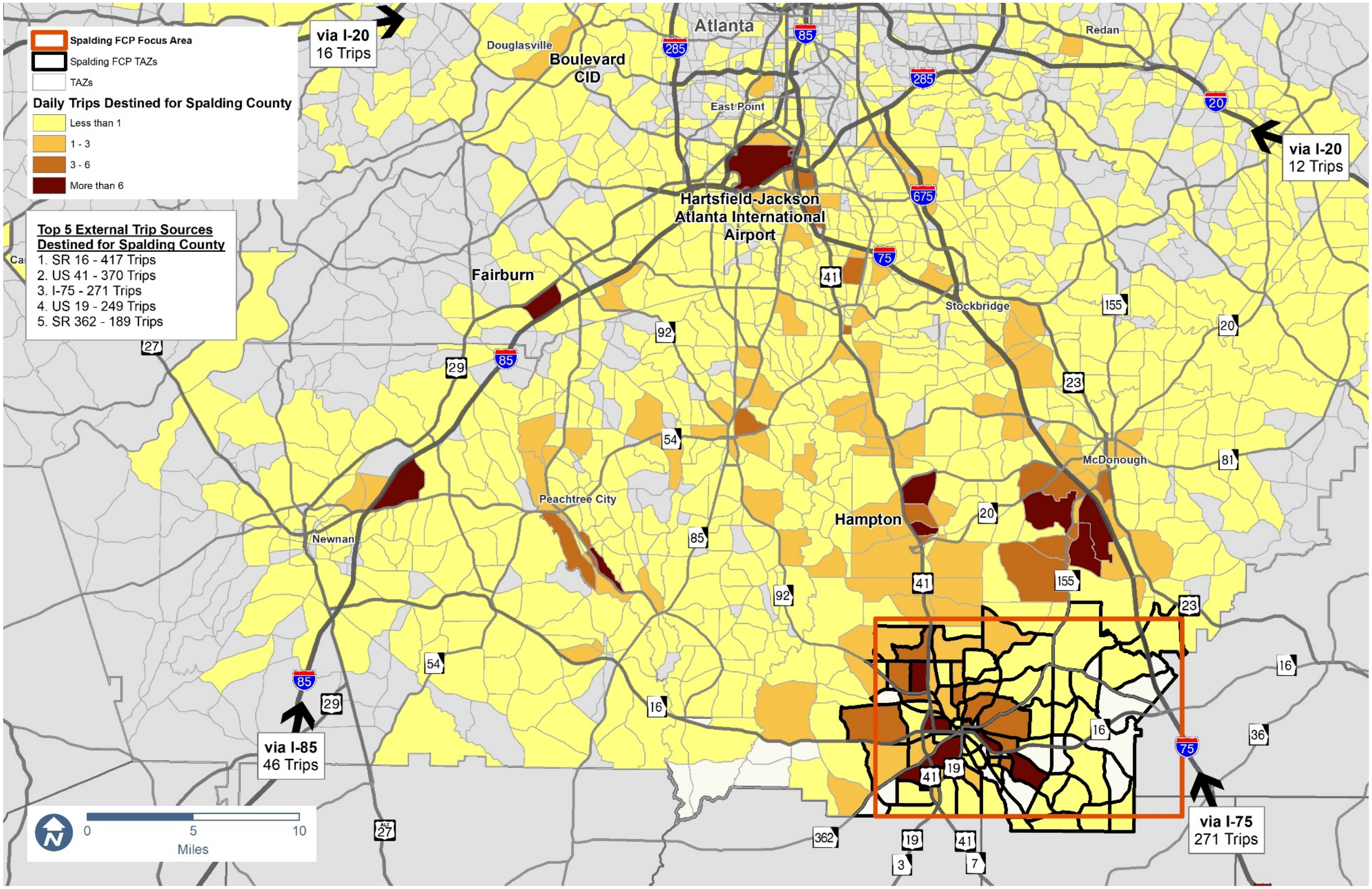


Figure 4: Total Daily Trips Destined for Spalding County



Public Outreach Efforts

In addition to the data collection and analysis completed for this technical memo, a public outreach effort to connect with truck drivers, business owners and operators in Spalding County was conducted. A group of calls were made, and emails sent out to 27 industrial companies within Spalding County between the dates of April 27, 2020 and May 11, 2020. Two initial survey questions were asked of those who were contacted.

- Where do your incoming trucks typically come from? Which major roadways do they typically use (SR 16, SR 155, etc.) to access your business?
- What are the destinations for the trucks that leave your facility? Which roadways would they typically access to reach their destinations?

One follow-up question was received from the surveyed businesses:

- ***Question:*** What is the purpose of the information and how will it be used?
- ***Spalding FCP Team Response:*** The truck origin/destination information is intended to help the team understand the overall freight flows to and from Spalding from a macro level perspective. As part of the Plan, the collected responses will help prioritize needed improvements related to freight. No detailed information regarding responses from individual companies will be made public.

Of those 27 companies that were surveyed during that period, seven responses were received. Survey Responses were received from the following:

- Bridgestone Americas Manufacturing Group
- MarinoWare Industries
- Norwesco
- Norcom, Inc.
- Rinnai
- Newton Crouch
- Coveris

Summary of responses:

<u>Origins of materials to access Spalding County locations</u>:

- International from port in Savanna
- Origination at Spalding County plant, own truck line
- No real specific
- Metro Atlanta, empty containers return back to plant in Spalding
- Multi-modal facilities in Atlanta or Macon and truck into Spalding if no rail spur at site

<u>Destination of products once leaving Spalding County location</u>:

- Sites are central hubs for the Southeast in many cases.
- Southeastern states
- All over US and some International to Canada or South America
- Many locations if load is full than direct to destinations, if load is partial then to south Atlanta (Moreland Ave) or McDonough to a consolidation center then onto to destination

- All shipments are by truck or rail. All rails ship from multi-modal centers in Atlanta if a rail spur not existing on site.

Most used roadways for to access Spalding County sites:
- I-75
- SR 16
- US 19/41/SR 3
- SR 155

Key Findings from the Spalding Origin and Destination Analysis

The origin and destination analysis for the Spalding County Freight Cluster Plan produced the following key findings:

- Daily Truck Trips are fairly balanced between Origins and Destinations. Of the total volume of trips (5,367) originating or destined for Spalding County, originating trips from Spalding account for about 52 percent, while trips destined for Spalding County are about 48 percent.
- The split between medium and heavy truck trips is approximately 61-63 percent medium trucks versus 37-39 percent heavy trucks.
- Daily Truck Trips originating from external areas or destined for external areas outside the ARC region in Spalding County account for 73-74 percent of the total daily truck trips.
- Daily Truck Trips originating and destined for locations within the TSCID accounts for approximately 7-8 percent of traffic.
- Several key geographic areas throughout the Atlanta region contribute to daily truck trips to and from the TSCID. Those geographic locations area as follows:
    - Hartsfield-Jackson Atlanta International Airport
    - SR 155 Corridor in McDonough
    - Peachtree City, GA
    - Newnan, GA
    - Fairburn, GA (Intermodal Yard and I-85 Corridor)

Spalding County Freight Cluster Plan

Inventory and Assessment Report

Prepared by

For

In cooperation with

August 2020

Table of Contents

List of Figures

List of Tables

1. Overview and Purpose of Report

The purpose of the Inventory and Assessment Report is to provide a detailed inventory of existing conditions and an assessment of current and future needs for the study area. The overall intent of the report is to provide the information necessary to begin to develop recommendations for transportation improvements and land use and development policies that will help improve freight mobility and foster an environment for prosperous industrial development. As such, the remainder of this report is organized as follows:

- Chapter 2 – This chapter presents a review of previously completed plans that are relevant to the study area, including those from the Georgia Department of Transportation (GDOT), Atlanta Regional Commission (ARC), Spalding County, and the City of Griffin. A review of these documents provides a policy background from which to conduct the study.
- Chapter 3 – This chapter provides an overview of the existing transportation network, land use and development patterns, and other characteristics that influence freight traffic and economic development. This includes an inventory of existing land uses, workforce characteristics, roadway network, travel characteristics and transit services.
- Chapter 4 – This chapter presents an assessment of future projected conditions based on the ARC's regional travel demand model and the programmed and planned improvements throughout the County that will influence future travel.
- Chapter 5 – This chapter summarizes significant findings from the report that will carry forward into the traffic study and/or the development of preliminary study recommendations.

2. Review of Previous Plans and Studies

During the past 15 years, there have been several plans and studies conducted that influence a wide variety of freight modes and operations in Spalding County and the surrounding region. This section summarizes previous plans and studies and highlights conclusions and findings that will influence the Spalding County Freight Cluster Plan.

2.1. GDOT Statewide Freight and Logistics Plan

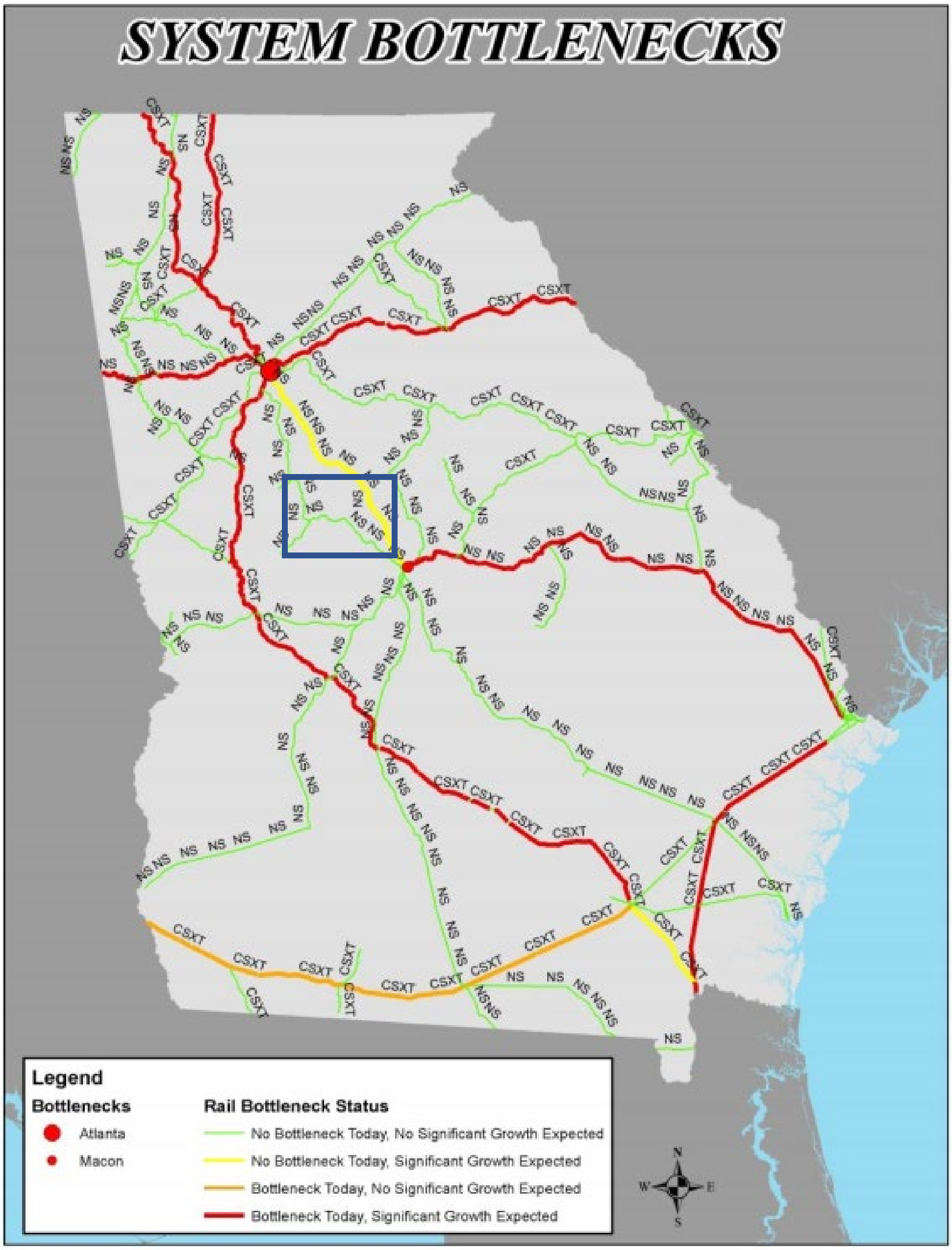
In 2013, GDOT updated the Statewide Freight and Logistics Plan, which evaluates Georgia's multimodal freight needs and provides a strategy for addressing those needs. For each mode, the plan recommends a set of improvements and estimated the economic return on those investments for the state.

The plan identifies I-75, which traverses Spalding County, as a strategic highway corridor along the Atlanta-to-Savannah route. Recommendations highlighted for this corridor primarily consist of adding lanes on long-haul corridors and improving major system-to-system interchanges.

The air cargo strategy in the plan focuses on supporting the expansion and access improvements to air cargo facilities on the south side of Hartsfield-Jackson Atlanta International Airport (H-JAIA). According to H-JAIA's master plan, the expansion of cargo operations will continue as part of a long-term strategy to attract additional air cargo traffic at the airport.

According to the plan, the Norfolk Southern (NS) "S" rail line that crosses through Spalding County does not currently experience any bottlenecks, and no significant rail volume growth is expected. The "S" line is shown in green in **Figure 1.**

Figure 1: Georgia Rail Network Bottlenecks and Forecasted Growth[1]



[1] Georgia Department of Transportation. Georgia Statewide Freight and Logistics Plan, Rail Modal Profile. http://www.dot.ga.gov/InvestSmart/Freight/Documents/Plan/Task%203_Georgia%20Rail%20Freight%20Modal%20Profile.pdf

2.2. ARC Atlanta Strategic Truck Route Master Plan (ASTRoMaP)

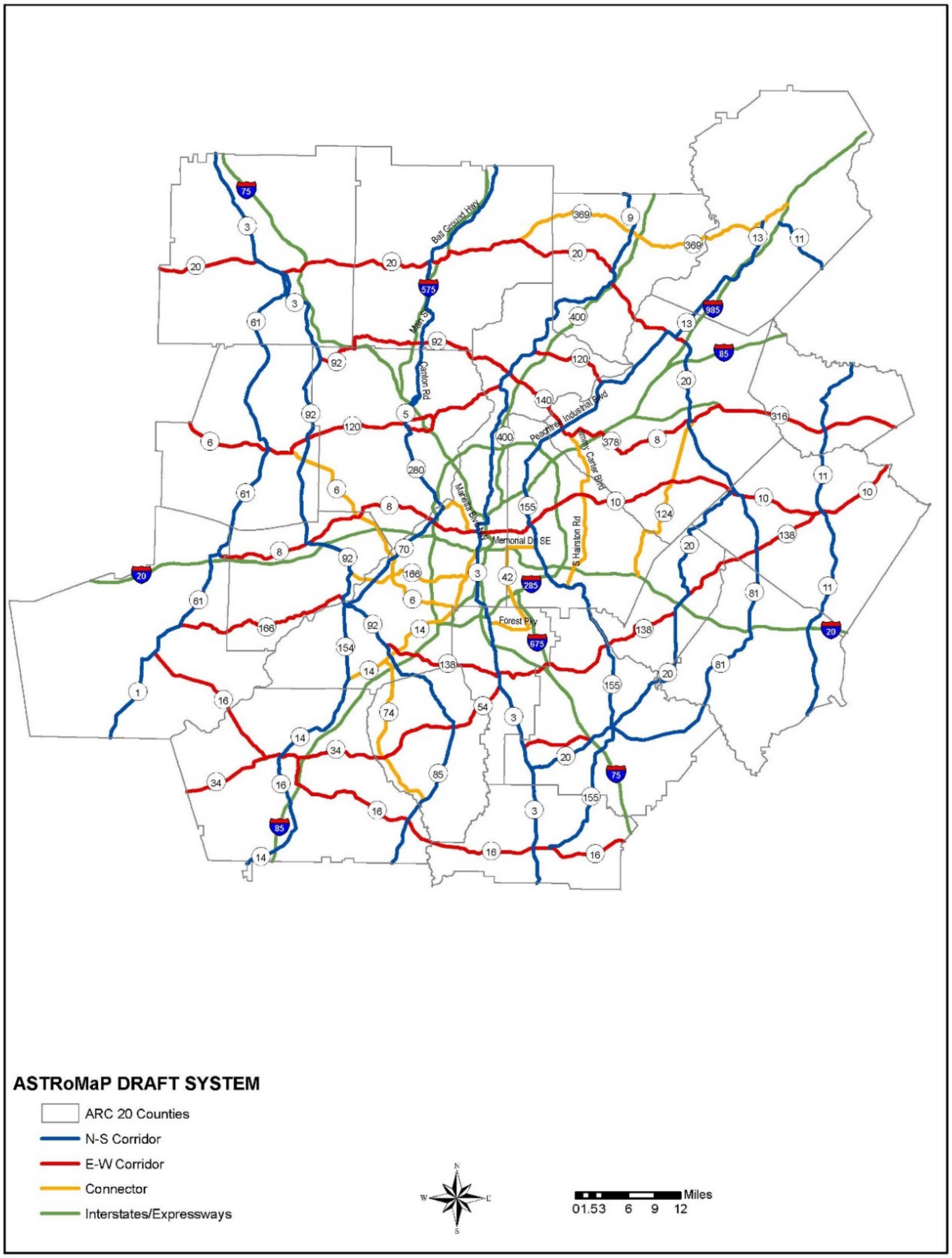
The Atlanta Regional Commission (ARC) completed the Atlanta Strategic Truck Route Master Plan (ASTRoMaP) in 2010. The ASTRoMaP built on the regional freight mobility plan completed in 2008 by identifying a regional truck route network and providing design guidelines for roundabouts, signage guidelines, and recommendations for addressing at-grade crossings.[2]

Potential routes for the network were scored according to a set of quantitative and qualitative attributes including truck volumes, functional classification, lane width, shoulder width, bridge clearances, stakeholder support, land use compatibility, and environmental justice. Within Spalding County, three routes were designated on the regional truck route network: US 19/US 41/SR 3, SR 155, and SR 16.

The plan ultimately recommended a set of projects to address portions of the network that did not meet optimal expectations for attracting or facilitating truck traffic. Within Spalding County, there was one project proposed (NS-E1). To address traffic congestion at the intersection of SR 155 and Jackson Road, the plan proposed that in the short-term, radii should be increased at all four intersection approaches, and in the long-term, that the intersection be converted to a four-way stop with a roundabout. The regional truck route network designated by ASTRoMaP is shown in Error! Reference source not found..

[2] Atlanta Regional Commission. Atlanta Regional Freight Mobility Plan Update. May 2016. https://cdn.atlantaregional.org/wp-content/uploads/2017/02/atlanta-regional-freight-mobility-plan-update-2016.pdf

Figure 2. ARC ASTRoMaP Regional Truck Route Network

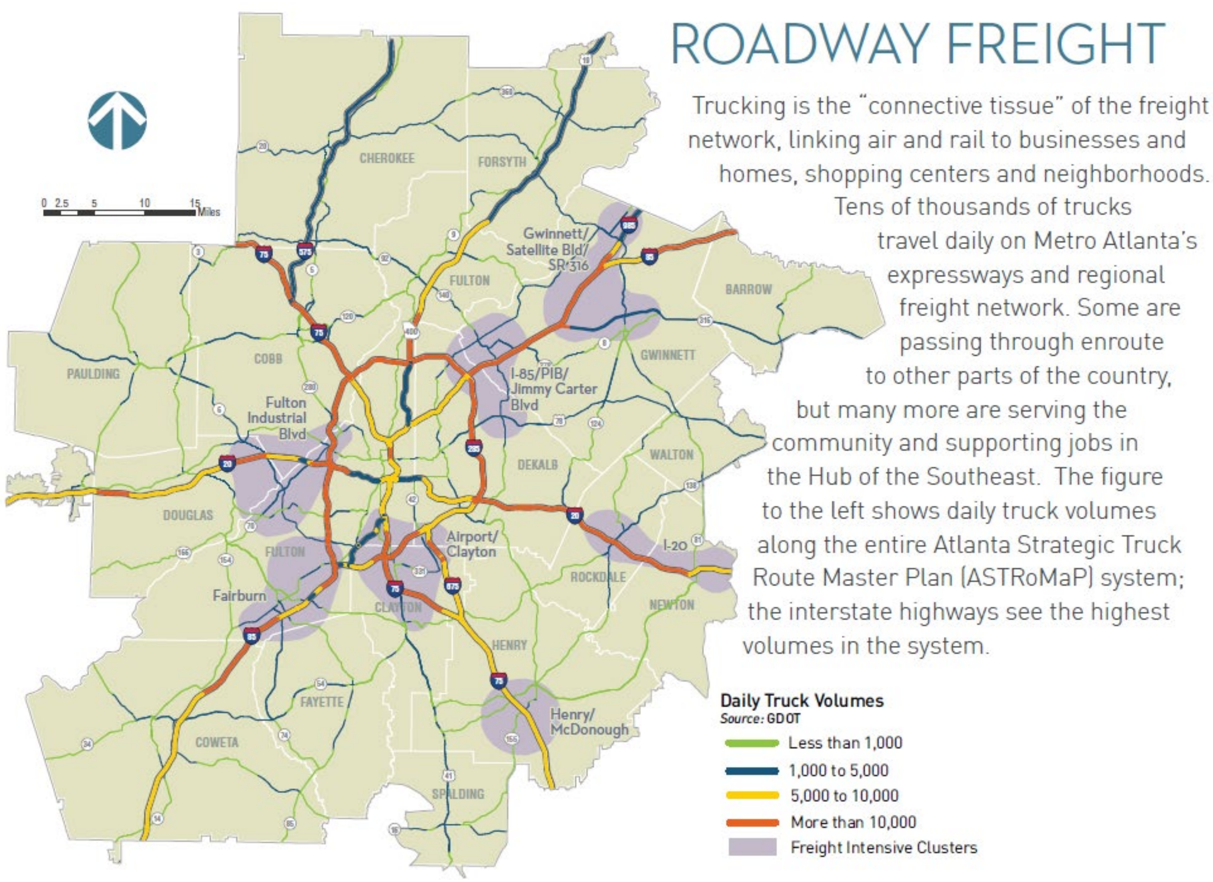


2.3. Atlanta Regional Freight Mobility Plan

The ARC Regional Freight Mobility Plan (2016) builds on the original 2008 study, which included a freight flow analysis and stakeholder outreach to identify several freight bottlenecks in the Atlanta region. The original study culminated with a set of institutional, infrastructure, and operational improvements and strategy recommendations focused on improving speed, reliability, and freight movement in the Atlanta region.

The plan was updated in 2016 to identify 91 projects that were prioritized into two tiers for implementation. The plan recommends further analysis of seven manufacturing and distribution clusters in the Atlanta region. It should be noted that Spalding County was not one of those clusters. As previously noted, Spalding County is undertaking this study to plan for future industrial growth. **Figure 3 s**hows the freight clusters identified based on the concentration of industrial development in these areas.

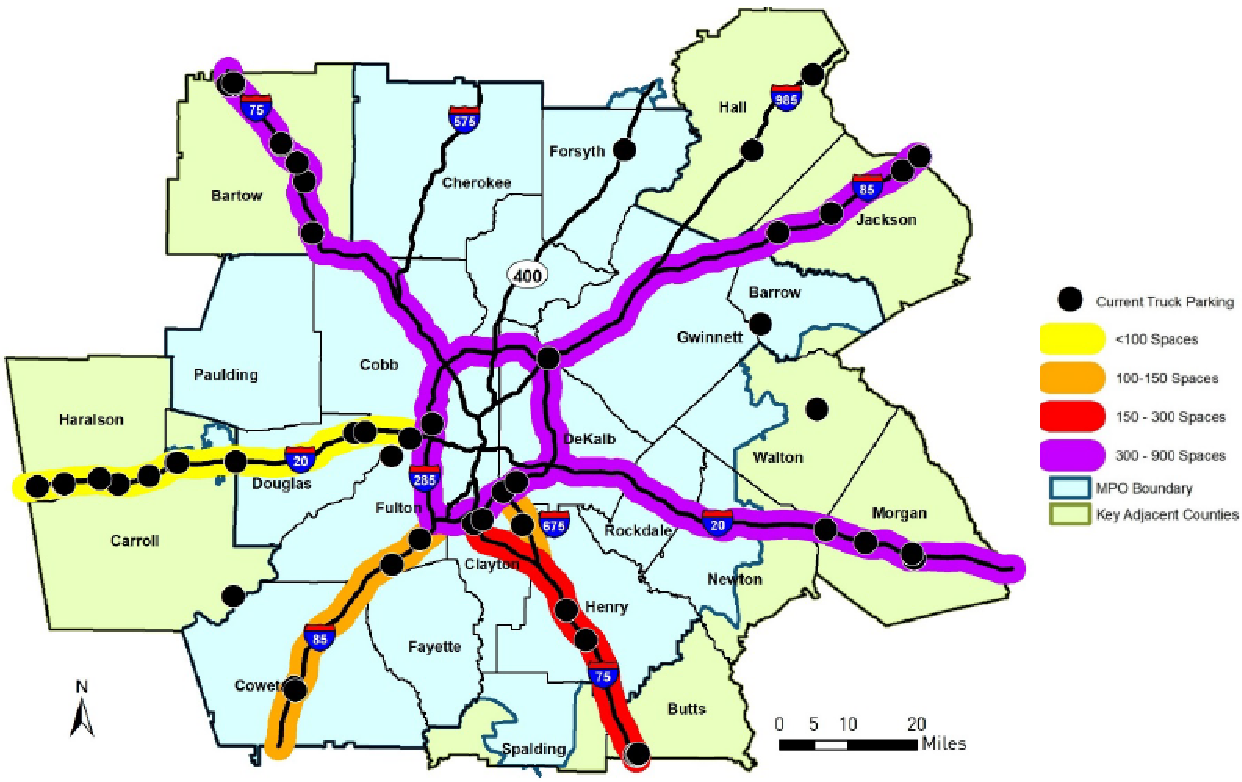
Figure 3. Freight Clusters and Truck Volume on ASTRoMaP Network



2.4. Atlanta Regional Truck Parking Assessment Study

The Atlanta Regional Truck Parking Assessment Study (2018) was developed in response to findings from the 2016 ARC Regional Freight Mobility Plan Update, which cited the lack of available truck parking in many areas within the Atlanta region. Based on a detailed inventory of available truck parking spaces and analysis of existing and future demand, the study concludes that truck parking is most limited in close proximity to Atlanta, and greater inventory is available in exurban communities such as Bartow, Jackson, Morgan, Butts, Haralson, and Carroll Counties. **Figure 4** illustrates the future truck parking deficiencies identified for the region. The I-75 South corridor adjacent to Spalding County shows a 150 to 300-space truck parking deficit. [3] A BP gas station currently under development at I-75 and SR 16 is anticipated to have approximately 200 parking spaces, which will help to address truck parking needs near Spalding County.

Figure 4: Future Projected Truck Parking Deficiencies (2045)



2.5. Southern Regional Accessibility Study

The Three Rivers Regional Commission (TRRC) completed the Southern Regional Accessibility Study in 2007. Many long-range projects were identified in the plan's roadway project recommendations. Within Spalding County, the study proposes a new interchange at Jenkinsburg Road and I-75 along with an improved facility along Jackson Road and McIntosh Road, providing connectivity between I-75 and US

[3] Atlanta Regional Commission. Atlanta Regional Truck Parking Assessment Study. April 2018. https://cdn.atlantaregional.org/wp-content/uploads/executive-summary-atlanta-regional-truck-parking-assessment-study-apr-2018.pdf

19/US 41/SR 3 in Griffin. The study also recommends a new HOV-only interchange at Locust Grove in Henry County. **Figure 5** illustrates the roadway project recommendations from the Southern Regional Accessibility Study.

2.6. Spalding County Transit Development Plan

In 2011, the McIntosh Trail Regional Development Center (MTRDC) completed a Transit Development Plan that evaluated regional public transportation service for the counties of Spalding, Butts, Pike, Lamar, and Upson. The regional public transportation program is administered by the MTRDC on behalf of the member governments and was the first regional rural/suburban public transit service area established within the state.[4] The program utilizes Section 5311 Program funds administered by the Federal Transit Administration (FTA) to provide rural public transportation within the five-county service area and is most heavily used by senior citizens, local workforce, and disabled populations. The Plan resulted in the recommendations to maintain on-demand services throughout the County.

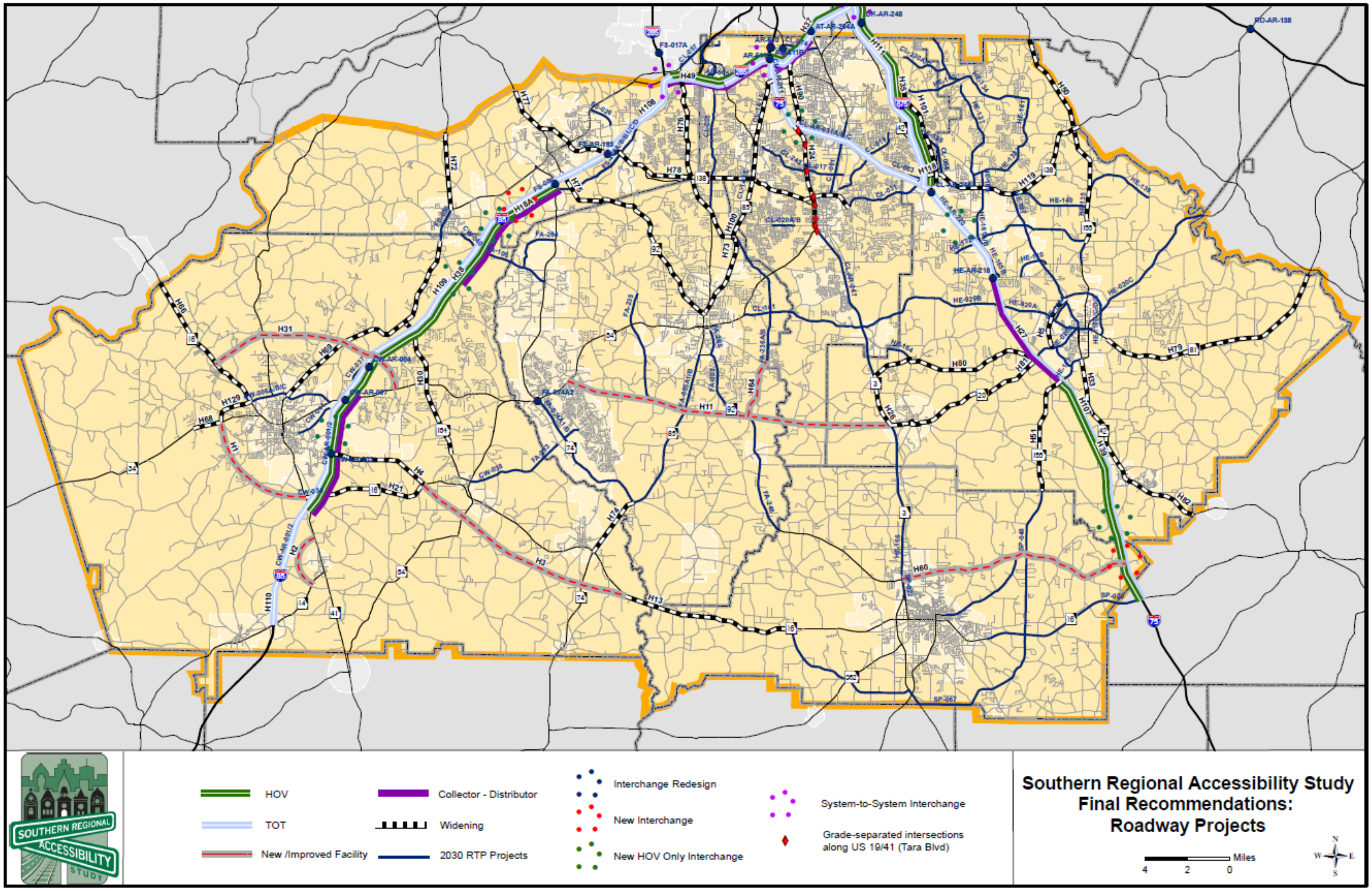
2.7. Spalding County Transit Feasibility Study

The Spalding County Transit Development Plan (2007) set the stage for the Transit Feasibility Study and Implementation Plan completed in October 2014. The study evaluated the potential for new public transportation services in Griffin and Spalding County, beyond the limited, rural demand response transit service that is operated via contract with the Three Rivers Regional Commission (TRRC). The feasibility study mapped the locations in the region with the highest transit propensity by combining demographic variables to evaluate transit service demand and evaluated land use to identify activity centers with the needed residential and employment density to support transit service.

The Transit Development Plan identified the need to provide enhanced transit service for commuter trips for the Griffin-Spalding County area. The assessment concludes that while fixed-route service would be feasible in the area, demand for new transit service is low and that flexible, lower-cost alternatives would be more readily implementable in the short-term. The plan recommends a phased program of recommendations to enhance transit service in the county, including expanded participation in transportation demand management programs, such as Georgia Commute Options; an expansion of the Griffin-Spalding rural transit service to a countywide flexible route system; and a new fixed-route system concentrated in and around Griffin.[5]

[4] McIntosh Trail Regional Development Center. Spalding County Transit Development Plan. 2007.
[5] The City of Griffin and Spalding County, Georgia. Griffin-Spalding Transit Feasibility Study. October 2014.

Figure 5: Roadway Project Recommendations – Southern Regional Accessibility Study[6]



[6] Three Rivers Regional Commission. https://www.threeriversrc.com/download/tp_sras_roadmap_090607.pdf

2.8. Griffin-Spalding Comprehensive Transportation Plan

Spalding County has been investigating alternative roadway alignments and improving connections to more efficiently move people and goods throughout the region for many years. The Griffin-Spalding Comprehensive Transportation Plan (CTP), completed in 2008, represents the county's first effort to deliver a new transportation vision for the future, including improved mobility for freight travel:

> "Growth in truck and auto travel will increase the need for highway preservation and additional capacity. While the Spalding County population has consistently grown, vehicle and truck miles have grown at a faster rate. This trend is expected to continue. The population is projected to increase by 93 percent in the next 25 years, further fueling the growth of vehicle and truck traffic. This growth will significantly impact the needs of Spalding County roadway system."[7]

An update of the CTP was completed in 2016. A key goal stated in the plan is to "ensure the transportation system supports economic development and efficient freight movement."[8] The CTP update evaluated needs at the Griffin Spalding Airport and surrounding business park and included discussion of the proposed new airport. Transportation needs identified for the existing airport site focus mainly on the addition of a second entrance to the west of the existing site. The study also identifies the need for several bridge improvements, roadway realignments and access improvements that would be necessary to support moderate truck traffic accessing the new airport. The CTP also identifies additional intermodal facility needs south of Griffin, based on emerging industrial areas around the Lakes at Green Valley and the existing airport site. All of these, in combination with the overall concern for truck traffic addressed in the previous CTP, demonstrate a need to limit truck traffic in already congested areas and locate intermodal terminals in locations that avoid impacting traffic in already-congested areas.[9]

2.9. Spalding Comprehensive Plan

In 2017, Spalding County conducted an update of its Comprehensive Plan, which presents goals and a long-range vision for growth and development in unincorporated portions of the county as well as Sunny Side and Orchard Hill.

Citing an anticipated increase in truck traffic, the plan identifies a need to separate truck and passenger vehicle traffic to improve mobility and safety in the county. The needs assessment proposes that a new interchange at Jenkinsburg Road and I-75, along with the redesignation of SR 155 to create a truck bypass, would help to address growing freight needs. The plan recommends a feasibility study to examine the need and utility of a truck bypass around Griffin.

The plan designates two-character areas where industrial growth should be targeted within Spalding County. The Activity Center character area, which allows for campus-style light industrial uses, is

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[7] Spalding County Comprehensive Transportation Plan. April 2008. http://www.spaldingcounty.com/docs/public_works/Spalding_County_CTP_Final_Report_Final.pdf

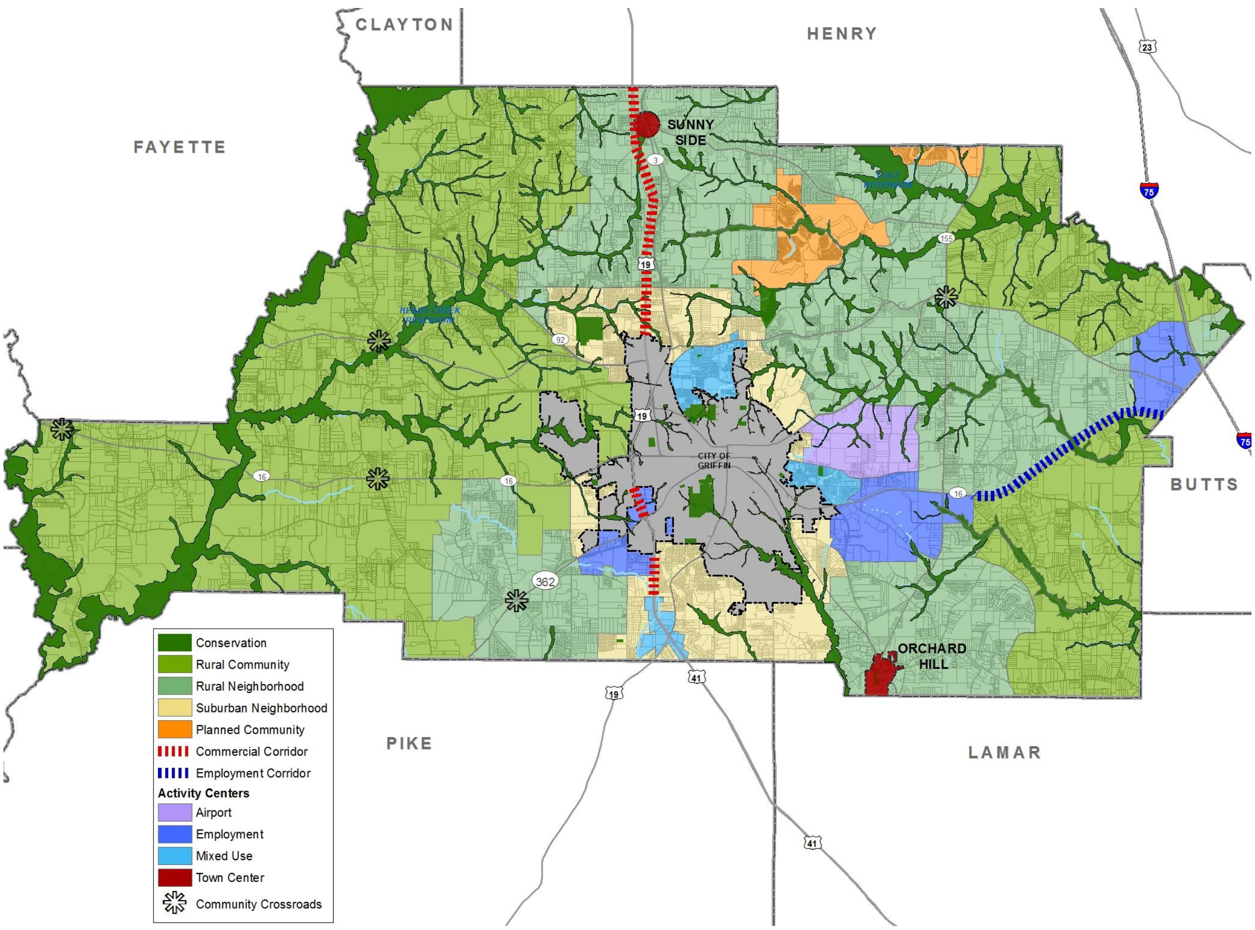
[8] 2016 Griffin-Spalding Comprehensive Transportation Plan (CTP) Update. May 2016. https://www.spaldingcounty.com/docs/public_works/Needs_and_Recommendations_Report_-_2016_Griffin-Spalding_CTP_Update.pdf

[9] Griffin-Spalding Comprehensive Transportation Plan Update – Needs and Recommendations Report. 2016.

characterized by compact development with robust pedestrian and vehicular connectivity. The Activity Center area is focused on concentrations of existing or potential industrial development, including southwest Griffin, the Lakes at Green Valley industrial park, and Jenkinsburg Road area in northeast Spalding County. The Corridor character area targets master-planned/campus-style industrial parks along corridors such as SR 16 east of Griffin as well as US 19/US 41/SR 3. The area is characterized by robust pedestrian and vehicular connectivity, as well as access management to facilitate traffic flow.

The Comprehensive Plan provides an update on planned projects and initiatives to achieve the goals of the plan. A proposed Griffin Truck Bypass Study is recommended in the near-term to assess the feasibility and utility of the facility. Addressing the potential need for a new interchange at Jenkinsburg Road and I-75, the plan recommends the completion of an Interchange Feasibility Study, after which GDOT would develop an Interchange Justification Report to request FHWA approval of a potential new interchange.[10]

Figure 6. Spalding County Future Development Map



[10] Spalding County Comprehensive Plan. 2017. https://www.spaldingcounty.com/cms/uploads/file/community_dev_2018/spalding-comp-plan_adopted.pdf

2.10. City of Griffin Comprehensive Plan 2018-2038

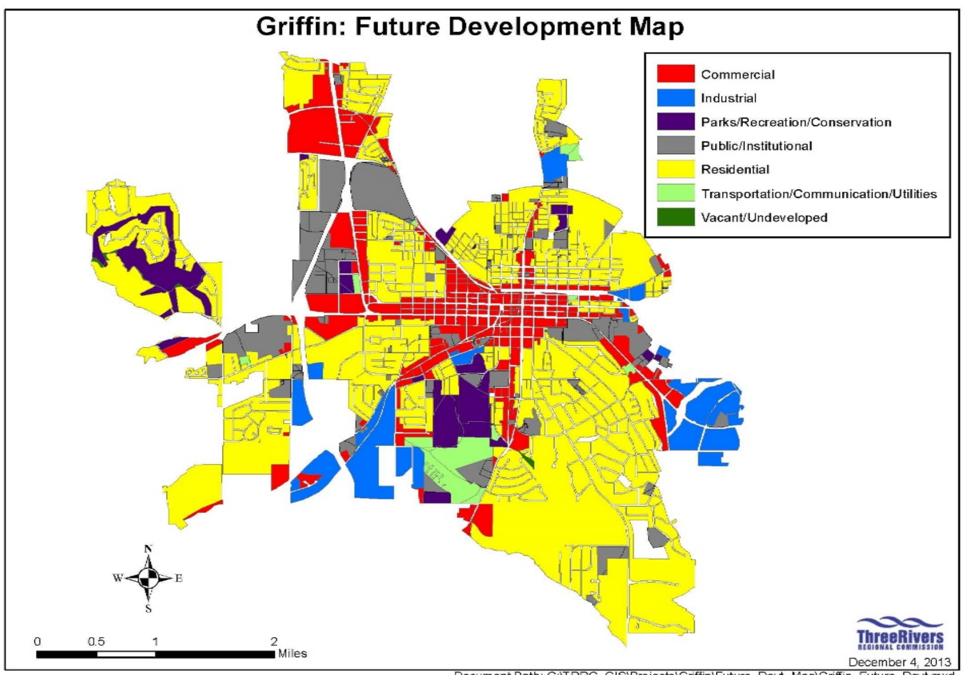
The City of Griffin completed its 2018-2038 Comprehensive Plan in October 2018. This plan defines a community vision and goals, provides an assessment of existing conditions and future needs, and presents recommendations that will help to manage anticipated growth for the benefit of the health, safety, and welfare of present and future residents in Griffin.

One of the goals of the plan is "to promote an efficient, safe, and connected transportation system that serves all sectors of the City of Griffin." Complementary policies include:

- Promote multi-modal transportation network.
- Establish public-private partnerships for the establishment of public transit options.
- Research and seek to adopt a local Complete Streets policy.
- Promote the beautification and increased functionality of highway corridors within the City.
- Increase infrastructure that supports electric cars and other future transportation needs.

The needs assessment identifies needs for a truck bypass around the city and more multi-modal and alternative transportation options, including public transportation. The plan establishes an Industrial Park character area and includes a future development map to target industrial growth primarily along SR 362 in southwest Griffin and along SR 16 in southeast Griffin.

Figure 7. Griffin Future Development Map



2.11. Griffin LCI Studies

The ARC Livable Centers Initiative (LCI) is a program that awards planning grants on a competitive basis to local governments and nonprofit organizations to prepare and implement plans for the enhancement of existing centers and corridors consistent with regional development policies, and also provides transportation infrastructure funding for projects identified in the LCI plans. The City of Griffin has conducted two LCI studies: West Griffin and Downtown Griffin.

2.11.1. West Griffin Activity Center LCI Study

The West Griffin Activity Center LCI examines transportation, land use, and urban design needs at the northern entrance to Griffin from Atlanta off of US 19/US 41/SR 3. The study area encompassing the area between Business US 19/US 41/SR 3, Experiment Street, and SR 16. Located west and northwest of Downtown Griffin, the area is home to numerous educational institutions, including the University of Georgia (UGA)–Griffin and Southern Crescent Technical College.

In order to support a higher density development patterns recommended along Business US 19/US 41/SR 3, the plan includes several multimodal transportation improvements that aim to improve bicycle and pedestrian connectivity as well as roadway operations. This includes:

- Network of new sidewalks along corridors such as W. Broad Street, N. 17th Street, and W. Solomon Street help to fill gaps in the sidewalk network.
- Proposed trails along major roads such as US 19/US 41/SR 3 and Ellis Street provide a more robust walking and biking network for students as well as the local workforce.
- The addition of a full diamond interchange to provide access between Ellis Road and US 19/US 41/SR 3 to replace the existing southbound flyover ramp.[11]

Since its completion in 2010, there has been very little activity in moving the plan forward with respect to development activity. However, it is important to note that the US 19/US 41/SR 3 corridor to the west of the LCI area should be prioritized for freight movement given its more favorable roadway geometrics (wider lanes, interchanges, etc.) and to preserve the potential for the vision created in this LCI study.

2.11.2. City of Griffin Town Center LCI Study

The City of Griffin Town Center LCI Study, developed in 2006, includes an examination of needs in the historic downtown area of Griffin and adjacent neighborhoods, which is traversed by the Norfolk Southern railroad line. The study identifies challenges associated with heavy truck traffic in Downtown Griffin, and that the presence of only one grade-separated crossing of the rail line results in traffic congestion for vehicular and pedestrian traffic. Recommendations from the study include designating McDonough Road as SR 155 between Jackson Road/East McIntosh Road and SR 16, conducting a bypass feasibility study to investigate reducing through traffic on SR 16 by rerouting trucks around Griffin, and further examining a study of railroad crossings to ensure that pedestrian and vehicular needs can be met without interfering with freight railroad operations. The plan also includes recommendations for new sidewalks and improved sidewalk facilities along corridors such as S. Hill Street, 9th Street, and 6th Street, and implementation of a multi-use trail network for the area.[12]

[11] West Griffin Activity Center LCI Study. February 2010. https://atlantaregional.org/wp-content/document-archives/LCI-Recipients/Spalding/WestGriffin/West%20Griffin%20LCI%20Study.pdf

[12] 2.9.2. City of Griffin Town Center LCI Study. November 2006. https://atlantaregional.org/wp-content/document-archives/LCI-Recipients/Spalding/Griffin/Study.pdf

3. Existing Conditions Assessment

This section of the Inventory and Assessment will explore how vehicles, freight, bicyclists, and pedestrians utilize transportation in Griffin and Spalding County, and implications for freight traffic. It should be noted that since most of the industrial uses and impacted roadways and in the eastern portion of the County, many of the maps within this section are oriented to a "focus area" as shown on the inset of these maps.

3.1. Land Use and Development

Managing the impacts of Greater Atlanta's encroaching urban sprawl with effective planning and policies to create and maintain efficient infrastructure, will help ensure close-knit neighborhoods and a sense of community while preserving natural systems will ensure sustainable growth for Spalding County in the future. It is important to get a good picture of existing uses to understand how emerging growth and potential recommendations could affect those uses.

3.1.1. Existing Land Use Overview

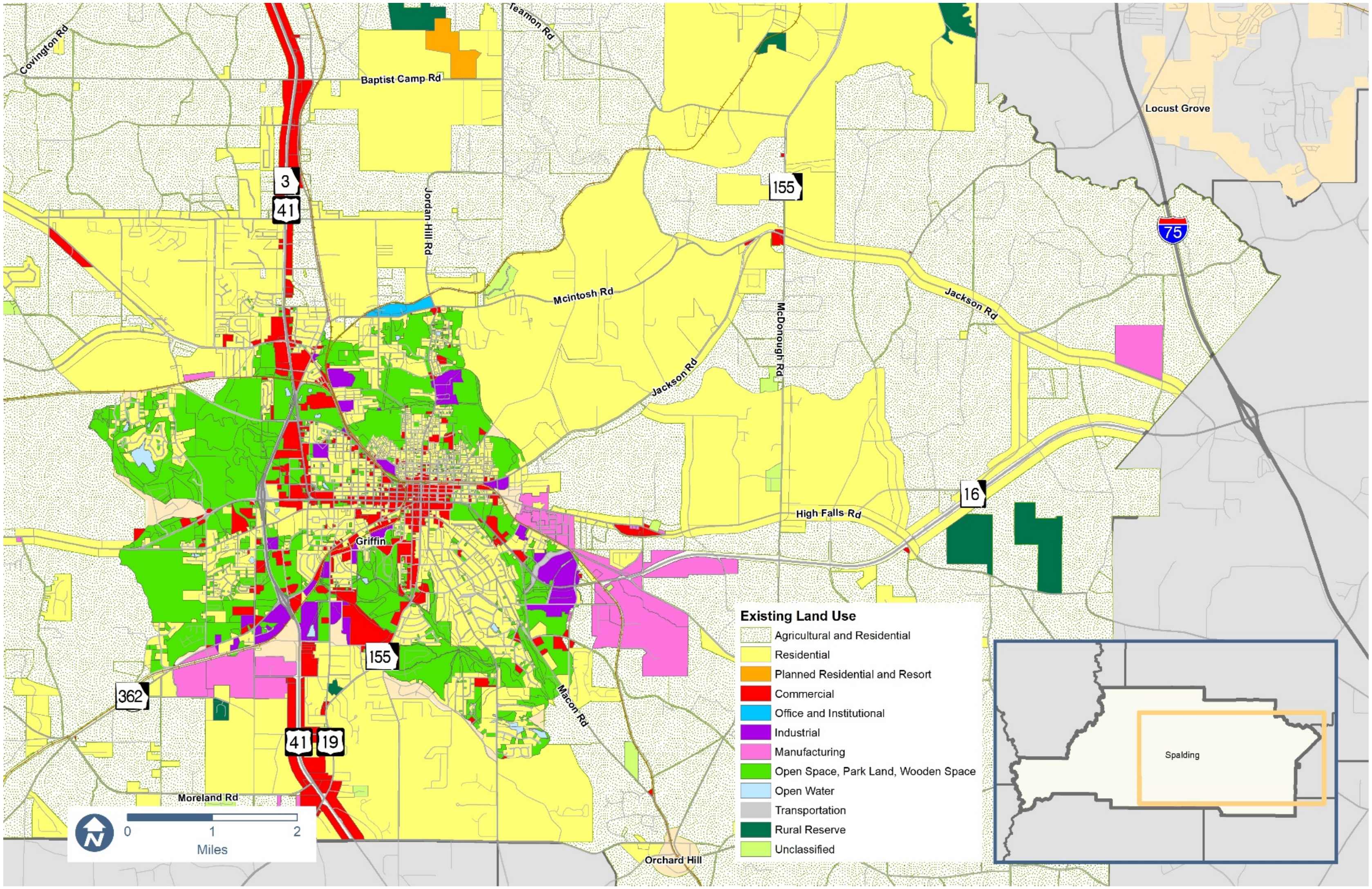
Spalding County is a predominantly residential and agricultural county with significant projected growth in industrial development. Approximately 90 percent of the county's land area is currently used for residential or agricultural and residential purposes, while two percent is used for industrial or manufacturing. However, the county's future development plans include a significant expansion of industrial development. A map of existing land uses is provided in **Figure 8**.

The City of Griffin and Spalding County both delineate areas for future employment centers within their jurisdictions. Suggested uses for these areas include light industrial and manufacturing. For this analysis, all the parcels within the identified "future employment/development areas" were included to create Industrial Districts. The majority of existing office, manufacturing, and commercial zoning are located within the City of Griffin, while planned future development sites are primarily in the eastern half of the county, near the proposed future airport and/or I-75. **Figure 9** shows zoning classifications.

3.1.2. Cargo Oriented Development Industrial District Analysis

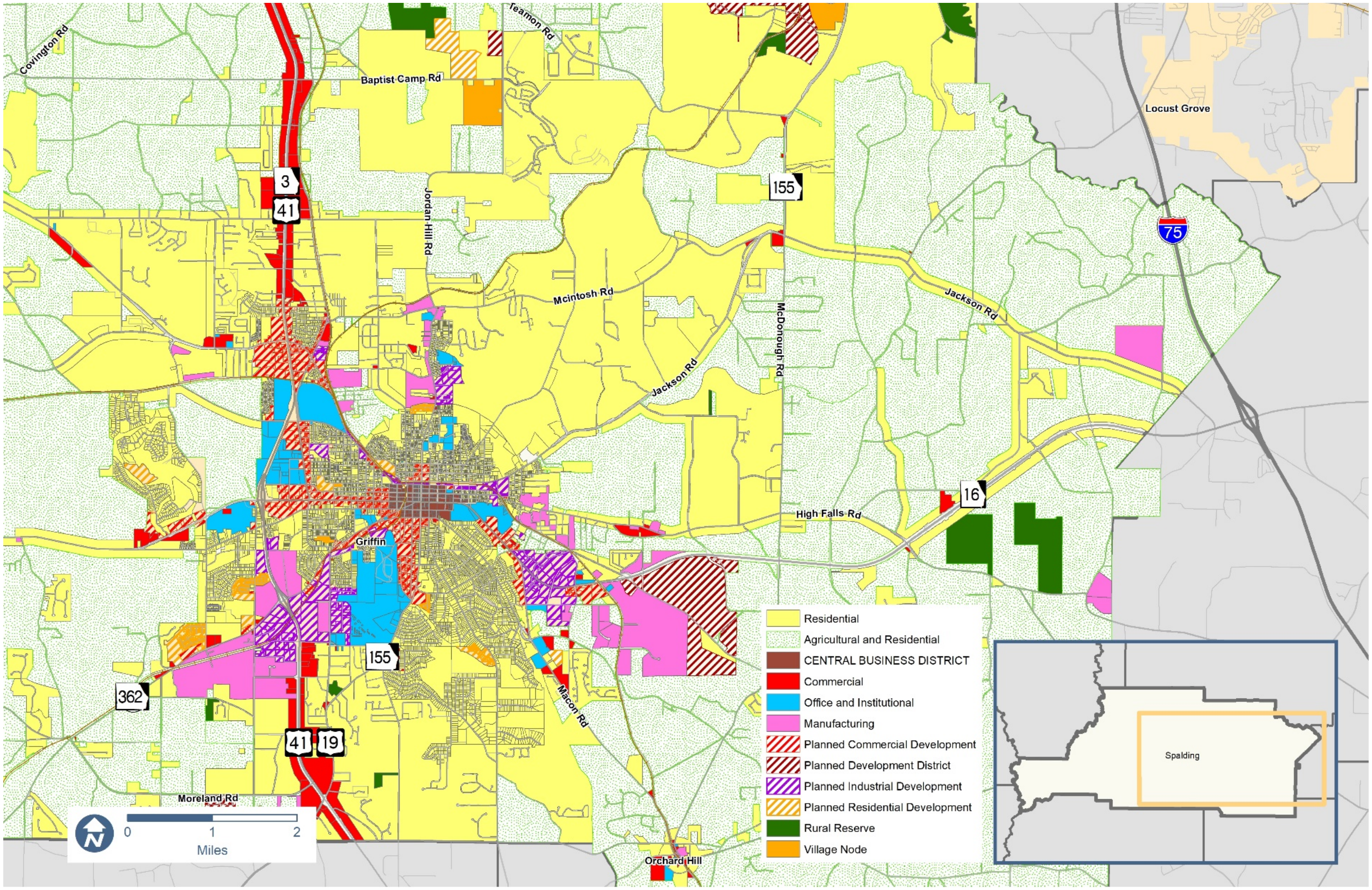
Given the close relationship between industrial development and freight activity, planned future industrial development is important to account for in freight planning efforts. Transportation and land use strategies, when considered comprehensively, can reinforce one another, and improve the efficiency, sustainability, and economic potential of freight and industrial development. Cargo-oriented development (COD) is a development strategy that promotes efficient and sustainable freight movement and industrial development, within a framework that enables the resulting spaces to be sufficiently attractive for a mix of uses beyond just industrial. Similar to transit-oriented development (TOD), COD focuses on coordinating transportation and land use investment to maximize economic and social benefits by supporting industrial businesses in districts with access to multiple modes of freight transportation, strengthening access to nearby workers, deploying greener vehicles and cleaner technologies, and increasing the types of land uses that can be attracted to industry-heavy areas.

Figure 8: Existing Land Use[13]



[13] Spalding County, City of Griffin.

Figure 9: Zoning Classifications[14]



[14] Spalding County, City of Griffin.

The basic unit in this geographical analysis of economic opportunity is the Cargo-Oriented Development (COD) Industrial District. For purposes of this analysis, an Industrial District is a contiguous grouping of 25 or more acres of contiguous land with either existing or planned industrial uses. In **Figure 9**, parcels were grouped into clusters based on the following proximity criteria: 1) Same side of a rail line; 2) Same side of a major road (US and State highways); and 3) Within 0.1-mile of each other.

Fourteen Industrial Districts were identified based on the above method and analyzed on current land use, access to region-wide freight infrastructure, access to eligible labor pool and effect on the environment and quality of life of county residents. The suitability of each Industrial District for Cargo Oriented Development is based on four categories:

- Industrial Land Use and Development Characteristics
- Freight System Characteristics
- Worker Access Characteristics
- Environmental Impact & Quality of Life Metrics

Overall rankings are shown in **Figure 10**. Identifying the highest-performing Industrial Districts can point to places to prioritize for future investment, but it can also identify factors preventing lower-ranked districts from being more successful. Many of these factors can be changed through policy and investment decisions, making these districts more suitable for sustainable industrial development.

The total rankings of Industrial Districts confirm patterns observed in the individual categories in parts of Spalding County that are well-connected to existing infrastructure. Driving factors in this comparison in addition to closer access to multiple freight facilities, are more industrial neighbors, and access to existing workforce as illustrated in the analysis below. An important consideration of this analysis is that it reflects these factors as they currently exist. As such, the overall rankings help identify areas that may have more challenges and, therefore, reflect the level of effort needed to develop successful industrial uses based on the factors assessed.

When CODs are built in established industrial areas, which are usually closer to city centers, regional environmental benefits multiply: sprawl is contained, brownfields are reclaimed while exurban open space is preserved, and workers can make shorter commutes.

In regard to development opportunity, the value of this ranking is not limited to relative positioning of sites within a defined set. The transparency of this analysis also permits the ranking to be used as a diagnostic tool, playing "what if" in evaluating impediments to the development of individual districts.

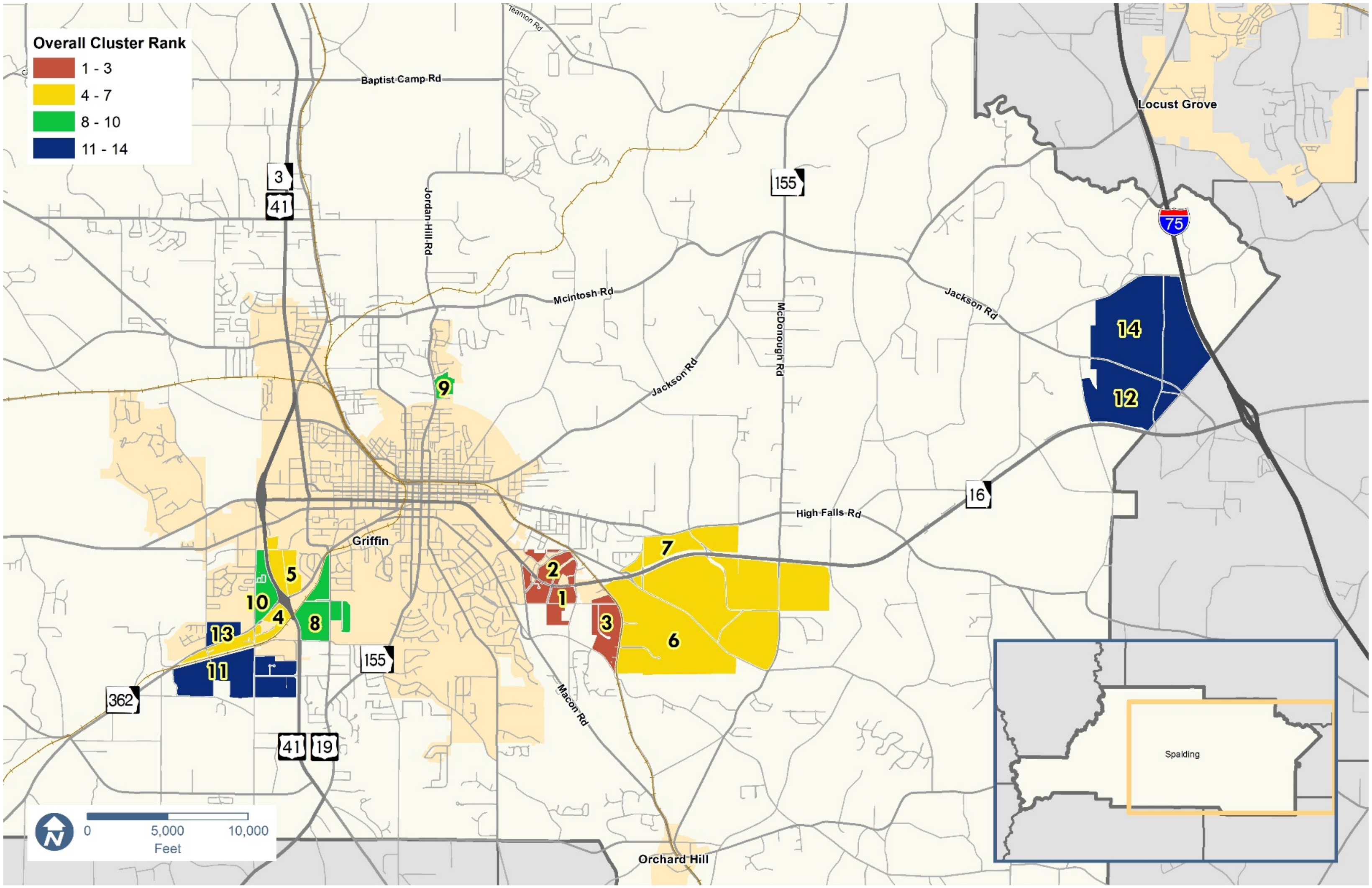
Districts along SR 16, at the Griffin City boundary score high due to their synergistic relation with the existing industrial base. The second tier of high-ranking sites are in two clusters: along SR 16, between Green Valley Road and McDonough Road and at the intersection of US 19/US 41/SR 3 and Williamson Zebulon Road.

With their overall ratings of 12th and 14th, the eastern-most districts along I-75 present a challenge for County leaders to accommodate industrial development. While they scored their best rankings in the area of Freight Access, they scored poorly due to their distant location from population and employment centers, greenfield land status, and lack of supporting infrastructure. Still, recent development trends throughout the Atlanta region and along I-75 would indicate that these areas will be targeted for industrial development despite these obstacles given the proximity to I-75 and potential access to the Port of Savannah. Reinforcing this point, a 2019 Development of Regional Impact (DRI) filing includes the development of over 18 million square feet of industrial uses directly across from these districts on the eastern side of I-75. The DRI also includes 800,000 square feet of commercial and 200 units of single family residential. While most of the development is in Butts County, some of the residential area is in Spalding. While an ambitious project, buildout is not projected until 2039. Much like the eastern-most districts in the COD analysis, this development will require significant investment of infrastructure (roads, water, sewer, etc.) in order to succeed.

While the opportunities for maximizing previous investments in infrastructure, leveraging previous economic development initiatives and promoting more sustainable growth industrial growth are presented in the industrial districts near Lakes at Green Valley and along SR 16, the County will need to adopt a two-pronged approach for planning its industrial uses:

- Continuing to promote more coordinated growth by focusing its efforts on developing its planned industrial districts along SR 16; and
- Developing a policy framework to provide the necessary infrastructure to accommodate new industrial development in the districts along I-75.

Figure 10: Industrial District Rankings - Composite[15]



[15] CNT Analysis.

3.1.3. Industrial Land Use and Development Characteristics

Land use considerations play an important role in the suitability of Industrial Districts for further industrial development or redevelopment. In addition to containing available and suitable land for industrial uses, thriving Industrial Districts often contain a mix of construction, wholesale, logistics, and manufacturing businesses, establishing an industrial ecology with distinctive economic, environmental, and social value. A ranking of Industrial Districts by industrial land and development characteristics is provided in **Figure 11**. The development characteristics of each Industrial District was assessed using the following factors:

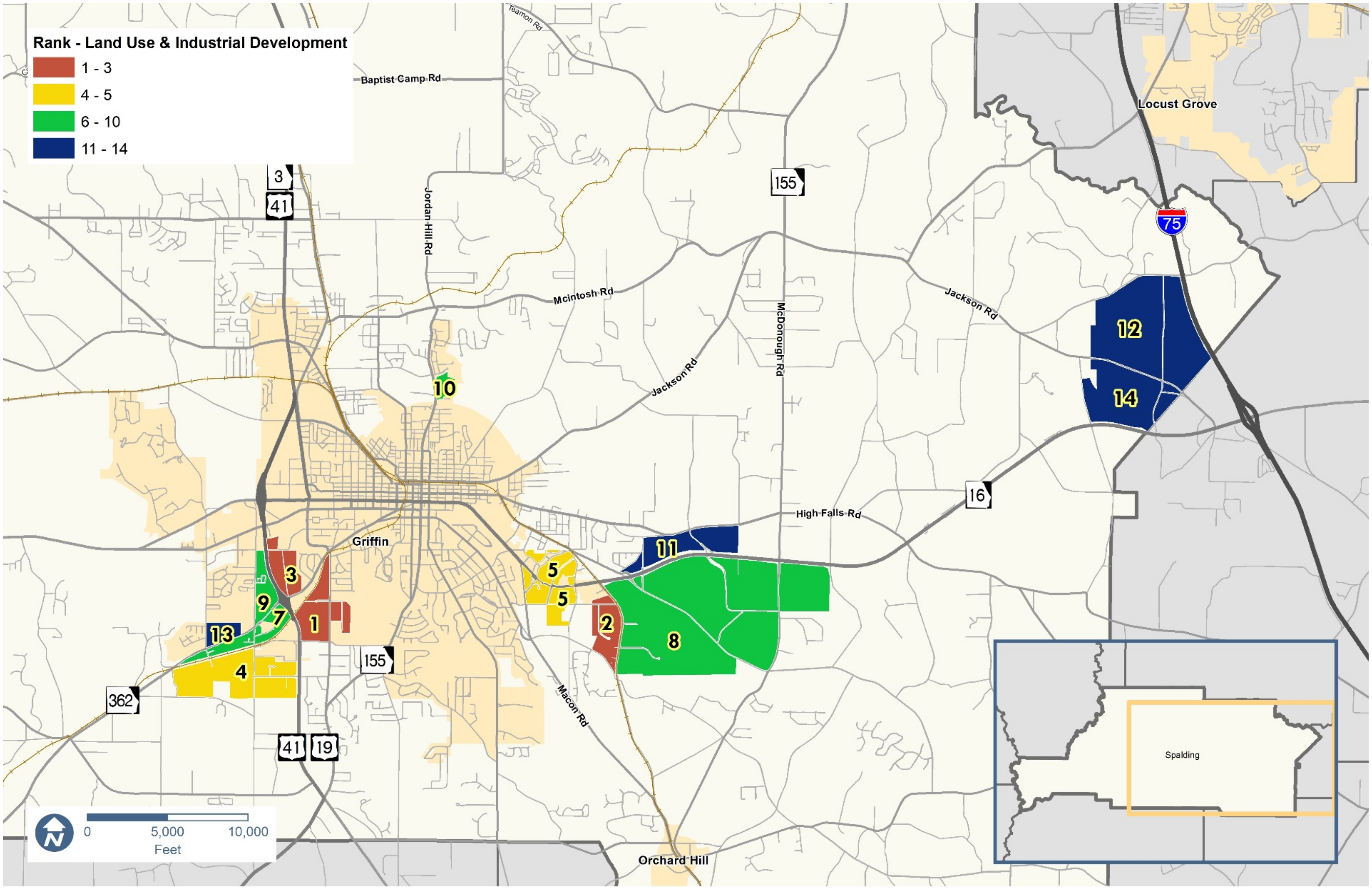
Table 1. Industrial District Development Characteristics

Factor	Criteria	Ranking Notes
A1	Adequate land available	All districts are at least 25 acres. Larger districts receive a higher score.
A2	Current industrial zoning	Districts with a higher percentage of current industrial zoning receive a higher score.
A3	Number of Industrial businesses within 5-mile radius	Districts with more industrial businesses receive a higher score.
A4	Number of Industrial jobs within 5-mile radius	Districts with more current employees in industrial jobs receive a higher score.

One factor that is very important but that was not considered in this analysis due to data availability is the percent of each district that is currently underutilized. The ratio of the land in full use compared to vacant and under-utilized land is an important indicator of economic development. New developments in districts with ratios between 0.7 to 1.5 will likely benefit the most from the synergy from established businesses.

The ranking of districts by land use and industrial development factors identifies three top-performing districts in or near the City of Griffin. These districts score well because of their relatively large size and the presence of a number of existing industrial businesses and the jobs they currently provide. However, it is possible, and even likely, that these top-ranking Industrial Districts do not have sufficient capacity to absorb projected or planned future industrial development. The 8th ranked planned district south of SR 16 (east of Griffin) and the 4th ranked district south and west of Griffin score relatively well in this category despite lower concentrations of current industrial uses. The two districts adjacent to I-75 received low scores due to a combination of smaller numbers of existing industrial businesses and lower rates of current industrial zoning.

Figure 11: Industrial District Rankings by Industrial Land Use and Development [16]



[16] Griffin Comprehensive Plan, City of Griffin, Spalding County, ESRI Business Analyst (2019).

3.1.4. Freight Access

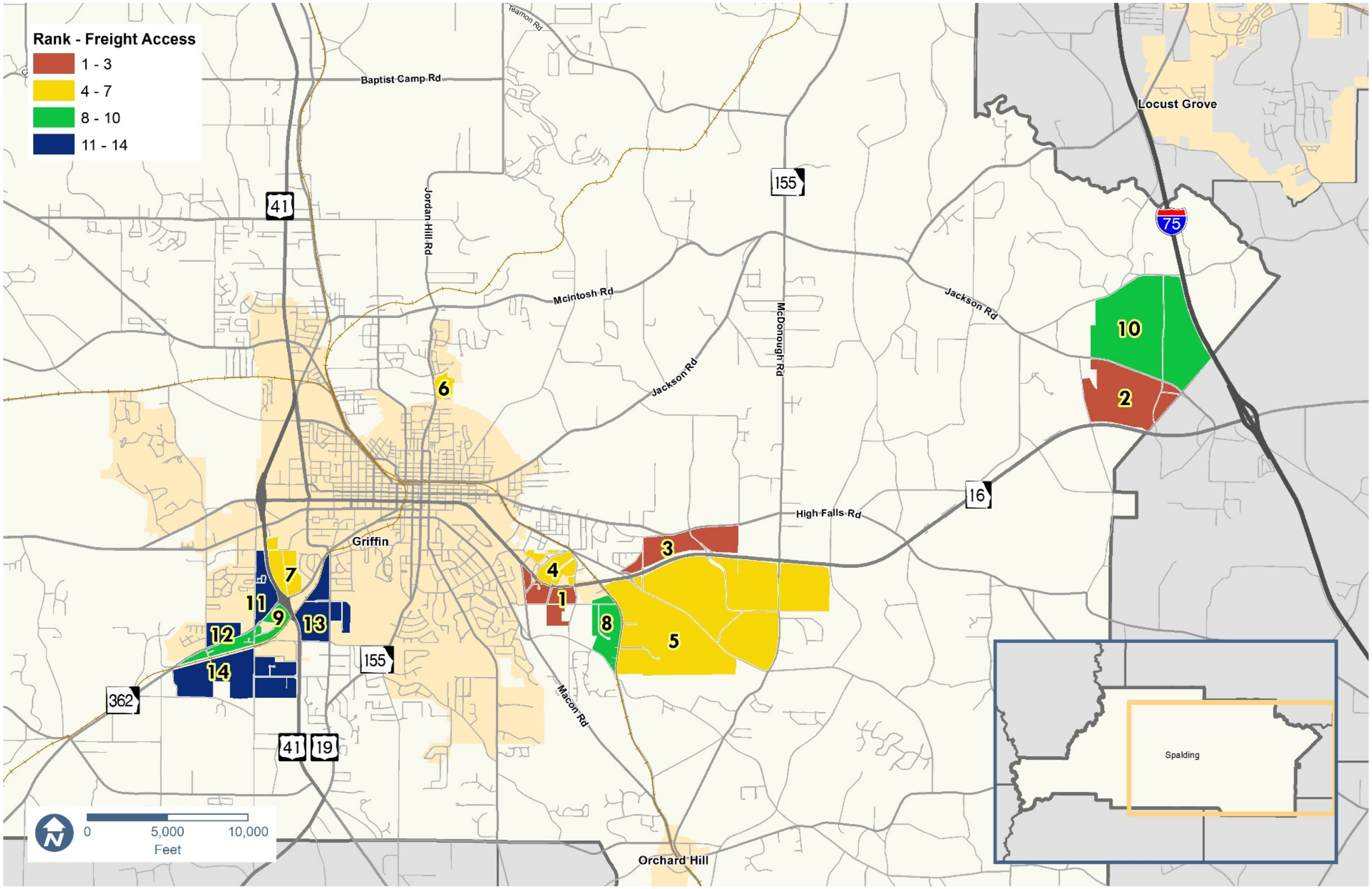
Transportation access is particularly critical for industrial firms, which are increasingly operating on a just-in-time delivery model. While the primary and preferred method of shipment for most current industrial firms in Spalding county is by truck, the county and surrounding region have a number of air, rail, and intermodal assets that are important to attracting and retaining industrial development and relieving traffic on the road network. The criteria below address the basic business and transportation questions of how efficiently a district might be accessed by rail, truck, air, or a combination of all three. According to ARC, throughout the Atlanta regional over 80 percent of freight movement is via truck, rail freight makes up approximately 17 percent and less than 1 percent is via air. Assuming this ratio for Spalding County (which is likely a higher share of truck), a weighting factor is applied to reflect this distribution among the three modes.

Table 2. Freight Access Criteria for Industrial Districts

Factor	Criteria	Data Source & Calculation Method
B1	Adjacent to an active freight rail line	Districts that are adjacent to an active freight line receive a higher score.
B2	Proximity to highway ramp	Districts with greater proximity (based on network distance) receive a higher score.
B3	Proximity to freight network	Districts with greater proximity (based on network distance) receive a higher score.
B4	Distance to nearest intermodal terminal	Districts with greater proximity (based on network distance) receive a higher score.
B5	Proximity to proposed airport location	Districts with greater proximity (based on network distance) receive a higher score.
B6	Volume-to-Capacity Ratio (V/C) - on adjacent roads	Districts with higher V/C ratio, indicating higher levels of congestion, receive a lower score.

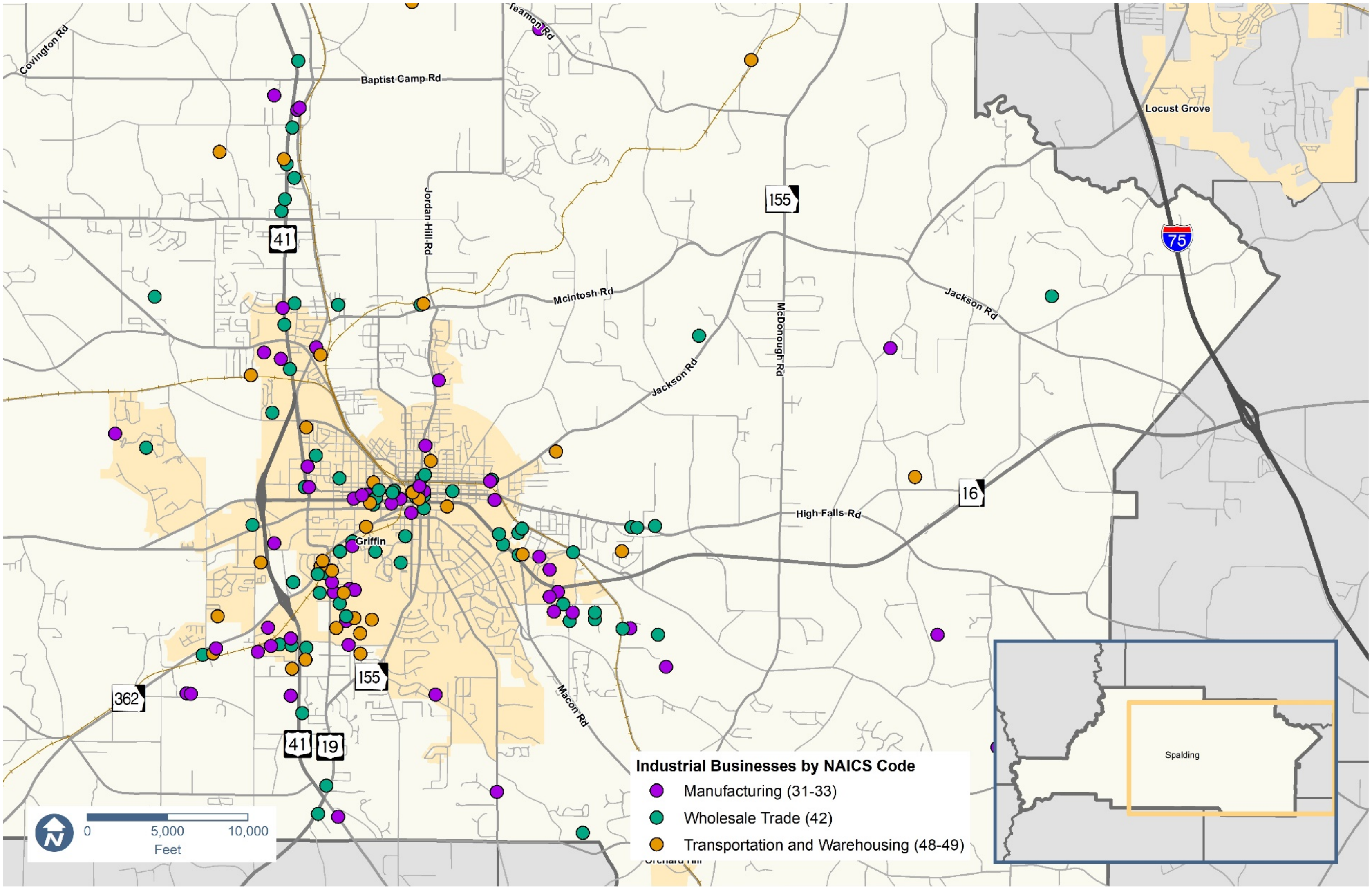
The ranking of industrial districts by freight access is provided in **Figure 12**. Each of the existing and proposed Industrial Districts has close access to nearby links on the freight network. The highest-ranking districts also have access to truck routes, the new airport site, and the CSX intermodal facility (located to the northwest in Fulton County). The top-ranked district has scored in the top half for every metric in this category except proximity to the rail network. The second-ranked district has the closest access via the road network to I-75 and is also immediately adjacent to SR 16, which compensates for less convenient access to the airport and intermodal terminal. This district scores significantly higher than the neighboring district immediately adjacent to I-75. Despite closer proximity to the highway facility, it is farther from the interchange and from SR 16. Several planned infrastructure investments could improve transportation access to industrial districts. Based on the industrial development map developed from North American Industry Classification System (NAICS) codes in **Figure 13** a bypass project south of Griffin would bolster access to highly ranked industrial districts near the former airport. While the current proposed bypass alignment is shown in **Figure 37** (in Chapter 4), the alignment for this bypass will be explored in later phases of this Plan.

Figure 12: Industrial District Rankings by Freight Access [17]



[17] City of Griffin, Spalding County, Atlanta Regional Commission, Three Rivers Regional Commission.

Figure 13: Industrial Development by NAICS Codes [18]



[18] NAICS.

3.1.5. Worker Access

Approximately 17 percent of jobs in Spalding County are in the Transportation, Warehousing, Wholesale Trade, or Manufacturing industries. These freight-dependent industries offer potential paths out of poverty, as they generally have fairly low educational requirements on average, and these jobs pay wages 50 percent higher than jobs in service industries with similar educational requirements. Spalding County has a 63 percent labor participation rate and a 4.5 percent unemployment rate, slightly below the national average. The unemployment rate for workers with a high school degree or less is significantly higher, at 8.5 percent. Supporting further industrial development in Spalding County could reduce this disparity, not only for workers who live in Spalding County, but for those who commute to Spalding County from other nearby counties.

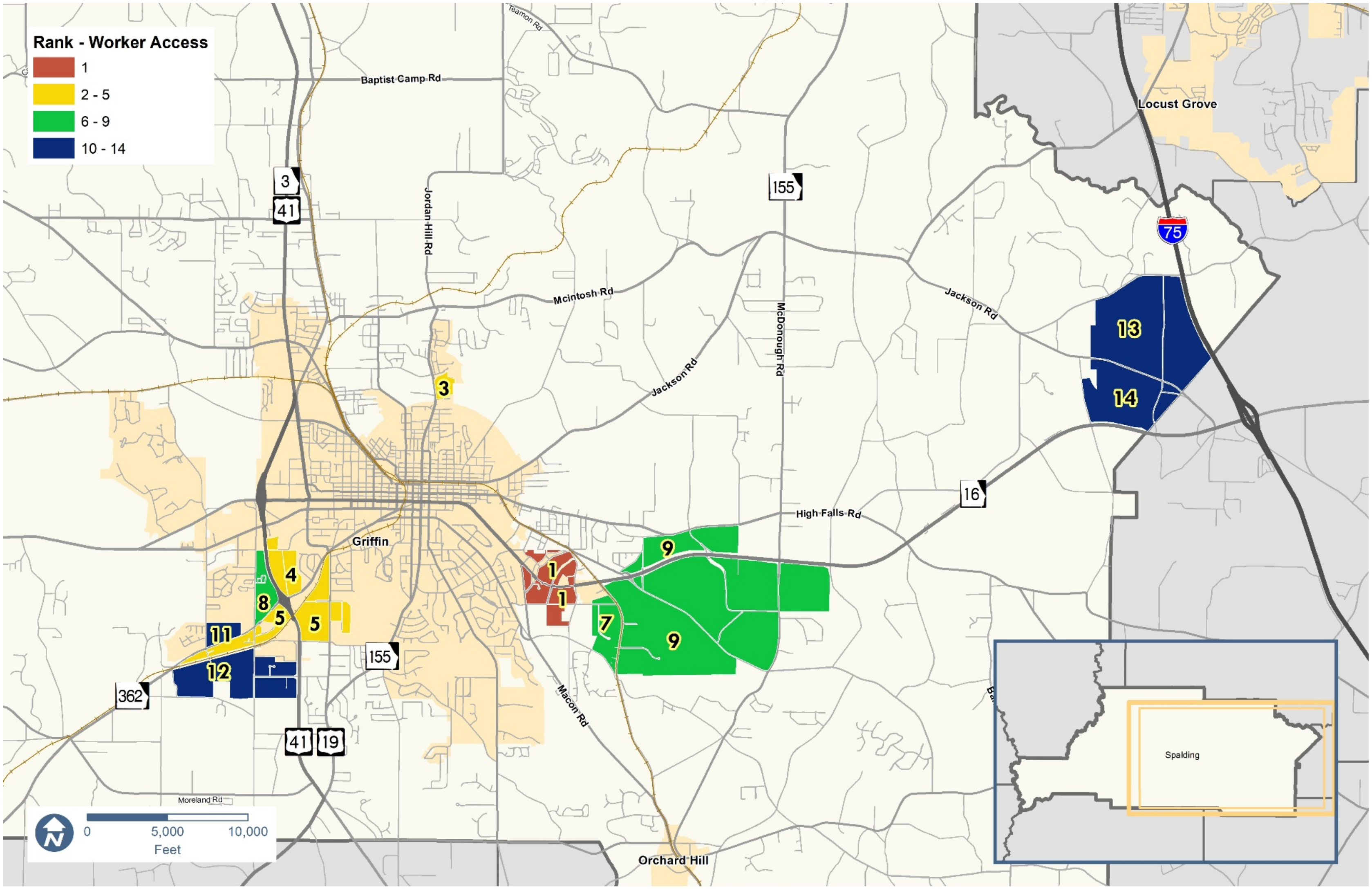
However, transportation access can be a significant challenge to workers accessing industrial jobs, particularly low-income or young workers who may not have access to a personal vehicle. The metrics in this category assess the accessibility of current and proposed Industrial Districts to the current industrial workforce, as well as to potential workers living in low-income neighborhoods.

Table 3. Worker Access Criteria for Industrial Districts

Factor	Criteria	Data Source & Calculation Method
C1	Number of households in poverty within 5-mile radius	Districts with more households in poverty within a 5-mile radius receive a higher score.
C2	Number of people currently employed in industrial sector within 5-mile radius	Districts with greater numbers of people employed in the industrial sector receive a higher score.
C3	Number of households making less than median income within 5-mile radius	Districts with greater numbers of households making below-median income receive a higher score.

The Industrial District rankings by worker access are provided in **Figure 14**. The districts on the southeastern border of Griffin once again score highly on this metric due to their close proximity to Griffin, which has the highest population density within Spalding County. The districts along the eastern border of Spalding County and I-75 have lower worker access; however, access could be improved by requiring sidewalks in nearby residential development and through the implementation of a transportation demand management program that make it easier for workers to commute by a mode other than driving alone.

Figure 14: Industrial District Rankings by Worker Access [19]



[19] American Community Survey 5-year estimates (2012-2016), Longitudinal Employer Household Dynamics (2017).

3.1.6. Environment and Quality of Life

Cargo-oriented development contributes to regional sustainability because it establishes compact industrial districts where businesses can maximize use of efficient rail transportation and minimize less efficient truck travel, while employees can commute without driving alone. However, neighbors of compact industrial districts may still experience negative externalities of productive activity, and industrial users may experience additional complications to their operations. COD can mitigate these problems through the application of sustainable new design concepts, information systems, and equipment. The metrics below assess the potential of Industrial Districts to affect quality of life in nearby non-industrial uses.

Table 4. Environment and Quality of Life Criteria for Industrial Districts

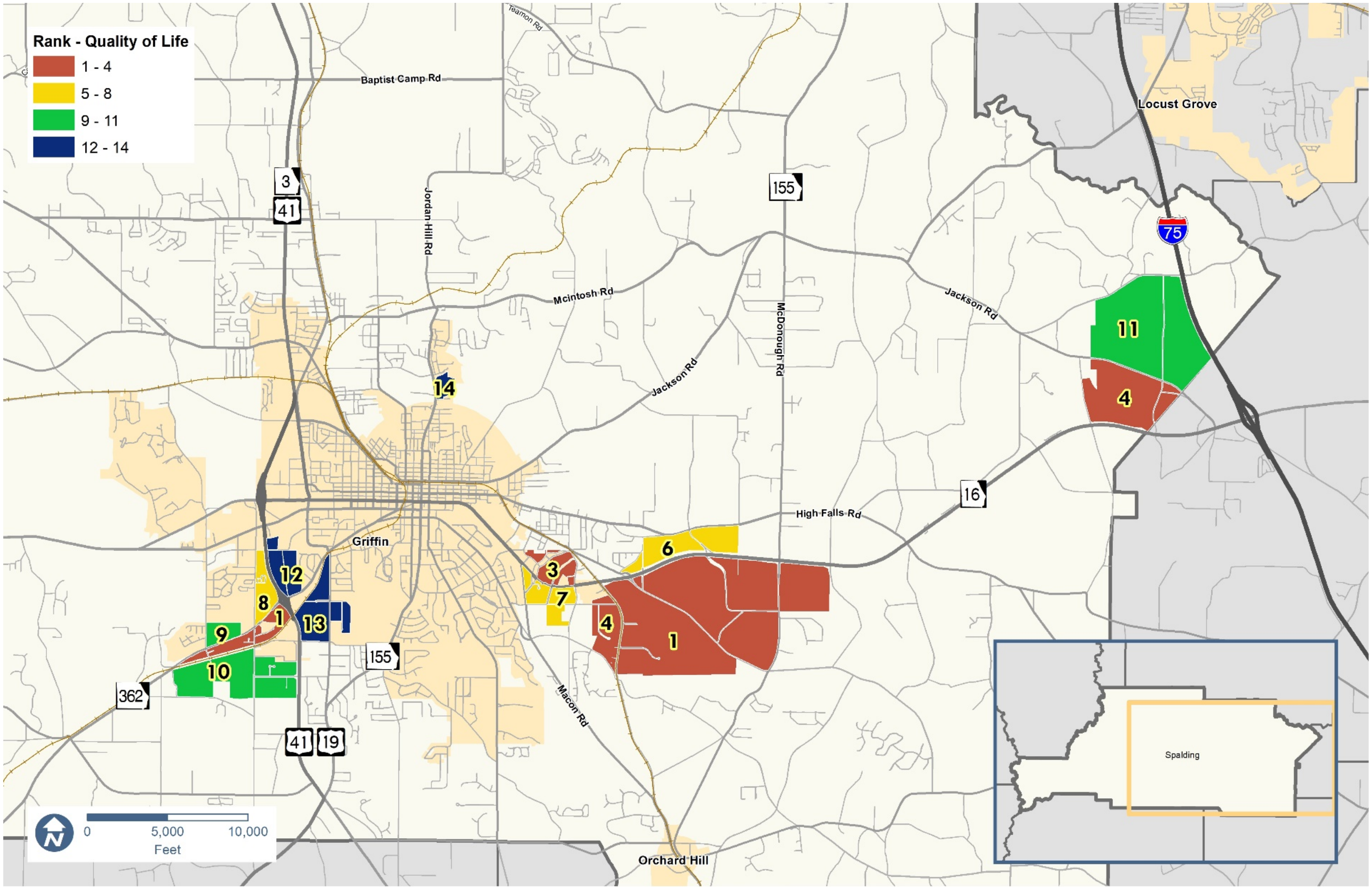
Factor	Criteria	Data Source & Calculation Method
D1	Adjacency to non-industrial land uses	Districts with more adjacent non-industrial land uses receive a lower score.
D2	Miles through non-industrial land	Districts where freight network access is through non-industrial land receive a lower score.
D3	Number of adjacent community services (e.g., parks, hospitals, schools)	Districts with more adjacent community facilities receive a lower score.

A ranking of the Industrial Districts by environmental and quality of life characteristics is provided in **Figure 15.** Conflicts between industrial/manufacturing and residential land uses are prominent in southwest Griffin, along Williamson Zebulon Road. While the districts are currently used for industrial purposes, they abut single and multi-family residential uses. The district with the lowest ranking (14), along Hill Street, is close to downtown Griffin and gets a low score due to its proximity to residential uses and schools. Districts in east Spalding County currently house several industrial businesses and have a lower impact on quality of life. The exception is the 11th ranked district – despite its adjacency to I-75, the network distance to the interchange and freight network is farther and passes through residential uses.

Due to their lower proximity to community facilities and non-industrial uses, the districts south of the proposed airport and near I-75 score the highest in this category. However, since additional non-industrial development is planned adjacent to some of these districts, these represent opportunities to implement sustainable policies and practices from the beginning.

At the site level, placement of green infrastructure can serve as a buffer between neighborhoods and industrial activity and provide significant benefits to water quality and flood mitigation. A wide range of vehicle and logistics technologies, like new diesel engines, electric freight handling equipment and facilities, and improved routing technologies, can dramatically reduce the fumes, noise, safety, and lighting problems associated with prior-generation technologies. Municipalities, counties, or other jurisdictions can implement regulations, incentives, and invest in infrastructure to facilitate the adoption of these technologies and policies.

Figure 15: Industrial District Rankings by Environment and Quality of Life [20]



20 Three Rivers Regional Commission, City of Spalding, Griffin County.

3.1.7. Overview of Potential Land Use Conflicts

As discussed in Section 3.1.6, a number of land use conflicts were identified during the analysis of existing industrial districts. This section will serve as an overview of areas where conflicts occur and the characteristics that cause them to be an issue. For the purposes of this discussion, this section will be broken into the four geographic areas that make up the industrial districts in the previous analyses.

- **Area southwest of Griffin near Zebulon Road and US 41:** In this area, there are several industrial properties located adjacent to residential land uses. Just south of Odell Rd, there are industrial sites adjacent to single-family residential along Moose Lodge Road. On the north side, west of Carver Road and south of Poplar Street there is existing low-density residential adjacent to industrial and institutional land uses. The potential for conflicts along Williamson Road appears to be relatively low; however, a few residential uses are located south of Williamson Road between Pine Hill Road and Carver Road. East of Carver Road a subdivision and a couple of apartment complexes are located near industrial land uses. In addition, east of Justice Boulevard, a single-family residential subdivision is clearly adjacent to several industrial land uses. Because this area is already developed, redevelopment opportunities should focus carefully on access management and site design to mitigate potential conflicts to nearby residents. To relieve these conflicts, site design and access management is needed to minimize interactions with these existing residential uses
- **Areas near the Lakes at Green Valley:** Due to the fact the Lakes at Green Valley is a master-planned industrial district, the potential for conflicts with surrounding residential uses is minimal. The only real potential for conflict is the presence of a medium-density apartment complex off of Futral Road.
- **North of Griffin along North Hill Street:** The smallest concentration of industrial uses in the focus area, this is actually a cluster consisting of a concrete factory and a County solid waste facility. While there are older residential areas in the vicinity, the cluster is pretty well buffered and separated from nearby residential uses.
- **Areas along I-75 north of SR 16 along Jackson Road/Wallace Road:** Land uses in the districts along I-75 primarily consists of agricultural and very low-density housing. The major exception is the Dollar General distribution center located on the Butts County line along Jackson Road. Much like Lakes at Green Valley, the opportunity exists to develop an overall area master plan for these districts to that would not only serve to minimize residential conflicts, but also provide the much-needed infrastructure for these areas to support viable industrial land uses.

3.2. Roadway Profile

This section discusses the infrastructure and operational characteristics of Spalding County roadways, and how the roadways function as a network to serve freight operations.

3.2.1. Spalding County Freight Network

Spalding County has an extensive freight network that extends across the county, providing both north-south and east-west connectivity. The freight network consists of a combination of state-, federally-, and regionally-designated routes.

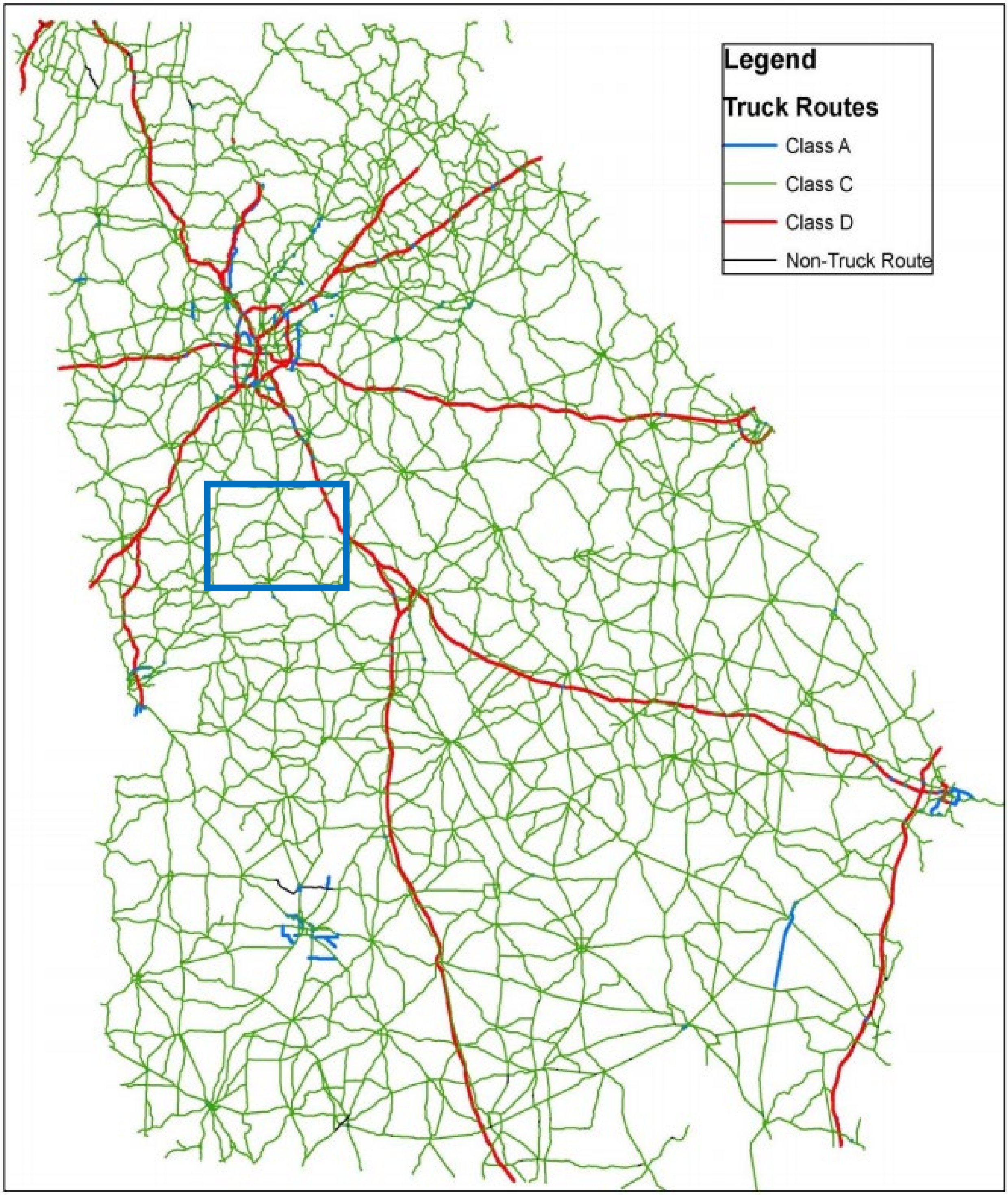
GDOT has designated a network of truck routes specific to oversize trucks, or trucks that exceed the five-axle, 80,000-pound Federal limit. **Figure 16** illustrates the GDOT designated freight network. Spalding County routes included in the GDOT route network are SR 155, SR 16, US 19 Business/Hill Street, US 19/ US 41/SR 3, SR 362, and SR 92. These are each Class C routes – these routes may have sharp turns that a single-trailer truck cannot negotiate, but that articulated twin trailer combinations can use.

The National Highway Freight Network (NHFN) is displayed in **Figure 17.** The NFHN is designated by the FHWA to strategically direct Federal resources and policies toward improved performance of highway portions of the U.S. freight transportation system. In Spalding County, the NFHN includes US 19/US 41/SR 3, SR 16, and portions of McIntosh Road accessing the Trans Montaigne Pipeline Terminal. Additionally, there are several National Highway System (NHS) intermodal connectors in the study area, including Atlanta Road, McIntosh Road, Tower Street, 5th Street and SR 16.

The ARC's ASTRoMaP network designates regional truck routes that provide freight connectivity throughout the Atlanta region. ASTRoMaP corridors within Spalding County include US 19/US 41/SR 3, SR 16, and SR 155. **Figure 17** illustrates the designated truck route network in Spalding County.

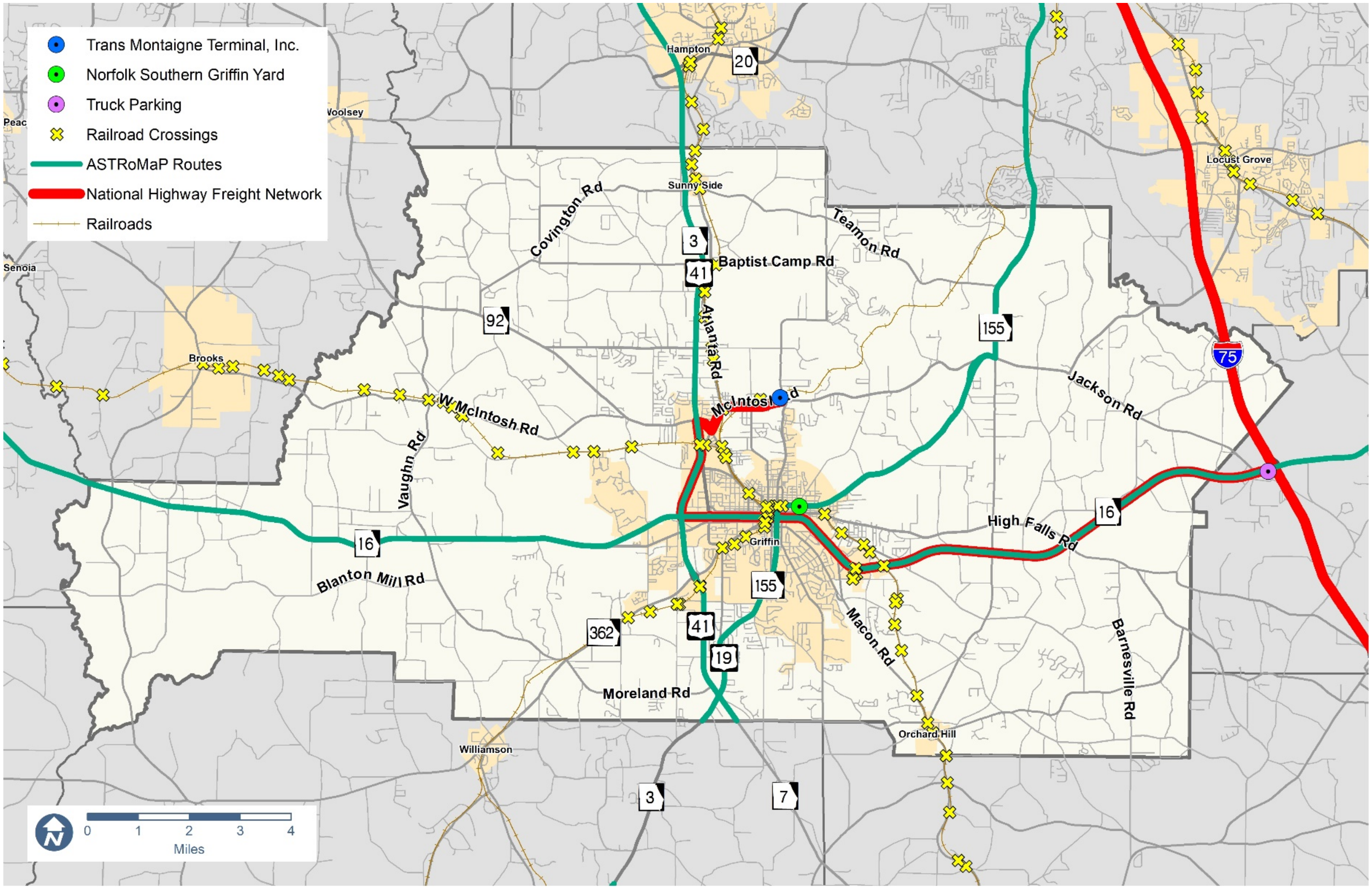
Also shown in **Figure 17** is the Spalding rail network and railroad crossings. Spalding County's railroad network includes two Class 1 rail lines, which are both owned by the Norfolk Southern Corporation. The rail lines intersect in downtown Griffin, converge northwest of the city, and then split towards McDonough (Henry County) to the northeast, Jonesboro (Clayton County) to the north, Brooks (Fayette County) to the west, Zebulon (Pike County) and Barnesville (Lamar County) to the south. There are 38 at-grade railroad crossings within the county, including 16 in the City of Griffin. These are primarily located along local roads adjacent to the rail lines. With respect to railroad crossings, input from local officials and community leaders has indicated that a great deal of disruption to local traffic occurs at the rail crossing over Hill Street in Downtown Griffin due to operations at the Norfolk Southern rail yard.

Figure 16: GDOT Truck Route Network[21]



[21] GDOT. Statewide Freight and Logistics Plan.

Figure 17: Spalding County Freight Network[22]



[22] GDOT, ARC, and Spalding County

Spalding County prohibits trucks or delivery vehicles with more than six wheels or over 30 feet in length from traveling on county roads unless the vehicle is making a pick-up or delivery. Exceptions are made for select portions of county roads:

- Old Atlanta Road from the Griffin city limit to the Henry County line
- Macon Road from the Griffin city limit to the Lamar County line
- Jackson Road from N. McDonough Road and SR 155 east to the Butts County line
- High Falls Road from the Griffin city limit east to SR 16
- Highland Street adjacent to the Crompton-Highland Mill

The ordinance also states that freight vehicles are allowed on non-residential streets that do not have signage restricting passage.[23] "No Thru Trucks" signage is present on county and local roads throughout Spalding County. **Figure 18** illustrates the designated truck restrictions in Spalding County. A key item for developing a successful industrial district in the focus area will be identifying corridors that will feed the industrial district and modifying the level of truck travel restrictions as appropriate.

3.2.2. Number of Lanes

While most roadways in Spalding County consist of two lanes, there are a number of major roadways that include four or more lanes. The most prominent of these is I-75, which includes six lanes and traverses the northeast corner of Spalding County. US 19/US 41/SR 3, which bisects Spalding County and serves as a bypass for the City of Griffin, has four lanes. Other routes with four lanes include Atlanta Road in Griffin; SR 92 between West McIntosh Road and Old Atlanta Road; and SR 16 from downtown Griffin east towards the I-75 interchange in adjacent Butts County. **Figure 19** illustrates the number of lanes on roadways throughout the county.

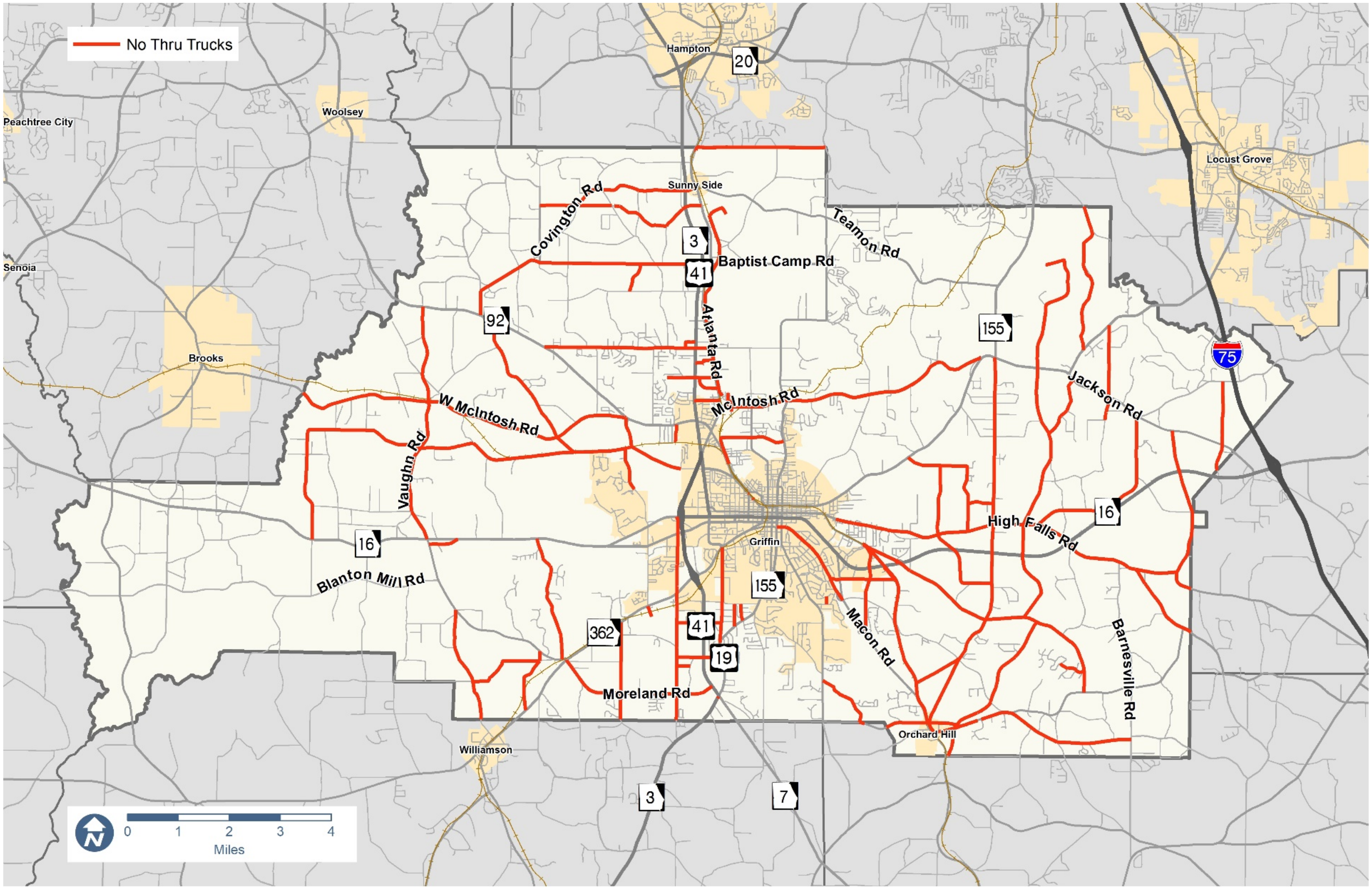
3.2.3. Functional Classification

Within the focus area for the Freight Cluster Plan, which consists of eastern Spalding County including Griffin, Spalding County has a diverse roadway network that includes one interstate highway, I-75; a limited-access expressway that serves as a bypass around the west side of Griffin; principal and minor arterial roadways, which include the regional truck route network; major and minor collectors that accommodate traffic movements between local roads and regional routes; and local roads that serve local traffic. This roadway network is illustrated in **Figure 20**.

Interstate 75 passes through the northeast corner of Spalding County between Henry and Butts counties. The portion of I-75 within Spalding County is less than two miles in distance, and there are no interchanges within the county. The closest interchange along I-75 is located along SR 16, approximately one mile east of the Spalding-Butts County line. A five-mile portion of US 19/US 41/SR 3 between Ellis Road and Kalamazoo Drive is a limited-access expressway and serves as a bypass around the City of Griffin. There are three principal arterials in the focus area. These include US 19/US 41/SR 3 located north and south of Griffin (excluding the freeway portion); US 19/US 41/SR 3 near the Spalding-Pike County line; and SR 16 from US 19/US 41/SR 3 eastward towards I-75 in Butts County.

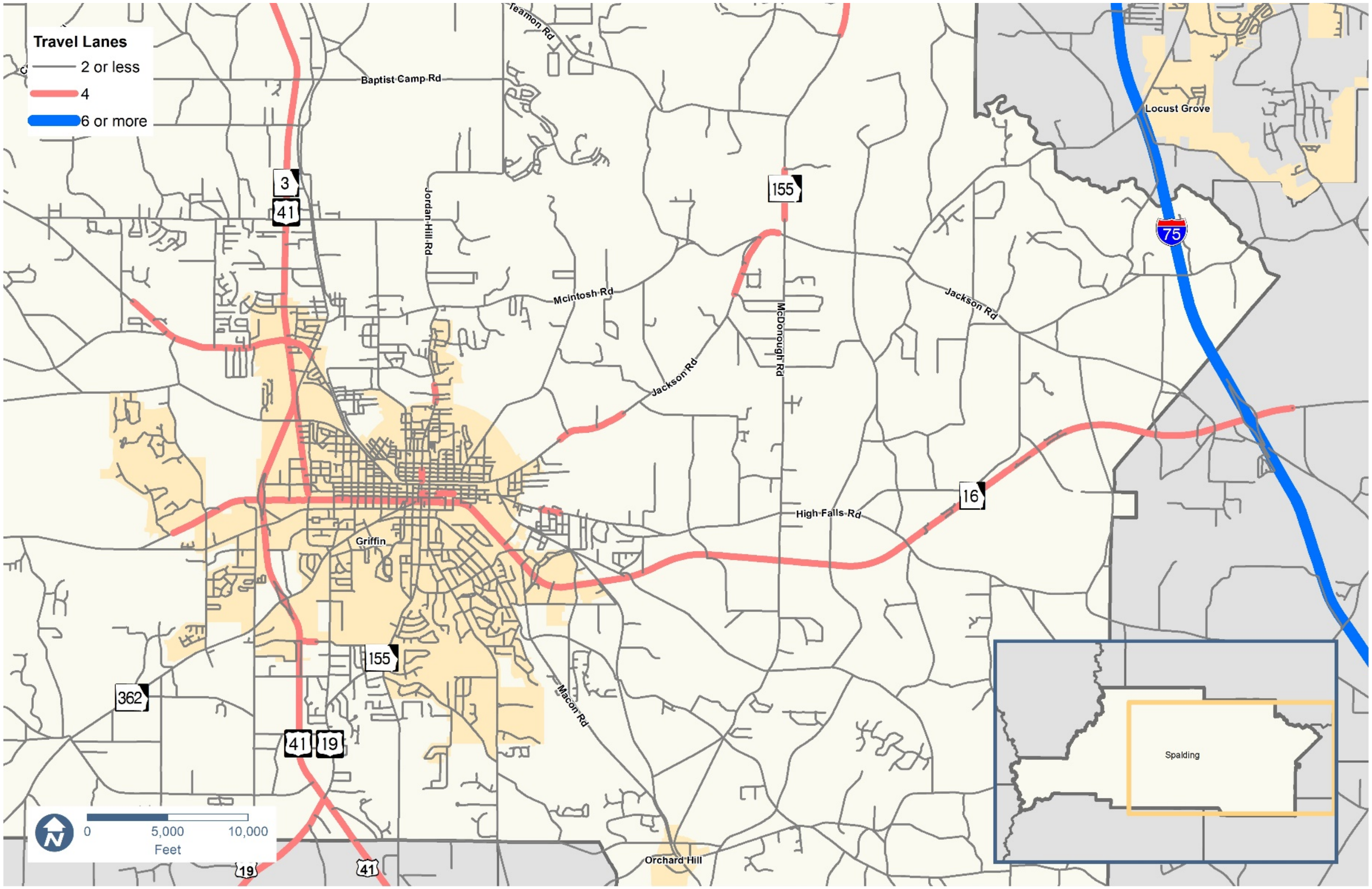
[23] Spalding County Code of Ordinances, Part VI, Article A § 6-2004 (2019) https://library.municode.com/ga/spalding_county/codes/code_of_ordinances?nodeId=DIVIICOGEOR_PTVILIRE_ARTAGEPR_S6-2004ROTRTHTR

Figure 18: Truck Route Restrictions[24]



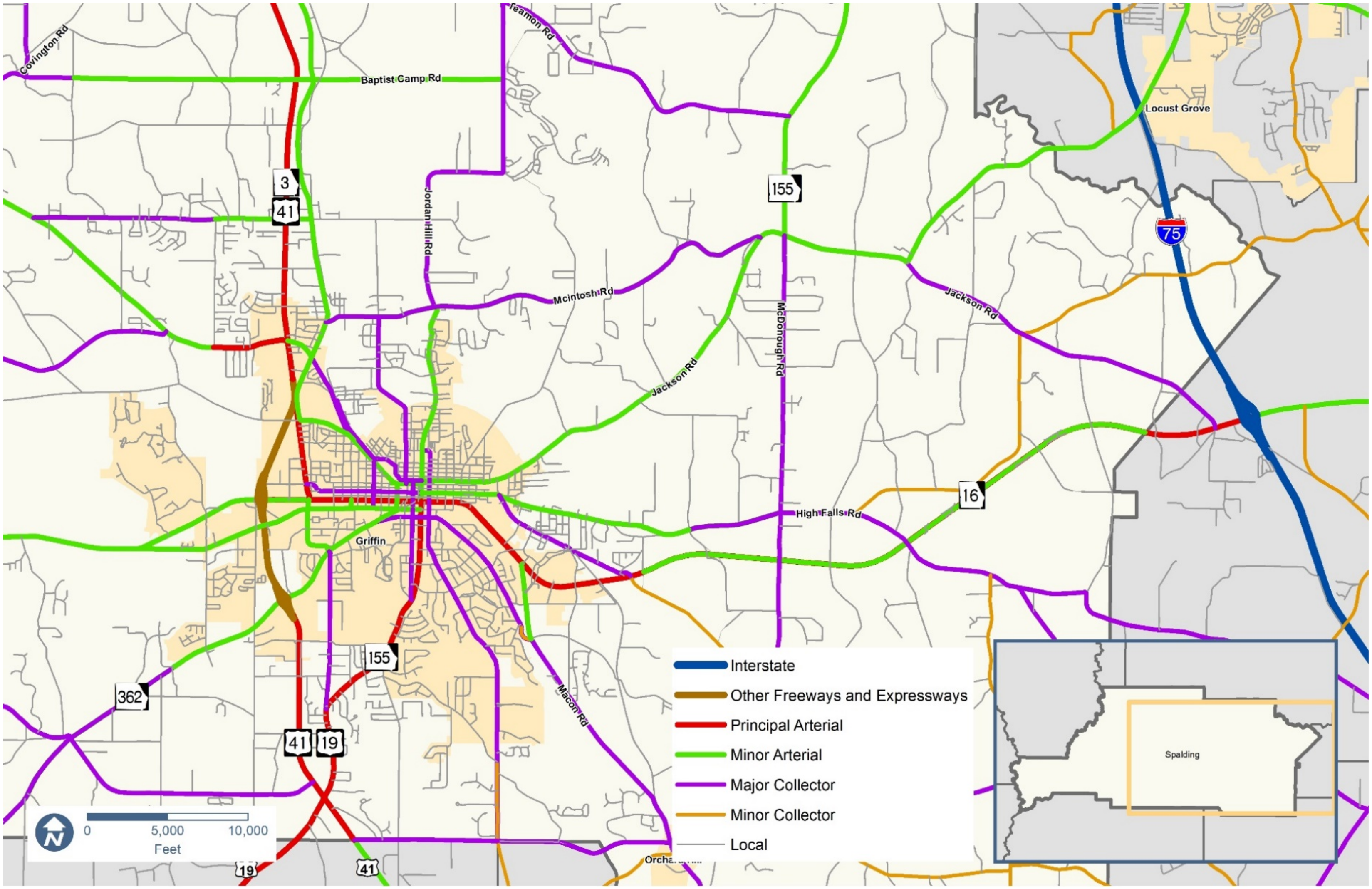
[24] Spalding County

Figure 19: Number of Lanes[25]



25 GDOT Roadway Inventory, 2017

Figure 20: Functional Classification[26]



[26] Atlanta Regional Commission

Minor arterials extend from principal arterials and are primarily located in the northern portions of the focus area. There are a limited number of minor arterials south of SR 16, and none extend into the southeast portion of Spalding County. Minor arterials in the focus area include SR 92, which extends into northwestern Spalding County; SR 16 west of Griffin; SR 155 (Jackson Road and N. McDonough Road) northeast of Griffin; Locust Grove Road, which extends from Jackson Road northeast towards the City of Locust Grove; High Falls Road west of SR 155; Baptist Camp Road/Birdie Road to the north; and Old Atlanta Road, which parallels US 19/US 41/SR 3 north of Griffin. In the City of Griffin, minor arterials include West Poplar Street; North Hill Street; East Solomon Street; East Broadway Street; Memorial Drive; Experiment Street; Meriwether Street (SR 362); and Hammond Drive.

Major collectors are dispersed across the focus area, and many serve warehouses and other freight-intensive land uses. Major collectors within Griffin include West Solomon Street; 13th Street; Quilly Street; North 9th Street; 6th Street/Maple Drive; Searcy Avenue/Rehoboth Road; and East College Street. Major collectors outside of Griffin include West McIntosh Road; East McIntosh Road; Jordan Hill Road; Moreland Road; County Line Road; Macon Road; S. McDonough Road; Swint Road; Rehoboth Church Road; High Falls Road (east of Sapelo Road); Teamon Road; and Bucksnort Road.

Minor collectors are not as prevalent as other types of roadways in the focus area but create important linkages between local roads and major roadways. Notable minor collectors include Barnesville Road, Rehoboth Road, Tomochichi Road, and Jenkinsburg Road.

The majority of roadways in the focus area consists of local roads that are either maintained by the City of Griffin or Spalding County. These primarily serve local traffic, including residential and community-oriented uses; the local roadway network has less connectivity and includes several cul-de-sacs and "dead ends," or roadways with no outlets.

3.2.4. Signalized Intersections

There are 81 signalized intersections within the focus area, which are maintained by either Spalding County or GDOT. These signalized intersections are illustrated in **Figure 21**. Most signalized intersections are concentrated within Griffin, particularly in the Downtown Griffin area. Among the designated truck routes, SR 16 has the most signalized intersections, both within Griffin and at several intersections in eastern Spalding adjacent to freight-intensive uses, including Hamilton Boulevard, Wilson Road, Green Valley Road, Rehoboth Road, McDonough Road, and High Falls Road. There are five signalized intersections along US 19/US 41/SR 3 between Baptist Camp Road and SR 16, and one signalized intersection located south of Griffin at Airport Road. Outside of Griffin, there are no traffic signals along SR 155. Within Griffin, there are five traffic signals along SR 155 in Downtown Griffin and two additional signals located at Milner Avenue and Crescent Road.

3.2.5. Bridge Conditions

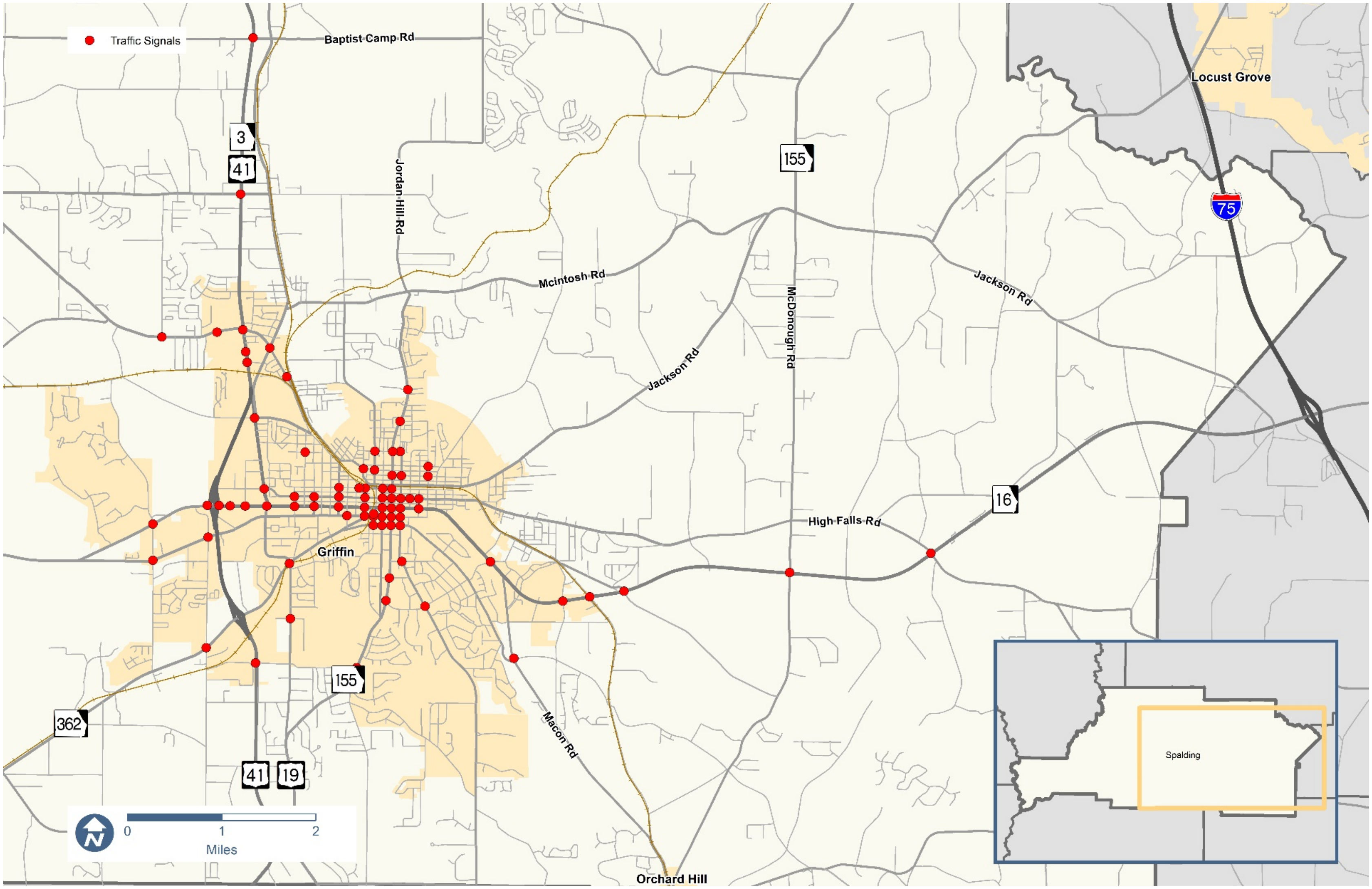
Based on the most recent data from FHWA's National Bridge Inventory (NBI) and GDOT, there are 55 roadway bridges within the focus area. Bridge conditions are depicted in **Figure 22**. Based upon bridge inspections, bridges are classified as Good, Fair, or Poor. According to the FHWA's National Bridge Inventory, based on the Pavement and Bridge Condition Performance Measures final rule (January 2017), Bridge Condition is determined by the lowest rating of National Bridge Inventory (NBI) condition ratings for Item 58 (Deck), Item 59 (Superstructure), Item 60 (Substructure), or Item 62 (Culvert). If the lowest rating is greater than or equal to 7, the bridge is classified as Good; if it is less than or equal to 4, the classification is Poor. Bridges rated 5 or 6 are classified as Fair.

Of the 55 bridges in the focus area, 14 bridges are classified as Good. Forty bridges are classified as Fair, with 11 that are load-posted, or have weight restrictions in place. One bridge, located on Jordan Hill Road at Troublesome Creek Tributary (five miles north of Griffin), is classified as Poor and is load-posted. This bridge is now currently under construction. Since this this bridge coincides with Industrial District 8 it may serve as a hub for freight activity in the county in the future. It should be noted that all bridges that fall along designated truck routes are in good or fair condition and have no weight restrictions.

Table 5: Bridges in Fair/Poor Condition with Weight Restrictions

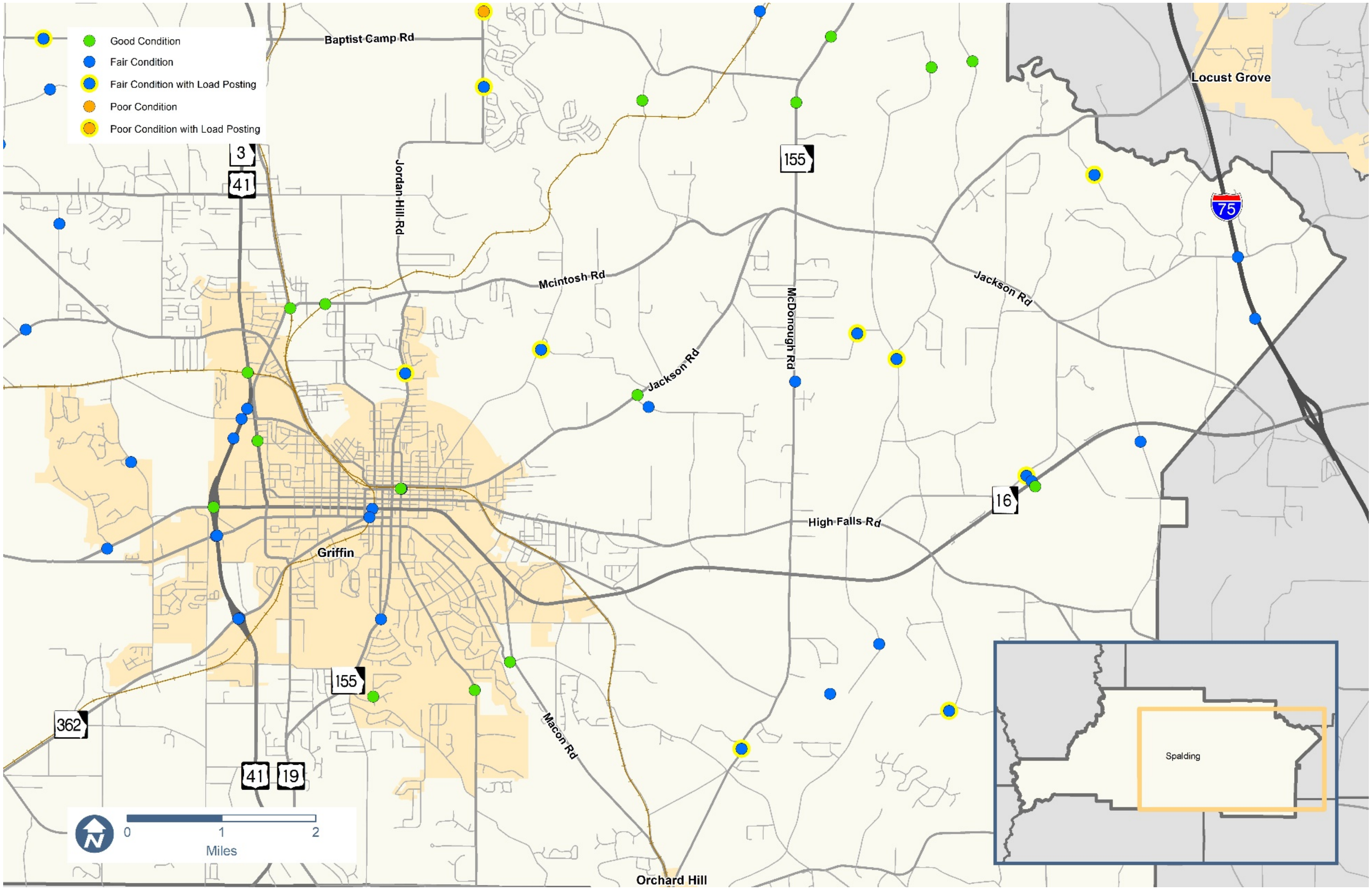
Name	Location
McDonough Road at Buck Creek Tributary	4 miles southeast of Griffin
Jordan Hill Road at Troublesome Creek	4 miles north of Griffin
Birdie Road at Griffin Reservoir Tributary	5 miles northwest of Griffin
Dutchmans Road at Cabin Creek	5 miles east of Griffin
Mangham Road at Buck Creek	3 miles northeast of Orchard Hill
Walkers Mill Road at Cabin Creek	5 miles east of Griffin
Chuli Road at Towaliga River Tributary	8 miles northeast of Griffin
Tomochichi Road at Cabin Creek	6 miles east of Griffin
Barnesville Road at Buck Creek	5 miles east of Orchard Hill
N. 2nd St Extension at Cabin Creek	2 miles northeast of Griffin
Hill Street at Cabin Creek	In Griffin

Figure 21: Signalized Intersections[27]



[27] GDOT and City of Griffin

Figure 22: Bridge Condition in Focus Area[28]



[28] FHWA National Bridge Inventory (NBI)

3.2.6. ITS and Connected Infrastructure

There are initiatives ongoing at the national and state level to utilize intelligent transportation systems (ITS) and connected infrastructure to advance traffic management and safety operations. At the regional level, the Atlanta Regional Commission (ARC) is currently updating its Regional ITS Architecture, which specifies ITS elements and connections for the 20-county region of the MPO. Within the Regional ITS Architecture, Spalding County has not identified any ITS inventory nor upcoming or ongoing ITS projects. The robustness of ITS elements across the Atlanta region, including those identified for freight, presents an opportunity for Spalding County to identify ITS and connected infrastructure elements that would improve freight operations and safety in the county.

The 2016 Griffin-Spalding County Comprehensive Transportation Plan (CTP) Update discussed the need for an ITS Master Plan for the county. While an ITS Master Plan was not developed, in 2009 Spalding County had signal upgrades programmed at 24 locations over two different phases at a cost of approximately $4 million.

On the state level, GDOT administers the Regional Traffic Operations Program (RTOP); however, since Spalding County is relatively rural compared to other portions of the Metro Atlanta area, it does not contain an RTOP Corridor. The nearest RTOP corridor is US 19/US 41/SR 3 in Henry County which ends near the Spalding County line. One of the challenges cited in the CTP Update is the difference between ownership and operations of traffic signal equipment between the City of Griffin and unincorporated Spalding County. Signalized intersections outside the Griffin area are largely under the control of GDOT since most are along state and federal routes.

3.2.7. Pavement Conditions

Due to the weight of commercial trucks, corridors that carry a significant volume of heavy trucks tend to have pavement that deteriorates at a faster rate compared to other roadways. Spalding County and the City of Griffin utilize two different but comparable scales to evaluate pavement condition; the county uses the Pavement Surface Evaluation & Rating (PASER) System on a scale of 0 to 100, and the city uses a Pavement Condition Index (PCI) on a scale of 0 to 10. GDOT uses a similar evaluation method, Overall Condition Index (OCI), for state roadways in Spalding County on a scale of 0 to 100. For this assessment, in order to compare pavement condition of roadways countywide, PCI scores provided by Griffin have been normalized by a factor of 10 (i.e., such that a PCI score of "1" is considered as "10"), and each of the ratings are reported as pavement scores. Scores that fall below 70 indicate the need for rehabilitation of pavement, including repair and resurfacing. The normalized pavement scores for all roadways in Spalding County are shown in **Figure 23.**

Designated Truck Routes

Each of the designated truck routes throughout Spalding County has a pavement score greater than 70. Northbound US 19/US 41/SR 3 throughout Spalding County carries the lowest score of 72, indicating that it will need rehabilitation soonest, prior to the other designated truck routes.

If SR 155 were to be relocated from Jackson Road to N. McDonough Road and S. McDonough Road to serve as a bypass for trucks around Griffin (GDOT PI 0008682), then S. McDonough Road would need to undergo rehabilitation. Currently, the corridor has a pavement score of 66 between High Falls Road and Johnston Road.

Roadways in Industrial Districts

For this assessment, Industrial Districts have been identified as shown in **Figure 23.**

Industrial Districts 1, 2, 3, 4, 5, and 6 are served by two arterial roadways: SR 362 and US 19/US 41/SR 3. In the vicinity of these Industrial Districts, SR 362 has a pavement score of 88 west of US 19/US 41/SR 3, and 49 to 60 east of US 19/US 41/SR 3. US 19/US 41/SR 3 has a pavement score of 72. While some local roads that serve these Industrial Districts have pavement scores greater than 70, many fail to meet that threshold. Local roadways in need of rehabilitation include the following.

Table 6. Roadways in Need of Pavement Rehabilitation in Industrial Districts 1-6

Roadway	Limits	Pavement Score	Industrial District(s) Served
Lakeside Drive	Moreland Road to SR 362	32 - 38	1
S. Pine Hill Road	SR 16 to SR 362	58 - 60	1, 3
Carver Road	Newnan Road to Louise Anderson Drive	40	4
Justice Boulevard	SR 362 to Southern Drive	53	5
Southern Drive/DF Fuller Drive	West of Hammond Drive	30	5
Everee Inn Road	SR 362 to US 19 Business/SR 155	59	6

Industrial Districts 7, 8, 9, 10, and 11 are served by SR 16. In the vicinity of these Industrial Districts, SR 362 has a pavement score ranging from 83 to 85. While some local roads that serve these Industrial Districts have pavement scores greater than 70, many fail to meet that threshold. Local roadways in need of rehabilitation include the following.

Table 7. Roadways in Need of Pavement Rehabilitation in Industrial Districts 7-11

Roadway	Limits	Pavement Score	Industrial District(s) Served
Memorial Drive / Macon Road / Old Macon Road	SR 16 to Johnston Road	47	7
Wilson Road	Macon Road to Searcy Avenue	47	7, 8
Greenbelt Avenue	--	40	7, 8
Hudson Road	--	40 - 63	7, 9
Green Valley Road	Rehoboth Road to Johnston Road	63	9, 10
S. McDonough Road	High Falls Road to Rehoboth Road	66	10
Newton Road	--	61	11

Industrial District 12 is served by N. Hill Street. In the vicinity of this Industrial District, N. Hill Street has a pavement score of 65. The two local roads that directly serve this district have pavement scores that fall below 70, indicating that they need rehabilitation. Thomas Packing Company Road has a pavement score of 30, and Emlet Drive has a pavement score of 40.

Table 8. Roadways in Need of Pavement Rehabilitation in District 12

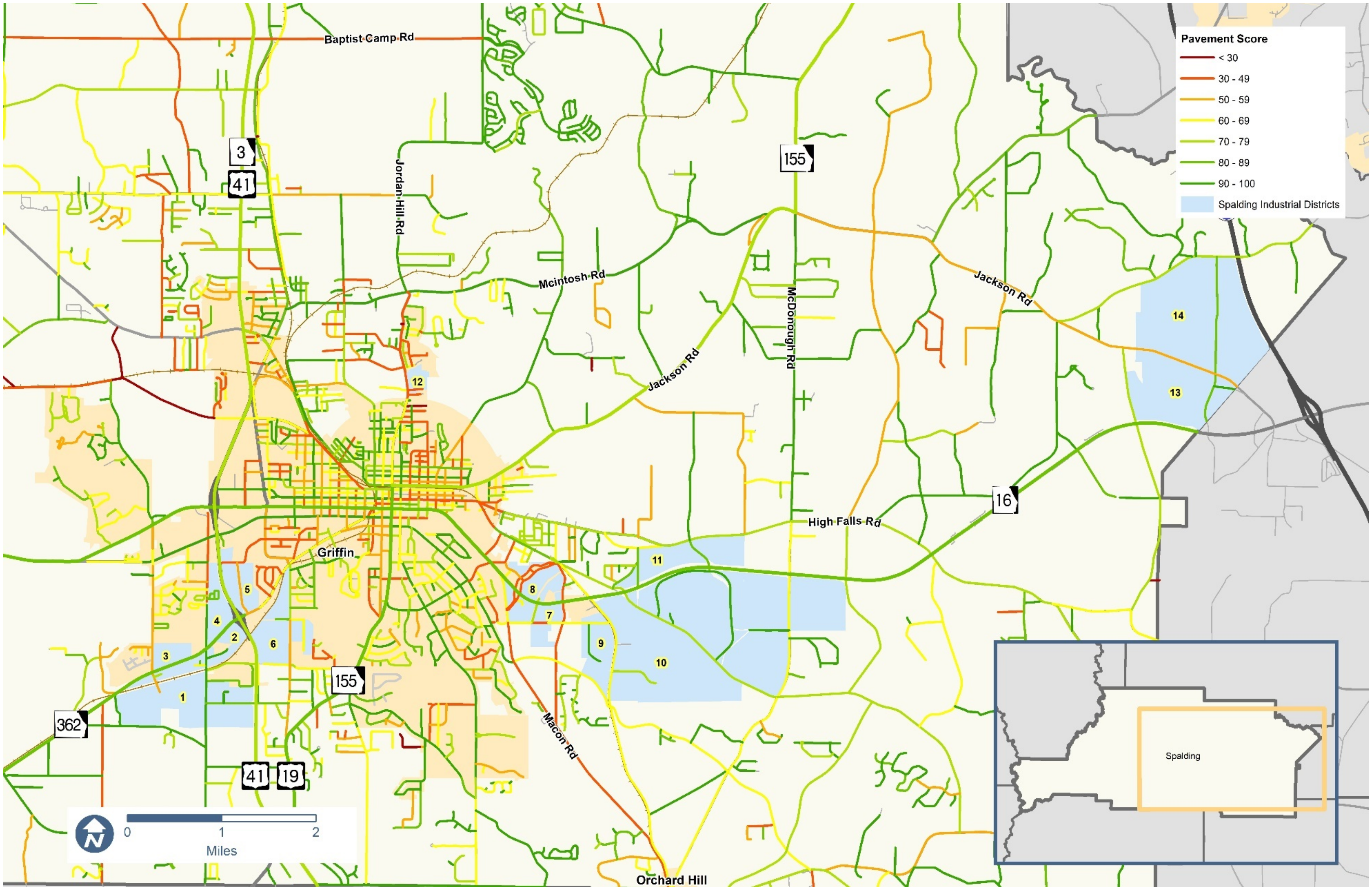
Roadway	Limits	Pavement Score	Industrial District(s) Served
N. Hill Street	Northside Drive to Bourbon Street	65	12
Thomas Packing Company Road	--	30	12
Emlet Drive	--	40	12

Industrial districts 13 and 14 are served by SR 16. In the vicinity of these industrial districts, SR 16 has a pavement score of 85. While most local roads that serve these industrial districts have pavement scores greater than 70, one roadway fails to meet that threshold. Jackson Road between Bailey Jester Road and the Butts County line has a pavement score of 53, indicating that it needs rehabilitation.

Table 9. Roadways in Need of Pavement Rehabilitation in Industrial Districts 13-14

Roadway	Limits	Pavement Score	Industrial District(s) Served
Jackson Road	Bailey Jester Road to Butts County Line	53	13, 14

Figure 23. Pavement Conditions



3.2.8. Vulnerable Transportation Assets

Another consideration for the overall network is its vulnerability to disasters. In Spalding County that primary threat would be flooding, given the fact it is not in a coastal area. To assess the vulnerability of key transportation assets, the major facilities throughout the County were compared to flood zones in the County. As shown in **Figure 24**, all of the major roadways are adequately served by bridges where floodplains exist.

3.2.9. Alternative Fuel Facilities

Promoting the use of alternative and cleaner fuels is a priority of FHWA and the ARC. The US Department of Energy has identified one alternative fuel site within Spalding County – an electronic fuel station at Chronic Nissan on US 19/US41/SR 3 – which has no impact on freight traffic in the County.

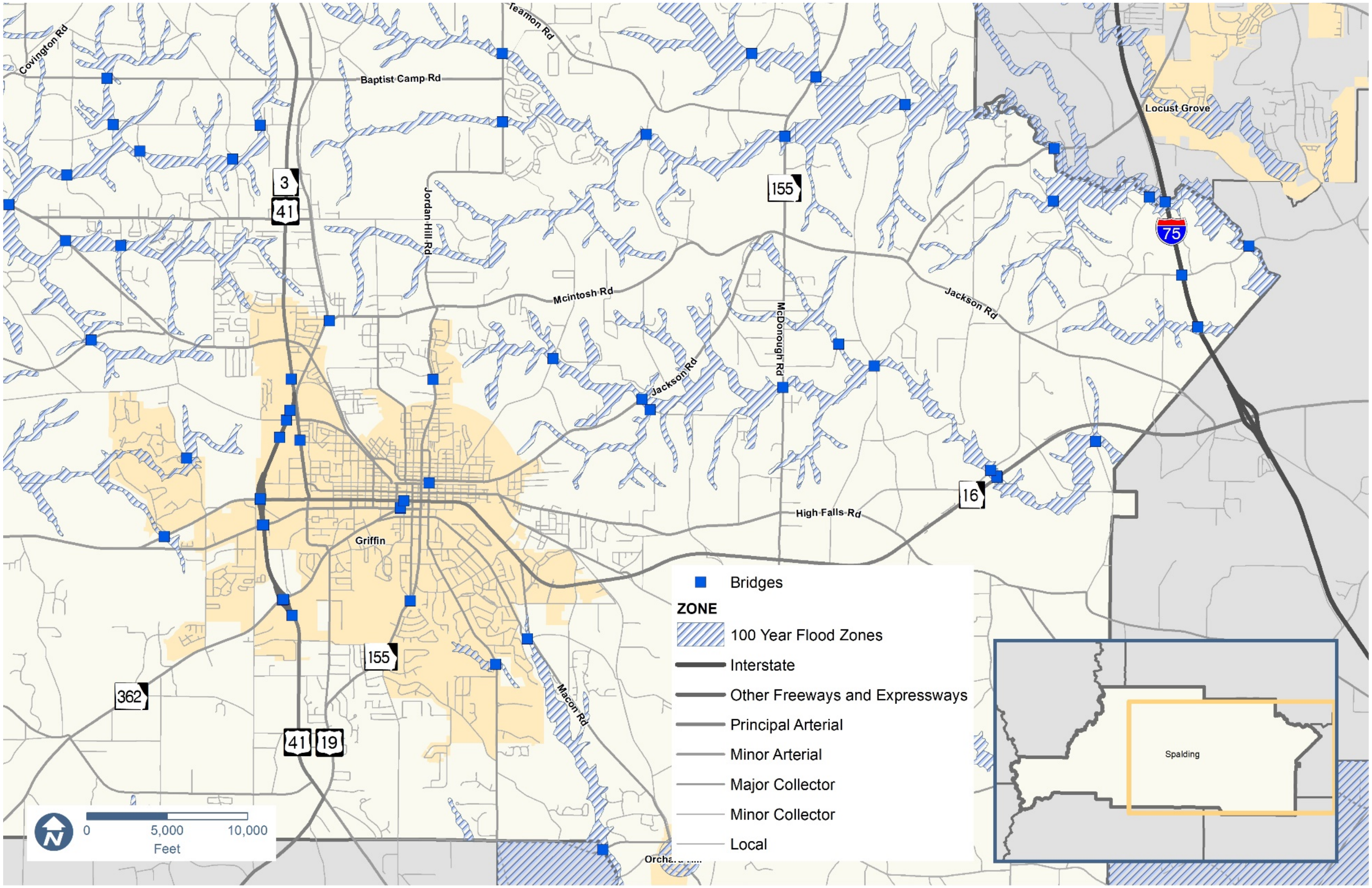
3.2.10. Network Connectivity and Resiliency

One of the biggest problems plaguing the currently built-out Atlanta region, and most of urban America, is the general lack of a resilient network – not enough collectors or arterials to serve as relief valves for freeways and expressways. Judging from aerial photos, Spalding County already has enough scattered development that it will be impossible to create an ideal network for adequate circulation at build out. But that does not mean Spalding cannot have a far more robust network. The large amount of relatively undeveloped land presents the opportunity to identify and preserve a great many corridors that will eventually be needed.

However, there are many challenges associated with identifying and preserving corridors that may not be needed for decades, including a lack of funding and organization for planning and corridor preservation. But the most significant need is to muster political will to “show a line on a map” that could gain negative attention from nearby residents. Even if there is resistance, you can confidently report that many corridors are decades away from construction. It is not the purpose of this memo or this plan to solve the funding or organizational challenges required to ensure Spalding County will ultimately obtain the infrastructure they will need for freight and general mobility.

During the development of potential improvements, corridors will be assessed for their potential to provide parallel relief to major roadways such as SR 16, SR 155 and US 19/US 41/SR 3 to not only serve the County through 2040, but ultimately at build out.

Figure 24. Vulnerable Transportation Assets



3.3. Existing Travel Characteristics

3.3.1. Roadway Volumes

Within the focus area, the highest roadway traffic volumes in Spalding County are observed along I-75 and on principal and minor arterials in and around Griffin. In 2017, the portion of I-75 that traverses northeast Spalding County carried annual average daily traffic (AADT) of 82,900 vehicles per day. Among the arterials in and around Griffin, US 19/US 41/SR 3 carries the most traffic; in 2017, the roadway carried between 31,200 and 33,850 vehicles per day between SR 16 and Baptist Camp Road, and 21,900 to 27,900 vehicles from SR 16 to Zebulon Road. Within Griffin, SR 16 carries 22,400 vehicles per day between US 19/US 41/SR 3 and S. Hill Street. Roadway traffic volumes are shown in **Figure 25**

3.3.2. Congestion

Levels of existing traffic congestion have been derived based on data from the ARC activity-based travel demand model (ABM), with 2015 as the base year for analysis. According to the Transportation Research Board's Highway Capacity Manual (HCM), level of service, or LOS, is a quantitative categorization of roads based on performance measures representing quality of service such as volume and capacity. The HCM classifies six different LOS levels ranged A through F, with LOS A as the best operating conditions for travelers while LOS F is the worst.[29] LOS for 2015 in Spalding County is depicted in **Figure 26.**

Most roadways in Spalding County exhibit LOS A or B in 2015. A few corridors in and around Griffin, are at LOS C. The highest traffic congestion in the county, LOS D, is exhibited along SR 155 from Jackson Road to the northern county boundary; and limited portions of Newnan Road, US 19/US 41/SR 3, and East Broadway Street in Griffin. Note that congestion experienced in reality is often quite different than those shown in models, but the models are generally good indicators of emerging problem areas.

3.3.3. Truck Travel Characteristics

Truck travel characteristics along designated truck routes have been derived from the most recent GDOT classification traffic counts available (2018 and 2019). Truck traffic counts at GDOT count locations are shown in **Figure 27**.

The US 19/US 41/SR 3 and SR 16 corridors carry the most substantial truck traffic. US 19/US 41/SR 3, which provides a north-south connection to Henry County to the north and Pike and Lamar Counties to the south, carries the highest traffic volume within the focus area and therefore the greatest volume of trucks. North of SR 16, truck volume ranges from 2,650 to 2,925 average daily trucks; just south of SR 16, the corridor reaches a peak of 3,350 trucks per day. South of Griffin, at the intersection with SR 155, truck volume drops substantially to 1,625 average daily trucks. SR 16, which provides a connection to I-75 in Butts County to the east and Coweta County to the west, carries a lower volume of trucks but notably has the highest truck percentages within the focus area. West of Green Valley Road, SR 16 carries 1,325 to 2,200 average daily trucks, representing 11 to 16 percent of total traffic, respectively. Truck volume along SR 16 drops as the corridor approaches Griffin from the west and rises once more just west of Griffin near W. Poplar Street (1,250 average daily trucks, or 13.2 percent of total traffic). The

[29] Transportation Research Board (2018). Highway Capacity Manual Version 6.0. p. 5-3.

SR 155 truck route, which connects Griffin to northern Spalding and Henry County, carries the lowest volume of trucks, ranging from 350 to 550 average daily trucks (3.7 to 5 percent of total traffic).

The SR 16 corridor carries the greatest percentage of trucks compared to total vehicles. The highest percentages are observed between Green Valley Road and the Spalding-Butts County line near I-75 (11 to 16 percent trucks), and between W. Poplar Street and SR 92 in Griffin (10 to 13 percent trucks). Within Downtown Griffin, truck percentages fall below 10 percent.

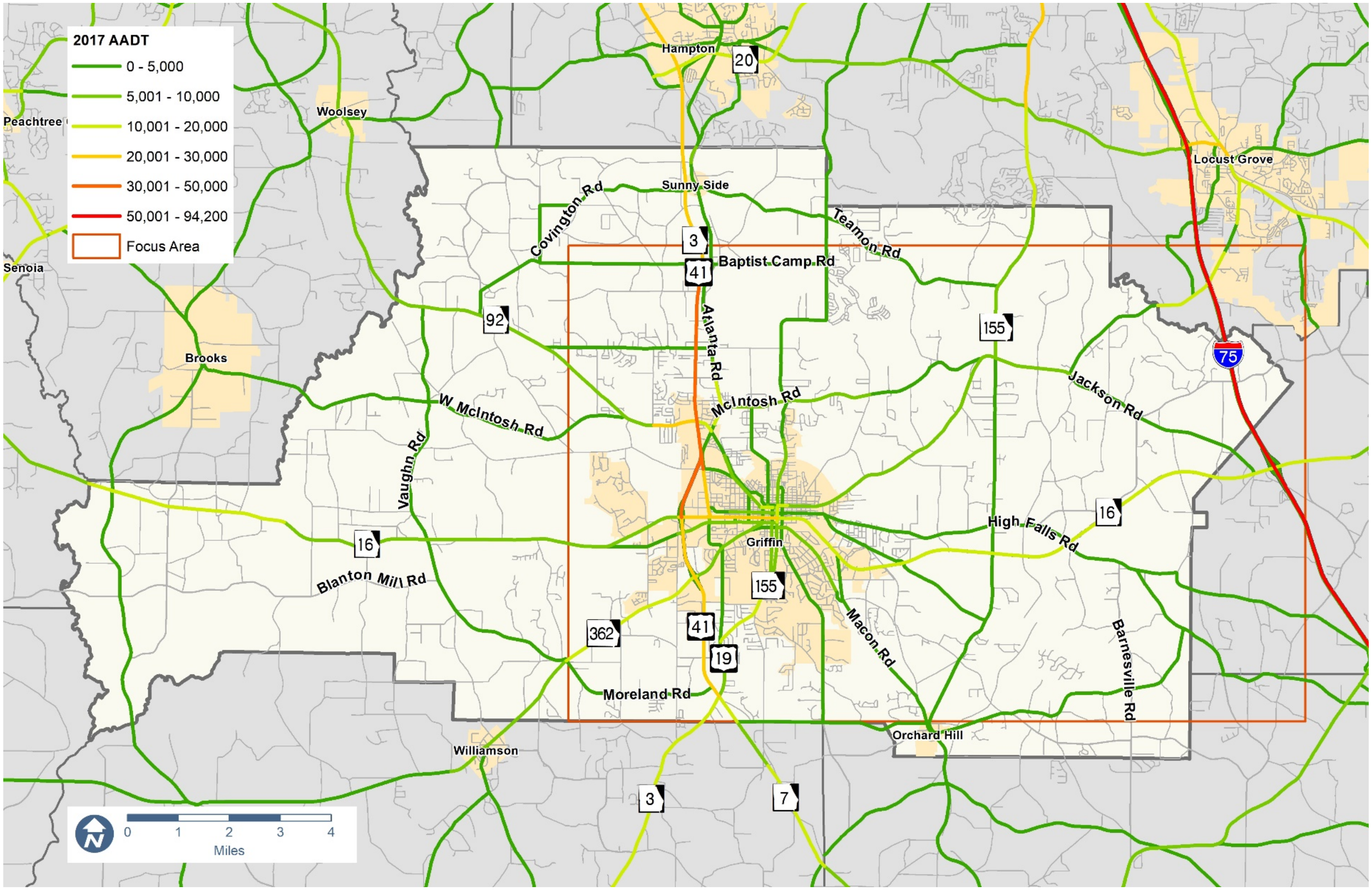
With respect to freight origins and destinations, no quantitative data was collected given the relatively small industrial district within the Spalding focus area. However, interviews with manufacturers within the Lakes at Green Valley revealed the importance of SR 16 and I-75 in order to provide access from the Port of Savannah. With an industrial base comprised primarily of manufacturing uses, preserving the access to the Port will be critical to preserving and expanding the viability of the Spalding manufacturing base.

While it does not carry significant truck volumes, it should be noted that the intersection of Broadway and Hill Street along SR 155 has been identified as a problem spot for truck traffic and downtown mobility.

3.3.4. Truck Parking

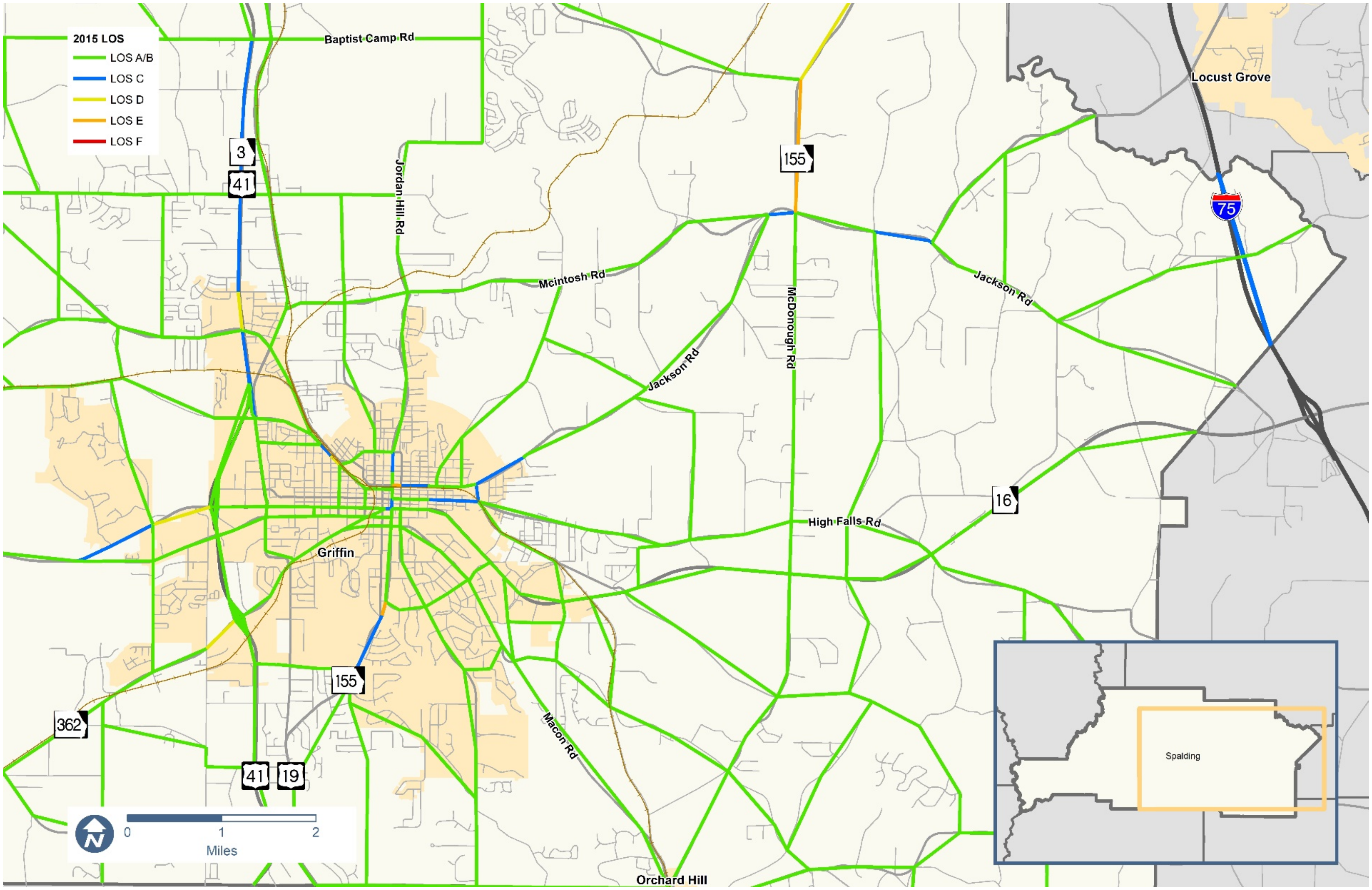
Truck parking facilities were identified through a review of the Atlanta Regional Truck Parking Assessment Study (summarized in Section 2.4) and input from the Spalding County Community Development Department. As shown in Figure 4 (on page 6), there were no truck parking facilities in Spalding County. It should be noted that a nearby facility is located at the I-75 Interchange of SR 36 in nearby Butts County. Additionally, a new JC Travel Center opened at the I-75 interchange at SR 16. Interviews with local staff revealed no areas of illegal truck parking.

Figure 25: 2017 Roadway Volumes (AADT)[30]



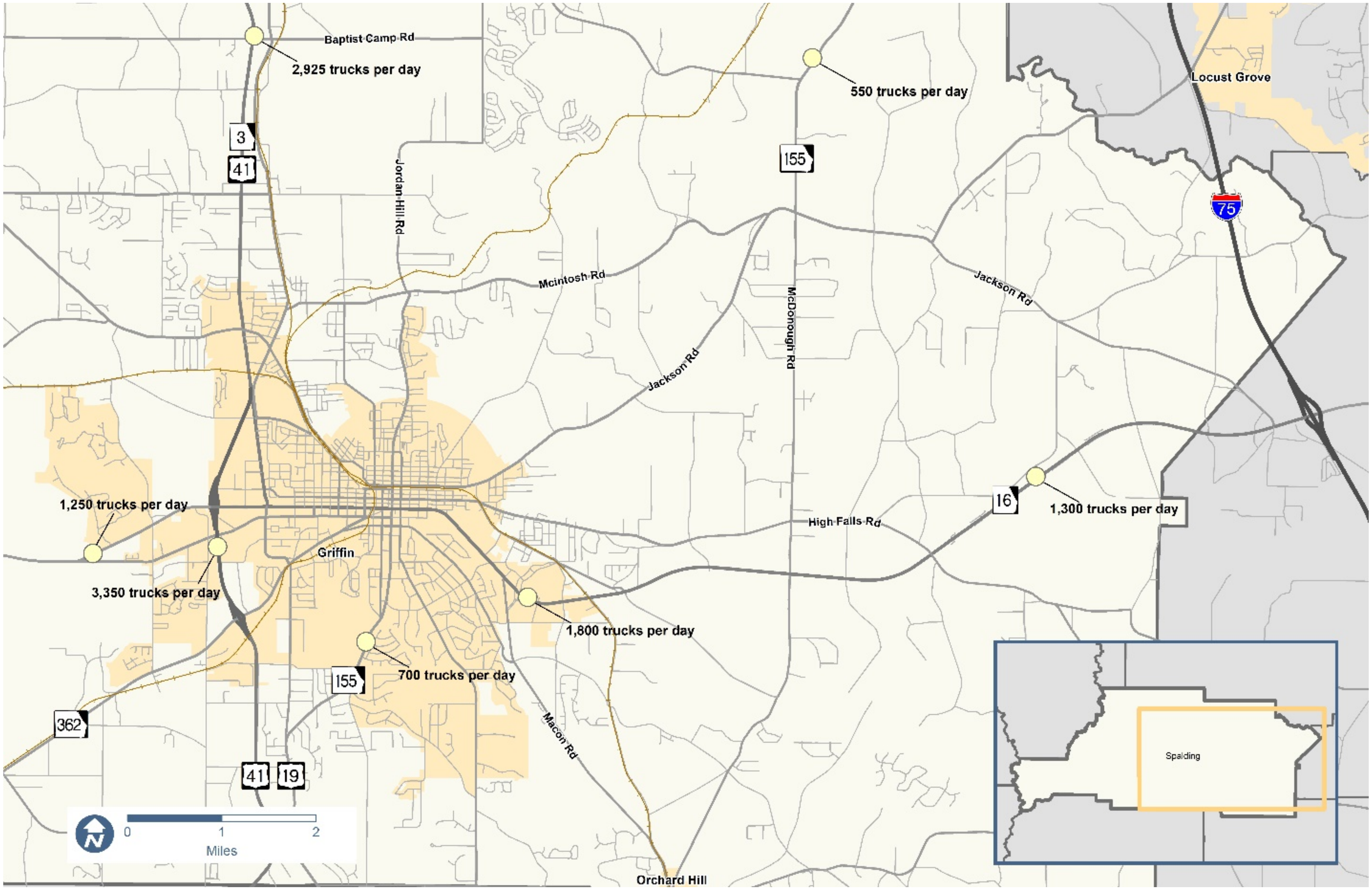
30 GDOT Traffic Analysis & Data Application (TADA)

Figure 26: 2015 Roadway Congestion (LOS) Map[31]



[31] Atlanta Regional Commission (Activity-Based Model)

Figure 27: Truck Volume (2018/2019)[32]



32 GDOT Traffic Analysis & Data Application (TADA)

3.4. Safety Assessment

Given the relative lack of congestion throughout the County, it can be assumed that most delays within the City are due to operational deficiencies. Safety issues are often a clear indicator of operational issues. The following section examines crashes involving commercial vehicles for a five-year period (2014-2018) within the focus area. This includes analysis for 1) all crashes as well as 2) crashes along truck routes.

3.4.1. Focus Area Crashes

Between 2014 and 2018, within the focus area, there were 191 crashes involving a tractor-trailer or other type of commercial vehicle on non-interstate routes. These are shown in **Figure 28**.

The greatest concentrations of commercial crashes occurred along US 19/US 41/SR 3 and SR 16 in Griffin, particularly at intersections with arterials and collector roadways. The majority of crashes were rear-end crashes (27.7 percent), angle crashes (27.2 percent), and collisions with an object other than a motor vehicle, including deer, other animals, trees, and other objects on the roadside (22.0 percent). The rate of crashes with objects other than vehicles can be attributed to the rural character found throughout much of the focus area, which is characterized by two-lane roadways in areas with more wildlife than typically found in urban areas. Table 10 shows commercial vehicle crashes by type.

Over two-thirds of crashes involved property damage only (PDO), and nearly one-third of crashes resulted in at least one injury. Four crashes involving commercial vehicles were fatal. One of these fatal crashes involved a bicyclist; a truck struck a bicyclist on Vineyard Road near Fleetwood Drive (just west of US 19/US 41/SR 3), resulting in fatal injuries to the bicyclist.

Table 11 shows commercial vehicle crashes by severity.

Table 10.Commercial Vehicle Crashes by Type[33]

Year	Crash Type							Total Crashes
	Angle	Head On	Rear End	Sideswipe -Same Direction	Sideswipe -Opposite Direction	Not A Collision with Motor Vehicle	Not Specified	
2014	9	0	8	2	2	5	0	**26**
2015	10	1	12	5	3	13	0	**44**
2016	7	0	11	2	7	5	0	**32**
2017	15	1	10	6	5	11	0	**48**
2018	11	0	12	9	1	8	0	**41**
Total	**52**	**2**	**53**	**24**	**18**	**42**	**0**	**191**
	27.2%	**1.0%**	**27.7%**	**12.6%**	**9.4%**	**22.0%**	**0.0%**	**100.0%**

[33] **GDOT GEARS Crash Database.**

Table 11. Commercial Vehicle Crashes by Severity

Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	15	11	0	**26**
2015	29	15	0	**44**
2016	21	10	1	**32**
2017	39	8	1	**48**
2018	26	13	2	**41**
Total	**130**	**57**	**4**	**191**
	68%	**30%**	**2%**	**100.0%**

When crashes do occur on truck routes and cause backups or delays, trucks and other vehicles traveling in the area are known to seek alternative routes, adding to the existing levels of congestion on roadways. Therefore, addressing these common crash locations with safety and infrastructure improvements will help reduce the likelihood or frequency of drivers using alternate, parallel routes. Crash hotspots, or areas of high crash concentration, coincide with major intersections and freight-intensive land uses in the focus area. These include, but are not limited to, the junctions of US 19/US 41/SR 3 and Airport Road, US 19/US 41/SR 3 and SR 362, US 19/US 41/SR 3 and SR 92 (W. McIntosh Road), SR 16 and Green Valley Road, SR 16 and S. McDonough Road, and SR 16 and High Falls Road.

3.4.2. Crashes along Truck Routes

SR 16

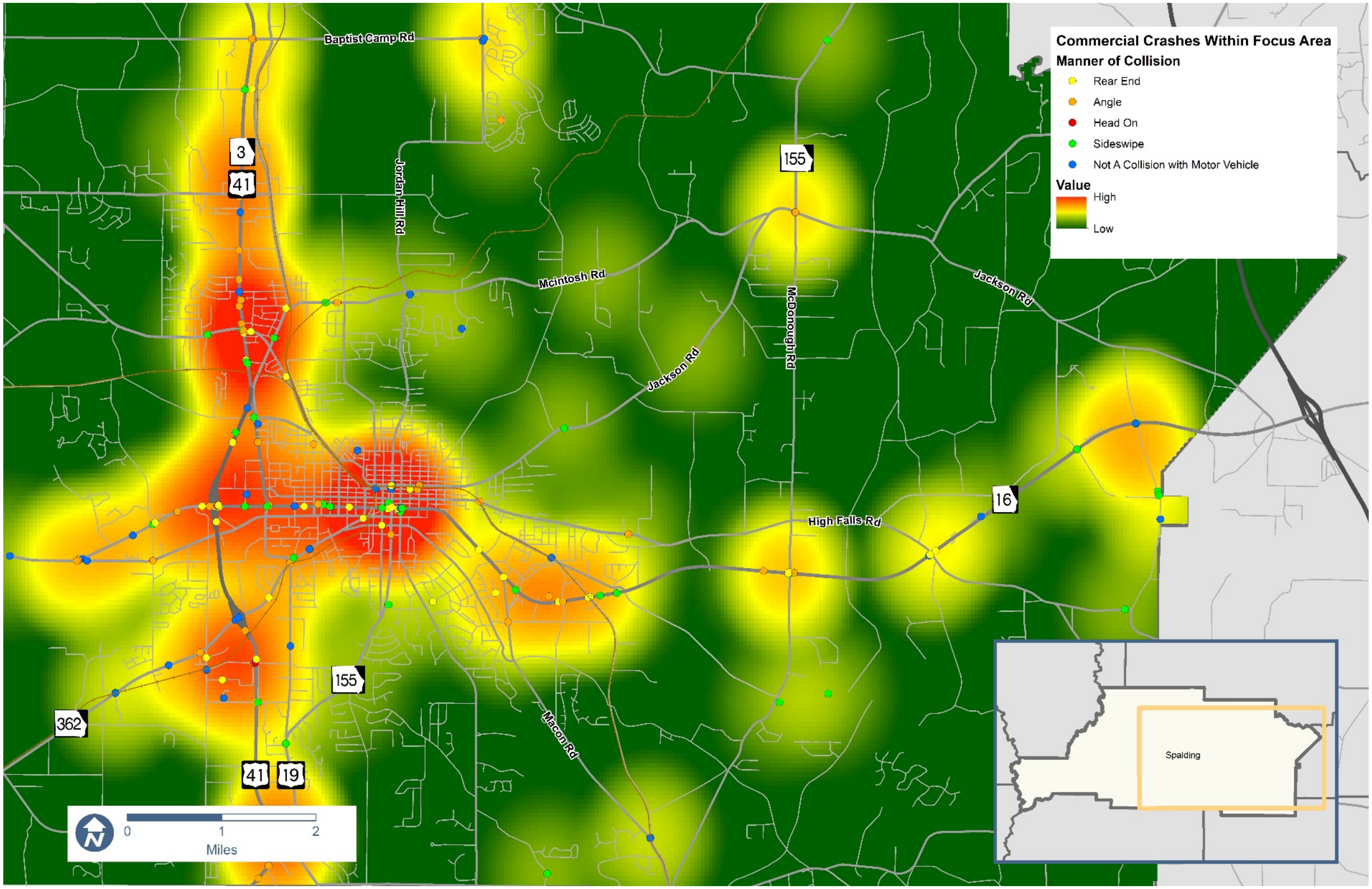
Of the 191 commercial crashes in the focus area from 2014 to 2018, 52 crashes, or 27 percent of all commercial crashes, occurred along SR 16.[34] The most prevalent crash type was rear-end crashes (35 percent), indicating that they are likely attributed to traffic congestion. The other commercial crashes were sideswipes (23 percent), angle (21 percent), and collisions with objects other than a motor vehicle (21 percent), including deer, other animals, trees, and other objects on the roadside.

US 19/US 41/SR 3

Of the 191 commercial crashes in the focus area from 2014 to 2018, 24 crashes, or 13 percent of all commercial crashes, occurred along US 19/US 41/SR 3.[35] The most prevalent crash type was angle crashes (38 percent), which may be attributed to sight distance issues, intersection geometry, or the need for signal control at unsignalized intersections. The other commercial crashes along US 19/US 41/SR 3 were rear-ends (29 percent), collisions with objects other than a motor vehicle, including deer, other animals, trees, and other objects on the roadside (25 percent), and sideswipes (8 percent).

[34] Includes commercial crashes within 50 feet of the corridor, including intersections
[35] Includes commercial crashes within 50 feet of the corridor, including intersections

Figure 28: Commercial Crash Locations[36]



36 GDOT GEARS Crash Database.

SR 155

Of the 191 commercial crashes in the focus area from 2014 to 2018, 14 crashes, or 7 percent of all commercial crashes, occurred along SR 155.[37] The most prevalent crash type was angle crashes (50 percent), which may be attributed to sight distance issues, intersection geometry, or the need for signal control at unsignalized intersections. The other commercial crashes along US 19/US 41/SR 3 were sideswipes (28 percent), collisions with objects other than a motor vehicle, including deer, other animals, trees, and other objects on the roadside (14 percent), and rear-ends (7 percent).

3.5. Commute Characteristics

The mean travel time to work for Spalding County workers (age 16 and over) is 29.0 minutes.[38] This commute time is the lowest compared to workers in neighboring Pike, Lamar, Butts, Fayette, and Henry Counties. Almost half of Spalding County workers (45.3 percent) have travel times to work under 30 minutes.[39] Nearly one-third of workers in Spalding County (27.7 percent) spend 10 to 19 minutes traveling to work, and over one-fifth (22.8 percent) have a commute travel time of 30 to 44 minutes.[40]

Table 12: Travel Time to Work[41]

Travel Time to Work	Percent Estimate
Less than 10 minutes	9.0%
10-19 minutes	27.7%
20-29 minutes	17.6%
30 - 44 minutes	22.8%
45 - 59 minutes	11.1%
60 or more minutes	11.9%

The majority of employed Spalding County residents commute outside the county for employment. Among the estimated 27,301 residents of working age who live in Spalding County, 75 percent are employed outside of Spalding County, and 25 percent, or approximately 6,827 residents, are employed within Spalding County. **Figure 29** shows the top locations of work among employed Spalding County residents. Of the 75 percent of residents who leave the county for work, the greatest proportion travel to Fulton County, followed by Henry County and Clayton County.

[37] Includes commercial crashes within 50 feet of the corridor, including intersections
[38] American Fact Finder (2017). Table S0801: Commuting Characteristics - 2013-2017 ACS 5-Year Estimates.
[39] Ibid.
[40] Ibid.
[41] Ibid.

Table 13: Top Places of Work for Spalding County Residents (2002-2017)[42]

Location	Count	Share
Spalding County, GA	6,827	25.0%
Fulton County, GA	3,921	14.4%
Henry County, GA	2,867	10.5%
Clayton County, GA	2,119	7.8%
Cobb County, GA	1,539	5.6%
Fayette County, GA	1,349	4.9%
DeKalb County, GA	1,332	4.9%
Gwinnett County, GA	900	3.3%
Coweta County, GA	575	2.1%
Troup County, GA	479	1.8%
All Other Locations	5,393	19.8%

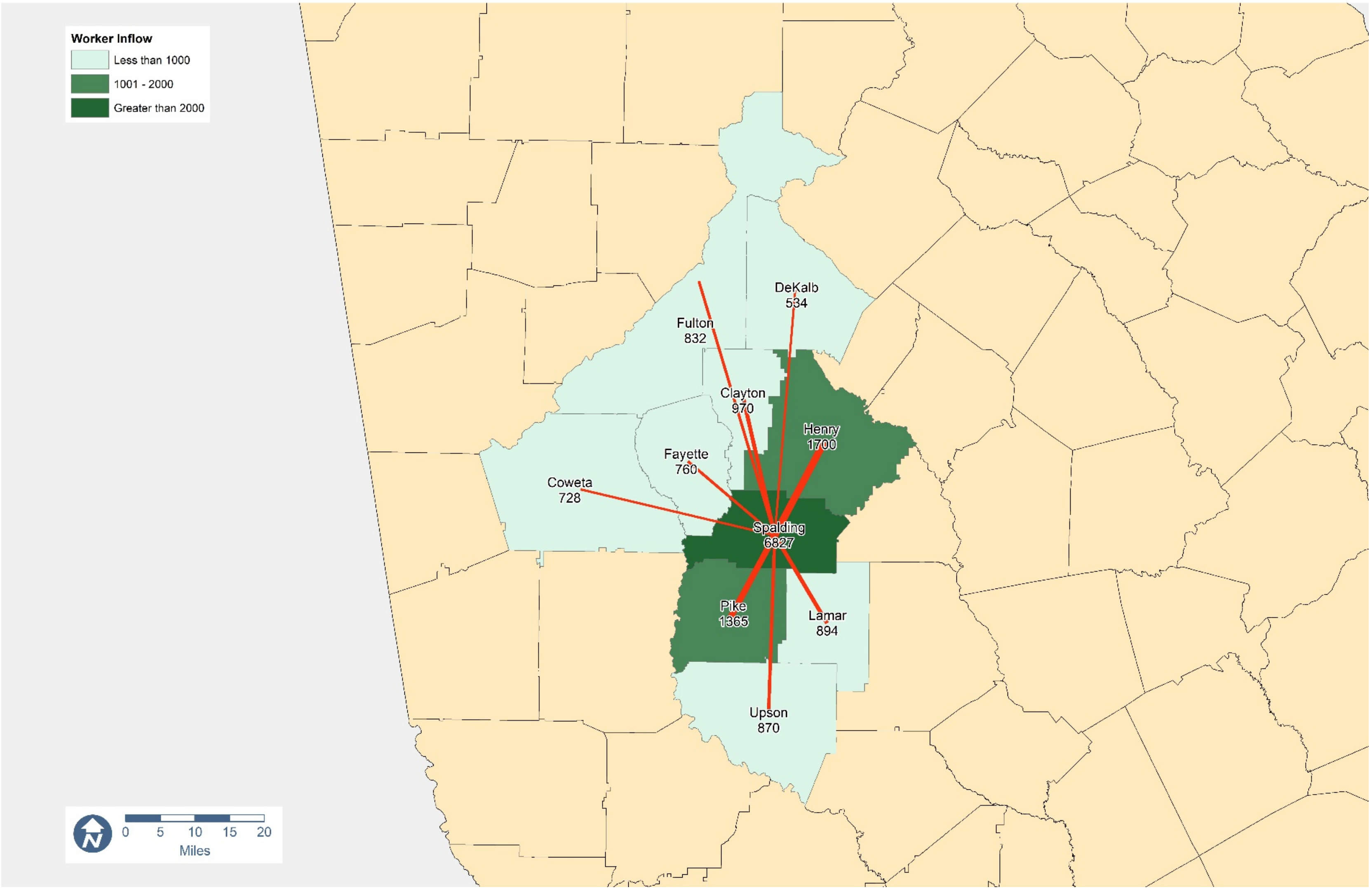
Most of Spalding County's workforce resides outside of the county and travels into the county for work. Of the estimated 23,260 workers employed in Spalding County, nearly one-third (29.4 percent) live within the county, and 70.6 percent commute from outside of Spalding County. Of the 70.6 percent of workers who live outside Spalding County, the greatest number of workers travel from Henry County, followed by Pike County. **Figure 30** illustrates the top places of residence for Spalding County workers.

Table 14: Top Places of Residence for Spalding County Workers (2002-2017)[43]

Location	Count	Share
Spalding County, GA	6,827	29.4%
Henry County, GA	1,700	7.3%
Pike County, GA	1,365	5.9%
Clayton County, GA	970	4.2%
Lamar County, GA	894	3.8%
Upson County, GA	870	3.7%
Fulton County, GA	832	3.6%
Fayette County, GA	760	3.3%
Coweta County, GA	728	3.1%
DeKalb County, GA	534	2.3%
All Other Locations	7,780	33.4%

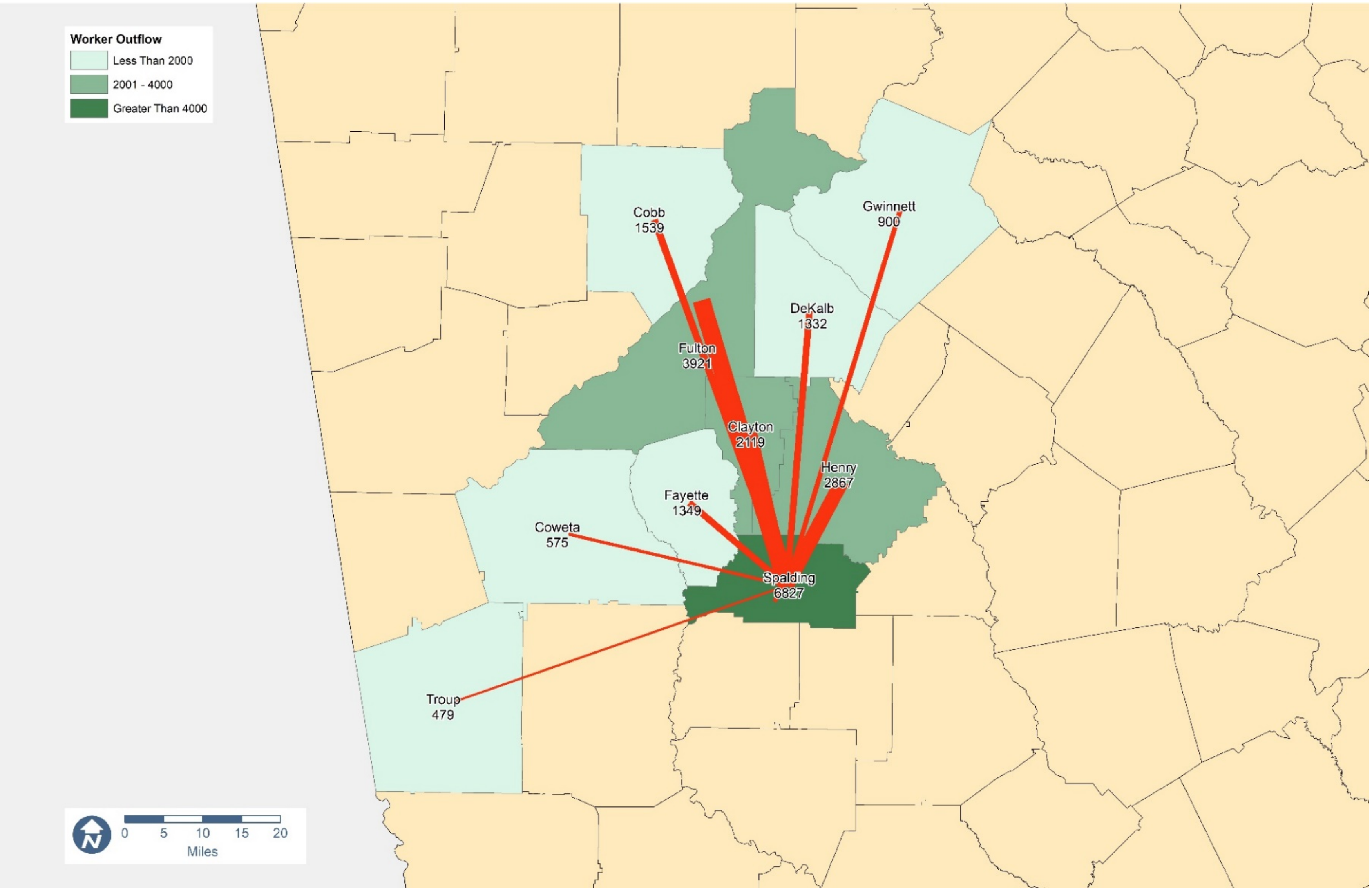
[42] U.S. Census Bureau. OnTheMap Application and LEHD Origin-Destination Employment Statistics.
[43] U.S. Census Bureau. OnTheMap Application and LEHD Origin-Destination Employment Statistics.

Figure 29: Place of Work for Spalding County Residents[44]



[44] U.S. Census OnTheMap Application (2017 data)

Figure 30: Place of Residence for Spalding County Workers [45]



[45] U.S. Census OnTheMap Application (2017 data)

3.6. Multimodal Access for Workforce

Spalding County's multimodal network consists of sidewalks as well as transit services countywide and within Griffin. While the Griffin-Spalding CTP proposes recommendations for bicycle facilities and trails, there are currently no bicycle lanes, trails, or multi-use paths within the county. This section discusses multimodal access available for the local workforce to commute to freight-centric businesses in Spalding County.

3.6.1. Sidewalks

Most of Spalding County's sidewalk and crosswalk infrastructure is concentrated within the City of Griffin. Within Griffin, there are approximately 60 miles of sidewalk. Of the 71 intersections with signal control (traffic signals or flashing caution signals) within the City of Griffin, 19 intersections lack adequate crossing infrastructure. Many freight-oriented businesses, including industrial and manufacturing uses that are within or in close proximity to Downtown Griffin, have sidewalk access. Outside of the downtown area, however, particularly along SR 16 and SR 362, there are no sidewalks available for use by the local workforce. Sidewalks and crosswalks in the focus area are shown in **Figure 31**. .

As noted in section 3.1.5, numerous industrial districts have a need for greater transportation access for the local workforce. In these areas, the industrial districts are located within close proximity to residential neighborhoods with a higher concentration of low-income households and people who work in the industrial sector. The Griffin-Spalding CTP has identified sidewalk needs in many of these areas. Adjacent to districts in southeast Griffin, these corridors include Futral Road, Wilson Road, and Hudson Road. In southwest Griffin, there are numerous roadways that connect residential areas to industrial districts which currently lack sidewalks. These include SR 362/Meriwether Street, and SR 362/Williamson Road, Carver Road, and S. Pine Hill Road. There is also a need for sidewalks further south on Carver Road, and on side streets serving industrial areas, including Odell Road, Kalamazoo Drive, and Airport Road.

In east Spalding, near I-75, the industrial districts are located further from residential neighborhoods. While sidewalks may not be as great of a need for workforce access, Spalding County can help to ensure good multimodal access by requiring sidewalks for new developments, both residential and industrial. The County may also consider implementation of a transportation demand management program that makes it easier for workers to commute by a mode other than driving alone.

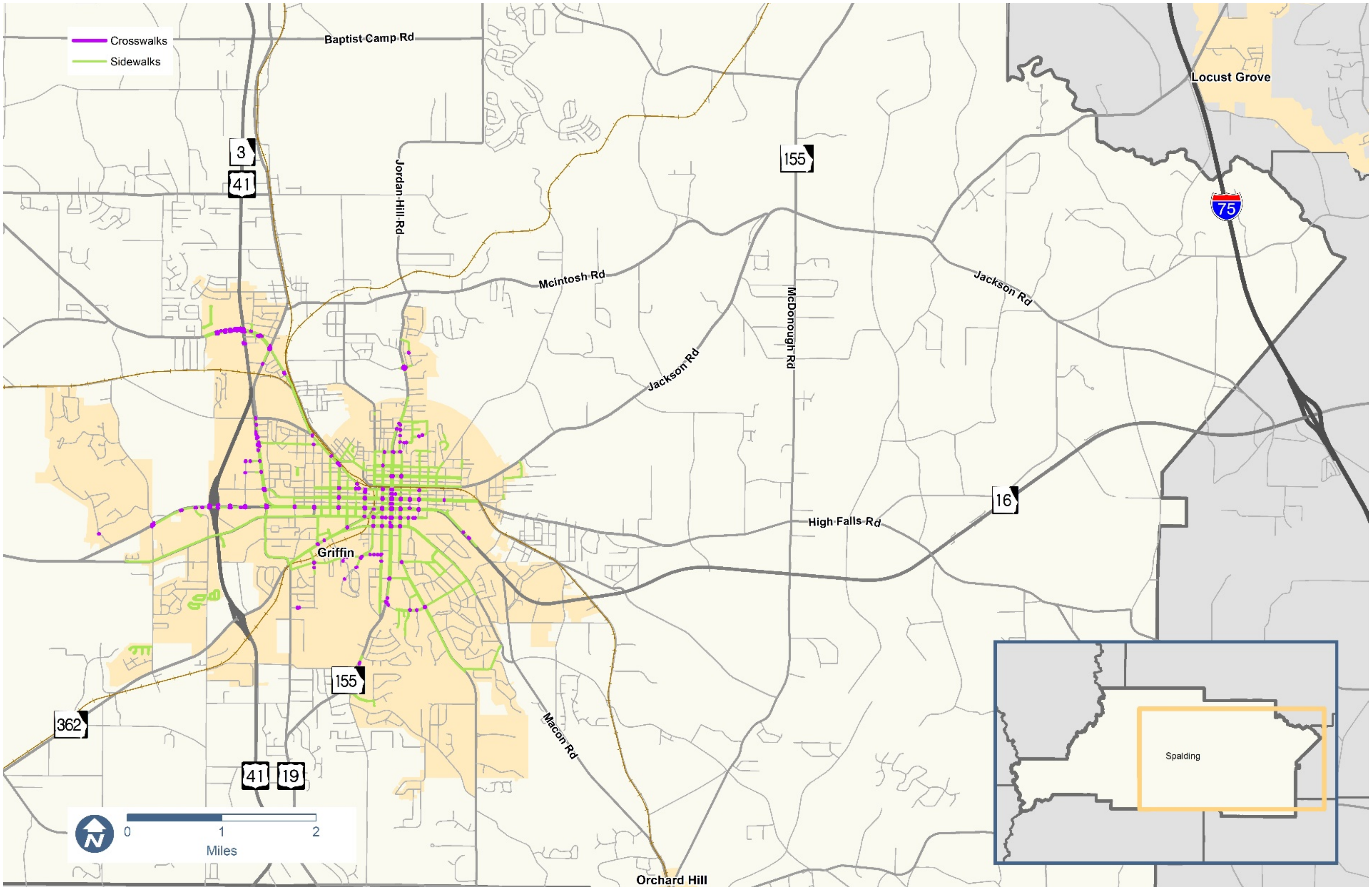
3.6.2. Transit System

Three Rivers Regional Transit System

The regional public transportation program has been administered by the Three Rivers Regional Commission (TRRC) on behalf of its participating governments since 1999. The residents of Spalding, Butts, Lamar, Meriwether, Pike, and Upson Counties have access to a demand response transit service, which means that there are no fixed routes, bus stops, or pick up times. Residents call 1-855-407-RIDE (7433) and order a trip 24 hours in advance, and daily routes are generated based on the destinations requested. The fee is $2.00 per one-way trip, and the service is offered Monday through Friday between the hours of 8:00 a.m. and 5:00 p.m. The service is funded through 5311 Rural Transit Service funding passed through the Georgia Department of Transportation.

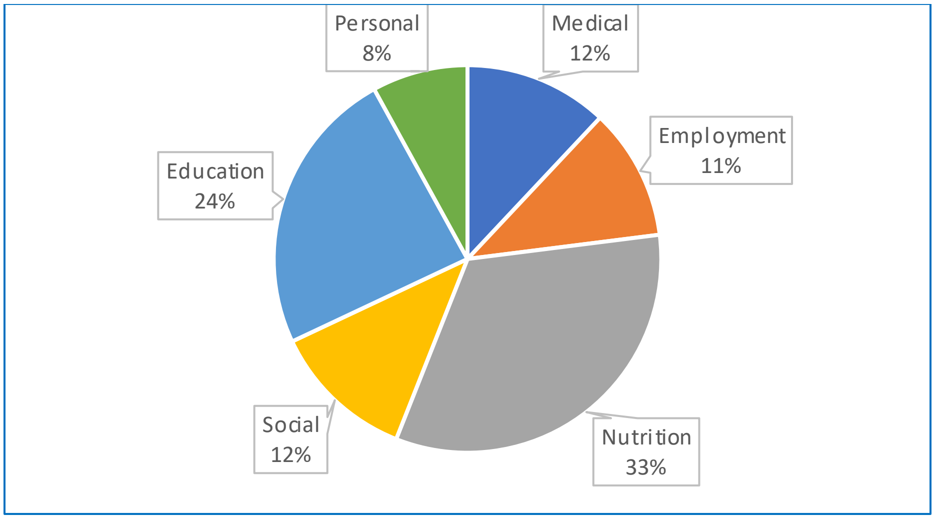
Spalding County is serviced with five 2016 Ford Mini Bus vehicles as shown in picture above – two mini buses have 10-seat capacity with wheelchair lifts and three mini buses have 14-seat capacity without wheelchair lifts.

Figure 31: Sidewalk and Crosswalk Infrastructure[46]



46 City of Griffin

Figure 32: Spalding County Demand Response Trip Destinations[47]



In 2019, TRRC reported a total of 26,431 one-way trips with an average of 440 one-way trips per month. The trip destinations are estimated to be 56 percent senior-related, 35 percent education/employment-related and eight percent for other purposes. As shown in **Figure 32**, most of the trips were non-workforce related trips.

City of Griffin Park District Shuttle

The Park District Shuttle is a free circulator shuttle that has been in operation within the City of Griffin since 2016. The circulator serves seven stops, including the City Park, City Hall, Well-Star Spalding Regional Hospital, and retail destinations. The circulator runs twice daily in the morning (10:00-11:00 am) and afternoon (3:30-4:30 pm). Because the circulator does not directly serve freight-oriented businesses and has limited service hours and daily routes, it is likely not a viable option for the local workforce employed in the freight and logistics industry in the county.

[47] Three Rivers Regional Commission

Xpress Regional Commuter Service

The State of Georgia operates Xpress, a regional commuter service, which provides an alternative commute option between employment centers and residential areas across the Atlanta region. Xpress provides over two dozen park-and-ride lots, where residents can park their personal vehicles and board an Xpress bus to Perimeter Center, Midtown Atlanta, or Downtown Atlanta. For Spalding County residents, the nearest Xpress park-and-ride lots are located in Hampton and McDonough in Henry County.

The Hampton Park-and-Ride (Boothe's Crossing) is located at 104 Woolsey Road Hampton, GA 30228. Route 440 Hampton to Downtown/Midtown leaves from the Hampton Park-and-Ride lot into Downtown and Midtown Atlanta. Six (6) buses depart between 5:15 AM and 8:00 AM. Seven (7) buses return to Hampton P&R lot between 4:42 PM and 7:46 PM.

The McDonough Park-and-Ride is located at 1059 Industrial Parkway McDonough, GA 30253. Route 430 McDonough to Downtown leaves from the McDonough Park-and-Ride lot into Downtown Atlanta. Eight (8) buses depart between 5:20 AM and 8:05 AM. Eight (8) buses return to the McDonough P&R lot between 3:56 PM and 7:30 PM.

3.6.3. Transportation Demand Management Services

Georgia Commute Options

Georgia Commute Options (GCO) is a program designed to reduce the number of single-occupancy vehicles on Atlanta area roadways, thereby improving air quality and traffic congestion. Federal transportation funds provide these programs as a means to minimize commuting impacts through transportation demand management (TDM) strategies such as carpooling, vanpools, transit, and teleworking. The program assists Spalding County commuters with a variety of TDM services, including coordinating shared vanpools and carpools, and providing financial incentives for alternative commute strategies such as teleworking. For program participants, GCO also provides a Guaranteed Ride Home for registered commuters. Participants must register at https://gacommuteoptions.com/ in advance to receive program benefits.

Private Transportation Providers

Lyft and Uber operate as private rideshare services within Spalding County and across the surrounding area. Due to the higher relative cost of each trip, ridesharing is often not a viable long-term alternative to public transit for the local workforce but can supplement short-distance travel needs on an occasional basis.

4. Future Conditions Assessment

4.1. Projected Roadway Volumes

Projected future traffic volumes have been derived based on data from the ABM, with 2040 as the horizon year for analysis. In the 25-year window between 2015 and 2040, traffic volume in Spalding County is expected to increase along many routes in the county. **Figure 33** shows projected traffic volumes for 2040. The portion of I-75 that traverses Spalding County is forecast to handle 105,200 vehicles per day in 2040, representing a 35 percent increase from 2015. While there is no interchange along I-75 in Spalding County, this projected increase in traffic, including truck volumes, is reflective of the broader trend of growing traffic in the Spalding County area. Several arterial roadways are projected to carry substantially higher traffic volumes by 2040. Each designated truck route is projected to increase both in roadway volume and in truck percentage. US 19/US 41/SR 3 between SR 362 and W. Poplar Street is projected to handle over 34,000 vehicles per day in 2040, an increase of 38 percent from 2015 traffic volumes. SR 155 from Jackson Road to Teamon Road is projected to carry 23,155 vehicles per day by 2040, representing a 33 percent increase from 2015. SR 16 just east of Rehoboth Road has a base year (2015) traffic volume of 7,876 vehicles per day; this is projected to grow to 12,444 vehicles per day in 2040, reflecting a 58 percent increase in traffic volume.

4.2. Projected Growth in Truck Traffic

The ARC activity-based travel demand model for 2015 and 2040 was used to determine projected growth in truck traffic over a 25-year period. **Figures 34 and 35** illustrate daily truck volumes on non-interstate roadways in the focus area for the year 2015 and projected for the year 2040, respectively. These volumes reflect traffic in both directions of traffic on each segment. It should be noted that while the 2015 model data exhibits more truck traffic than has been observed through GDOT classification counts, a comparison between the 2015 and 2040 model years can be made to identify corridors where truck growth is anticipated.

Similar to data collected from GDOT classification traffic counts, the 2015 model shows that the highest truck volumes are generally observed along designated truck routes: US 19/US 41/SR 3, SR 155, and SR 16. Despite the truck restrictions along N. McDonough Road, the corridor carries truck volumes comparable to that of SR 155 between Jackson Road and Griffin. Truck volumes across the entire study area are expected to increase considerably between 2015 and 2040. On non-interstate highways and roadways, the designated truck routes still exhibit the highest truck volumes. Among non-interstate routes, the highest truck volume is projected along US 19/US 41/SR 3 south of Baptist Camp Road (9,140 daily trucks), representing a 35 percent increase from 2015 truck volume along the corridor. South of Griffin, daily truck volumes along US 19/US 41/SR 3 are projected to reach 4,427 trucks by 2040, or a 35 percent increase in traffic from 2015. SR 16 in eastern Spalding County also exhibits substantial growth in truck traffic; by 2040, it is projected that the corridor will carry 3,809 trucks per day, representing a 36 percent increase in truck traffic. Significant truck traffic is also seen along SR 16 between Hamilton Boulevard and Green Valley Road (3,370 to 3,831 trucks per day, or a 22 to 26 percent increase in truck traffic). Among the designated truck routes, SR 155 shows the most moderate growth in truck traffic.

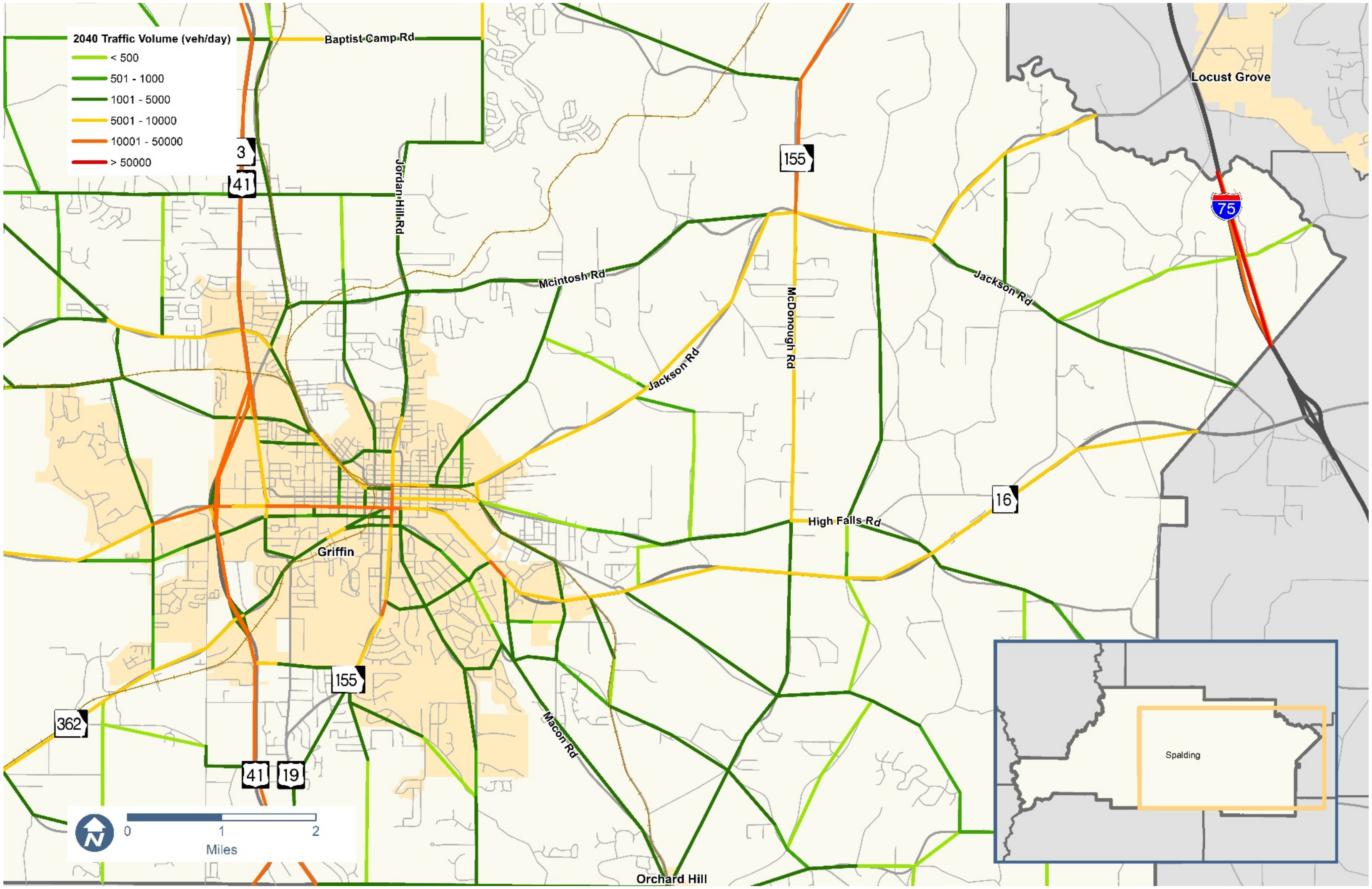
The highest truck volume projected for 2040 is exhibited just north of Searcy Avenue (2,347 trucks per day), representing a 16 percent increase in truck traffic from 2015.

4.3. Projected Roadway Congestion

Projected levels of future traffic congestion have similarly been derived based on data from the ABM, with 2040 as the horizon year for analysis. By 2040, traffic congestion is projected to remain at acceptable levels (LOS A, B, and C) in most of the focus area. Along select truck routes, the projected increase in traffic volume is anticipated to result in worsening traffic congestion. SR 155 from Henry County to McIntosh Road and Jackson Road is projected to operate at LOS F by 2040. US 19/US 41/SR 3 is projected to operate at LOS D and E between Baptist Camp Road and near where the limited access portion begins near SR 92. East of Downtown Griffin, SR 16 is forecasted to remain at LOS A and B. Within Griffin, SR 155 from S. Hill Street to N. 2nd Street is projected to worsen to LOS E and F. Portions of other arterials and collectors leading into Downtown Griffin, including SR 16, Experiment Street, S. Hill Street, and E. Solomon Street, are also projected to operate at LOS D and E. **Figure 36** shows forecasted 2040 LOS for roads in Spalding County.

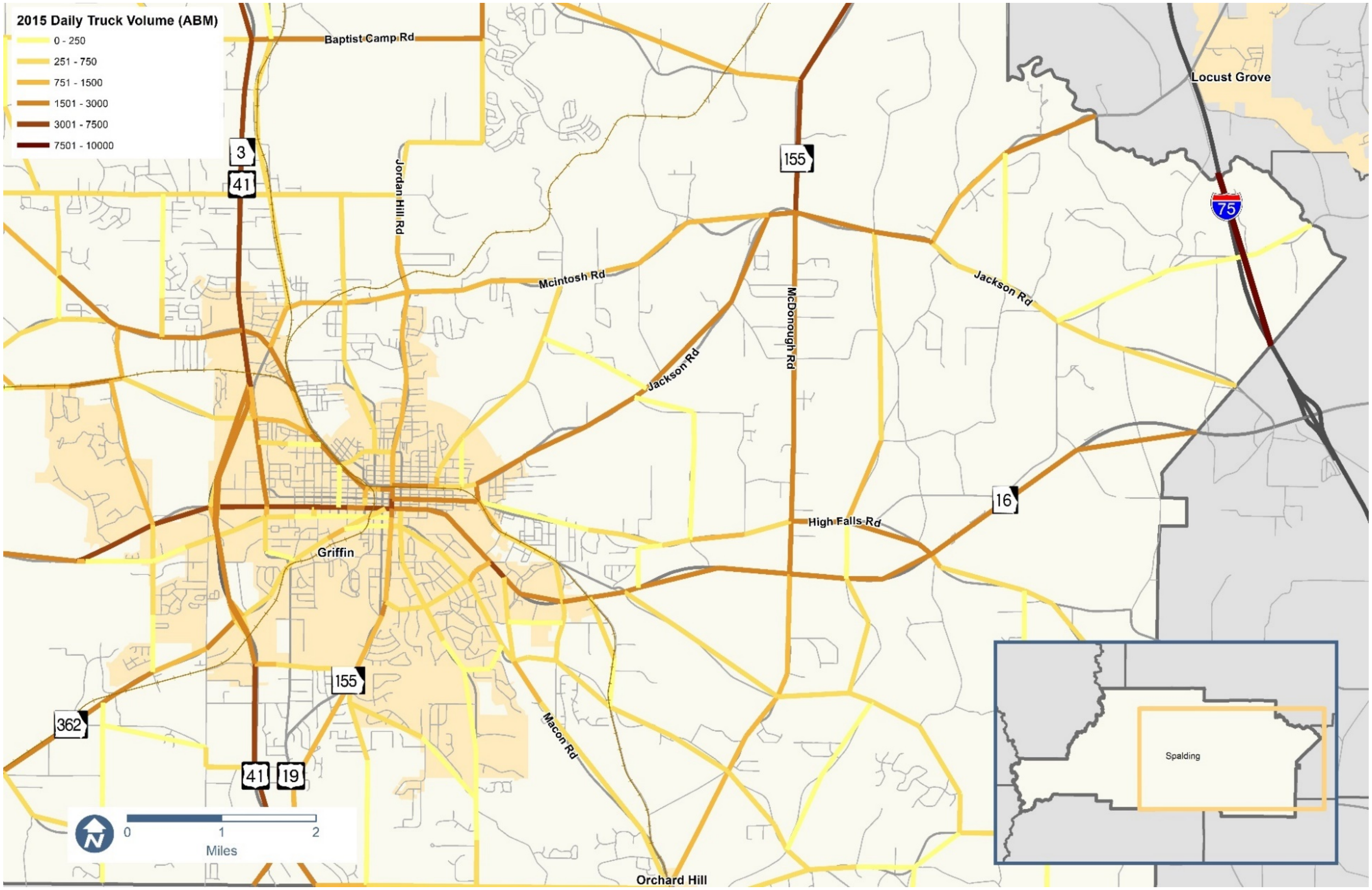
By 2040, it is anticipated that the Industrial Districts identified in Section 3 will not be significantly impacted by roadways with high traffic congestion, or deficient LOS. Trucks traveling to industrial districts located along SR 16 east of Griffin will be able to operate in LOS A/B conditions in 2040. The same holds true for industrial district 8, located along Jordan Hill Road in north Griffin. Trucks accessing industrial districts in southwest Griffin may experience minor congestion along SR 362 west of US 19/US 41/SR 3, where the corridor is projected to operate at LOS E.

Figure 33: Projected Traffic Volumes (2040) [48]



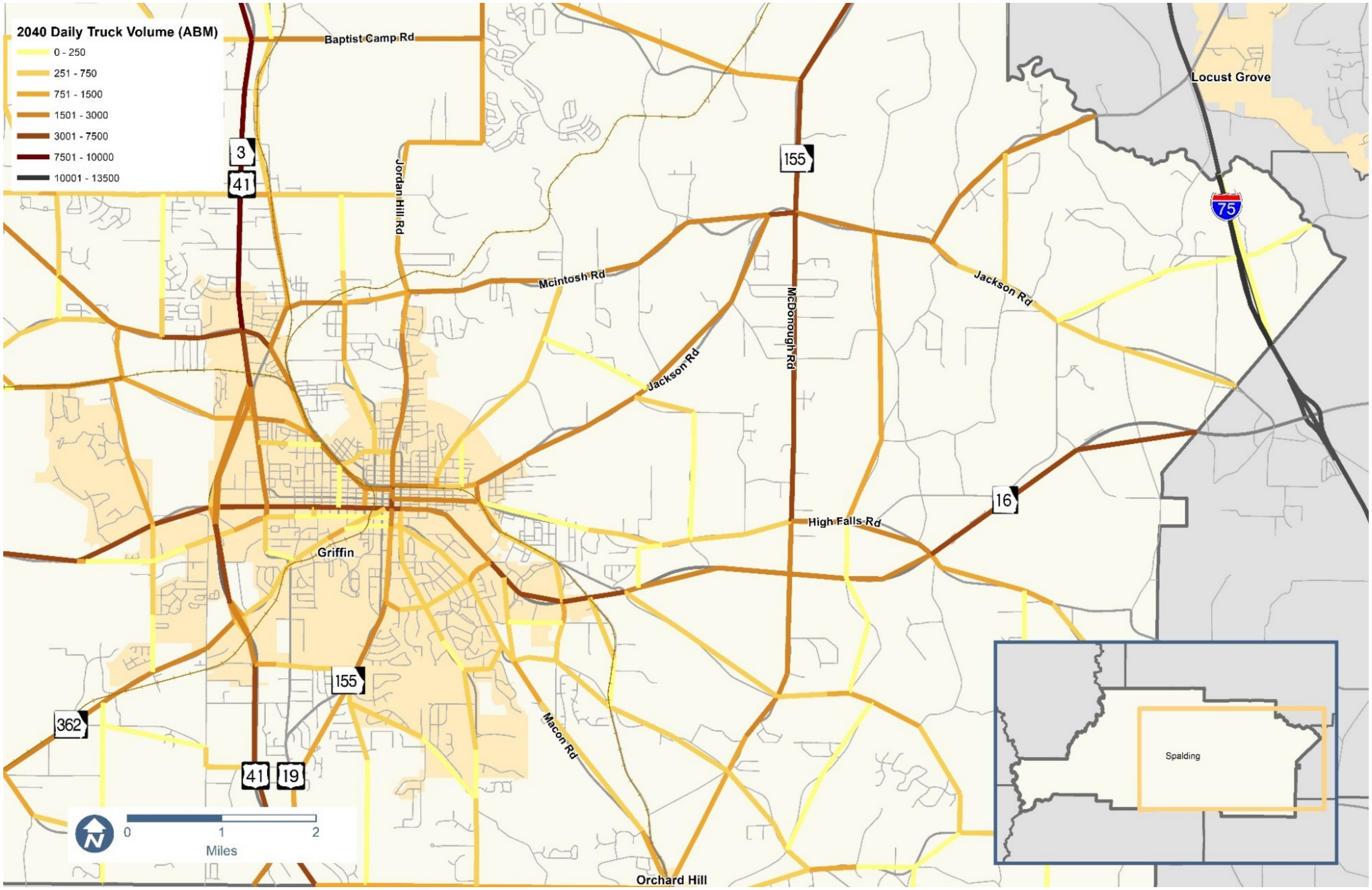
[48] Atlanta Regional Commission (Activity-Based Model)

Figure 34. 2015 Daily Truck Volume (ARC ABM)[49]



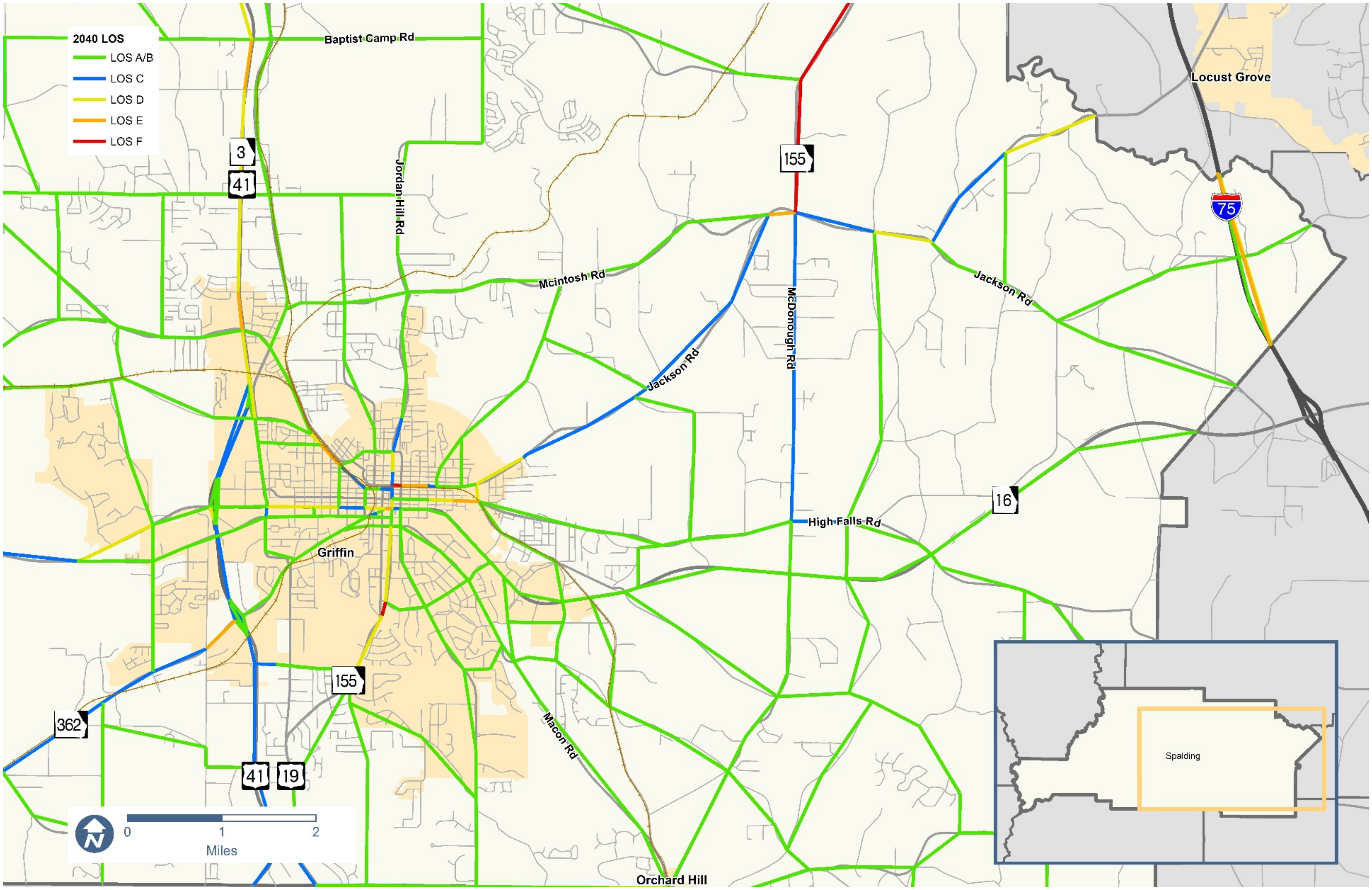
[49] Atlanta Regional Commission (Activity-Based Model)

Figure 35. 2040 Daily Truck Volume (ARC ABM)[50]



50 Atlanta Regional Commission (Activity-Based Model)

Figure 36: 2040 Level of Service[51]



[51] Atlanta Regional Commission (Activity-Based Model)

4.4. Planned and Programmed Projects

Several transportation projects are planned and programmed within the focus area. The different types of projects, including maintenance, new roadways, roadway widenings, and intersection improvements, are intended to improve mobility and safety. **Figure 37** shows planned projects from the Griffin-Spalding CTP and programmed GDOT transportation projects within the focus area.

4.4.1. GDOT Projects

One of the most substantial planned projects pertinent to freight in Spalding County is the Griffin South Bypass, which will serve as a truck bypass around the City of Griffin. A study of the bypass was completed in 2010. The development of a bypass around in the City of Griffin is anticipated to improve regional mobility for truck traffic and reduce congestion and conflicts between trucks and general purpose traffic within Griffin. Phase 1 of the Griffin South Bypass is the relocation of SR 155 from Jackson Road to N. McDonough Road (PI 0008682), which is programed in the Atlanta Regional Transportation Plan (RTP) at a cost of $9.6 million. [52] This project would entail improvements along N. McDonough Road to support truck traffic, and shifting the designation of SR 155 from Jackson Road to N. McDonough Road to serve as a bypass around the east side of Griffin and to enhance connectivity with SR 16 to the south. Preliminary engineering is programmed for 2032 and construction in 2036.[53] While the improvement and re-designation of SR 155 from Jackson Road to N. McDonough Road is the primary option being considered for the first phase of the bypass, Spalding County will continue to coordinate with GDOT to examine additional options moving forward.

Subsequent phases of the project, Griffin Southwest Bypass Phases 2 (PI 0007871) and 3 (PI 0010441), will construct new roadway around the east and south sides of Griffin, extending from SR 16 west of the city near the intersection with Rover Zetella Road, to east of the city near the intersection with South McDonough Road. Phase 2 is programmed in 2036[54] at cost of $39.6 million[55], and Phase 3 is programmed in 2051 at a cost of $35.9 million. [56] Construction of these segments will complete the truck bypass around Griffin.

GDOT also has a related project to widen SR 155 from CR 508/N. 2nd Street in Griffin to the Henry County line (PI 0007870). These projects are included in the Griffin-Spalding CTP and programmed in GDOT's long-range plan. Other GDOT transportation projects planned and programmed for Spalding County in the short and long-term include:

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52 Atlanta Region's Plan. FY 2020-2025 Transportation Improvement Program and RTP. http://documents.atlantaregional.com/transportation/TIP20/Q1/RTP%20Project%20List%20-%20ARCID%20-%2002-28-2020.pdf.

53 GDOT (2019). CR 498/McDonough Rd From SR 155 TO SR 16 - SR 155 Relocation. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0008682.

54 GDOT (2019). Griffin Southwest Bypass from SR 3 To SR 16 - Phase II. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0007871 .

55 Atlanta Region's Plan. FY 2020-2025 Transportation Improvement Program and RTP. http://documents.atlantaregional.com/transportation/TIP20/Q1/RTP%20Project%20List%20-%20ARCID%20-%2002-28-2020.pdf

56 GDOT (2019). Griffin Southwest Bypass from SR 3 To SR 16 - Phase III. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0010441.

- SR 155 is programmed to be widened from 2nd Street to the Henry County line (PI 0007870). This project will cost an estimated $53.3 million and is scheduled for 2051.[57]
- Resurfacing and maintenance along SR 92 is also programmed for the segment between Westmoreland Road and US 19/41 (PI M005002).[58]

As part of the Downtown Griffin LCI Study, three corridors in the downtown area are programmed for bicycle and pedestrian enhancements (PI 0010333): SR 155/CR 134/North Hill Street from Poplar Street to Tinsley Street; Solomon Street from 9th Street to 3rd Street; and 5th Street from Taylor Street to Solomon Street. The project will consist of shared lanes for bicycles and automobiles, traffic calming measures, access management improvements, intersection bump outs, bicycle parking racks, street furniture, improved pavement markings and wayfinding signage. The project is currently under construction at a cost of $5.9 million.[59] There are also long-range projects that would create commuter rail service between Griffin in Atlanta (PI#0009219[60], 0009220[61], and 0009221[62]) and between Griffin and Macon (PI#371800-[63] & 371801-[64]).

GDOT projects relevant to freight in the Spalding County focus area are summarized in Table 15.

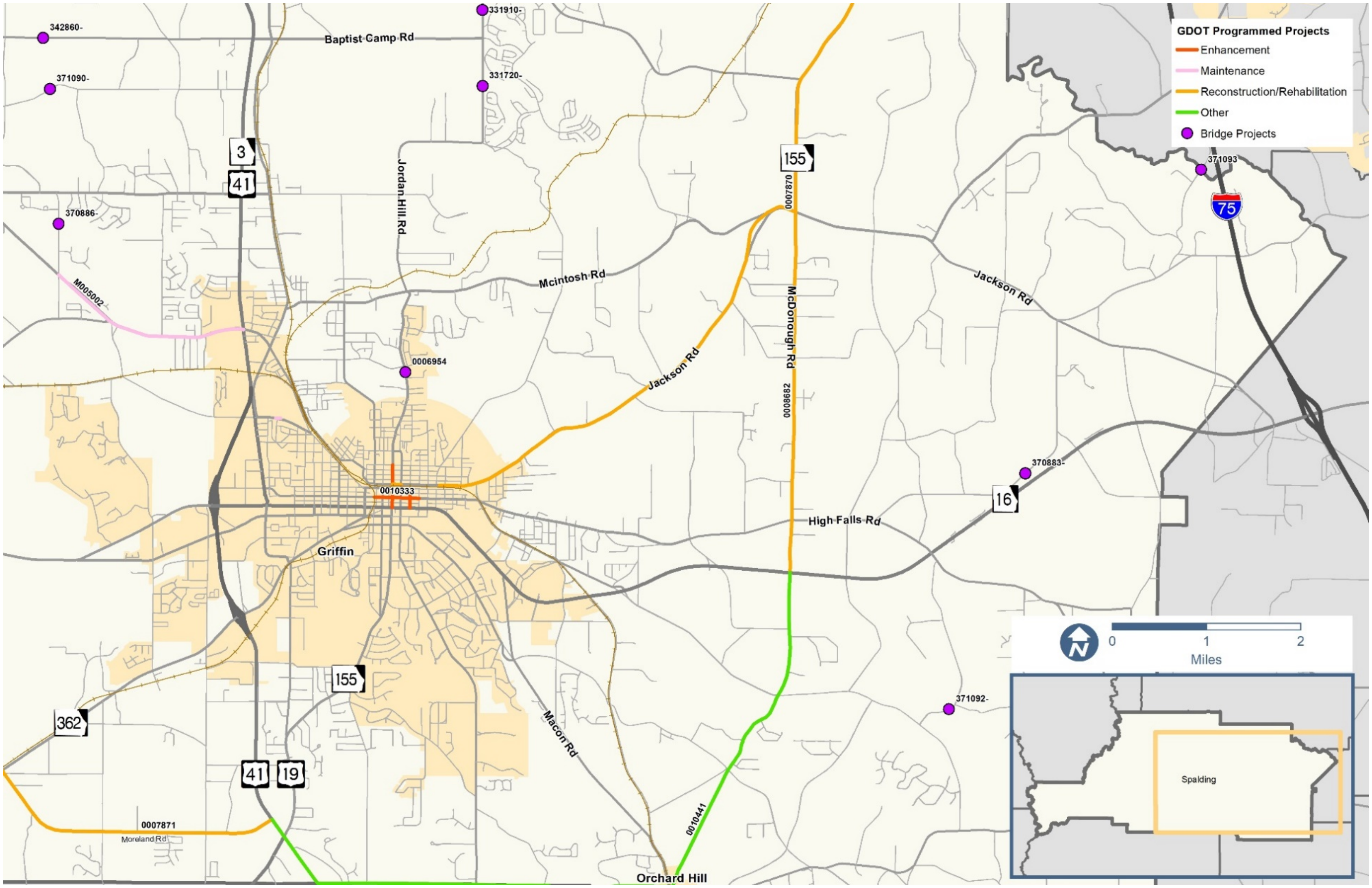
[57] GDOT (2019). SR 155 From CR 508/North 2nd Street to Henry County Line. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0007870.
[58] GDOT (2019). Statewide Transportation Improvement Program – FY 2018-2021, p. 518. http://www.dot.ga.gov/InvestSmart/Documents/STIP/FY18-21/FinalSTIP-FY18-21.pdf.
[59] GDOT (2019). North Hill St; Solomon St & 5th St In Downtown Griffin – LCI. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0010333.
[60] GDOT (2019). Commuter Rail – Atlanta to Griffin - Phase I. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0009219.
[61] GDOT (2019). Commuter Rail – Atlanta to Griffin - Phase II. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0009220.
[62] GDOT (2019). Commuter Rail – Atlanta to Griffin - Phase III. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0009221.
[63] GDOT (2019). Commuter Rail Griffin to Macon/Bibb – Houston Co. – Phase IV. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=371800-.
[64] GDOT (2019). Commuter Rail Griffin to Macon/Bibb – Houston Co. – Phase V. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=371801-.

Table 15. GDOT Planned and Programmed Improvements in Project Focus Area

PI #	Project Name	Status	Description
M005002	SR 92 From SR 3 To CR 347/Westmoreland Rd.	Programmed	Resurfacing and maintenance
0010333	North Hill St.; Solomon St & 5th St. In Downtown Griffin - LCI	Under Construction – Scheduled for Completion in 2020	LCI Project in Downtown Griffin that includes improvements on N. Hill St. (SR 155) from Poplar St. to Tinsley St., Solomon St. from 9th St. to 3rd St., 5th St. from Taylor St. (SR 16) to Solomon St.
331910-	CR 889/Jordan Hill Rd. North of Griffin at Troublesome Creek Tributary	Under Construction	Bridge Replacement
0013295	SR 155 at CS 1020/N. Hill St.	Complete	Traffic signal installation and construction of a left turn lane on the westbound approach
0008682	Griffin South Bypass Phase 1	Programmed – Scoping in 2019	From intersection of SR 155 and Jackson Rd. along existing alignment of N. McDonough Rd. to SR 16 (Arthur K. Bolton Pkwy.)
0007870	SR 155 from CR 508/N. 2nd St. to Henry County line	Long-Range	Widening of SR 155 from 2nd St. to the Henry County line
0007871	Griffin South Bypass Phase 2	Long-Range	Widening from SR 16 (Arthur K. Bolton Pkwy.) along existing alignment of S. McDonough Rd. and County Line Rd. to US 19/US 41/SR 3
0010441	Griffin South Bypass Phase 3	Long-Range	Construction of bypass between US 19/US 41/SR 3 and SR 16 (Arthur K. Bolton Pkwy.) along existing County Line Rd. and S. McDonough Rd.
0009219	Commuter Rail – Atlanta to Griffin - Phase I	Long-Range	Long-term commuter rail service between Atlanta and Griffin
0009220	Commuter Rail – Atlanta to Griffin - Phase II	Long-Range	Long-term commuter rail service between Atlanta and Griffin
0009221	Commuter Rail – Atlanta to Griffin - Phase III	Long-Range	Long-term commuter rail service between Atlanta and Griffin
371800-	Commuter Rail – Griffin to Macon/Bibb – Houston County - Phase IV	Long-Range	Long-term commuter rail service between Macon and Griffin

371801-	Commuter Rail – Griffin to Macon/Bibb – Houston County - Phase V	Long-Range	Long-term commuter rail service between Macon and Griffin
0006954	CR 134/N. Hill St. at Cabin Creek	Long-Range	Bridge replacement project
331720-	CR 889/Jordan Hill Rd. @ Troublesome Creek north of SR 16	Long-Range	Bridge replacement project
342860-	CR 509/Birdie Rd. @ Griffin Reservoir Tributary Northwest of Griffin	Long-Range	Bridge replacement project

Figure 37: GDOT Planned and Programmed Projects[65]



65 GDOT

4.4.2. Griffin-Spalding CTP Projects

The Griffin-Spalding CTP includes projects that support regional truck mobility and address localized congestion and safety needs.[66] There are roadway and intersection improvements planned to support the new airport, including the signalization of Wild Plum Road at SR 16, the widening of Wild Plum Road from SR 16 as the entrance to the new airport, and a new airport access road that would connect to Jackson Road. An intersection improvement at SR 155 and Jackson Road is planned to support the relocation of SR 155. Improvements are also planned for the intersection of SR 16 and Wallace Road, to support access to future development in the area. Longer-term projects in the CTP address the need to widen SR 16 west of Griffin from Pine Hill Road to Coweta County and US 19/US 41/SR 3 between Laprade Road and the Henry County line (corresponds to GDOT PI 0000294 detailed in Section 4.4.1). The CTP also proposes a long-term project to construct a new interchange at I-75 and Jenkinsburg Road, which would be the first interstate interchange within the county.

The Griffin-Spalding CTP also includes several projects within Griffin that address safety and operational needs. Projects located along and adjacent to truck routes include the following:

- Intersection improvement - SR 155 (E. Broad Street) at Searcy Avenue
- Intersection improvement - SR 16 at Macon Road
- Intersection improvement - Carver Road at W. Poplar Street/Poplar Road
- Intersection improvement - US 19/US 41/SR 3 at Ellis Road
- Intersection improvement - US 19/US 41/SR 3 at SR 362
- Roadway improvement - SR 155 from S. 9th Street to Poplar Street

While there are several deficient bridges in the focus area, there are no bridge rehabilitation or replacement projects planned or programmed along regional truck routes.

The CTP identifies a need for several corridor studies, including Teamon Road in the northern part of the county and McDonough Road east of Griffin. The CTP also identifies a need for further access management studies along two vital freight connections in Spalding County: US 19/US 41/SR 3 from SR 16 to Ellis Road, and SR 16 from the US 19/US 41/SR 3 Bypass (Martin Luther King Jr. Parkway) to SR 155 in Downtown Griffin. Freight-related projects included in the CTP are summarized in Table 16 and depicted in the map in **Figure 38**.

[66] 2016 Griffin-Spalding Comprehensive Transportation Plan (CTP) Update. May 2016. https://www.spaldingcounty.com/docs/public_works/Needs_and_Recommendations_Report_-_2016_Griffin-Spalding_CTP_Update.pdf

Table 16. CTP Tiered Recommendations in Focus Area (Spalding County)

Project ID	Tier	Project Name	Type	Status
Int #3	1	LCI Intersection #3: N. Hill St. at E. McIntosh Rd.	Intersection	Completed in May 2020
0008682	1	CR 498/S. McDonough Rd. from SR 155 to SR 16 - SR 155 Relocation	Roadway	Programmed – Scoping in 2019
CTP-01	1	Jackson Rd. at N. McDonough Rd.	Intersection	Proposed
CTP-02	1	Orchard Hill Intersection Improvements: Johnston Rd. / Macon Rd. / S. McDonough Rd. & Macon Rd. at Swint Rd.	Intersection	Proposed
CTP-03	1	Tri-County Crossing: Moreland Rd. extension to Zebulon Rd. with intersection improvements	Intersection	Proposed
CTP-04	2	Airport Access Road	Roadway	Proposed
CTP-05	2	Airport Entrance Road (Sapelo Rd. / Wild Plum Rd.) Widening and Improvement	Roadway	Proposed
CTP-06	2	County Line Rd. at Ethridge Mill Rd.	Intersection	Proposed
CTP-07	2	Signalize SR 16 at Wild Plum Rd. / Lakes at Green Valley	Intersection	Proposed
CTP-08	3	Jackson Rd. at Locust Grove Rd.	Intersection	Proposed
CTP-09	3	Old Atlanta Rd. at Dobbins Mill Rd .	Intersection	Proposed
0007870	3	SR 155 Widening to Henry County Line	Roadway	Proposed
CTP-10	3	SR 92 at Cowan Rd.	Intersection	Proposed
0007871	4	Griffin Bypass Phase 2	Roadway	Proposed
0010441	4	Griffin Bypass Phase 3	Roadway	Proposed
ASP-SP-172	4	SR 92 Widening	Roadway	Proposed
ASP-SP-169	4	SR 16 Widening to Coweta County	Roadway	Proposed
0000294	4	US 19/41 Widening to Henry County	Roadway	Proposed
0006972	4	SR 362 from Kings Bridge Rd. to SR 3/US 19	Roadway	Proposed
C-015	4	E. McIntosh / Jackson Rd. Widening	Roadway	Proposed

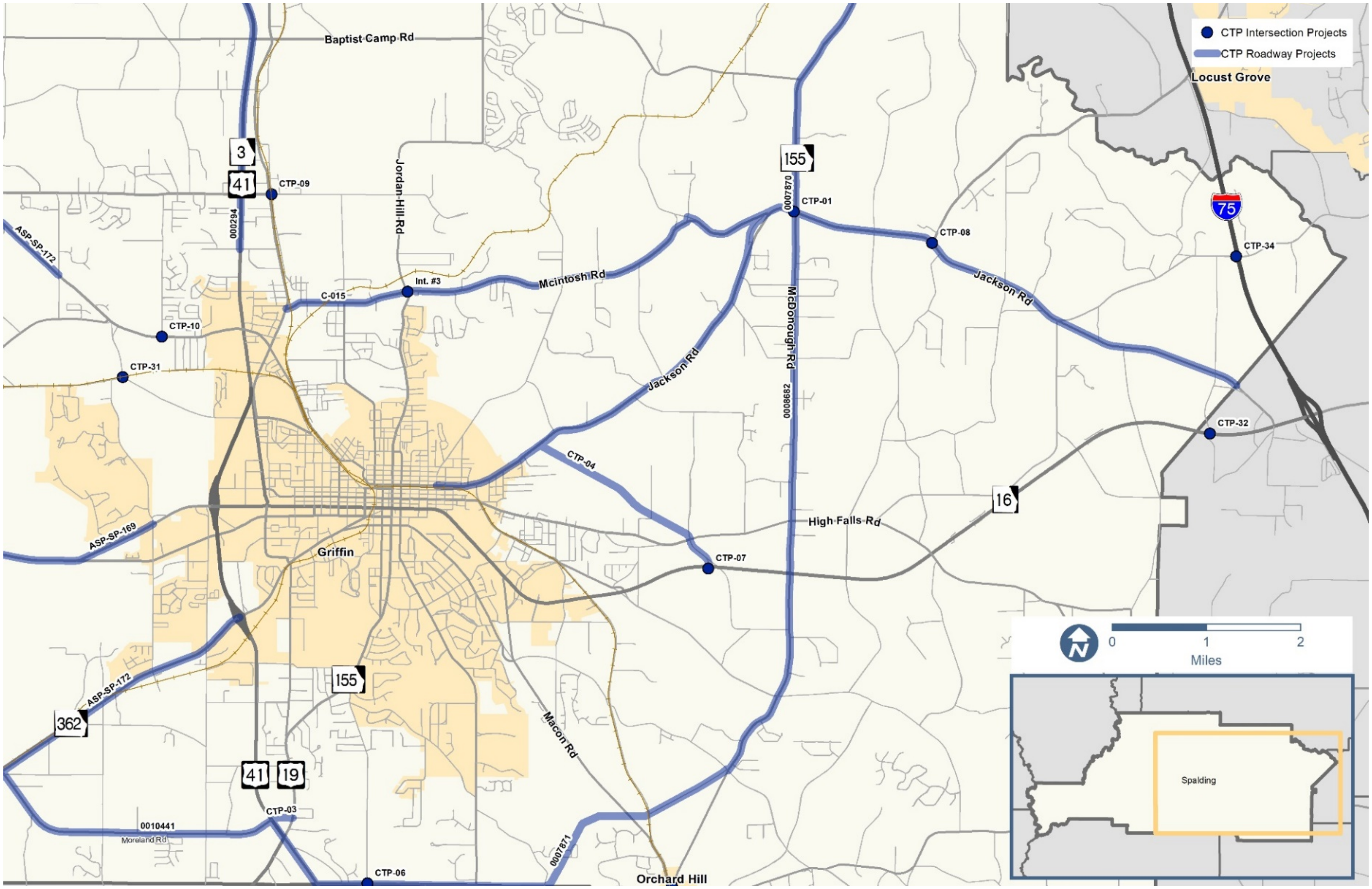
CTP projects within the City of Griffin are shown in Table 17 and depicted in the map in **Figure 39.**

Table 17. CTP Tiered Recommendations in Focus Area (City of Griffin)

Project ID	Tier	Project Name	Type	Status
1	Int #1	LCI Intersection #1: N. Hill St. at Blanton Ave. and N. 6th St.	Intersection	Complete
1	Int #2	LCI Intersection #2: N. Hill St at Northside Dr and Tuskegee Ave Roundabout	Intersection	Complete
1	SPLOST-1	Solomon St. (Little 5 Points) Improvements	Intersection	Concept study complete
1	SPLOST-2	Searcy Ave. at E. Broadway St. (SR 155)	Intersection	Proposed
1	SPLOST-3	Cain St. at Everee Inn Rd.	Intersection	Proposed
1	SPLOST-4	Spalding Dr. at SR 16	Intersection	Proposed
1	SPLOST-5	Hammond Dr. at W. Poplar St.	Intersection	Concept study underway
1	SPLOST-6	College St. at Hamilton/ Kincaid St. (Intersection Improvement Program - Phase I)	Intersection	Proposed
2	CTP-01	Old Atlanta Rd. between E. McIntosh Rd. & McIntosh Rd. / Experiment St.	Intersection	Proposed
2	CTP-02	Poplar St. at 8th St.	Intersection	Proposed
2	CTP-03	SR 16 at Macon Rd.	Intersection	Proposed
3	CTP-04	Poplar St. at Meriwether/ New Orleans/10th St. (Intersection Improvement Program – Phase 1)	Intersection	Proposed
3	CTP-05	Broad St. at 9th St. (Intersection Improvement Program - Phase II)	Intersection	Proposed
3	CTP-06	Experiment St. at 13th/ Ray St. (Intersection Improvement Program - Phase II)	Intersection	Proposed
3	CTP-07	Carver Rd. @ W Poplar St. / Poplar Rd.	Intersection	Proposed
3	CTP-08	Macon Rd. at Hudson Rd.	Intersection	Proposed
3	CTP-09	N. Expressway at Ellis Rd.	Intersection	Proposed
3	CTP-10	Ellis Rd. at US 19/41	Interchange	Proposed
3	CTP-11	SR 362 at US 19/41	Interchange	Proposed
3	CTP-12	Ellis Rd. at Experiment St.	Intersection	Proposed
3	CTP-40	Crescent Rd. at Maple Dr. Improvement	Intersection	Proposed
4	CTP-13	SR 155 / S. Hill St. from S. 9th St. to Poplar St.	Roadway	Proposed

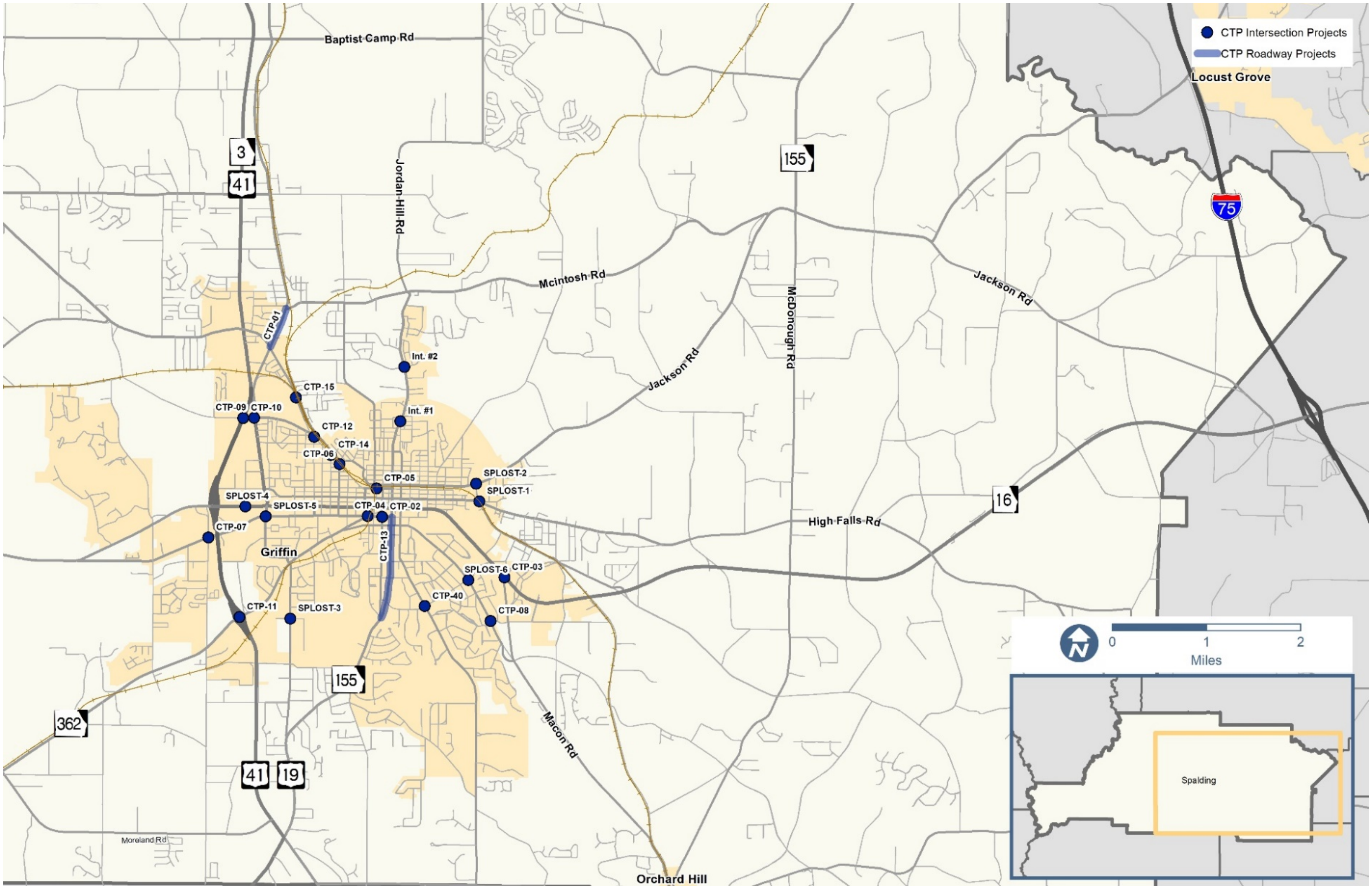
4	CTP-14	Experiment St. at 14th St. (Intersection Improvement Program - Phase I)	Intersection	Proposed
4	CTP-15	Experiment St. at Elm St. (Intersection Improvement Program - Phase II)	Intersection	Proposed

Figure 38: CTP Recommendations in Spalding County[67]



[67] GDOT and Griffin-Spalding Comprehensive Transportation Plan

Figure 39: CTP Recommendations in City of Griffin [68]



68 GDOT and Griffin-Spalding Comprehensive Transportation Plan

5. Major Findings

The following section represents the major findings from this report as they relate to freight mobility and industrial development. For ease of review, these findings have been organized by the subject matter presented here in this report.

- Land Use and Development
- Roadway Network Characteristics
- Freight Network Characteristics
- Workforce Access

5.1. Land Use and Development

- Approximately 90 percent of the County, including much of eastern Spalding County between Griffin and I-75, is characterized by low density residential and agricultural uses. In conjunction with the growth anticipated along the I-75 corridor, the current growth in the Green Valley industrial area along the SR 16 corridor and the new airport, and the amount of undeveloped/low density land use, it can be anticipated that the demand for industrial development will occur in this area. This will require a more detailed plan for industrial development in the eastern portion of the County to ensure responsible development and avoid community conflicts.
- Industrial development is currently located primarily in two areas: 1) older industrial sectors along Zebulon Road and Everee Inn Road in southwest Griffin; and 2) the Green Lakes area southeast of Griffin along SR 16. There is also the Dollar General distribution center along Jackson Road on the Butts County line, which is foreseen as the first of many new industrial developments that will be interested in proximity to the I-75/SR 16 interchange.
- Of the existing industrial developments in the County, those located in the Green Valley area rated best for development potential due to a combination of existing infrastructure, freight access, worker access, and developable land for expansion. While the area adjacent to I-75 has the greatest potential for future demand, it is still relatively undeveloped and lacks supporting infrastructure for immediate development.

5.2. Roadway Network Characteristics

- Given the relatively undeveloped nature of the County, most of the roadways outside of Griffin are two-lane facilities. Routes with four lanes include US 19/US 41/SR 3 throughout the County, Business US 19/US 41 (North Expressway), SR 92/McIntosh Road between West McIntosh Road and Old Atlanta Road, and SR 16/Taylor Street from downtown Griffin east towards the I-75 interchange in adjacent Butts County. As such, most roadways throughout the County operate at under minimal congested conditions. Even within the City, the number of congested segments is minimal. This indicates that, unlike many studies that take place in the Atlanta region, a main objective of the Spalding Freight Cluster Plan is to mitigate future congestion through responsible development rather than addressing existing congestion. Furthermore, adequate capacity along County roadways indicates that operational improvements may help to alleviate most localized congestion issues.

- With the exception of the Griffin Bypass, most of the planned and programmed improvements within the County are operations and maintenance projects rather than capacity improvements (roadway widenings and new roadways). Despite the fact that little new capacity is planned for the County, the level of congestion projected in 2040 throughout the County is still relatively low. However, it should be noted that the ARC travel demand model is based upon future land use plans at the time of its development. Given the anticipated level of industrial development expected in the eastern part of the County, the roadway volumes and related congestion levels currently projected in 2040 are maybe somewhat understated.

5.3. Freight Network Characteristics

- Significant truck routes throughout the County include SR 16, US 19 Business/Hill St./Zebulon Road, US 19/US 41/SR 3, SR 362 and SR 92. Portions of McIntosh Road accessing the Trans Montaigne Pipeline Terminal are also on the NHFN. SR 16 and US 19/US 41/SR 3 carry the most substantial truck traffic within the County and provide connectivity I-75 and I-85, and to industrial uses within the County as well as distribution points outside Spalding County and across the region.
- Spalding County's Class 1 rail lines, which are owned by Norfolk Southern, intersect in downtown Griffin, converge northwest of the city, and then split towards McDonough to the northeast, Jonesboro to the north, Brooks to the west, and Zebulon and Barnesville to the south. There are almost 40 at-grade railroad crossings within the county, and more than 15 inside the City of Griffin. In conjunction with the number of truck routes in the County, Spalding County has a robust network of freight facilities to support and encourage future industrial development opportunities.
- There are also several designated truck route restrictions in the County. As new industrial development is planned, special attention will need to be given to these restrictions and how they restrict freight movement.

5.4. Workforce Access

- Spalding County experiences a substantial influx of workers who commute into the county each day, as well as a significant outflow of residents who travel to work outside the county. Among the estimated 27,301 residents of working age who live in Spalding County, 75 percent are employed outside of Spalding County, and 25 percent, or approximately 6,827 residents, remain within the county for employment. As Spalding County expands its industrial sectors, it should identify ways to attract more local workers.
- Other than the circulator routes within the City, there is very limited transit opportunities to support local businesses. Furthermore, there is also no direct access to commute services available to Spalding County residents. As a result, nearly all of the workforce within the County is dependent on personal automobiles. This would indicate a need to investigate better workforce accessibility options as the County expands its industrial base.

Spalding County Freight Cluster Plan

Recommendations Report

Prepared by

metro analytics

For

Spalding County

In cooperation with

ARC Atlanta Regional Commission

Griffin Growing Together

December 2020

Table of Contents

Table of Figures

List of Tables

1. Overview of Report

1.1. Purpose of the Report

The purpose of the Recommendations Report is to provide the information related to recommendations associated with the Spalding County Freight Cluster Plan. This report documents recommended transportation improvements and land use and development policies to improve freight mobility and foster an environment for prosperous industrial development.

1.2. Report Organization

As such, the remainder of this report is organized as follows:

- Chapter 2 – An overview and summary of results from various outreach activities conducted throughout the Spalding County Freight Cluster Plan. Some of the activities completed include, Steering Committee Meetings, Trucker Interviews, Cargo Oriented Development (COD) Workshops, and other activities. The section also includes a summary of major takeaways from the outreach exercises.
- Chapter 3 – A summary of major analytical findings from the Inventory and Assessment Report, including roadways needs, land use and development needs, freight routing needs, transit workforce access needs, and bicycle and pedestrian needs.
- Chapter 4 – An overview of previously identified projects and policy recommendations including roadway, bridge and safety, resurfacing, land use and development, transit initiatives, and bicycle and pedestrian improvements.
- Chapter 5 – A description of new and modified projects identified during the development of the Spalding County Freight Cluster Plan. Projects include planning studies, roadway improvements, bridge and safety improvements, and transit initiatives.
- Chapter 6 – A review of the vision, goals and objectives developed early in the Spalding County Freight Cluster Plan and develops a prioritization framework for new roadway and capacity projects, operation improvements, bridge projects, and resurfacing projects.
- Chapter 7 – A discussion of potential costs and revenues for potential projects. The conceptual project costs for identified roadway, safety, bridge, and resurfacing projects. It also identifies potential project funding from Federal, State, County and Local sources.
- Chapter 8 – A prioritized short-term work program which identifies roadway and operational/safety projects. It also provides suggested land use and development strategies, transit and workforce access strategies, and economic development strategies to improve freight operations in Spalding County.
- Chapter 9 – A collection of long-term vision projects and strategies, including roadway capacity projects, roadway network system resiliency corridor preservation, transit and workforce access strategies, land use and development strategies, and economic development strategies.

2. Outreach Activities

This section will summarize stakeholder engagement and outreach activities conducted during the development of the Spalding County Freight Cluster Plan. At the beginning of this planning process the Outreach Plan was developed to serve as a guide for the project team in scheduling and developing strategic outreach methods and the timing for engaging the community as defined in the scope of the project. The plan identified resources and partnerships, defined project stakeholders, and described opportunities for the public to learn and comment on project activities. The objectives of the Outreach Plan were as follows:

- Inform the public and stakeholders of the project and milestones while providing sound technical expertise in an easily understandable format.
- Identify strategic existing resources and partners to engage in the process.
- Target outreach towards most impacted stakeholders like freight industry leaders, truckers, employees and end users of project scope and potential recommendations.
- Engage key implementing entities to comprehend and inform project objectives, deliverables, and outcomes.
- Ensure that interested parties and individuals of the public can access project information and have opportunity to provide input.

2.1. Stakeholders Identified

Spalding County has an established network of community leadership and an active organized structure of on-going engagement. The project team, along with the County's direction, identified several strategic and existing resources to include in the planning process. The many perspectives were captured through the Outreach Plan and methods of engagement to build consensus throughout the planning process. As more of the community leadership are involved the greater the likelihood for successful plan implementation.

Key stakeholders identified included existing local partners, UGA Archway Partnerships, industry and major employers, regional and state partners, and community resources and infrastructure. The following participants were actively engaged during the development of this Freight Cluster Plan:

- Spalding County
- City of Griffin
- Griffin-Spalding Area Transportation Council (GSATC)
- Griffin-Spalding Development Authority
- Griffin-Spalding Airport Authority
- University of Georgia Archway Partnership
- Griffin-Spalding Chamber of Commerce
- ARC Freight Advisory Task Force
- Georgia Center of Innovation for Logistics
- Georgia Motor Trucking Association
- Georgia Department of Transportation

- Atlanta Regional Commission
- Three Rivers Regional Commission
- Griffin Region College & Career Academy
- Southern Crescent Technical College
- City of Griffin Fire and Police Departments
- Spalding County Fire and Police Departments
- WellStar Spalding Regional Hospital

Stakeholders participated consistently provided a critical perspective to measure feasibility of funding, implementation and potential impacts to the community which could delay or prevent implementation.

2.2. Stakeholder Steering Committee (SSC) Meetings

For the Spalding County Freight Cluster Plan, the following perspectives have been identified for targeting strategic stakeholder outreach efforts. A committee was developed at the start of the planning process and comprised of members from each of the key perspectives listed above. The SSC was comprised of organizations and existing community committee members involved in implementing any recommendations that may come as a result of the planning process.

The SSC met periodically four (4) times through the project schedule to receive briefings on milestones. For convenience of scheduling, the in-person meetings occurred after the regularly scheduled Griffin-Spalding Area Transportation Committee (GSATC). The later meetings in May and July were conducted online in virtual meetings. Each meeting included a facilitated discussion on the pertinent topics to further advance the planning process.

<u>Meeting #1 Agenda: September 18, 2019</u>

- Overview of Process
- Committee and Project Team Introductions
- Project Overview: Tasks, Schedule, Coordination Milestones
- Introduction to Cargo-Oriented Development
- Stakeholder Input Session: Vision, Goals, and Objectives

Meeting #2 Agenda: November 20, 2019

- Introductions, Overview of Agenda and Status of Deliverables
- Report on Cargo Oriented Development Workshops
- Highlights of Inventory and Assessment Report:
    - Land Use and Development Analysis
    - Traffic Analysis – Volumes, Congestion, Safety, Truck Travel Characteristics
- Stakeholder Input Session

Meeting #3 Agenda: May 20, 2020

- Introductions, Overview of Agenda, Status of Deliverables and Impacts of COVID-19
- Outreach Update – Norfolk Southern Input
- Recap of Inventory and Assessment Report
- Traffic Study Results and Methodology
- Stakeholder Input Session:
  Potential Projects/Recommendations Short Term Projects – Intersection and Signalization, Long Term Projects – Capacity and New Roadways

Meeting #4 Agenda: July 30, 2020

- Introductions and Overview of Agenda
- Overview of Projects: Potential Short Term and Long-Term Projects
- Overview of Prioritization Framework: Evaluation Criteria and Performance Measures
- Preliminary Prioritization Results: Scenario Review and Projects by Type
- Stakeholder Input Session: Potential Projects
    - Input on Prioritization Weights
    - Input on Bypass Alternatives
    - Input on Work Program Priorities

Menti.com is a real time voting tool, which was used to survey participants on the call. Everyone was asked to log onto Menti.com and use a meeting ID. Each question below was shown on the screen while the participants selected their priorities anonymously. The group then discussed the results. The input session results will be used to weight and prioritize the projects in the framework previously presented.

Prioritization Weights

Question #1: Please rank the following criteria in order of importance:

1. Mobility
2. Economic Benefit
3. Safety
4. Project Readiness
5. Environment &Public Health
6. System Reliability

Bypass Alternatives

Question #2: Which of the Bypass Alternatives do you prefer (from Long-Term Map)? Please pick one.

a) NB-1 – New alignment from Jackson Road to US 19/41	5
b) NB-2 – New alignment via New Airport Boulevard from SR 16 to US 19/41	2
c) SB-1 – McDonough Road/County Line Road alignment from SR 16 to US 41	6
d) SB-2 – New Alignment from McDonough Road to Moreland Road to connect to US 41	1

<u>Work Program Priorities</u>

Question #3: Which work plan scenario would you like to see programmed from the short-term?

Operations Based - SR 155 Re-designation/Operations/Pedestrian Connections/New By-Pass/Transit	0
Bypass Focused – SR 155 Re-designation/New Bypass/Operations/Pedestrian Connections/Transit	9
Workforce Access Focused – SR 155 Re-designation/Transit/Pedestrian Connections/Operations/New Bypass	3

Meeting summaries and presentation slides are provided in the appendices. The major findings from these meetings are included in a later section of this Outreach Report.

2.3. Cargo-Oriented Development Focus Group Workshops

Separate focus group workshops were conducted on the concept of Cargo-Oriented Development (COD) presented by the Center for Neighborhood Technology (CNT) and facilitated by the project team. A mixture of government, community and industry leaders were invited to participate for a few hours to discuss the COD concept and initial CNT findings of the Spalding County assessment to prioritize solutions.

The purpose for the workshop was to gather input from community and business leaders to frame a vision for Cargo-Oriented Development (COD) in Spalding County and identify priority trucking hotspots for potential future transportation improvements. Participants provided local knowledge of what works and what does not work for industrial developments and moving goods, or freight, in and out of Spalding County.

The description below set the expectations for the participants of the COD process and what each participant could expect to do in the workshop:

Cargo-Oriented Development (COD) connects transportation infrastructure, existing development patterns, market forces and community characteristics to promote efficient and sustainable freight movement and industrial development. It is driven in equal parts by quantitative analysis and input from private sector leaders, business leaders as well as local policy leaders. Assessing COD is a four-step process:

- *Step 1: Looking at the existing policy, zoning standards, land use plans and industry composition to identify current and potential future generators of economic activity and freight traffic.*
- *Step 2: Comparing the presence of freight infrastructure – not only highways but also rail and intermodal facilities – to land use analysis results and identifying synergies.*

- *Step 3: Assessing potential workforce to support freight and industrial development, and assessing barriers to access, including education and transportation needs.*
- *Step 4: Identifying strategies to promote sustainable industrial development and ensure overarching quality of life issues are being addressed.*

The workshops were held on two dates to provide options for days and times:

Wednesday, November 6th at 1:00 p.m.-3:30 p.m. <u>OR</u>

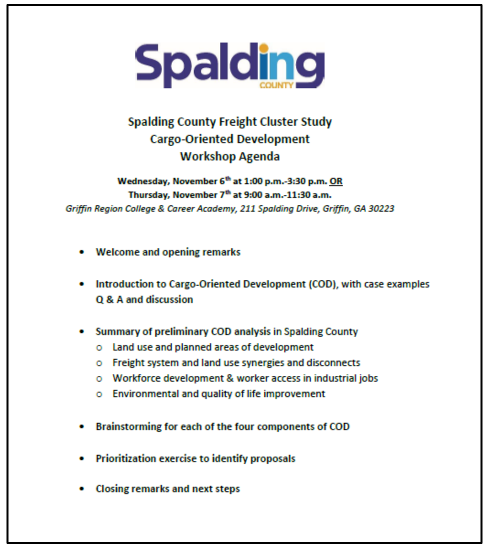
Thursday, November 7th at 9:00 a.m.-11:30 a.m.

The space was hosted by the Griffin Region College & Career Academy, 211 Spalding Drive, Griffin, GA 30223 in partnership with the County. The GRCCA partners with several local industrial manufacturing businesses to educate high school students with vocational training to work upon graduation.

The attendees for the sessions were summarized as follows:

- 14 participants attended the November 6 workshop including:
  - 8 representatives of local or regional government bodies
  - 3 representatives of industrial companies, and
  - 3 representatives of civic organizations
- 13 participants attended the November 7 workshop including:
  - 6 representatives of local or regional government bodies
  - 2 representatives of industrial companies, and
  - 5 representatives of civic organizations
- Within these counts of participants, 4 individuals attended both workshops:
  - Daniel Studdard – Atlanta Regional Commission
  - Chad Jacobs – Spalding County Community Development
  - Michelle Irizarry – Spalding County Government
  - Sam Brown – Paragon (a firm employed by Spalding County for transportation services)

Cargo-Oriented Development Workshop Agenda:



Spalding County

Spalding County Freight Cluster Study
Cargo-Oriented Development
Workshop Agenda

Wednesday, November 6th at 1:00 p.m.-3:30 p.m. OR
Thursday, November 7th at 9:00 a.m.-11:30 a.m.
Griffin Region College & Career Academy, 211 Spalding Drive, Griffin, GA 30223

- Welcome and opening remarks
- Introduction to Cargo-Oriented Development (COD), with case examples
  Q & A and discussion
- Summary of preliminary COD analysis in Spalding County
  - Land use and planned areas of development
  - Freight system and land use synergies and disconnects
  - Workforce development & worker access in industrial jobs
  - Environmental and quality of life improvement
- Brainstorming for each of the four components of COD
- Prioritization exercise to identify proposals
- Closing remarks and next steps

- **Introduction to Cargo-Oriented Development (COD)**, with case examples
  Q & A and discussion
- **Summary of preliminary COD analysis** in Spalding County
  a. Land use and planned areas of development
  b. Freight system and land use synergies and disconnects
  c. Workforce development & worker access in industrial jobs
  d. Environmental and quality of life improvement
- **Brainstorming for each of the four components of COD**
- **Prioritization exercise to identify proposals**

WORKSHOP #1: November 6th - Summary/Count of Ideas Discussed & Votes for High Effectiveness

Upgrade COD Potential Through:	# Ideas Discussed	# Votes for High Effectiveness
A. Land Use Policy	4	6
B. Leveraging Freight Assets	7	24
C. Improving Worker Access	7	0
D. Neighbor-Friendly Development & Emerging Technologies	3	6

WORKSHOP 32: November 7th - Summary/Count of Ideas Discussed & Votes for High Effectiveness

Upgrade COD Potential Through:	# Ideas Discussed	# Votes for High Effectiveness
A. Land Use Policy	5	13
B. Leveraging Freight Assets	2	3
C. Improving Worker Access	7	13
D. Neighbor-Friendly Development & Emerging Technologies	3	7

2.4. Industry Interviews

One-on-one stakeholder interviews were conducted at different periods over the course of the Plan development. The targeted perspectives varied a little to meet the objectives at the time. Below outlines each concerted effort to collect a sampling of inputs, the rationale for the selected subsets and the subject matter seeking feedback.

1) ***Major Industrial Employers and Supply/Chain Manufacturers*** –
   a. In the Fall of 2019, prior to the focus group workshops, the project team consulted with the County, Development Authority and UGA Archway Partnership to select major industrial employers and a mix of manufacturers to interview contacts on how trucks and employees access their facilities, what kinds of materials are brought in, products shipped out, workforce capacity locally and any congestion hot spots. The results were provided for preparation of the Cargo-Oriented Development workshops.
   b. In the Spring of 2020, a similar cross section of large employers and manufacturers were contacted to interview Shipping & Receiving Managers and Operations Managers on cross county travel patterns, origins of materials and destinations of shipments, use of rail, air cargo or trucking for distribution. The geographic origins and destinations ranged from the Southeast to some International movement of goods. The findings informed the Origin/Destination Technical Memo.

2) ***Norfolk Southern Interviews*** – In November 2019, the Stakeholder Committee raised several issues and questions surrounding rail operations, crossings, rail car queues parked on the tracks and spurs to access industrial buildings. The follow up task was for the project team to conduct executive level interviews with current and former Norfolk Southern executives that are primarily responsible for the Spalding County region and economic development. The agenda was geared towards the issues raised by the SSC to report back. Additional coordination was recommended with a NS Government Affairs representative.

3) ***Small group stakeholder interviews*** – In Summer 2020, the project team coordinated with Spalding County on recommended key stakeholders to brief in small groups on preliminary recommendations as an initial vetting process. The four small groups were:
   a. Spalding County leadership
   b. City of Griffin leadership
   c. Community Development and Public Works staffs from both, and
   d. Citizen appointees from GSATC and new airport representative

2.5. Briefings

Certain groups were identified as key participants to engage in the planning process; however, the membership broad enough that periodic briefings would be more appropriate to keep the group updated on milestones and high-level findings.

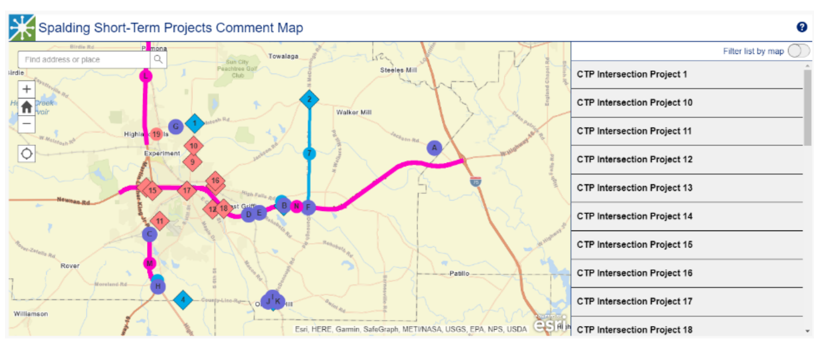
- ***Griffin-Spalding Area Transportation Committee (GSATC)*** – This committee meets every other month and is a standing formal committee comprised of citizen appointments and organizational appointments representing various interests impacted by transportation needs. The project team presented at several meetings over the project timeline. Most briefings occurred prior to a Stakeholder Steering Committee meeting since there was overlap in memberships.

- ***ARC Freight Advisory Task Force*** – The Atlanta Regional Commission (ARC) sponsors and supports this task force as part of the regional freight program. The members receive updates on the Freight Cluster Plan progress and specific freight issues applicable region-wide, statewide, or nationally. The project team presented the Plan overview, key milestones, and preliminary findings.
- ***Board of Commissioner Briefings*** **–** The project team provided briefing sheets to the County and City staff over the project timeline. When preliminary recommendations became available, the project team met one-on-one and in small groups with the Spalding County Board of Commissioners, the City of Griffin Board of Commissioners, and key staff.

2.6. Online Tools

Multiple web-based tools were utilized to distribute project information and gather feedback from the public during the development of this plan. These tools were critical given the current pandemic and the inability to meet with the public during most of the plan development. The tools used are described below:

- ***Project Webpage*** – Spalding County hosted the project page and provided the technical support for postings documents as needed. The URL made available for the planning process was https://www.spaldingcounty.com/freight-c-s/. The content included an overview of the project, final deliverables, Stakeholder Steering Committee descriptions, meeting materials and summaries, upcoming outreach dates and links to ARC and GDOT Freight program websites. For additional information, questions or comments, Metro Analytics project manager direct email address was provided.
- ***Virtual meetings*** **–** Due to the COVID-19 pandemic, the Outreach Plan had to be adjusted to continue seeking stakeholder input while maintaining social distancing. When the project team rescheduled the Stakeholder Steering Committee meeting originally scheduled in March 2020 for May, it was determined that a virtual meeting platform would be necessary to safely interact and continue with the plan development and engage stakeholders. General meeting participation instructions were provided to assist stakeholders with the technical virtual meeting Zoom platform.
- ***Interactive Web-based Tool*** – Due to the COVID-19 pandemic, the project team adjusted the outreach program to facilitate more online interaction. Thus, for the stakeholder input session on Meeting #3, the project team developed an Interactive Web-based Tool of Road Improvements. The stakeholders were able to visit the weblink (https://bit.ly/SpaldingSCMap) at their convenience, peruse the preliminary recommendations and insert comments or questions for individual projects.



2.7. Major Findings by Topic

Common themes continued to be raised throughout the stakeholder engagement and public outreach process. These themes are summarized below:

2.7.1. Freight Impacts on Downtown Griffin

At most, if not all, of the stakeholder meetings, the topic of freight impacts on Downtown Griffin was raised. Issues around the topics of traffic congestion, delay, turning movements and railroad crossing jams were raised as well. Comments were made regarding the vibration of freight movement damaging the interiors of historic buildings. The noise and pollution were additional factors for consideration when the Downtown area is promoting a walkable environment. Investments were made with a Livable Center Initiative (LCI) Study and implementation funds provided for streetscape improvements with risk of truck traffic damaging it.

2.7.2. Cross-County Movements and Interstate Accessibility

Access to industrial sites on SR 16 and the new airport via I-75 and the Interstate congestion was a key theme. The proposed exit at Jenkinsburg Road from the planned Commercial Vehicle (CV) lanes is critical for the future of economic development in Spalding County.

2.7.3. Cargo-Oriented Development Opportunities

When discussing the concept of Cargo-Oriented Developments, stakeholders frequently remarked on the future new airport location as a priority opportunity. The second area identified was that around the current airport and the older industrial properties surrounding the facility, which are ideal for redevelopment to accommodate light industrial businesses and e-commerce distribution centers.

2.7.4. Workforce Training

Spalding County currently has programs for workforce training at the Griffin Region College & Career Academy and Southern Crescent Technical College. These partnerships between the school system and local industrial businesses help high school students prepare to transition from high school to vocational and technical training. In turn, these programs enable the students to obtain their high school diplomas and remain locally to launch a career in one of the Spalding County's industrial trades. The stakeholders confirmed the importance of keeping residents employed within the County through means of training for the jobs that are created with new industrial developments.

3. Major Analytical Findings

The following section includes the major findings from the Spalding County Freight Cluster Plan *Inventory and Assessment Report* as they relate to freight mobility and industrial development. For the ease of review these findings have been organized by the subject matter presented below.

- Roadway Needs
- Freight Routing Needs
- Land Use and Development Needs
- Transit Workforce Access Needs
- Bicycle and Pedestrian Needs

For more detailed information, see the *Spalding County Freight Cluster Plan Inventory and Assessment Report* in Appendix A.

3.1. Roadway Needs

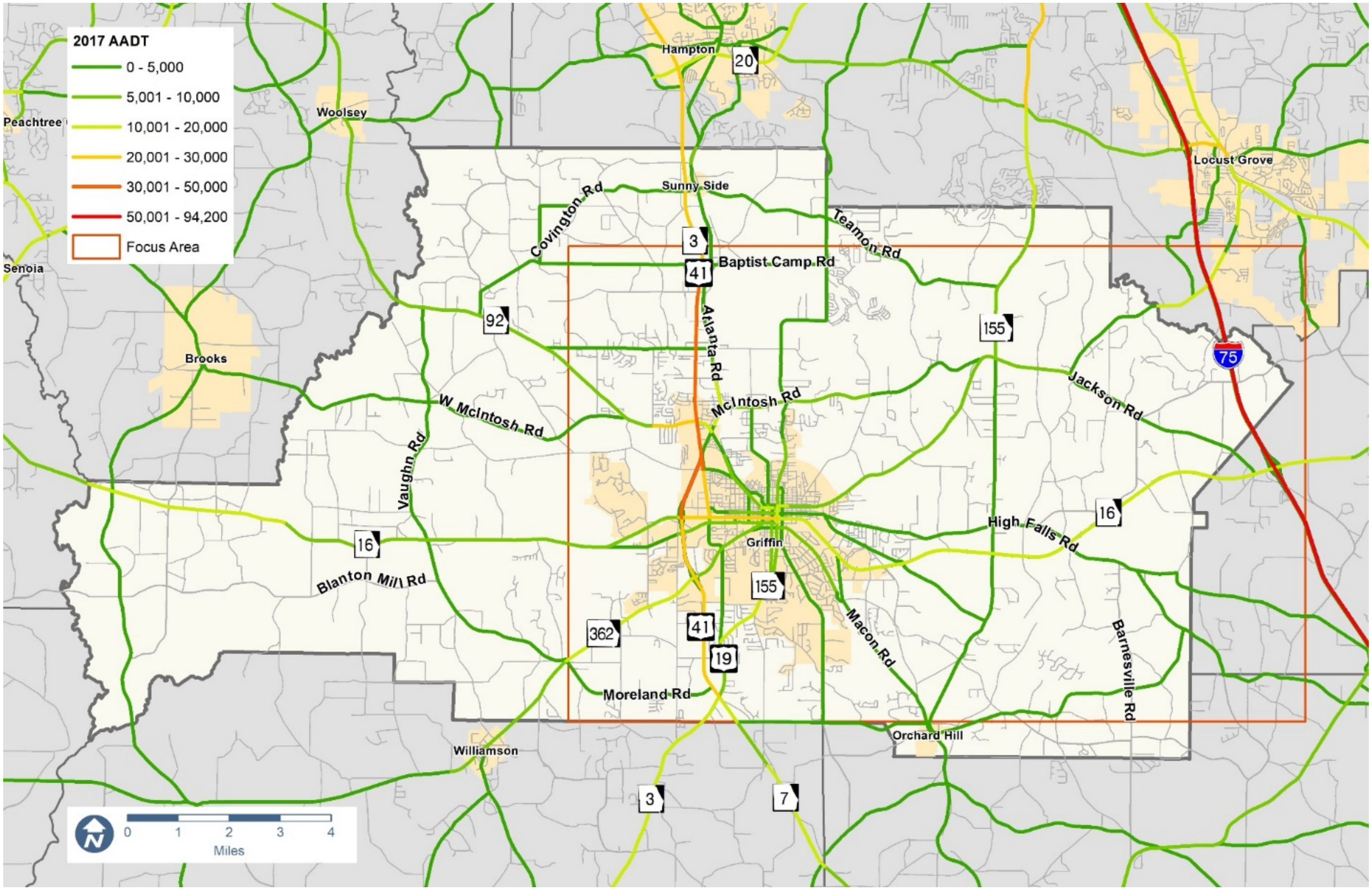
The following sections discuss the needs discovered during a review of the roadway network in Spalding County. Sections address needs relating to capacity, operations, safety, resurfacing, bridges, and system resiliency issues.

3.1.1. Capacity

An investigation of existing travel characteristics was completed as part of the Inventory and Assessment Report. It revealed that the highest existing (2017) volume roadway traffic in Spalding County was observed along I-75 and on principal and minor arterials in and around Griffin. Specifically, I-75 carried an annual average daily traffic (AADT) of 82,900 vehicles per day. In Griffin, US 19/US 41/SR 3 with an AADT of 33,850 vehicles per day between SR 16 and Baptist Camp Road and 27,900 vehicles per day from SR 16 to Zebulon Road. SR 16 carries 22,400 vehicles per day between US 19/US 41/SR 3 and S. Hill Street. Roadway Traffic Volumes are shown in Figure 1.

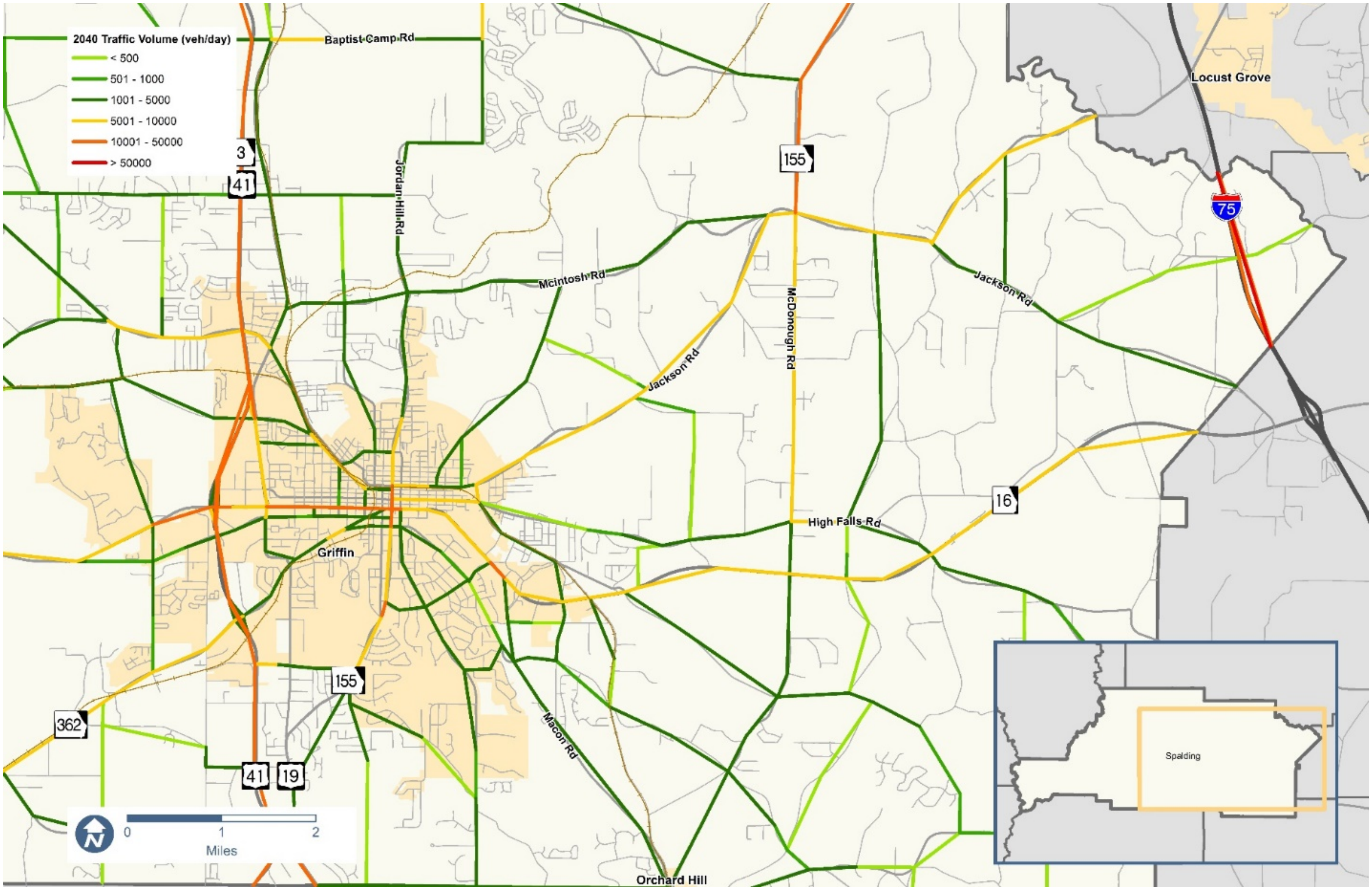
An investigation of future travel characteristics was also completed as part of the *Inventory and Assessment Report*. It revealed that the 2040 traffic volumes in Spalding County are expected to increase along many routes. Portions of I-75 are forecasted to handle 105,200 vehicles per day, which is a 35% increase from 2015. While there is no interchange along I-75 in Spalding County, this growth is indicative of a growth of traffic volumes throughout Spalding County. Several roadways within Spalding County are forecasted to carry substantially higher volumes and are expected to also have an increased truck percentage. US 19/US 41/SR 3 is projected to handle over 34,000 vehicles per day, an increase of 38%, SR 155 from Jackson Road to Teamon Road is forecasted to carry 23,155 vehicles per day, a 33% increase, and SR 16 near Rehobeth Road is anticipated to have a traffic volume of 12,444 vehicles per day, reflecting a 58% increase in traffic volume in 2040. Future Roadway Traffic Volumes are shown in Figure 2.

Figure 1: 2017 Roadway Volumes (AADT)[1]



[1] GDOT Traffic Analysis & Data Application (TADA)

Figure 2: Projected Traffic Volumes (2040)[2]

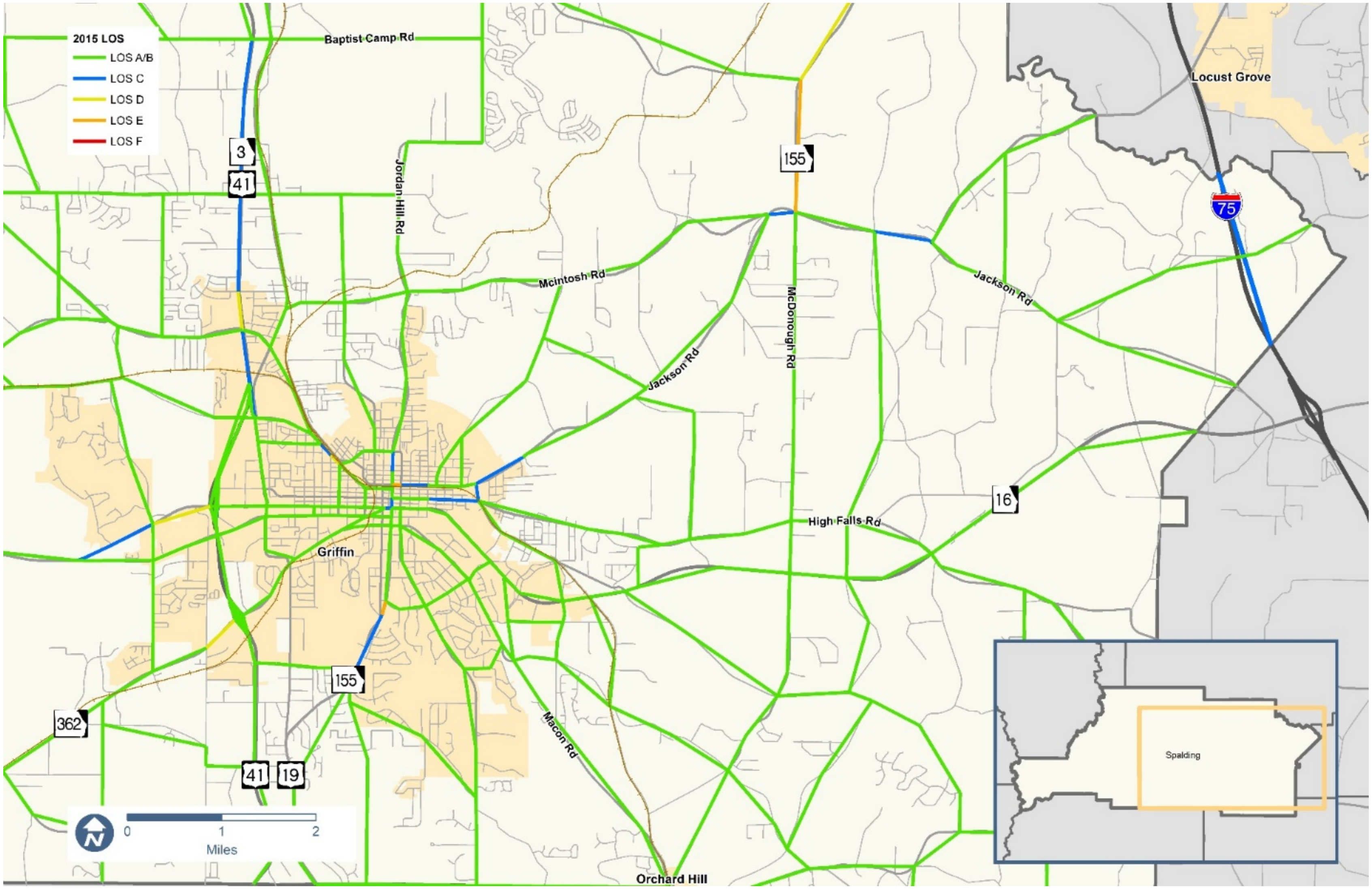


2 Atlanta Regional Commission (Activity-Based Model)

As shown in Figure 3, a review of the existing condition 2015 Levels of Service (LOS) in Spalding County identified that most roadways exhibit LOS A or B. A few corridors in and around Griffin, are at LOS C. However, the highest congestion is exhibited along SR 155 from Jackson Road to the northern county boundary exhibited a LOS D. In addition, limited portions of Newnan Road, US 19/US 41/SR 3 and East Broadway Street in Griffin also exhibited LOS D.

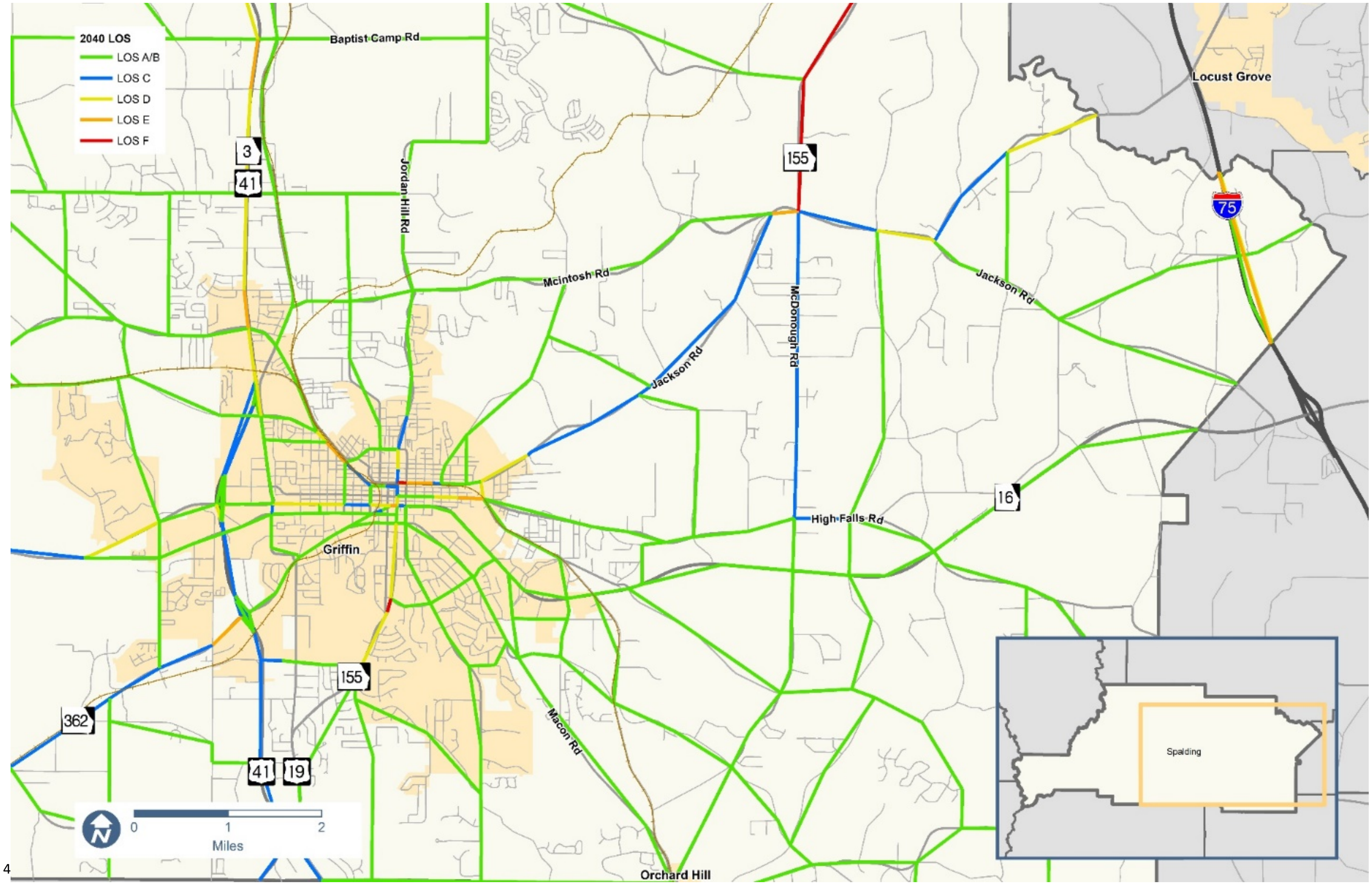
A review of future condition 2040 LOS in Spalding County indicated that traffic congestion remains at acceptable levels (LOS A, B, and C) for most of the roads within the county. However, along some truck routes, the increase in traffic volume is anticipated to worsen congestion. Specifically, SR 155 from Henry County to McIntosh Road and Jackson Road is projected to have an LOS F, US 19/US 41/SR 3 is projected to operate at LOS D and E from Baptist Camp Road to SR 92. Also, SR 155 from S. Hill Street to N. 2nd Street, are projected to have an LOS E and F. Portions of other arterials and collectors including SR 16, Experiment Street, S. Hill Street, and E. Solomon Street, which lead into Downtown Griffin are projected to be at LOS D and E. Figure 4 shows 2040 LOS for roads in Spalding County.

Figure 3: 2015 Roadway Congestion (LOS) Map[3]



[3] Atlanta Regional Commission (Activity-Based Model)

Figure 4: 2040 Level of Service



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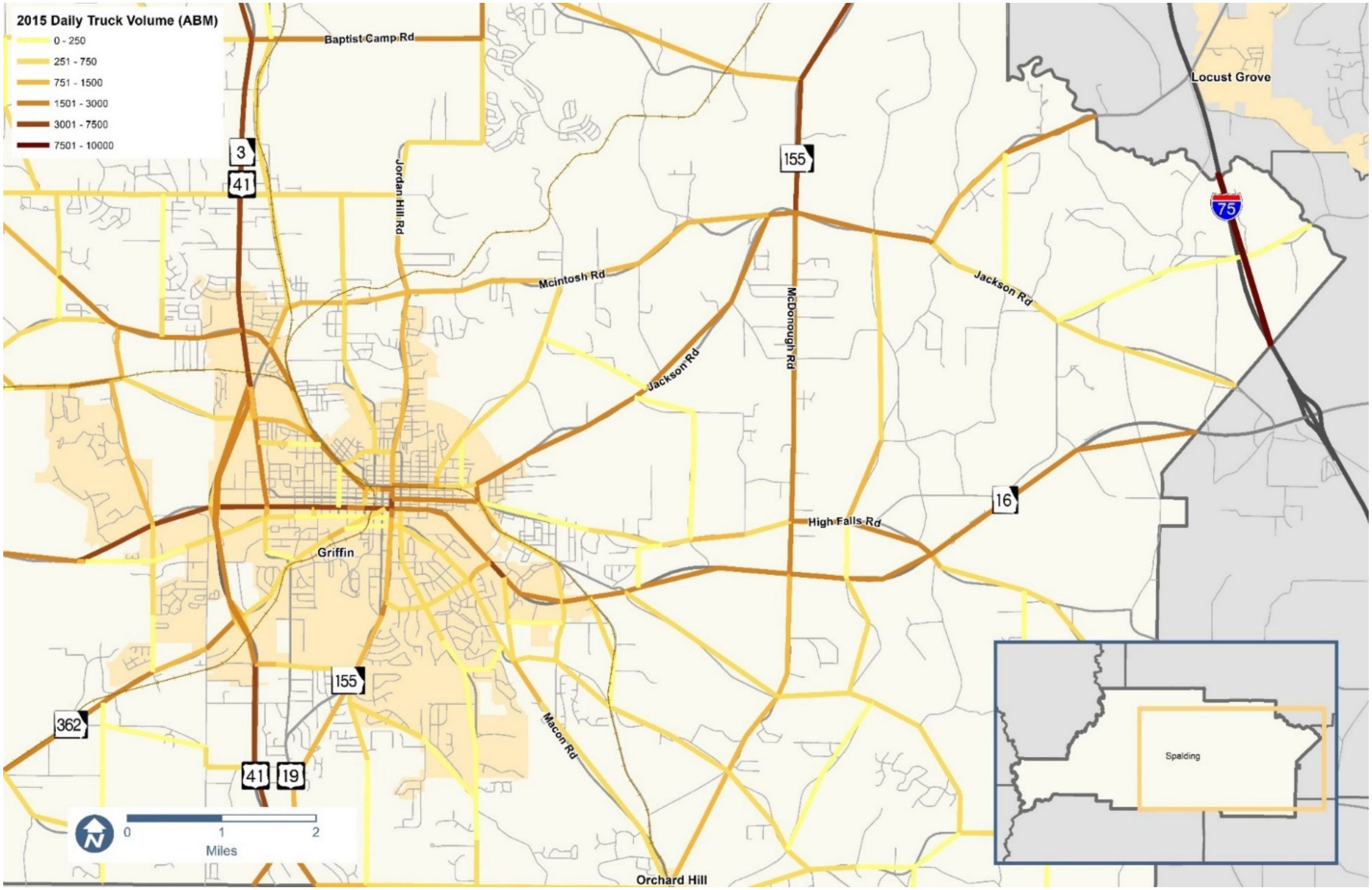
[4] Atlanta Regional Commission (Activity-Based Model)

Within Spalding County, there are a few roadways which carry substantial average daily truck traffic in 2015. US 19/US 41/SR 3 carries the highest volume of trucks ranging from 2,650 per day north of SR 16 to 3,350 per day south of SR 16. SR 16 which provides a connection to I-75 in Butts County to the east and Coweta County to the west ranging from 1,325 to 2,200 trucks per day, which represents 11 to 16% of total traffic. SR 155, which connects Griffin to northern Spalding County and Henry County carries about 350 to 550 average daily trucks. Figure 5 shows the 2015 Truck Volumes in Spalding County.

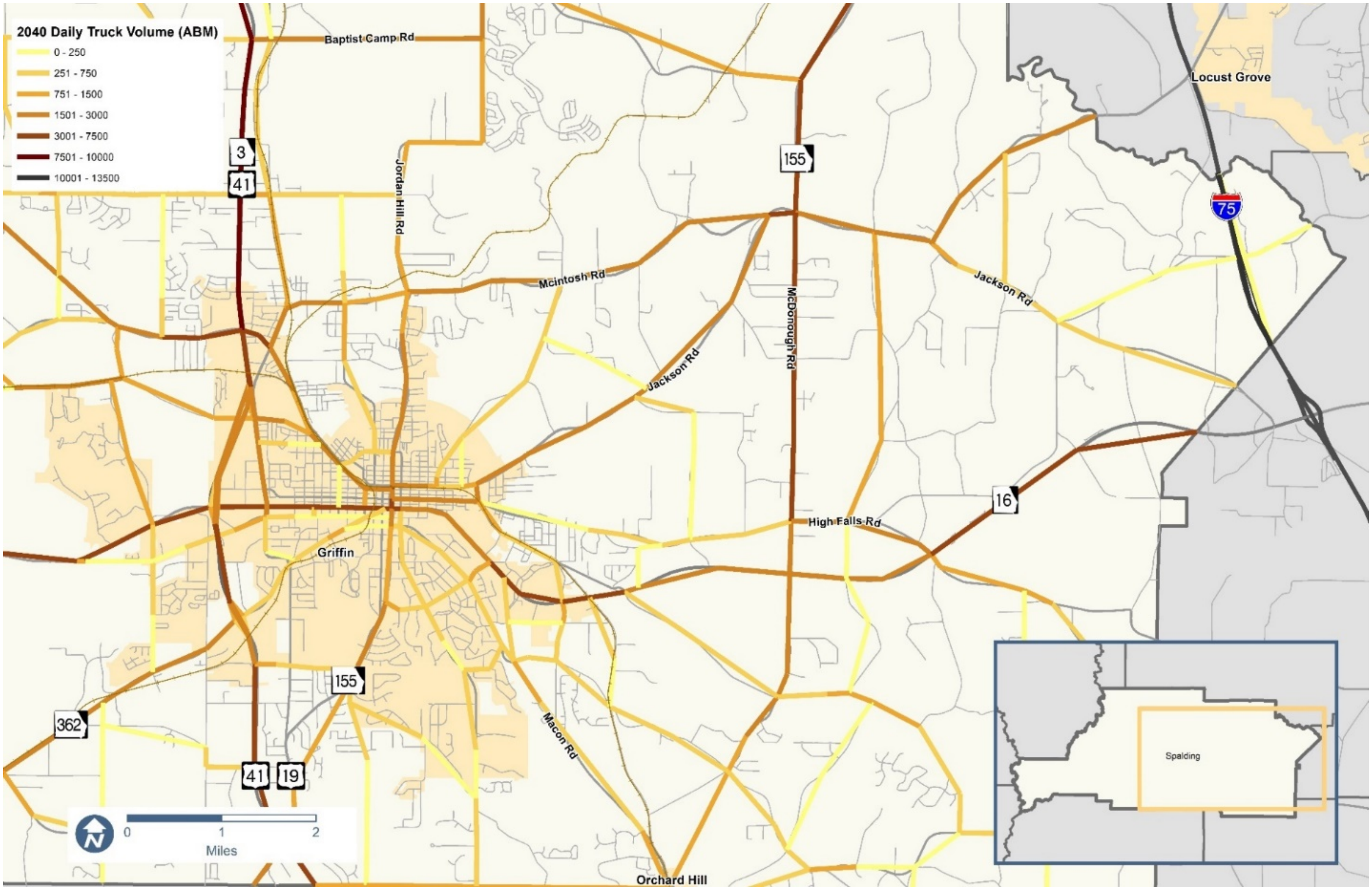
Truck volumes within Spalding County are anticipated to increase considerably between 2015 and 2040 particularly on designated truck routes. The highest truck volume is projected along US 19/US 41/SR south of Baptist Camp Road with 9,140 trucks or a 35% increase. South of Griffin US 19/US 41/SR 3 is projected to reach 4,421 trucks per day, which is also a 35% increase. SR 16 in eastern Spalding County is also expected to incur substantial growth in truck traffic. It is projected to have 36% increase in truck traffic or 3,809 trucks per day. SR 16 between Hamilton Boulevard and Green Valley Road is anticipated to carry 3,370 to 3,831 trucks per day or a 22 to 26% increase. SR 155 shows moderate growth from 2015 to 2040, particularly near Searcy Avenue with 2,347 trucks per day or a 16% increase. Figure 6 shows the 2040 projected Truck Volumes in Spalding County.

Figure 5. 2015 Daily Truck Volume (ARC ABM)[5]



[5] Atlanta Regional Commission (Activity-Based Model)

Figure 6. 2040 Daily Truck Volume (ARC ABM)[6]



[6] Atlanta Regional Commission (Activity-Based Model)

3.1.2. Operations

As part of the Freight Cluster Plan, a detailed traffic study was conducted at 11 key intersections within Spalding County. Key findings from this plan include the following:

- Under the existing year (2019) conditions, most of the intersections evaluated operate at an acceptable level-of-service (LOS D or better) during peak periods. The exception is SR 16 at Wild Plum Road, which currently operates at LOS E during peak periods due to the delay experienced by northbound through and left-turning vehicles from Wild Plum Road.
- Based on the projected growth in traffic at the intersections, if no improvements are made, two intersections are projected to operate at LOS D or worse during peak periods by the future horizon year (2029): SR 16 at Wild Plum Road (LOS F during both morning and afternoon peak periods) and US 19/US 41/SR 3 at Zebulon Parkway (LOS D during the morning peak period and LOS E during the afternoon peak period).

3.1.3. Safety

A crash analysis was conducted for commercial vehicle crashes (involving a tractor-trailer or other type of commercial vehicle) from 2014 to 2018 in the focus area, which includes Griffin and eastern Spalding County. Given the relative lack of traffic congestion throughout the county, it can be assumed that most delays are due to operational deficiencies. Safety issues are often a clear indicator of operational issues. Key findings from this analysis are as follows:

- Between 2014 and 2018, within the focus area, there were 191 crashes involving a tractor-trailer or other type of commercial vehicle on non-interstate routes.
- The greatest concentrations of commercial crashes occurred along US 19/US 41/SR 3 and SR 16 in Griffin, particularly at intersections with arterials and collector roadways. Most crashes were rear-end crashes (28 percent), angle crashes (27 percent), and collisions with an object other than a motor vehicle, including deer, other animals, trees, and other objects on the roadside (22 percent).
- Nearly one-third of commercial crashes resulted in at least one injury. Four of the 191 commercial crashes resulted in a fatality, including a bicyclist who was struck on Vineyard Road near Fleetwood Drive (just west of US 19/US 41/SR 3).
- Crash hotspots, or areas of high crash concentration, coincide with major intersections and freight-intensive land uses in the focus area. These include, but are not limited to, the junctions of US 19/US 41/SR 3 and Airport Road, US 19/US 41/SR 3 and SR 362, US 19/US 41/SR 3 and SR 92 (West McIntosh Road), SR 16 and Green Valley Road, SR 16 and South McDonough Road, and SR 16 and High Falls Road.
- A corridor-level crash analysis was performed for designated truck routes corridors within the focus area, including SR 16, US 19/41/SR 3, and SR 155.[7] Nearly one-third of all commercial crashes (27 crashes) occurred along SR 16, where rear-end crashes were the most prevalent crash type. Thirteen percent of all commercial crashes occurred along US 19/US 41/SR 3, where angle crashes were the most prevalent crash type. Along SR 155, angle crashes were also the

[7] Includes commercial crashes within 50 feet of the corridor, including intersections

most prevalent commercial crash type along SR 155, accounting for seven percent of all commercial crashes.

A crash analysis for all crashes (involving both commercial vehicles and non-commercial vehicles) was performed for the 11 intersections included in the traffic study. Two intersections averaged more than ten crashes annually: US 19/41/SR 3 at Zebulon Road (24 annual average crashes) and US 19/41/SR 3 at Airport Road/Kalamazoo Drive (11 average annual crashes).

3.1.4. Resurfacing

The Freight Cluster Plan includes an evaluation of pavement condition of local and state routes in the focus area. Key findings include the following:

- Each of the designated truck routes in the focus area has a pavement score greater than 70, indicating that the pavement is in good condition. Among the designated truck routes, northbound US 19/US 41/SR 3 carries the lowest score (72), indicating that it will need rehabilitation soonest, prior to the other truck routes.
- If SR 155 were to be relocated from Jackson Road to North McDonough Road and South McDonough Road to serve as a bypass for trucks around Griffin, as proposed by a GDOT project (GDOT PI 0008682), then South McDonough Road would need to undergo rehabilitation. Currently, the corridor has a pavement score of 66 between High Falls Road and Johnston Road.
- Within the industrial districts designated in this plan (see Section 2.3), there are several local roadways in need of pavement rehabilitation:
    - Lakeside Drive (Moreland Road to SR 362)
    - South Pine Hill Road (SR 16 to SR 362)
    - Carver Road (Newnan Road to Louise Anderson Drive)
    - Justice Boulevard (SR 362 to Southern Drive)
    - Southern Drive/DF Fuller Drive (West of Hammond Drive)
    - Everee Inn Road (SR 362 to US 19 Business/SR 155)
    - Memorial Drive / Macon Road /Old Macon Road (SR 16 to Johnston Road)
    - Wilson Road (Macon Road to Searcy Avenue)
    - Greenbelt Avenue (entire corridor)
    - Hudson Road (entire corridor)
    - Green Valley Road (Rehoboth Road to Johnston Road)
    - South McDonough Road (High Falls Road to Rehoboth Road)
    - Newton Road (entire corridor)
    - North Hill Street (Northside Drive to Bourbon Street)
    - Thomas Packing Company Road (entire corridor)
    - Emlet Drive (entire corridor)
    - Jackson Road (Bailey Jester Road to Butts County Line)

3.1.5. Bridge Needs

A review of bridges located in Spalding County and the condition was completed as part of the Inventory and Assessment Report. Fifty-five bridges were identified within Spalding County of which 14 were rated as in Good condition, 40 were rated as in Fair condition, and one was rated as in Poor condition. The one bridge rated in Poor condition was under construction at the time of the writing of the Inventory and Assessment Report. All bridges located along designated freight routes are noted to be in Good or Fair condition and have no weight restrictions. Table 1 identifies bridges in Fair or Poor condition that also have weight restrictions within Spalding County.

Table 1: Bridges in Fair/Poor Condition with Weight Restrictions

Name	Location
McDonough Road at Buck Creek Tributary	4 miles southeast of Griffin
Jordan Hill Road at Troublesome Creek	4 miles north of Griffin
Birdie Road at Griffin Reservoir Tributary	5 miles northwest of Griffin
Dutchman Road at Cabin Creek	5 miles east of Griffin
Mangham Road at Buck Creek	3 miles northeast of Orchard Hill
Walkers Mill Road at Cabin Creek	5 miles east of Griffin
Chuli Road at Towaliga River Tributary	8 miles northeast of Griffin
Tomochichi Road at Cabin Creek	6 miles east of Griffin
Barnesville Road at Buck Creek	5 miles east of Orchard Hill
N. 2nd Street Extension at Cabin Creek	2 miles northeast of Griffin
Hill Street at Cabin Creek	In Griffin

3.1.6. System Resiliency Needs

A major issue in the Atlanta region is the general lack of collectors or arterials to serve as relief valves for freeways and expressways, also known as network resiliency. Spalding County is no different. It has enough scattered development to make the development of adequate circulation difficult, however a far more robust network is still possible. Spalding County still has a lot of undeveloped land available providing an opportunity to identify and preserve land for future corridors that will be needed to create such a robust network. This recommendations report will identify some of those corridors and provide a starting point for discussions and more importantly provide a frame of reference for future development and planning of such corridors. The development of these future corridors and bypasses is key to providing system resilience in Spalding County.

Three specific corridors have been identified by stakeholders and through public outreach activities that need resilience solutions. They are SR 155, SR 16, and US 19/US 41/SR 3. SR 155 and SR 16 both currently run through Downtown Griffin which leads to a lot of undesirable truck traffic in the downtown area. For many years now, officials have wanted to redesignate McDonough Road as SR 155 to relieve north south traffic through downtown. Similarly, a bypass either north, south, or both, of Downtown Griffin is desired by many to provide relief from east-west truck traffic on SR 16 through downtown.

3.2. Freight Routing Needs

The Spalding County Freight Cluster Plan Inventory and Assessment Report identified US 19/US 41/SR 3 and SR 16 as the most substantial truck routes in Spalding County. US 19/US 41/SR provides a north-south connection, while SR 16 provides and east west connection. In addition, SR 155 in Downtown

Griffin has been identified as a problem spot for truck traffic and downtown mobility. Stakeholder input from outreach activities also identified truck traffic in the downtown area as a problem, thus there is a popular desire to remove truck traffic from Downton Griffin. This plan will address the need to remove trucks from Downtown Griffin through both short- and long-term strategies which will be described further later in this document.

In addition to the need to remove trucks from the downtown area, interviews with manufacturers at the Lakes at Green Valley revealed the importance of SR 16 and I-75 to provide access from the Port of Savannah. With an industrial base comprised primarily of manufacturing uses, preserving the access to the Port will be critical to preserving and expanding the viability of the Spalding manufacturing base.

3.3. Land Use and Development Needs

Managing the impacts of Greater Atlanta's encroaching urban sprawl with effective planning and policies to create and maintain efficient infrastructure, will help ensure close-knit neighborhoods and a sense of community while preserving natural systems will ensure sustainable growth for Spalding County in the future. In the Inventory and Assessment Report, a review of existing uses to understand how emerging growth and potential recommendations could affect those uses was completed.

Spalding County is a predominantly residential and agricultural county, about 90%, while industrial and manufacturing accounts for about 2% with significant growth anticipated in industrial development. The majority of existing office, manufacturing, and commercial zoning are located within the City of Griffin, while planned future development sites are primarily in the eastern half of the county, near the proposed future airport and/or I-75.

3.3.1. Cargo Oriented Development

A review of Cargo Oriented Development characteristics was also analyzed in the Inventory and Assessment Report. COD focuses on coordinating transportation and land use investment to maximize economic and social benefits by supporting industrial businesses in districts with access to multiple modes of freight transportation, strengthening access to nearby workers, deploying greener vehicles and cleaner technologies, and increasing the types of land uses that can be attracted to industry-heavy areas. Fourteen districts were analyzed based on four categories including:

- Industrial Land Use and Development Characteristics
- Freight System Characteristics
- Worker Access Characteristics
- Environmental Impact & Quality of Life Metrics

Results identified that districts along SR 16, at the Griffin City boundary scored high due to their synergistic relation with the existing industrial base. The second tier of high-ranking sites are in two clusters: along SR 16, between Green Valley Road and McDonough Road and at the intersection of US 19/US 41/SR 3 and Williamson Zebulon Road. With low overall ratings, the eastern-most districts along I-75 present a challenge for County leaders to accommodate industrial development. While they scored their best rankings in Freight Access, they scored poorly due to their distant location from population and employment centers, greenfield land status, and lack of supporting infrastructure. Still, recent development trends throughout the Atlanta region and along I-75 would indicate that these areas will be targeted for industrial development despite these obstacles given the proximity to I-75 and potential access to the Port of Savannah. Much like the eastern-most districts in the COD analysis, this development will require significant investment of infrastructure (roads, water, sewer, etc.) to succeed.

While the opportunities for maximizing previous investments in infrastructure, leveraging previous economic development initiatives and promoting more sustainable industrial growth are presented in the industrial districts near Lakes at Green Valley and along SR 16, the County will need to adopt a two-pronged approach for planning its industrial uses:

- Continuing to promote more coordinated growth by focusing its efforts on developing its planned industrial districts along SR 16; and
- Developing a policy framework to provide the necessary infrastructure to accommodate new industrial development in the districts along I-75.

3.3.2. Potential Land Use Conflicts

The Inventory and Assessment Report also identified several potential land use conflicts during the analysis of existing industrial districts. These areas include four general geographic areas including:

- Southwest of Griffin near Zebulon Road and US 41
- Near the Lakes at Green Valley
- North of Griffin along North Hill Street
- Along I-75 near N. Jackson Road/Wallace Road

This plan will look at the development of local policies to avoid potential future land use conflicts.

3.4. Transit Workforce Access Needs

A review of available transit services in Spalding County identified three transit programs operating in the county. The Three Rivers Regional Transit System which serves residents of Spalding, Butts, Lamar, Meriwether, Pike, and Upson Counties with on-demand transit services and has no fixed routes or stops. Most of the trips utilizing this service were for non-workforce related trips. The second service, the City of Griffin Park District Shuttle, is a free circulator that serves 7 stops and runs twice daily. This service does not directly serve freight-oriented businesses and is likely not a viable option for the local workforce. Finally, the Xpress Regional Commuter Service, while operating in the Atlanta Region, does not have park and ride lots in Spalding County. The closest lots are in Henry County. With that said, it also does not serve as a viable option for Spalding County workers either.

Other than the circulator routes within the City, there is very limited transit opportunities to support local businesses. Furthermore, there is also no direct access to commute services available to Spalding County residents. As a result, nearly all the workforce within the County is dependent on personal automobiles. This would indicate a need to investigate better workforce accessibility options as the County expands its industrial base.

Georgia Commute Options is a program managed by the Atlanta Regional Commission and funded through GDOT to reduce the number of single-occupant vehicles on Metro Atlanta’s roads, particularly during peak times. The program is administered throughout the Atlanta region including Spalding County, and rewards participants for ridesharing options. Use of the programs should be promoted through the Griffin Spalding Chamber of Commerce to its membership.

3.5. Bicycle and Pedestrian Needs

Transportation access can be a significant challenge to workers accessing industrial jobs, particularly low-income or young workers who may not have access to a personal vehicle. An analysis of accessibility of the current industrial workforce, to current and proposed Industrial Districts, particularly for potential workers living in low-income neighborhoods, reveals that there is a lack of sufficient pedestrian facilities between industrial districts and adjacent low-income communities. Access could be improved by requiring sidewalks in nearby residential development.

4. Previously Identified Projects and Policy Recommendations

Several transportation projects that are either planned or programmed were identified during the Inventory and Assessment within Spalding County. Projects identified included maintenance, new roadways, roadway widenings, and traffic operations intended to improve mobility and safety in Spalding County. The Inventory and Assessment also revealed several policy and strategy recommendations identified in previously completed documents that should be considered going forward. The sections below describe the projects, policies, and strategies in further detail.

4.1. Roadway Improvements

The following section provides the inventories of the roadway projects programmed within the Atlanta Regional Commission (ARC) TIP, planned at the state level within the GDOT work program, or identified from other studies and provide a benefit to the freight system in the Spalding County.

4.1.1. Programmed (within ARC and County TIP)

The following roadway projects have been programmed at the regional, county or city level:

- **GDOT M005002 – SR 92 From Sr 3 to CR 347/Westmoreland Road –** Resurfacing and Maintenance.
- **GDOT 0008682 – Griffin South Bypass Phase 1 -** From intersection of SR 155 and Jackson Road along existing alignment of N. McDonough Road to SR 16 (Arthur K. Bolton Parkway).

4.1.2. Planned – Cost Feasible (assigned PI number)

The following roadway projects were within the GDOT work program. Since they have secured designated funding, they were not included in the Freight Cluster Plan work program:

- **GDOT 0010333 – North Hill Street; Solomon Street & 5th Street in Downtown Griffin (LCI) -** LCI Project in Downtown Griffin that includes improvements on N. Hill Street (SR 155) from Poplar Street to Tinsley Street, Solomon Street from 9th Street to 3rd Street, 5th Street from Taylor Street (SR 16) to Solomon Street. This project is currently under construction with an anticipated completion in 2020.
- **GDOT 0013295 – SR 155 at CS 1020/N. Hill Street -** Traffic signal installation and construction of a left turn lane on the westbound approach. This project was completed during the development of this plan.

4.1.3. Planned – Long-Term (assigned PI number)

The following long-term proposed roadway projects were identified within Spalding County:

- **GDOT 0007870 - Griffin South Bypass Phase 2 -** Widening from SR 16 (Arthur K. Bolton Parkway) along existing alignment of S. McDonough Road and County Line Road to US 19/US 41/SR 3.
- **GDOT 0010441 – Griffin South Bypass Phase 3 -** Construction of bypass between US 19/US 41/SR 3 and SR 16 (Arthur K. Bolton Parkway) along existing County Line Road and S. McDonough Road.
- **GDOT 0000294 – US 19/41 Widening to Henry County**

- **GDOT 0006972 – SR 362 from Kings Bridge Road to SR 3/US 19**

4.1.4. Planned – Aspirational (Not assigned PI number)

The following roadway projects were identified in previously completed plans or programs, however funding has not been identified for them at this time:

- **Spalding County - CTP-04 – Airport Access Road**
- **Spalding County - CTP-05 – Airport entrance Road (Sapelo Road/Wild Plum Road) Widening and Improvement**
- **Spalding County - ASP-SP-172 – SR 92 Widening**
- **Spalding County - ASP-SP-169 – SR 16 Widening to Henry County**
- **Spalding County - C-015 – E. McIntosh/Jackson Road Widening**
- **City of Griffin - CTP-13 - SR 155 / S. Hill Street from S. 9th Street to Poplar St**
- **City of Griffin - CTP-14 - Experiment Street at 14th Street (Intersection Improvement Program - Phase I)**
- **City of Griffin - CTP-15 Experiment Street at Elm Street (Intersection Improvement Program - Phase II)**

4.2. Bridge Improvements

Three bridge replacement projects were identified in the Inventory and Assessment Report. These projects were not included in the work program because they are already programmed by GDOT. They are as follows:

- **GDOT 0006954 - CR 134/N. Hill Street at Cabin Creek** - Bridge replacement project.
- **GDOT 331720 - CR 889/Jordan Hill Road @ Troublesome Creek north of SR 16 -** Bridge replacement project.
- **GDOT 342860 - CR 509/Birdie Road @ Griffin Reservoir Tributary Northwest of Griffin -** Bridge replacement project.

4.3. Safety and Operational Improvements

The following section provides an inventory of the safety and operational projects programmed within the Atlanta Regional Commission (ARC) TIP, planned at the state level within the GDOT work program, or identified from other studies and provide a benefit to the freight system in Spalding County.

4.3.1. Programmed (within ARC and County TIP)

The following safety and operational projects have been programmed at the regional, county or city level. Because these projects have been completed, they are not included in the work program.

- **Spalding County - Int #3 - LCI Intersection #3: N. Hill Street at E. McIntosh Road –** This project was completed in May 2020.
- **City of Griffin - Int #1 - LCI Intersection #1: N. Hill Street at Blanton Ave. and N. 6th Street –** This project is complete.
- **City of Griffin - Int #2 - LCI Intersection #2: N. Hill Street at Northside Drive and Tuskegee Ave Roundabout –** This project is complete.

4.3.2. Planned – Aspirational (not assigned PI number)

The following planned safety and operational projects in Spalding County and the City of Griffin were identified in the Inventory and Assessment Report. It is important to note that not all the projects identified were carried forward into the work program. Based on direction from Spalding County Staff only Tier 1 and Tier 2 projects were considered for inclusion in the work program.

- **Spalding County - CTP-01 - Jackson Road at N. McDonough Road**
- **Spalding County - CTP-02 - Orchard Hill Intersection Improvements: Johnston Road /Macon Road / S. McDonough Road & Macon Road at Swint Road**
- **Spalding County - CTP-03 - Tri-County Crossing: Moreland Road extension to Zebulon Road with intersection improvements**
- **Spalding County - CTP-06 - County Line Road at Ethridge Mill Road**
- **Spalding County - CTP-07 - Signalize SR 16 at Wild Plum Road / Lakes at Green Valley**
- **Spalding County - CTP-08 - Jackson Road at Locust Grove Road**
- **Spalding County - CTP-09 - Old Atlanta Road at Dobbins Mill Road**
- **Spalding County - CTP-10 - SR 92 at Cowan Road**
- **City of Griffin - Int #1 - LCI Intersection #1: N. Hill Street at Blanton Ave. and N. 6th Street**
- **City of Griffin - Int #2 - LCI Intersection #2: N. Hill Street at Northside Drive and Tuskegee Ave Roundabout**
- **City of Griffin - SPLOST-1 - Solomon Street (Little 5 Points) Improvements - Concept study complete**
- **City of Griffin - SPLOST-2 - Searcy Ave. at E. Broadway Street (SR 155)**
- **City of Griffin - SPLOST-3 - Cain Street at Everee Inn Road**
- **City of Griffin - SPLOST-4 - Spalding Drive at SR 16**
- **City of Griffin - SPLOST-5 - Hammond Drive at W. Poplar Street - Concept study underway**
- **City of Griffin - SPLOST-6 - College Street at Hamilton/ Kincaid Street (Intersection Improvement Program - Phase I)**
- **City of Griffin - CTP-01 - Old Atlanta Road between E. McIntosh Road & McIntosh Road / Experiment Street**
- **City of Griffin - CTP-02 - Poplar Street at 8th Street**
- **City of Griffin - CTP-03 - SR 16 at Macon Road**
- **City of Griffin - at Meriwether/ New Orleans/10th Street (Intersection Improvement Program –Phase 1)**
- **City of Griffin - CTP-05 - Broad Street at 9th Street (Intersection Improvement Program - Phase II)**
- **City of Griffin - CTP-06 - Experiment Street at 13th/ Ray Street (Intersection Improvement Program - Phase II)**
- **City of Griffin - CTP-07 - Carver Road @ W Poplar Street / Poplar Road**
- **City of Griffin - CTP-08 - Macon Road at Hudson Road**
- **City of Griffin - CTP-09 - N. Expressway at Ellis Road**
- **City of Griffin - CTP-10 - Ellis Road at US 19/41**

- **City of Griffin - CTP-11 - SR 362 at US 19/41**
- **City of Griffin - CTP-12 - Ellis Road at Experiment Street**
- **City of Griffin - CTP-40 - Crescent Road at Maple Drive Improvement**

4.4. Resurfacing

While no specific resurfacing projects were identified in the Inventory and Assessment Report, a review of pavement condition ratings used within Spalding County was completed. Recommendations and descriptions based on that review are included later in this plan in section 5.3.

4.5. Land Use and Development

In the Inventory and Assessment, several previous plans and studies were reviewed from the state, regional, and local level. This section will address previously identified policies directed at the issue of land use in Spalding County.

4.5.1. Local

While no specific policies were identified, the Spalding County Transit Feasibility Study evaluated land use to identify activity centers with the needed residential and employment density to support transit service with the goal to enhance transit service for commuter trips in Spalding County.

In addition to the transit feasibility study, two Livable Centers Initiative plans were conducted for the area in West Griffin and in the City of Griffin Town Center. These studies also did not provide specific land use policies, but also review land use patterns in the study areas to encourage growth and quality of life in the City of Griffin.

4.5.2. Regional

From a regional perspective, no policies were identified as well. However, the ARC Atlanta Strategic Truck Route Master Plan (ASTRoMaP) identified a regional truck route network for the region that was scored according to a set of quantitative and qualitative attributes including truck volumes, functional classification, lane width, shoulder width, bridge clearances, stakeholder support, land use compatibility, and environmental justice. Within Spalding County, three routes were designated on the regional truck route network: US 19/US 41/SR 3, SR 155, and SR 16.

4.6. Transit Initiatives

While Spalding County is a primarily auto oriented community, a review of available transit services identified both local and regional ridership options available to riders, by way of shuttle, bus, express bus, and private transportation services. This section will provide a review of any transit initiatives identified in the Inventory and Assessment Report.

4.6.1. Local

Several local planning documents were reviewed during the development of this plan including the Spalding County Transit Development Plan, Spalding County Transit Feasibility Study, Griffin-Spalding CTP, Spalding Comprehensive Plan, City of Griffin Comprehensive Plan, and the Griffin LCI Studies. The following initiatives were identified in those documents:

- Maintain on-demand services throughout Spalding County.
- Provide enhanced transit service for commuter trips for the Griffin-Spalding County area. A phased program of recommendations was suggested to enhance transit service in the county, including expanded participation in transportation demand management programs, an expansion Griffin-Spalding rural transit service to a countywide flexible route system, and a new fixed route system concentrated in and around Griffin.
- Promotion of a multi-modal transportation network.
- Establishment of public-private partnerships for the establishment of public transit options.

4.6.2. Regional

In addition to the local planning documents, multiple state and regional planning documents were also reviewed during the development of this plan. Some of those documents include the Georgia Statewide Freight and Logistics Plan, ARC Atlanta Strategic Truck Route Master Plan, Atlanta Regional Freight Mobility Pan, Atlanta Regional Truck Parking Assessment Study, and Southern Regional Accessibility Study. Because the documents reviewed were primarily focused on freight initiatives no transit initiatives were identified.

However, several commuter rail projects, which are being developed by GDOT were identified in the Inventory and Assessment. These projects would provide an invaluable connection to the Atlanta region from Griffin and beyond and in turn provide access to work in and around the city for many outside of Spalding County. Those projects are as follows:

- **0009219 - Commuter Rail – Atlanta to Griffin - Phase I -** Long-term commuter rail service between Atlanta and Griffin.
- **0009220 - Commuter Rail – Atlanta to Griffin - Phase II -** Long-term commuter rail service between Atlanta and Griffin.
- **0009221 - Commuter Rail – Atlanta to Griffin - Phase III -** Long-term commuter rail service between Atlanta and Griffin.
- **371800 - Commuter Rail – Griffin to Macon/Bibb – Houston County - Phase IV -** Long-term commuter rail service between Macon and Griffin.
- **371801 - Commuter Rail – Griffin to Macon/Bibb – Houston County - Phase V -** Long-term commuter rail service between Macon and Griffin.

4.7. Bicycle and Pedestrian

Spalding County and the City of Griffin have proposed a variety of multimodal improvements to improve safety and mobility for pedestrians and cyclists within Spalding County. These include the following:

- The Griffin-Spalding CTP Update (2016) proposed nearly 14 miles of new sidewalk projects that address safety concerns, connect to schools and concentrated land uses, fill gaps in existing sidewalk segments, and fall along or connect to major routes. Some of these segments fall along designated truck routes, including:
    - SR 155 (S. Hill Street) from Milner Avenue to Crescent Road

- SR 16 (Memorial Drive) from Hamilton Boulevard to near Harlow Avenue
- SR 155 (E. Broadway Street) from Morris Street to Jackson Elementary School

- There are also sidewalk projects proposed along local roads that coincide with the highest ranked industrial districts designated as part of the Freight Cluster Plan and are within proximity of households that may not have vehicle access. These include:
  - Futral Road from Rhodes Lane to Wilson Road
  - Wilson Road from SR 16 to Futral Road
  - SR 362 (Meriwether Street) from Westwind Court to Everee Inn Road
  - SR 362 (Williamson Road) from Carver Road to US 19/US 41/SR 3
  - Carver Road from W. Poplar Street to SR 362 (Williamson Road)
  - S. Pine Hill Road from W. Poplar Street to SR 362 (Williamson Road)
- Bicycle and pedestrian policies and recommendations were identified in previous plans and studies as part of the completion of the Inventory and Assessment. In the City of Griffin's Comprehensive Plan, the lack of multi-modal transportation is listed as both a weakness and threat in the document's strengths, weaknesses, opportunities, and threats (SWOT) analysis.[8] There are needs within the City to increase the bicycle & pedestrian network and overall connectivity as well as to create multi-modal and alternative transportation options, such as bicycle sharing infrastructure.[9] It is the City's goal to "promote an efficient, safe, and connected transportation system that serves all sectors of the City of Griffin" with policies to promote a multi-modal transportation network and to research and seek to adopt a local Complete Streets policy.[10] In the Land Use section of the plan, one goal is to "develop a recreational network of greenways, trails, and parks" with one strategy to create a Greenway Master Plan.[11] Trails program implementation is included in the City's Community Work Program at a cost of $1 million through SPLOST.[12]
- At a countywide level, Spalding County's Comprehensive Plan includes goals to improve multi-modal connectivity by evaluating options for greenways and trails during the update of the Parks and Recreation Master Plan and by implementing the Rails-With-Trails Study.[13] The Community Work Program for Spalding County includes sidewalks and bike lanes along North Hill Street at a cost of $550,000 and $2.3 million, respectively. Sidewalks would be funded

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[8] City of Griffin Comprehensive Plan, p. 16. 2018.
https://cityofgriffin.com/Portals/1/Documents/PlanDev/2014-2034%20Comp%20Plan/Community%20Needs%20%26%20Opportunities%2015-20.pdf
[9] Ibid, p. 18.
[10] City of Griffin Comprehensive Plan, p. 12. 2018.
http://www.cityofgriffin.com/Portals/1/Documents/PlanDev/2014-2034%20Comp%20Plan/Community%20Goals%2010-14.pdf
[11] City of Griffin Comprehensive Plan, p. 29-30. 2018.
http://www.cityofgriffin.com/Portals/1/Documents/PlanDev/2014-2034%20Comp%20Plan/Planning%20Elements%2021-82.pdf
[12] City of Griffin Comprehensive Plan, p. 93. 2018.
https://cityofgriffin.com/Portals/1/Documents/PlanDev/2014-2034%20Comp%20Plan/Community%20Work%20Program%2086-94.pdf
[13] Spalding County Comprehensive Plan, p. 10. 2017.
https://www.spaldingcounty.com/cms/uploads/file/community_dev_2018/spalding-comp-plan_adopted.pdf

through a possible TSPLOST while bike lanes would be funded through either GDOT, TSPLOST, or general funds.[14] Additionally, Goal 3 of the Griffin-Spalding CTP 2016 Update is to "improve bicycle and pedestrian ways, including multi-use paths and sidewalks, as a means to offer recreational improvements and to connect community centers as well as adjacent counties."[15]

From a planned and programmed project perspective, the Downtown Griffin LCI Study includes three corridors which are programmed for bicycle and pedestrian enhancements at a cost of $5.9 million (PI 0010333):[16]

- North Hill Street (SR 155/CR 134) from Poplar Street to Tinsley Street
- Solomon Street from 9th Street to 3rd Street
- 5th Street from Taylor Street to Solomon Street

Recommended sidewalk projects from the Griffin-Spalding CTP 2016 Update which are along state routes or freight routes include:

- Project S01 – South Hill Street (SR 155) – from Milner Avenue to Crescent Road
- Project S04 – Memorial Drive (SR 16) – from Hamilton Boulevard to Harlow Avenue
- Project S06 – Meriwether Street (SR 362) – from Westwind Court to Everee Inn Road
- Project S07 – Williamson Road (SR 362) – from Carver Road to US 19/41/SR 3 Bypass
- Project S13 – East Broadway Street (SR 155) – from Morris Street to Jackson Elementary School
- Project S30 – North Hill Street – from Northside Drive to East McIntosh Road

While the CTP includes programmed and proposed bikeways, no recommended bikeways are included in the final recommendations report; however, potential opportunities exist with the Fairmont School SPLOST Trail and the Roosevelt Rail Greenway.[17]

[14] Spalding County Comprehensive Plan, p. 29-37. 2017. https://www.spaldingcounty.com/cms/uploads/file/community_dev_2018/spalding-comp-plan_adopted.pdf
[15] 2016 Griffin-Spalding Comprehensive Transportation Plan (CTP) Update, p. 4. May 2016. https://www.spaldingcounty.com/docs/public_works/Needs_and_Recommendations_Report_-_2016_Griffin-Spalding_CTP_Update.pdf
[16] GDOT (2019). North Hill St; Solomon Street & 5th Street in Downtown Griffin – LCI. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0010333.
[17] 2016 Griffin-Spalding Comprehensive Transportation Plan (CTP) Update, p. 4. May 2016. https://www.spaldingcounty.com/docs/public_works/Needs_and_Recommendations_Report_-_2016_Griffin-Spalding_CTP_Update.pdf

5. New and Modified Projects from the Cluster Plan

This chapter will identify new or modified projects that were developed through the Spalding County Freight Cluster Plan process. The development of this plan identified the need for multiple planning level studies that should be completed to further evaluate potential roadway improvement. It also identified roadway improvements, including capacity, safety, and operational improvements and transit initiatives developed from stakeholder input, outreach activities, analysis from the *Inventory and Assessment Report*, and the *Traffic Study Report*. Details regarding the identified improvements are described below. This section will also address resurfacing improvements and transit initiatives identified during the development of this plan.

5.1. Planning Studies Identified

Multiple planning studies were identified during the development of this plan. These planning studies will evaluate conceptual alternatives and policies for some of the projects later mentioned in the roadway improvements section. Studies identified include:

- **SR 155 Concept Study –** One result of outreach activities and identified by Spalding County and City of Griffin staff was the need to redesignate SR 155 to divert truck traffic out of Downtown Griffin. This study would further evaluate the redesignation of SR 155 east of Griffin along McDonough Road.
- **SR 155 Design for Redesignation –** Following the SR 155 Concept Study listed above would be a corridor alternatives study to further explore details for potential alternatives to achieve a viable redesignated SR 155.
- **Griffin Bypass Alternatives Analysis –** Another finding from the development of this plan was the desire to develop a bypass around the City of Griffin for east-west truck traffic. This study would further evaluate Northern Bypass Alternatives 1 and 2 and Southern Bypass Alternatives 1 and 2 listed below in the roadway improvements section.

5.2. Roadway Improvements

Roadway improvements identified through the Plan process are either capacity/new roadway or safety/operational improvements. Some of the projects are suited for short-term implementation while others are long-term visionary projects. The long-term visionary projects are identified so they can support a long-term vision for Spalding County.

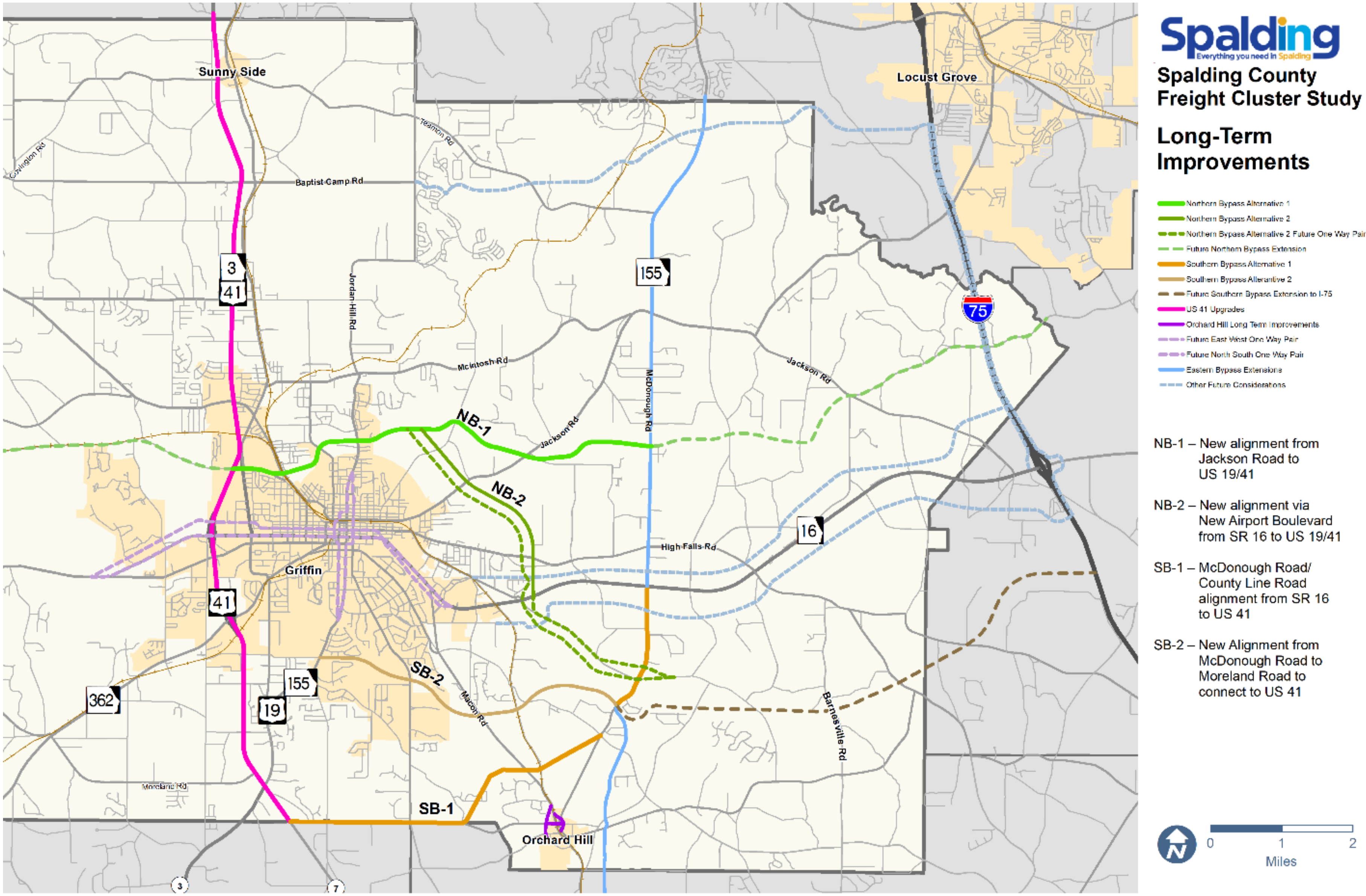
5.2.1. Capacity/New Roadway

The following capacity and new roadway projects have been identified for further evaluation in the prioritization process. It is important to understand that while these projects were identified and evaluated, not all projects were moved forward into the final work program based on factors such as stakeholder input and Spalding County priorities:

- **US 41 Upgrades (South County Line to North County Line)** - Plan for grade separation of significant cross-streets, and one-way frontage roads to collect and distribute from property driveways. Existing ROW + setback is about 200 ft, which should be sufficient.

- **Northern Bypass Alternative 1 (McDonough to US 41) -** New alignment from McDonough Road west to US 41 just south of McIntosh Road.
- **Northern Bypass Alternative 2 (Airport Drive to US 41) -** New alignment northwest from future Airport Drive to new alignment west to US 41.
- **Northern Bypass Route (SR 16 to East County Line) -** New East-West alignment through entire length of Spalding County, eventually connecting I-75 to I-85. Preserve 200 ft ROW everywhere possible. Plan for collector-level backage roads.
- **Eastern Bypass (US 41 to North County Line) -** New alignment from US 41 in Lamar County north to McDonough Road and Upgrade McDonough Road to Spalding County northern boundary. Split into one-way pairs where possible.
- **One Way Pair NW Diagonal (Northern Bypass Route to Rehobeth Road) -** New Airport Bypass. Purpose is to divert traffic on Hwy 16 up to new northern bypass. Starting near Rehobeth Road and McDonough Road upgrade and convert Rehobeth Road to One Way Pair north to SR 16, then continue One Way pair north on New Alignment to future Northern Bypass. Each one-way roadway should have about 100 ft overall ROW, which will include sidewalks and buffer areas for pedestrians.
- **SR 16 Backage Roads -** New Alignments both to the north and south of SR 16. Starting from Green Valley Road, backage roads should be 66-80 ft ROW for 3-lane cross-section. Distance from SR 16 likely to range from about 700 ft to 2000 ft but aim for about 1000 ft on average. This is a "thread the needle" exercise.
- **Southern Truck Bypass Alternative 1 (US 41 to McDonough Road to SR 16**) - Upgrade County Line Road from US 41 to Maddox Road; Partial New Alignment from Maddox Road northeast to McDonough Road, then continues north to SR 16 on McDonough Road to form a Southern Bypass. Overall ROW should be at least 120 ft for eventual needs (so setback accordingly), but early phase upgrades will work as 3-lane cross section.
- **Southern Bypass Alternative 2 (McDonough Road to Airport Road) -** New alignment west from McDonough Road to existing Airport Drive.
- **Southern Truck Bypass, Long Term, Moreland Road Ext East to I-75 -** This corridor should have setbacks that would allow a 150 ft ROW. Initially build 3-lane cross-section incremental with development, but plan for up to 7-lanes. Eventually this will make a "ring road" around Griffin.
- **Locust Grove Connector (Baptist Camp Road to I-75) -** New alignment from Baptist Camp Road on the west to I-75 and Indian Creek Road. This would serve general traffic more than trucks but allows truck corridors to avoid getting overloaded. The road would initially be constructed as a 3-lane section with property setbacks and utility placement should allow for easy transition to a 5-lane cross-section within 120 ft eventual ROW.
- **Orchard Hill Long Term Improvements -** Realign Macon Road from just south of Hoppin Branch Road and continue South to John Jones Road. Realign Green Valley Road and McDonough Road east. Construct bridge over railroad line.

Figure 7. Long-Term Improvements



5.2.2. Operational and Safety Improvements

The traffic study component of the Freight Cluster Plan proposes operational and safety improvements at the 11 intersections evaluated. With these proposed improvements, each intersection is projected to operate at an acceptable level-of-service (LOS C or better) during peak periods by the future horizon year (2029).

5.2.2.1. Jackson Road at Wallace Road

- **Splitter Islands:** Install splitter islands along the Wallace Road approach to the intersection. This would provide separation for traffic moving in different directions and would help to improve the skew angle of the intersection.
- **Signage:** Replace damaged and missing stop signs on east and west legs of the intersection. Install missing signage notifying drivers of truck traffic restrictions on Wallace Road.
- **Pavement Markings:** Restripe the intersection and install raised pavement markers. Raised pavement markers improve the intersection safety by making the delineation between lanes more visible to drivers, particularly in dark, foggy, or other low-visibility conditions.

5.2.2.2. Arthur K. Bolton Parkway (SR 16) at Wild Plum Road

- **Conversion to New Intersection Control:** Convert the intersection into an unsignalized Restricted Crossing U-Turn (RCUT) intersection. The RCUT design and the directional crossover U-turns would be designed to accommodate large trucks by incorporating expanded paved aprons (bum-outs or “loons”) in the shoulder area opposite to the crossover locations.
- **Signage:** Install signage along The Lakes Parkway to redirect traffic destined to SR 16 west (or downtown Griffin) to use the Rehoboth Road or the South McDonough Road intersections.

5.2.2.3. Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) at Airport Road/Kalamazoo Drive

- **Smart Corridor/Technology Improvements:** Install an Advanced Dilemma-Zone Detection System along Martin Luther King Jr. Parkway (US 19/41) in the northbound and southbound directions. The technology utilizes cameras that detect approaching vehicles, distinguishing between trucks and other vehicles, and can extend the yellow signal phase so that heavier vehicles have time to stop before they inadvertently travel through a red light or cause a rear-end crash in an attempt to stop suddenly.
- **Flashing Yellow Arrows:** Install flashing yellow arrow signal head indications for the eastbound and westbound left-turns. Flashing yellow arrows give a clearer indicator to drivers to yield to oncoming traffic for permissive left turns on green, thereby improving safety.
- **Warning Beacon:** Install a warning beacon along Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) in the southbound direction to alert the motorists from the limited-access section of the roadway of the traffic signal ahead.

- **Signage:** Install "Be Prepared To Stop" traffic control signs in advance of the existing "Signal Ahead" sign along Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) in the northbound and southbound directions.
- **Pavement Markings:** Restripe the intersection and install raised pavement markers. Raised pavement markers improve the intersection safety by making the delineation between lanes more visible to drivers, particularly in dark, foggy, or other low-visibility conditions.
- **Median Nose Delineators:** Install median nose delineators to enhance the visibility of medians.
- **Retroreflective Signal Head Backplates:** Install backplates with retroreflective borders on traffic signal heads. This enhances the visibility of traffic signals, especially in dark, foggy, or other low-visibility conditions.
- **Repaving:** Repave the intersection to improve pavement condition.

5.2.2.4. Arthur K. Bolton Parkway (SR 16) at Green Valley Road

- **Smart Corridor/Technology Improvements:** Install advance signs interconnected to the traffic signal to warn motorists when a train is blocking the intersection at Green Valley Road. Install these signs at Rehoboth Road to the east and Wilson Road to the west so that motorists can choose alternative routes to avoid the blocked intersection.
- **Flashing Yellow Arrows:** Install flashing yellow arrow signal head indications for the westbound, northbound, and southbound left-turns. Flashing yellow arrows give a clearer indicator to drivers to yield to oncoming traffic for permissive left turns on green, thereby improving safety.
- **Install Lane Line Extensions:** Install lane line extensions or skip markings through the intersection to guide motorists making westbound left-turns from Arthur K. Bolton Parkway (SR 16) to southbound Green Valley Road, preventing turning vehicles from encroaching onto vehicles stopped in the northbound left-turn lane.
- **Relocate At-Grade Railroad Crossing Marking:** On the south leg of the intersection, relocate the railroad at-grade crossing pavement marking further away from stop bar, so that motorists don't confuse the grade crossing pavement marking for the stop bar.
- **Shoulder and Curb Improvements:** Repave shoulders with SafetyEdge treatment along the northwest and southwest intersection curb radii. The application of SafetyEdge makes the shoulder flush with the top of the pavement, which prevents motorists who have steered off the pavement from over-correcting when re-entering the travel lane.
- **Pavement Markings:** Restripe the intersection and install raised pavement markers. Raised pavement markers improve the intersection safety by making the delineation between lanes more visible to drivers, particularly in dark, foggy, or other low-visibility conditions.
- **Retroreflective Signal Head Backplates:** Install backplates with retroreflective borders on traffic signal heads. This enhances the visibility of traffic signals, especially in dark, foggy, or other low-visibility conditions.

5.2.2.5. Arthur K. Bolton Parkway (SR 16) at Rehoboth Road

- **Relocate Stop Bars:** Reposition and restripe the stop bars on the eastbound through-lanes closer to the traffic signal. Remove the stop bar across the eastbound right-turn lane and install a yield bar and accompanying yield sign.
- **Delineator Posts:** Repair damaged delineator posts.

5.2.2.6. Arthur K. Bolton Parkway (SR 16) at S. McDonough Road

- **Flashing Yellow Arrows:** Install flashing yellow arrow signal head indications for the northbound and southbound left-turns. Flashing yellow arrows give a clearer indicator to drivers to yield to oncoming traffic for permissive left turns on green, thereby improving safety.
- **Install Lane Line Extensions:** Install lane line extensions or skip markings through the intersection to assist eastbound left-turning motorists from Arthur K. Bolton Parkway (SR 16) to northbound South McDonough Road to maneuver through the intersection, preventing them from encroaching onto vehicles stopped at the southbound left-turn lane.
- **Relocate Stop Bar:** Relocate the stop bar on the southbound left-turn lane from S. McDonough Road to eastbound Arthur K. Bolton Parkway (SR 16) further away from the intersection, such that eastbound left-turning vehicles from Arthur K. Bolton Parkway (SR 16) to northbound South McDonough Road do not conflict with the southbound left turning vehicles stopped at the stop bar.
- **Pavement Markings:** Restripe the intersection and install raised pavement markers. Raised pavement markers improve the intersection safety by making the delineation between lanes more visible to drivers, particularly in dark, foggy, or other low-visibility conditions.
- **Retroreflective Signal Head Backplates:** Install backplates with retroreflective borders on traffic signal heads. This enhances the visibility of traffic signals, especially in dark, foggy, or other low-visibility conditions.

5.2.2.7. Martin Luther King Jr. Parkway (US 41) at Zebulon Parkway (US 19 Bus.)

- ***Short-Term Improvements***
    - **Turn Lane Reconfigurations:**
        - Install dual left-turn lanes for the eastbound left-turn movement from Zebulon Parkway (US 19) to northbound Martin Luther King, Jr. Parkway (US 41).
        - Lengthen the southbound right-turn lane (from Martin Luther King Jr. Parkway (US 41) to westbound Zebulon Parkway (US 19)) to accommodate and provide appropriate lane change and deceleration distances for the 55 miles per hour speed limit on Martin Luther King, Jr. Parkway (US 41), per AASHTO requirements.
        - Work with the property owner to close the shopping center driveway located along the right-turn lane from southbound Martin Luther King Jr. Parkway (US 41), which falls within the functional area of the intersection. Retain the access to the shopping center along Zebulon Parkway (US 19).
    - **Flashing Yellow Arrows:** Install flashing yellow arrow signal head indications for westbound left-turns.

  - **Median Nose Delineators:** Install median nose delineators to enhance the visibility of medians.
  - **Pavement Markings:** Restripe the intersection and install raised pavement markers. Raised pavement markers improve the intersection safety by making the delineation between lanes more visible to drivers, particularly in dark, foggy, or other low-visibility conditions.
- ***Long-Term Improvements***
  - **Install Displaced Left-Turn (DLT) Intersection:** In the long-term, continue to monitor the level of traffic congestion and consider installing a single-legged displaced left turn (DLT) intersection for eastbound left-turn movements from Zebulon Road (US 19) to northbound Martin Luther King, Jr. Parkway (US 41). Include the corresponding free-flow right-turn bypass lane for the southbound right turns from Martin Luther King Jr. Parkway (US 41) to westbound Zebulon Road (US 19). As part of this design, improve the skew of the intersection by slightly realigning the eastbound Zebulon Road (US 19) approach and the westbound Zebulon Road (US 19 Bus19/SR 155) approaches. As part of this design, consider installing a displaced left turn (DLT) for westbound left-turn movements from Zebulon Road (US 19 Bus./SR 155) to southbound Martin Luther King Jr. Parkway (US 41), with due consideration for maintaining the access for the gas station parcel.
  - **Moreland Road Extension:** In the long-term, in the vicinity of the intersection, consider implementing the proposed Tri-County Crossing: Moreland Road extension project (Spalding County CTP-03) to connect Moreland Road from the west of Martin Luther King Jr. Parkway (US 41) to Clark Road east of Zebulon Parkway (US 19 Bus.). This will benefit the Martin Luther King Jr. Parkway (US 41) at Zebulon Parkway (US 19 Bus.) intersection operation by reducing the demand for turning movements at the intersection; particularly, southbound left-turns from Martin Luther King Jr. Parkway (US 41) to eastbound Zebulon Parkway (US 19) and westbound right-turns from Zebulon Parkway (US 19 Business/ SR 155) to northbound Martin Luther King Jr. Parkway (US 41).

5.2.2.8. Johnston Road at Macon Road

- ***Short-Term Improvements***
  - **Repaving and Reconstruction:** Reconstruct and repave Johnston Road between Macon Road and South McDonough Road to correct the vertical sight lines at the intersection and improve pavement condition.
  - **Pavement Markings:** Restripe the intersection and install raised pavement markers. Raised pavement markers improve the intersection safety by making the delineation between lanes more visible to drivers, particularly in dark, foggy, or other low-visibility conditions.
- ***Long-Term Improvements***
  - **Roundabout:** In the long-term, consider installing a roundabout at the intersection, in conjunction with Phase 2 of the Griffin South Bypass project (GDOT PI 007871).

5.2.2.9. Johnston Road @ Green Valley Road

- ***Short-Term Improvements***
  - **Repaving:** Repave Johnston Road between Macon Road and South McDonough Road to improve pavement condition.
  - **Pavement Markings:** Restripe the intersection and install raised pavement markers. Raised pavement markers improve the intersection safety by making the delineation between lanes more visible to drivers, particularly in dark, foggy, or other low-visibility conditions.
- ***Long-Term Improvements***
  - **Relocate Intersection:** In the long-term, consider removing the intersection by relocating Green Valley Road to intersect South McDonough Road north of Johnston Road, in conjunction with Phase 2 of the Griffin South Bypass project (GDOT PI 007871).

5.2.2.10. Johnston Road at South McDonough Road

- ***Short-Term Improvements***
  - **Splitter Islands:** Install splitter islands along the South McDonough Road approach to the intersection. This would provide separation for traffic moving in different directions and would help to improve the skew angle of the intersection.
  - **Repaving:** Repave the intersection to improve pavement condition.
  - **Pavement Markings:** Restripe the intersection and install raised pavement markers. Raised pavement markers improve the intersection safety by making the delineation between lanes more visible to drivers, particularly in dark, foggy, or other low-visibility conditions.
- ***Long-Term Improvements***
  - **Roundabout:** In the long-term, consider installing a roundabout at the intersection, in conjunction with Phase 2 of the Griffin South Bypass project (GDOT PI 007871).

In addition to the operational and safety improvements recommended as part of the Traffic Study, this plan includes proposed “smart corridor” or technology-based solutions to improve safety and mobility along designated truck routes in the study area.

5.2.2.11. Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) Signal Optimization and Advanced Dilemma-Zone Detection System (Mailer Road to Bowling Lane)

- Coordinate with GDOT to optimize signal timing along Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) from Mailer Road to Bowling Lane. Install an Advanced Dilemma-Zone Detection System technology to provide additional green signal time for trucks approaching signalized intersections. The technology utilizes cameras that detect approaching vehicles, distinguishing between trucks and other vehicles, and can extend the yellow signal phase so that heavier vehicles have time to stop before they inadvertently travel through a red light or cause a rear-end crash in an attempt to stop suddenly. This should be developed as a pilot project and evaluated for potential application on other key truck routes, such as SR 155 and SR 16.

5.2.2.12. Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) Advanced Dilemma-Zone Detection System (Zebulon Road to Kalamazoo Drive)

- Coordinate with GDOT to implement an Advanced Dilemma-Zone Detection System to provide additional green signal time for trucks approaching signalized intersections along Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) from Zebulon Road to Kalamazoo Drive, The technology utilizes cameras that detect approaching vehicles, distinguishing between trucks and other vehicles, and can extend the yellow signal phase so that heavier vehicles have time to stop before they inadvertently travel through a red light or cause a rear-end crash in an attempt to stop suddenly. This should be developed as a pilot project and evaluated for potential application on other key truck routes, such as SR 155 and SR 16.

5.2.2.13. Arthur K. Bolton Parkway (SR 16) Signal Optimization and Advanced Dilemma-Zone Detection System (Pine Hill Road to I-75)

- Coordinate with GDOT to implement an Advanced Dilemma-Zone Detection System to provide additional green signal time for trucks approaching signalized intersections along Arthur K. Bolton Parkway (SR 16) from Pine Hill Road to I-75. The technology utilizes cameras that detect approaching vehicles, distinguishing between trucks and other vehicles, and can extend the yellow signal phase so that heavier vehicles have time to stop before they inadvertently travel through a red light or cause a rear-end crash in an attempt to stop suddenly. This should be developed as a pilot project and evaluated for potential application on other key truck routes, such as US 19/US 41/SR 3 and SR 155.

5.2.2.14. S. Hill Street (SR 155) Signal Optimization and Advanced Dilemma-Zone Detection System (E. Taylor Street to Airport Road)

- Coordinate with GDOT to implement an Advanced Dilemma-Zone Detection System to provide additional green signal time for trucks approaching signalized intersections y along S. Hill Street (SR 155) from E. Taylor Street to Airport Road. The technology utilizes cameras that detect approaching vehicles, distinguishing between trucks and other vehicles, and can extend the yellow signal phase so that heavier vehicles have time to stop before they inadvertently travel through a red light or cause a rear-end crash in an attempt to stop suddenly. This should be developed as a pilot project and evaluated for potential application on other key truck routes, such as US 19/US 41/SR 3 and SR 16.

5.3. Resurfacing Improvements

The project team examined roadways in the vicinity of the industrial districts as designated for the Freight Cluster Plan. Based on pavement condition, accessibility to state routes and designated freight routes, truck volume, and proximity to freight-intensive land uses, the following roadways are recommended for resurfacing:

Table 2: Roadways Recommended for Resurfacing

Roadway	Limits	Length (mi)	Pavement Score
S. Pine Hill Road	**SR 16 to SR 362**	**2.02**	**58 - 60**
Carver Road	**Newnan Road to Louise Anderson Dr**	**0.94**	**40**
Everee Inn Road	**SR 362 to US 19 Business/SR 155**	**1.83**	**59**
Memorial Drive / Macon Road / Old Macon Road	**SR 16 to Johnston Road**	**4.01**	**47 - 60**
Wilson Road	**Macon Road to Searcy Avenue**	**1.73**	**47**
Greenbelt Pkwy	**Macon Road to Wilson Road**	**0.8**	**40**
Hudson Road	**Macon Road to RR Tracks**	**1.06**	**40 - 63**
Green Valley Road	**Rehoboth Road to Johnston Road**	**3.77**	**63**
S. McDonough Road	**High Falls Road to Rehoboth Road**	**4.14**	**66**

5.4. Bridge Improvements

While Section 4.2 identified three bridge improvements currently planned in Spalding County. No additional specific bridge projects were identified through analysis or outreach activities. Many of the long-term improvements involving new roadway alignments however would require the development of bridges along those new alignments.

5.5. Transit Initiatives

The presence of transit service is an important factor for attracting new businesses and providing workforce access. As such, the County's economic climate would be better served to connect its current workforce to employment opportunities. In 2021, Spalding County will be sponsoring a transit study to better make these connections; however, given the need to better connect the industrial areas of Green Valley to the population centers of Griffin, the following strategies could be employed:

- **Prioritize projects in census-designated urbanized areas –** Funding streams differ by designation of areas by the Census. Focusing initial transit investments in urbanized parts of the County can open a larger pool of funding. The transit network can then be extended to non-urbanized areas with high density of jobs. The upcoming transit feasibility will shed more insight on potential alternatives.
- **New mobility –** Investigate the role for new mobility services. Innovations in technology and service provision have allowed micro-mobility and rideshare companies to complement transit service in some locations. These services are very well-suited for making last mile connections.
- **Reverse commute –** Integrate reverse commute routes when creating the public transit system. Currently, 3,000 workers commute to Spalding County from Henry and Pike Counties. If a portion of these trips can be served by a shuttle or van service, the reduction in vehicle miles can be significant and can attract more workers to jobs in Spalding County.

- **Georgia Commute Options –** Encourage the Griffin Spalding Chamber of Commerce to increase awareness of Georgia Commute Options for workforce residing in the Atlanta metro area through encouraging its membership to promote the program.

6. Prioritization Framework

This section will outline and identify the Prioritization Framework used to validate the priority of projects recommended later in this document. The framework will be based on the vision, goals, and objectives set forth early in the development of the Spalding County Freight Cluster Plan. This section will also define the prioritization framework for capacity and new roadway projects, operational improvements, bridge projects, and resurfacing projects.

6.1. Vision, Goals and Objectives

Early in the development of the Spalding County Freight Cluster Plan, a technical memorandum was developed using input from the RFP and Scope of Services, Fieldwork and Preliminary Analysis, and the initial Steering Committee Meeting held on February 4, 2020. The technical memorandum outlined the vision, goals and objectives that would serve as the foundation for identifying and prioritizing projects within the Spalding County Freight Cluster Plan. The sections below summarize the results of that technical memorandum and identify the vision, goals, and objectives which are the basis for the prioritization framework outlined in this section.

6.1.1. Vision Statement

Based on the previous considerations, the following represents the overall vision for the Spalding County Freight Cluster Plan:

"Identify strategies to improve freight mobility and make Spalding more attractive to industry and economic development"

6.1.2. Goals and Objectives

The goals and objectives of the Spalding County Freight Cluster Plan are as follows:

Goal 1: Identify and program transportation improvements specific to freight.

- Objective 1.1: Identify alternatives to increase mobility throughout Spalding County and the City of Griffin, while limiting freight traffic in downtown Griffin.

Goal 2: Promote economic development in Spalding County.

- Objective 2.1: Identify development and redevelopment opportunities to bring job growth and an increased tax base to Spalding County.
- Objective 2.2: Facilitate responsible development of a mix of industrial types (logistics and manufacturing in Spalding County.

Goal 3: Identify complementary market sectors.

- Objective 3.1: Identify commercial and industrial land use opportunities that promote growth that is complementary to and preserves the community vision.
- Objective 3.2: Prioritize quality of life and environmental needs in Spalding County.

Goal 4: Promote efficient transportation solutions.

- Objective 4.1: Facilitate corridor development and freight mobility throughout Spalding County.
- Objective 4.2: Provide multimodal access via the airports and rail assets.

- Objective 4.3: Remove bottlenecks throughout the transportation system, particularly in Downtown Griffin.

Goal 5: Engaging the private sector.

- Objective 5.1: Attract industrial businesses and workers to Spalding County.
- Objective 5.2: Attract supportive commercial services near industrial areas.

Goal 6: Promote Workforce development and worker access in industrial jobs.

- Objective 6.1: Better use of transit funds to provide workforce access in Spalding County.
- Objective 6.2: Develop programs to promote better worker retention and reduce unemployment in Spalding County.
- Objective 6.3: Provide County training programs to provide necessary training to grow jobs in Spalding County.

6.2. Project Prioritization Methodology

The vision, goals and objectives described in the previous section were integrated into a set of criteria, on which the projects were evaluated and compared. These criteria served as the foundation for developing the project prioritization framework. The study team developed the following six criteria:

1. Mobility
2. Safety
3. Economic Benefit
4. Environment & Public Health
5. Project Readiness
6. System Reliability

The project prioritization methodology included establishing the qualitative and quantitative evaluation factors, also called measures, for each criterion. The project values were collected for each measure, and an ordinal rating scheme was developed that converted the project values to scores between 0 and 100. These scores were used to estimate the total points each project received and then rank-ordered by the total number of points.

This section discusses the criteria, the measures within each criterion and the rating scheme.

6.2.1. Criteria 1: Mobility

Criteria Mobility was used to assess potential improvements that are considered to address an operational deficiency. Five measures, two quantitative and three qualitative, were included in Mobility.

- **Total AADT -** The total AADT was estimated for each project using the Atlanta Regional Commission's (ARC) Travel Demand Model (TDM). The analysis was done for the existing year 2020, for which travel model was available from ARC. The procedure to calculate AADT depended on the project type. For capacity projects, maximum AADT was picked from the segments that make up the project corridor. For intersection improvements, maximum AADT from the intersecting segments was selected. Projects in locations with higher vehicle AADT received a higher score than the ones in areas with lower vehicle AADT.

- **Truck percentage -** The truck percentage was estimated for each project using ARC's TDM for the year 2020. The truck percentage for each project was based on the links at which AADT was estimated. Projects in locations with higher truck percentage received a higher score than the ones in areas with lower truck percentage.
- **Travel time savings -** Travel time savings are an important measure for evaluating the performance of projects. Ideally, a travel demand model could provide the travel time savings by comparing the model results from a No-Build model run and a build (with project in place) run. However, an ARC model run requires high computing power and time (more than 36 hours) making it practically not possible to run a build scenario for each project. Therefore, travel time savings were estimated qualitatively using professional judgment, and the values used were "Low", "Medium" and "High". A project with high travel time savings received a higher score.
- **Serve congested corridor (existing LOS) -** The level of congestion was estimated from the ARC's travel demand model. The level of service (LOS) was estimated for each project using links that were used to estimate AADT. The projects were classified into four categories of LOS – A-C, D, E and F. The projects serving regions with poor LOS received more points that the others.
- **Freight-designated corridor -** The values used of the measure freight-designated corridor were qualitative and the projects were classified in two categories, Yes or No, depending if the project lies on a freight corridor or not. The projects that are on a freight corridor receive higher points than the ones that are not.

6.2.2. Criteria 2: Safety

Criteria safety was used to identify the potential improvements that are considered to improve highway safety. The project was considered to improve safety if is in location where crash occurrences are high, have high truck crashes or if the improvement has high Crash Modification Factor (CMF). Safety consists of six measures, four quantitative and two qualitative, and are described below.

- **Fatal crashes per thousand AADT (within 0.25 mi) -** The crash data was obtained from Georgia Electronic Crash Reporting System (GEARS). A quarter mile buffer was created along each project and the number of fatal crashes for five years from 2014 to 2018 were collected. The crashes were normalized by the AADT to calculate the fatal crashes per thousand AADT. The projects in locations with higher fatal crashes per thousand AADT receive higher scores.
- **Injury crashes per thousand AADT (within 0.25 mi) -** Like the fatal crashes, injury crashes were also extracted from Georgia Electronic Crash Reporting System (GEARS). The injury crashes per thousand AADT were calculated for each project. The projects in locations with higher injury crashes per thousand AADT receive higher scores.
- **Other crashes per thousand AADT (within 0.25 mi) -** Like the fatal and injury crashes, PDO crashes were also calculated from Georgia Electronic Crash Reporting System (GEARS). The crashes per thousand AADT were calculated for each project. The projects in locations with higher PDO crashes per thousand AADT receive higher scores.

- **Percent Truck crashes -** Project scoring was also done using the number of trucks involved in the corridor. The GEARS data included trucks involved in the crashes which were used to calculate the percentage of truck crashes for each project. The projects in locations with higher truck crashes receive higher scores.
- **Expected reductions in crashes by project type -** The expected reduction was estimated qualitatively using the crash modification factor for each project. The CMF clearinghouse provided the crash reduction by type of improvement. In case the project included multiple improvements, the highest crash modification factor was used. Since all the projects did not have crash modification factors available, professional judgment was used. The projects were classified into High, Medium, and Low expected reduction in crashes.
- **At-risk bridges -** The projects were evaluated to see if they were located on at-risk bridges, or if they reconstruct load-limited bridges to improve freight movement. The projects were assigned qualitative values of Yes or No, and the ones with Yes were scored higher.

6.2.3. Criteria 3: Economic Benefit

Economic benefit criteria were used to identify potential improvements that are generally considered to support connectivity and economic growth. Four measures, all qualitative, were used to evaluate the projects under this criterion.

- **Supporting Regionally Significant Locations -** The measure is qualitative and values the project by assigning Yes and No values to each project depending if the project connects to (or is within) a Regional Employment Center, a Freight Cluster Area or a Regional Place.
- **Regional Freight Significance -** Each project was evaluated to see if it improves the movement of freight and is it located on ARC's regional freight system (ASTRoMaP), GDOT's Statewide Designated Freight Corridors or the FHWA National Highway Freight Network (NHFN). The values of Yes or No were assigned to the project and projects with values Yes received higher score.
- **Minimize Impacts to ROW and Historical Properties -** The measure was to evaluate if the project requires Right-of-Way (ROW) acquisition, including construction easements and/or potentially impacts National Register listed property. The projects were assigned values of Yes and No and the ones that maximize the use of right-of way received higher scores.
- **Multimodal connectivity (Transit, Bicycle, Pedestrian) -** This is a qualitative measure and was used to evaluate whether the project provided connectivity to multiple modes like transit, bicycle, and pedestrian. The projects were assigned values of Yes and No and the ones that provided multimodal connectivity, received higher scores.

6.2.4. Criteria 4: Environment & Public Health

The criteria Environmental and Public Health was used to identify projects that were expected to reduce emissions. It included only one qualitative measure, describe below.

- **Diesel emission reduction -** The projects which helped in reducing vehicle emissions that cause bad air quality and contribute to climate change, reduced higher scores than others. The projects were categorized qualitatively into High, Medium, and Low values. The projects with High emission reductions received higher score.

6.2.5. Criteria 5: Project Readiness

The criteria Project Readiness was used to evaluate what would be the level of effort to implement project. It reflects project complexity and following qualitative measures were used to evaluate it. Four measures, all qualitative, were used to evaluate the projects under this criterion.

- **Coordination with City and County; Consistency with Previously Adopted Studies/Plans. -** Each project was evaluated to see if it requires coordination with cities or counties and is consistent with their previously adopted studies/plans. Qualitative values of Yes and No were used. Projects with value of Yes, were consistent with the previously adopted policy documents and received higher score.
- **Included in Regional Transportation Plan (RTP) -** Qualitative values of Yes and No were used for this measure. If the project is included in the RTP, it would have already been studied regionally. Such projects received a higher score.
- **Level of effort to implement project (project complexity) -** It is a qualitative measure that evaluated the level of effort to implement the project based on ROW and environmental requirements. Low, Medium, and High values were assigned to the projects. Projects with low level of effort to implement received higher score.
- **Sensitivity to environmentally and/or historic resources -** Qualitative values of Yes and No were used for this measure. If the project could potentially impact environmentally sensitive and/or historic resources, it would receive a higher score.

6.2.6. Criteria 6: System Reliability

The criterion of reliability was used to determine which projects were helpful in adding network resiliency to the transportation network. Only one qualitative measure was used.

- **Provide resiliency to regional and Spalding County network -** It is a qualitative measure that assigned values of Yes or No to the projects, based on whether they are expected to provided resiliency to the regional and Spalding County transportation networks. Projects with value of Yes received higher score.

After the project values, which included both quantitative and qualitative values, were obtained for each measure under each criterion, they were converted to scores of 0-100 using the scoring scheme. For additional details regarding the scoring methodology, see *Appendix B: Prioritization Technical Memo*.

6.3. Ranking of Projects

The next step involved defining multiple scenarios and ranking the projects under each scenario. Scenarios were developed by assigning different weighting factors to individual criteria. The purpose of this was to understand the impact of each criteria on project rankings and to identify projects that consistently appeared near the top of the rankings, regardless of where the emphasis was placed.

Seven scenarios were developed:

- Scenario 1: Mobility
- Scenario 2: Safety
- Scenario 3: Economic Benefit
- Scenario 4: Environment & Public Health
- Scenario 5: Project Readiness
- Scenario 6: System Reliability
- Scenario 7: User Defined

The preferred, or "user defined" scenario (Scenario 7), shown in Figure 8, was determined through input from the Spalding County staff and stakeholders during the Stakeholder Committee Meetings input sessions. This user defined scenario provided the basis for the overall ranking of projects to inform stakeholders how each met the overall performance goals of the Plan. Additional details are provided in *Appendix B: Prioritization Framework Technical Memo*.

The weights of individual performance measures within each criterion are shown in Table 3.

Figure 8. Weight Assigned within User Defined Scenario (Scenario 7)

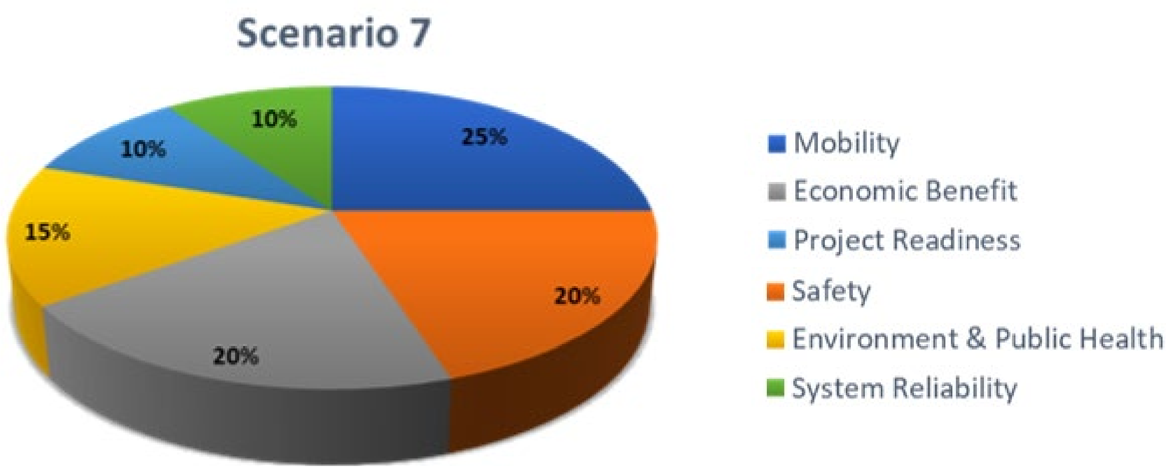


Table 3: Weights of Performance Measures within Criteria

No.	Criteria	Measures	Measure % within Criteria
1	Mobility	Total AADT	20%
		Truck %	20%
		Travel time savings	20%
		Serve congested corridor (existing LOS)	20%
		Freight-designated corridor	20%
2	Safety	Fatal crashes per AADT (within 0.25 mi)	20%

No.	Criteria	Measures	Measure % within Criteria
		Injury crashes per AADT (within 0.25 mi)	20%
		Other crashes per AADT (within 0.25 mi)	15%
		% Truck crashes	15%
		Expected reductions in crashes by project type	15%
		At-risk bridges	15%
3	Economic Benefit	Supporting Regionally Significant Locations	25%
		Regional Freight Significance	25%
		Maximize use of ROW	25%
		Multimodal connectivity (Transit, Bicycle, Pedestrian)	25%
4	Environment & Public Health	Diesel emission reduction	100%
5	Project Readiness	Coordination with City and County; Consistency with Previously Adopted Studies/Plans.	25%
		Included in RTP	25%
		Level of effort to implement project (project complexity)	25%
		Sensitivity to environmentally and/or historic resources	25%
6	System Reliability	Provide resiliency to regional and Spalding network	100%

6.4. Prioritization Results

To rank the projects under a selected scenario, total points were calculated for each project under that scenario. For each project, the score (0-100) of each measure was multiplied by the weight of the measure and the weight of the criterion that measure belongs to. The total points each project received were estimated by summing up the weighted scores of all the performance measures. The project that received the most points received the highest ranking.

While the priority rankings were based on the qualitative and quantitative criteria discussed previously, it should be noted that the scores are not meant to be the final decision on whether a project should be implemented. Rather, they reflect the prioritization ranking of each project within the study area under different scenarios and weighting factors. They provide input and guidance for planners and decision-makers.

Table 4, 5, and 6 represents the project rankings for short-term roadway and operational projects, short-term bicycle and pedestrian projects, and long-term vision projects under the User-Defined Scenario. It should be emphasized that the rankings were developed merely to inform stakeholders on how each project performed related to the overall goals of the plan. Other factors, such as local support, project costs, and funding opportunities ultimately determine the overall prioritization of these projects in the recommended work program.

Table 4: Short-Term Roadway/Operational Project Rankings

Rank	Project Name
1	S. Hill Street (SR 155) Signal Optimization and Advanced Dilemma-Zone Detection System (E. Taylor Street to Airport Road)
2	Arthur K. Bolton Parkway (SR 16) at Wild Plum Road Intersection Improvement
3	Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) Signal Optimization and Advanced Dilemma-Zone Detection System (Mailer Road to Bowling Lane)
4	Martin Luther King, Jr. Parkway (US 19/41) at Zebulon Road (SR 155) Intersection Improvement (Dual Left Turn Lanes)
5	Martin Luther King, Jr. Parkway (US 19/41) at Zebulon Road (SR 155) Intersection Improvement (Displaced Left Turn Lanes, Realign Approaches)
6	Arthur K. Bolton Parkway (SR 16) Signal Optimization and Advanced Dilemma-Zone Detection System (Pine Hill Road to I-75)
7	Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) Advanced Dilemma-Zone Detection System (Zebulon Road to Kalamazoo Drive)
8	CTP-07 - Signalize SR 16 at Wild Plum/Lakes at Green Valley
9	SPLOST-4 - Spalding Drive at SR 16 Turn Lane
10	Arthur K. Bolton Parkway (SR 16) at Green Valley Road Intersection Improvement
11	Arthur K. Bolton Parkway (SR 16) at S. McDonough Road Intersection Improvement
12	Martin Luther King, Jr. Parkway (US 19/41) at Airport Road/Kalamazoo Drive Intersection Improvement
13	SPLOST-2 - Add right turn lane on northbound Searcy Ave. at E. Broadway Street (SR 155)
14	CTP-03 - SR 16 at Macon Road
15	CTP03 - Tri-County Crossing: Moreland Road Extension to Zebulon Road (SR 155)
16	CTP-01 - Jackson Road at N McDonough Road
17	SPLOST-1 - Solomon Street (Little 5 Points) Improvements
18	Arthur K. Bolton Parkway (SR 16) at Rehoboth Road Intersection Improvement
19	E. McIntosh Road at 9th Street Intersection Roundabout
20	Johnston Road at S. McDonough Road Intersection Roundabout
21	SPLOST-5 - Hammond / W. Poplar Realignment
22	SPLOST-3 - Cain Street Realignment at Everee Inn Road
23	CTP-01 - Old Atlanta Road between E. McIntosh Road & McIntosh Road / Experiment St
24	Johnston Road at Macon Road Roundabout
25	CTP-05 - Wild Plum Road from SR 16 to High Falls Road
26	Green Valley Road Realignment
27	CTP-02 - Orchard Hill Intersection Improvements
28	SPLOST-6 - Intersection Improvement Program - Phase I: (College Street at Hamilton/ Kincaid Street)
29	CTP-02 - Poplar Street at 8th Street
30	CTP-06 - County Line at Etheridge Mill Road
31	E. McIntosh Road at 9th Street Intersection Improvements
32	Jackson Road at Wallace Road Intersection Improvement
33	Johnston Road at Macon Road Reconstruction and Improvement
34	Johnston Road at Green Valley Road Improvements and Repave

35	Johnston Road at S. McDonough Road Intersection Improvements and Repave

Table 5: Short-Term Bicycle and Pedestrian Project Rankings

Rank	Project Name
1	SR 362 / Williamson Road Sidewalk
2	Carver Road Sidewalk
3	Carver Road Sidewalk
4	Hudson Road Sidewalk
5	S. Pine Hill Road Sidewalk
6	Wilson Road Sidewalk
7	SR 362 / Meriwether Street Sidewalk
8	Kalamazoo Drive Sidewalk
9	Airport Road Sidewalk
10	Odell Road Sidewalk
11	Futral Road Sidewalk (East)
12	Futral Road Sidewalk (West)

Table 6: Long-Term Vision Project Rankings

Rank	Project Name
1	US 41 Upgrades (South County Line to North County Line)
2	Eastern Bypass (US 41 to North County Line)
3	I-75 Parallel Frontage Access Roads (eventually one-way frontage)
4	Northern Bypass Alternative 2 (Airport Drive to US 41)
5	Northern Bypass Alternative 1 (McDonough to US 41)
6	Locust Grove Connector (Baptist Camp Road to I-75)
7	Northern Bypass Route (SR 16 to East County Line)
8	One Way Pair NW Diagonal (Northern Bypass Route to Rehobeth Road)
9	Southern Bypass Alternative 2 (McDonough to Airport Road)
10	Southern Truck Bypass Alternative 1 (US 41 to McDonough Road to SR 16)
11	SR 16 Backage Roads
12	Southern Truck Bypass, Long Term, Moreland Road Ext East to I-75
13	Orchard Hill Long Term Improvements

7. Cost Estimates and Revenue Forecasts

The following chapter provides a summary of the costing tool and the methodology of determining projects cost estimates and the development of potential revenue forecasts available for the Freight Cluster Plan (FCP) work program.

7.1. Summary of Costing Tool/Assumptions

As part of this Freight Cluster Plan work program, the project team estimated costs for each of the proposed operational improvement and pedestrian recommendations. This was done in consultation with the Atlanta Regional Commission's Planning Level Cost Estimation Tool to determine costs by unit and mile for corresponding project elements.[18] Additionally, the project team utilized engineering judgment and the GDOT pay item index to cost primary components of each project such as necessary curb improvements, signal upgrades, and sidewalk construction. Additional input on project costing was provided by Spalding County.

Across all projects, raw costs were calculated based on these per-unit inputs and then increased by specified magnitudes to account for grading and erosion control, right-of-way, utilities, and engineering inspection costs. The final costs include a 20 percent contingency.

7.2. Potential Revenue Sources

When developing a work program, the primary factor that determines your capacity to implement projects is the amount of local funding that can be contributed for either funding local projects or providing local match for federal aid offered through the ARC. The following section breaks down the available revenue sources and how revenue projections were developed.

- County/Local Sources – Funding from the Special Local Option Sales Tax (SPLOST) for the County and City of Griffin
- Federal sources – Funding from federal aid programs administered by ARC.
- State sources – Funding from state revenues administered by GDOT.

7.2.1. County/Local

The availability of local funding for local projects serves as the fundamental basis of any work program – either to directly fund projects or provide local match for Federal and State funds for larger projects. Based on input from County staff, the primary source of revenue assumed for local match was the Spalding County SPLOST, which serves to fund a wide range of capital improvements for local government needs including transportation. Revenues from the SPLOST are split 51% to the County and 49% to the City of Griffin. Projecting potential SPLOST funds was completed through a three-step process.

[18] Atlanta Regional Commission (2016). Planning Level Cost Estimation Tool. http://documents.atlantaregional.com/transportation/projsolicitation/2019/Cost%20Estimation%20Tool%20(2016%20Final).zip

- Step 1: Projecting the overall SPLOST revenues – Based on input from County staff, historical revenues were provided to project their amounts from 2021-2025. Given the uncertainty presented by the COVID-19 pandemic, a modest 2% increase in overall revenues was assumed after 2022. The overall projected SPLOST revenues are shown in Table 7.
- Step 2: Based on historical expenditures, it was assumed that 50% of the SPLOST revenue generated for the County and 40% of the SPLOST revenues for the City would be dedicated to transportation. The resulting projected SPLOST revenue is shown in Table 8.
- Step 3: Based on historical expenditures, it was assumed that 35% of the transportation funds would be dedicated to the LMIG program for general resurfacing and bridge replacement throughout the County and City, which is presented in Table 9. The resulting available SPLOST revenue assumed for the FCP work program is presented in Table 10.

Table 7: Annual SPLOST Revenue Projections

	2021	2022	2023	2024	2025	Total
TOTAL	$8,700,000	$8,700,000	$8,874,000	$9,051,480	$9,232,510	$44,557,990
County (51%)	$4,437,000	$4,437,000	$4,525,740	$4,616,255	$4,708,580	$22,724,575
City (49%)	$4,263,000	$4,263,000	$4,348,260	$4,435,225	$4,523,930	$21,833,415

Table 8: Projected SPLOST Revenue for Transportation

	2021	2022	2023	2024	2025	Total
TOTAL	$3,923,700	$3,923,700	$4,002,174	$4,082,217	$4,163,862	$20,095,653
County	$2,218,500	$2,218,500	$2,262,870	$2,308,127	$2,354,290	$11,362,287
City	$1,705,200	$1,705,200	$1,739,304	$1,774,090	$1,809,572	$8,733,366

Table 9: Projected LMIG Payment Schedule

	2021	2022	2023	2024	2025	Total
TOTAL	$1,373,295	$1,373,295	$1,400,761	$1,428,776	$1,457,352	$7,033,479
County	$776,475	$776,475	$792,005	$807,845	$824,001	$3,976,801
City	$596,820	$596,820	$608,756	$620,932	$633,350	$3,056,678

Table 10: Projected SPLOST Revenue for FCP Work Program

	2021	2022	2023	2024	2025	Total
TOTAL	$2,550,405	$2,550,405	$2,601,413	$2,653,441	$2,706,510	$13,062,175
County	$1,442,025	$1,442,025	$1,470,866	$1,500,283	$1,530,288	$7,385,487
City	$1,108,380	$1,108,380	$1,130,548	$1,153,159	$1,176,222	$5,676,688

It should be noted that local officials are considering a potential Transportation Special Local Option Sales Tax (TSPLOST) specifically for transportation enhancements, which would have to be approved by Spalding County voters. As part of the TSPLOST process, specific improvements would need to be identified for TSPLOST funding prior to the vote.

7.2.2. Federal Sources (from ARC)

Given that much of Spalding County is in the Atlanta urbanized area, most of the federal funding is administered by the ARC. Based on the roadway characteristics and designations within the Spalding County FCP study area, the following FHWA funding sources are technically eligible for use in the FCP work program:

- National Highway System (NHS) Funds – US 19/41 is designated as an NHS facility and SR 16 between I-75 and US 19/41 is designated as an Intermodal Connector on the NHS. Therefore, funding for NHS facilities, called the National Highway Performance Program (NHPP), could be sought for improvements to these roadways. However, these funds are specifically tied to achieving performance targets established by GDOT for the statewide NHS network. As a result, nearly all these funds are allocated to major interstate facilities that impact statewide mobility. Therefore, this funding source was not considered a viable option for the TSCID work program.
- Surface Transportation Block Grant (STBG) Funds – This federal program is much more flexible. It allows for projects to preserve or improve conditions and performance on any Federal-aid highway, bridge projects on any public road. Projects can include facilities for nonmotorized transportation, transit capital projects, and public bus terminals and facilities.
- STBG - Transportation Alternatives Funds - These funds are a subset of the overall STBG funds specifically set aside for smaller-scale transportation projects such as pedestrian and bicycle facilities, recreational trails, and safe routes to school projects.

Based on the criteria above, it was assumed that the federal aid most suitable for the Spalding short-term work program is the STBG program for both roadway and sidewalk improvements. This funding source is consistent with the current ARC TIP, which was assessed to identify funding sources used for projects similar to those proposed within the Spalding work program.

More important than identifying overall eligibility for federal aid, a critical step for project implementation is recognizing and addressing the competitive process to secure these funds within the ARC project solicitation process. The process requires demonstrating benefits for several factors – such as mobility, economic benefit, safety, et. al. In recognition, individual projects developed within Spalding County were assessed for their overall interrelationship and common objectives and redefined in the short-term work program based on their collective benefits. By strategically defining the projects in the short-term work program, the County better positions itself to secure these competitive resources.

7.2.3. State Sources (from GDOT)

In addition to ARC funds, GDOT offers programs for funding that can be applied for outside the ARC TIP solicitation process. There are only two proposed improvements within the work program along state roadways. Given these recommendations call primarily for operations projects, the funding sources are most appropriate for the implementation of this work program are Quick Response and the Local Maintenance and Improvement Grant (LMIG) programs.

- Quick Response Projects - The program is designed for lower-cost operational projects such as restriping, intersection improvements, turn lane additions and extensions that can be implemented in a short period of time and for under $200k.
- LMIG - The annual LMIG allocation is based on the total centerline road miles for each local road system and the total population of each county or city as compared with the total statewide centerline road miles and total statewide population. The following types of projects could be eligible for LMIG funds:
  - Preliminary engineering (including engineering work for R/W plans and Utility plans)
  - Construction supervision and inspection
  - Utility adjustments or replacement
  - Patching, leveling, and resurfacing a paved roadway
  - Grading, Drainage, Base and Paving existing or new roads
  - Replacing storm drainpipe or culverts
  - Intersection improvements
  - Turn lanes
  - Bridge repair or replacement
  - Sidewalk adjacent (within right of way) to a public roadway or street
  - Roadway Signs, striping, guardrail installation
  - Signal installation or improvement

Based on input from Spalding County staff, both the County and City procure funds from GDOT for numerous projects. As noted in the previous subsection, LMIG matching funds have been accounted for in the estimated funding available from Spalding County and the City of Griffin.

7.3. Potential Additional Revenue Sources

Given the competition to secure funds from the ARC federal programs noted in the previous section, the ARC has stressed to the importance of defining projects that can compete for grants suited for improving areas such as the City of Griffin and Spalding County. Based on the types of projects identified within the overall work program, the most relevant grant programs are:

- **Better Utilizing Investments to Leverage Development (BUILD) Program –** BUILD transportation grants are provided directly from FHWA for planning and capital investments in surface transportation infrastructure and are awarded on a competitive basis for projects that will have a significant local or regional impact. Projects can range from $5 million to a maximum of $25 million. The program selection criteria encompass safety, economic competitiveness, quality of life, state of good repair, environmental sustainability, innovation, and partnerships with a broad range of stakeholders. However, it should be noted that grants in areas such as Spalding County have become more competitive since the FHWA has made a commitment for 50% of funds to be allocated towards rural areas. Furthermore, the overall statewide cap is $100 million so any applications would need to be coordinated through GDOT to ensure eligibility.

- **Infrastructure for Rebuilding America (INFRA) Grants** – INFRA grants are essentially a similar FHWA program as the BUILD program but at a much larger scale. The minimum project cost is $100 million in Georgia. The projects within the Spalding FCP project list need to be part of a larger program and include projects from multiple jurisdictions to utilize this resource.
- **Georgia Transportation Infrastructure Bank (GTIB) –** GTIB is a grant and loan program administered by the State Road and Tollway Authority (SRTA). This program is also competitive and accepts applications for projects up to $10 million. An important aspect of the GTIB program is that it can be used as local match for federal funding sources. Key factors SRTA considers for GTIB applications include demonstrating economic development potential, project readiness, and feasibility.

Based on the eligibility requirements for these programs and the overall scale of improvements needed within Spalding County, the BUILD and GTIB offer the most potential for future utilization. More detail on potential strategies are provided in Chapter 9 of this report.

8. Short-Term Work Program (Fiscally Constrained)

The following chapter outlines the proposed Spalding County Freight Cluster Plan Short-Term Work Program. For the purposes of this analysis, short-term projects are those which can be programmed for construction by the year 2025. As noted in previous sections of this report, the process of developing this work program was a culmination of the following efforts:

- **Step 1: Identification of a Universe of Projects:** A universe of initial projects was identified through: 1) the analysis within the *Inventory and Assessment Report*; 2) the completion of *Traffic Study* to identify more detailed issues at problem intersections; 3) an inventory of projects identified through previous studies; and 4) input from stakeholders.
- **Step 2: Development of a Project Prioritization Tool:** A project evaluation tool was developed specifically for this Plan based on: 1) factors utilized by the ARC in their project evaluation process; and 2) goals set forth for this Freight Cluster Plan. This tool was specifically designed to assess projects in a manner consistent with the ARC TIP prioritization to ensure compatibility with the regional process.
- **Step 3: Initial Evaluation of Projects based on Prioritization Framework:** All proposed projects were assessed within the tool to provide insight on the potential for projects to meet the overall goals of the project.
- **Step 4: Refinement of Project Prioritization:** The initial priorities developed within the tool were vetted with Spalding County staff and refined based on local knowledge, previous project development efforts, and well-known needs historically voiced from Spalding County community members.
- **Step 5: Development of Project Costs:** Detailed cost estimates were developed based on the ARC Costing tool, specific project details, and input from Spalding County staff.
- **Step 6: Development of Projected Local Revenues:** Historical SPLOST revenues provided from Spalding County staff were utilized to determine realistic revenue forecasts for local funds available for the short-term work program through 2025.
- **Step 7: Definition of Bundled Projects:** In order to be better positioned for ARC and grant opportunities, projects that would be mutually beneficial along US 19/41 and SR 16 have been bundled to present greater collective benefits as they would individually.

8.1. Short-Term Fiscally Constrained Projects

The following roadway, safety and operational projects were identified and prioritized based on input from Spalding County staff for inclusion in this plan and considered for short-term implementation. A table of the short-term projects along with their associated costs are provided in Table 11.

8.1.1. FCP-1 – SR 155 Redesignation

- **Project Description:** In advance of the upcoming scoping study (PI 0016792), coordinate with GDOT to redesignate SR 155 to N. McDonough Road between Jackson Road and SR 16.
- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $312,500

8.1.2. FCP-2 – Griffin Bypass Alternatives Analysis

- **Project Description:** Another finding from the development of this plan was the desire to develop a bypass around the City of Griffin for east-west truck traffic. This study would further evaluate Northern Bypass Alternatives 1 and 2 and Southern Bypass Alternatives 1 and 2 listed below in the roadway improvements section.
- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $350,000

8.1.3. FCP-3 – S. Hill Street (SR 155) Signal Optimization and Advanced Dilemma-Zone Detection System (E. Taylor Street to Airport Road)

- **Project Description:** Coordinate with GDOT to implement Advanced Dilemma-Zone Detection System to provide additional green signal time for trucks approaching signalized intersections y along S. Hill Street (SR 155) from E. Taylor Street to Airport Road. This should be developed as a pilot project and evaluated for potential application on other key truck routes, such as US 19/US 41/SR 3 and SR 16.
- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $1.37 million

8.1.4. FCP-4 – SR 16 Freight Cluster Plan Corridor Improvements

The following projects were bundled together for funding purposes.

8.1.4.1. FCP-4.1 – Arthur K. Bolton Parkway (SR 16) Signal Optimization and Advanced Dilemma-Zone Detection System (Pine Hill Road to I-75)

- **Project Description:** Coordinate with GDOT to implement an Advanced Dilemma-Zone Detection System to provide additional green signal time for trucks approaching signalized intersections along Arthur K. Bolton Parkway (SR 16) from Pine Hill Road to I-75. This should be developed as a pilot project and evaluated for potential application on other key truck routes, such as US 19/US 41/SR 3 and SR 155.
- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $4.48 million

Table 11: Short-Term Work Program Projects Summary

Project ID	Project Name	Total Project Cost	Primary Responsible (Lead) Agency	Potential Funding Sources	Federal/ State Funding	Total Local Match Required
FCP-1	SR 155 Concept Study	$312,500	GDOT, Spalding County, City of Griffin	GDOT, SPLOST Funds	$250,000	$62,500
FCP-2	Griffin Bypass Alternatives Analysis	$350,000	Spalding County, City of Griffin	ARC, SPLOST Funds	$280,000	$70,000
FCP-3	S. Hill Street (SR 155) Signal Optimization and Advanced Dilemma-Zone Detection System (E. Taylor Street to Airport Road)	$1,370,000	GDOT, Spalding County, City of Griffin	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$1,096,000	$274,000
FCP-4.1	Arthur K. Bolton Parkway (SR 16) Signal Optimization and Advanced Dilemma-Zone Detection System (Pine Hill Road to I-75)	$4,480,000	GDOT, Spalding County, City of Griffin	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$3,584,000	$896,000
FCP-4.2	Arthur K. Bolton Parkway (SR 16) at Green Valley Road Intersection Improvement	$200,000	GDOT, Spalding County, City of Griffin	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$160,000	$40,000
FCP-4.3	Arthur K. Bolton Parkway (SR 16) at Wild Plum Road Intersection Improvement	$160,000	GDOT, Spalding County, City of Griffin	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$128,000	$32,000
FCP-4.4	Arthur K. Bolton Parkway (SR 16) at Rehoboth Road Intersection Improvement	$10,000	Spalding County	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$8,000	$2,000
FCP-4.5	Arthur K. Bolton Parkway (SR 16) at S. McDonough Road Intersection Improvement	$200,000	Spalding County	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$160,000	$40,000
FCP-4	SR 16 Freight Cluster Plan Corridor Improvements	$6,420,000	Spalding County	ARC, GDOT, SPLOST Funds, T-SPLOST Funds, BUILD	$5,136,000	$1,284,000
FCP-5	SR 155 Design for Redesignation	$1,000,000	GDOT, Spalding County, City of Griffin	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$800,000	$200,000

Project ID	Project Name	Total Project Cost	Primary Responsible (Lead) Agency	Potential Funding Sources	Federal/ State Funding	Total Local Match Required
FCP-6.1	Martin Luther King, Jr. Parkway (US 19/41) at Zebulon Road (SR 155) Intersection Improvement (Dual Left Turn Lanes)	$370,000	GDOT, Spalding County, City of Griffin	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$296,000	$74,000
FCP-6.2	Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) Advanced Dilemma-Zone Detection System (Zebulon Rd to Kalamazoo Drive)	$390,000	GDOT, Spalding County, City of Griffin	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$312,000	$78,000
FCP-6.3	Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) Signal Optimization and Advanced Dilemma-Zone Detection System (Mailer Road to Bowling Lane)	$1,370,000	GDOT, Spalding County, City of Griffin	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$1,096,000	$274,000
FCP-6.4	Martin Luther King, Jr. Parkway (US 19/41) at Airport Road/Kalamazoo Drive Intersection Improvement	$200,000	City of Griffin, Spalding County	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$160,000	$40,000
FCP-6	US 19/41 Freight Cluster Plan Corridor Improvements	$22,330,000	Spalding County	ARC, GDOT, SPLOST Funds, T-SPLOST Funds, BUILD	$17,864,000	$4,466,000
FCP-7	CTP03 - Tri-County Crossing: Moreland Road Extension to Zebulon Rd (SR 155)	$1,200,000	Spalding County	ARC, SPLOST Funds, T-SPLOST Funds	$-	$1,200,000
FCP-8	Jackson Road at Wallace Road Intersection Improvement	$70,000	Spalding County	ARC, SPLOST Funds, T-SPLOST Funds	$-	$70,000
		$13,052,500			**$9,426,000**	**$3,626,500**

Figure 9: Short-Term Fiscally Constrained Projects

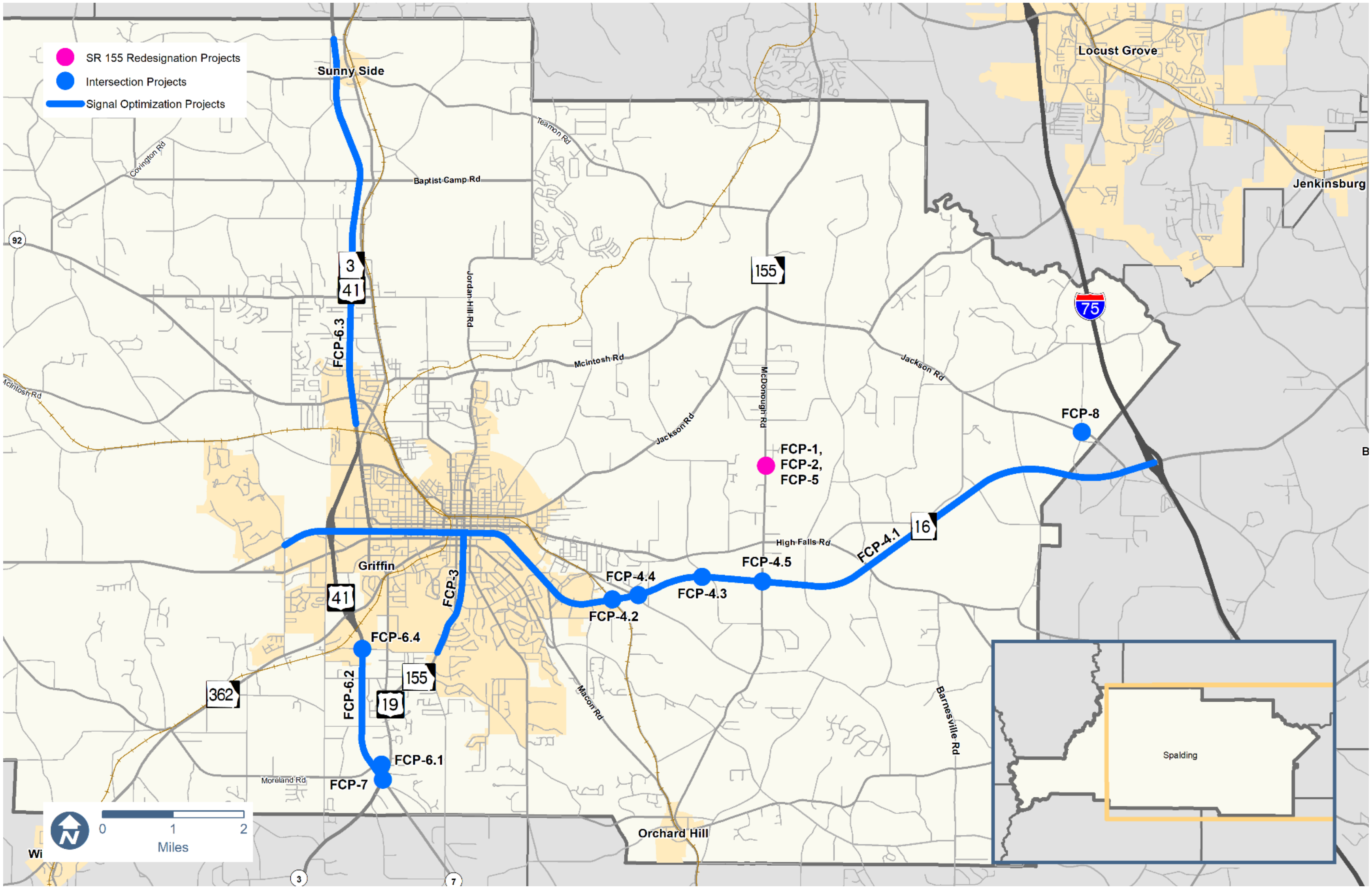


Table 12: Short-Term Policy Strategies

Project ID	Recommendation Type	Project Description	Implementing Agencies	Timeframe (Initiation)
LU-1	Land Use/ Development	Prioritize development of high-ranking freight clusters	Spalding County, City of Griffin, ARC	1-5 Years
LU-2	Land Use/ Development	Zoning incentives	Spalding County, City of Griffin	1-5 Years
LU-3	Land Use/ Development	Innovative site design.	Spalding County, City of Griffin	1-5 Years
LU-4	Land Use/ Development	Mixed-use developments	Spalding County, City of Griffin	1-5 Years
LU-5	Land Use/ Development	Preserve agricultural and open lands	Spalding County, City of Griffin, ARC	1-5 Years
LU-6	Land Use/ Development	Industrial Retention	Spalding County, City of Griffin, ARC	1-5 Years
P-1	Truck Parking	Identify Truck Parking Areas	Spalding County, City of Griffin, ARC, GDOT	1-5 Years
P-2	Truck Parking	Adopt Truck Parking Ordinance	Spalding County	1-5 Years
P-3	Truck Parking	Truck Parking Technologies	Spalding County, City of Griffin	1-5 Years
WF-1	Transit/Workforce Access	Prioritize projects in census-designated urbanized areas	Spalding County, City of Griffin, ARC	1-5 Years
WF-2	Transit/Workforce Access	Georgia Commute Options	Spalding County, City of Griffin	1-5 Years
WF-4	Transit/Workforce Access	New mobility	Spalding County, City of Griffin, ARC	1-5 Years
WF-5	Transit/Workforce Access	Reverse commute	Spalding County, City of Griffin, ARC	1-5 Years
E-1	Economic Development	Workforce development with Employer Engagement	Spalding County, City of Griffin	1-5 Years

8.1.4.2. FCP-4.2 – Arthur K. Bolton Parkway (SR 16) at Green Valley Road Intersection Improvement

- **Project Description:** At Rehoboth Road (to the east) and Wilson Road (to the west), install advance signs interconnected to the traffic signal to warn motorists when a train is blocking the intersection at Green Valley Road, allowing approaching motorists to choose alternate routes; on south leg, relocate railroad at-grade crossing pavement marking further away from stop bar; convert all left turns to flashing yellow arrows (FYAs); install lane line extensions/skip markings to guide motorists making westbound left-turn; repave shoulders on northwest quadrants with safety edge treatment; install backplates with retroreflective borders on all traffic signal heads; restripe intersection; install raised pavement markers.
- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $200,000

8.1.4.3. FCP-4.3 – Arthur K. Bolton Parkway (SR 16) at Wild Plum Road Intersection Improvement

- **Project Description:** In the interim, install a Restricted Crossing U-Turn (RCUT) intersection with expanded paved aprons (bum-outs or "loons") in the shoulder area opposite to the crossover locations to accommodate large trucks; install signage along The Lakes Parkway to redirect traffic destined to SR 16 west (or downtown Griffin) to use the Rehoboth Road or the S. McDonough Road intersections. As more development is built at The Lakes at Green Valley industrial park, monitor traffic volumes; if and when traffic volumes warrant a signal, then remove RCUT and consider installing a traffic signal.
- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $160,000

8.1.4.4. FCP-4.4 – Arthur K. Bolton Parkway (SR 16) at Rehoboth Road Intersection Improvement

- **Project Description:** Relocate stop bars on eastbound through-lanes closer to the traffic signal; remove stop bar across the eastbound right-turn lane and install yield bar and yield sign; repair damaged delineator posts.
- **Partner Agencies:** GDOT, Spalding County
- **Estimated Cost:** $10,000

8.1.4.5. FCP-4.5 – Arthur K. Bolton Parkway (SR 16) at S. McDonough Road Intersection Improvement

- **Project Description:** Convert northbound and southbound left turns to flashing yellow arrows (FYAs); restripe the intersection and relocate stop bar on southbound left-turn lane further away from intersection; install lane line extensions/skip markings to guide motorists making eastbound left-turn; install median nose delineators; install backplates with retroreflective borders on all traffic signal heads; install raised pavement markings.
- **Partner Agencies:** GDOT, Spalding County
- **Estimated Cost:** $200,000

8.1.5. FCP-5 – SR 155 Design for Redesignation

- **Project Description:** Following the SR 155 Concept Study listed above would be a corridor alternatives study to further explore details for potential alternatives to achieve a viable redesignated SR 155.
- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $1,000,000

8.1.6. FCP-6 – SR 16 Freight Cluster Plan Corridor Improvement

The following projects were bundled together for funding purposes.

8.1.6.1. FCP-6.1 – Martin Luther King, Jr. Parkway (US 19/41) at Zebulon Road (SR 155) Intersection Improvement (Dual Left Turn Lanes)

- **Project Description:** Install dual left-turn lanes for the eastbound left-turn movement from Zebulon Road (US 19) to northbound Martin Luther King, Jr. Parkway (US 41); convert westbound left-turn signal to a flashing yellow arrow (FYA); lengthen the southbound right-turn lane on Martin Luther King, Jr. Parkway (US 41) and extend the right-turn lane to the Ingles shopping center and add a narrow concrete median between the two right-turn lanes; restripe intersection.
- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $370,000

8.1.6.2. FCP-6.2 – Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) Advanced Dilemma-Zone Detection System (Zebulon Road to Kalamazoo Drive)

- **Project Description:** Coordinate with GDOT to leverage connected signal technology along Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) from Zebulon Road to Kalamazoo Dr, to implement Advanced Dilemma-Zone Detection System to provide additional green signal time for trucks approaching signalized intersections. This should be developed as a pilot project and evaluated for potential application on other key truck routes, such as SR 155 and SR 16.
- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $390,000

8.1.6.3. FCP-6.3 – Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) Signal Optimization and Advanced Dilemma-Zone Detection System (Mailer Road to Bowling Lane)

- **Project Description:** Coordinate with GDOT to optimize signal timing along Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) from Mailer Road to Bowling Ln. Install Advanced Dilemma-Zone Detection System to provide additional green signal time for trucks approaching signalized intersections. This should be developed as a pilot project and evaluated for potential application on other key truck routes, such as SR 155 and SR 16.
- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $1.37 million

8.1.6.4. FCP-6.4 – Martin Luther King, Jr. Parkway (US 19/41) at Airport Road/Kalamazoo Drive Intersection Improvement

- **Project Description:** Install Advanced Dilemma-Zone Detection System along northbound and southbound Martin Luther King, Jr. Parkway (US 19/41); convert eastbound and westbound left turns to flashing yellow arrows (FYAs); install "BE PREPARED TO STOP" traffic control signs in advance of the existing Signal Ahead sign along the Martin Luther King, Jr. Parkway (US 19/41) in the northbound and southbound directions; install warning beacon along southbound Martin Luther King, Jr. Parkway (US 19/41) to alert the motorists from the limited-access section of Martin Luther King, Jr. Parkway (US 19/41) of the signal ahead; install backplates with retroreflective borders on all traffic signal heads; install median nose delineators; install raised pavement markers; repave and restripe intersection.

- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $200,000

8.1.7. FCP-7 – Tri-County Crossing: Moreland Road Extension to Zebulon Rd (SR 155))

- **Project Description:** A new 2-lane roadway connecting US 41 to SR 155
- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $200,000

8.1.8. FCP-8 – Jackson Road at Wallace Road Intersection Improvement

- **Project Description:** Install splitter islands along the Wallace Road approaches to the intersection, which will also help to improve the skew of the intersection; replace damaged and missing stop signs on east and west legs (Jackson Road); install signs notifying drivers of truck traffic restriction on Wallace Road; repave and restripe intersection; install raised pavement markers.
- **Partner Agencies:** Spalding County, City of Griffin
- **Estimated Cost:** $70,000

8.2. Resurfacing

Given that resurfacing priorities are coordinated between City and County staff. No specific program of resurfacing projects was developed as part of this effort; however, a list of roadway segments with resurfacing needs was identified in Section 3 and provided to the County for consideration.

8.3. Land Use and Development Strategies

Thorough analysis was completed as part of the Inventory and Assessment stage of this plan. The result is a list of potential short term-land use strategies as follows:

- **Prioritize development of high-ranking freight clusters –** Develop sites ranked high in the COD industrial district analysis. Regulatory approaches alone will not ensure industrial redevelopment; financial assistance will also likely be needed, through incentives and supportive programs. Land banks, community development corporations (CDCs) and nonprofit organizations can be useful "patient" partners in industrial redevelopment, but do not often have experience with this development type. Public sector investment is also critical.
- **Zoning incentives –** Explore regulatory approaches such as restricting eligible development types to only include industrial or related uses or adjusting zoning and development regulations to make industrial development easier, using techniques such as right-sizing employee parking, loading space requirements and adjusting FAR requirements.
- **Innovative site design –** Provide district-level industrial amenities. In compact industrial districts it can be challenging for individual projects to meet stormwater, parking, and other infrastructure goals and requirements on-site. It often makes sense to approach these needs at the district scale. Services to explore offering at a larger scale include shared truck parking, employee parking and transportation services; green stormwater infrastructure and water reuse; and district energy.

- **Mixed-use developments –** Explore compatible land uses such as commercial and mixed-use developments in areas with high freight activity. For non-industrial uses to be shielded from the noise and pollution from freight developments, establish industrial site design guidelines that ensure proper screening and buffering.
- **Preserve agricultural and open lands –** Concentrate development of freight districts in proximity to existing industrial businesses and areas identified as future employment centers.

8.3.1. Industrial Retention

Cities and regions around the country are recognizing the value of preserving industrial uses and jobs within industrial districts. Successful efforts involve collaboration between the public, nonprofit, and private sector to provide regulatory certainty, financial support, and business development services to existing manufacturing firms and enable new development and redevelopment.

Local governments and their partners have a variety of tools that they can use to preserve and enable industrial development. Briefly, promising options include:

- Regulatory approaches, which can include restricting eligible development types to only include industrial or related uses or adjusting zoning and development regulations to make industrial development easier, such as right-sizing employee parking and loading space requirements and adjusting FAR requirements.
- Investments or incentives, such as technical assistance programs for business support, industrial development grants, revolving loans, tax abatements, and other incentives to preserve existing industrial development and facilitate industrial redevelopment.
- District-scale approaches to industrial development, such as shared parking for workers or vehicles, shared stormwater management and water reuse systems, district energy systems, co-located support services, and many other options.

Below are case studies from around the country that offer models for successful industrial preservation.

Saint Paul: Saint Paul's recently adopted 2040 Comprehensive Plan includes a specific focus on industrial preservation, particularly in the Midway District. The plan includes a variety of policies with the goal of keeping these land uses adaptable, relevant, and supportive of well-paying jobs with low barriers to entry and a growing tax base. The nine policies they suggest address logistics[19]. Additionally, it makes specific mentions to industrial development needing access to freight infrastructure.

Minneapolis: Minneapolis 2040 highlights freight's role in achieving a healthy, sustainable, and diverse economy. The City commits to fully utilizing currently zoned land use for freight rail infrastructure and innovating the truck route network for efficient delivery. The closure of the Nokomois Wheat Mill provides an opportunity for Minneapolis to preserve industrial zoned land.

Pittsburgh: The Regional Industrial Development Corporation (RIDC) focuses on transforming buildings once used for past industries into updated spaces fit to accommodate current industries. One project in

19 https://www.stpaul.gov/sites/default/files/Media%20Root/Planning%20%26%20Economic%20Development/Saint-Paul-For-All-2040-Comprehensive-Plan-Land-Use.pdf Page number 42 (Page 10 of this pdf)

process is the transformation of a building once used by the J&L Steel Hazelwood Works and LTV Steel into a 265,000 square feet complex fit for present businesses. This development has created a new home for innovative businesses and university programs alike. The first of the three buildings in this redevelopment houses Carnegie Mellon University's Advanced Robotics for Manufacturing Institute (ARM) and CMU's Manufacturing Futures Initiative (MFI). Through this project and others like it, RIDC has been able to generate $3.4M in real estate taxes in 2018.

Indianapolis: Legacy manufacturing districts in Indianapolis have faced sustained disinvestment and high rates of vacancy and underutilization. To revitalize these districts, the city modified its existing zoning policy to allow for easier process for a zoning variance for vacant industrial properties. The revisions focused on incentivizing complementary uses to existing manufacturing firms, such as food production and artisan manufacturing, through a joint effort between the City of Indianapolis, LISC, and the local chamber of commerce. The City is using CDBG funds towards smaller industrial preservation projects, LISC is supporting the residential land bank, and the local chamber of commerce is developing eligibility criteria for some of their funding programs.

New York City: Faced with the loss of industrial businesses, New York City enacted new restrictions on hotel and self-storage development within its designated 21 industrial business zones (IBZ) and is considering additional restrictions for entertainment, office, and other uses in certain critical manufacturing districts. Complementary investments include tax incentives, training programs, incubator spaces, and many others.

Urban Manufacturing Alliance: The Urban Manufacturing Alliance is a national coalition of organizations and individuals focused on ensuring that cities and towns continue to be home to manufacturing facilities. Based on research and work in several cities, including Boston, Indianapolis, and Nashville, they have developed a suite of best practices for retaining maker and manufacturer industries.

8.4. Truck Parking

8.4.1. Truck Parking Opportunities

The shortage of truck parking is one of the more pressing issues within the Atlanta region and the US. Siting potential locations for truck parking is challenging because:

- On industrial property, truck parking as a use generates far less return on property value (and tax revenues) than a functioning industrial use (manufacturing, warehouse/distribution, etc.).
- On non-industrial property, truck parking typically requires a rezoning and must be properly buffered from surrounding uses – especially residential uses. Furthermore, truck parking can also generate community opposition.

FHWA has convened the "National Coalition on Truck Parking – Working Groups" which has developed ideas to address this issue, among many other truck parking issues. In their documentation they describe the importance of developing truck parking:

> "If a community has retail establishments, manufacturing, or other industry, trucks will be necessary to support these businesses. Proactively considering truck parking in plans

for community development will help reduce illegal truck parking as well as address a number of concerns:

Safety: It is imperative that truck drivers have safe places to park to meet hours of service rest requirements. When parking is not available, truck drivers are forced to park in unsafe locations, such as along roads. This creates safety hazards for other motorists, obstructs vehicle and bicycle lanes, or blocks sight lines at intersections and driveways.

Commerce: People are increasingly reliant on goods being shipped from other parts of the country or world. Local businesses rely on supplies and goods to serve their customers. Having truck parking in development codes ensures that the community can manage how truck parking and staging is occurring in the community.

Traffic Congestion: The extra time drivers spend looking for parking can add to the congestion levels on local roads, increasing delays for others. Looking for parking can also force drivers to drive through residential zones which can be unsafe as well as a nuisance for local residents. Truck drivers looking for parking tend to drive longer, burning more fuel, which can negatively impact air quality.

Planning for the Future: Freight access to communities will only get more important as time goes on. Planning for truck parking now will help be proactive in addressing the parking problem and ensures your community can be a competitive and desirable place for industry in the future.

Similar to the employee and customer parking requirements contained in most zoning ordinances, truck parking requirements can be implemented for uses that frequently generate truck traffic. Having provisions for truck parking in the zoning ordinance also allows the community to set standards for siting and design to ensure compatibility with surrounding land uses.

Truck parking needs are different in urban and rural communities, industrial or residential zones, and many other types of areas. It is important to plan accordingly to ensure siting is compatible with surrounding land uses.*"*[20]

Other resources on truck parking are available from the APA[21] and ARC[22].

8.4.2. Truck Parking Assessment Methodology

In order to assess the potential for truck parking opportunities, an inventory of lots was taken that met the following criteria:

- Zoned for industrial uses
- Vacant
- Lot size between five and 25 acres

[20] https://ops.fhwa.dot.gov/freight/infrastructure/truck_parking/workinggroups/state_reg_lgov_coord/product/local_zoning.htm
[21] https://www.planning.org/policy/guides/adopted/freight/
[22] https://atlantaregional.org/transportation-mobility/freight/atlanta-regional-truck-parking-assessment-study/

8.4.3. Potential Industrial Truck Parking Sites

There are three industrial zoning districts within the City and County:

- Manufacturing
- Light Manufacturing
- Planned Development District (PDD)

It should be noted that the vacant properties currently zoned PDD are owned by the Griffin-Spalding Development Authority, which expressed opposition to truck parking facilities on its property. The remaining vacant industrial properties between five and 25 acres are shown in Figure 10. As shown, most of the potential sites are in and around the City of Griffin, near the Lakes at Green Valley and along the US 19/41 corridor. While these sites can serve local demand, they do not serve the anticipated growth along SR 16 in the eastern portion of the County.

8.4.4. Other Truck Parking Needs

As noted above, there are currently no sites that could accommodate truck parking zoned for industrial uses within the eastern portion of the County. While several larger vacant lots zoned for non-residential development exist in the area, more internal discussion with staff and property owners is needed before identifying specific parcels appropriate for truck parking. Furthermore, while the SR 16 corridor contains the most favorable locations for potential truck parking, the Arthur K. Bolton overlay zoning along the corridor is not conducive to this use. For example, the ordinance:

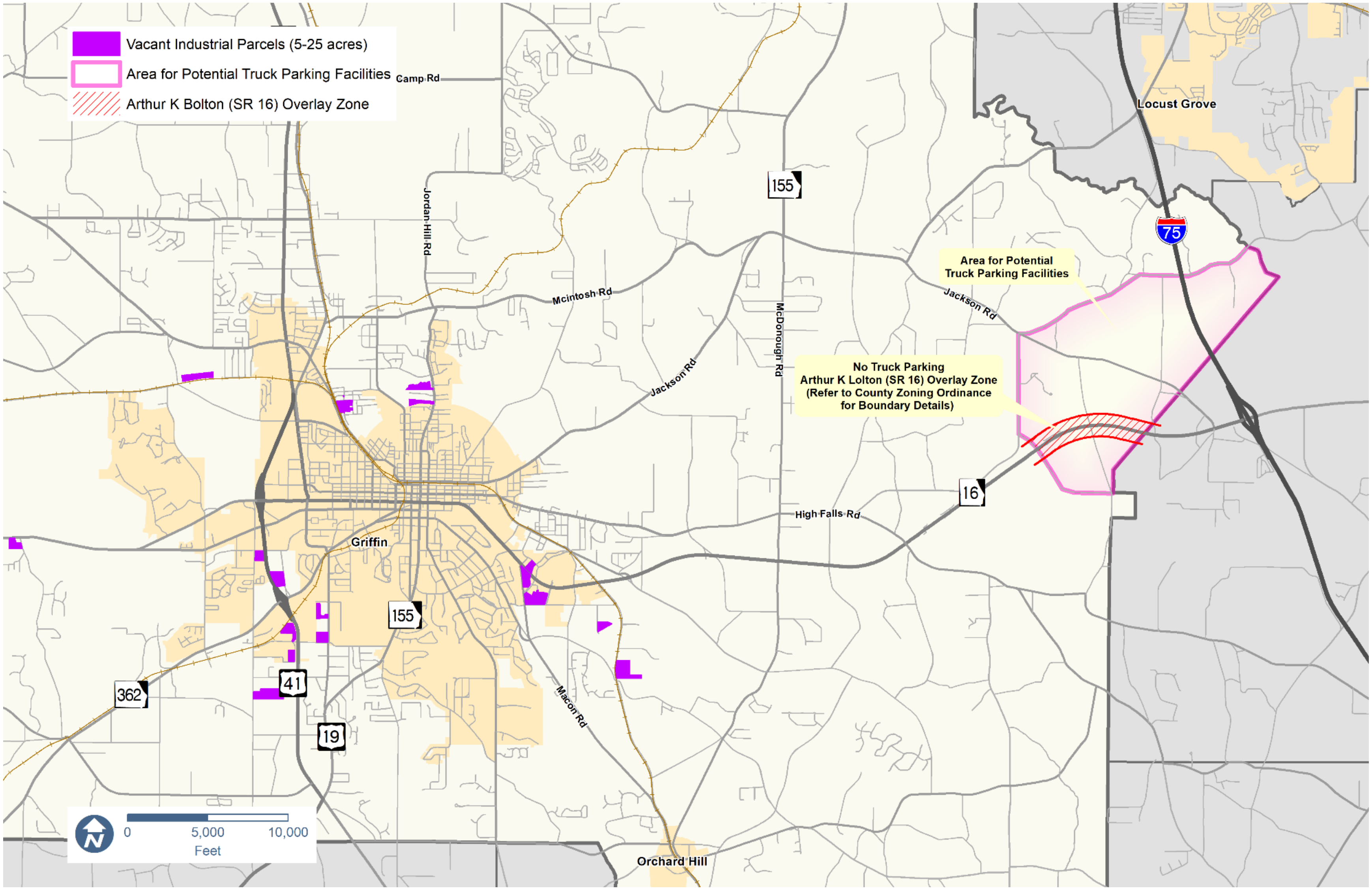
- Prohibits any type of development that could threaten the overall mobility along the corridor.
- Applies to all parcels within 750 feet of the SR 16 ROW and prohibits any subdivision of parcels.[23]

Based on input from County staff, the following policy actions are needed to address the accommodation of truck parking in the eastern portions of the County:

- Identify a specific area in the eastern portion of the County (outside of the ABK Overlay District) as having potential for truck parking facilities that would be subject to further internal discussions. This area is shown in Figure 10.
- Develop a more detailed truck parking ordinance that specifically regulates their locations and site plan details to accommodate the anticipated future demand in the vicinity of I-75 and SR 16.

[23] Spalding County Code of Ordinances, Appendix V – Zoning, Article 22.

Figure 10: Truck Parking Opportunities



8.4.5. Other Truck Parking Strategies

- **Truck Parking Technologies –** In addition to the identification of truck parking opportunities within the county, Spalding County should encourage the Griffin Spalding Chamber of Commerce to promote to its membership to the use of truck parking ITS applications for its drivers.

8.5. Transit and Workforce Access Strategies

In the section below several transit and workforce access strategies have been identified to address short-term priorities.

- **Prioritize projects in census-designated urbanized areas –** Funding streams differ by designation of areas by the Census. Focusing initial transit investments in urbanized parts of the County can open a larger pool of funding. The transit network can then be extended to non-urbanized areas with high density of jobs. The upcoming transit feasibility will shed more insight on potential alternatives.
- **New mobility –** Investigate the role for new mobility services. Innovations in technology and service provision have allowed micro-mobility and rideshare companies to complement transit service in some locations. These services are very well-suited for making last mile connections.
- **Reverse commute –** Integrate reverse commute routes when creating the public transit system. Currently, 3,000 workers commute to Spalding County from Henry & Pike Counties. If a portion of these trips can be served by a shuttle or van service, the reduction in vehicle miles can be significant and can attract more workers to jobs in Spalding County.
- **Georgia Commute Options –** Encourage the Griffin Spalding Chamber of Commerce to increase awareness of Georgia Commute Options to its membership for workforce residing in the Atlanta metro area.

8.6. Economic Development Strategies

The following short-term economic development strategies have been identified for implementation in Spalding County:

- **Workforce development with Employer Engagement –** Create strategic partnerships between local high schools, community colleges, trade schools and employers to create sector-specific training programs in the industrial sector with good growth prospects. Apprentice Carolina, SC, a state program housed in the South Carolina Technical College System has been recognized by the US Dept of Labor as a national model for apprenticeship expansion. Over 31,000 students have graduated from the program since 2007 with participation from over 990 companies.

9. Long-Term Vision Projects and Strategies

This chapter outlines proposed long-term vision projects and strategies identified during the development of the Spalding County Freight Cluster Plan. While the short-term work program serves to address immediate needs, long-term improvements represent a collection of projects that are not feasible over the next five years. Generally, the most credible factor for these projects being labeled as long-term is their overall costs and, as a result, the difficulties in programming them within a five-year cost feasible work program. In some cases, more study and coordination are needed to fully define projects moving forward.

9.1. Overview of Long-Term Fiscally Unconstrained Work Program

Projects and recommendations included in the long-term work program consist of eight projects that address roadway improvements and eight intersection improvements that address safety and operational issues, and one interchange project. Collectively, the long-term work program consists of a total of 17 individual improvements.

Table 13 and Figure 11 contains the long-term fiscally unconstrained projects and policy strategies included in the Spalding County Freight Cluster Plan Work Program. This table has been abbreviated for legibility in this report. The full table can be found in Appendix D of this report. The table is followed by a figure showing an overview of the project locations.

9.2. Long-Term Fiscally Unconstrained Projects

The following projects represent long-term options for Spalding County to implement a more robust freight network within the county. These recommendations consist of two options for a truck bypass north of Griffin; two options for a truck bypass south of Griffin; a new interchange at Jenkinsburg Road and I-75 (and accompanying FHWA required studies); upgrades to Wallace Road; and new parallel backage roads along SR 16. The projects also include operational and safety improvements throughout the county.

9.2.1. LR-1 – SR 155 Improvements

- **Project Description:** McDonough Road Improvements for SR 155 Designation.
- **Partner Agencies:** GDOT, Spalding County
- **Estimated Cost:** TBD

9.2.2. LR-2 – E. McIntosh Road at 9th Street Roundabout

- **Project Description:** Consider converting the intersection to a roundabout if crashes become more frequent.
- **Partner Agencies:** Spalding County, City of Griffin
- **Estimated Cost:** $3 million

Table 13: Long-Term Fiscally Unconstrained Projects Summary

Project ID	Project Name	Sponsoring Agencies	From	To	Estimated Total Project Cost
LR-1	McDonough Road SR 155 Designation Improvements	GDOT, Spalding County	Jackson Road	SR 16	TBD
LR-2	Johnston Road at S. McDonough Road Intersection Roundabout	Spalding County	N/A	N/A	$4,000,000
LR-3	Johnston Road at Macon Road Roundabout	Spalding County	N/A	N/A	$4,000,000
LR-4	Green Valley Road Realignment	Spalding County	N/A	N/A	$2,300,000
LR-5	Johnston Road at Macon Road Reconstruction and Improvement	Spalding County	N/A	N/A	$70,000
LR-6	Johnston Road at Green Valley Road Improvements and Repave	Spalding County	N/A	N/A	$10,000
LR-7	Johnston Road at S. McDonough Road Intersection Improvements and Repave	Spalding County	N/A	N/A	$10,000
LR-8	Wallace Road Upgrade to 2-lane				
LR-9	Jenkinsburg Road Interchange Federally Required Studies	GDOT, Spalding County	N/A	N/A	$450,000
LR-10	Jenkinsburg Road Interchange	GDOT, Spalding County	N/A	N/A	$40,000,000
LR-11	Northern Bypass Alternative 2 (Airport Dr to US 41)	City of Griffin, Spalding County	Airport Drive	US 41	$102,000,000
LR-12	Northern Bypass Alternative 1 (McDonough to US 41)	City of Griffin, Spalding County	McDonough Road	US 41	$113,000,000
LR-13	Southern Bypass Alternative 2 (McDonough to Airport Rd)	City of Griffin, Spalding County	McDonough Road	Airport Drive	$93,000,000
LR-14	Southern Truck Bypass Alternative 1 (US 41 to McDonough Rd to SR 16)	Spalding County	US 41	SR 16	$77,000,000
LR-15	SR 16 Backage Roads	Spalding County	Green Valley Road	I-75	$95,000,000

Project ID	Project Name	Sponsoring Agencies	From	To	Estimated Total Project Cost
LR-16	Martin Luther King, Jr. Parkway (US 19/41) at Zebulon Road (SR 155) Intersection Improvement (Displaced Left Turn Lanes)	GDOT, Spalding County	NA	NA	$20,000,000
					$553,890,000

Figure 11: Long-Term Fiscally Unconstrained Projects

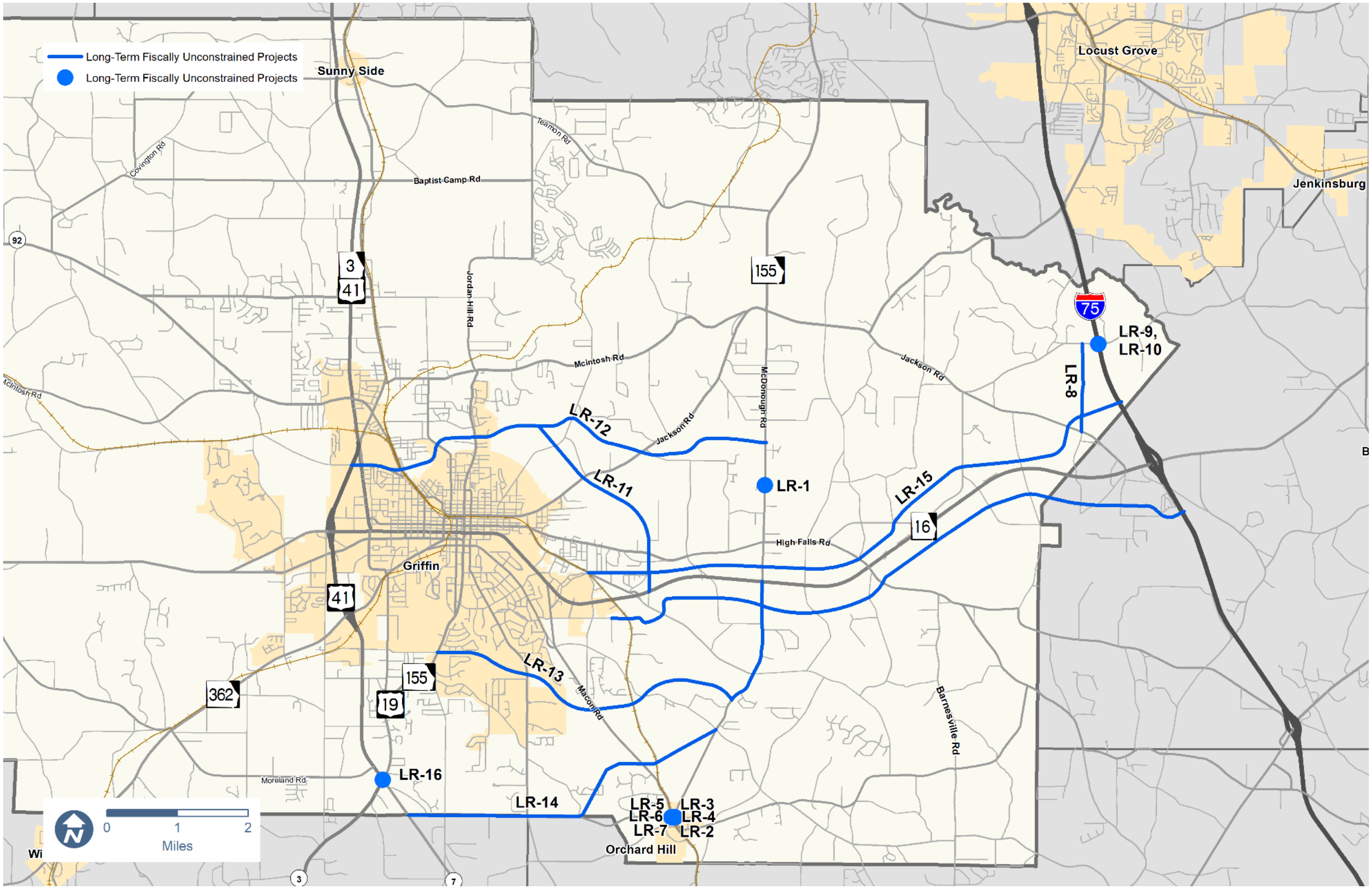


Table 14: Long-Term Policy Strategies

Project ID	Recommendation Type	Project Description	Implementing Agencies	Timeframe (Initiation)
LU-8	**Land Use/Development**	**Minimize residential land use conflicts**	Spalding County, City of Griffin	Long-Term
LU-9	**Land Use/Development**	**Affordable housing for workforce**	Spalding County, City of Griffin, ARC	Long-Term
LU-10	**Land Use/Development**	**Preparing for electrification of freight fleets and autonomous vehicles.**	Spalding County, City of Griffin, ARC, GDOT	Long-Term
LU-11	**Land Use/Development**	**Require green stormwater infrastructure in large industrial sites**	Spalding County, City of Griffin	Long-Term
WF-6	**Transit/Workforce Access**	**Establish public transit**	Spalding County, City of Griffin, ARC	Long-Term
WF-7	**Transit/Workforce Access**	**Last mile solutions**	Spalding County, City of Griffin	Long-Term
E-2	**Economic Development**	**Workforce development and training in times of automation**	Spalding County, City of Griffin	Long-Term

9.2.3. LR-3 – Johnston Road at S. McDonough Road Roundabout

- **Project Description:** Install a roundabout, in conjunction with Phase 2 of the Griffin South Bypass project (GDOT PI 007871).
- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $4 million

9.2.4. LR-4 – Johnston Road at Macon Road Roundabout

- **Project Description:** Install a roundabout, in conjunction with Phase 2 of the Griffin South Bypass project (GDOT PI 007871).
- **Partner Agencies:** Spalding County, Town of Orchard Hill
- **Estimated Cost:** $4 million

9.2.5. LR-5 – Green Valley Road Realignment

- **Project Description:** Eliminate intersection by relocating Green Valley Road to intersect S. McDonough Road north of Johnston Road, in conjunction with Phase 2 of the Griffin South Bypass project (GDOT PI 007871).
- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $2.3 million

9.2.6. LR-7 – Johnston Road at Macon Road Improvement

- **Project Description:** Reconstruct and repave Johnston Road between Macon Road and S. McDonough Road to correct vertical sight lines and improve pavement condition; restripe the intersection; install raised pavement markers.
- **Partner Agencies:** Spalding County, Town of Orchard Hill
- **Estimated Cost:** $10,000

9.2.7. LR-8 – Johnston Road at Green Valley Road Intersection Improvement

- **Project Description:** Repave and restripe the intersection; install pavement markers.
- **Partner Agencies:** Spalding County, Town of Orchard Hill
- **Estimated Cost:** $10,000

9.2.8. LR-9 – Johnston Road at S. McDonough Road Intersection Improvement

- **Project Description:** Install splitter islands along the S. McDonough Road approaches to the intersection, which will also help to improve the skew of the intersection; repave and restripe the intersection; install raised pavement markers.
- **Partner Agencies:** Spalding County, Town of Orchard Hill
- **Estimated Cost:** $40,000

9.2.9. LR-10 – Wallace Road Upgrade

- **Project Description:** Redesign and widen Wallace Road between SR 16 and Jenkinsburg Road to a two-lane divided roadway with adequate travel lane width and turn radii to accommodate significant freight traffic as industrial development occurs along the west side of I-75.
- **Partner Agencies:** Spalding County
- **Estimated Cost:** $8,000,000

9.2.10. LR-11 – Jenkinsburg Road Interchange Feasibility/Justification Study

- **Project Description:** To reflect recommendations from past plans and studies,[24] coordinate with GDOT to conduct an interchange feasibility study for I-75 at Jenkinsburg Road. Contingent upon the outcome of this feasibility study, coordinate with FHWA[25] and GDOT[26] to prepare an Interchange Justification Report (IJR) for this location.
- **Partner Agencies:** Spalding County, GDOT
- **Estimated Cost:** $750,000

9.2.11. LR-12 – Jenkinsburg Road Interchange

- **Project Description:** Construct a conventional diamond interchange at Jenkinsburg Road at I-75, which would tie into the proposed I-75 Parallel Frontage Access Roads and the Northern Bypass (if implemented).
- **Partner Agencies:** Spalding County, City of Griffin, GDOT
- **Estimated Cost:** $40,000,000

9.2.12. LR-13 – Northern Bypass Alternative 2 (Airport Drive to US 41)

- **Project Description:** Construct a new roadway alignment connecting US 41 and SR 16 on the northeast side of Griffin.
- **Partner Agencies:** Spalding County, City of Griffin, GDOT
- **Estimated Cost:** $102,000,000

9.2.13. LR-14 – Northern Bypass Alternative 1 (McDonough Road to US 41)

- **Project Description:** Construct a new roadway alignment from McDonough Road west to US 41 (just south of McIntosh Road).
- **Partner Agencies:** Spalding County, City of Griffin, GDOT
- **Estimated Cost:** $113,000,000

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[24] Spalding County Comprehensive Plan. 2017. DP Strategy 4.4 & DP Strategy 4.5, p. 10. https://www.spaldingcounty.com/cms/uploads/file/community_dev_2018/spalding-comp-plan_adopted.pdf

[25] FHWA. 2010. Interstate System Access Informational Guide. U.S. Department of Transportation, Office of Infrastructure. https://www.fhwa.dot.gov/design/interstate/pubs/access/access.pdf

[26] GDOT. 2014. Policy 3140-1 – Responsibility and Procedure for Interchange Justification IJR and Interchange Modification IMR Reports. http://mydocs.dot.ga.gov/info/gdotpubs/Publications/3140-1.pdf

9.2.14. LR-15 – Southern Bypass Alternative 2 (US 41 to McDonough Road to SR 16)

- **Project Description:** Construct a new roadway alignment west from S. McDonough Road to existing Airport Drive.
- **Partner Agencies:** Spalding County, City of Griffin, GDOT
- **Estimated Cost:** $95,000,000

9.2.15. LR-16 – Southern Bypass Alternative 1 (US 41 to McDonough Road to SR 16)

- **Project Description:** Upgrade County Line Road from US 41 to E. Maddox Road; construct a new roadway alignment from E. Maddox Road to Holly Grove Road; upgrade Holly Grove Road from Green Valley Road to Futral Road/S. McDonough Road, following Holly Grove Road.
- **Partner Agencies:** Spalding County, City of Griffin, GDOT
- **Estimated Cost:** $77,000,000

9.2.16. LR-17 – SR 16 Backage Roads

- **Project Description:** Construct new roadway alignments to the north and south of SR 16 as backage roads. The northern backage road will begin at Rehobeth Road and Green Valley Road and extend east to the proposed I-75 Parallel Frontage Roads (east of I-75). The southern backage road will begin at Hudson Rod and Green Valley Rod, extending east to the proposed I-75 Parallel Frontage Roads (east of I-75).
- **Partner Agencies:** Spalding County, City of Griffin, GDOT
- **Estimated Cost:** $95,000,000

9.2.17. LR-18 – Martin Luther King, Jr. Parkway (US 19/41) at Zebulon Road (SR 155) Intersection Improvement (Displaced Left Turn Lanes)

- **Project Description:** Monitor level of congestion and consider installing a single-legged displaced left turn (DLT) for eastbound left-turn movements from Zebulon Road (US 19) to northbound MLK Jr. Parkway (US 41), to include the corresponding free-flow right-turn bypass lane from southbound MLK Jr. Parkway (US 41) to westbound Zebulon Parkway (US 19); realign the eastbound and westbound intersection approaches to improve the skew. As part of this design, consider installing a displaced left turn (DLT) for westbound left-turn movements from Zebulon Road (US 19) to northbound MLK Jr. Parkway (US 41).
- **Partner Agencies:** GDOT, Spalding County, City of Griffin
- **Estimated Cost:** $20 million

9.3. Transit and Workforce Access Strategies

The following long-term transit and workforce access strategies were identified through the development of this plan for implementation:

- **Establish public transit –** Investigate different models to form a public transit system for the nearly 3,000 workers who live and work within the County. Reach out to large employers in the industrial sector to gather information on employee’s preferred connections, shift times, and demand for transit from different areas within and outside the County.

- **Last mile solutions –** Consider various business models for offered last mile services. These services can be operated by a local transit agency or a private vendor. This option will be investigated during the upcoming transit study.

9.4. Land Use and Development Strategies

The following long-term land use and development strategies were identified through the development of this plan:

- **Include industrial uses in planning efforts -** Industrial development is often left out of many future-oriented planning efforts or segregated into undesirable locations. While frequently included in comprehensive plans, it is also important to consider in other land use and transportation plans. For example, job creating uses are as critical near transit as residential development, and industrial users need to be engaged in transit-oriented development (TOD) plans. And transportation plans like complete streets conversions need to consider freight transportation needs, or else risk developing streets that do not solve conflict between trucks and vulnerable users.
- **Minimize residential land use conflicts –** Address the environmental justice issues linked to freight transportation and industrial redevelopment primarily through incentivizing applications of green technology in the context of a COD strategy. As environmental justice concerns include access to industrial jobs as well as minimizing the risks of exposure to pollution and other negative impacts of freight movement, and as these negative impacts are primarily local and can be substantially reduced with green freight technologies, effectively incentivizing the use of green freight technologies in COD projects, particularly in low-income and minority neighborhoods, represents a preferred environmental justice strategy. Examples of green freight technologies include:
    - Trucks equipped with engines that meet current USEPA standards for new engines and with devices that minimize emissions during idling, along with incentivized use of compressed natural gas or electric engines that drive vehicle emissions below USEPA standards
    - Automated gate systems at industrial complexes that read bar codes and admit trucks in seconds, eliminating truck queues
    - Any exterior lighting at industrial facilities made directional to illuminate work areas with negligible spillage to neighboring properties
    - New or rehabilitated industrial facilities designed to Leadership in Energy and Environmental Design (LEED) standards
- **Affordable housing for workforce –** Provide opportunities to add affordable housing for the workforce in location-efficient neighborhoods. The design of the future transit system must accommodate locations of affordable housing in their network design to ensure the County can attract and retain industrial workers.
- **Preparing for electrification of freight fleets and autonomous vehicles –** Investigate upgrades needed to freight infrastructure to accommodate electric freight fleets and autonomous trucks such as charging stations, information and management systems, and curbside sensors.

- **Require green stormwater infrastructure in large industrial sites –** Site design guidelines for large industrial sites would benefit from guidelines on green stormwater infrastructure requirements to manage run-off produced within the site to avoid overwhelming the County's stormwater infrastructure, particularly in greenfield developments.

9.5. Economic Development Strategies

The following economic development strategies have been identified as long-term strategies for implementation in Spalding County:

- **Workforce development and training in times of automation –**There is expected to be a hiring gap in the manufacturing sector as technology advances and use of automation becomes commonplace in industries. To keep up with the shifting skills requirements, workforce development plans that train current labor force in technical and soft skills needed to meet future needs should be developed in conjunction with larger employers.

Appendix A

Spalding County Freight Cluster Plan

Inventory and Assessment Report

Spalding County Freight Cluster Plan

Inventory and Assessment Report

Prepared by

For

In cooperation with

August 2020

Table of Contents

List of Figures

List of Tables

1. Overview and Purpose of Report

The purpose of the Inventory and Assessment Report is to provide a detailed inventory of existing conditions and an assessment of current and future needs for the study area. The overall intent of the report is to provide the information necessary to begin to develop recommendations for transportation improvements and land use and development policies that will help improve freight mobility and foster an environment for prosperous industrial development. As such, the remainder of this report is organized as follows:

- Chapter 2 – This chapter presents a review of previously completed plans that are relevant to the study area, including those from the Georgia Department of Transportation (GDOT), Atlanta Regional Commission (ARC), Spalding County, and the City of Griffin. A review of these documents provides a policy background from which to conduct the study.
- Chapter 3 – This chapter provides an overview of the existing transportation network, land use and development patterns, and other characteristics that influence freight traffic and economic development. This includes an inventory of existing land uses, workforce characteristics, roadway network, travel characteristics and transit services.
- Chapter 4 – This chapter presents an assessment of future projected conditions based on the ARC's regional travel demand model and the programmed and planned improvements throughout the County that will influence future travel.
- Chapter 5 – This chapter summarizes significant findings from the report that will carry forward into the traffic study and/or the development of preliminary study recommendations.

2. Review of Previous Plans and Studies

During the past 15 years, there have been several plans and studies conducted that influence a wide variety of freight modes and operations in Spalding County and the surrounding region. This section summarizes previous plans and studies and highlights conclusions and findings that will influence the Spalding County Freight Cluster Plan.

2.1. GDOT Statewide Freight and Logistics Plan

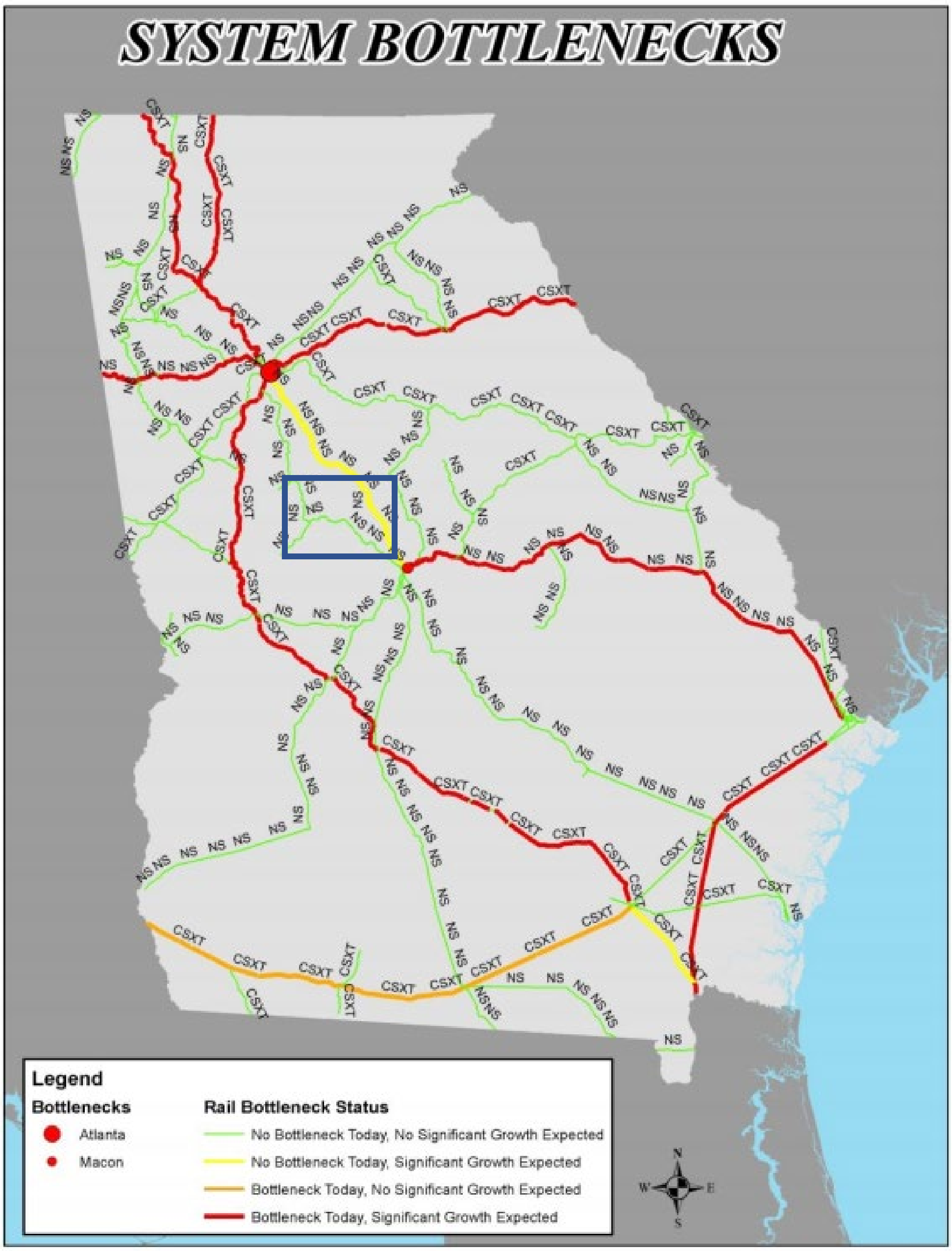
In 2013, GDOT updated the Statewide Freight and Logistics Plan, which evaluates Georgia's multimodal freight needs and provides a strategy for addressing those needs. For each mode, the plan recommends a set of improvements and estimated the economic return on those investments for the state.

The plan identifies I-75, which traverses Spalding County, as a strategic highway corridor along the Atlanta-to-Savannah route. Recommendations highlighted for this corridor primarily consist of adding lanes on long-haul corridors and improving major system-to-system interchanges.

The air cargo strategy in the plan focuses on supporting the expansion and access improvements to air cargo facilities on the south side of Hartsfield-Jackson Atlanta International Airport (H-JAIA). According to H-JAIA's master plan, the expansion of cargo operations will continue as part of a long-term strategy to attract additional air cargo traffic at the airport.

According to the plan, the Norfolk Southern (NS) “S” rail line that crosses through Spalding County does not currently experience any bottlenecks, and no significant rail volume growth is expected. The “S” line is shown in green in **Figure 1.**

Figure 1: Georgia Rail Network Bottlenecks and Forecasted Growth[1]



[1] Georgia Department of Transportation. Georgia Statewide Freight and Logistics Plan, Rail Modal Profile. http://www.dot.ga.gov/InvestSmart/Freight/Documents/Plan/Task%203_Georgia%20Rail%20Freight%20Modal%20Profile.pdf

2.2. ARC Atlanta Strategic Truck Route Master Plan (ASTRoMaP)

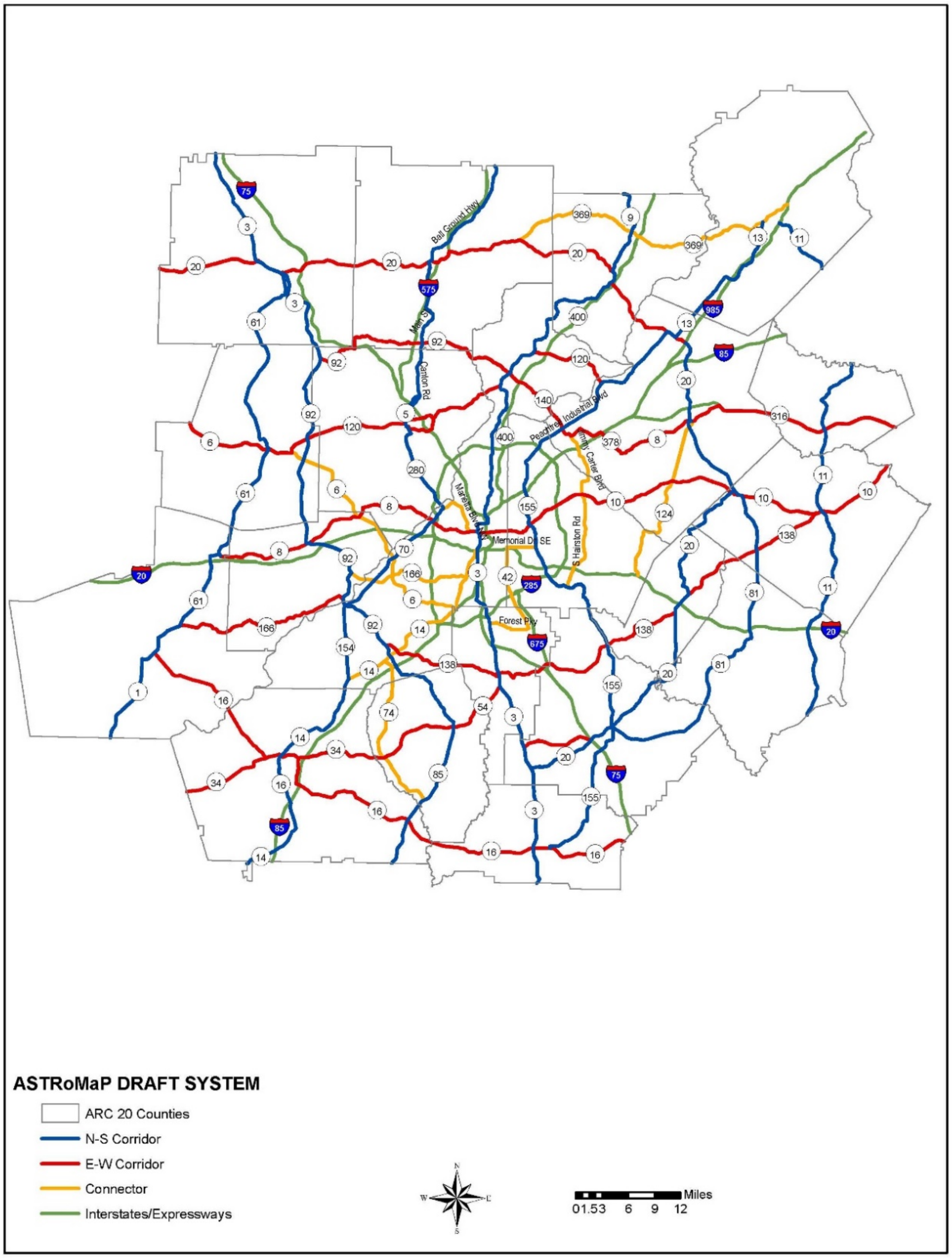
The Atlanta Regional Commission (ARC) completed the Atlanta Strategic Truck Route Master Plan (ASTRoMaP) in 2010. The ASTRoMaP built on the regional freight mobility plan completed in 2008 by identifying a regional truck route network and providing design guidelines for roundabouts, signage guidelines, and recommendations for addressing at-grade crossings.[2]

Potential routes for the network were scored according to a set of quantitative and qualitative attributes including truck volumes, functional classification, lane width, shoulder width, bridge clearances, stakeholder support, land use compatibility, and environmental justice. Within Spalding County, three routes were designated on the regional truck route network: US 19/US 41/SR 3, SR 155, and SR 16.

The plan ultimately recommended a set of projects to address portions of the network that did not meet optimal expectations for attracting or facilitating truck traffic. Within Spalding County, there was one project proposed (NS-E1). To address traffic congestion at the intersection of SR 155 and Jackson Road, the plan proposed that in the short-term, radii should be increased at all four intersection approaches, and in the long-term, that the intersection be converted to a four-way stop with a roundabout. The regional truck route network designated by ASTRoMaP is shown in Error! Reference source not found..

[2] Atlanta Regional Commission. Atlanta Regional Freight Mobility Plan Update. May 2016. https://cdn.atlantaregional.org/wp-content/uploads/2017/02/atlanta-regional-freight-mobility-plan-update-2016.pdf

Figure 2. ARC ASTRoMaP Regional Truck Route Network

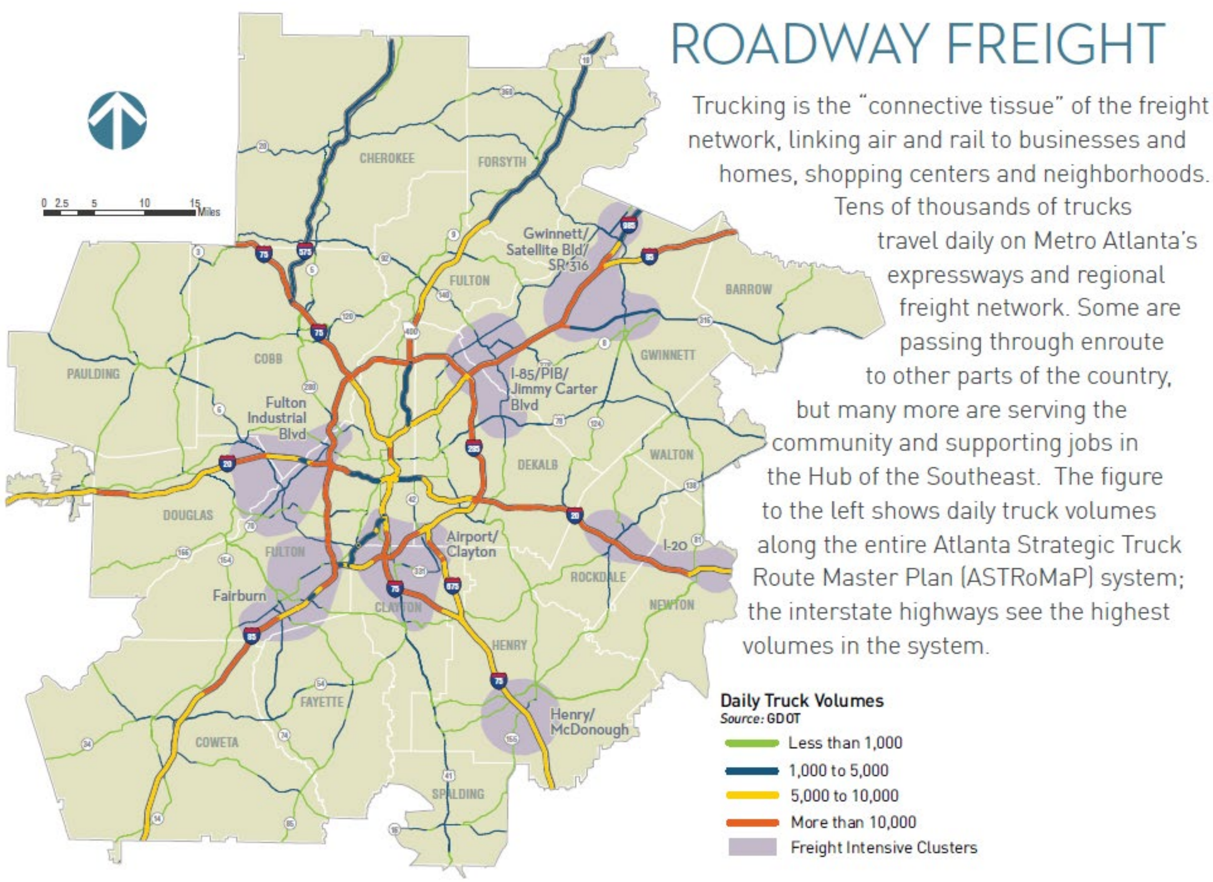


2.3. Atlanta Regional Freight Mobility Plan

The ARC Regional Freight Mobility Plan (2016) builds on the original 2008 study, which included a freight flow analysis and stakeholder outreach to identify several freight bottlenecks in the Atlanta region. The original study culminated with a set of institutional, infrastructure, and operational improvements and strategy recommendations focused on improving speed, reliability, and freight movement in the Atlanta region.

The plan was updated in 2016 to identify 91 projects that were prioritized into two tiers for implementation. The plan recommends further analysis of seven manufacturing and distribution clusters in the Atlanta region. It should be noted that Spalding County was not one of those clusters. As previously noted, Spalding County is undertaking this study to plan for future industrial growth. **Figure 3 s**hows the freight clusters identified based on the concentration of industrial development in these areas.

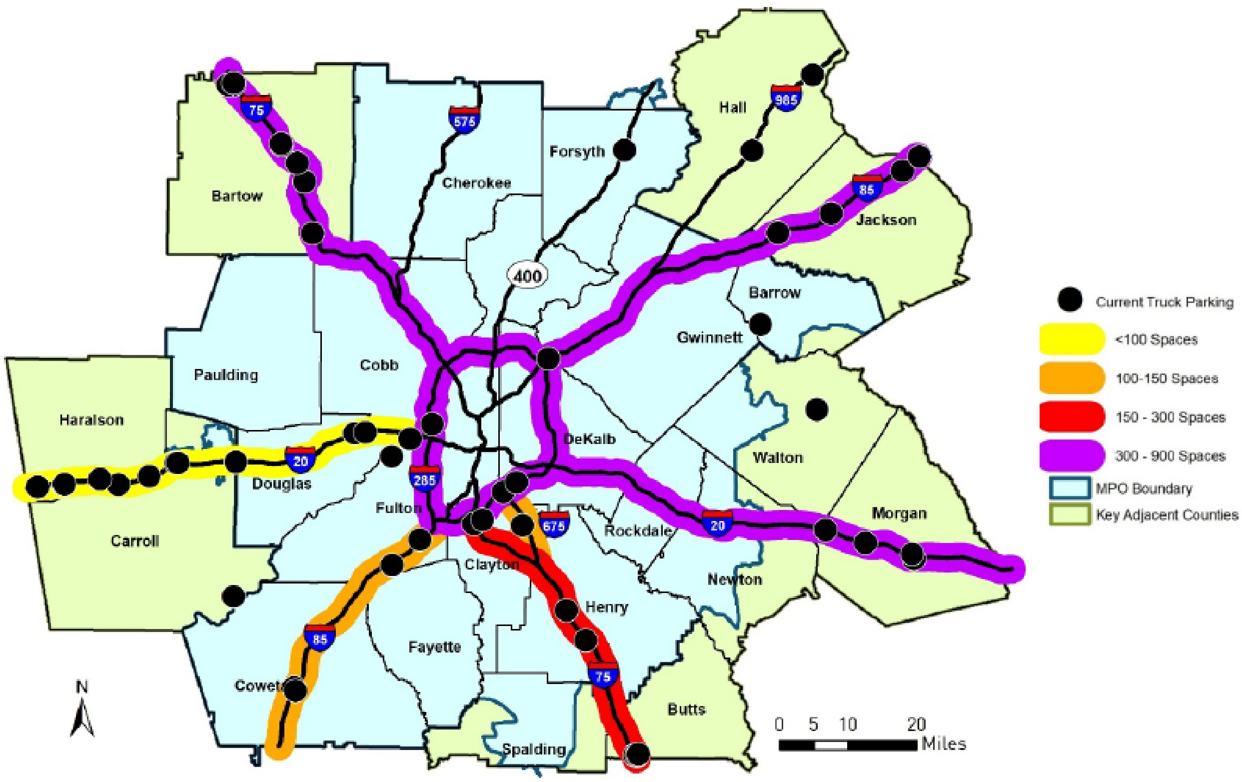
Figure 3. Freight Clusters and Truck Volume on ASTRoMaP Network



2.4. Atlanta Regional Truck Parking Assessment Study

The Atlanta Regional Truck Parking Assessment Study (2018) was developed in response to findings from the 2016 ARC Regional Freight Mobility Plan Update, which cited the lack of available truck parking in many areas within the Atlanta region. Based on a detailed inventory of available truck parking spaces and analysis of existing and future demand, the study concludes that truck parking is most limited in close proximity to Atlanta, and greater inventory is available in exurban communities such as Bartow, Jackson, Morgan, Butts, Haralson, and Carroll Counties. **Figure 4** illustrates the future truck parking deficiencies identified for the region. The I-75 South corridor adjacent to Spalding County shows a 150 to 300-space truck parking deficit. [3] A BP gas station currently under development at I-75 and SR 16 is anticipated to have approximately 200 parking spaces, which will help to address truck parking needs near Spalding County.

Figure 4: Future Projected Truck Parking Deficiencies (2045)



2.5. Southern Regional Accessibility Study

The Three Rivers Regional Commission (TRRC) completed the Southern Regional Accessibility Study in 2007. Many long-range projects were identified in the plan's roadway project recommendations. Within Spalding County, the study proposes a new interchange at Jenkinsburg Road and I-75 along with an improved facility along Jackson Road and McIntosh Road, providing connectivity between I-75 and US

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[3] Atlanta Regional Commission. Atlanta Regional Truck Parking Assessment Study. April 2018. https://cdn.atlantaregional.org/wp-content/uploads/executive-summary-atlanta-regional-truck-parking-assessment-study-apr-2018.pdf

19/US 41/SR 3 in Griffin. The study also recommends a new HOV-only interchange at Locust Grove in Henry County. **Figure 5** illustrates the roadway project recommendations from the Southern Regional Accessibility Study.

2.6. Spalding County Transit Development Plan

In 2011, the McIntosh Trail Regional Development Center (MTRDC) completed a Transit Development Plan that evaluated regional public transportation service for the counties of Spalding, Butts, Pike, Lamar, and Upson. The regional public transportation program is administered by the MTRDC on behalf of the member governments and was the first regional rural/suburban public transit service area established within the state.[4] The program utilizes Section 5311 Program funds administered by the Federal Transit Administration (FTA) to provide rural public transportation within the five-county service area and is most heavily used by senior citizens, local workforce, and disabled populations. The Plan resulted in the recommendations to maintain on-demand services throughout the County.

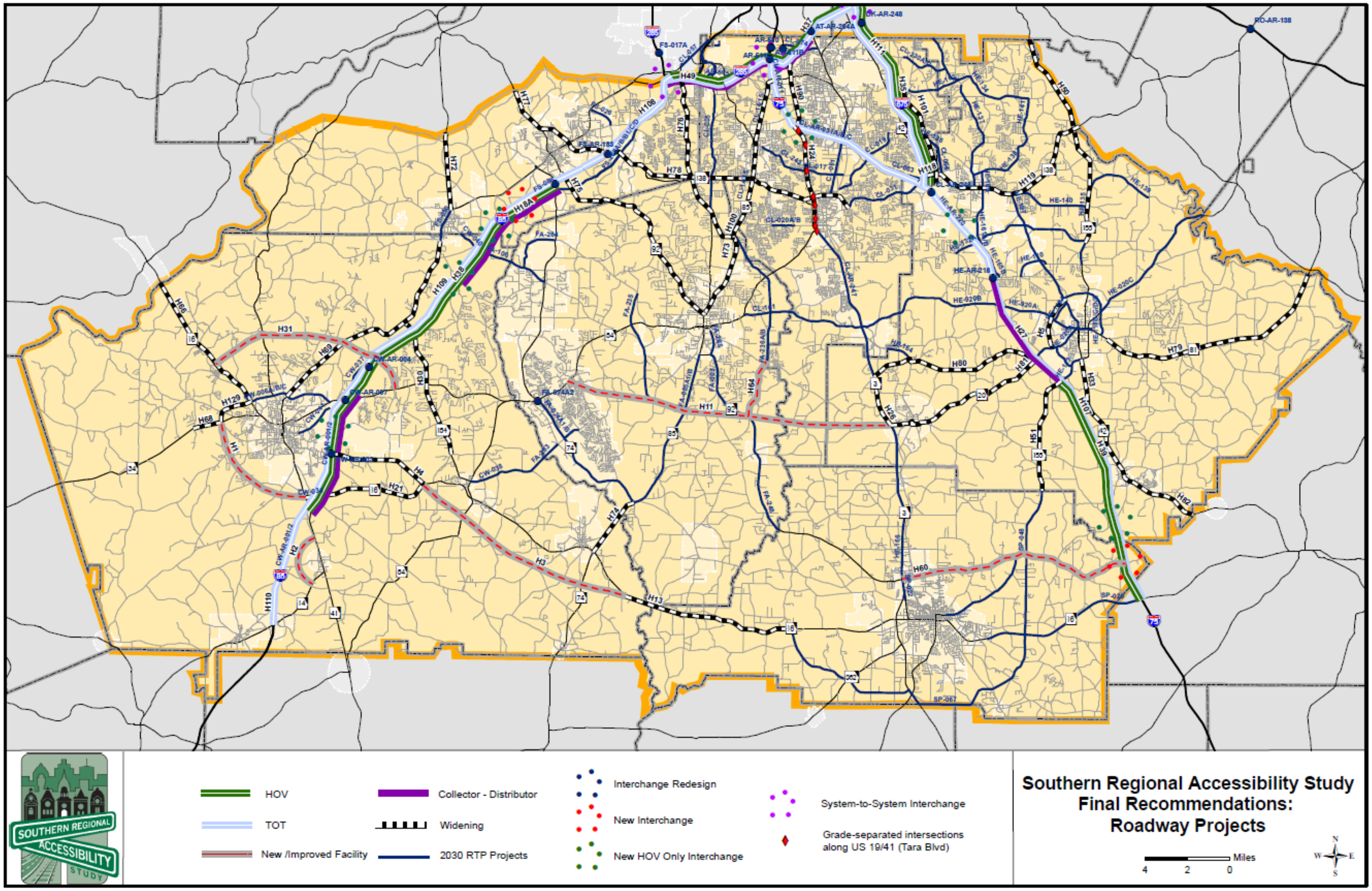
2.7. Spalding County Transit Feasibility Study

The Spalding County Transit Development Plan (2007) set the stage for the Transit Feasibility Study and Implementation Plan completed in October 2014. The study evaluated the potential for new public transportation services in Griffin and Spalding County, beyond the limited, rural demand response transit service that is operated via contract with the Three Rivers Regional Commission (TRRC). The feasibility study mapped the locations in the region with the highest transit propensity by combining demographic variables to evaluate transit service demand and evaluated land use to identify activity centers with the needed residential and employment density to support transit service.

The Transit Development Plan identified the need to provide enhanced transit service for commuter trips for the Griffin-Spalding County area. The assessment concludes that while fixed-route service would be feasible in the area, demand for new transit service is low and that flexible, lower-cost alternatives would be more readily implementable in the short-term. The plan recommends a phased program of recommendations to enhance transit service in the county, including expanded participation in transportation demand management programs, such as Georgia Commute Options; an expansion of the Griffin-Spalding rural transit service to a countywide flexible route system; and a new fixed-route system concentrated in and around Griffin.[5]

[4] McIntosh Trail Regional Development Center. Spalding County Transit Development Plan. 2007.
[5] The City of Griffin and Spalding County, Georgia. Griffin-Spalding Transit Feasibility Study. October 2014.

Figure 5: Roadway Project Recommendations – Southern Regional Accessibility Study[6]



[6] Three Rivers Regional Commission. https://www.threeriversrc.com/download/tp_sras_roadmap_090607.pdf

2.8. Griffin-Spalding Comprehensive Transportation Plan

Spalding County has been investigating alternative roadway alignments and improving connections to more efficiently move people and goods throughout the region for many years. The Griffin-Spalding Comprehensive Transportation Plan (CTP), completed in 2008, represents the county's first effort to deliver a new transportation vision for the future, including improved mobility for freight travel:

> "Growth in truck and auto travel will increase the need for highway preservation and additional capacity. While the Spalding County population has consistently grown, vehicle and truck miles have grown at a faster rate. This trend is expected to continue. The population is projected to increase by 93 percent in the next 25 years, further fueling the growth of vehicle and truck traffic. This growth will significantly impact the needs of Spalding County roadway system."[7]

An update of the CTP was completed in 2016. A key goal stated in the plan is to "ensure the transportation system supports economic development and efficient freight movement."[8] The CTP update evaluated needs at the Griffin Spalding Airport and surrounding business park and included discussion of the proposed new airport. Transportation needs identified for the existing airport site focus mainly on the addition of a second entrance to the west of the existing site. The study also identifies the need for several bridge improvements, roadway realignments and access improvements that would be necessary to support moderate truck traffic accessing the new airport. The CTP also identifies additional intermodal facility needs south of Griffin, based on emerging industrial areas around the Lakes at Green Valley and the existing airport site. All of these, in combination with the overall concern for truck traffic addressed in the previous CTP, demonstrate a need to limit truck traffic in already congested areas and locate intermodal terminals in locations that avoid impacting traffic in already-congested areas.[9]

2.9. Spalding Comprehensive Plan

In 2017, Spalding County conducted an update of its Comprehensive Plan, which presents goals and a long-range vision for growth and development in unincorporated portions of the county as well as Sunny Side and Orchard Hill.

Citing an anticipated increase in truck traffic, the plan identifies a need to separate truck and passenger vehicle traffic to improve mobility and safety in the county. The needs assessment proposes that a new interchange at Jenkinsburg Road and I-75, along with the redesignation of SR 155 to create a truck bypass, would help to address growing freight needs. The plan recommends a feasibility study to examine the need and utility of a truck bypass around Griffin.

The plan designates two-character areas where industrial growth should be targeted within Spalding County. The Activity Center character area, which allows for campus-style light industrial uses, is

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[7] Spalding County Comprehensive Transportation Plan. April 2008. http://www.spaldingcounty.com/docs/public_works/Spalding_County_CTP_Final_Report_Final.pdf

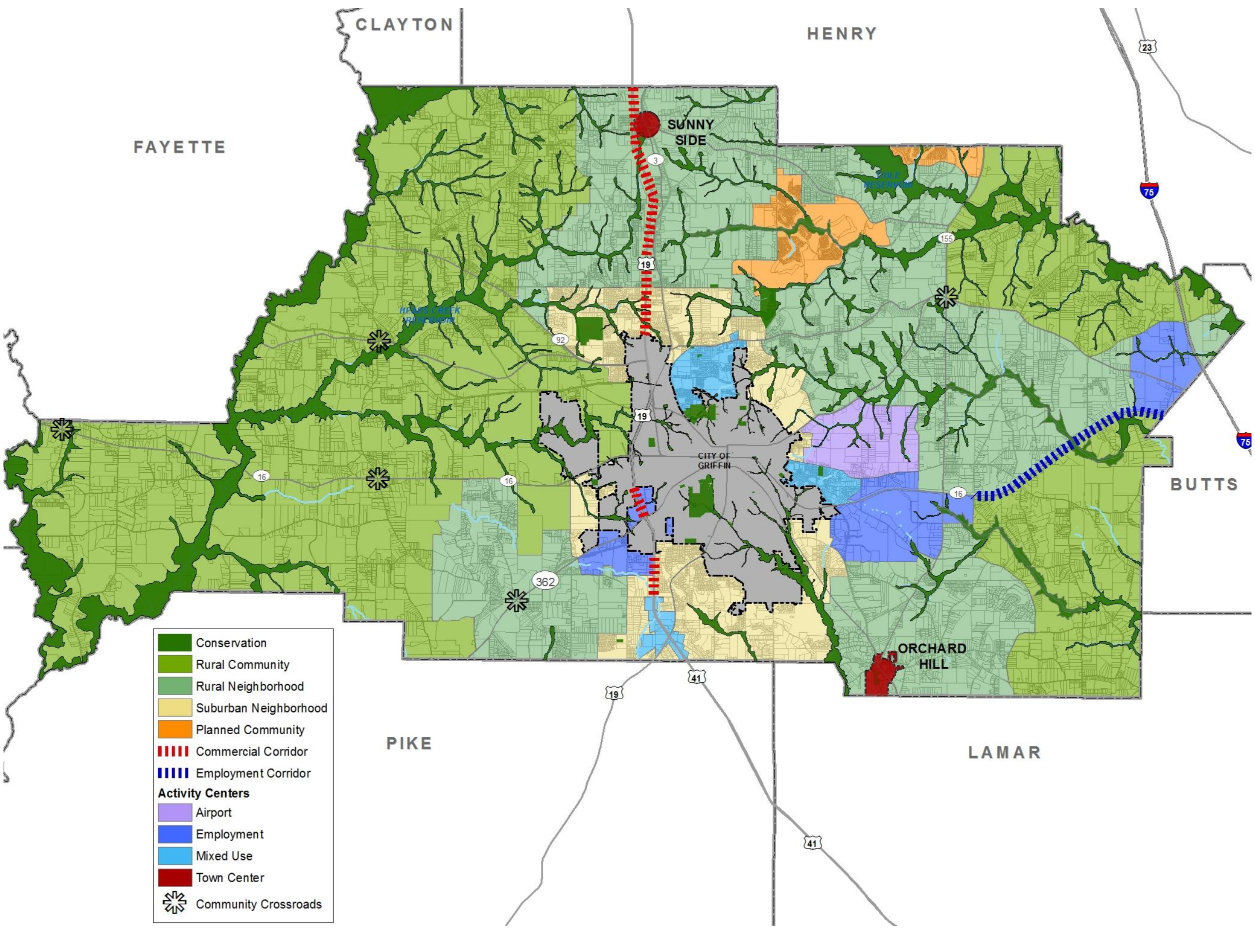
[8] 2016 Griffin-Spalding Comprehensive Transportation Plan (CTP) Update. May 2016. https://www.spaldingcounty.com/docs/public_works/Needs_and_Recommendations_Report_-_2016_Griffin-Spalding_CTP_Update.pdf

[9] Griffin-Spalding Comprehensive Transportation Plan Update – Needs and Recommendations Report. 2016.

characterized by compact development with robust pedestrian and vehicular connectivity. The Activity Center area is focused on concentrations of existing or potential industrial development, including southwest Griffin, the Lakes at Green Valley industrial park, and Jenkinsburg Road area in northeast Spalding County. The Corridor character area targets master-planned/campus-style industrial parks along corridors such as SR 16 east of Griffin as well as US 19/US 41/SR 3. The area is characterized by robust pedestrian and vehicular connectivity, as well as access management to facilitate traffic flow.

The Comprehensive Plan provides an update on planned projects and initiatives to achieve the goals of the plan. A proposed Griffin Truck Bypass Study is recommended in the near-term to assess the feasibility and utility of the facility. Addressing the potential need for a new interchange at Jenkinsburg Road and I-75, the plan recommends the completion of an Interchange Feasibility Study, after which GDOT would develop an Interchange Justification Report to request FHWA approval of a potential new interchange.[10]

Figure 6. Spalding County Future Development Map



[10] Spalding County Comprehensive Plan. 2017. https://www.spaldingcounty.com/cms/uploads/file/community_dev_2018/spalding-comp-plan_adopted.pdf

2.10. City of Griffin Comprehensive Plan 2018-2038

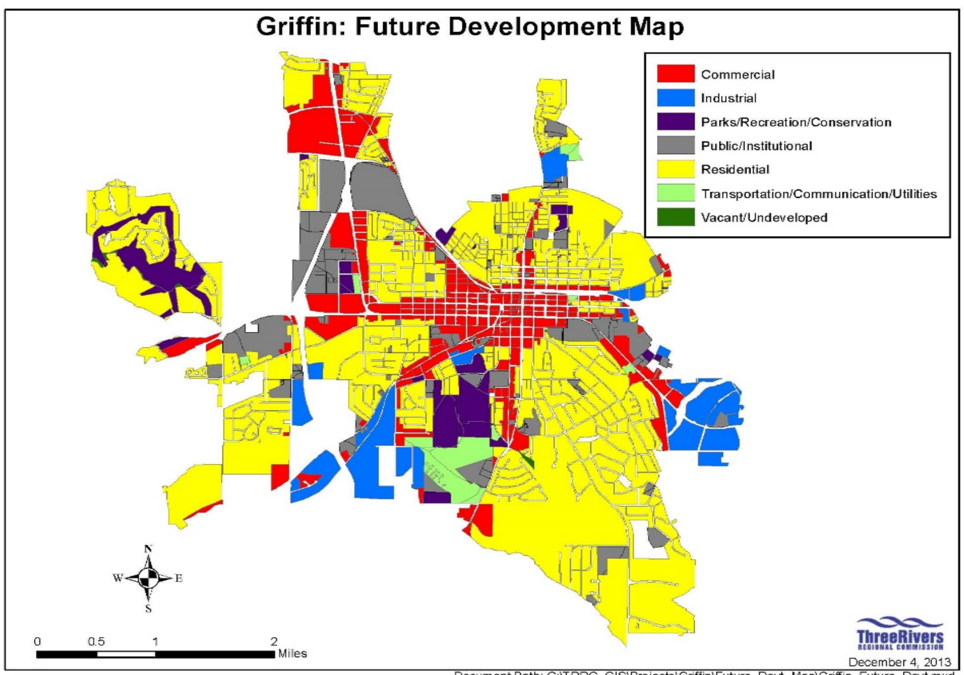
The City of Griffin completed its 2018-2038 Comprehensive Plan in October 2018. This plan defines a community vision and goals, provides an assessment of existing conditions and future needs, and presents recommendations that will help to manage anticipated growth for the benefit of the health, safety, and welfare of present and future residents in Griffin.

One of the goals of the plan is "to promote an efficient, safe, and connected transportation system that serves all sectors of the City of Griffin." Complementary policies include:

- Promote multi-modal transportation network.
- Establish public-private partnerships for the establishment of public transit options.
- Research and seek to adopt a local Complete Streets policy.
- Promote the beautification and increased functionality of highway corridors within the City.
- Increase infrastructure that supports electric cars and other future transportation needs.

The needs assessment identifies needs for a truck bypass around the city and more multi-modal and alternative transportation options, including public transportation. The plan establishes an Industrial Park character area and includes a future development map to target industrial growth primarily along SR 362 in southwest Griffin and along SR 16 in southeast Griffin.

Figure 7. Griffin Future Development Map



2.11. Griffin LCI Studies

The ARC Livable Centers Initiative (LCI) is a program that awards planning grants on a competitive basis to local governments and nonprofit organizations to prepare and implement plans for the enhancement of existing centers and corridors consistent with regional development policies, and also provides transportation infrastructure funding for projects identified in the LCI plans. The City of Griffin has conducted two LCI studies: West Griffin and Downtown Griffin.

2.11.1. West Griffin Activity Center LCI Study

The West Griffin Activity Center LCI examines transportation, land use, and urban design needs at the northern entrance to Griffin from Atlanta off of US 19/US 41/SR 3. The study area encompassing the area between Business US 19/US 41/SR 3, Experiment Street, and SR 16. Located west and northwest of Downtown Griffin, the area is home to numerous educational institutions, including the University of Georgia (UGA)–Griffin and Southern Crescent Technical College.

In order to support a higher density development patterns recommended along Business US 19/US 41/SR 3, the plan includes several multimodal transportation improvements that aim to improve bicycle and pedestrian connectivity as well as roadway operations. This includes:

- Network of new sidewalks along corridors such as W. Broad Street, N. 17th Street, and W. Solomon Street help to fill gaps in the sidewalk network.
- Proposed trails along major roads such as US 19/US 41/SR 3 and Ellis Street provide a more robust walking and biking network for students as well as the local workforce.
- The addition of a full diamond interchange to provide access between Ellis Road and US 19/US 41/SR 3 to replace the existing southbound flyover ramp.[11]

Since its completion in 2010, there has been very little activity in moving the plan forward with respect to development activity. However, it is important to note that the US 19/US 41/SR 3 corridor to the west of the LCI area should be prioritized for freight movement given its more favorable roadway geometrics (wider lanes, interchanges, etc.) and to preserve the potential for the vision created in this LCI study.

2.11.2. City of Griffin Town Center LCI Study

The City of Griffin Town Center LCI Study, developed in 2006, includes an examination of needs in the historic downtown area of Griffin and adjacent neighborhoods, which is traversed by the Norfolk Southern railroad line. The study identifies challenges associated with heavy truck traffic in Downtown Griffin, and that the presence of only one grade-separated crossing of the rail line results in traffic congestion for vehicular and pedestrian traffic. Recommendations from the study include designating McDonough Road as SR 155 between Jackson Road/East McIntosh Road and SR 16, conducting a bypass feasibility study to investigate reducing through traffic on SR 16 by rerouting trucks around Griffin, and further examining a study of railroad crossings to ensure that pedestrian and vehicular needs can be met without interfering with freight railroad operations. The plan also includes recommendations for new sidewalks and improved sidewalk facilities along corridors such as S. Hill Street, 9th Street, and 6th Street, and implementation of a multi-use trail network for the area.[12]

[11] West Griffin Activity Center LCI Study. February 2010. https://atlantaregional.org/wp-content/document-archives/LCI-Recipients/Spalding/WestGriffin/West%20Griffin%20LCI%20Study.pdf
[12] 2.9.2. City of Griffin Town Center LCI Study. November 2006. https://atlantaregional.org/wp-content/document-archives/LCI-Recipients/Spalding/Griffin/Study.pdf

3. Existing Conditions Assessment

This section of the Inventory and Assessment will explore how vehicles, freight, bicyclists, and pedestrians utilize transportation in Griffin and Spalding County, and implications for freight traffic. It should be noted that since most of the industrial uses and impacted roadways and in the eastern portion of the County, many of the maps within this section are oriented to a "focus area" as shown on the inset of these maps.

3.1. Land Use and Development

Managing the impacts of Greater Atlanta's encroaching urban sprawl with effective planning and policies to create and maintain efficient infrastructure, will help ensure close-knit neighborhoods and a sense of community while preserving natural systems will ensure sustainable growth for Spalding County in the future. It is important to get a good picture of existing uses to understand how emerging growth and potential recommendations could affect those uses.

3.1.1. Existing Land Use Overview

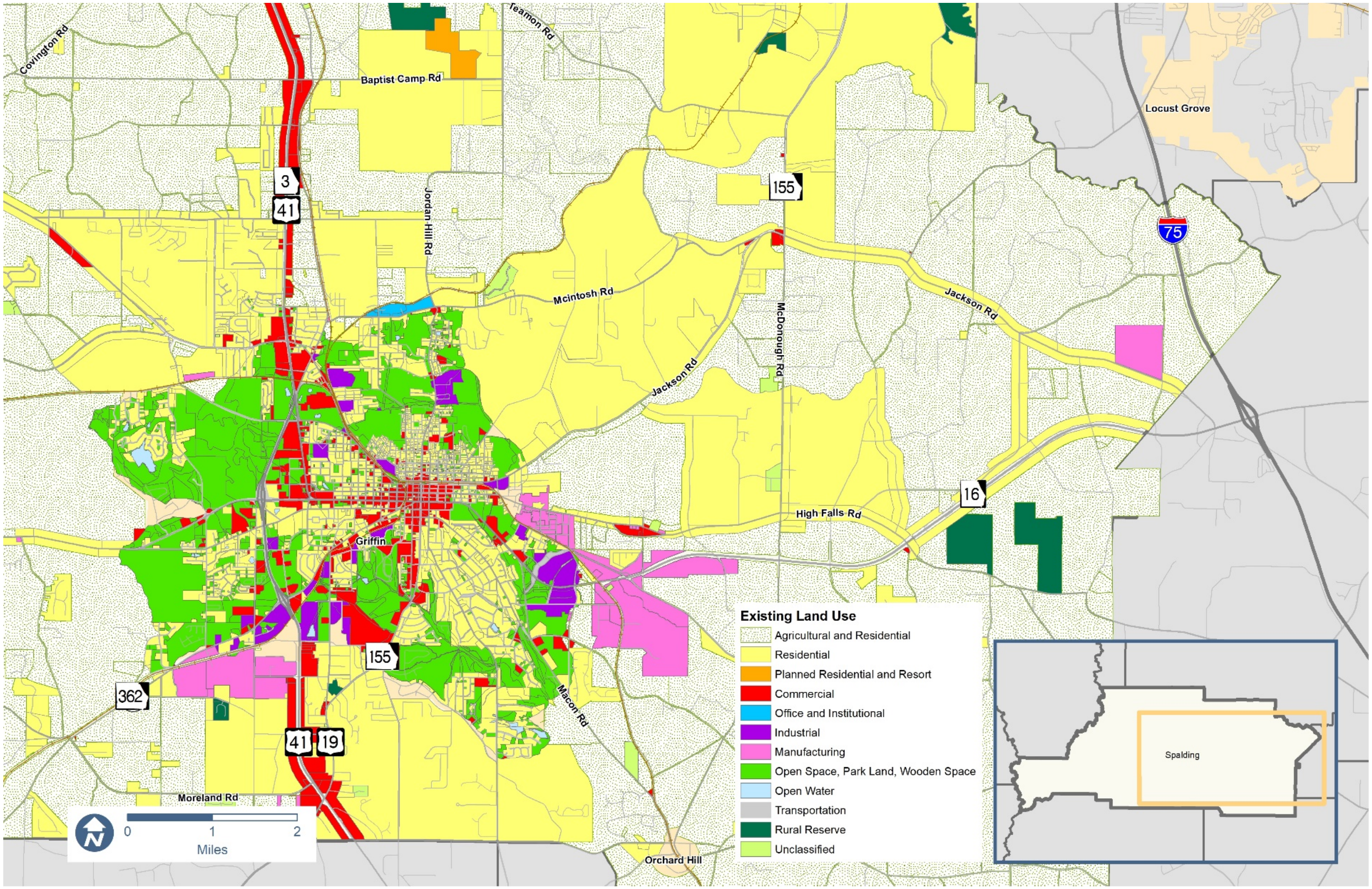
Spalding County is a predominantly residential and agricultural county with significant projected growth in industrial development. Approximately 90 percent of the county's land area is currently used for residential or agricultural and residential purposes, while two percent is used for industrial or manufacturing. However, the county's future development plans include a significant expansion of industrial development. A map of existing land uses is provided in **Figure 8**.

The City of Griffin and Spalding County both delineate areas for future employment centers within their jurisdictions. Suggested uses for these areas include light industrial and manufacturing. For this analysis, all the parcels within the identified "future employment/development areas" were included to create Industrial Districts. The majority of existing office, manufacturing, and commercial zoning are located within the City of Griffin, while planned future development sites are primarily in the eastern half of the county, near the proposed future airport and/or I-75. **Figure 9** shows zoning classifications.

3.1.2. Cargo Oriented Development Industrial District Analysis

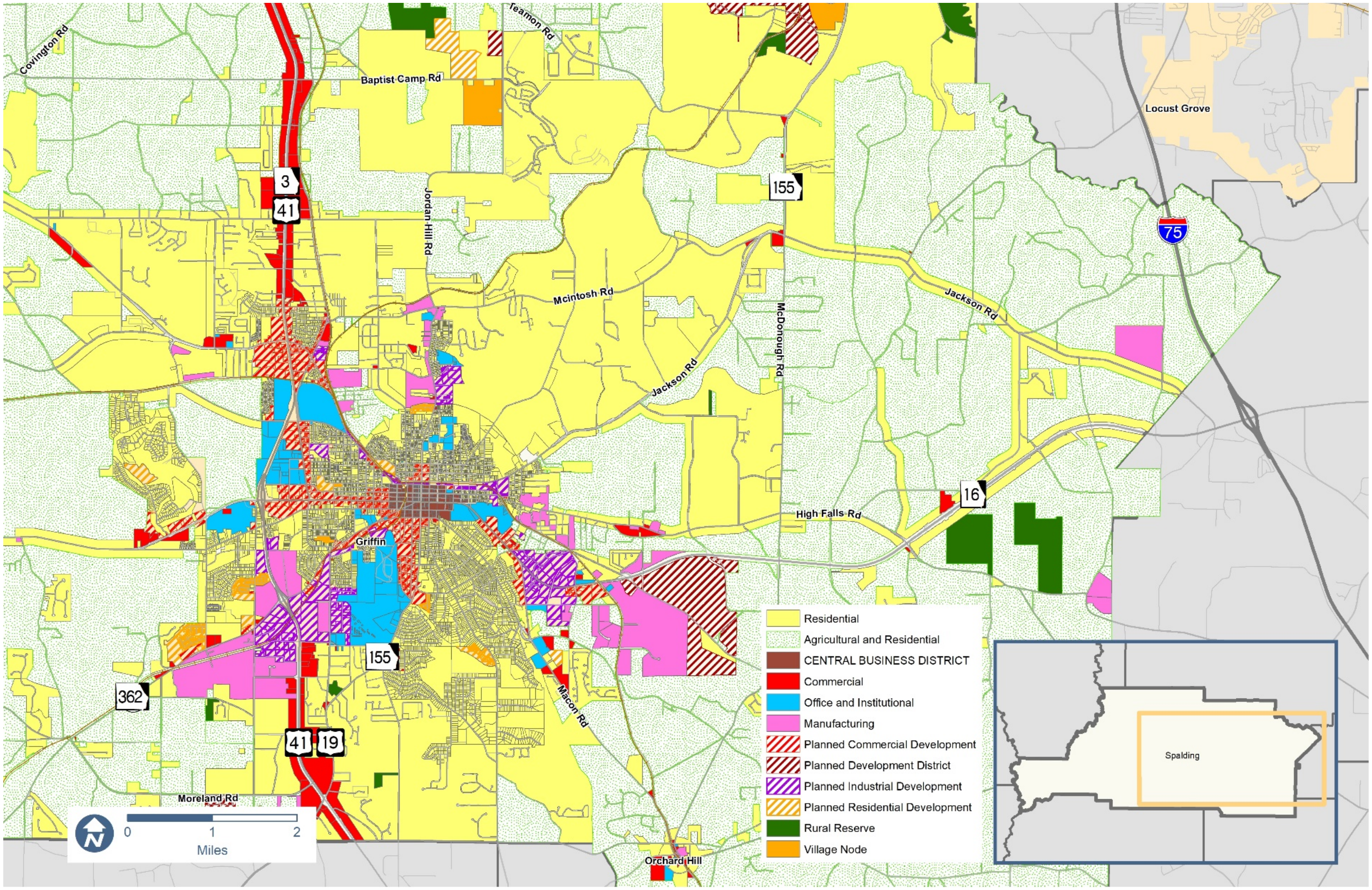
Given the close relationship between industrial development and freight activity, planned future industrial development is important to account for in freight planning efforts. Transportation and land use strategies, when considered comprehensively, can reinforce one another, and improve the efficiency, sustainability, and economic potential of freight and industrial development. Cargo-oriented development (COD) is a development strategy that promotes efficient and sustainable freight movement and industrial development, within a framework that enables the resulting spaces to be sufficiently attractive for a mix of uses beyond just industrial. Similar to transit-oriented development (TOD), COD focuses on coordinating transportation and land use investment to maximize economic and social benefits by supporting industrial businesses in districts with access to multiple modes of freight transportation, strengthening access to nearby workers, deploying greener vehicles and cleaner technologies, and increasing the types of land uses that can be attracted to industry-heavy areas.

Figure 8: Existing Land Use [13]



[13] Spalding County, City of Griffin.

Figure 9: Zoning Classifications[14]



[14] Spalding County, City of Griffin.

The basic unit in this geographical analysis of economic opportunity is the Cargo-Oriented Development (COD) Industrial District. For purposes of this analysis, an Industrial District is a contiguous grouping of 25 or more acres of contiguous land with either existing or planned industrial uses. In **Figure 9**, parcels were grouped into clusters based on the following proximity criteria: 1) Same side of a rail line; 2) Same side of a major road (US and State highways); and 3) Within 0.1-mile of each other.

Fourteen Industrial Districts were identified based on the above method and analyzed on current land use, access to region-wide freight infrastructure, access to eligible labor pool and effect on the environment and quality of life of county residents. The suitability of each Industrial District for Cargo Oriented Development is based on four categories:

- Industrial Land Use and Development Characteristics
- Freight System Characteristics
- Worker Access Characteristics
- Environmental Impact & Quality of Life Metrics

Overall rankings are shown in **Figure 10**. Identifying the highest-performing Industrial Districts can point to places to prioritize for future investment, but it can also identify factors preventing lower-ranked districts from being more successful. Many of these factors can be changed through policy and investment decisions, making these districts more suitable for sustainable industrial development.

The total rankings of Industrial Districts confirm patterns observed in the individual categories in parts of Spalding County that are well-connected to existing infrastructure. Driving factors in this comparison in addition to closer access to multiple freight facilities, are more industrial neighbors, and access to existing workforce as illustrated in the analysis below. An important consideration of this analysis is that it reflects these factors as they currently exist. As such, the overall rankings help identify areas that may have more challenges and, therefore, reflect the level of effort needed to develop successful industrial uses based on the factors assessed.

When CODs are built in established industrial areas, which are usually closer to city centers, regional environmental benefits multiply: sprawl is contained, brownfields are reclaimed while exurban open space is preserved, and workers can make shorter commutes.

In regard to development opportunity, the value of this ranking is not limited to relative positioning of sites within a defined set. The transparency of this analysis also permits the ranking to be used as a diagnostic tool, playing "what if" in evaluating impediments to the development of individual districts.

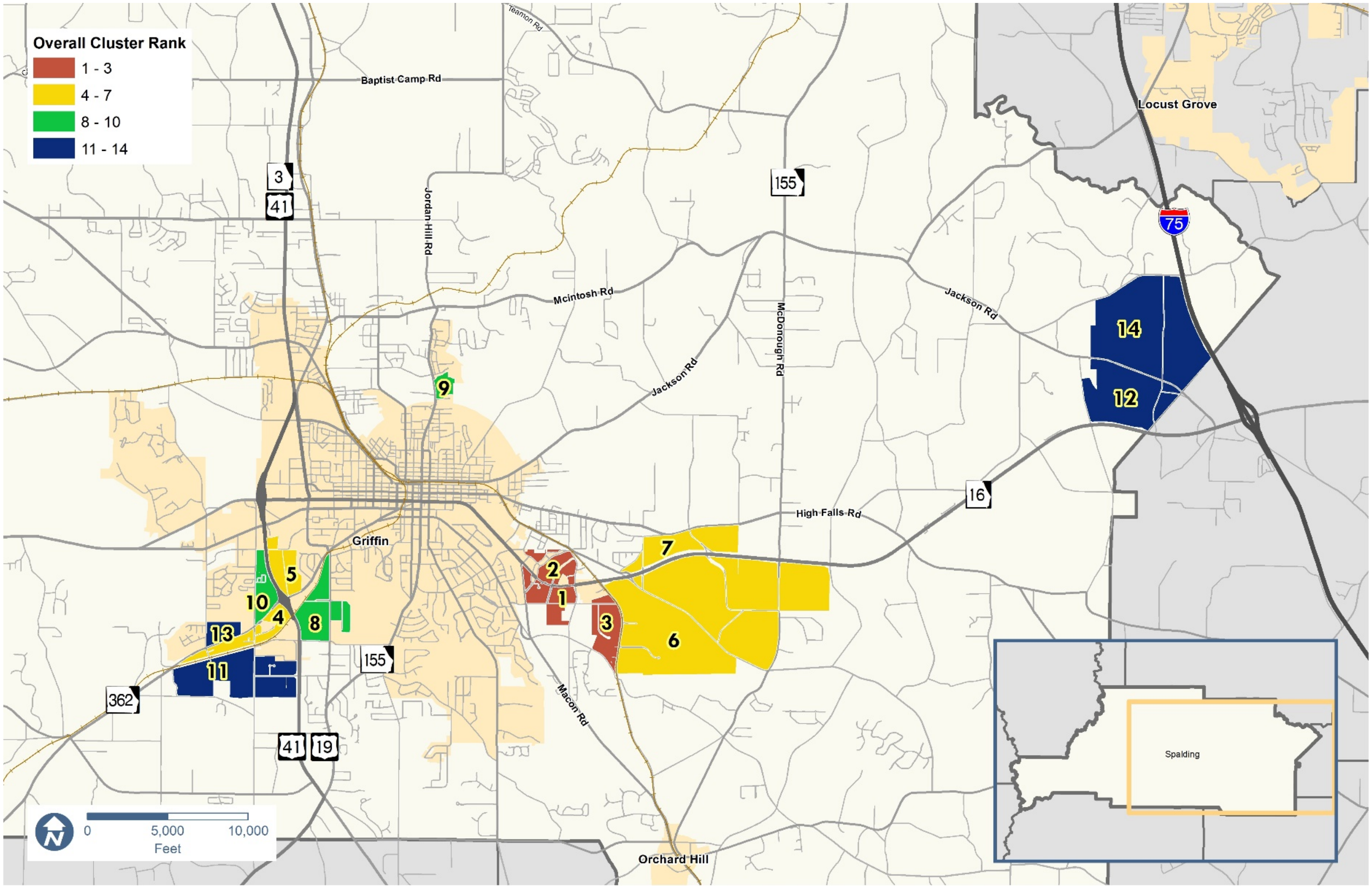
Districts along SR 16, at the Griffin City boundary score high due to their synergistic relation with the existing industrial base. The second tier of high-ranking sites are in two clusters: along SR 16, between Green Valley Road and McDonough Road and at the intersection of US 19/US 41/SR 3 and Williamson Zebulon Road.

With their overall ratings of 12th and 14th, the eastern-most districts along I-75 present a challenge for County leaders to accommodate industrial development. While they scored their best rankings in the area of Freight Access, they scored poorly due to their distant location from population and employment centers, greenfield land status, and lack of supporting infrastructure. Still, recent development trends throughout the Atlanta region and along I-75 would indicate that these areas will be targeted for industrial development despite these obstacles given the proximity to I-75 and potential access to the Port of Savannah. Reinforcing this point, a 2019 Development of Regional Impact (DRI) filing includes the development of over 18 million square feet of industrial uses directly across from these districts on the eastern side of I-75. The DRI also includes 800,000 square feet of commercial and 200 units of single family residential. While most of the development is in Butts County, some of the residential area is in Spalding. While an ambitious project, buildout is not projected until 2039. Much like the eastern-most districts in the COD analysis, this development will require significant investment of infrastructure (roads, water, sewer, etc.) in order to succeed.

While the opportunities for maximizing previous investments in infrastructure, leveraging previous economic development initiatives and promoting more sustainable growth industrial growth are presented in the industrial districts near Lakes at Green Valley and along SR 16, the County will need to adopt a two-pronged approach for planning its industrial uses:

- Continuing to promote more coordinated growth by focusing its efforts on developing its planned industrial districts along SR 16; and
- Developing a policy framework to provide the necessary infrastructure to accommodate new industrial development in the districts along I-75.

Figure 10: Industrial District Rankings - Composite[15]



15 CNT Analysis.

3.1.3. Industrial Land Use and Development Characteristics

Land use considerations play an important role in the suitability of Industrial Districts for further industrial development or redevelopment. In addition to containing available and suitable land for industrial uses, thriving Industrial Districts often contain a mix of construction, wholesale, logistics, and manufacturing businesses, establishing an industrial ecology with distinctive economic, environmental, and social value. A ranking of Industrial Districts by industrial land and development characteristics is provided in **Figure 11**. The development characteristics of each Industrial District was assessed using the following factors:

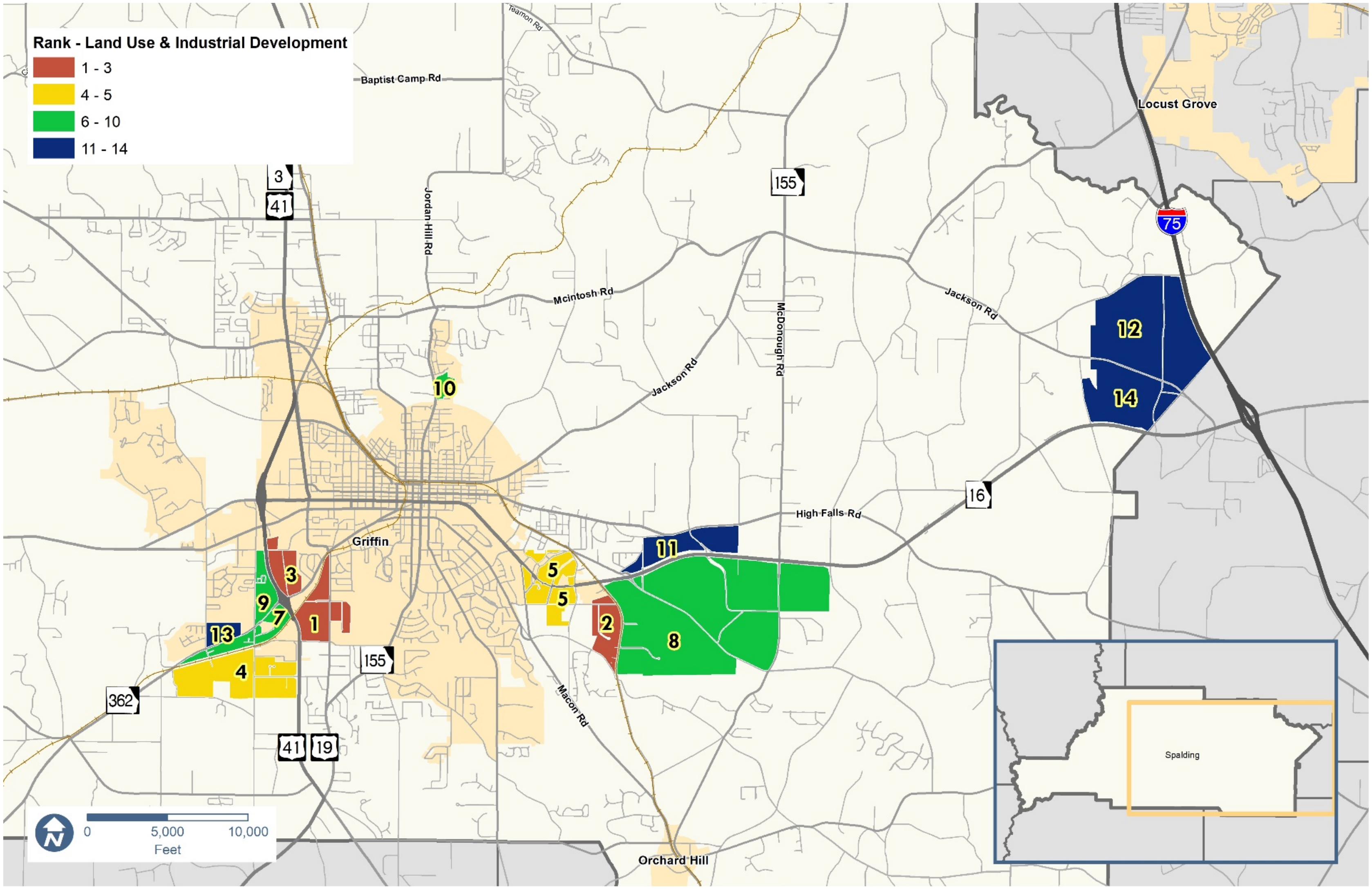
Table 1. Industrial District Development Characteristics

Factor	Criteria	Ranking Notes
A1	Adequate land available	All districts are at least 25 acres. Larger districts receive a higher score.
A2	Current industrial zoning	Districts with a higher percentage of current industrial zoning receive a higher score.
A3	Number of Industrial businesses within 5-mile radius	Districts with more industrial businesses receive a higher score.
A4	Number of Industrial jobs within 5-mile radius	Districts with more current employees in industrial jobs receive a higher score.

One factor that is very important but that was not considered in this analysis due to data availability is the percent of each district that is currently underutilized. The ratio of the land in full use compared to vacant and under-utilized land is an important indicator of economic development. New developments in districts with ratios between 0.7 to 1.5 will likely benefit the most from the synergy from established businesses.

The ranking of districts by land use and industrial development factors identifies three top-performing districts in or near the City of Griffin. These districts score well because of their relatively large size and the presence of a number of existing industrial businesses and the jobs they currently provide. However, it is possible, and even likely, that these top-ranking Industrial Districts do not have sufficient capacity to absorb projected or planned future industrial development. The 8th ranked planned district south of SR 16 (east of Griffin) and the 4th ranked district south and west of Griffin score relatively well in this category despite lower concentrations of current industrial uses. The two districts adjacent to I-75 received low scores due to a combination of smaller numbers of existing industrial businesses and lower rates of current industrial zoning.

Figure 11: Industrial District Rankings by Industrial Land Use and Development [16]



[16] Griffin Comprehensive Plan, City of Griffin, Spalding County, ESRI Business Analyst (2019).

3.1.4. Freight Access

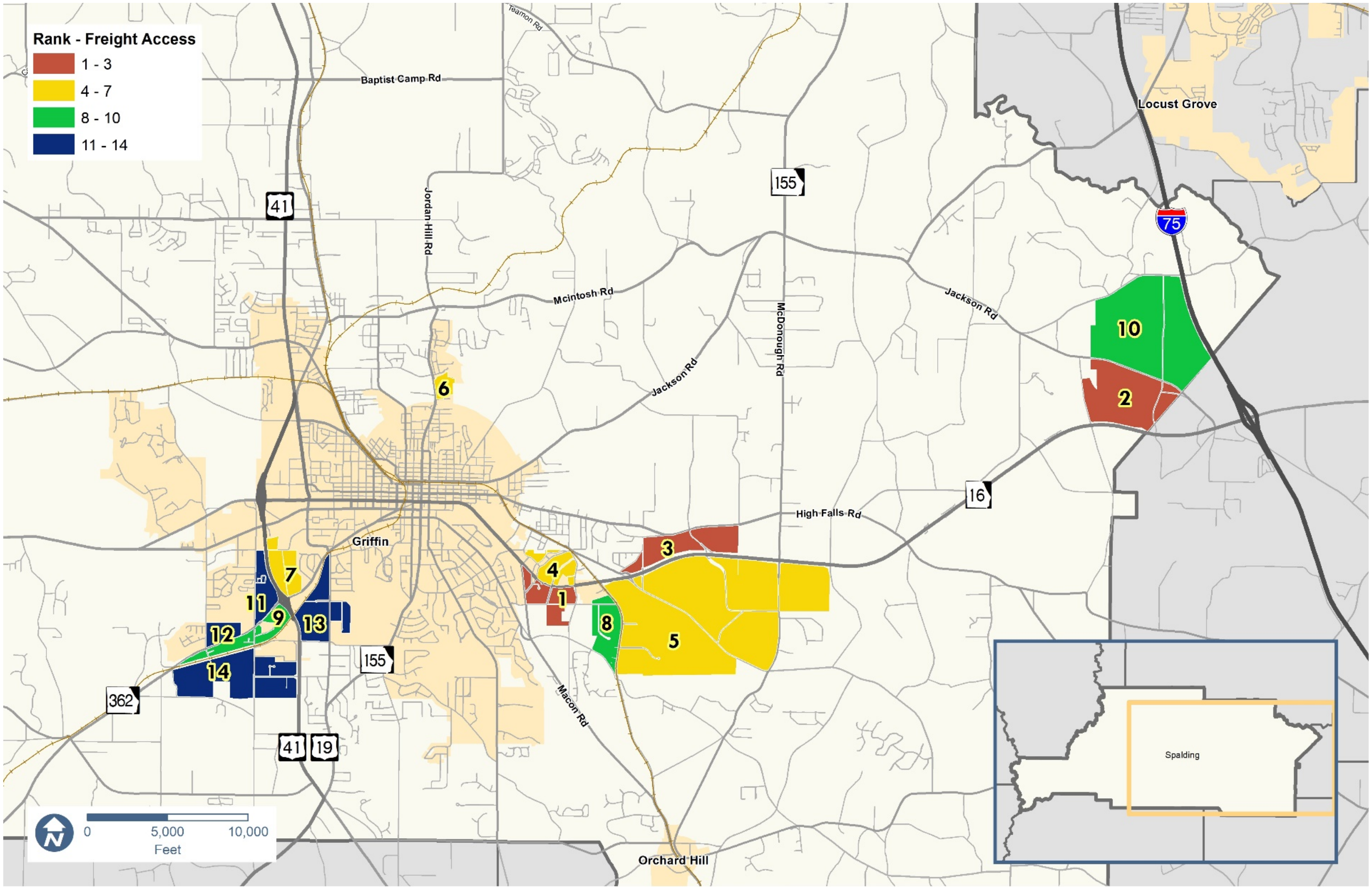
Transportation access is particularly critical for industrial firms, which are increasingly operating on a just-in-time delivery model. While the primary and preferred method of shipment for most current industrial firms in Spalding county is by truck, the county and surrounding region have a number of air, rail, and intermodal assets that are important to attracting and retaining industrial development and relieving traffic on the road network. The criteria below address the basic business and transportation questions of how efficiently a district might be accessed by rail, truck, air, or a combination of all three. According to ARC, throughout the Atlanta regional over 80 percent of freight movement is via truck, rail freight makes up approximately 17 percent and less than 1 percent is via air. Assuming this ratio for Spalding County (which is likely a higher share of truck), a weighting factor is applied to reflect this distribution among the three modes.

Table 2. Freight Access Criteria for Industrial Districts

Factor	Criteria	Data Source & Calculation Method
B1	Adjacent to an active freight rail line	Districts that are adjacent to an active freight line receive a higher score.
B2	Proximity to highway ramp	Districts with greater proximity (based on network distance) receive a higher score.
B3	Proximity to freight network	Districts with greater proximity (based on network distance) receive a higher score.
B4	Distance to nearest intermodal terminal	Districts with greater proximity (based on network distance) receive a higher score.
B5	Proximity to proposed airport location	Districts with greater proximity (based on network distance) receive a higher score.
B6	Volume-to-Capacity Ratio (V/C) - on adjacent roads	Districts with higher V/C ratio, indicating higher levels of congestion, receive a lower score.

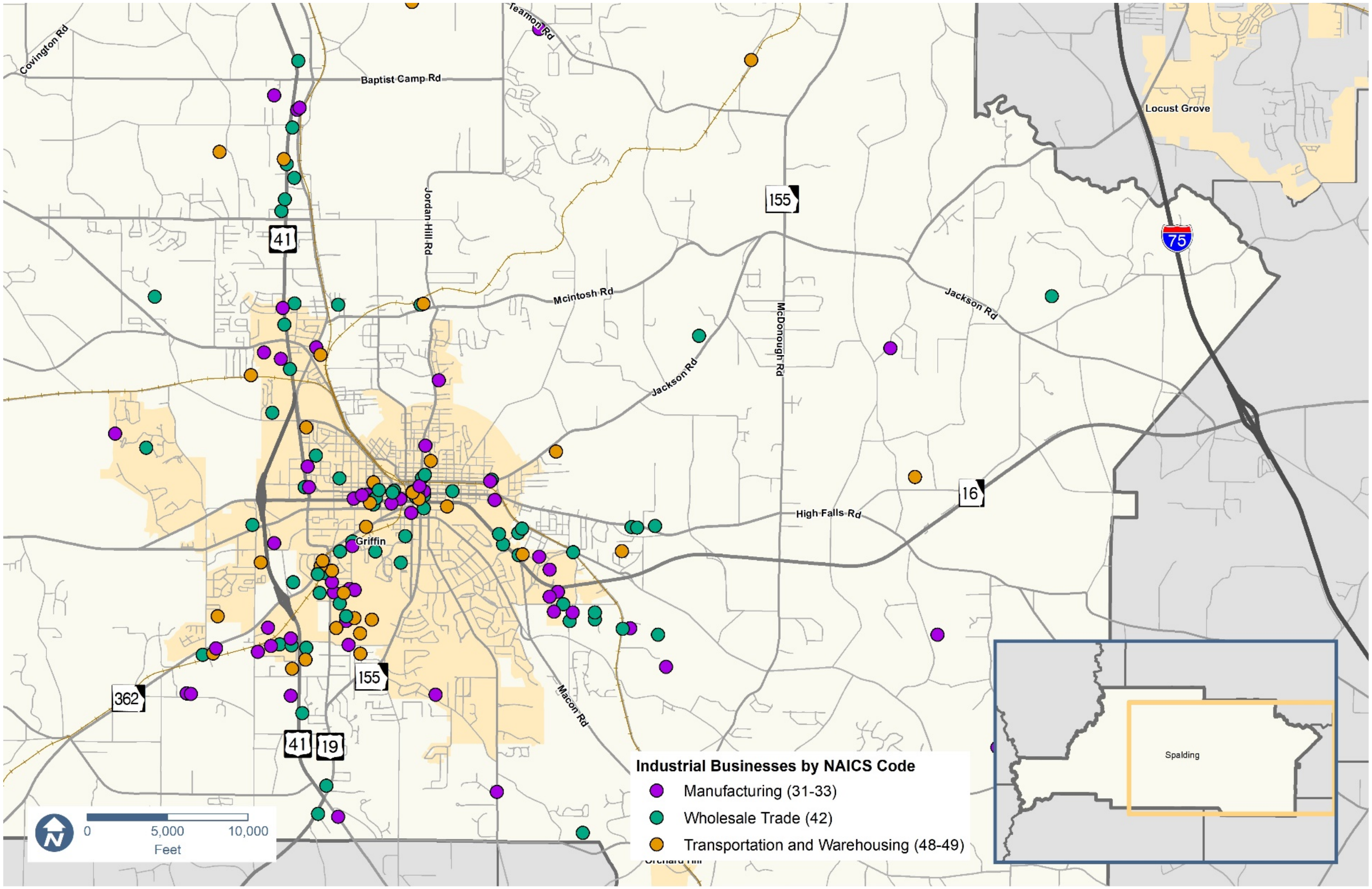
The ranking of industrial districts by freight access is provided in **Figure 12**. Each of the existing and proposed Industrial Districts has close access to nearby links on the freight network. The highest-ranking districts also have access to truck routes, the new airport site, and the CSX intermodal facility (located to the northwest in Fulton County). The top-ranked district has scored in the top half for every metric in this category except proximity to the rail network. The second-ranked district has the closest access via the road network to I-75 and is also immediately adjacent to SR 16, which compensates for less convenient access to the airport and intermodal terminal. This district scores significantly higher than the neighboring district immediately adjacent to I-75. Despite closer proximity to the highway facility, it is farther from the interchange and from SR 16. Several planned infrastructure investments could improve transportation access to industrial districts. Based on the industrial development map developed from North American Industry Classification System (NAICS) codes in **Figure 13** a bypass project south of Griffin would bolster access to highly ranked industrial districts near the former airport. While the current proposed bypass alignment is shown in **Figure 37** (in Chapter 4), the alignment for this bypass will be explored in later phases of this Plan.

Figure 12: Industrial District Rankings by Freight Access [17]



[17] City of Griffin, Spalding County, Atlanta Regional Commission, Three Rivers Regional Commission.

Figure 13: Industrial Development by NAICS Codes [18]



[18] NAICS.

3.1.5. Worker Access

Approximately 17 percent of jobs in Spalding County are in the Transportation, Warehousing, Wholesale Trade, or Manufacturing industries. These freight-dependent industries offer potential paths out of poverty, as they generally have fairly low educational requirements on average, and these jobs pay wages 50 percent higher than jobs in service industries with similar educational requirements. Spalding County has a 63 percent labor participation rate and a 4.5 percent unemployment rate, slightly below the national average. The unemployment rate for workers with a high school degree or less is significantly higher, at 8.5 percent. Supporting further industrial development in Spalding County could reduce this disparity, not only for workers who live in Spalding County, but for those who commute to Spalding County from other nearby counties.

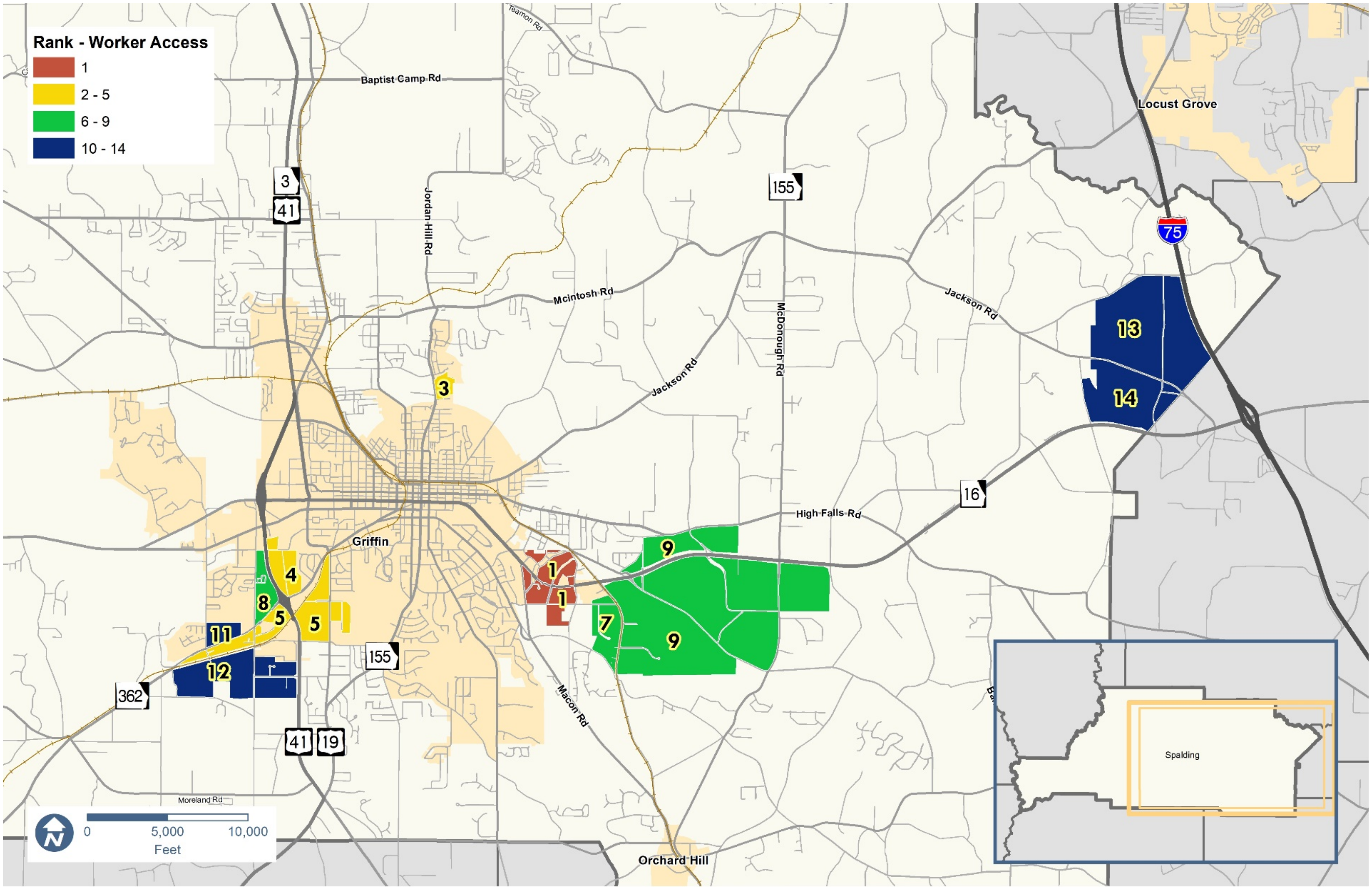
However, transportation access can be a significant challenge to workers accessing industrial jobs, particularly low-income or young workers who may not have access to a personal vehicle. The metrics in this category assess the accessibility of current and proposed Industrial Districts to the current industrial workforce, as well as to potential workers living in low-income neighborhoods.

Table 3. Worker Access Criteria for Industrial Districts

Factor	Criteria	Data Source & Calculation Method
C1	Number of households in poverty within 5-mile radius	Districts with more households in poverty within a 5-mile radius receive a higher score.
C2	Number of people currently employed in industrial sector within 5-mile radius	Districts with greater numbers of people employed in the industrial sector receive a higher score.
C3	Number of households making less than median income within 5-mile radius	Districts with greater numbers of households making below-median income receive a higher score.

The Industrial District rankings by worker access are provided in **Figure 14**. The districts on the southeastern border of Griffin once again score highly on this metric due to their close proximity to Griffin, which has the highest population density within Spalding County. The districts along the eastern border of Spalding County and I-75 have lower worker access; however, access could be improved by requiring sidewalks in nearby residential development and through the implementation of a transportation demand management program that make it easier for workers to commute by a mode other than driving alone.

Figure 14: Industrial District Rankings by Worker Access [19]



[19] American Community Survey 5-year estimates (2012-2016), Longitudinal Employer Household Dynamics (2017).

3.1.6. Environment and Quality of Life

Cargo-oriented development contributes to regional sustainability because it establishes compact industrial districts where businesses can maximize use of efficient rail transportation and minimize less efficient truck travel, while employees can commute without driving alone. However, neighbors of compact industrial districts may still experience negative externalities of productive activity, and industrial users may experience additional complications to their operations. COD can mitigate these problems through the application of sustainable new design concepts, information systems, and equipment. The metrics below assess the potential of Industrial Districts to affect quality of life in nearby non-industrial uses.

Table 4. Environment and Quality of Life Criteria for Industrial Districts

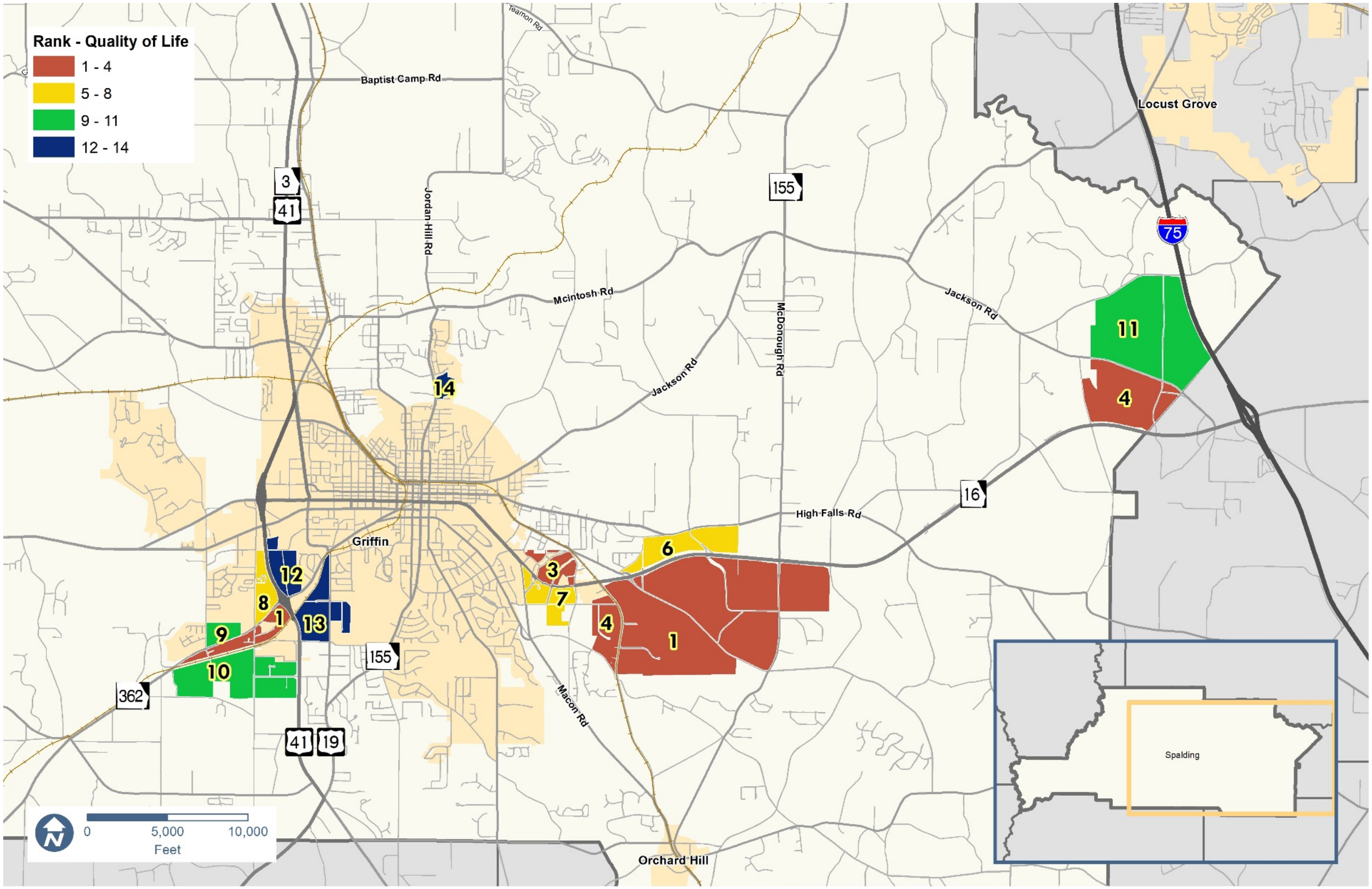
Factor	Criteria	Data Source & Calculation Method
D1	Adjacency to non-industrial land uses	Districts with more adjacent non-industrial land uses receive a lower score.
D2	Miles through non-industrial land	Districts where freight network access is through non-industrial land receive a lower score.
D3	Number of adjacent community services (e.g., parks, hospitals, schools)	Districts with more adjacent community facilities receive a lower score.

A ranking of the Industrial Districts by environmental and quality of life characteristics is provided in **Figure 15.** Conflicts between industrial/manufacturing and residential land uses are prominent in southwest Griffin, along Williamson Zebulon Road. While the districts are currently used for industrial purposes, they abut single and multi-family residential uses. The district with the lowest ranking (14), along Hill Street, is close to downtown Griffin and gets a low score due to its proximity to residential uses and schools. Districts in east Spalding County currently house several industrial businesses and have a lower impact on quality of life. The exception is the 11th ranked district – despite its adjacency to I-75, the network distance to the interchange and freight network is farther and passes through residential uses.

Due to their lower proximity to community facilities and non-industrial uses, the districts south of the proposed airport and near I-75 score the highest in this category. However, since additional non-industrial development is planned adjacent to some of these districts, these represent opportunities to implement sustainable policies and practices from the beginning.

At the site level, placement of green infrastructure can serve as a buffer between neighborhoods and industrial activity and provide significant benefits to water quality and flood mitigation. A wide range of vehicle and logistics technologies, like new diesel engines, electric freight handling equipment and facilities, and improved routing technologies, can dramatically reduce the fumes, noise, safety, and lighting problems associated with prior-generation technologies. Municipalities, counties, or other jurisdictions can implement regulations, incentives, and invest in infrastructure to facilitate the adoption of these technologies and policies.

Figure 15: Industrial District Rankings by Environment and Quality of Life [20]



[20] Three Rivers Regional Commission, City of Spalding, Griffin County.

3.1.7. Overview of Potential Land Use Conflicts

As discussed in Section 3.1.6, a number of land use conflicts were identified during the analysis of existing industrial districts. This section will serve as an overview of areas where conflicts occur and the characteristics that cause them to be an issue. For the purposes of this discussion, this section will be broken into the four geographic areas that make up the industrial districts in the previous analyses.

- **Area southwest of Griffin near Zebulon Road and US 41:** In this area, there are several industrial properties located adjacent to residential land uses. Just south of Odell Rd, there are industrial sites adjacent to single-family residential along Moose Lodge Road. On the north side, west of Carver Road and south of Poplar Street there is existing low-density residential adjacent to industrial and institutional land uses. The potential for conflicts along Williamson Road appears to be relatively low; however, a few residential uses are located south of Williamson Road between Pine Hill Road and Carver Road. East of Carver Road a subdivision and a couple of apartment complexes are located near industrial land uses. In addition, east of Justice Boulevard, a single-family residential subdivision is clearly adjacent to several industrial land uses. Because this area is already developed, redevelopment opportunities should focus carefully on access management and site design to mitigate potential conflicts to nearby residents. To relieve these conflicts, site design and access management is needed to minimize interactions with these existing residential uses
- **Areas near the Lakes at Green Valley:** Due to the fact the Lakes at Green Valley is a master-planned industrial district, the potential for conflicts with surrounding residential uses is minimal. The only real potential for conflict is the presence of a medium-density apartment complex off of Futral Road.
- **North of Griffin along North Hill Street:** The smallest concentration of industrial uses in the focus area, this is actually a cluster consisting of a concrete factory and a County solid waste facility. While there are older residential areas in the vicinity, the cluster is pretty well buffered and separated from nearby residential uses.
- **Areas along I-75 north of SR 16 along Jackson Road/Wallace Road:** Land uses in the districts along I-75 primarily consists of agricultural and very low-density housing. The major exception is the Dollar General distribution center located on the Butts County line along Jackson Road. Much like Lakes at Green Valley, the opportunity exists to develop an overall area master plan for these districts to that would not only serve to minimize residential conflicts, but also provide the much-needed infrastructure for these areas to support viable industrial land uses.

3.2. Roadway Profile

This section discusses the infrastructure and operational characteristics of Spalding County roadways, and how the roadways function as a network to serve freight operations.

3.2.1. Spalding County Freight Network

Spalding County has an extensive freight network that extends across the county, providing both north-south and east-west connectivity. The freight network consists of a combination of state-, federally-, and regionally-designated routes.

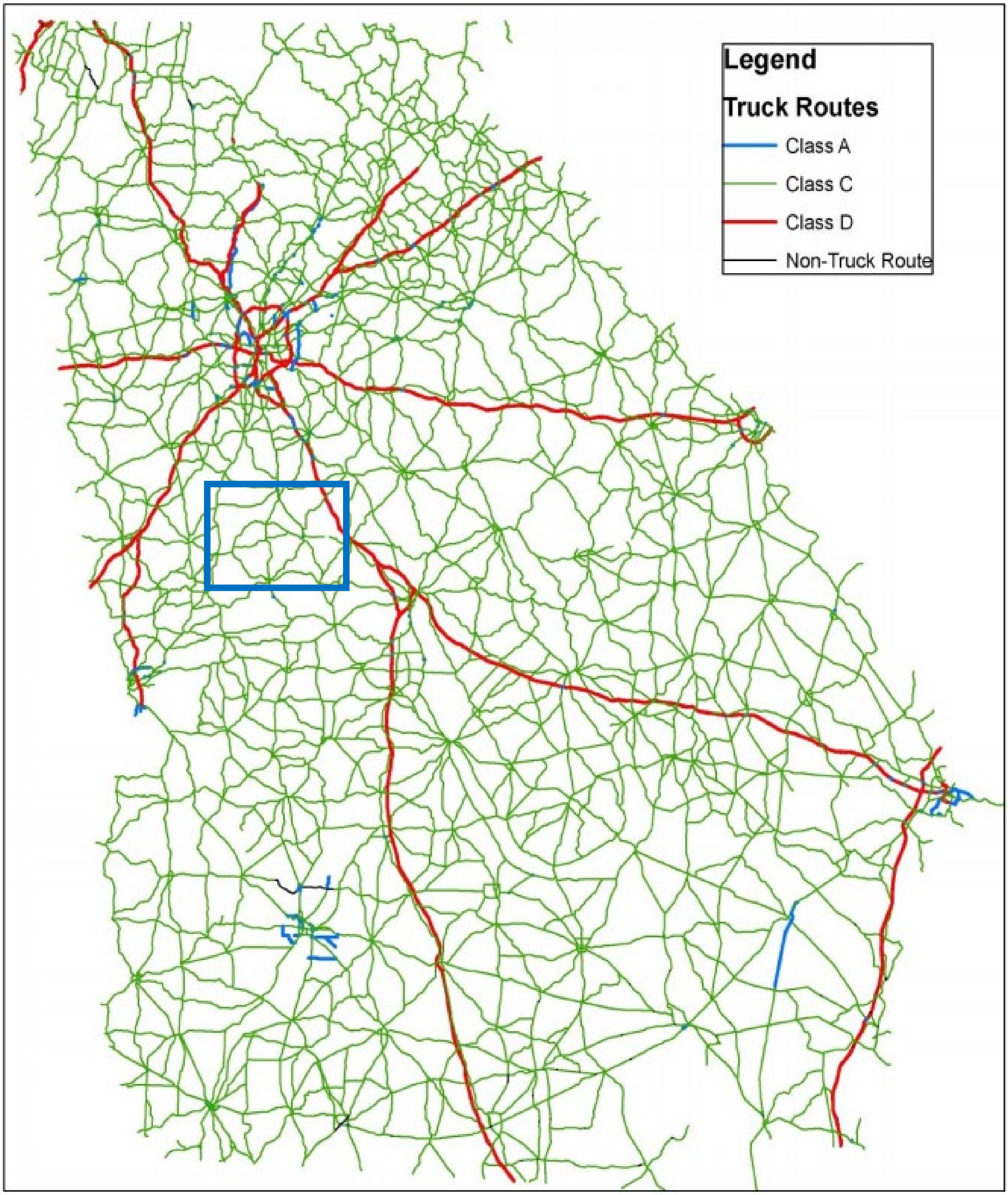
GDOT has designated a network of truck routes specific to oversize trucks, or trucks that exceed the five-axle, 80,000-pound Federal limit. **Figure 16** illustrates the GDOT designated freight network. Spalding County routes included in the GDOT route network are SR 155, SR 16, US 19 Business/Hill Street, US 19/ US 41/SR 3, SR 362, and SR 92. These are each Class C routes – these routes may have sharp turns that a single-trailer truck cannot negotiate, but that articulated twin trailer combinations can use.

The National Highway Freight Network (NHFN) is displayed in **Figure 17.** The NFHN is designated by the FHWA to strategically direct Federal resources and policies toward improved performance of highway portions of the U.S. freight transportation system. In Spalding County, the NFHN includes US 19/US 41/SR 3, SR 16, and portions of McIntosh Road accessing the Trans Montaigne Pipeline Terminal. Additionally, there are several National Highway System (NHS) intermodal connectors in the study area, including Atlanta Road, McIntosh Road, Tower Street, 5th Street and SR 16.

The ARC's ASTRoMaP network designates regional truck routes that provide freight connectivity throughout the Atlanta region. ASTRoMaP corridors within Spalding County include US 19/US 41/SR 3, SR 16, and SR 155. **Figure 17** illustrates the designated truck route network in Spalding County.

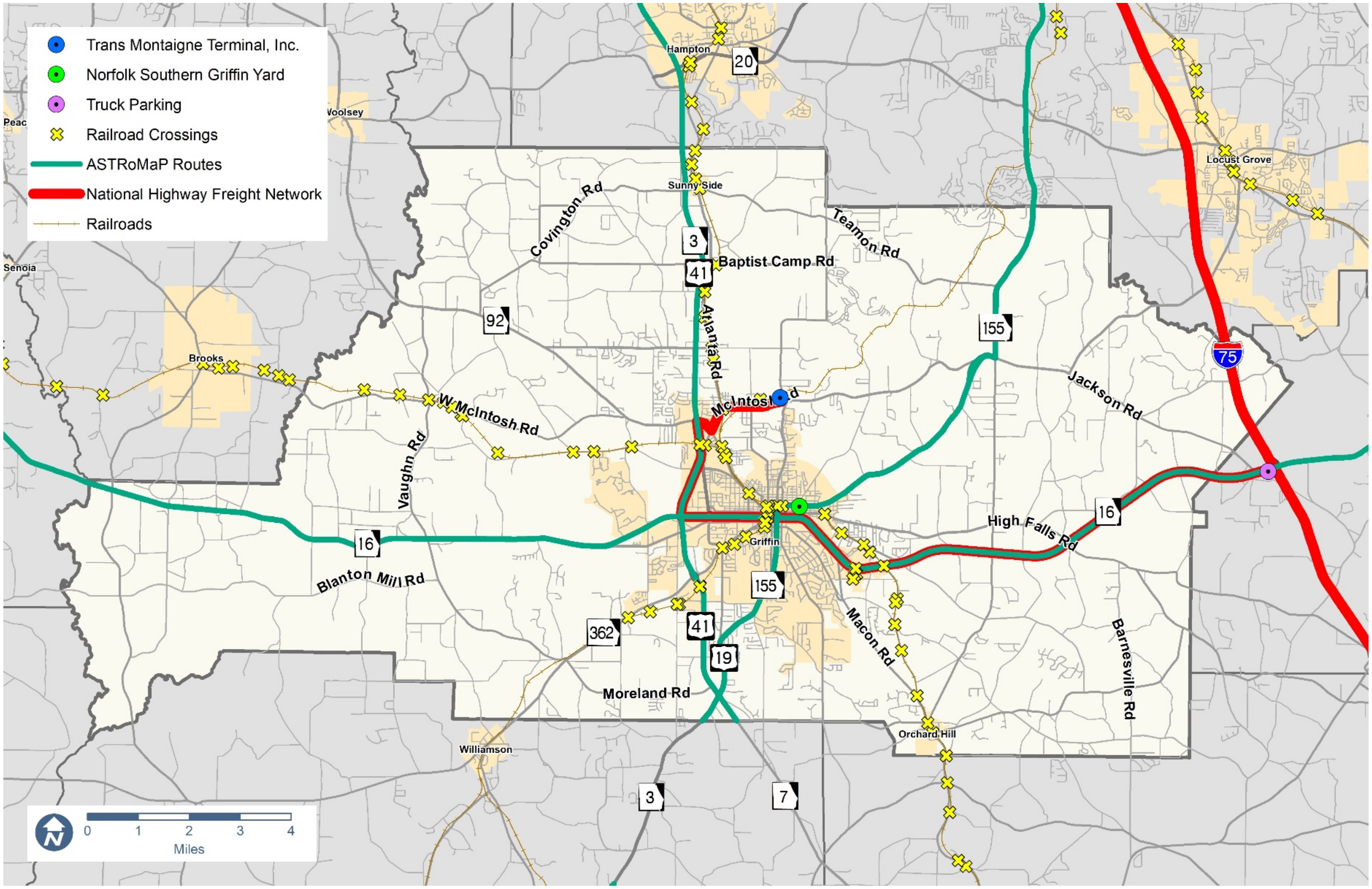
Also shown in **Figure 17** is the Spalding rail network and railroad crossings. Spalding County's railroad network includes two Class 1 rail lines, which are both owned by the Norfolk Southern Corporation. The rail lines intersect in downtown Griffin, converge northwest of the city, and then split towards McDonough (Henry County) to the northeast, Jonesboro (Clayton County) to the north, Brooks (Fayette County) to the west, Zebulon (Pike County) and Barnesville (Lamar County) to the south. There are 38 at-grade railroad crossings within the county, including 16 in the City of Griffin. These are primarily located along local roads adjacent to the rail lines. With respect to railroad crossings, input from local officials and community leaders has indicated that a great deal of disruption to local traffic occurs at the rail crossing over Hill Street in Downtown Griffin due to operations at the Norfolk Southern rail yard.

Figure 16: GDOT Truck Route Network[21]



[21] GDOT. Statewide Freight and Logistics Plan.

Figure 17: Spalding County Freight Network[22]



[22] GDOT, ARC, and Spalding County

Spalding County prohibits trucks or delivery vehicles with more than six wheels or over 30 feet in length from traveling on county roads unless the vehicle is making a pick-up or delivery. Exceptions are made for select portions of county roads:

- Old Atlanta Road from the Griffin city limit to the Henry County line
- Macon Road from the Griffin city limit to the Lamar County line
- Jackson Road from N. McDonough Road and SR 155 east to the Butts County line
- High Falls Road from the Griffin city limit east to SR 16
- Highland Street adjacent to the Crompton-Highland Mill

The ordinance also states that freight vehicles are allowed on non-residential streets that do not have signage restricting passage.[23] "No Thru Trucks" signage is present on county and local roads throughout Spalding County. **Figure 18** illustrates the designated truck restrictions in Spalding County. A key item for developing a successful industrial district in the focus area will be identifying corridors that will feed the industrial district and modifying the level of truck travel restrictions as appropriate.

3.2.2. Number of Lanes

While most roadways in Spalding County consist of two lanes, there are a number of major roadways that include four or more lanes. The most prominent of these is I-75, which includes six lanes and traverses the northeast corner of Spalding County. US 19/US 41/SR 3, which bisects Spalding County and serves as a bypass for the City of Griffin, has four lanes. Other routes with four lanes include Atlanta Road in Griffin; SR 92 between West McIntosh Road and Old Atlanta Road; and SR 16 from downtown Griffin east towards the I-75 interchange in adjacent Butts County. **Figure 19** illustrates the number of lanes on roadways throughout the county.

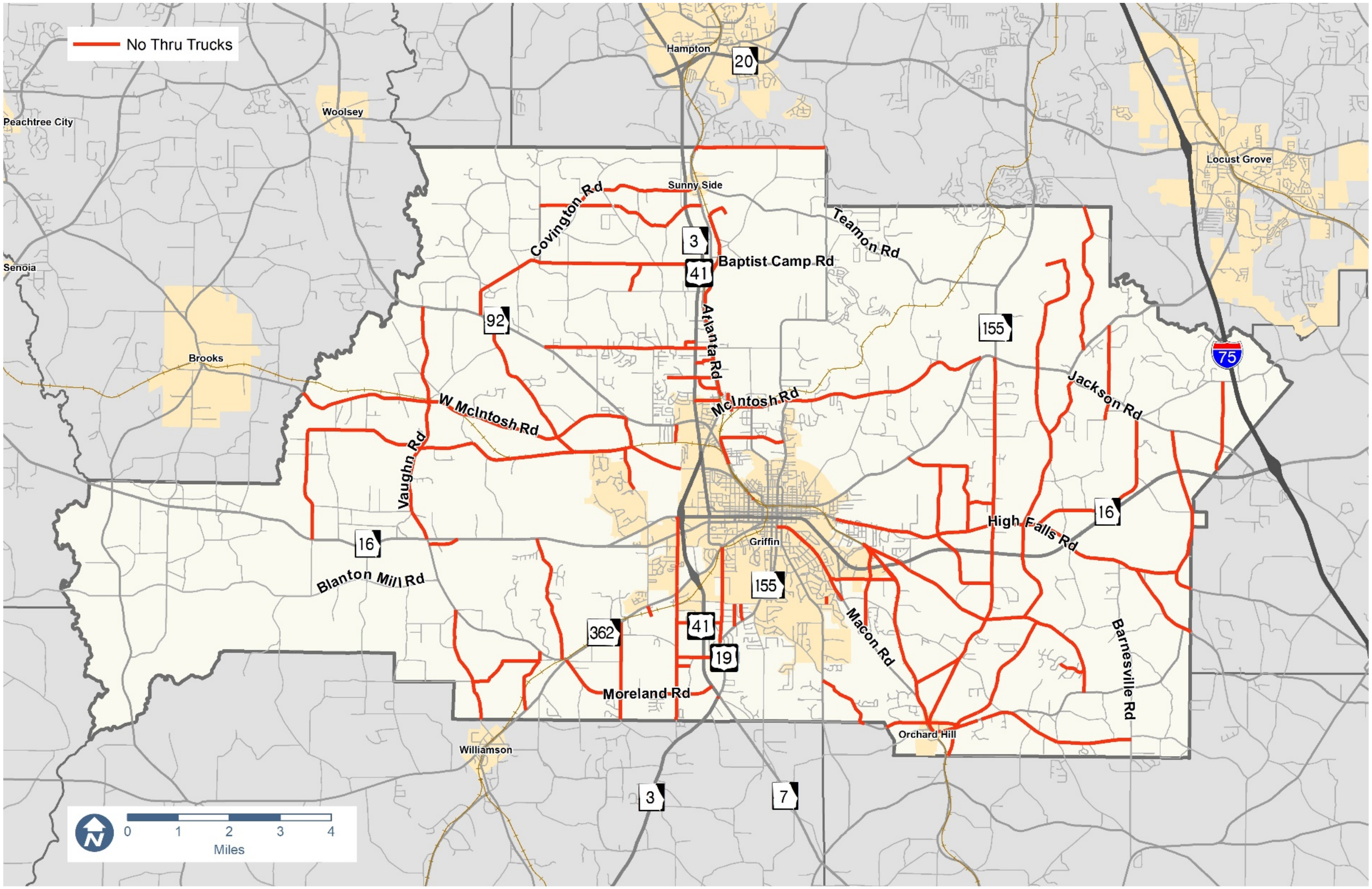
3.2.3. Functional Classification

Within the focus area for the Freight Cluster Plan, which consists of eastern Spalding County including Griffin, Spalding County has a diverse roadway network that includes one interstate highway, I-75; a limited-access expressway that serves as a bypass around the west side of Griffin; principal and minor arterial roadways, which include the regional truck route network; major and minor collectors that accommodate traffic movements between local roads and regional routes; and local roads that serve local traffic. This roadway network is illustrated in **Figure 20**.

Interstate 75 passes through the northeast corner of Spalding County between Henry and Butts counties. The portion of I-75 within Spalding County is less than two miles in distance, and there are no interchanges within the county. The closest interchange along I-75 is located along SR 16, approximately one mile east of the Spalding-Butts County line. A five-mile portion of US 19/US 41/SR 3 between Ellis Road and Kalamazoo Drive is a limited-access expressway and serves as a bypass around the City of Griffin. There are three principal arterials in the focus area. These include US 19/US 41/SR 3 located north and south of Griffin (excluding the freeway portion); US 19/US 41/SR 3 near the Spalding-Pike County line; and SR 16 from US 19/US 41/SR 3 eastward towards I-75 in Butts County.

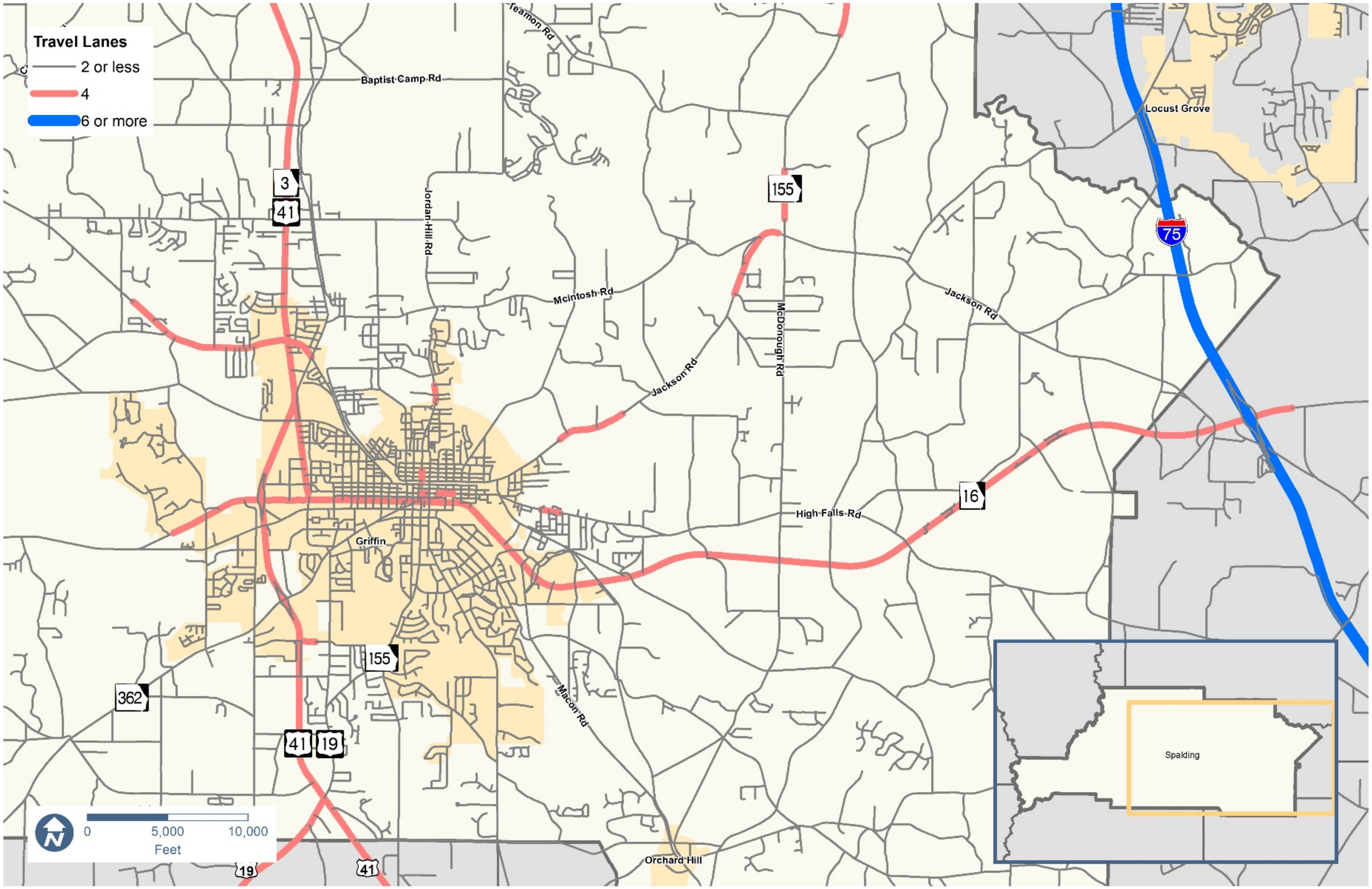
[23] Spalding County Code of Ordinances, Part VI, Article A § 6-2004 (2019) https://library.municode.com/ga/spalding_county/codes/code_of_ordinances?nodeId=DIVIICOGEOR_PTVILIRE_ARTAGEPR_S6-2004ROTRTHTR

Figure 18: Truck Route Restrictions[24]



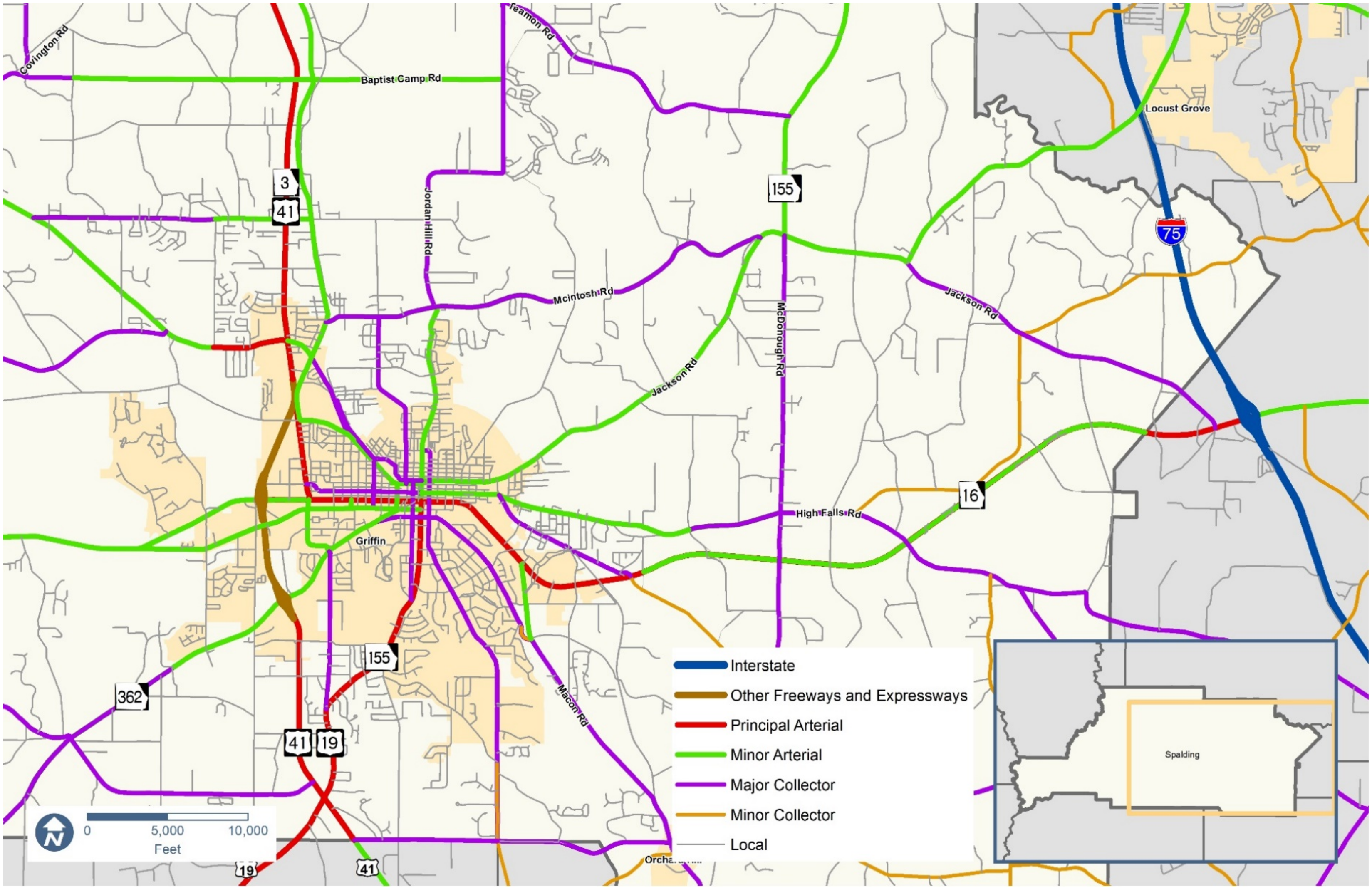
[24] Spalding County

Figure 19: Number of Lanes[25]



[25] GDOT Roadway Inventory, 2017

Figure 20: Functional Classification[26]



[26] Atlanta Regional Commission

Minor arterials extend from principal arterials and are primarily located in the northern portions of the focus area. There are a limited number of minor arterials south of SR 16, and none extend into the southeast portion of Spalding County. Minor arterials in the focus area include SR 92, which extends into northwestern Spalding County; SR 16 west of Griffin; SR 155 (Jackson Road and N. McDonough Road) northeast of Griffin; Locust Grove Road, which extends from Jackson Road northeast towards the City of Locust Grove; High Falls Road west of SR 155; Baptist Camp Road/Birdie Road to the north; and Old Atlanta Road, which parallels US 19/US 41/SR 3 north of Griffin. In the City of Griffin, minor arterials include West Poplar Street; North Hill Street; East Solomon Street; East Broadway Street; Memorial Drive; Experiment Street; Meriwether Street (SR 362); and Hammond Drive.

Major collectors are dispersed across the focus area, and many serve warehouses and other freight-intensive land uses. Major collectors within Griffin include West Solomon Street; 13th Street; Quilly Street; North 9th Street; 6th Street/Maple Drive; Searcy Avenue/Rehoboth Road; and East College Street. Major collectors outside of Griffin include West McIntosh Road; East McIntosh Road; Jordan Hill Road; Moreland Road; County Line Road; Macon Road; S. McDonough Road; Swint Road; Rehoboth Church Road; High Falls Road (east of Sapelo Road); Teamon Road; and Bucksnort Road.

Minor collectors are not as prevalent as other types of roadways in the focus area but create important linkages between local roads and major roadways. Notable minor collectors include Barnesville Road, Rehoboth Road, Tomochichi Road, and Jenkinsburg Road.

The majority of roadways in the focus area consists of local roads that are either maintained by the City of Griffin or Spalding County. These primarily serve local traffic, including residential and community-oriented uses; the local roadway network has less connectivity and includes several cul-de-sacs and "dead ends," or roadways with no outlets.

3.2.4. Signalized Intersections

There are 81 signalized intersections within the focus area, which are maintained by either Spalding County or GDOT. These signalized intersections are illustrated in **Figure 21**. Most signalized intersections are concentrated within Griffin, particularly in the Downtown Griffin area. Among the designated truck routes, SR 16 has the most signalized intersections, both within Griffin and at several intersections in eastern Spalding adjacent to freight-intensive uses, including Hamilton Boulevard, Wilson Road, Green Valley Road, Rehoboth Road, McDonough Road, and High Falls Road. There are five signalized intersections along US 19/US 41/SR 3 between Baptist Camp Road and SR 16, and one signalized intersection located south of Griffin at Airport Road. Outside of Griffin, there are no traffic signals along SR 155. Within Griffin, there are five traffic signals along SR 155 in Downtown Griffin and two additional signals located at Milner Avenue and Crescent Road.

3.2.5. Bridge Conditions

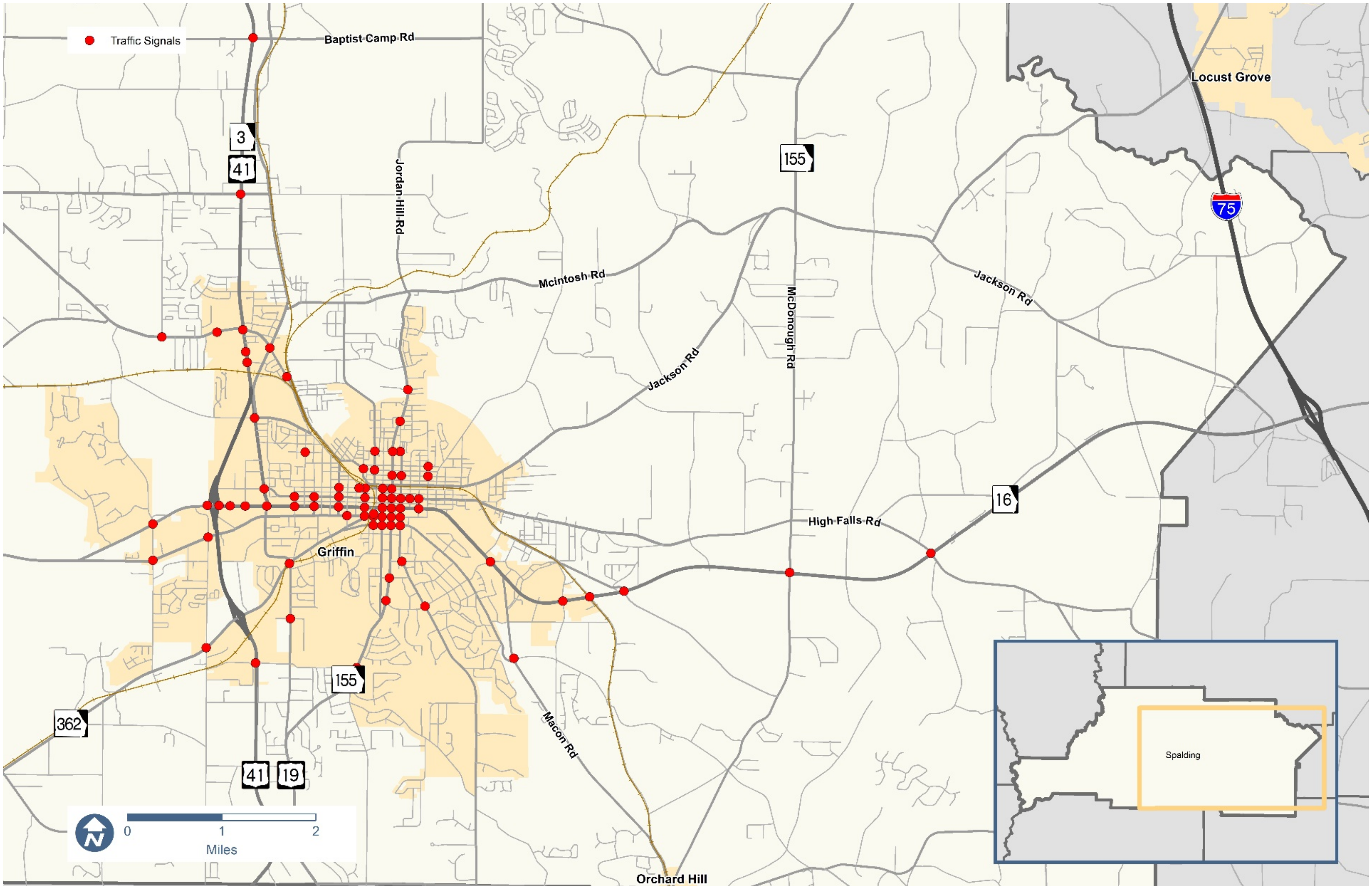
Based on the most recent data from FHWA's National Bridge Inventory (NBI) and GDOT, there are 55 roadway bridges within the focus area. Bridge conditions are depicted in **Figure 22**. Based upon bridge inspections, bridges are classified as Good, Fair, or Poor. According to the FHWA's National Bridge Inventory, based on the Pavement and Bridge Condition Performance Measures final rule (January 2017), Bridge Condition is determined by the lowest rating of National Bridge Inventory (NBI) condition ratings for Item 58 (Deck), Item 59 (Superstructure), Item 60 (Substructure), or Item 62 (Culvert). If the lowest rating is greater than or equal to 7, the bridge is classified as Good; if it is less than or equal to 4, the classification is Poor. Bridges rated 5 or 6 are classified as Fair.

Of the 55 bridges in the focus area, 14 bridges are classified as Good. Forty bridges are classified as Fair, with 11 that are load-posted, or have weight restrictions in place. One bridge, located on Jordan Hill Road at Troublesome Creek Tributary (five miles north of Griffin), is classified as Poor and is load-posted. This bridge is now currently under construction. Since this this bridge coincides with Industrial District 8 it may serve as a hub for freight activity in the county in the future. It should be noted that all bridges that fall along designated truck routes are in good or fair condition and have no weight restrictions.

Table 5: Bridges in Fair/Poor Condition with Weight Restrictions

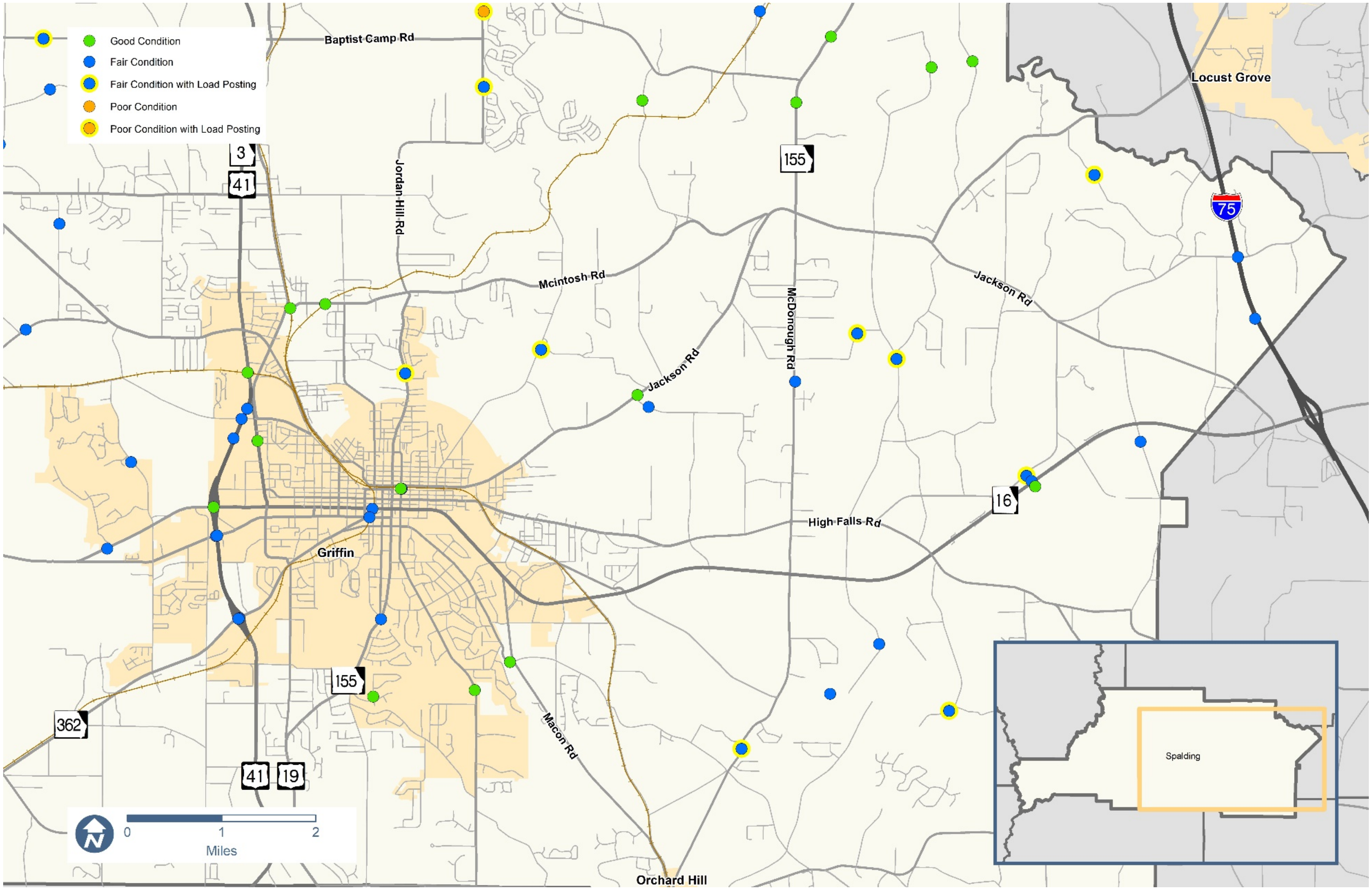
Name	Location
McDonough Road at Buck Creek Tributary	4 miles southeast of Griffin
Jordan Hill Road at Troublesome Creek	4 miles north of Griffin
Birdie Road at Griffin Reservoir Tributary	5 miles northwest of Griffin
Dutchmans Road at Cabin Creek	5 miles east of Griffin
Mangham Road at Buck Creek	3 miles northeast of Orchard Hill
Walkers Mill Road at Cabin Creek	5 miles east of Griffin
Chuli Road at Towaliga River Tributary	8 miles northeast of Griffin
Tomochichi Road at Cabin Creek	6 miles east of Griffin
Barnesville Road at Buck Creek	5 miles east of Orchard Hill
N. 2nd St Extension at Cabin Creek	2 miles northeast of Griffin
Hill Street at Cabin Creek	In Griffin

Figure 21: Signalized Intersections[27]



[27] GDOT and City of Griffin

Figure 22: Bridge Condition in Focus Area[28]



[28] FHWA National Bridge Inventory (NBI)

3.2.6. ITS and Connected Infrastructure

There are initiatives ongoing at the national and state level to utilize intelligent transportation systems (ITS) and connected infrastructure to advance traffic management and safety operations. At the regional level, the Atlanta Regional Commission (ARC) is currently updating its Regional ITS Architecture, which specifies ITS elements and connections for the 20-county region of the MPO. Within the Regional ITS Architecture, Spalding County has not identified any ITS inventory nor upcoming or ongoing ITS projects. The robustness of ITS elements across the Atlanta region, including those identified for freight, presents an opportunity for Spalding County to identify ITS and connected infrastructure elements that would improve freight operations and safety in the county.

The 2016 Griffin-Spalding County Comprehensive Transportation Plan (CTP) Update discussed the need for an ITS Master Plan for the county. While an ITS Master Plan was not developed, in 2009 Spalding County had signal upgrades programmed at 24 locations over two different phases at a cost of approximately $4 million.

On the state level, GDOT administers the Regional Traffic Operations Program (RTOP); however, since Spalding County is relatively rural compared to other portions of the Metro Atlanta area, it does not contain an RTOP Corridor. The nearest RTOP corridor is US 19/US 41/SR 3 in Henry County which ends near the Spalding County line. One of the challenges cited in the CTP Update is the difference between ownership and operations of traffic signal equipment between the City of Griffin and unincorporated Spalding County. Signalized intersections outside the Griffin area are largely under the control of GDOT since most are along state and federal routes.

3.2.7. Pavement Conditions

Due to the weight of commercial trucks, corridors that carry a significant volume of heavy trucks tend to have pavement that deteriorates at a faster rate compared to other roadways. Spalding County and the City of Griffin utilize two different but comparable scales to evaluate pavement condition; the county uses the Pavement Surface Evaluation & Rating (PASER) System on a scale of 0 to 100, and the city uses a Pavement Condition Index (PCI) on a scale of 0 to 10. GDOT uses a similar evaluation method, Overall Condition Index (OCI), for state roadways in Spalding County on a scale of 0 to 100. For this assessment, in order to compare pavement condition of roadways countywide, PCI scores provided by Griffin have been normalized by a factor of 10 (i.e., such that a PCI score of “1” is considered as “10”), and each of the ratings are reported as pavement scores. Scores that fall below 70 indicate the need for rehabilitation of pavement, including repair and resurfacing. The normalized pavement scores for all roadways in Spalding County are shown in **Figure 23.**

Designated Truck Routes

Each of the designated truck routes throughout Spalding County has a pavement score greater than 70. Northbound US 19/US 41/SR 3 throughout Spalding County carries the lowest score of 72, indicating that it will need rehabilitation soonest, prior to the other designated truck routes.

If SR 155 were to be relocated from Jackson Road to N. McDonough Road and S. McDonough Road to serve as a bypass for trucks around Griffin (GDOT PI 0008682), then S. McDonough Road would need to undergo rehabilitation. Currently, the corridor has a pavement score of 66 between High Falls Road and Johnston Road.

Roadways in Industrial Districts

For this assessment, Industrial Districts have been identified as shown in **Figure 23.**

Industrial Districts 1, 2, 3, 4, 5, and 6 are served by two arterial roadways: SR 362 and US 19/US 41/SR 3. In the vicinity of these Industrial Districts, SR 362 has a pavement score of 88 west of US 19/US 41/SR 3, and 49 to 60 east of US 19/US 41/SR 3. US 19/US 41/SR 3 has a pavement score of 72. While some local roads that serve these Industrial Districts have pavement scores greater than 70, many fail to meet that threshold. Local roadways in need of rehabilitation include the following.

Table 6. Roadways in Need of Pavement Rehabilitation in Industrial Districts 1-6

Roadway	Limits	Pavement Score	Industrial District(s) Served
Lakeside Drive	Moreland Road to SR 362	32 - 38	1
S. Pine Hill Road	SR 16 to SR 362	58 - 60	1, 3
Carver Road	Newnan Road to Louise Anderson Drive	40	4
Justice Boulevard	SR 362 to Southern Drive	53	5
Southern Drive/DF Fuller Drive	West of Hammond Drive	30	5
Everee Inn Road	SR 362 to US 19 Business/SR 155	59	6

Industrial Districts 7, 8, 9, 10, and 11 are served by SR 16. In the vicinity of these Industrial Districts, SR 362 has a pavement score ranging from 83 to 85. While some local roads that serve these Industrial Districts have pavement scores greater than 70, many fail to meet that threshold. Local roadways in need of rehabilitation include the following.

Table 7. Roadways in Need of Pavement Rehabilitation in Industrial Districts 7-11

Roadway	Limits	Pavement Score	Industrial District(s) Served
Memorial Drive / Macon Road / Old Macon Road	SR 16 to Johnston Road	47	7
Wilson Road	Macon Road to Searcy Avenue	47	7, 8
Greenbelt Avenue	--	40	7, 8
Hudson Road	--	40 - 63	7, 9
Green Valley Road	Rehoboth Road to Johnston Road	63	9, 10
S. McDonough Road	High Falls Road to Rehoboth Road	66	10
Newton Road	--	61	11

Industrial District 12 is served by N. Hill Street. In the vicinity of this Industrial District, N. Hill Street has a pavement score of 65. The two local roads that directly serve this district have pavement scores that fall below 70, indicating that they need rehabilitation. Thomas Packing Company Road has a pavement score of 30, and Emlet Drive has a pavement score of 40.

Table 8. Roadways in Need of Pavement Rehabilitation in District 12

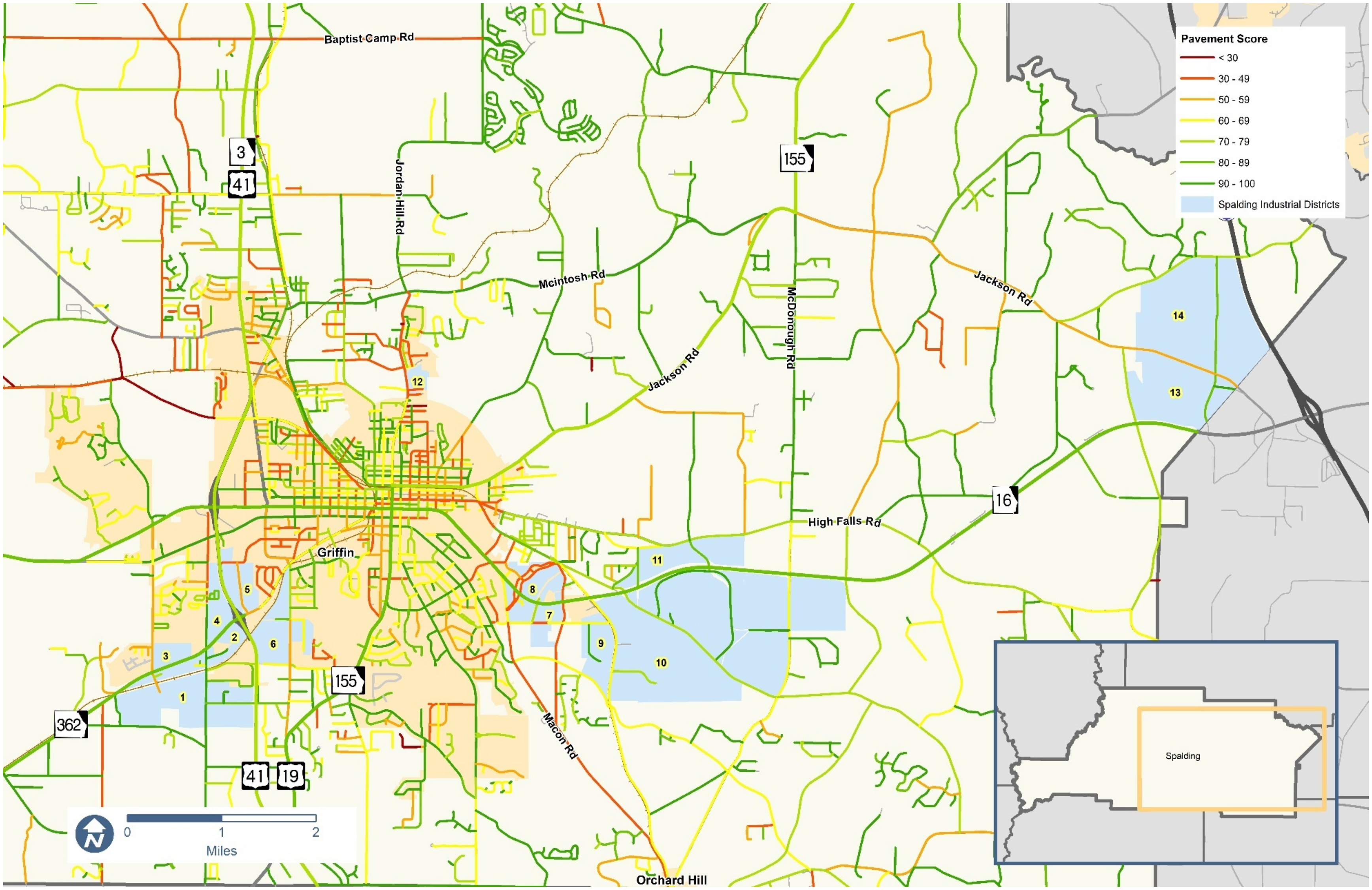
Roadway	Limits	Pavement Score	Industrial District(s) Served
N. Hill Street	Northside Drive to Bourbon Street	65	12
Thomas Packing Company Road	--	30	12
Emlet Drive	--	40	12

Industrial districts 13 and 14 are served by SR 16. In the vicinity of these industrial districts, SR 16 has a pavement score of 85. While most local roads that serve these industrial districts have pavement scores greater than 70, one roadway fails to meet that threshold. Jackson Road between Bailey Jester Road and the Butts County line has a pavement score of 53, indicating that it needs rehabilitation.

Table 9. Roadways in Need of Pavement Rehabilitation in Industrial Districts 13-14

Roadway	Limits	Pavement Score	Industrial District(s) Served
Jackson Road	Bailey Jester Road to Butts County Line	53	13, 14

Figure 23. Pavement Conditions



3.2.8. Vulnerable Transportation Assets

Another consideration for the overall network is its vulnerability to disasters. In Spalding County that primary threat would be flooding, given the fact it is not in a coastal area. To assess the vulnerability of key transportation assets, the major facilities throughout the County were compared to flood zones in the County. As shown in **Figure 24**, all of the major roadways are adequately served by bridges where floodplains exist.

3.2.9. Alternative Fuel Facilities

Promoting the use of alternative and cleaner fuels is a priority of FHWA and the ARC. The US Department of Energy has identified one alternative fuel site within Spalding County – an electronic fuel station at Chronic Nissan on US 19/US41/SR 3 – which has no impact on freight traffic in the County.

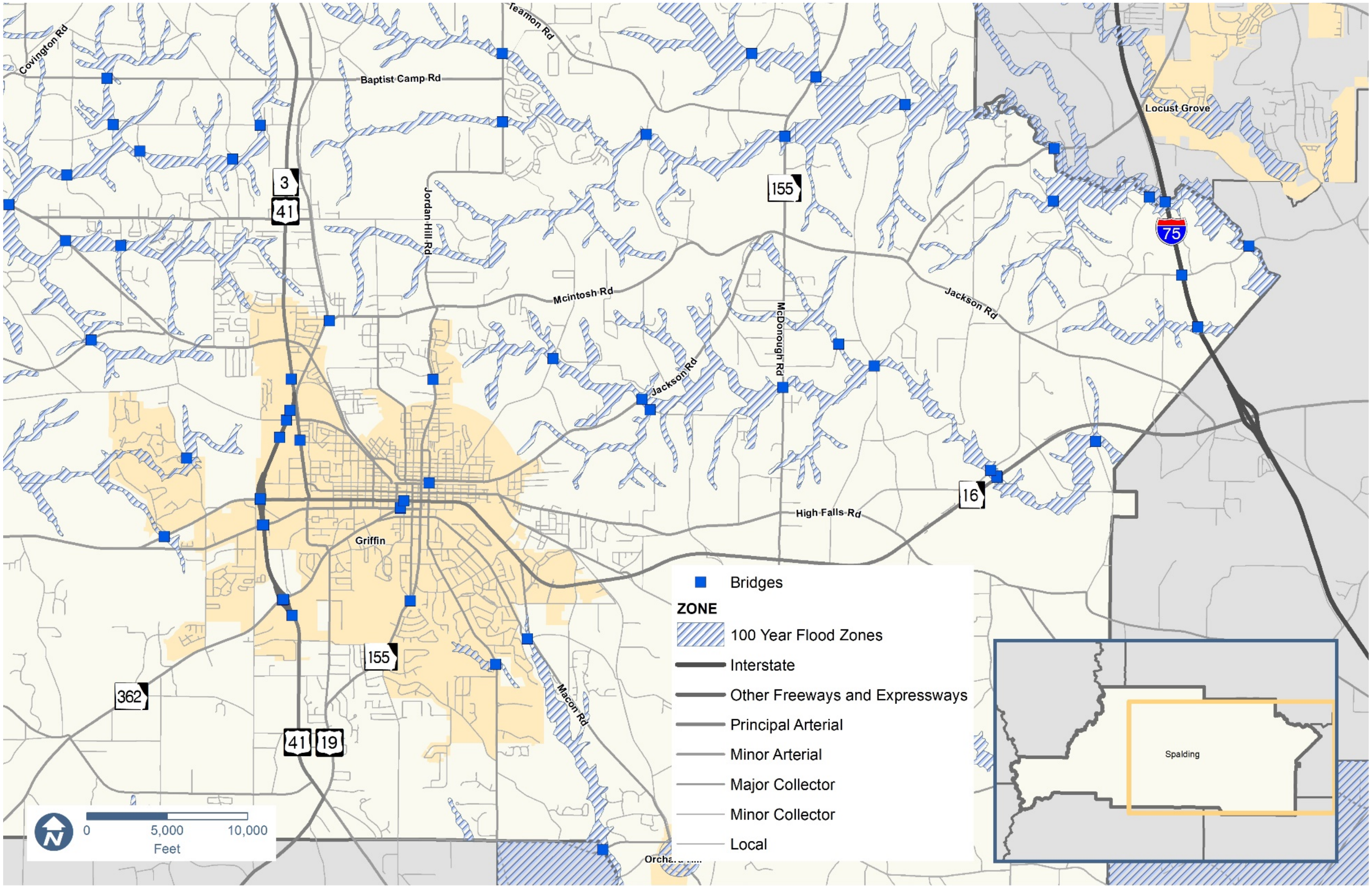
3.2.10. Network Connectivity and Resiliency

One of the biggest problems plaguing the currently built-out Atlanta region, and most of urban America, is the general lack of a resilient network – not enough collectors or arterials to serve as relief valves for freeways and expressways. Judging from aerial photos, Spalding County already has enough scattered development that it will be impossible to create an ideal network for adequate circulation at build out. But that does not mean Spalding cannot have a far more robust network. The large amount of relatively undeveloped land presents the opportunity to identify and preserve a great many corridors that will eventually be needed.

However, there are many challenges associated with identifying and preserving corridors that may not be needed for decades, including a lack of funding and organization for planning and corridor preservation. But the most significant need is to muster political will to "show a line on a map" that could gain negative attention from nearby residents. Even if there is resistance, you can confidently report that many corridors are decades away from construction. It is not the purpose of this memo or this plan to solve the funding or organizational challenges required to ensure Spalding County will ultimately obtain the infrastructure they will need for freight and general mobility.

During the development of potential improvements, corridors will be assessed for their potential to provide parallel relief to major roadways such as SR 16, SR 155 and US 19/US 41/SR 3 to not only serve the County through 2040, but ultimately at build out.

Figure 24. Vulnerable Transportation Assets



3.3. Existing Travel Characteristics

3.3.1. Roadway Volumes

Within the focus area, the highest roadway traffic volumes in Spalding County are observed along I-75 and on principal and minor arterials in and around Griffin. In 2017, the portion of I-75 that traverses northeast Spalding County carried annual average daily traffic (AADT) of 82,900 vehicles per day. Among the arterials in and around Griffin, US 19/US 41/SR 3 carries the most traffic; in 2017, the roadway carried between 31,200 and 33,850 vehicles per day between SR 16 and Baptist Camp Road, and 21,900 to 27,900 vehicles from SR 16 to Zebulon Road. Within Griffin, SR 16 carries 22,400 vehicles per day between US 19/US 41/SR 3 and S. Hill Street. Roadway traffic volumes are shown in **Figure 25**

3.3.2. Congestion

Levels of existing traffic congestion have been derived based on data from the ARC activity-based travel demand model (ABM), with 2015 as the base year for analysis. According to the Transportation Research Board's Highway Capacity Manual (HCM), level of service, or LOS, is a quantitative categorization of roads based on performance measures representing quality of service such as volume and capacity. The HCM classifies six different LOS levels ranged A through F, with LOS A as the best operating conditions for travelers while LOS F is the worst.[29] LOS for 2015 in Spalding County is depicted in **Figure 26.**

Most roadways in Spalding County exhibit LOS A or B in 2015. A few corridors in and around Griffin, are at LOS C. The highest traffic congestion in the county, LOS D, is exhibited along SR 155 from Jackson Road to the northern county boundary; and limited portions of Newnan Road, US 19/US 41/SR 3, and East Broadway Street in Griffin. Note that congestion experienced in reality is often quite different than those shown in models, but the models are generally good indicators of emerging problem areas.

3.3.3. Truck Travel Characteristics

Truck travel characteristics along designated truck routes have been derived from the most recent GDOT classification traffic counts available (2018 and 2019). Truck traffic counts at GDOT count locations are shown in **Figure 27**.

The US 19/US 41/SR 3 and SR 16 corridors carry the most substantial truck traffic. US 19/US 41/SR 3, which provides a north-south connection to Henry County to the north and Pike and Lamar Counties to the south, carries the highest traffic volume within the focus area and therefore the greatest volume of trucks. North of SR 16, truck volume ranges from 2,650 to 2,925 average daily trucks; just south of SR 16, the corridor reaches a peak of 3,350 trucks per day. South of Griffin, at the intersection with SR 155, truck volume drops substantially to 1,625 average daily trucks. SR 16, which provides a connection to I-75 in Butts County to the east and Coweta County to the west, carries a lower volume of trucks but notably has the highest truck percentages within the focus area. West of Green Valley Road, SR 16 carries 1,325 to 2,200 average daily trucks, representing 11 to 16 percent of total traffic, respectively. Truck volume along SR 16 drops as the corridor approaches Griffin from the west and rises once more just west of Griffin near W. Poplar Street (1,250 average daily trucks, or 13.2 percent of total traffic). The

[29] Transportation Research Board (2018). Highway Capacity Manual Version 6.0. p. 5-3.

SR 155 truck route, which connects Griffin to northern Spalding and Henry County, carries the lowest volume of trucks, ranging from 350 to 550 average daily trucks (3.7 to 5 percent of total traffic).

The SR 16 corridor carries the greatest percentage of trucks compared to total vehicles. The highest percentages are observed between Green Valley Road and the Spalding-Butts County line near I-75 (11 to 16 percent trucks), and between W. Poplar Street and SR 92 in Griffin (10 to 13 percent trucks). Within Downtown Griffin, truck percentages fall below 10 percent.

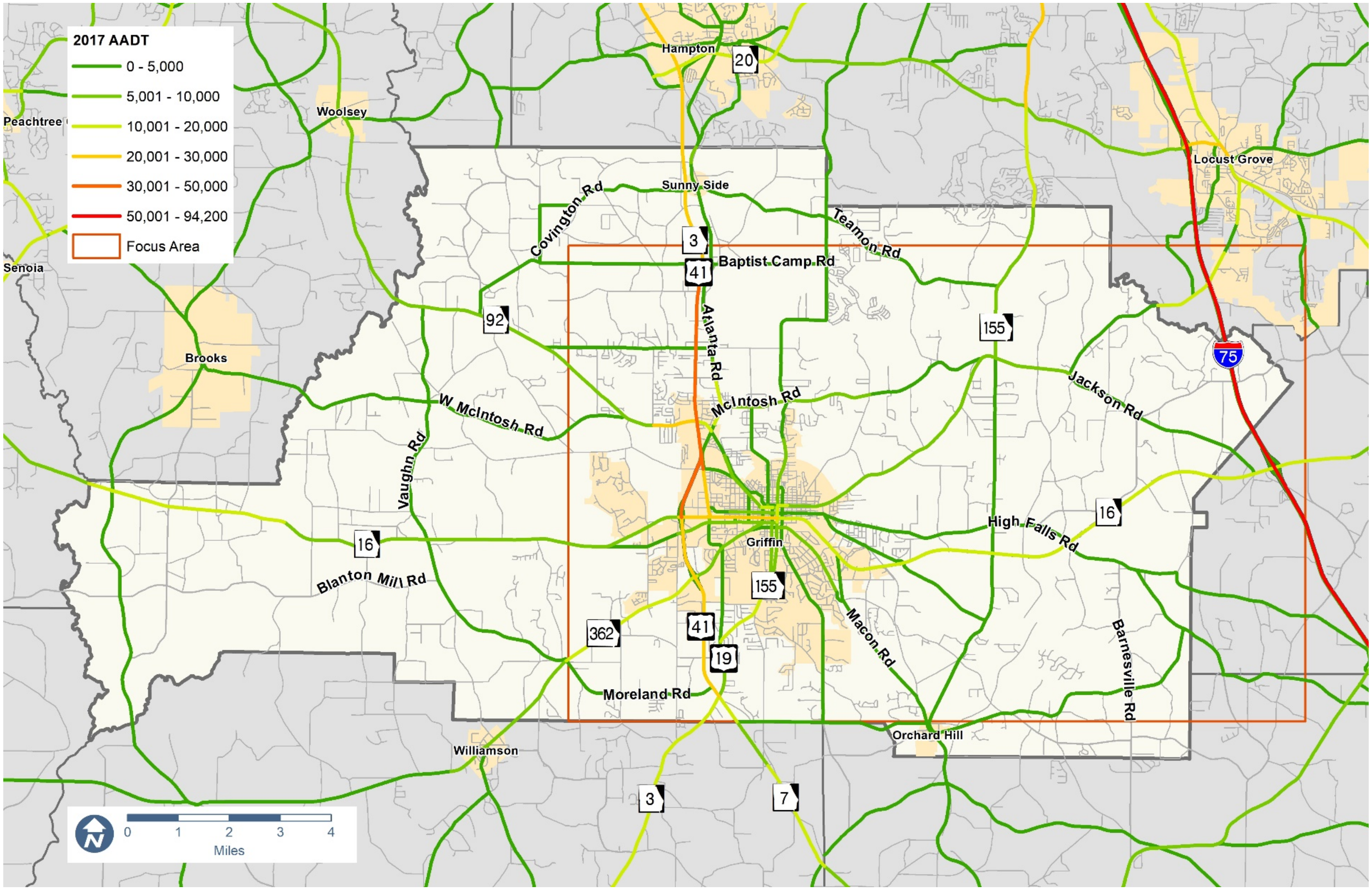
With respect to freight origins and destinations, no quantitative data was collected given the relatively small industrial district within the Spalding focus area. However, interviews with manufacturers within the Lakes at Green Valley revealed the importance of SR 16 and I-75 in order to provide access from the Port of Savannah. With an industrial base comprised primarily of manufacturing uses, preserving the access to the Port will be critical to preserving and expanding the viability of the Spalding manufacturing base.

While it does not carry significant truck volumes, it should be noted that the intersection of Broadway and Hill Street along SR 155 has been identified as a problem spot for truck traffic and downtown mobility.

3.3.4. Truck Parking

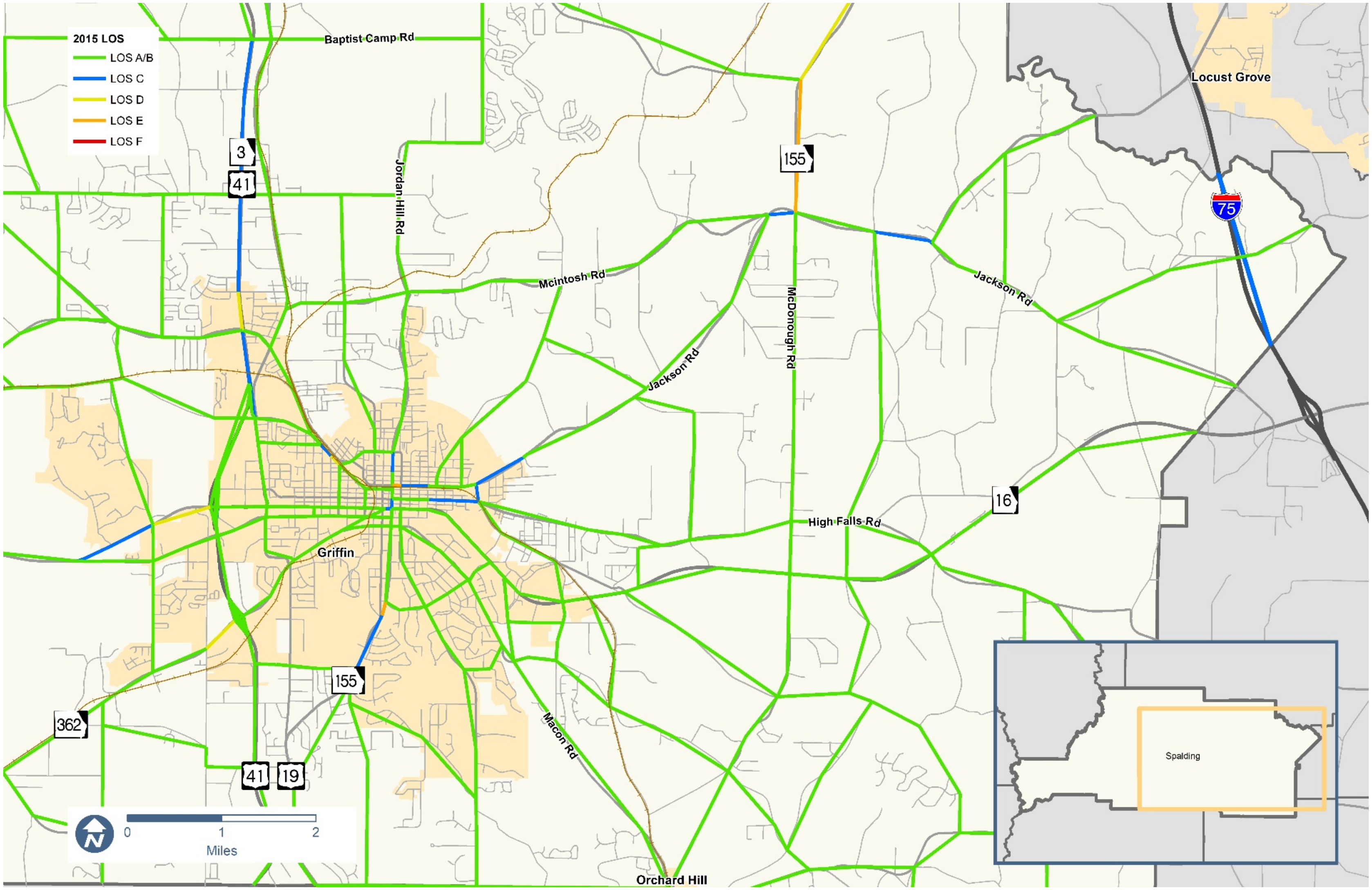
Truck parking facilities were identified through a review of the Atlanta Regional Truck Parking Assessment Study (summarized in Section 2.4) and input from the Spalding County Community Development Department. As shown in Figure 4 (on page 6), there were no truck parking facilities in Spalding County. It should be noted that a nearby facility is located at the I-75 Interchange of SR 36 in nearby Butts County. Additionally, a new JC Travel Center opened at the I-75 interchange at SR 16. Interviews with local staff revealed no areas of illegal truck parking.

Figure 25: 2017 Roadway Volumes (AADT)[30]



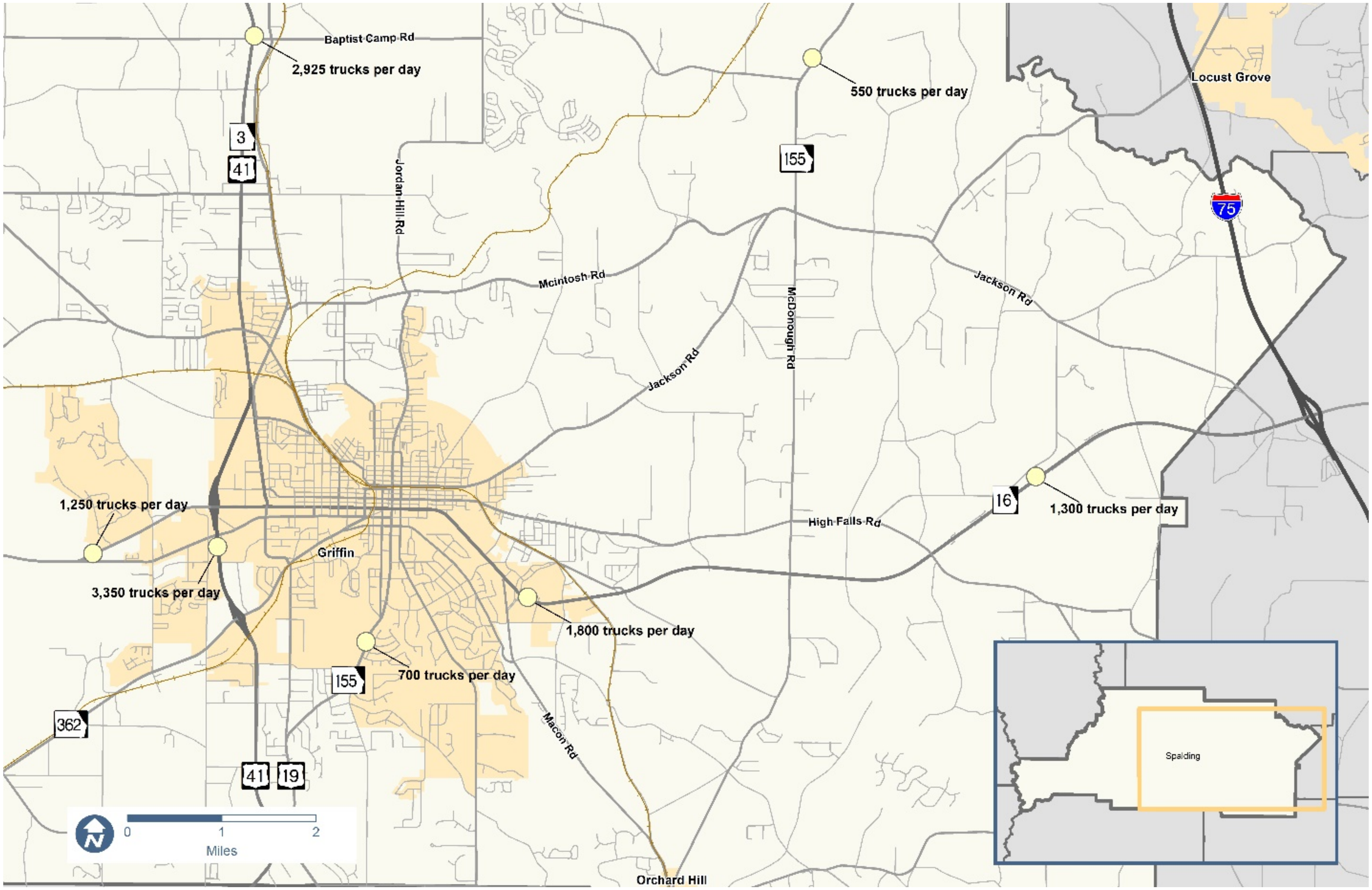
30 GDOT Traffic Analysis & Data Application (TADA)

Figure 26: 2015 Roadway Congestion (LOS) Map[31]



[31] Atlanta Regional Commission (Activity-Based Model)

Figure 27: Truck Volume (2018/2019)[32]



[32] GDOT Traffic Analysis & Data Application (TADA)

3.4. Safety Assessment

Given the relative lack of congestion throughout the County, it can be assumed that most delays within the City are due to operational deficiencies. Safety issues are often a clear indicator of operational issues. The following section examines crashes involving commercial vehicles for a five-year period (2014-2018) within the focus area. This includes analysis for 1) all crashes as well as 2) crashes along truck routes.

3.4.1. Focus Area Crashes

Between 2014 and 2018, within the focus area, there were 191 crashes involving a tractor-trailer or other type of commercial vehicle on non-interstate routes. These are shown in **Figure 28**.

The greatest concentrations of commercial crashes occurred along US 19/US 41/SR 3 and SR 16 in Griffin, particularly at intersections with arterials and collector roadways. The majority of crashes were rear-end crashes (27.7 percent), angle crashes (27.2 percent), and collisions with an object other than a motor vehicle, including deer, other animals, trees, and other objects on the roadside (22.0 percent). The rate of crashes with objects other than vehicles can be attributed to the rural character found throughout much of the focus area, which is characterized by two-lane roadways in areas with more wildlife than typically found in urban areas. Table 10 shows commercial vehicle crashes by type.

Over two-thirds of crashes involved property damage only (PDO), and nearly one-third of crashes resulted in at least one injury. Four crashes involving commercial vehicles were fatal. One of these fatal crashes involved a bicyclist; a truck struck a bicyclist on Vineyard Road near Fleetwood Drive (just west of US 19/US 41/SR 3), resulting in fatal injuries to the bicyclist.

Table 11 shows commercial vehicle crashes by severity.

Table 10.Commercial Vehicle Crashes by Type[33]

Year	Crash Type							Total Crashes
	Angle	Head On	Rear End	Sideswipe -Same Direction	Sideswipe -Opposite Direction	Not A Collision with Motor Vehicle	Not Specified	
2014	9	0	8	2	2	5	0	**26**
2015	10	1	12	5	3	13	0	**44**
2016	7	0	11	2	7	5	0	**32**
2017	15	1	10	6	5	11	0	**48**
2018	11	0	12	9	1	8	0	**41**
Total	**52**	**2**	**53**	**24**	**18**	**42**	**0**	**191**
	27.2%	**1.0%**	**27.7%**	**12.6%**	**9.4%**	**22.0%**	**0.0%**	**100.0%**

[33] **GDOT GEARS Crash Database.**

Table 11. Commercial Vehicle Crashes by Severity

Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	15	11	0	**26**
2015	29	15	0	**44**
2016	21	10	1	**32**
2017	39	8	1	**48**
2018	26	13	2	**41**
Total	**130**	**57**	**4**	**191**
	68%	**30%**	**2%**	**100.0%**

When crashes do occur on truck routes and cause backups or delays, trucks and other vehicles traveling in the area are known to seek alternative routes, adding to the existing levels of congestion on roadways. Therefore, addressing these common crash locations with safety and infrastructure improvements will help reduce the likelihood or frequency of drivers using alternate, parallel routes. Crash hotspots, or areas of high crash concentration, coincide with major intersections and freight-intensive land uses in the focus area. These include, but are not limited to, the junctions of US 19/US 41/SR 3 and Airport Road, US 19/US 41/SR 3 and SR 362, US 19/US 41/SR 3 and SR 92 (W. McIntosh Road), SR 16 and Green Valley Road, SR 16 and S. McDonough Road, and SR 16 and High Falls Road.

3.4.2. Crashes along Truck Routes

SR 16

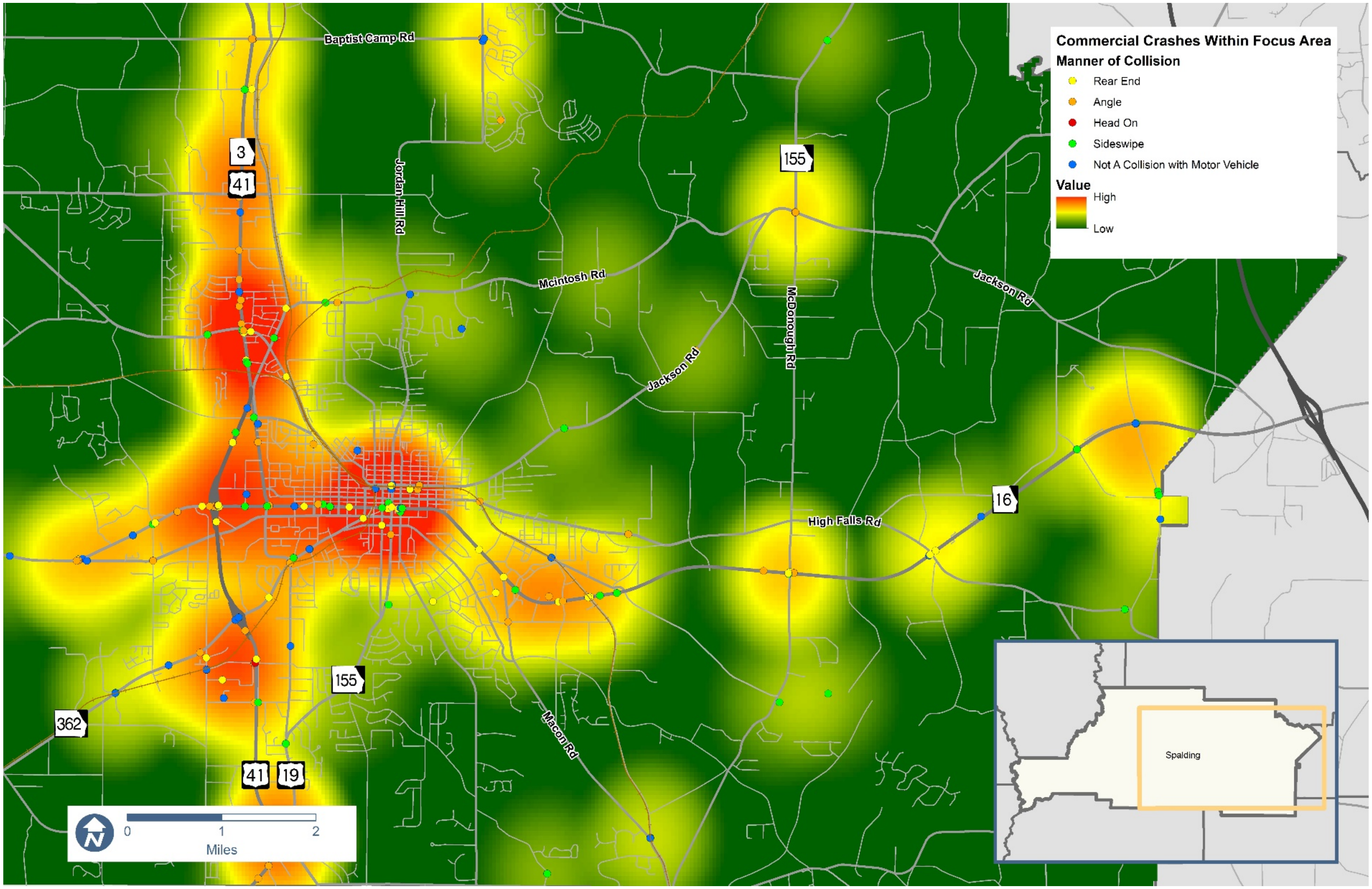
Of the 191 commercial crashes in the focus area from 2014 to 2018, 52 crashes, or 27 percent of all commercial crashes, occurred along SR 16.[34] The most prevalent crash type was rear-end crashes (35 percent), indicating that they are likely attributed to traffic congestion. The other commercial crashes were sideswipes (23 percent), angle (21 percent), and collisions with objects other than a motor vehicle (21 percent), including deer, other animals, trees, and other objects on the roadside.

US 19/US 41/SR 3

Of the 191 commercial crashes in the focus area from 2014 to 2018, 24 crashes, or 13 percent of all commercial crashes, occurred along US 19/US 41/SR 3.[35] The most prevalent crash type was angle crashes (38 percent), which may be attributed to sight distance issues, intersection geometry, or the need for signal control at unsignalized intersections. The other commercial crashes along US 19/US 41/SR 3 were rear-ends (29 percent), collisions with objects other than a motor vehicle, including deer, other animals, trees, and other objects on the roadside (25 percent), and sideswipes (8 percent).

[34] Includes commercial crashes within 50 feet of the corridor, including intersections
[35] Includes commercial crashes within 50 feet of the corridor, including intersections

Figure 28: Commercial Crash Locations[36]



[36] GDOT GEARS Crash Database.

SR 155

Of the 191 commercial crashes in the focus area from 2014 to 2018, 14 crashes, or 7 percent of all commercial crashes, occurred along SR 155.[37] The most prevalent crash type was angle crashes (50 percent), which may be attributed to sight distance issues, intersection geometry, or the need for signal control at unsignalized intersections. The other commercial crashes along US 19/US 41/SR 3 were sideswipes (28 percent), collisions with objects other than a motor vehicle, including deer, other animals, trees, and other objects on the roadside (14 percent), and rear-ends (7 percent).

3.5. Commute Characteristics

The mean travel time to work for Spalding County workers (age 16 and over) is 29.0 minutes.[38] This commute time is the lowest compared to workers in neighboring Pike, Lamar, Butts, Fayette, and Henry Counties. Almost half of Spalding County workers (45.3 percent) have travel times to work under 30 minutes.[39] Nearly one-third of workers in Spalding County (27.7 percent) spend 10 to 19 minutes traveling to work, and over one-fifth (22.8 percent) have a commute travel time of 30 to 44 minutes.[40]

Table 12: Travel Time to Work[41]

Travel Time to Work	Percent Estimate
Less than 10 minutes	9.0%
10-19 minutes	27.7%
20-29 minutes	17.6%
30 - 44 minutes	22.8%
45 - 59 minutes	11.1%
60 or more minutes	11.9%

The majority of employed Spalding County residents commute outside the county for employment. Among the estimated 27,301 residents of working age who live in Spalding County, 75 percent are employed outside of Spalding County, and 25 percent, or approximately 6,827 residents, are employed within Spalding County. **Figure 29** shows the top locations of work among employed Spalding County residents. Of the 75 percent of residents who leave the county for work, the greatest proportion travel to Fulton County, followed by Henry County and Clayton County.

[37] Includes commercial crashes within 50 feet of the corridor, including intersections
[38] American Fact Finder (2017). Table S0801: Commuting Characteristics - 2013-2017 ACS 5-Year Estimates.
[39] Ibid.
[40] Ibid.
[41] Ibid.

Table 13: Top Places of Work for Spalding County Residents (2002-2017)[42]

Location	Count	Share
Spalding County, GA	6,827	25.0%
Fulton County, GA	3,921	14.4%
Henry County, GA	2,867	10.5%
Clayton County, GA	2,119	7.8%
Cobb County, GA	1,539	5.6%
Fayette County, GA	1,349	4.9%
DeKalb County, GA	1,332	4.9%
Gwinnett County, GA	900	3.3%
Coweta County, GA	575	2.1%
Troup County, GA	479	1.8%
All Other Locations	5,393	19.8%

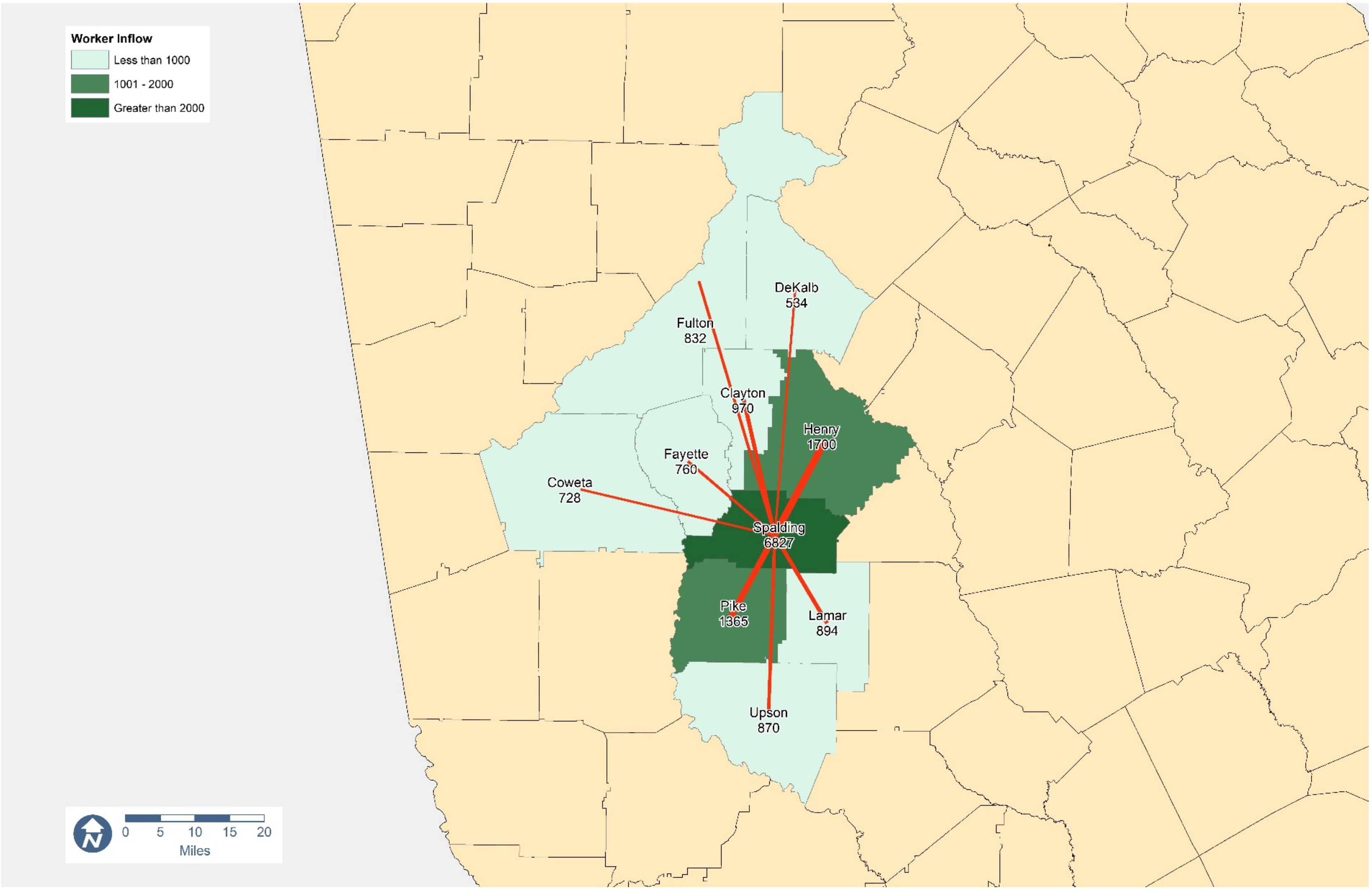
Most of Spalding County's workforce resides outside of the county and travels into the county for work. Of the estimated 23,260 workers employed in Spalding County, nearly one-third (29.4 percent) live within the county, and 70.6 percent commute from outside of Spalding County. Of the 70.6 percent of workers who live outside Spalding County, the greatest number of workers travel from Henry County, followed by Pike County. **Figure 30** illustrates the top places of residence for Spalding County workers.

Table 14: Top Places of Residence for Spalding County Workers (2002-2017)[43]

Location	Count	Share
Spalding County, GA	6,827	29.4%
Henry County, GA	1,700	7.3%
Pike County, GA	1,365	5.9%
Clayton County, GA	970	4.2%
Lamar County, GA	894	3.8%
Upson County, GA	870	3.7%
Fulton County, GA	832	3.6%
Fayette County, GA	760	3.3%
Coweta County, GA	728	3.1%
DeKalb County, GA	534	2.3%
All Other Locations	7,780	33.4%

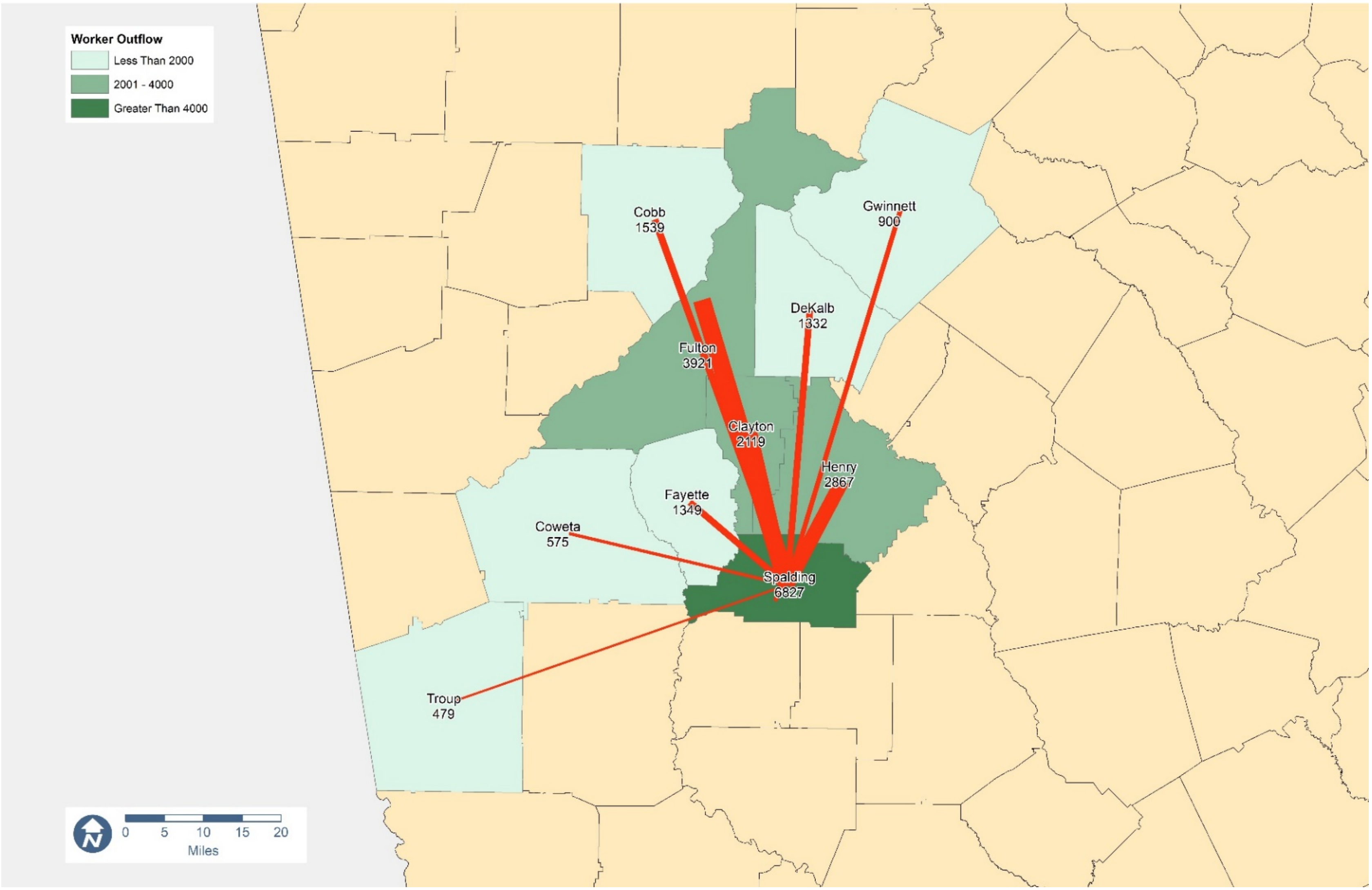
[42] U.S. Census Bureau. OnTheMap Application and LEHD Origin-Destination Employment Statistics.
[43] U.S. Census Bureau. OnTheMap Application and LEHD Origin-Destination Employment Statistics.

Figure 29: Place of Work for Spalding County Residents[44]



[44] U.S. Census OnTheMap Application (2017 data)

Figure 30: Place of Residence for Spalding County Workers [45]



[45] U.S. Census OnTheMap Application (2017 data)

3.6. Multimodal Access for Workforce

Spalding County's multimodal network consists of sidewalks as well as transit services countywide and within Griffin. While the Griffin-Spalding CTP proposes recommendations for bicycle facilities and trails, there are currently no bicycle lanes, trails, or multi-use paths within the county. This section discusses multimodal access available for the local workforce to commute to freight-centric businesses in Spalding County.

3.6.1. Sidewalks

Most of Spalding County's sidewalk and crosswalk infrastructure is concentrated within the City of Griffin. Within Griffin, there are approximately 60 miles of sidewalk. Of the 71 intersections with signal control (traffic signals or flashing caution signals) within the City of Griffin, 19 intersections lack adequate crossing infrastructure. Many freight-oriented businesses, including industrial and manufacturing uses that are within or in close proximity to Downtown Griffin, have sidewalk access. Outside of the downtown area, however, particularly along SR 16 and SR 362, there are no sidewalks available for use by the local workforce. Sidewalks and crosswalks in the focus area are shown in **Figure 31**. .

As noted in section 3.1.5, numerous industrial districts have a need for greater transportation access for the local workforce. In these areas, the industrial districts are located within close proximity to residential neighborhoods with a higher concentration of low-income households and people who work in the industrial sector. The Griffin-Spalding CTP has identified sidewalk needs in many of these areas. Adjacent to districts in southeast Griffin, these corridors include Futral Road, Wilson Road, and Hudson Road. In southwest Griffin, there are numerous roadways that connect residential areas to industrial districts which currently lack sidewalks. These include SR 362/Meriwether Street, and SR 362/Williamson Road, Carver Road, and S. Pine Hill Road. There is also a need for sidewalks further south on Carver Road, and on side streets serving industrial areas, including Odell Road, Kalamazoo Drive, and Airport Road.

In east Spalding, near I-75, the industrial districts are located further from residential neighborhoods. While sidewalks may not be as great of a need for workforce access, Spalding County can help to ensure good multimodal access by requiring sidewalks for new developments, both residential and industrial. The County may also consider implementation of a transportation demand management program that makes it easier for workers to commute by a mode other than driving alone.

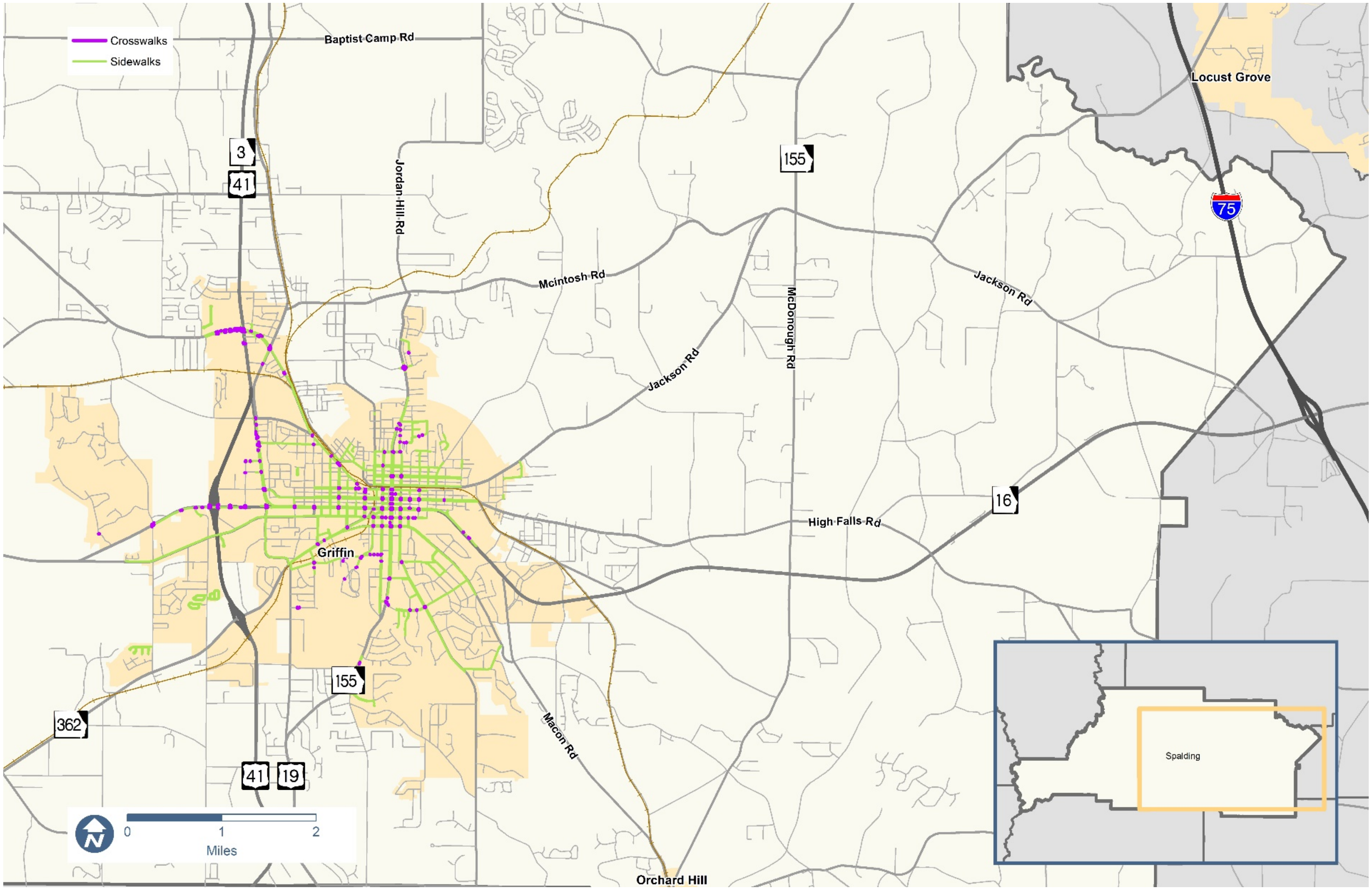
3.6.2. Transit System

Three Rivers Regional Transit System

The regional public transportation program has been administered by the Three Rivers Regional Commission (TRRC) on behalf of its participating governments since 1999. The residents of Spalding, Butts, Lamar, Meriwether, Pike, and Upson Counties have access to a demand response transit service, which means that there are no fixed routes, bus stops, or pick up times. Residents call 1-855-407-RIDE (7433) and order a trip 24 hours in advance, and daily routes are generated based on the destinations requested. The fee is $2.00 per one-way trip, and the service is offered Monday through Friday between the hours of 8:00 a.m. and 5:00 p.m. The service is funded through 5311 Rural Transit Service funding passed through the Georgia Department of Transportation.

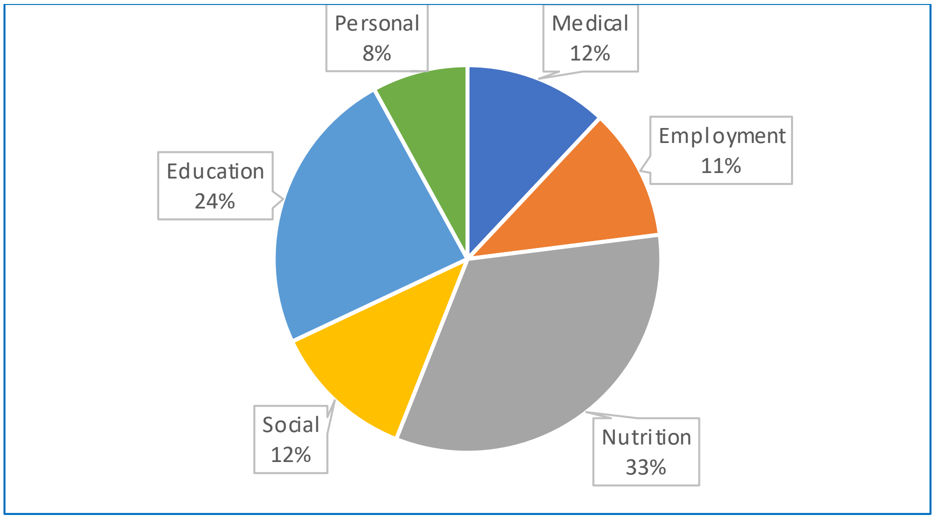
Spalding County is serviced with five 2016 Ford Mini Bus vehicles as shown in picture above – two mini buses have 10-seat capacity with wheelchair lifts and three mini buses have 14-seat capacity without wheelchair lifts.

Figure 31: Sidewalk and Crosswalk Infrastructure[46]



46 City of Griffin

Figure 32: Spalding County Demand Response Trip Destinations[47]



In 2019, TRRC reported a total of 26,431 one-way trips with an average of 440 one-way trips per month. The trip destinations are estimated to be 56 percent senior-related, 35 percent education/employment-related and eight percent for other purposes. As shown in **Figure 32**, most of the trips were non-workforce related trips.

City of Griffin Park District Shuttle

The Park District Shuttle is a free circulator shuttle that has been in operation within the City of Griffin since 2016. The circulator serves seven stops, including the City Park, City Hall, Well-Star Spalding Regional Hospital, and retail destinations. The circulator runs twice daily in the morning (10:00-11:00 am) and afternoon (3:30-4:30 pm). Because the circulator does not directly serve freight-oriented businesses and has limited service hours and daily routes, it is likely not a viable option for the local workforce employed in the freight and logistics industry in the county.

[47] Three Rivers Regional Commission

Xpress Regional Commuter Service

The State of Georgia operates Xpress, a regional commuter service, which provides an alternative commute option between employment centers and residential areas across the Atlanta region. Xpress provides over two dozen park-and-ride lots, where residents can park their personal vehicles and board an Xpress bus to Perimeter Center, Midtown Atlanta, or Downtown Atlanta. For Spalding County residents, the nearest Xpress park-and-ride lots are located in Hampton and McDonough in Henry County.

The Hampton Park-and-Ride (Boothe's Crossing) is located at 104 Woolsey Road Hampton, GA 30228. Route 440 Hampton to Downtown/Midtown leaves from the Hampton Park-and-Ride lot into Downtown and Midtown Atlanta. Six (6) buses depart between 5:15 AM and 8:00 AM. Seven (7) buses return to Hampton P&R lot between 4:42 PM and 7:46 PM.

The McDonough Park-and-Ride is located at 1059 Industrial Parkway McDonough, GA 30253. Route 430 McDonough to Downtown leaves from the McDonough Park-and-Ride lot into Downtown Atlanta. Eight (8) buses depart between 5:20 AM and 8:05 AM. Eight (8) buses return to the McDonough P&R lot between 3:56 PM and 7:30 PM.

3.6.3. Transportation Demand Management Services

Georgia Commute Options

Georgia Commute Options (GCO) is a program designed to reduce the number of single-occupancy vehicles on Atlanta area roadways, thereby improving air quality and traffic congestion. Federal transportation funds provide these programs as a means to minimize commuting impacts through transportation demand management (TDM) strategies such as carpooling, vanpools, transit, and teleworking. The program assists Spalding County commuters with a variety of TDM services, including coordinating shared vanpools and carpools, and providing financial incentives for alternative commute strategies such as teleworking. For program participants, GCO also provides a Guaranteed Ride Home for registered commuters. Participants must register at https://gacommuteoptions.com/ in advance to receive program benefits.

Private Transportation Providers

Lyft and Uber operate as private rideshare services within Spalding County and across the surrounding area. Due to the higher relative cost of each trip, ridesharing is often not a viable long-term alternative to public transit for the local workforce but can supplement short-distance travel needs on an occasional basis.

4. Future Conditions Assessment

4.1. Projected Roadway Volumes

Projected future traffic volumes have been derived based on data from the ABM, with 2040 as the horizon year for analysis. In the 25-year window between 2015 and 2040, traffic volume in Spalding County is expected to increase along many routes in the county. **Figure 33** shows projected traffic volumes for 2040. The portion of I-75 that traverses Spalding County is forecast to handle 105,200 vehicles per day in 2040, representing a 35 percent increase from 2015. While there is no interchange along I-75 in Spalding County, this projected increase in traffic, including truck volumes, is reflective of the broader trend of growing traffic in the Spalding County area. Several arterial roadways are projected to carry substantially higher traffic volumes by 2040. Each designated truck route is projected to increase both in roadway volume and in truck percentage. US 19/US 41/SR 3 between SR 362 and W. Poplar Street is projected to handle over 34,000 vehicles per day in 2040, an increase of 38 percent from 2015 traffic volumes. SR 155 from Jackson Road to Teamon Road is projected to carry 23,155 vehicles per day by 2040, representing a 33 percent increase from 2015. SR 16 just east of Rehoboth Road has a base year (2015) traffic volume of 7,876 vehicles per day; this is projected to grow to 12,444 vehicles per day in 2040, reflecting a 58 percent increase in traffic volume.

4.2. Projected Growth in Truck Traffic

The ARC activity-based travel demand model for 2015 and 2040 was used to determine projected growth in truck traffic over a 25-year period. **Figures 34 and 35** illustrate daily truck volumes on non-interstate roadways in the focus area for the year 2015 and projected for the year 2040, respectively. These volumes reflect traffic in both directions of traffic on each segment. It should be noted that while the 2015 model data exhibits more truck traffic than has been observed through GDOT classification counts, a comparison between the 2015 and 2040 model years can be made to identify corridors where truck growth is anticipated.

Similar to data collected from GDOT classification traffic counts, the 2015 model shows that the highest truck volumes are generally observed along designated truck routes: US 19/US 41/SR 3, SR 155, and SR 16. Despite the truck restrictions along N. McDonough Road, the corridor carries truck volumes comparable to that of SR 155 between Jackson Road and Griffin. Truck volumes across the entire study area are expected to increase considerably between 2015 and 2040. On non-interstate highways and roadways, the designated truck routes still exhibit the highest truck volumes. Among non-interstate routes, the highest truck volume is projected along US 19/US 41/SR 3 south of Baptist Camp Road (9,140 daily trucks), representing a 35 percent increase from 2015 truck volume along the corridor. South of Griffin, daily truck volumes along US 19/US 41/SR 3 are projected to reach 4,427 trucks by 2040, or a 35 percent increase in traffic from 2015. SR 16 in eastern Spalding County also exhibits substantial growth in truck traffic; by 2040, it is projected that the corridor will carry 3,809 trucks per day, representing a 36 percent increase in truck traffic. Significant truck traffic is also seen along SR 16 between Hamilton Boulevard and Green Valley Road (3,370 to 3,831 trucks per day, or a 22 to 26 percent increase in truck traffic). Among the designated truck routes, SR 155 shows the most moderate growth in truck traffic.

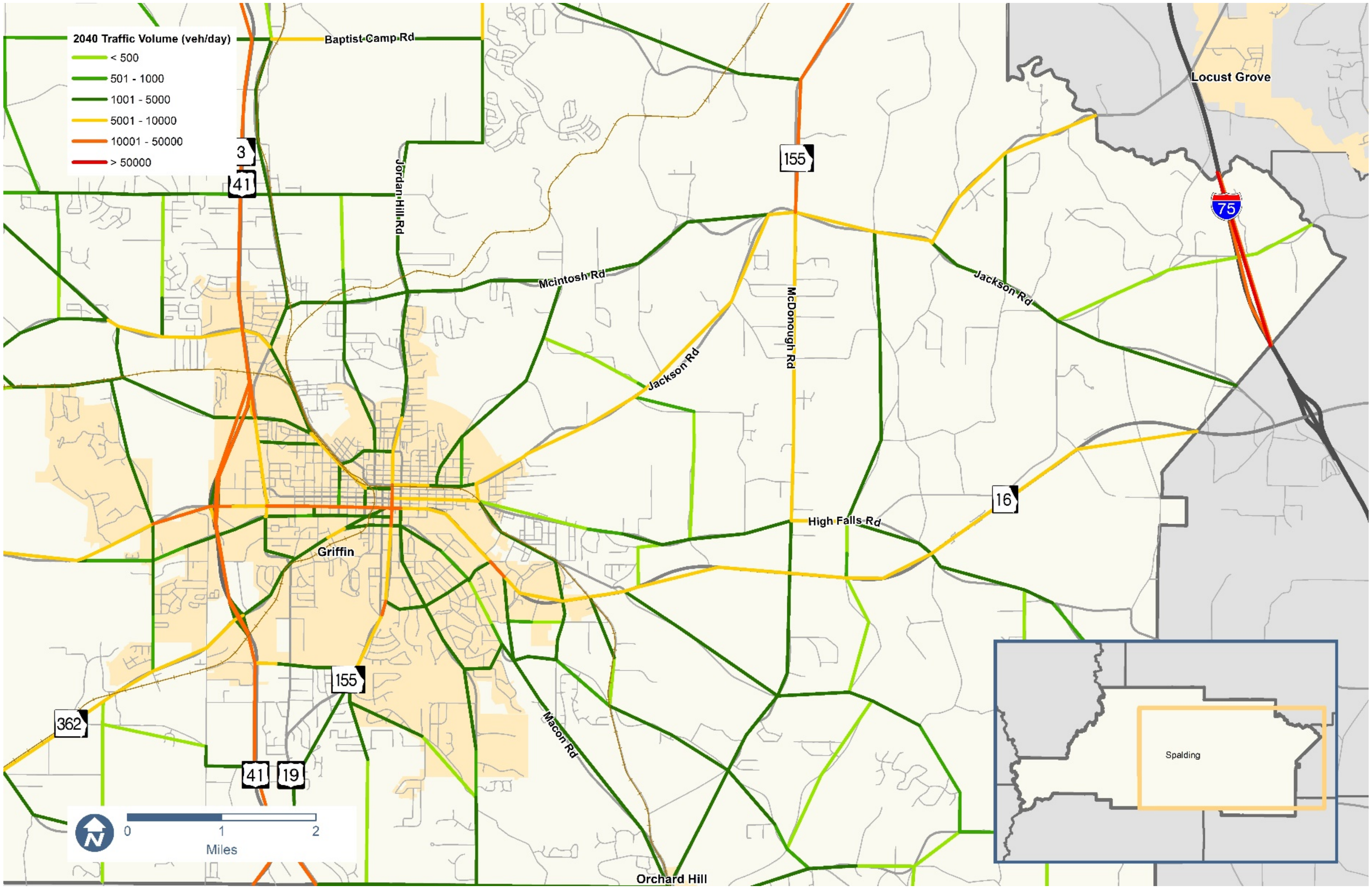
The highest truck volume projected for 2040 is exhibited just north of Searcy Avenue (2,347 trucks per day), representing a 16 percent increase in truck traffic from 2015.

4.3. Projected Roadway Congestion

Projected levels of future traffic congestion have similarly been derived based on data from the ABM, with 2040 as the horizon year for analysis. By 2040, traffic congestion is projected to remain at acceptable levels (LOS A, B, and C) in most of the focus area. Along select truck routes, the projected increase in traffic volume is anticipated to result in worsening traffic congestion. SR 155 from Henry County to McIntosh Road and Jackson Road is projected to operate at LOS F by 2040. US 19/US 41/SR 3 is projected to operate at LOS D and E between Baptist Camp Road and near where the limited access portion begins near SR 92. East of Downtown Griffin, SR 16 is forecasted to remain at LOS A and B. Within Griffin, SR 155 from S. Hill Street to N. 2nd Street is projected to worsen to LOS E and F. Portions of other arterials and collectors leading into Downtown Griffin, including SR 16, Experiment Street, S. Hill Street, and E. Solomon Street, are also projected to operate at LOS D and E. **Figure 36** shows forecasted 2040 LOS for roads in Spalding County.

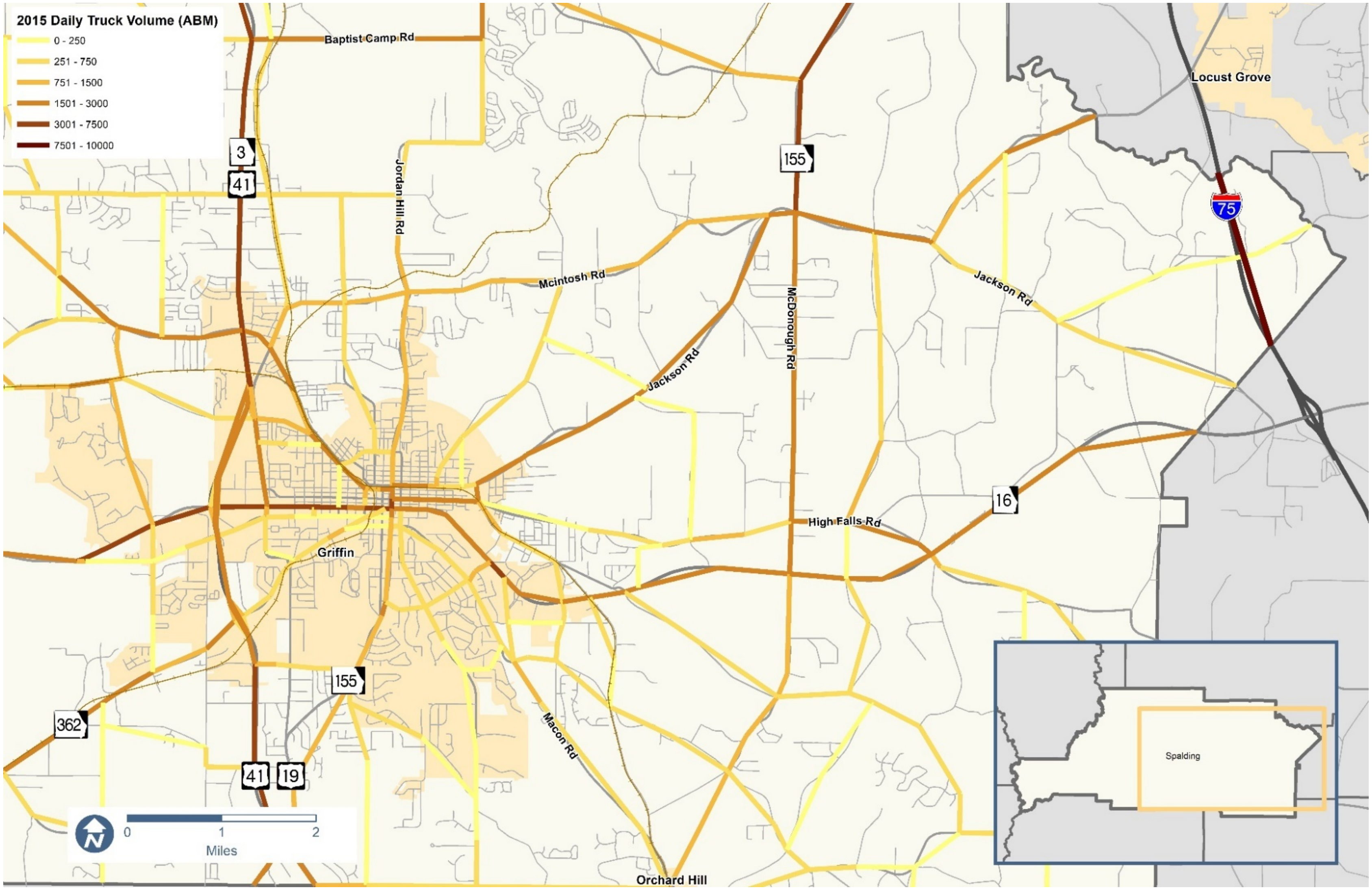
By 2040, it is anticipated that the Industrial Districts identified in Section 3 will not be significantly impacted by roadways with high traffic congestion, or deficient LOS. Trucks traveling to industrial districts located along SR 16 east of Griffin will be able to operate in LOS A/B conditions in 2040. The same holds true for industrial district 8, located along Jordan Hill Road in north Griffin. Trucks accessing industrial districts in southwest Griffin may experience minor congestion along SR 362 west of US 19/US 41/SR 3, where the corridor is projected to operate at LOS E.

Figure 33: Projected Traffic Volumes (2040)[48]



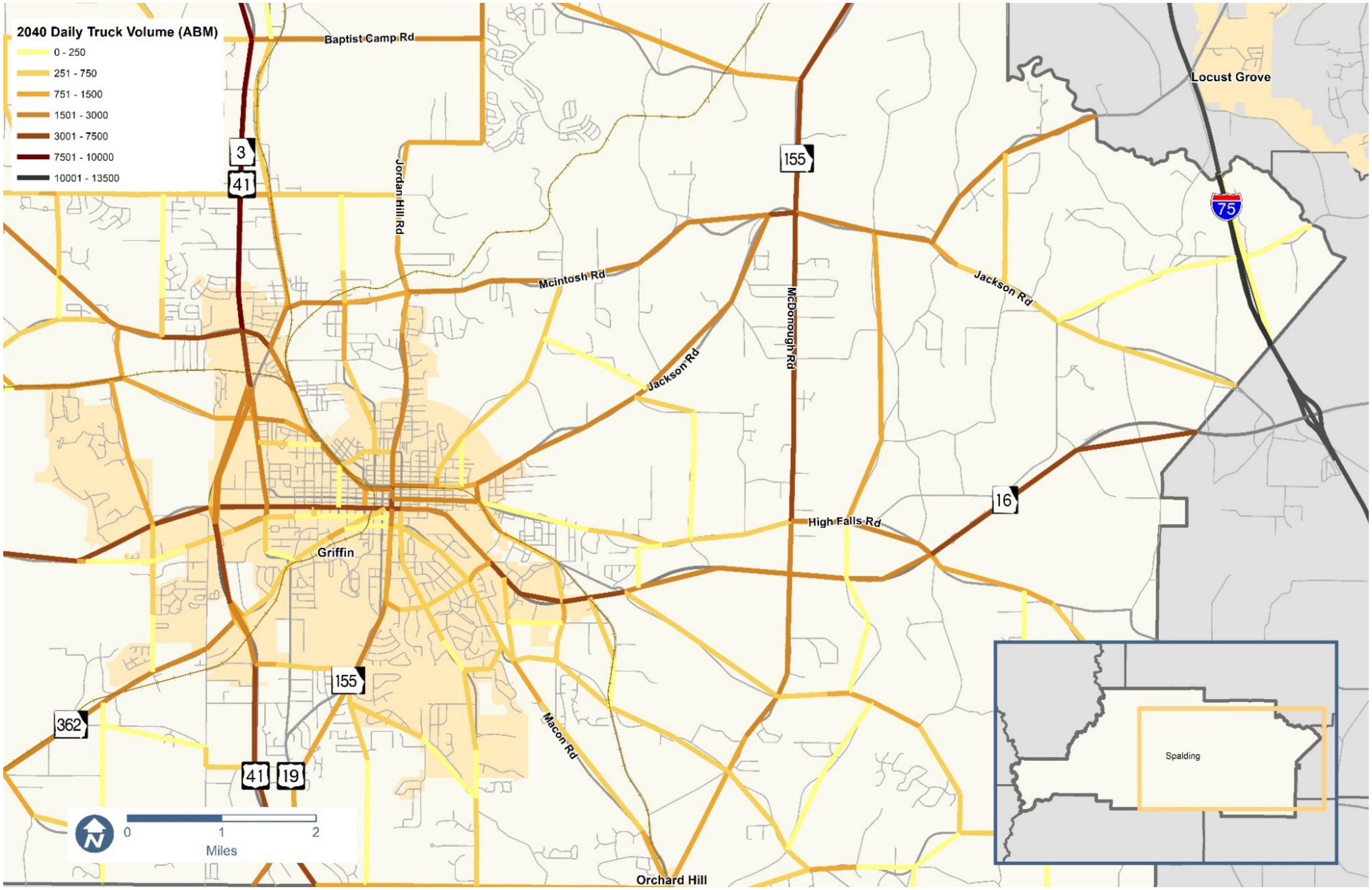
48 Atlanta Regional Commission (Activity-Based Model)

Figure 34. 2015 Daily Truck Volume (ARC ABM)[49]



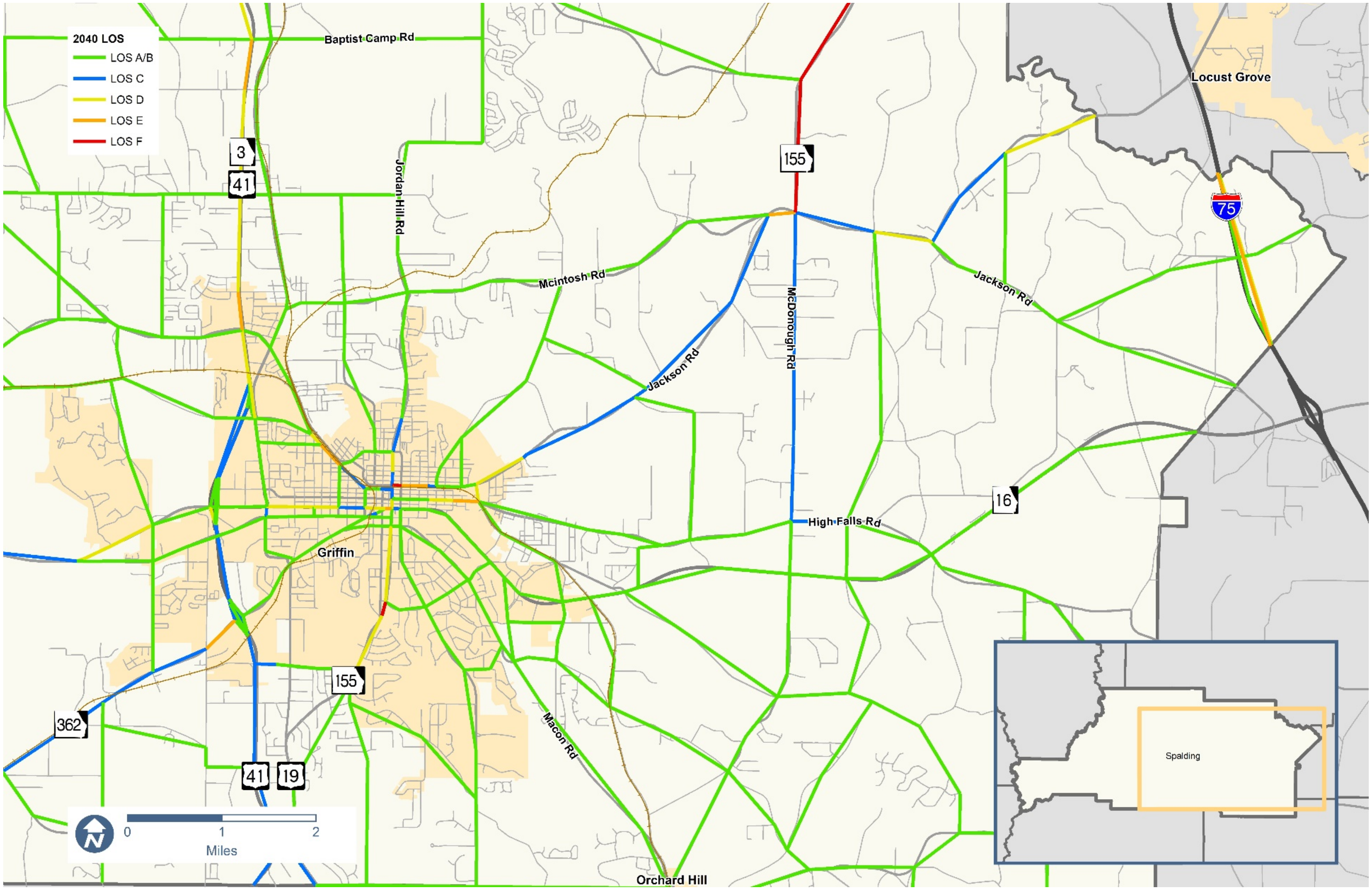
[49] Atlanta Regional Commission (Activity-Based Model)

Figure 35. 2040 Daily Truck Volume (ARC ABM)[50]



50 Atlanta Regional Commission (Activity-Based Model)

Figure 36: 2040 Level of Service[51]



[51] Atlanta Regional Commission (Activity-Based Model)

4.4. Planned and Programmed Projects

Several transportation projects are planned and programmed within the focus area. The different types of projects, including maintenance, new roadways, roadway widenings, and intersection improvements, are intended to improve mobility and safety. **Figure 37** shows planned projects from the Griffin-Spalding CTP and programmed GDOT transportation projects within the focus area.

4.4.1. GDOT Projects

One of the most substantial planned projects pertinent to freight in Spalding County is the Griffin South Bypass, which will serve as a truck bypass around the City of Griffin. A study of the bypass was completed in 2010. The development of a bypass around in the City of Griffin is anticipated to improve regional mobility for truck traffic and reduce congestion and conflicts between trucks and general purpose traffic within Griffin. Phase 1 of the Griffin South Bypass is the relocation of SR 155 from Jackson Road to N. McDonough Road (PI 0008682), which is programed in the Atlanta Regional Transportation Plan (RTP) at a cost of $9.6 million. [52] This project would entail improvements along N. McDonough Road to support truck traffic, and shifting the designation of SR 155 from Jackson Road to N. McDonough Road to serve as a bypass around the east side of Griffin and to enhance connectivity with SR 16 to the south. Preliminary engineering is programmed for 2032 and construction in 2036.[53] While the improvement and re-designation of SR 155 from Jackson Road to N. McDonough Road is the primary option being considered for the first phase of the bypass, Spalding County will continue to coordinate with GDOT to examine additional options moving forward.

Subsequent phases of the project, Griffin Southwest Bypass Phases 2 (PI 0007871) and 3 (PI 0010441), will construct new roadway around the east and south sides of Griffin, extending from SR 16 west of the city near the intersection with Rover Zetella Road, to east of the city near the intersection with South McDonough Road. Phase 2 is programmed in 2036[54] at cost of $39.6 million[55], and Phase 3 is programmed in 2051 at a cost of $35.9 million. [56] Construction of these segments will complete the truck bypass around Griffin.

GDOT also has a related project to widen SR 155 from CR 508/N. 2nd Street in Griffin to the Henry County line (PI 0007870). These projects are included in the Griffin-Spalding CTP and programmed in GDOT's long-range plan. Other GDOT transportation projects planned and programmed for Spalding County in the short and long-term include:

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[52] Atlanta Region's Plan. FY 2020-2025 Transportation Improvement Program and RTP. http://documents.atlantaregional.com/transportation/TIP20/Q1/RTP%20Project%20List%20-%20ARCID%20-%2002-28-2020.pdf.

[53] GDOT (2019). CR 498/McDonough Rd From SR 155 TO SR 16 - SR 155 Relocation. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0008682.

[54] GDOT (2019). Griffin Southwest Bypass from SR 3 To SR 16 - Phase II. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0007871 .

[55] Atlanta Region's Plan. FY 2020-2025 Transportation Improvement Program and RTP. http://documents.atlantaregional.com/transportation/TIP20/Q1/RTP%20Project%20List%20-%20ARCID%20-%2002-28-2020.pdf

[56] GDOT (2019). Griffin Southwest Bypass from SR 3 To SR 16 - Phase III. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0010441.

- SR 155 is programmed to be widened from 2nd Street to the Henry County line (PI 0007870). This project will cost an estimated $53.3 million and is scheduled for 2051.[57]
- Resurfacing and maintenance along SR 92 is also programmed for the segment between Westmoreland Road and US 19/41 (PI M005002).[58]

As part of the Downtown Griffin LCI Study, three corridors in the downtown area are programmed for bicycle and pedestrian enhancements (PI 0010333): SR 155/CR 134/North Hill Street from Poplar Street to Tinsley Street; Solomon Street from 9th Street to 3rd Street; and 5th Street from Taylor Street to Solomon Street. The project will consist of shared lanes for bicycles and automobiles, traffic calming measures, access management improvements, intersection bump outs, bicycle parking racks, street furniture, improved pavement markings and wayfinding signage. The project is currently under construction at a cost of $5.9 million.[59] There are also long-range projects that would create commuter rail service between Griffin in Atlanta (PI#0009219[60], 0009220[61], and 0009221[62]) and between Griffin and Macon (PI#371800-[63] & 371801-[64]).

GDOT projects relevant to freight in the Spalding County focus area are summarized in Table 15.

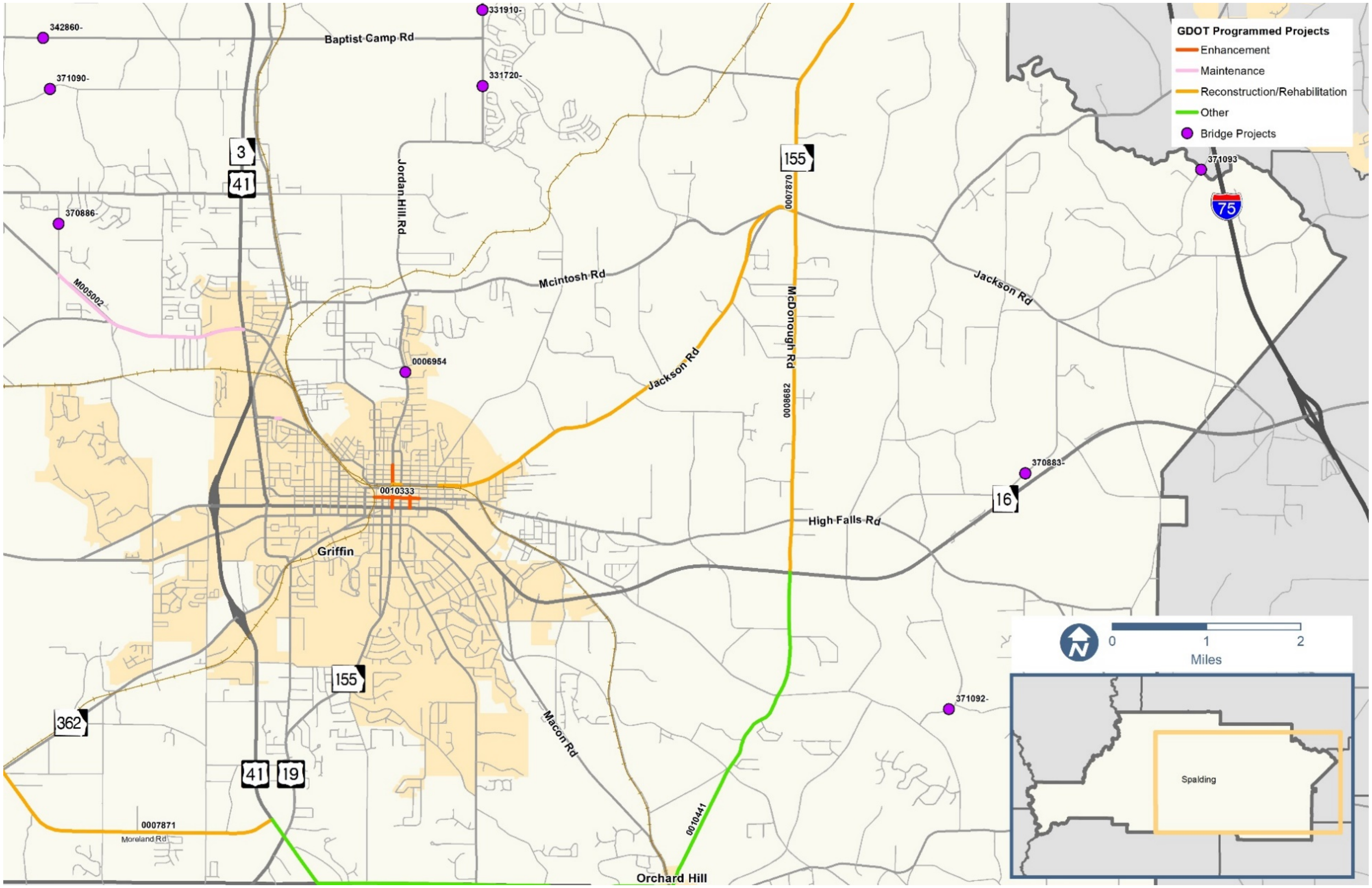
[57] GDOT (2019). SR 155 From CR 508/North 2nd Street to Henry County Line. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0007870.
[58] GDOT (2019). Statewide Transportation Improvement Program – FY 2018-2021, p. 518. http://www.dot.ga.gov/InvestSmart/Documents/STIP/FY18-21/FinalSTIP-FY18-21.pdf.
[59] GDOT (2019). North Hill St; Solomon St & 5th St In Downtown Griffin – LCI. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0010333.
[60] GDOT (2019). Commuter Rail – Atlanta to Griffin - Phase I. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0009219.
[61] GDOT (2019). Commuter Rail – Atlanta to Griffin - Phase II. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0009220.
[62] GDOT (2019). Commuter Rail – Atlanta to Griffin - Phase III. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=0009221.
[63] GDOT (2019). Commuter Rail Griffin to Macon/Bibb – Houston Co. – Phase IV. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=371800-.
[64] GDOT (2019). Commuter Rail Griffin to Macon/Bibb – Houston Co. – Phase V. http://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectId=371801-.

Table 15. GDOT Planned and Programmed Improvements in Project Focus Area

PI #	Project Name	Status	Description
M005002	SR 92 From SR 3 To CR 347/Westmoreland Rd.	Programmed	Resurfacing and maintenance
0010333	North Hill St.; Solomon St & 5th St. In Downtown Griffin - LCI	Under Construction – Scheduled for Completion in 2020	LCI Project in Downtown Griffin that includes improvements on N. Hill St. (SR 155) from Poplar St. to Tinsley St., Solomon St. from 9th St. to 3rd St., 5th St. from Taylor St. (SR 16) to Solomon St.
331910-	CR 889/Jordan Hill Rd. North of Griffin at Troublesome Creek Tributary	Under Construction	Bridge Replacement
0013295	SR 155 at CS 1020/N. Hill St.	Complete	Traffic signal installation and construction of a left turn lane on the westbound approach
0008682	Griffin South Bypass Phase 1	Programmed – Scoping in 2019	From intersection of SR 155 and Jackson Rd. along existing alignment of N. McDonough Rd. to SR 16 (Arthur K. Bolton Pkwy.)
0007870	SR 155 from CR 508/N. 2nd St. to Henry County line	Long-Range	Widening of SR 155 from 2nd St. to the Henry County line
0007871	Griffin South Bypass Phase 2	Long-Range	Widening from SR 16 (Arthur K. Bolton Pkwy.) along existing alignment of S. McDonough Rd. and County Line Rd. to US 19/US 41/SR 3
0010441	Griffin South Bypass Phase 3	Long-Range	Construction of bypass between US 19/US 41/SR 3 and SR 16 (Arthur K. Bolton Pkwy.) along existing County Line Rd. and S. McDonough Rd.
0009219	Commuter Rail – Atlanta to Griffin - Phase I	Long-Range	Long-term commuter rail service between Atlanta and Griffin
0009220	Commuter Rail – Atlanta to Griffin - Phase II	Long-Range	Long-term commuter rail service between Atlanta and Griffin
0009221	Commuter Rail – Atlanta to Griffin - Phase III	Long-Range	Long-term commuter rail service between Atlanta and Griffin
371800-	Commuter Rail – Griffin to Macon/Bibb – Houston County - Phase IV	Long-Range	Long-term commuter rail service between Macon and Griffin

371801-	Commuter Rail – Griffin to Macon/Bibb – Houston County - Phase V	Long-Range	Long-term commuter rail service between Macon and Griffin
0006954	CR 134/N. Hill St. at Cabin Creek	Long-Range	Bridge replacement project
331720-	CR 889/Jordan Hill Rd. @ Troublesome Creek north of SR 16	Long-Range	Bridge replacement project
342860-	CR 509/Birdie Rd. @ Griffin Reservoir Tributary Northwest of Griffin	Long-Range	Bridge replacement project

Figure 37: GDOT Planned and Programmed Projects[65]



65 GDOT

4.4.2. Griffin-Spalding CTP Projects

The Griffin-Spalding CTP includes projects that support regional truck mobility and address localized congestion and safety needs.[66] There are roadway and intersection improvements planned to support the new airport, including the signalization of Wild Plum Road at SR 16, the widening of Wild Plum Road from SR 16 as the entrance to the new airport, and a new airport access road that would connect to Jackson Road. An intersection improvement at SR 155 and Jackson Road is planned to support the relocation of SR 155. Improvements are also planned for the intersection of SR 16 and Wallace Road, to support access to future development in the area. Longer-term projects in the CTP address the need to widen SR 16 west of Griffin from Pine Hill Road to Coweta County and US 19/US 41/SR 3 between Laprade Road and the Henry County line (corresponds to GDOT PI 0000294 detailed in Section 4.4.1). The CTP also proposes a long-term project to construct a new interchange at I-75 and Jenkinsburg Road, which would be the first interstate interchange within the county.

The Griffin-Spalding CTP also includes several projects within Griffin that address safety and operational needs. Projects located along and adjacent to truck routes include the following:

- Intersection improvement - SR 155 (E. Broad Street) at Searcy Avenue
- Intersection improvement - SR 16 at Macon Road
- Intersection improvement - Carver Road at W. Poplar Street/Poplar Road
- Intersection improvement - US 19/US 41/SR 3 at Ellis Road
- Intersection improvement - US 19/US 41/SR 3 at SR 362
- Roadway improvement - SR 155 from S. 9th Street to Poplar Street

While there are several deficient bridges in the focus area, there are no bridge rehabilitation or replacement projects planned or programmed along regional truck routes.

The CTP identifies a need for several corridor studies, including Teamon Road in the northern part of the county and McDonough Road east of Griffin. The CTP also identifies a need for further access management studies along two vital freight connections in Spalding County: US 19/US 41/SR 3 from SR 16 to Ellis Road, and SR 16 from the US 19/US 41/SR 3 Bypass (Martin Luther King Jr. Parkway) to SR 155 in Downtown Griffin. Freight-related projects included in the CTP are summarized in Table 16 and depicted in the map in **Figure 38**.

[66] 2016 Griffin-Spalding Comprehensive Transportation Plan (CTP) Update. May 2016. https://www.spaldingcounty.com/docs/public_works/Needs_and_Recommendations_Report_-_2016_Griffin-Spalding_CTP_Update.pdf

Table 16. CTP Tiered Recommendations in Focus Area (Spalding County)

Project ID	Tier	Project Name	Type	Status
Int #3	1	LCI Intersection #3: N. Hill St. at E. McIntosh Rd.	Intersection	Completed in May 2020
0008682	1	CR 498/S. McDonough Rd. from SR 155 to SR 16 - SR 155 Relocation	Roadway	Programmed – Scoping in 2019
CTP-01	1	Jackson Rd. at N. McDonough Rd.	Intersection	Proposed
CTP-02	1	Orchard Hill Intersection Improvements: Johnston Rd. / Macon Rd. / S. McDonough Rd. & Macon Rd. at Swint Rd.	Intersection	Proposed
CTP-03	1	Tri-County Crossing: Moreland Rd. extension to Zebulon Rd. with intersection improvements	Intersection	Proposed
CTP-04	2	Airport Access Road	Roadway	Proposed
CTP-05	2	Airport Entrance Road (Sapelo Rd. / Wild Plum Rd.) Widening and Improvement	Roadway	Proposed
CTP-06	2	County Line Rd. at Ethridge Mill Rd.	Intersection	Proposed
CTP-07	2	Signalize SR 16 at Wild Plum Rd. / Lakes at Green Valley	Intersection	Proposed
CTP-08	3	Jackson Rd. at Locust Grove Rd.	Intersection	Proposed
CTP-09	3	Old Atlanta Rd. at Dobbins Mill Rd .	Intersection	Proposed
0007870	3	SR 155 Widening to Henry County Line	Roadway	Proposed
CTP-10	3	SR 92 at Cowan Rd.	Intersection	Proposed
0007871	4	Griffin Bypass Phase 2	Roadway	Proposed
0010441	4	Griffin Bypass Phase 3	Roadway	Proposed
ASP-SP-172	4	SR 92 Widening	Roadway	Proposed
ASP-SP-169	4	SR 16 Widening to Coweta County	Roadway	Proposed
0000294	4	US 19/41 Widening to Henry County	Roadway	Proposed
0006972	4	SR 362 from Kings Bridge Rd. to SR 3/US 19	Roadway	Proposed
C-015	4	E. McIntosh / Jackson Rd. Widening	Roadway	Proposed

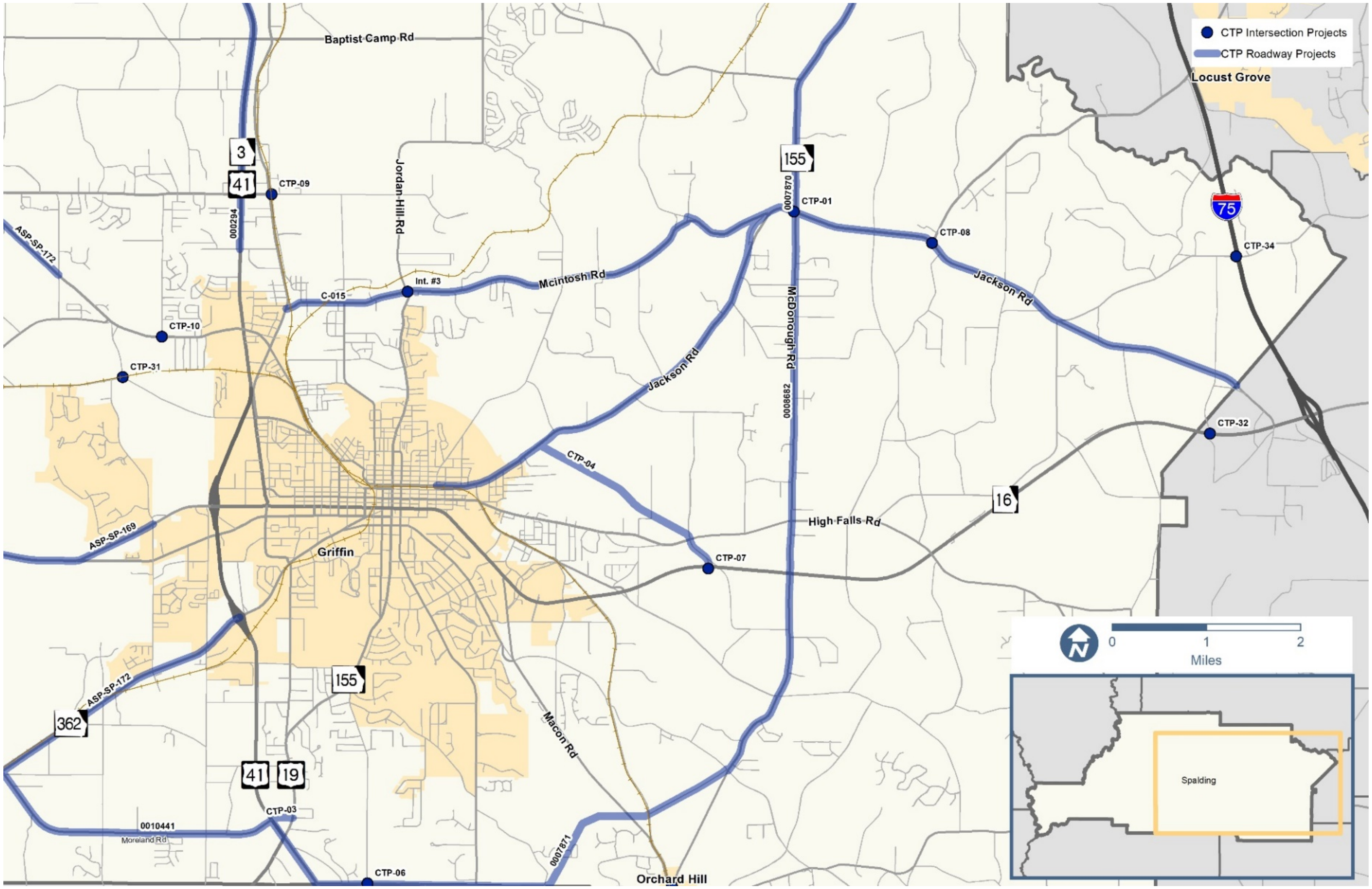
CTP projects within the City of Griffin are shown in Table 17 and depicted in the map in **Figure 39.**

Table 17. CTP Tiered Recommendations in Focus Area (City of Griffin)

Project ID	Tier	Project Name	Type	Status
1	Int #1	LCI Intersection #1: N. Hill St. at Blanton Ave. and N. 6th St.	Intersection	Complete
1	Int #2	LCI Intersection #2: N. Hill St at Northside Dr and Tuskegee Ave Roundabout	Intersection	Complete
1	SPLOST-1	Solomon St. (Little 5 Points) Improvements	Intersection	Concept study complete
1	SPLOST-2	Searcy Ave. at E. Broadway St. (SR 155)	Intersection	Proposed
1	SPLOST-3	Cain St. at Everee Inn Rd.	Intersection	Proposed
1	SPLOST-4	Spalding Dr. at SR 16	Intersection	Proposed
1	SPLOST-5	Hammond Dr. at W. Poplar St.	Intersection	Concept study underway
1	SPLOST-6	College St. at Hamilton/ Kincaid St. (Intersection Improvement Program - Phase I)	Intersection	Proposed
2	CTP-01	Old Atlanta Rd. between E. McIntosh Rd. & McIntosh Rd. / Experiment St.	Intersection	Proposed
2	CTP-02	Poplar St. at 8th St.	Intersection	Proposed
2	CTP-03	SR 16 at Macon Rd.	Intersection	Proposed
3	CTP-04	Poplar St. at Meriwether/ New Orleans/10th St. (Intersection Improvement Program – Phase 1)	Intersection	Proposed
3	CTP-05	Broad St. at 9th St. (Intersection Improvement Program - Phase II)	Intersection	Proposed
3	CTP-06	Experiment St. at 13th/ Ray St. (Intersection Improvement Program - Phase II)	Intersection	Proposed
3	CTP-07	Carver Rd. @ W Poplar St. / Poplar Rd.	Intersection	Proposed
3	CTP-08	Macon Rd. at Hudson Rd.	Intersection	Proposed
3	CTP-09	N. Expressway at Ellis Rd.	Intersection	Proposed
3	CTP-10	Ellis Rd. at US 19/41	Interchange	Proposed
3	CTP-11	SR 362 at US 19/41	Interchange	Proposed
3	CTP-12	Ellis Rd. at Experiment St.	Intersection	Proposed
3	CTP-40	Crescent Rd. at Maple Dr. Improvement	Intersection	Proposed
4	CTP-13	SR 155 / S. Hill St. from S. 9th St. to Poplar St.	Roadway	Proposed

4	CTP-14	Experiment St. at 14th St. (Intersection Improvement Program - Phase I)	Intersection	Proposed
4	CTP-15	Experiment St. at Elm St. (Intersection Improvement Program - Phase II)	Intersection	Proposed

Figure 38: CTP Recommendations in Spalding County[67]



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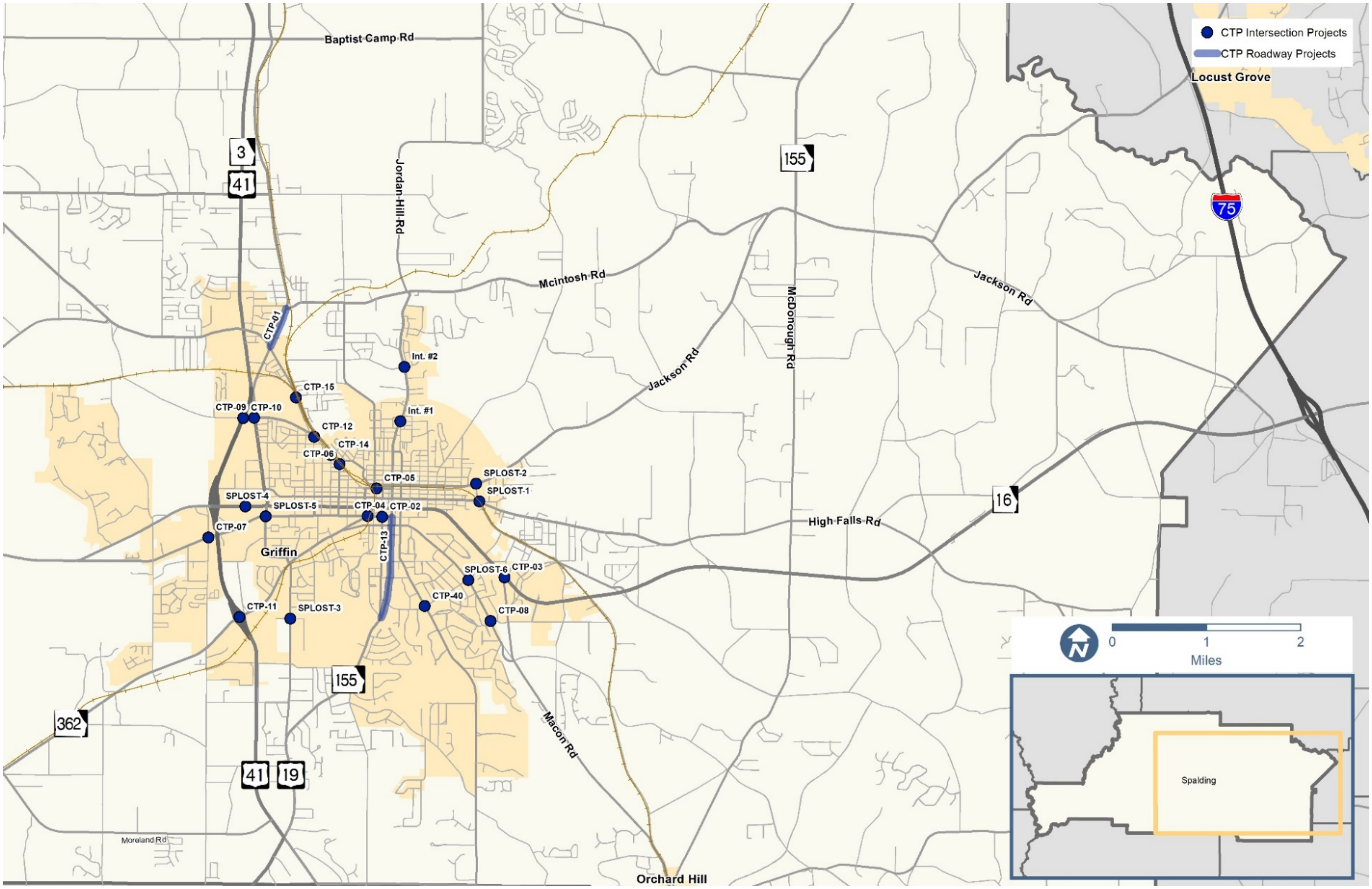
[67] GDOT and Griffin-Spalding Comprehensive Transportation Plan

Figure 39: CTP Recommendations in City of Griffin [68]



68 GDOT and Griffin-Spalding Comprehensive Transportation Plan

5. Major Findings

The following section represents the major findings from this report as they relate to freight mobility and industrial development. For ease of review, these findings have been organized by the subject matter presented here in this report.

- Land Use and Development
- Roadway Network Characteristics
- Freight Network Characteristics
- Workforce Access

5.1. Land Use and Development

- Approximately 90 percent of the County, including much of eastern Spalding County between Griffin and I-75, is characterized by low density residential and agricultural uses. In conjunction with the growth anticipated along the I-75 corridor, the current growth in the Green Valley industrial area along the SR 16 corridor and the new airport, and the amount of undeveloped/low density land use, it can be anticipated that the demand for industrial development will occur in this area. This will require a more detailed plan for industrial development in the eastern portion of the County to ensure responsible development and avoid community conflicts.
- Industrial development is currently located primarily in two areas: 1) older industrial sectors along Zebulon Road and Everee Inn Road in southwest Griffin; and 2) the Green Lakes area southeast of Griffin along SR 16. There is also the Dollar General distribution center along Jackson Road on the Butts County line, which is foreseen as the first of many new industrial developments that will be interested in proximity to the I-75/SR 16 interchange.
- Of the existing industrial developments in the County, those located in the Green Valley area rated best for development potential due to a combination of existing infrastructure, freight access, worker access, and developable land for expansion. While the area adjacent to I-75 has the greatest potential for future demand, it is still relatively undeveloped and lacks supporting infrastructure for immediate development.

5.2. Roadway Network Characteristics

- Given the relatively undeveloped nature of the County, most of the roadways outside of Griffin are two-lane facilities. Routes with four lanes include US 19/US 41/SR 3 throughout the County, Business US 19/US 41 (North Expressway), SR 92/McIntosh Road between West McIntosh Road and Old Atlanta Road, and SR 16/Taylor Street from downtown Griffin east towards the I-75 interchange in adjacent Butts County. As such, most roadways throughout the County operate at under minimal congested conditions. Even within the City, the number of congested segments is minimal. This indicates that, unlike many studies that take place in the Atlanta region, a main objective of the Spalding Freight Cluster Plan is to mitigate future congestion through responsible development rather than addressing existing congestion. Furthermore, adequate capacity along County roadways indicates that operational improvements may help to alleviate most localized congestion issues.

- With the exception of the Griffin Bypass, most of the planned and programmed improvements within the County are operations and maintenance projects rather than capacity improvements (roadway widenings and new roadways). Despite the fact that little new capacity is planned for the County, the level of congestion projected in 2040 throughout the County is still relatively low. However, it should be noted that the ARC travel demand model is based upon future land use plans at the time of its development. Given the anticipated level of industrial development expected in the eastern part of the County, the roadway volumes and related congestion levels currently projected in 2040 are maybe somewhat understated.

5.3. Freight Network Characteristics

- Significant truck routes throughout the County include SR 16, US 19 Business/Hill St./Zebulon Road, US 19/US 41/SR 3, SR 362 and SR 92. Portions of McIntosh Road accessing the Trans Montaigne Pipeline Terminal are also on the NHFN. SR 16 and US 19/US 41/SR 3 carry the most substantial truck traffic within the County and provide connectivity I-75 and I-85, and to industrial uses within the County as well as distribution points outside Spalding County and across the region.
- Spalding County's Class 1 rail lines, which are owned by Norfolk Southern, intersect in downtown Griffin, converge northwest of the city, and then split towards McDonough to the northeast, Jonesboro to the north, Brooks to the west, and Zebulon and Barnesville to the south. There are almost 40 at-grade railroad crossings within the county, and more than 15 inside the City of Griffin. In conjunction with the number of truck routes in the County, Spalding County has a robust network of freight facilities to support and encourage future industrial development opportunities.
- There are also several designated truck route restrictions in the County. As new industrial development is planned, special attention will need to be given to these restrictions and how they restrict freight movement.

5.4. Workforce Access

- Spalding County experiences a substantial influx of workers who commute into the county each day, as well as a significant outflow of residents who travel to work outside the county. Among the estimated 27,301 residents of working age who live in Spalding County, 75 percent are employed outside of Spalding County, and 25 percent, or approximately 6,827 residents, remain within the county for employment. As Spalding County expands its industrial sectors, it should identify ways to attract more local workers.
- Other than the circulator routes within the City, there is very limited transit opportunities to support local businesses. Furthermore, there is also no direct access to commute services available to Spalding County residents. As a result, nearly all of the workforce within the County is dependent on personal automobiles. This would indicate a need to investigate better workforce accessibility options as the County expands its industrial base.

Appendix B

Spalding County Freight Cluster Plan

Prioritization Tech Memo

Technical Memorandum

To: William Wilson, County Manager
Brian Upson, Paragon Consulting

From: Metro Analytics

Date: October 31, 2020

Re: Spalding County Freight Cluster Plan - Prioritization Process and Results

Introduction

The purpose of this technical memorandum is to document the prioritization of projects for the Tucker Summit Community Improvement District (TSCID) Freight Cluster Plan. The purpose of the Plan is to provide detailed insight into the TSCID's current and future freight activity in order to address transportation planning, traffic operations, and related planning. This analysis is associated with the development of the Work Program task of the Plan Scope of Services.

1.1. Project Prioritization Methodology

The vision, goals and objectives described in the previous section were integrated into a set of criteria, on which the projects were evaluated and compared. These criteria served as the foundation for developing the project prioritization framework. The study team developed the following six criteria:

1. Mobility
2. Safety
3. Economic Benefit
4. Environment & Public Health
5. Project Readiness
6. System Reliability

The project prioritization methodology included establishing the qualitative and quantitative evaluation factors, also called measures, for each criterion. The project values were collected for each measure, and an ordinal rating scheme was developed that converted the project values to scores between 0 and 100. These scores were used to estimate the total points each project received and then rank-ordered by the total number of points.

This section discusses the criteria, the measures within each criterion and the rating scheme.

1.1.1. Criteria 1: Mobility

Criteria Mobility was used to assess potential improvements that are considered to address an operational deficiency. Five measures, two quantitative and three qualitative, were included in Mobility.

1.1.1.1. Total AADT

The total AADT was estimated for each project using the Atlanta Regional Commission's (ARC) Travel Demand Model (TDM). The analysis was done for the existing year 2020, for which travel model was available from ARC. The procedure to calculate AADT depended on the project type. For capacity projects, maximum AADT was picked form the segments that make up the project corridor. For intersection improvements, maximum AADT from the intersecting segments was selected. Projects in locations with higher vehicle AADT received a higher score than the ones in areas with lower vehicle AADT.

1.1.1.2. Truck percentage

The truck percentage was estimated for each project using ARC's TDM for the year 2020. The truck percentage for each project was based on the links at which AADT was estimated. Projects in locations with higher truck percentage received a higher score than the ones in areas with lower truck percentage.

1.1.1.3. Travel time savings

Travel time savings are important measure for evaluating the performance of projects. Ideally, a travel demand model could provide the travel time savings by comparing the model results from a No-Build model run and a build (with project in place) run. However, ARC model run requires high computing power and time (more than 36 hours) making it practically not possible to run a build scenario for each project. Therefore, travel time savings were estimated qualitatively using professional judgment, and the values used were "Low", "Medium" and "High". A project with high travel time savings received a higher score.

1.1.1.4. Serve congested corridor (existing LOS)

The level of congestion was estimated from the ARC's travel demand model. The level of service (LOS) was estimated fir each project using links that were used to estimate AADT. The projects were classified into four categories of LOS – A-C, D, E and F. The projects serving regions with poor LOS received more points that the others.

1.1.1.5. Freight-designated corridor

The values used of the measure freight-designated corridor were qualitative and the projects were classified in two categories, Yes or No, depending if the project lies on a freight corridor or not. The projects that are on a freight corridor receive higher points than the ones that are not.

1.1.2. Criteria 2: Safety

Criteria safety was used to identify the potential improvements that are considered to improve highway safety. The project was considered to improve safety if is in location where crash occurrences are high, have high truck crashes or if the improvement has high Crash Modification Factor (CMF). Safety consists of six measures, four quantitative and two qualitative, and are described below.

1.1.2.1. *Fatal crashes per thousand AADT (within 0.25 mi)*

The crash data was obtained from Georgia Electronic Crash Reporting System (GEARS). A quarter mile buffer was created along each project and the number of fatal crashes for five years from 2014 to 2018 were collected. The crashes were normalized by the AADT to estimate the fatal crashes per thousand AADT. The projects in locations with higher fatal crashes per thousand AADT receive higher scores.

1.1.2.2. *Injury crashes per thousand AADT (within 0.25 mi)*

Like the fatal crashes, injury crashes were also estimated from Georgia Electronic Crash Reporting System (GEARS). The process was similar to estimating the injury crashes per thousand AADT for each project. The projects in locations with higher injury crashes per thousand AADT receive higher scores.

1.1.2.3. *Other crashes per thousand AADT (within 0.25 mi)*

Like the fatal and injury crashes, PDO crashes were also estimated from Georgia Electronic Crash Reporting System (GEARS). The process was similar to estimating the injury crashes per thousand AADT for each project. The projects in locations with higher PDO crashes per thousand AADT receive higher scores.

1.1.2.4. *Percent Truck crashes*

Project scoring was also done using the number of trucks involved in the corridor. The GEARS data included trucks involved in the crashes which were used to calculate the percentage of truck crashes for each project. The projects in locations with higher truck crashes receive higher scores.

1.1.2.5. *Expected reductions in crashes by project type*

The expected reduction was estimated qualitatively using the crash modification factor for each project. The CMF clearinghouse provided the crash reduction by type of improvement. In case the project included multiple improvements, the highest crash modification factor was used. Since all the projects did not have crash modification factors available, professional judgment was used. The projects were classified into High, Medium, and Low expected reduction in crashes.

1.1.2.6. *At-risk bridges*

The projects were evaluated to see if they were located on at-risk bridges, or if they reconstruct load-limited bridges to improve freight movement. The projects were assigned qualitative values of Yes or No, and the ones with Yes were scored higher.

1.1.3. *Criteria 3: Economic Benefit*

Criteria Economic was used to identify potential improvements that are generally considered to support connectivity and economic growth. Four measures, all qualitative, were used to evaluate the projects under this criterion.

1.1.3.1. *Supporting Regionally Significant Locations*

The measure is qualitative and values the project by assigning Yes and No values to each project depending if the project connects to (or is within) a Regional Employment Center, a Freight Cluster Area or a Regional Place.

1.1.3.2. Regional Freight Significance

Each project was evaluated to see if it improves the movement of freight and is it located on ARC's regional freight system (ASTRoMaP), GDOT's Statewide Designated Freight Corridors or the FHWA National Highway Freight Network (NHFN). The values of Yes or No were assigned to the project and projects with values Yes received higher score.

1.1.3.3. Maximize use of ROW

The measure was to evaluate if the project requires Right-of-Way (ROW) acquisition, including construction easements, from a potential historic property or National Register listed property. The projects were assigned values of Yes and No and the ones that maximize the use of right-of way received higher scores.

1.1.3.4. Multimodal connectivity (Transit, Bicycle, Pedestrian)

This is a qualitative measure and was used to evaluate whether the project provided connectivity to multiple modes like transit, bicycle, and pedestrian. The projects were assigned values of Yes and No and the ones that provided multimodal connectivity, received higher scores.

1.1.4. Criteria 4: Environment & Public Health

The criteria Environmental and Public Health was used to identify projects that were expected to reduce emissions. It included only one qualitative measure, describe below.

1.1.4.1. Diesel emission reduction

The projects which helped in reducing vehicle emissions that cause bad air quality and contribute to climate change, reduced higher scores than others. The projects were categorized qualitatively into High, Medium, and Low values. The projects with High emission reductions received higher score.

1.1.5. Criteria 5: Project Readiness

The criteria Project Readiness was used to evaluate what would be the level of effort to implement project. It reflects project complexity and following qualitative measures were used to evaluate it. Four measures, all qualitative, were used to evaluate the projects under this criterion.

1.1.5.1. Coordination with City and County; Consistency with County Comprehensive Transportation Plan (CTP), Transportation Master Plan, etc.

Each project was evaluated to see if it requires coordination with cities or counties and is consistent with their CTPs or Transportation Master plans. Qualitative values of Yes and No were used. Projects with value of Yes, were consistent with the CTPs and RTPs and received higher score.

1.1.5.2. Included in Regional Transportation Plan (RTP)

Qualitative values of Yes and No were used for this measure. If the project is included in the RTP, it would have already been studied regionally. Such projects received higher score.

1.1.5.3. Level of effort to implement project (project complexity)

It is a qualitative measure that evaluated the level of effort to implement the project based on ROW and environmental requirements. Low, Medium, and High values were assigned to the projects. Projects with low level of effort to implement received higher score.

1.1.5.4. Screening of environmentally historic resources

Qualitative values of Yes and No were used for this measure. If the project has been screened for environmentally historic resource like wetlands, it would receive a higher score.

1.1.6. Criteria 6: System Reliability

The criterion of reliability was used to determine which projects were helpful in adding network resiliency to the transportation network. Only one qualitative measure was used.

1.1.6.1. Provide resiliency to regional and Spalding County network

It is a qualitative measure that assigned values of Yes or No to the projects, based on whether they are expected to provided resiliency to the regional and Spalding County transportation networks. Projects with value of Yes received higher score.

After the project values, which included both quantitative and qualitative values, were obtained for each measure under each criterion, they were converted to scores of 0-100 using the scoring scheme presented in Table 2.

Table 2: Scoring scheme for project values

Criteria	Measure	Score
Mobility	**Total AADT**	
	0 - 1,000	5
	1,000 - 5,000	10
	5,000 - 10,000	20
	10,000 - 20,000	40
	20,000 - 40,000	60
	40,000 - 60,000	80
	>= 60,000	100
	Truck %	
	0% - 5%	10
	5% - 10%	20
	10% - 15%	40
	15% - 20%	60
	20% - 25%	80
	>= 25%	100

Criteria	Measure	Score
	Travel time savings	
	Low	20
	Med	60
	High	100
	Serve congested corridor (existing LOS)	
	A-C	0
	D	33
	E	67
	F	100
	Freight-designated corridor	
	No	0
	Yes	100
Safety	**Fatal crashes per thousand AADT (within 0.25 mi)**	
	0.00 - 1.00	0
	1.00 - 2.00	25
	2.00 - 3.00	50
	>= 3	100
	Injury crashes per thousand AADT (within 0.25 mi)	
	0.0 - 50.0	0
	50.0 - 100.0	25
	100.0 - 200.0	50
	200.0 - 400.0	75
	>= 400	100
	Other crashes per thousand AADT (within 0.25 mi)	
	0 - 50	0
	50 - 100	25
	100 - 500	50
	500 - 1,000	75
	>= 1,000	100
	% Truck crashes	
	0% - 5%	0
	5% - 10%	25
	10% - 20%	50
	20% - 40%	75
	>= 40%	100
	Expected reductions in crashes by project type	
	Low	20
	Med	60
	High	100
	At-risk bridges	
	No	0

Criteria	Measure	Score
	Yes	100
Economic Benefit	**Supporting Regionally Significant Locations**	
	No	0
	Yes	100
	Regional Freight Significance	
	No	0
	Yes	100
	Maximize use of ROW	
	No	0
	Yes	100
	Multimodal connectivity (Transit, Bicycle, Pedestrian)	
	No	0
	Yes	100
Environment & Public Health	**Diesel emission reduction**	
	Low	20
	Med	60
	High	100
Project Readiness	**Coordination with City and County; Consistency with County CTP, Transportation Master Plan, etc.**	
	No	0
	Yes	100
	Included in RTP	
	No	0
	Yes	100
	Level of effort to implement project (project complexity)	
	Low	100
	Med	60
	High	20
	Screening of environmentally historic resources	
	No	0
	Yes	100
System Reliability	**Provide resiliency to regional and Spalding network**	
	No	0
	Yes	100

1.2. Ranking of Projects

The next step involved defining multiple scenarios and ranking the projects under each scenario. Scenarios were developed by assigning different weighting factors to individual criteria. The purpose of this was to understand the impact of each criteria on project rankings and to identify projects that consistently appeared near the top of the rankings, regardless of where the emphasis was placed.

Seven scenarios were developed:

- Scenario 1: Mobility
- Scenario 2: Safety
- Scenario 3: Economic Benefit
- Scenario 4: Environment & Public Health
- Scenario 5: Project Readiness
- Scenario 6: System Reliability
- Scenario 7: User Defined

The weighting factor, in percentage, for each criterion under each scenario is shown in the pie charts in Figure xx. Scenarios 1 through 6 have 50% weight assigned to respective criterion, while the remaining criteria received 10% each. The weights of the criteria under scenario 7 were determined in consultation with the priorities of the Spalding County staff. In this scenario, Mobility is given the highest priority with 25% weightage, followed by Safety and Economic Benefits with 20% weightage for each, 15% weightage to Environment & Public Health, and 10% weightage to each of Project Readiness and System Reliability.

The weights of individual performance measures within each criterion are shown in Table xx. The weights of performance measures do not vary by scenario.

Figure 1: Weight Assigned to Each Criteria by Scenario

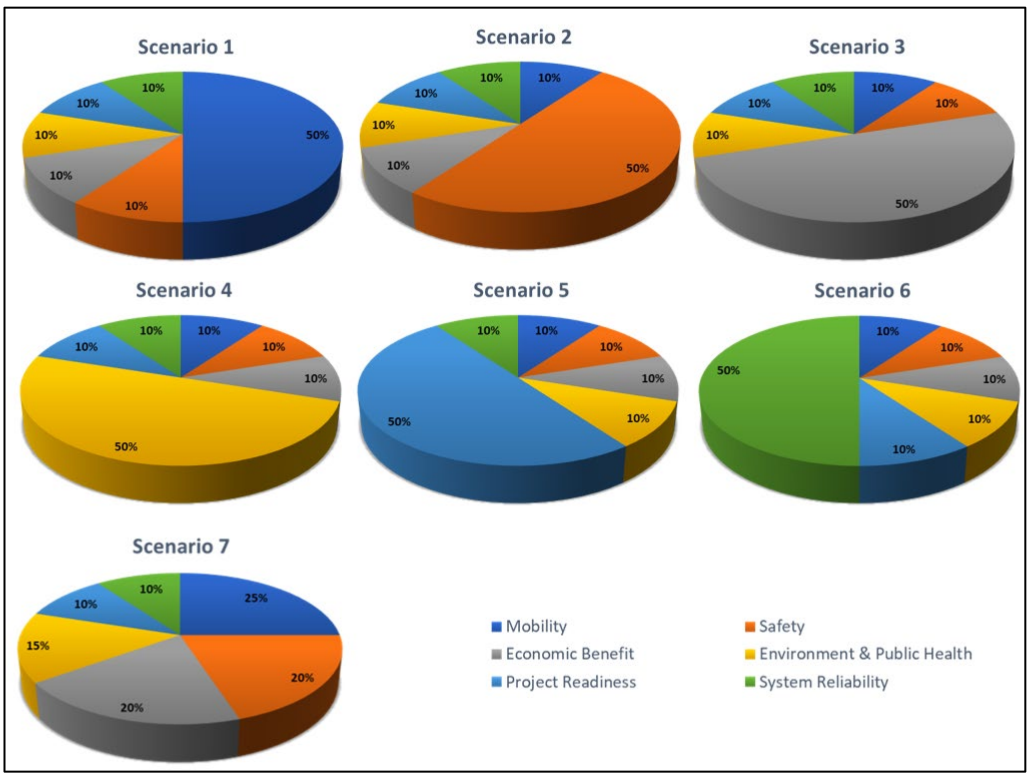


Table 1: Weights of Performance Measures within Criteria

No.	Criteria	Measures	Measure % within Criteria
1	Mobility	Total AADT	20%
		Truck %	20%
		Travel time savings	20%
		Serve congested corridor (existing LOS)	20%
		Freight-designated corridor	20%
2	Safety	Fatal crashes per AADT (within 0.25 mi)	20%
		Injury crashes per AADT (within 0.25 mi)	20%
		Other crashes per AADT (within 0.25 mi)	15%
		% Truck crashes	15%
		Expected reductions in crashes by project type	15%
		At-risk bridges	15%
3	Economic Benefit	Supporting Regionally Significant Locations	25%
		Regional Freight Significance	25%
		Maximize use of ROW	25%
		Multimodal connectivity (Transit, Bicycle, Pedestrian)	25%
4	Environment & Public Health	Diesel emission reduction	100%
5	Project Readiness	Coordination with City and County; Consistency with County CTP, Transportation Master Plan, etc.	25%
		Included in RTP	25%
		Level of effort to implement project (project complexity)	25%
		Screening of environmentally historic resources	25%
6	System Reliability	Provide resiliency to regional and Spalding network	100%

In order to rank the projects under a selected scenario, total points were calculated for each project under that scenario. For each project, the score (0-100) of each measure was multiplied by the weight of the measure (from Table xx) and the weight of the criterion that measure belongs to. The total points each project received were estimated by summing up the weighted scores of all the performance measures. The project that received the most points received the highest ranking.

While the priority rankings were based on the qualitative and quantitative criteria discussed previously, it should be noted that the scores are not meant to be the final decision on whether a project should be implemented. Rather, they reflect the prioritization ranking of each project within the study area under different scenarios and weighting factors. They provide input and guidance for planners and decision-makers.

1.3. Project Prioritization Spreadsheet Tool

A spreadsheet-based project prioritization tool was developed to implement the methodology in the previous section and rank the projects. The inputs required are the values of each performance measure in each criterion for every project. The values were converted to a score between 0 and 100. Once the scores were established, the user has the flexibility of choosing the scenario under which he would like to see project ranking. Once the scenario was chosen, the scores was multiplied by appropriate wights of the criteria and the measures to estimate total project scores, which were eventually used to rank the projects. Following are some of the features of the tool:

- It is User-friendly and flexible
- It has Navigation menu with instructions
- It is easy to add and delete projects, and select projects and add project data
- The user can change the scoring criteria and weights, and view the results on the fly
- The user can develop and print reports

Following figures show the useful worksheets in the tool.

- Figure 1: Opening sheet with navigation menu
- Figure 2: Database
- Figure 3: Evaluation Criteria and Scenarios
- Figure 4: Screening Points
- Figure 5: Scenario Selection and Project Ranking
- Figure 6: Report – Project Rank by Scenario

Figure 2: Opening sheet with navigation menu

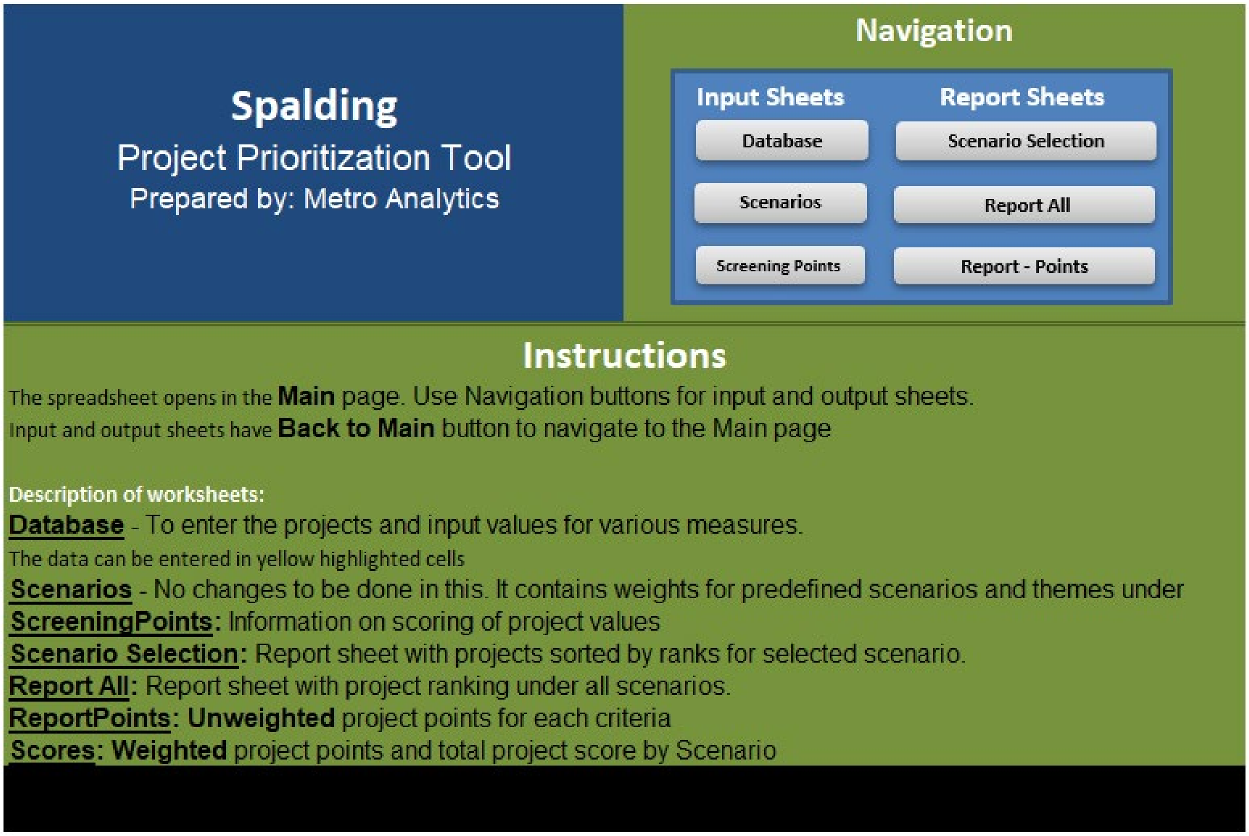


Figure 3: Database

Project No	ID	Project Name	Brief Description	Selection	Mobility					Safety					
		Back to Main		"N" to exclude the project	Total AADT	Truck %	Travel time savings	Serve congested corridor (existing LOS)	Freight-designated corridor	Fatal crashes per AADT (within 0.25 mi)	Injury crashes per AADT (within 0.25 mi)	Other crashes per AADT (within 0.25 mi)	% Truck crashes	Expected reductions in crashes by project type	At-risk bridges
1	I-1	Jackson Road at Wallace Road Intersection	Install splitter		2,081	13%	Low	N/A	No	0.00	0.96	4.81	33%	Low	No
2	I-2	Arthur K. Bolton Parkway (SR 16) at Wild Plum	In the interim,		10,025	20%	High	A-C	Yes	0.00	0.00	1.10	36%	Med	No
3	I-3	Martin Luther King, Jr. Parkway (US 19/41) at	Install Advanced		25,301	12%	Low	N/A	Yes	0.00	0.75	2.13	30%	Med	No
4	I-4	Arthur K. Bolton Parkway (SR 16) at Green Valley	At Rehoboth Rd		11,057	17%	Low	N/A	Yes	0.00	0.99	3.07	31%	Med	No
5	I-5	Arthur K. Bolton Parkway (SR 16) at Rehoboth	Relocate stop		10,515	20%	Low	N/A	Yes	0.00	1.43	2.00	31%	Low	No
6	I-6	Arthur K. Bolton Parkway (SR 16) at S.	Convert		9,692	21%	Low	N/A	Yes	0.00	1.86	3.20	45%	Med	No
7	I-7	E. McIntosh Road at 9th Street Intersection	Widen curb		4,598	17%	Low	A-C	No	0.00	3.26	3.04	28%	Med	No
8	I-8	Martin Luther King, Jr. Parkway (US 19/41) at	Install dual left-		27,413	14%	High	D	Yes	0.04	2.95	6.75	35%	High	No
9	I-9	Johnston Road at Macon Road Reconstruction	Reconstruct and		3,153	13%	Low	A-C	No	0.00	7.29	18.40	36%	Low	No
10	I-10	Johnston Road at Green Valley Road	Repave and		2,882	12%	Low	N/A	No	0.00	7.98	20.12	36%	Low	No
11	I-11	Johnston Road at S. McDonough Road	Install splitter		3,665	14%	Low	N/A	No	0.00	6.28	15.55	36%	Low	No
12	I-12	Martin Luther King, Jr. Parkway (US 19/41) at	Monitor level of		27,413	14%	High	D	Yes	0.04	2.95	6.75	35%	Med	No
13	I-13	Johnston Road at Macon Road Roundabout	Install a		3,153	13%	Med	A-C	No	0.00	7.29	18.40	36%	High	No
14	I-14	Green Valley Road Realignment	Eliminate		2,882	12%	High	A-C	No	0.00	7.98	20.12	36%	Med	No
15	I-15	Johnston Road at S. McDonough Road	Install a		3,665	14%	High	A-C	No	0.00	6.28	15.55	36%	Med	No
16	I-16	E. McIntosh Road at 9th Street Intersection	Consider		4,598	17%	Med	A-C	No	0.00	3.26	3.04	28%	High	No
17	I-17	CTP03 - Tri-County Crossing: Moreland Road	Connect		4,441	11%	High	A-C	No	0.23	14.19	26.57	34%	Low	No
18	T-1	Martin Luther King, Jr. Parkway (US 19/US 41/SR	Coordinate with		35,144	15%	High	D	Yes	0.40	12.32	23.16	33%	High	No
19	T-2	Martin Luther King, Jr. Parkway (US 19/US 41/SR	Coordinate with		27,413	14%	High	D	Yes	0.07	4.41	9.67	34%	High	No
20	T-3	Arthur K. Bolton Parkway (SR 16) Signal	Coordinate with		25,862	12%	High	D	Yes	0.12	24.90	60.98	31%	High	No
21	T-4	S. Hill Street (SR 155) Signal Optimization and	Coordinate with		18,669	12%	High	F	Yes	0.21	10.34	28.92	30%	High	No
22	LI-2	CTP-01 - Jackson Rd at N McDonough Rd	Intersection		18,639	19%	Med	E	No	0.00	1.13	3.22	32%	Med	No
23	LI-3	CTP-02 - Orchard Hill Intersection Improvements	Intersection		3,665	14%	Med	A-C	No	0.00	6.28	15.55	36%	Med	No
24	LI-4	CTP-06 - County Line at Etheridge Mill Rd	Intersection		4,406	14%	Med	A-C	No	0.00	0.68	2.72	27%	Low	No
25	LI-5	CTP-07 - Signalize SR 16 at Wild Plum/Lakes at	Intersection		10,025	20%	High	A-C	Yes	0.00	0.00	1.00	30%	Med	No
26	LI-8	SPLOST-3 - Cain St. Realignment at Everee Inn	Intersection		207	2%	Med	A-C	No	0.00	0.00	19.32	25%	High	No
27	LI-9	SPLOST-6 - Intersection Improvement Program -	Intersection		3,880	12%	Med	A-C	No	0.00	0.52	4.38	26%	Med	No
28	LI-10	SPLOST-1 - Solomon Street (Little 5 Points)	Intersection		4,010	12%	Med	A-C	No	0.00	0.75	6.48	31%	High	No
29	LI-11	SPLOST-4 - Spalding Dr. at SR 16 Turn Lane	Intersection		14,944	10%	Med	A-C	Yes	0.00	2.14	9.57	32%	High	No

Figure 4: Evaluation Criteria and Scenarios

Back to Main **Evaluation Criteria**

No.	Criteria	Measures	Criteria %	Mobility Scenario 1 Goals	Mobility Scenario 1 Criteria	Safety Scenario 2 Goals	Safety Scenario 2 Criteria	Economic Benefit Scenario 3 Goals	Economic Benefit Scenario 3 Criteria	Environment & Public Health Scenario 4 Goals	Environment & Public Health Scenario 4 Criteria	Project Readiness Scenario 5 Goals	Project Readiness Scenario 5 Criteria	System Reliability Scenario 6 Goals	System Reliability Scenario 6 Criteria	User Defined Scenario 7 Goals	User Defined Scenario 7 Criteria
1	Mobility	Total AADT	20%	50%	10.0%	10%	2.0%	10%	2.0%	10%	2.0%	10%	2.0%	10%	2.0%	25%	5.0%
		Truck %	20%		10.0%		2.0%		2.0%		2.0%		2.0%		2.0%		5.0%
		Travel time savings	20%		10.0%		2.0%		2.0%		2.0%		2.0%		2.0%		5.0%
		Serve congested corridor (existing LOS)	20%		10.0%		2.0%		2.0%		2.0%		2.0%		2.0%		5.0%
		Freight-designated corridor	20%		10.0%		2.0%		2.0%		2.0%		2.0%		2.0%		5.0%
2	Safety	Fatal crashes per AADT (within 0.25 mi)	20%	10%	2.0%	50%	10.0%	10%	2.0%	10%	2.0%	10%	2.0%	10%	2.0%	20%	4.0%
		Injury crashes per AADT (within 0.25 mi)	20%		2.0%		10.0%		2.0%		2.0%		2.0%		2.0%		4.0%
		Other crashes per AADT (within 0.25 mi)	15%		1.5%		7.5%		1.5%		1.5%		1.5%		1.5%		3.0%
		% Truck crashes	15%		1.5%		7.5%		1.5%		1.5%		1.5%		1.5%		3.0%
		Expected reductions in crashes by project type	15%		1.5%		7.5%		1.5%		1.5%		1.5%		1.5%		3.0%
		At-risk bridges	15%		1.5%		7.5%		1.5%		1.5%		1.5%		1.5%		3.0%
3	Economic Benefit	Supporting Regionally Significant Locations	25%	10%	2.5%	10%	2.5%	50%	12.5%	10%	2.5%	10%	2.5%	10%	2.5%	20%	5.0%
		Regional Freight Significance	25%		2.5%		2.5%		12.5%		2.5%		2.5%		2.5%		5.0%
		Maximize use of ROW	25%		2.5%		2.5%		12.5%		2.5%		2.5%		2.5%		5.0%
		Multimodal connectivity (Transit, Bicycle, Pedestrian)	25%		2.5%		2.5%		12.5%		2.5%		2.5%		2.5%		5.0%
4	Environment & Public Health	Diesel emission reduction	100%	10%	10.0%	10%	10.0%	10%	10.0%	50%	50.0%	10%	10.0%	10%	10.0%	15%	15.0%
5	Project Readiness	Coordination with City and County; Consistency with County CTP, Transportation Master Plan, etc.	25%	10%	2.5%	10%	2.5%	10%	2.5%	10%	2.5%	50%	12.5%	10%	2.5%	10%	2.5%
		Included in RTP	25%		2.5%		2.5%		2.5%		2.5%		12.5%		2.5%		2.5%
		Level of effort to implement project (project complexity)	25%		2.5%		2.5%		2.5%		2.5%		12.5%		2.5%		2.5%
		Screening of environmentally historic resources	25%		2.5%		2.5%		2.5%		2.5%		12.5%		2.5%		2.5%
6	System Reliability	Provide resiliency to regional and Spalding network	100%	10%	10.0%	10%	10.0%	10%	10.0%	10%	10.0%	10%	10.0%	50%	50.0%	10%	10.0%
			Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Figure 5: Screening Points

No.	Themes		Criteria	Questions	Lookup detail	Lookup value	Scores
1	Mobility		Total AADT	0		0	5
						1,000	10
						5,000	20
						10,000	40
						20,000	60
						40,000	80
						60,000	100
						N/A	0
			Truck %	0		0%	10
						5%	20
						10%	40
						15%	60
						20%	80
						25%	100
						N/A	0
			Travel time savings	0		Low	20
						Med	60
						High	100
						N/A	0
						TBD	60
			Serve congested corridor (existing LOS)	0	No	A-C	0
					Yes	D	33
						E	67
						F	100
						N/A	0
			Freight-designated corridor	0	No	No	0
					Yes	Yes	100
2	Safety		Fatal crashes per AADT (within 0.25 mi)			0	0
						1	25
						2	50
						3	100

Figure 6: Scenario Selection and Project Ranking

Select Scenario			Scenario 7			
User Defined						
Rank	**Project Name**	**Description**	**ID**			**Total Score**
1	One Way Pair East-West Downtown Griffin	Create an East-West One-Way Pair in Griffin. Purpose	LTR-6			60.9
2	S. Hill Street (SR 155) Signal Optimization and Advanced Dilemma-Zone Detection System (E. Taylor Street to	Coordinate with GDOT to leverage connected signal te	T-4			60.8
3	Arthur K. Bolton Parkway (SR 16) at Wild Plum Road Intersection Improvement	In the interim, install a Restricted Crossing U-Turn (RC	I-2			59.3
4	Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) Signal Optimization and Advanced Dilemma-Zone Detection	Coordinate with GDOT to optimize signal timing along	T-1			58.9
5	Martin Luther King, Jr. Parkway (US 19/41) at Zebulon Road (SR 155) Intersection Improvement (Dual Left Turn	Install dual left-turn lanes for the eastbound left-turn	I-8			58.4
5	US 41 Upgrades (South County Line to North County Line)	Plan for grade separation of signficant cross-streets, a	LTR-1			58.4
7	Martin Luther King, Jr. Parkway (US 19/41) at Zebulon Road (SR 155) Intersection Improvement (Displaced Left Turn	Monitor level of congestion and consider installing a	I-12			57.2
8	Arthur K. Bolton Parkway (SR 16) Signal Optimization and Advanced Dilemma-Zone Detection System (Pine Hill	Coordinate with GDOT to leverage connected signal te	T-3			56.7
9	Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) Advanced Dilemma-Zone Detection System (Zebulon Rd to	Coordinate with GDOT to leverage connected signal te	T-2			55.9
10	One Way Pair North-South Downtown Griffin	Create a North-South One-Way Pair in Griffin. Purpose	LTR-7			53.4
11	Eastern Bypass (US 41 to North County Line)	New alignment from US 41 in Lamar County north to M	LTR-4			52.3
11	I-75 Parallel Frontage Access Roads (eventually one-way frontage)	Construct / preserve for frontage roads along I-75 thro	LTR-12			52.3
13	CTP-07 - Signalize SR 16 at Wild Plum/Lakes at Green Valley	Intersection Improvements	LI-5			48.6
14	Northern Bypass Alternative 2 (Airport Dr to US 41)	New alignment northwest from future Airport Dr to ne	LTR-NB-2			46.8
15	Northern Bypass Alternative 1 (McDonough to US 41)	New alignment from McDonough Rd west to US 41 just	LTR-NB-1			45.8
16	SPLOST-4 - Spalding Dr. at SR 16 Turn Lane	Intersection Improvements	LI-11			45.2
17	Locust Grove Connector (Baptist Camp Rd to I-75)	New alignment from Baptist Camp Rd on the west to I	LTR-10			44.9
18	Northern Bypass Route (SR 16 to East County Line)	New East-West alignment through entire length of Sp	LTR-2			44.8
18	One Way Pair NW Diagonal (Northern Bypass Route to Rehobeth Rd)	New Airport Bypass. Purpose is to divert traffic on Hwy	LTR-5			44.8
20	Southern By Pass Alternative 2 (McDonough to Airport Rd)	New alignment west from McDonough to existing Airp	LTR-SB-2			43.8
21	Southern Truck Bypass Alternative 1 (US 41 to McDonough Rd to SR 16)	Upgrade County Line Rd. from US 41 to Maddox Rd and	LTR-SB-1			43.3
22	SR 16 Backage Roads	New Alignments both to the north and south of SR 16.	LTR-8			43.0
23	Southern Truck Bypass, Long Term, Moreland Road Ext East to I-75	This corridor should have setbacks that would allow a	LTR-9			42.0
24	Orchard Hill Long Term Improvements	Realign Macon Rd from just south of Hoppin Branch R	LTR-11			41.8
25	Arthur K. Bolton Parkway (SR 16) at Green Valley Road Intersection Improvement	At Rehoboth Rd (to the east) and Wilson Rd (to the we	I-4			41.5
26	Arthur K. Bolton Parkway (SR 16) at S. McDonough Road Intersection Improvement	Convert northbound and southbound left turns to flas	I-6			41.4
27	Martin Luther King, Jr. Parkway (US 19/41) at Airport Road/Kalamazoo Drive Intersection Improvement	Install Advanced Dilemma-Zone Detection System alc	I-3			41.1
28	SPLOST-2 - Add right turn lane on northbound Searcy Ave. at E. Broadway Steet (SR 155)	Intersection Improvement	LI-13			40.5
29	CTP-03 - SR 16 at Macon Rd	Intersection Improvements	LI-15			40.2
30	CTP03 - Tri-County Crossing: Moreland Road Extension to Zebulon Rd (SR 155)	Connect Moreland Rd to Zebulon Rd and add associat	I-17			39.9
31	CTP-01 - Jackson Rd at N McDonough Rd	Intersection Improvements	LI-2			39.6
32	SPLOST-1 - Solomon Street (Little 5 Points) Improvements	Intersection Improvements, Concept Study Underway	LI-10			35.0
33	Arthur K. Bolton Parkway (SR 16) at Rehoboth Road Intersection Improvement	Relocate stop bars on eastbound through-lanes close	I-5			33.1
34	E. McIntosh Road at 9th Street Intersection Roundabout	Consider converting the intersection to a roundabout i	I-16			29.3
35	Johnston Road at S. McDonough Road Intersection Roundabout	Install a roundabout, in conjunction with Phase 2 of th	I-15			29.1
35	SPLOST-5 - Hammond / W. Poplar Realignment	Intersection Improvements, Concept Study Underway	LI-12			29.1
37	SPLOST-3 - Cain St. Realignment at Everee Inn Road	Intersection Improvements	LI-8			28.3

Figure 7: Report – Project Rank by Scenario

ID	Project Name	Description	Rank By Scenario						
			1	2	3	4	5	6	7
I-1	Jackson Road at Wallace Road Intersection Improvement	Install splitter islands along the Wallace Rd ap	49	52	43	48	47	48	51
I-2	Arthur K. Bolton Parkway (SR 16) at Wild Plum Road Intersection Improvement	In the interim, install a Restricted Crossing U-Tu	7	20	1	5	15	5	3
I-3	Martin Luther King, Jr. Parkway (US 19/41) at Airport Road/Kalamazoo Drive Intersection Improvement	Install Advanced Dilemma-Zone Detection Syste	21	29	18	30	35	29	27
I-4	Arthur K. Bolton Parkway (SR 16) at Green Valley Road Intersection Improvement	At Rehoboth Rd (to the east) and Wilson Rd (to	20	28	17	29	33	28	25
I-5	Arthur K. Bolton Parkway (SR 16) at Rehoboth Road Intersection Improvement	Relocate stop bars on eastbound through-lanes	32	36	23	40	45	33	33
I-6	Arthur K. Bolton Parkway (SR 16) at S. McDonough Road Intersection Improvement	Convert northbound and southbound left turns t	22	25	16	31	43	31	26
I-7	E. McIntosh Road at 9th Street Intersection Improvements	Widen curb radius and install concrete curbing	47	47	43	46	46	46	47
I-8	Martin Luther King, Jr. Parkway (US 19/41) at Zebulon Road (SR 155) Intersection Improvement (Dual Left Turn Lanes)	Install dual left-turn lanes for the eastbound le	4	12	5	3	5	3	5
I-9	Johnston Road at Macon Road Reconstruction and Improvement	Reconstruct and repave Johnston Rd between M	50	53	49	51	48	51	53
I-10	Johnston Road at Green Valley Road Improvements and Repave	Repave and restripe the intersection; install pa	50	53	49	51	48	51	53
I-11	Johnston Road at S. McDonough Road Intersection Improvements and Repave	Install splitter islands along the S. McDonough	50	53	49	51	48	51	53
I-12	Martin Luther King, Jr. Parkway (US 19/41) at Zebulon Road (SR 155) Intersection Improvement (Displaced Left Turn Lanes, Realign Approaches)	Monitor level of congestion and consider instal	6	22	6	6	7	6	7
I-13	Johnston Road at Macon Road Roundabout	Install a roundabout, in conjunction with Phase	39	35	60	26	41	39	39
I-14	Green Valley Road Realignment	Eliminate intersection by relocating Green Valle	40	41	62	35	44	41	41
I-15	Johnston Road at S. McDonough Road Intersection Roundabout	Install a roundabout, in conjunction with Phase	35	38	57	25	37	38	35
I-16	E. McIntosh Road at 9th Street Intersection Roundabout	Consider converting the intersection to a rounda	37	34	56	24	36	37	34
I-17	CTP03 - Tri-County Crossing: Moreland Road Extension to Zebulon Rd (SR 155)	Connect Moreland Rd to Zebulon Rd and add as	28	31	27	23	26	25	30
T-1	Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) Signal Optimization and Advanced Dilemma-Zone Detection System (Mailer Road to Bowling Lane)	Coordinate with GDOT to optimize signal timing	3	17	2	7	29	7	4
T-2	Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) Advanced Dilemma-Zone Detection System (Zebulon Rd to Kalamazoo Drive)	Coordinate with GDOT to leverage connected sig	9	19	8	11	32	11	9
T-3	Arthur K. Bolton Parkway (SR 16) Signal Optimization and Advanced Dilemma-Zone Detection System (Pine Hill Road to I-75)	Coordinate with GDOT to leverage connected sig	8	15	7	9	31	9	8
T-4	S. Hill Street (SR 155) Signal Optimization and Advanced Dilemma-Zone Detection System (E. Taylor Street to Airport Road)	Coordinate with GDOT to leverage connected sig	1	6	4	2	4	2	2
LI-2	CTP-01 - Jackson Rd at N McDonough Rd	Intersection Improvements	17	27	21	37	3	27	31
LI-3	CTP-02 - Orchard Hill Intersection Improvements	Intersection Improvements	42	43	38	43	39	43	42
LI-4	CTP-06 - County Line at Etheridge Mill Rd	Intersection Improvements	44	49	41	45	42	45	45

Appendix C

Spalding County Freight Cluster Plan

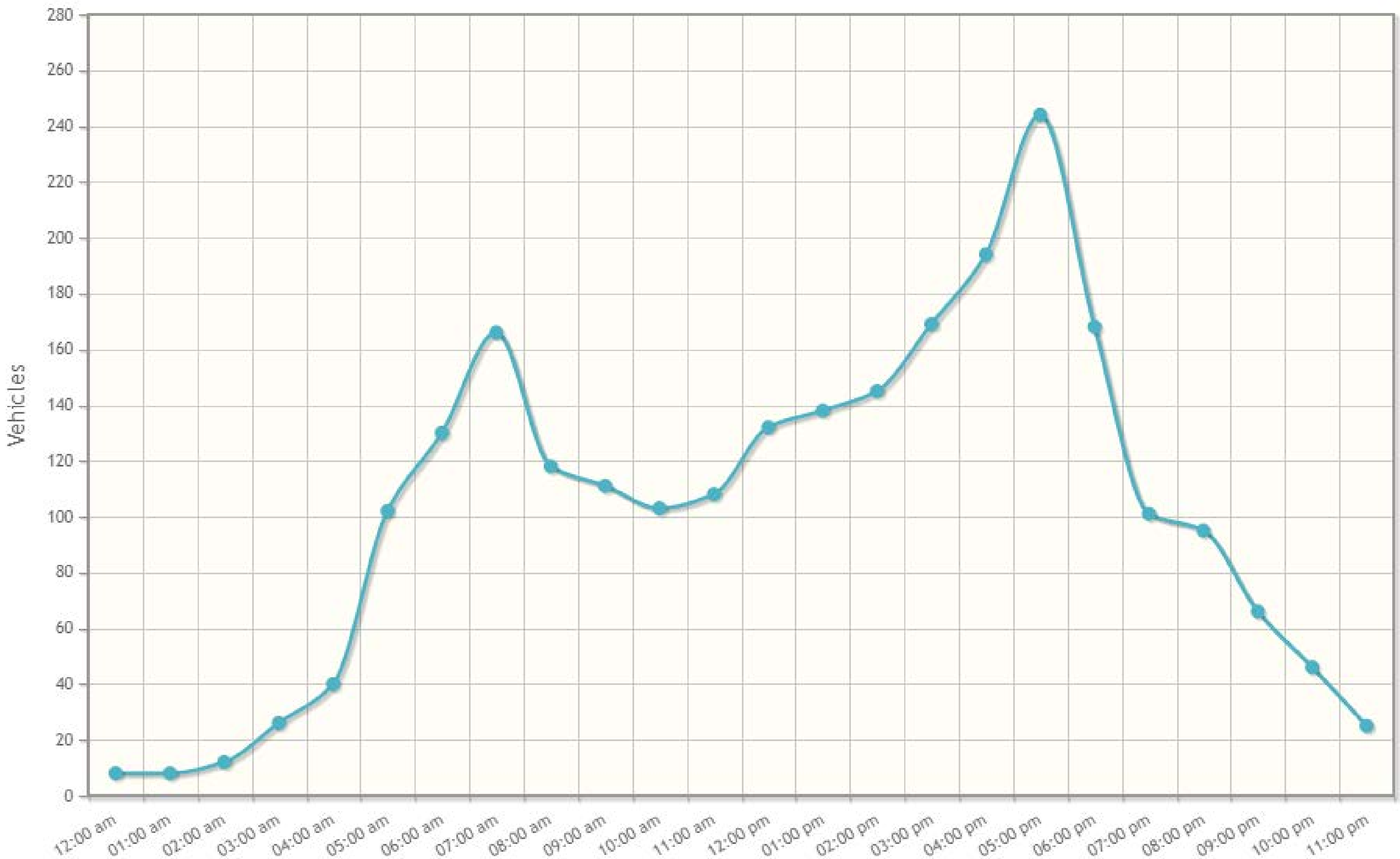
Detailed Short-Term Work Program

Project ID (for Work Program)	Project ID (from Plan)	Project Name	From	To	Project Description	Type of Improvement	Planning/Preliminary Engineering		Right of Way (ROW)/Utilities		Construction*		Total Project Cost	Primary Responsible (Lead) Agency	Potential Funding Sources	Federal/State Funding	Total Local Match Required
			From	To			Year	Cost	Year	Cost	Year	Cost					
FCP-1	**S-1**	**SR 155 Concept Study**	**SR 16**	**Jackson Road**	**A concept study to evaluate the needed actions for the relocation of SR 155 to McDonough Road.**	**Freight Route Designation**	**2021**	**$ 312,500**		**$0**		**$0**	**$ 312,500**	**GDOT, Spalding County, City of Griffin**	**GDOT, SPLOST Funds**	**$ 250,000**	**$ 62,500**
FCP-2	**S-3**	**Griffin Bypass Alternatives Analysis**	**NA**	**NA**	**A detailed analysis to determine the best route for a bypass around Griffin to alleviate truck traffic conflicts throughout Downtown.**	**Scoping Study**	**2021**	**$ 350,000**		**$0**		**$0**	**$ 350,000**	**Spalding County, City of Griffin**	**ARC, SPLOST Funds**	**$ 280,000**	**$ 70,000**
FCP-3	**T-4**	**S. Hill Street (SR 155) Signal Optimization and Advanced Dilemma-Zone Detection System (E. Taylor Street to Airport Road)**	**Taylor Street (SR 16)**	**Airport Road**	**Coordinate with GDOT to implement an Advanced Dilemma-Zone Detection System to provide additional green signal time for trucks approaching signalized intersections along S. Hill St (SR 155) from E. Taylor St to Airport Rd. This should be developed as a pilot project and evaluated for potential application on other key truck routes, such as US 19/US 41/SR 3 and SR 16.**	**Signal Optimization**	**2022**	**$86,400**	**2023**	**$180,000**	**2024**	**$1,103,600**	**$ 1,370,000**	**GDOT, Spalding County, City of Griffin**	**ARC, GDOT, SPLOST Funds, T-SPLOST Funds**	**$ 1,096,000**	**$ 274,000**
FCP-4.1	T-3	Arthur K. Bolton Parkway (SR 16) Signal Optimization and Advanced Dilemma-Zone Detection System (Pine Hill Road to I-75)	Pine Hill Road	I-75	Coordinate with GDOT to implement an Advanced Dilemma-Zone Detection System to provide additional green signal time for trucks approaching signalized intersections along Arthur K. Bolton Pkwy (SR 16) from Pine Hill Rd to I-75. This should be developed as a pilot project and evaluated for potential application on other key truck routes, such as US 19/US 41/SR 3 and SR 155.	Signal Optimization	2022	$331,200	2023	$690,000	2024	$3,458,800	$ 4,480,000	GDOT, Spalding County, City of Griffin	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$ 3,584,000	$ 896,000
FCP-4.2	I-4	Arthur K. Bolton Parkway (SR 16) at Green Valley Road Intersection Improvement	NA	NA	At Rehoboth Rd (to the east) and Wilson Rd (to the west), install advance signs interconnected to the traffic signal to warn motorists when a train is blocking the intersection at Green Valley Rd, allowing approaching motorists to choose alternate routes; on south leg, relocate railroad at-grade crossing pavement marking further away from stop bar; convert all left turns to flashing yellow arrows (FYAs); install lane line extensions/skip markings to guide motorists making westbound left-turn; repave shoulders on northwest quadrants with safety edge treatment; install backplates with retroreflective borders on all traffic signal heads; restripe intersection; install raised pavement markers.	Intersection Improvement	2022	$14,653	2023	$30,528	2024	$154,819	$ 200,000	GDOT, Spalding County, City of Griffin	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$ 160,000	$ 40,000
FCP-4.3	I-2	Arthur K. Bolton Parkway (SR 16) at Wild Plum Road Intersection Improvement	NA	NA	Install a Restricted Crossing U-Turn (RCUT) intersection with expanded paved aprons (bum-outs or “loons”) in the shoulder area opposite to the crossover locations to accommodate large trucks; install signage along The Lakes Pkwy to redirect traffic destined to SR 16 west (or downtown Griffin) to use the Rehoboth Rd or the S. McDonough Rd intersections. As more development is built at The Lakes at Green Valley industrial park, monitor traffic volumes; if and when traffic volumes warrant a signal, then remove RCUT and consider installing a traffic signal.	Intersection Improvement	2022	$11,785	2023	$24,552	2024	$123,663	$ 160,000	GDOT, Spalding County, City of Griffin	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$ 128,000	$ 32,000
FCP-4.4	I-5	Arthur K. Bolton Parkway (SR 16) at Rehoboth Road Intersection Improvement	N/A	N/A	Relocate stop bars on eastbound through-lanes closer to the traffic signal; remove stop bar across the eastbound right-turn lane and install yield bar and yield sign; repair damaged delineator posts.	Intersection Improvement	2022	$2,000	2023	$0	2024	$8,000	$ 10,000	Spalding County	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$ 8,000	$ 2,000
FCP-4.5	I-6	Arthur K. Bolton Parkway (SR 16) at S. McDonough Road Intersection Improvement	N/A	N/A	Convert northbound and southbound left turns to flashing yellow arrows (FYAs); restripe the intersection and relocate stop bar on southbound left-turn lane further away from intersection; install lane line extensions/skip markings to guide motorists making eastbound left-turn; install median nose delineators; install backplates with retroreflective borders on all traffic signal heads; install raised pavement markings.	Intersection Improvement	2022	$14,653	2023	$30,528	2024	$154,819	$ 200,000	Spalding County	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$ 160,000	$ 40,000
FCP-4	**T-3, T-4, I-2, I-4, I-5, I-6**	**SR 16 Freight Cluster Plan Corridor Improvements**					**2022**	**$460,692**	**2023**	**$955,608**	**2024**	**$5,003,700**	**$ 6,420,000**	**Spalding County**	**ARC, GDOT, SPLOST Funds, T-SPLOST Funds, BUILD**	**$5,136,000**	**$1,284,000**
FCP-5	**S-2**	**SR 155 Design for Redesignation**	**SR 16**	**Jackson Road**	**Design for modifications resulting from the SR 155 Concept Study**	**Corridor Alternatives Study**	**2022**	**$ 1,000,000**		**-**		**-**	**$ 1,000,000**	**GDOT, Spalding County, City of Griffin**	**ARC, GDOT, SPLOST Funds, T-SPLOST Funds**	**$ 800,000**	**$ 200,000**
FCP-6.1	I-8	Martin Luther King, Jr. Parkway (US 19/41) at Zebulon Road (SR 155) Intersection Improvement (Dual Left Turn Lanes)	NA	NA	Install dual left-turn lanes for the eastbound left-turn movement from Zebulon Rd (US 19) to northbound Martin Luther King, Jr. Pkwy (US 41); convert westbound left-turn signal to a flashing yellow arrow (FYA); lengthen the southbound right-turn lane on Martin Luther King, Jr. Pkwy (US 41) and extend the right-turn lane into the Ingles shopping center, and add a narrow concrete median between the two right-turn lanes; restripe intersection.	Intersection Improvement	2023	$26,907	2024	$56,055	2025	$287,038	$ 370,000	GDOT, Spalding County, City of Griffin	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$ 296,000	$ 74,000
FCP-6.2	T-2	Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) Advanced Dilemma-Zone Detection System (Zebulon Rd to Kalamazoo Drive)	Zebulon Road	Kalamazoo Drive	Coordinate with GDOT to implement an Advanced Dilemma-Zone Detection System to provide additional green signal time for trucks approaching signalized intersections along Martin Luther King, Jr. Pkwy (US 19/US 41/SR 3) from Zebulon Rd to Kalamazoo Dr. This should be developed as a pilot project and evaluated for potential application on other key truck routes, such as SR 155 and SR 16.	Signal Optimization	2023	$28,800	2024	$60,000	2025	$301,200	$ 390,000	GDOT, Spalding County, City of Griffin	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$ 312,000	$ 78,000

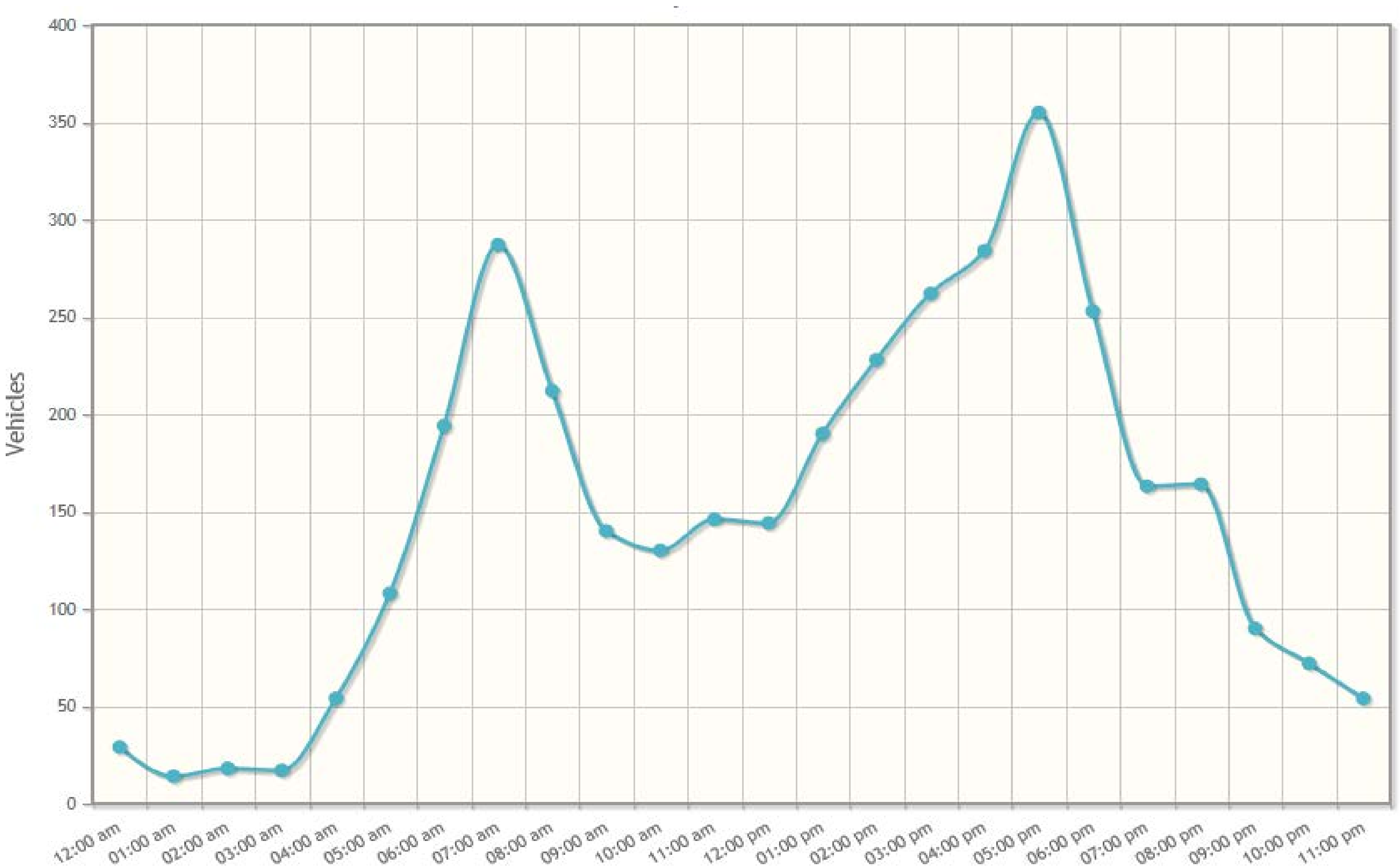
FCP-6.3	T-1	Martin Luther King, Jr. Parkway (US 19/US 41/SR 3) Signal Optimization and Advanced Dilemma-Zone Detection System (Mailer Road to Bowling Lane)	Mailer Road	Bowling Lane	Coordinate with GDOT to optimize signal timing along Martin Luther King, Jr. Pkwy (US 19/US 41/SR 3) from Mailer Rd to Bowling Ln. Leverage connected signal technology to implement an Advanced Dilemma-Zone Detection System to provide additional green signal time for trucks approaching signalized intersections. This should be developed as a pilot project and evaluated for potential application on other key truck routes, such as SR 155 and SR 16.	Signal Optimization	2023	$100,800	2024	$210,000	2025	$1,059,200	$ 1,370,000	GDOT, Spalding County, City of Griffin	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$ 1,096,000	$ 274,000
FCP-6.4	I-3	Martin Luther King, Jr. Parkway (US 19/41) at Airport Road/Kalamazoo Drive Intersection Improvement	N/A	N/A	Install an Advanced Dilemma-Zone Detection System along northbound and southbound Martin Luther King, Jr. Pkwy (US 19/41); convert eastbound and westbound left turns to flashing yellow arrows (FYAs); install "BE PREPARED TO STOP" advance traffic control signs downstream of the existing Signal Ahead sign along the Martin Luther King, Jr. Pkwy (US 19/41) in the northbound and southbound directions; install warning beacon along southbound Martin Luther King, Jr. Pkwy (US 19/41) to alert the motorists from the limited-access section of Martin Luther King, Jr. Pkwy (US 19/41) of the signal ahead; install backplates with retroreflective borders on all traffic signal heads; install median nose delineators; install raised pavement markers; repave and restripe intersection.	Intersection	2023	$14,653	2024	$30,528	2025	$154,819	$ 200,000	City of Griffin, Spalding County	ARC, GDOT, SPLOST Funds, T-SPLOST Funds	$ 160,000	$ 40,000
FCP-6	**I-3, I-8, T-1, T-2**	**US 19/41 Freight Cluster Plan Corridor Improvements**					**2023**	**$171,160**	**2024**	**$356,583**	**2025**	**$1,802,257**	**$2,330,000**	**Spalding County**	**ARC, GDOT, SPLOST Funds, T-SPLOST Funds, BUILD**	**$1,864,000**	**$466,000**
FCP-7	**I-17**	**CTP03 - Tri-County Crossing: Moreland Road Extension to Zebulon Rd (SR 155)**	**N/A**	**N/A**	**Connect Moreland Rd to Zebulon Rd and add associated intersections.**	**Intersection**	**2023**	**$87,921**	**2024**	**$183,168**	**2025**	**$928,911**	**$ 1,200,000**	**Spalding County**	**ARC, SPLOST Funds, T-SPLOST Funds**	**$ -**	**$ 1,200,000**
FCP-8	**I-1**	**Jackson Road at Wallace Road Intersection Improvement**	**N/A**	**N/A**	**Install splitter islands along the Wallace Rd approach to the intersection, which will also help to improve the skew of the intersection; replace damaged and missing stop signs on east and west legs (Jackson Rd.); install signs notifying drivers of truck traffic restriction on Wallace Rd; repave and restripe intersection; install raised pavement markers.**	**Intersection**	**2023**	**$4,573**	**2024**	**$9,528**	**2025**	**$55,899**	**$ 70,000**	**Spalding County**	**ARC, SPLOST Funds, T-SPLOST Funds**	**$ -**	**$ 70,000**
													$ 13,052,500			**$ 9,426,000**	**$ 3,626,500**

Appendix A

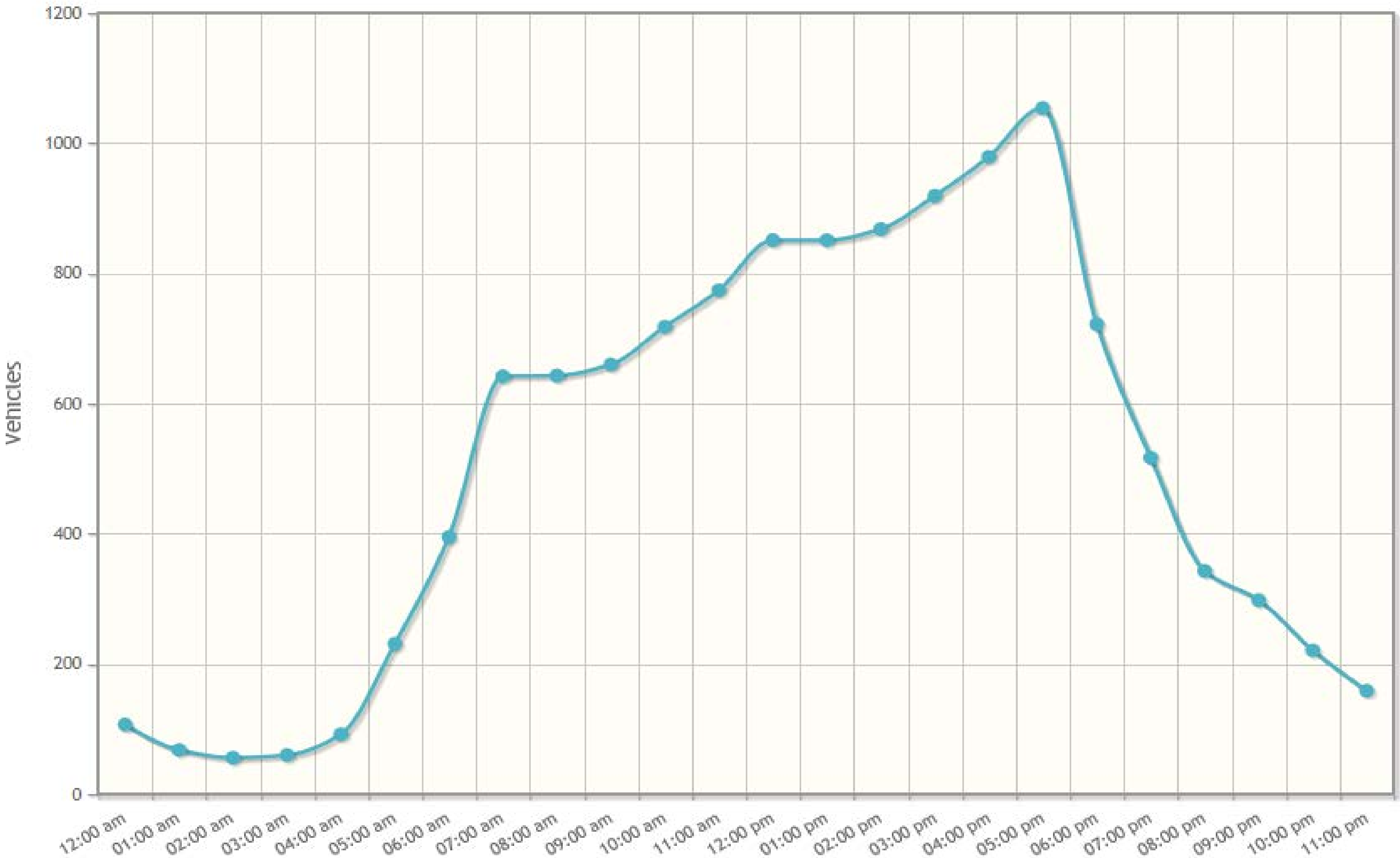
Hourly Distribution of Traffic Volumes from GDOT's TADA Count Stations



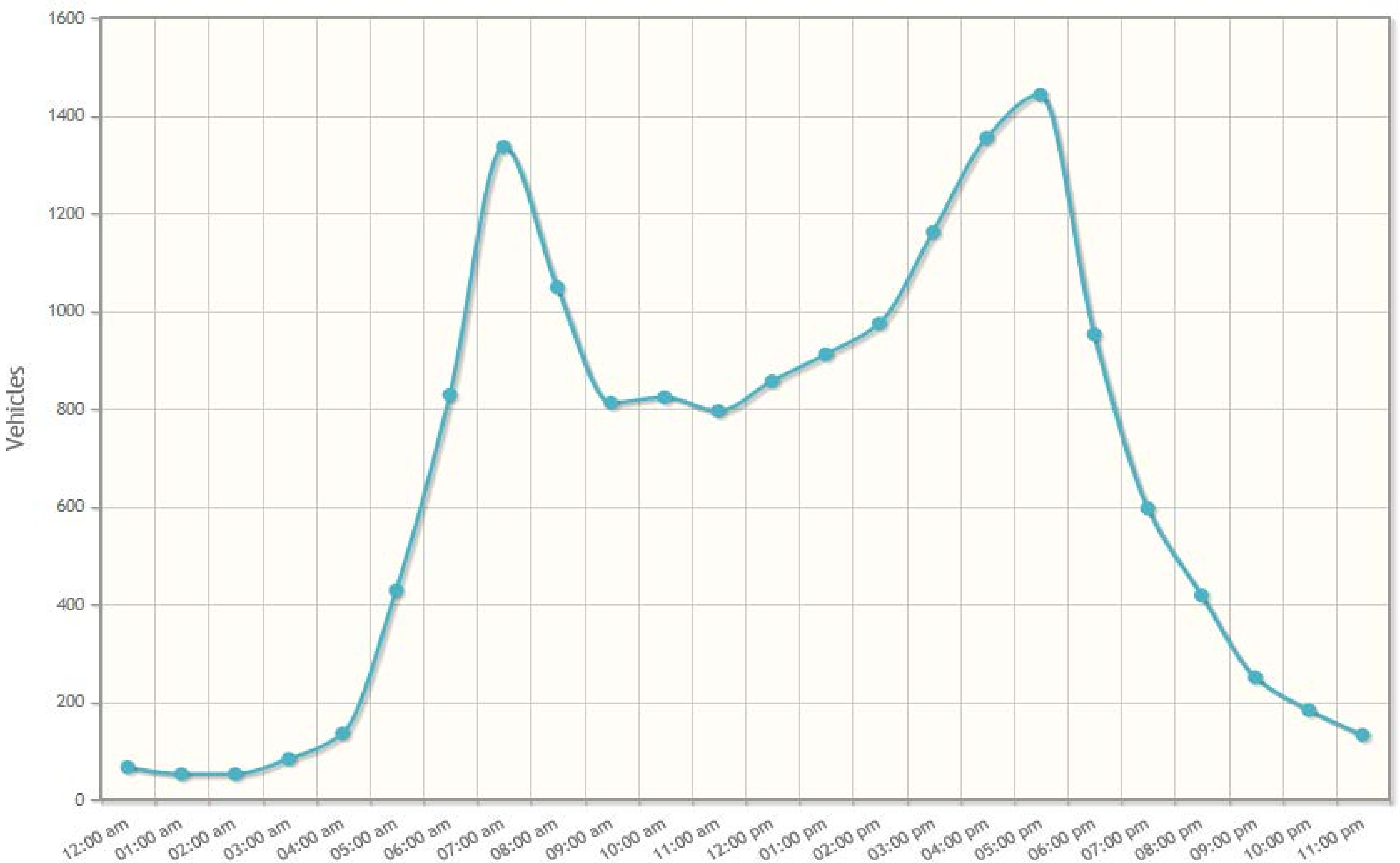
JACKSON ROAD SOUTH OF JENKINSBURG ROAD/TOMOCHICHI ROAD



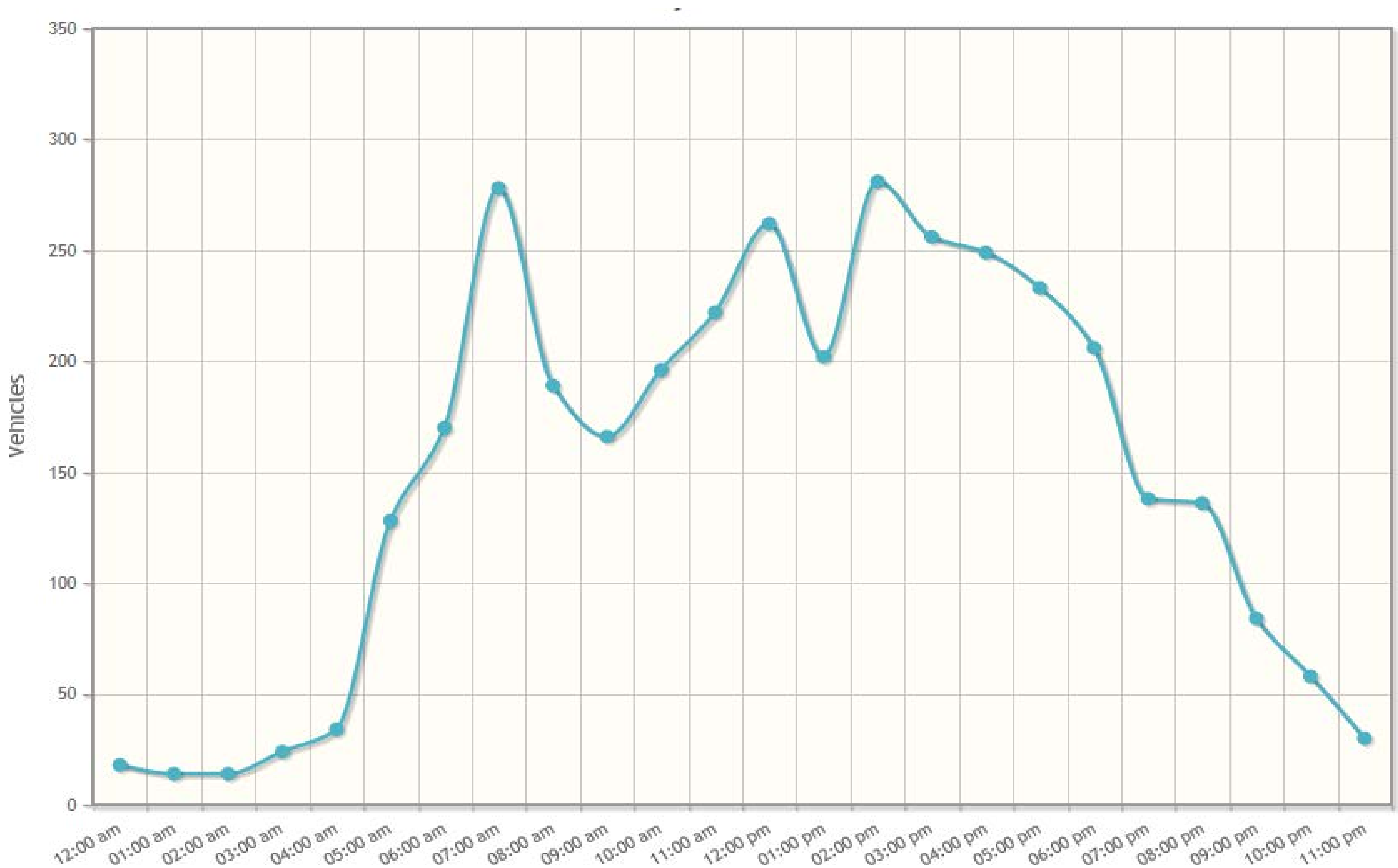
N McDonough Road South of Spring Valley Circle



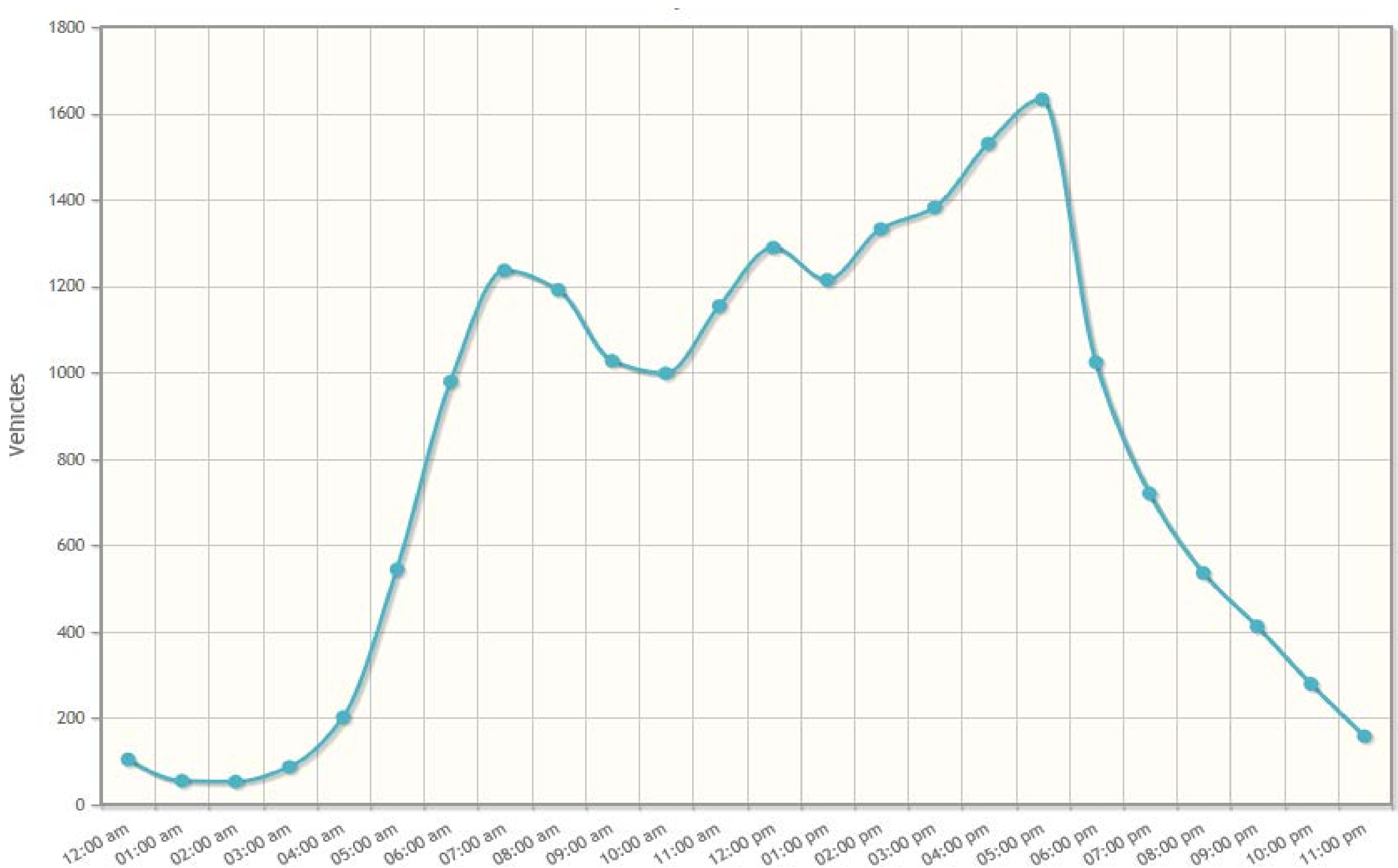
Arthur K Bolton Parkway (GA 16) West of S Walkers Mill Road



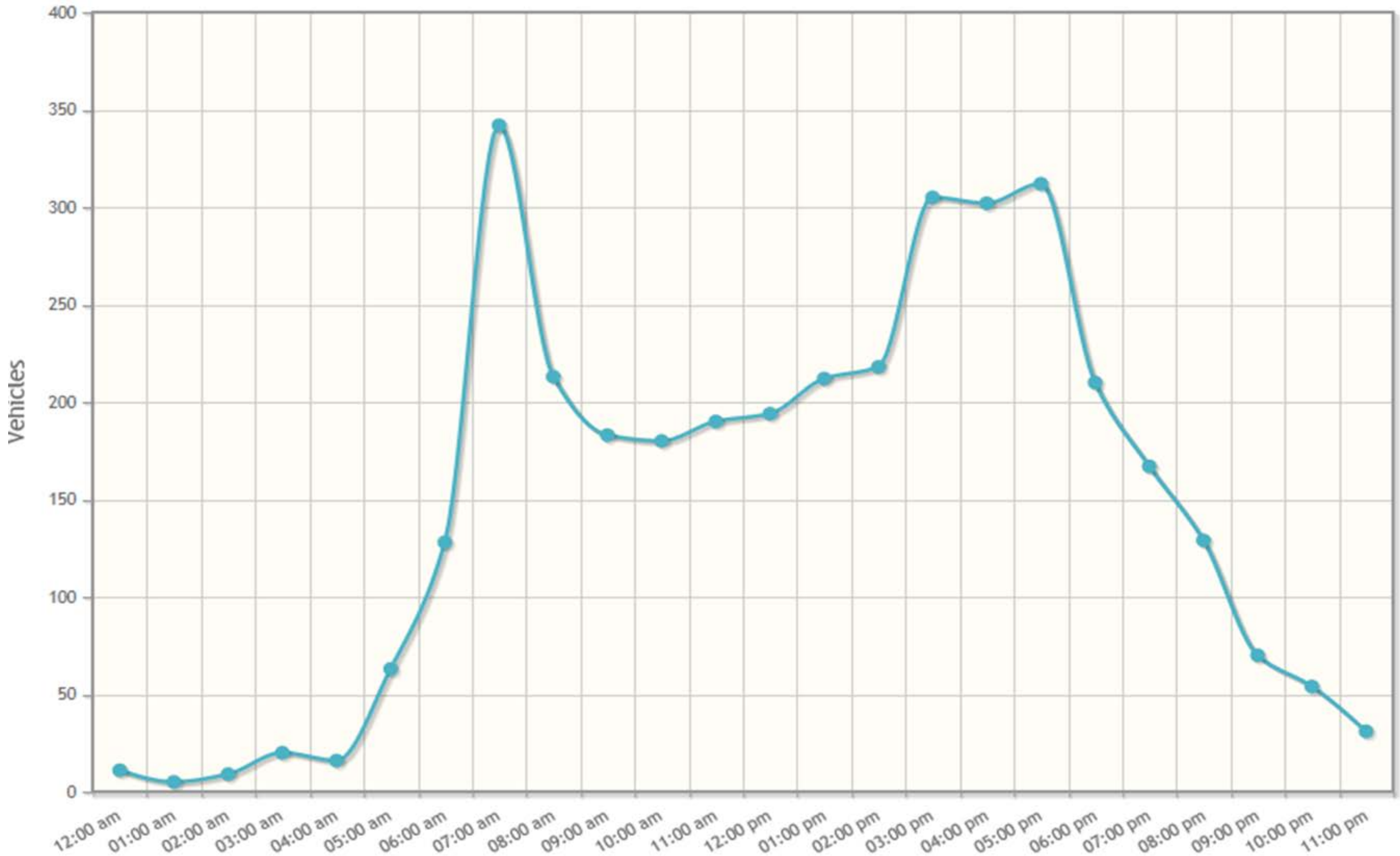
Arthur K Bolton Parkway (GA 16) West of Wild Plum Road



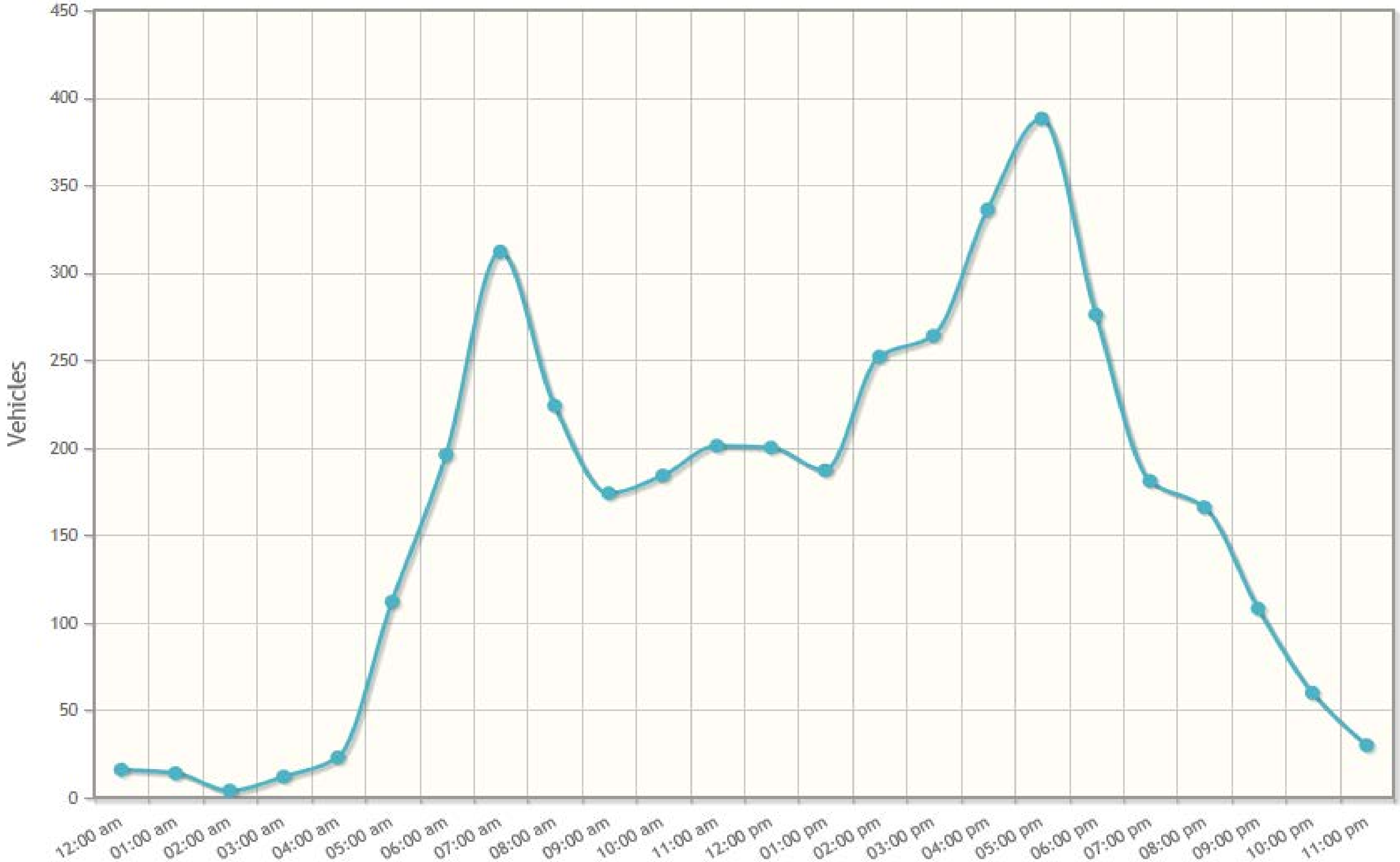
WILSON ROAD NORTH OF HUDSON ROAD



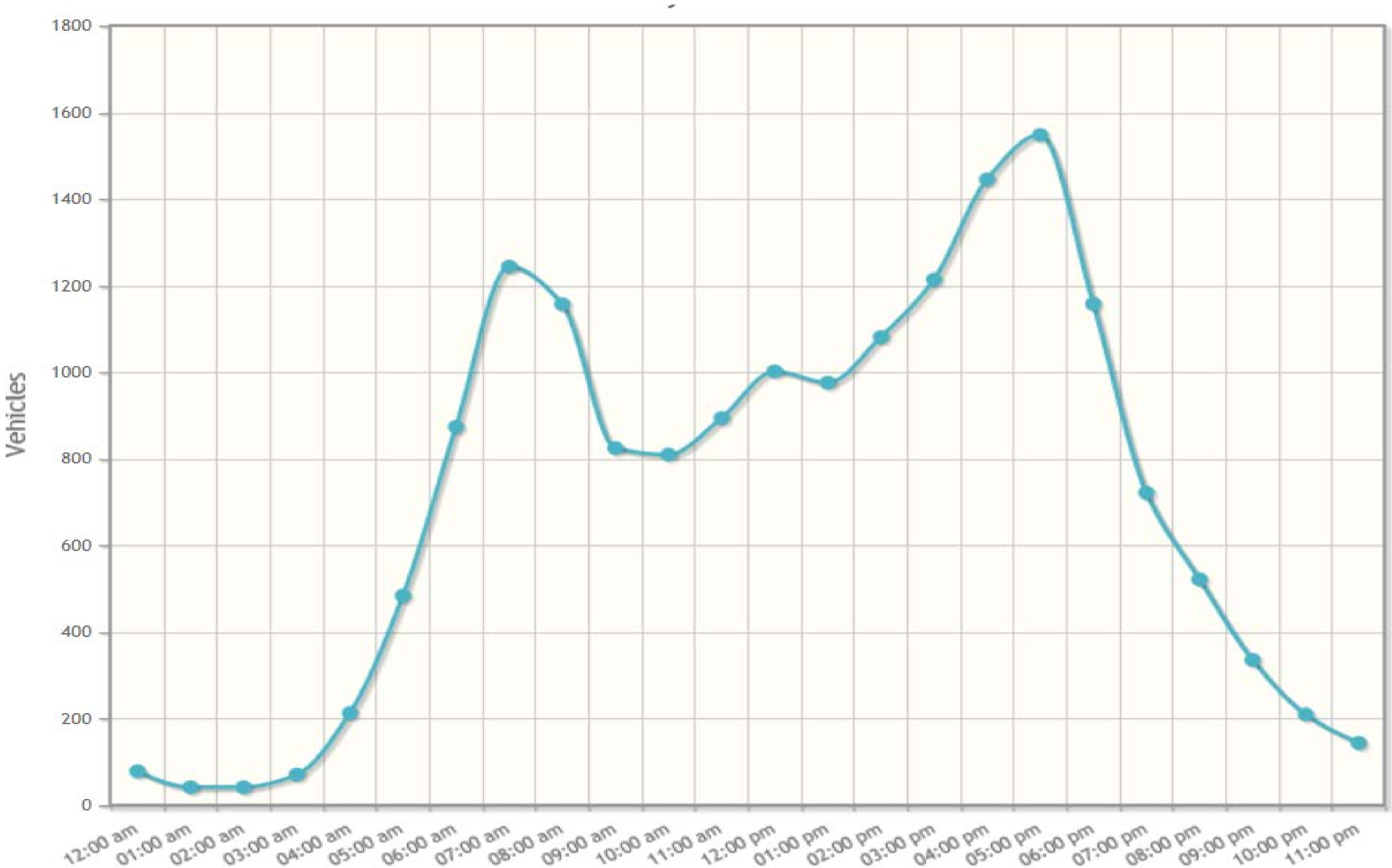
ARTHUR K BOLTON PARKWAY (GA 16) EAST OF GREENBELT PARKWAY



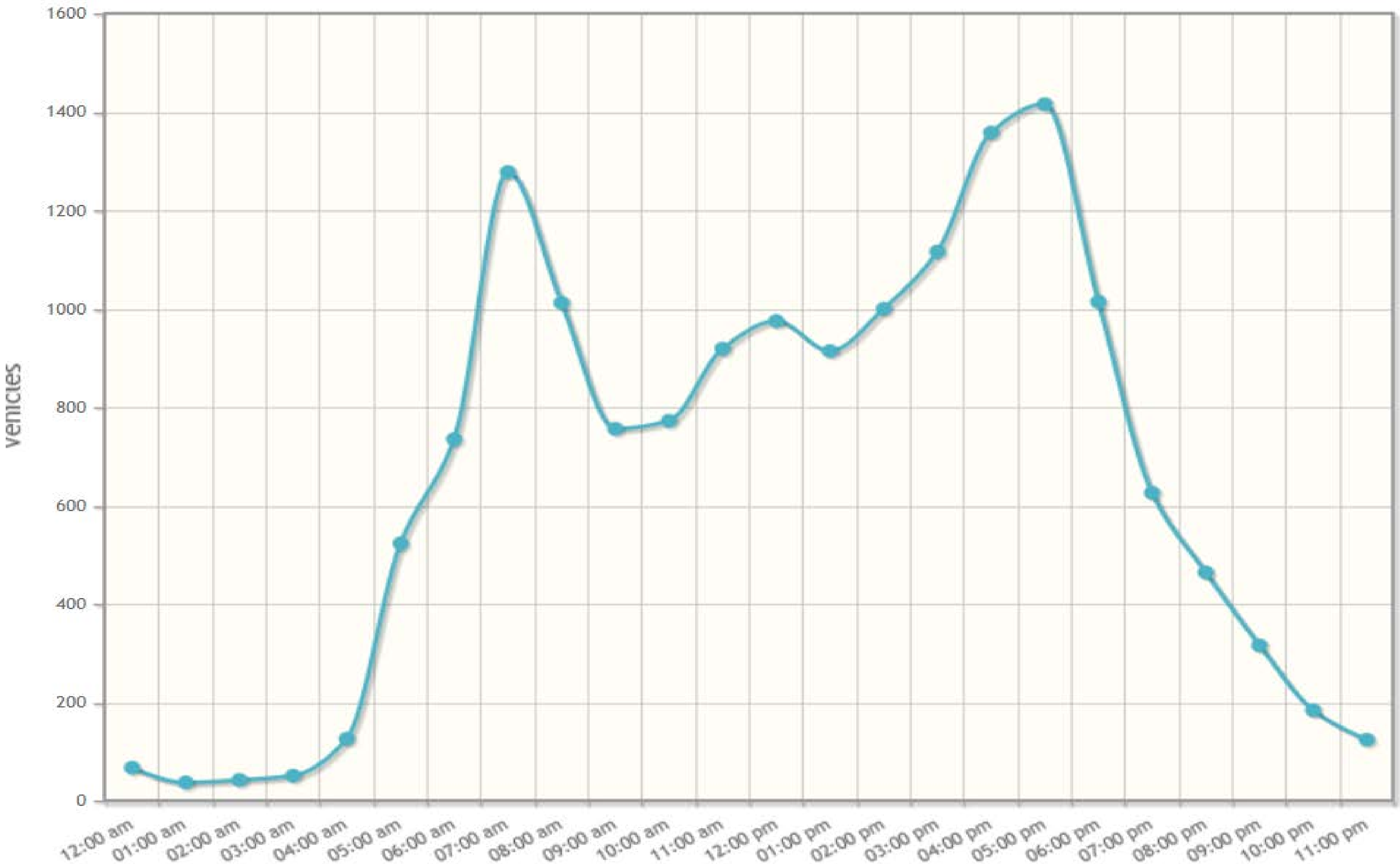
MACON ROAD WEST OF QUAIL HOLLOW ROAD



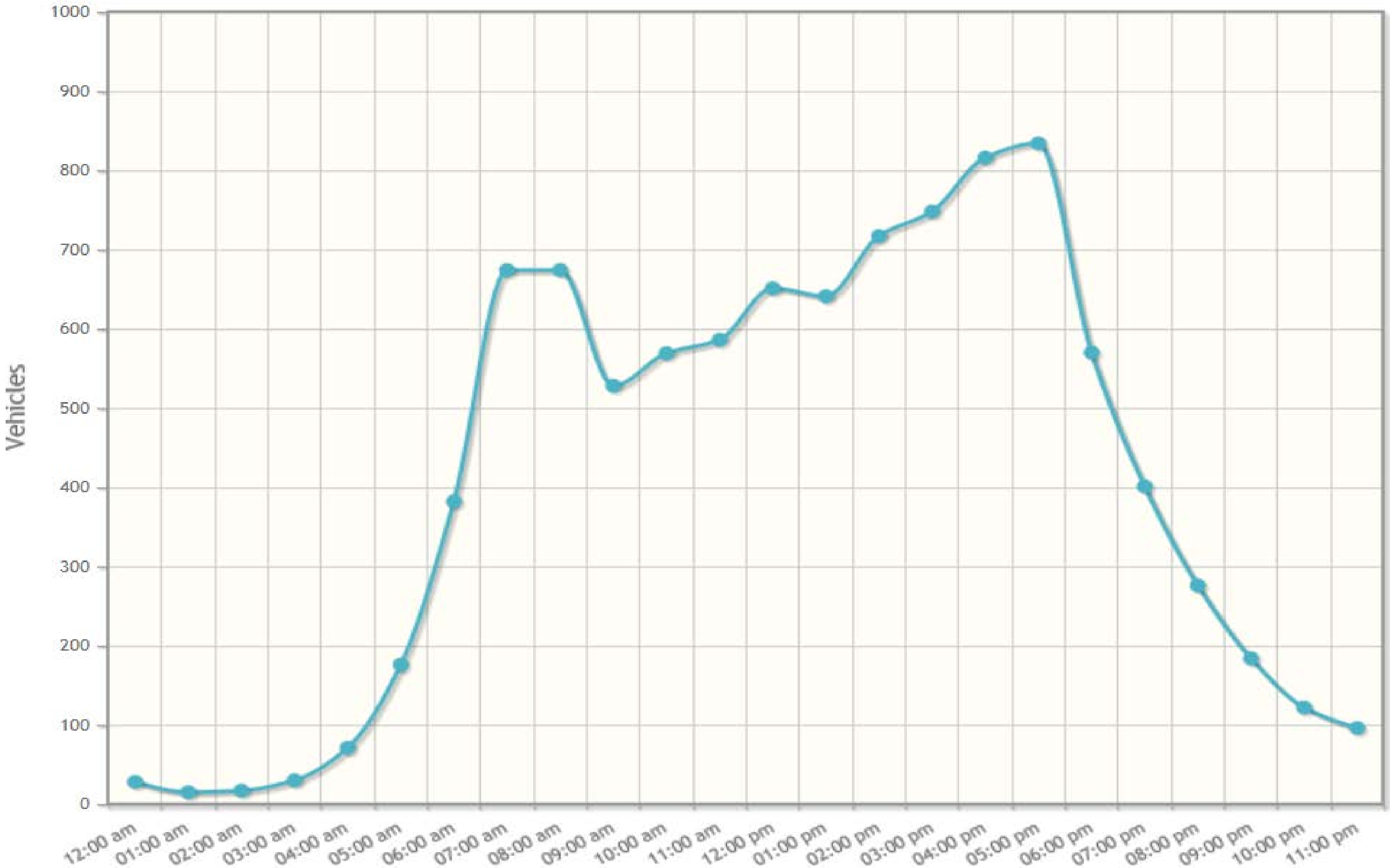
JOHNSTON ROAD EAST OF HOPPINS BRANCH ROAD



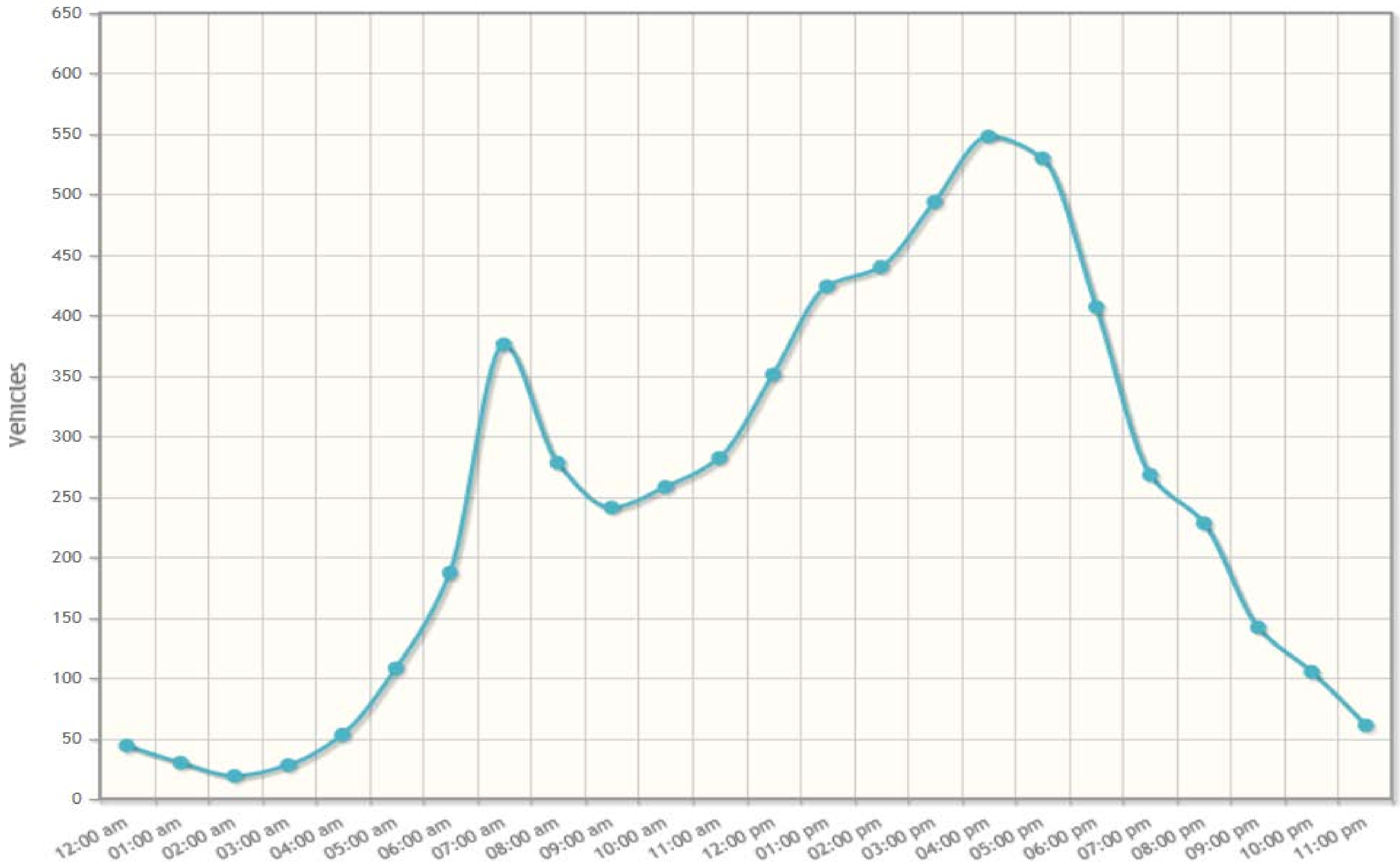
ZEBULON ROAD (US 19/GA 3) SOUTH OF HEMPHILL ROAD



US Highway 41 (US 41/GA 7) East of Zebulon Road (US 19/GA 3)



ZEBULON ROAD NORTH OF MEADOW LANE ROAD



E McIntosh Road East of Nicholas Court

Appendix B

Raw Traffic Counts

Prepared by National Data & Surveying Services

Wallace Rd & Jackson Rd

Peak Hour Turning Movement Count

ID: 19-09765-001
City: Griffin

Day: Tuesday
Date: 12/10/2019

	PEAK HOURS	COUNT PERIODS
AM	07:00 AM - 08:00 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:45 PM - 05:45 PM	04:00 PM - 06:00 PM

Wallace Rd — SOUTHBOUND

	↲	↓	↳	U	⇧
AM	2	5	8	0	3
NOON	0	0	0	0	0
PM	3	5	7	0	9
	0	1	0	0	

Jackson Rd — EASTBOUND

	AM	NOON	PM	
⇦	75	0	126	
U	0	0	0	0
⬏	0	0	1	0
→	70	0	73	1
↴	4	0	2	0

Jackson Rd — WESTBOUND

		PM	NOON	AM
⬑	0	5	0	1
←	1	119	0	72
↰	0	0	0	0
U	0	0	0	0
⇨		81	0	78

Wallace Rd — NORTHBOUND

	⇩	U	↰	↑	↱
		0	0	1	0
PM	7	0	4	3	1
NOON	0	0	0	0	0
AM	9	0	1	2	0

CONTROL

4-Way Stop

	AM	NOON	PM
TEV	165	0	223
PHF	0.78		0.94

Cars (AM)

Approach	Left/U	Thru	Right
Southbound	2	5	8
Eastbound	0	62	3
Westbound	1	66	0
Northbound	1	2	0

HT (AM)

Approach	Left/U	Thru	Right
Southbound	0	0	0
Eastbound	0	8	1
Westbound	0	6	0
Northbound	0	0	0

Cars (NOON)

Approach			
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

HT (NOON)

Approach			
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

Cars (PM)

Approach	Left/U	Thru	Right
Southbound	2	5	7
Eastbound	1	73	2
Westbound	5	114	0
Northbound	4	3	1

HT (PM)

Approach	Left/U	Thru	Right
Southbound	1	0	0
Eastbound	0	0	0
Westbound	0	5	0
Northbound	0	0	0

Pedestrians (Crosswalks)

Crosswalk	AM	NOON	PM
North leg	0	0	0
South leg	0	0	0
East leg	0	0	0
West leg	0	0	0
Diagonals	0	0	0

Prepared by National Data & Surveying Services

Wild Plum Rd & SR 16/Arthur K Bolton Pkwy

Peak Hour Turning Movement Count

ID: 19-09765-002
City: Griffin

Day: Tuesday
Date: 12/10/2019

	PEAK HOURS	COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:30 PM - 05:30 PM	04:00 PM - 06:00 PM

Wild Plum Rd — SOUTHBOUND

	Right	Through	Left	U-Turn	Departing
AM	14	1	4	0	20
NOON	0	0	0	0	0
PM	8	0	7	0	17
	0	1	0	0	

SR 16/Arthur K Bolton Pkwy — EASTBOUND

	AM	NOON	PM	
Departing	899	0	660	
U-Turn	1	0	0	0
Left	11	0	14	1
Through	480	0	966	2
Right	0	0	1	1

SR 16/Arthur K Bolton Pkwy — WESTBOUND

		PM	NOON	AM
Left	1	3	0	8
Through	2	651	0	884
Right	1	0	0	6
U-Turn	0	0	0	0
Departing		989	0	484

Wild Plum Rd — NORTHBOUND

	Departing	U-Turn	Left	Through	Right
		0	0	1	1
PM	1	0	1	0	16
NOON	0	0	0	0	0
AM	7	0	0	1	0

CONTROL

2-Way Stop(NB/SB)

	AM	NOON	PM
TEV	1410	0	1667
PHF	0.88		0.94

Cars (AM)

Approach			
Southbound	13	0	3
Eastbound	9	430	0
Westbound	6	839	6
Northbound	0	1	0

HT (AM)

Approach			
Southbound	1	1	1
Eastbound	2	50	0
Westbound	2	45	0
Northbound	0	0	0

Cars (NOON)

Approach			
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

HT (NOON)

Approach			
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

Cars (PM)

Approach			
Southbound	8	0	9
Eastbound	14	924	1
Westbound	3	616	0
Northbound	1	0	15

HT (PM)

Approach			
Southbound	0	0	1
Eastbound	0	42	0
Westbound	0	35	0
Northbound	0	0	1

Pedestrians (Crosswalks)

Crosswalk	AM	NOON	PM
North	0	0	0
South	0	0	0
East	0	0	0
West	0	0	0
NW corner	0	0	0
NE corner	0	0	0
SW corner	0	0	0
SE corner	0	0	0

Prepared by National Data & Surveying Services

US 41/US 19/ SR 3/Martin Luther King Jr Pkwy & Kalamazoo Dr/Airport Rd

Peak Hour Turning Movement Count

ID: 19-09765-003
City: Griffin

Day: Tuesday
Date: 12/10/2019

	PEAK HOURS	COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:30 PM - 05:30 PM	04:00 PM - 06:00 PM

US 41/US 19/ SR 3/Martin Luther King Jr Pkwy — SOUTHBOUND

	Right	Thru	Left	U-Turn	Exiting
AM	34	491	152	1	1163
NOON	0	0	0	0	0
PM	13	1029	190	2	873
Lanes	1	2	1	0	

Kalamazoo Dr/Airport Rd — EASTBOUND

	AM	NOON	PM	Lanes
Exiting	116	0	78	
U-Turn	0	0	0	0
Left	16	0	33	0
Thru	49	0	72	0.5
Right	13	0	25	0.5

Kalamazoo Dr/Airport Rd — WESTBOUND

	Lanes	PM	NOON	AM
Right	1	197	0	192
Thru	1	46	0	53
Left	0	63	0	22
U-Turn	0	0	0	0
Exiting		296	0	260

CONTROL

Signalized

	AM	NOON	PM
TEV	2065	0	2366
PHF	0.90		0.91

US 41/US 19/ SR 3/Martin Luther King Jr — NORTHBOUND

	Exiting	U-Turn	Left	Thru	Right
Lanes		0	1	2	1
PM	1119	2	19	641	34
NOON	0	0	0	0	0
AM	526	0	29	954	59

Cars (AM)

Approach			
SB	34	444	143
EB	10	47	12
WB	185	52	21
NB	28	907	58

HT (AM)

Approach			
SB	0	47	9
EB	6	2	1
WB	7	1	1
NB	1	47	1

Cars (NOON)

Approach			
SB	N/A	N/A	N/A
EB	N/A	N/A	N/A
WB	N/A	N/A	N/A
NB	N/A	N/A	N/A

HT (NOON)

Approach			
SB	N/A	N/A	N/A
EB	N/A	N/A	N/A
WB	N/A	N/A	N/A
NB	N/A	N/A	N/A

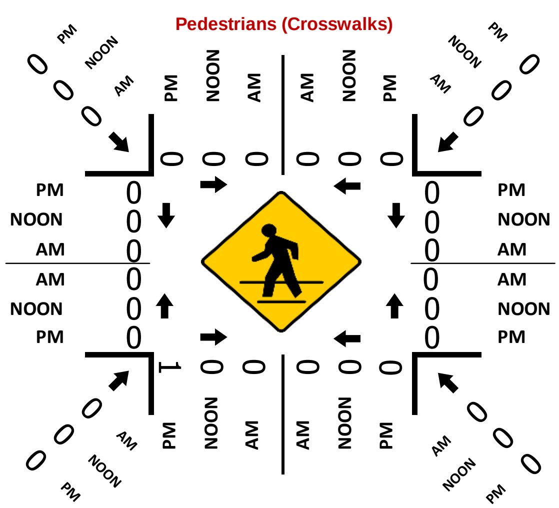
Cars (PM)

Approach			
SB	8	1003	186
EB	30	70	24
WB	187	44	62
NB	18	615	33

HT (PM)

Approach			
SB	5	26	4
EB	3	2	1
WB	10	2	1
NB	1	26	1

Pedestrians (Crosswalks)



Prepared by National Data & Surveying Services

Green Valley Rd & SR 16/Arthur K Bolton Pkwy

Peak Hour Turning Movement Count

ID: 19-09765-004
City: Griffin

Day: Tuesday
Date: 12/10/2019

	PEAK HOURS	COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:30 PM - 05:30 PM	04:00 PM - 06:00 PM

Green Valley Rd — SOUTHBOUND

	Right	Through	Left	U-Turn	Departing
AM	10	10	13	0	40
NOON	0	0	0	0	0
PM	2	19	9	0	58
Lanes	0.5	0.5	1	0	

SR 16/Arthur K Bolton Pkwy — EASTBOUND

	AM	NOON	PM	Lanes
Departing	993	0	920	
U-Turn	0	0	0	0
Left	3	0	4	1
Through	602	0	942	2
Right	60	0	65	0

SR 16/Arthur K Bolton Pkwy — WESTBOUND

	PM	NOON	AM	Lanes
Right	8	0	18	0
Through	774	0	937	2
Left	20	0	41	1
U-Turn	0	0	1	0
Departing	996	0	665	

Green Valley Rd — NORTHBOUND

	Departing	U-Turn	Left	Through	Right
Lanes		0	1	0.5	0.5
PM	104	0	144	46	45
NOON	0	0	0	0	0
AM	111	0	46	19	49

CONTROL

Signalized

	AM	NOON	PM
TEV	1809	0	2078
PHF	0.95		0.83

Cars (AM)

Approach	Left	Through	Right
Southbound	9	9	10
Eastbound	3	556	52
Westbound	38	890	17
Northbound	42	18	38

HT (AM)

Approach	Left	Through	Right
Southbound	4	1	0
Eastbound	0	46	8
Westbound	3	47	1
Northbound	4	1	11

Cars (NOON)

Approach	Left	Through	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

HT (NOON)

Approach	Left	Through	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

Cars (PM)

Approach	Left	Through	Right
Southbound	9	19	2
Eastbound	4	900	60
Westbound	20	737	8
Northbound	143	46	42

HT (PM)

Approach	Left	Through	Right
Southbound	0	0	0
Eastbound	0	42	5
Westbound	0	37	0
Northbound	1	0	3

Pedestrians (Crosswalks)

Crosswalk	AM	NOON	PM
North leg (westward)	0	0	0
North leg (eastward)	0	0	0
West leg (southward)	0	0	0
West leg (northward)	0	0	0
East leg (southward)	0	0	0
East leg (northward)	0	0	0
South leg (eastward)	0	0	0
South leg (westward)	0	0	0
NW corner (diagonal)	0	0	0
NE corner (diagonal)	0	0	0
SW corner (diagonal)	0	0	0
SE corner (diagonal)	0	0	0

Prepared by National Data & Surveying Services

Rehoboth Rd & SR 16/Arthur K Bolton Pkwy

Peak Hour Turning Movement Count

ID: 19-09765-005
City: Griffin

Day: Tuesday
Date: 12/10/2019

	PEAK HOURS	COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:30 PM - 05:30 PM	04:00 PM - 06:00 PM

Rehoboth Rd – SOUTHBOUND

	Right	Through	Left	U-Turn	Exit
AM	13	0	0	0	2
NOON	0	0	0	0	0
PM	5	0	0	0	4
HT %	1	0	0	0	

SR 16/Arthur K Bolton Pkwy – EASTBOUND

	AM	NOON	PM	HT %
Exit	988	0	801	
U-Turn	0	0	0	0
Left	0	0	0	0
Through	512	0	874	2
Right	155	0	115	1

SR 16/Arthur K Bolton Pkwy – WESTBOUND

	PM	NOON	AM	HT %
Right	4	0	2	1
Through	673	0	883	2
Left	8	0	35	1
U-Turn	0	0	0	0
Exit	956	0	518	

Rehoboth Rd – NORTHBOUND

	Exit	U-Turn	Left	Through	Right
PM	123	0	123	0	82
NOON	0	0	0	0	0
AM	190	0	92	0	6
HT %		0	1	0	1

CONTROL

2-Way Stop(NB/SB)

	AM	NOON	PM
TEV	1698	0	1884
PHF	0.91		0.87

Cars (AM)

Approach	Left	Through	Right
Southbound	0	0	13
Eastbound	0	460	146
Westbound	34	838	2
Northbound	87	0	5

Cars (NOON)

Approach	Left	Through	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

Cars (PM)

Approach	Left	Through	Right
Southbound	0	0	5
Eastbound	0	833	112
Westbound	8	638	4
Northbound	121	0	82

HT (AM)

Approach	Left	Through	Right
Southbound	0	0	0
Eastbound	0	52	9
Westbound	1	45	0
Northbound	5	0	1

HT (NOON)

Approach	Left	Through	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

HT (PM)

Approach	Left	Through	Right
Southbound	0	0	0
Eastbound	0	41	3
Westbound	0	35	0
Northbound	2	0	0

Pedestrians (Crosswalks)

Crosswalk	AM	NOON	PM
North leg	0	0	0
West leg	0	0	0
East leg	0	0	0
South leg	0	0	0
NW corner	0	0	0
NE corner	0	0	0
SW corner	0	0	0
SE corner	0	0	0

Prepared by National Data & Surveying Services

S McDonough Rd & SR 16/Arthur K Bolton Pkwy

Peak Hour Turning Movement Count

ID: 19-09765-006
City: Griffin

Day: Tuesday
Date: 12/10/2019

PEAK HOURS	
AM	07:15 AM - 08:15 AM
NOON	NONE
PM	04:30 PM - 05:30 PM

COUNT PERIODS	
AM	07:00 AM - 09:00 AM
NOON	NONE
PM	04:00 PM - 06:00 PM

S McDonough Rd — SOUTHBOUND

	Right	Through	Left	U-Turn	Exit
AM	105	32	7	0	100
NOON	0	0	0	0	0
PM	58	68	2	0	137
Lanes	1	1	1	0	

SR 16/Arthur K Bolton Pkwy — EASTBOUND

	AM	NOON	PM	Lanes
Exit	887	0	655	
U-Turn	0	0	0	0
Left	47	0	101	1
Through	432	0	858	2
Right	5	0	15	1

SR 16/Arthur K Bolton Pkwy — WESTBOUND

	Lanes	PM	NOON	AM
Right	1	2	0	4
Through	2	581	0	769
Left	1	46	0	25
U-Turn	0	0	0	0
Exit		888	0	486

S McDonough Rd — NORTHBOUND

	Exit	U-Turn	Left	Through	Right
Lanes		0	1	1	1
PM	129	0	16	34	28
NOON	0	0	0	0	0
AM	62	0	13	49	47

CONTROL

Signalized

	AM	NOON	PM
TEV	1535	0	1809
PHF	0.90		0.91

Cars (AM)

	Left	Through	Right
Southbound	5	31	103
Eastbound	46	383	4
Westbound	25	724	3
Northbound	12	48	46

HT (AM)

	Left	Through	Right
Southbound	2	1	2
Eastbound	1	49	1
Westbound	0	45	1
Northbound	1	1	1

Cars (NOON)

	Left	Through	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

HT (NOON)

	Left	Through	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

Cars (PM)

	Left	Through	Right
Southbound	2	67	58
Eastbound	100	815	15
Westbound	44	546	2
Northbound	16	34	28

HT (PM)

	Left	Through	Right
Southbound	0	1	0
Eastbound	1	43	0
Westbound	2	35	0
Northbound	0	0	0

Pedestrians (Crosswalks)

Crosswalk	AM	NOON	PM
North leg (eastward)	0	0	0
North leg (westward)	0	0	0
South leg (eastward)	0	0	0
South leg (westward)	0	0	0
West leg (southward)	0	0	0
West leg (northward)	0	0	0
East leg (southward)	0	0	0
East leg (northward)	0	0	0
NW corner (diagonal)	0	0	0
NE corner (diagonal)	0	0	0
SW corner (diagonal)	0	0	0
SE corner (diagonal)	0	0	0

Prepared by National Data & Surveying Services

Pineview Rd/N 9th St & E Mcintosh Rd

Peak Hour Turning Movement Count

ID: 19-09765-007
City: Griffin

Day: Tuesday
Date: 12/10/2019

PEAK HOURS		COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:00 PM - 05:00 PM	04:00 PM - 06:00 PM

Pineview Rd/N 9th St — SOUTHBOUND

	Right	Thru	Left	U-Turn	Out
AM	9	7	13	0	15
NOON	0	0	0	0	0
PM	13	4	6	0	41
Lanes	0	1	0	0	

E Mcintosh Rd — EASTBOUND

	AM	NOON	PM	Lanes
Out	231	0	282	
U-Turn	0	0	0	0
Left	3	0	21	0
Thru	112	0	223	1
Right	38	0	58	0

E Mcintosh Rd — WESTBOUND

	PM	NOON	AM	Lanes
Right	9	0	7	0
Thru	207	0	179	1
Left	30	0	17	0
U-Turn	0	0	0	0
Out	261	0	151	

Pineview Rd/N 9th St — NORTHBOUND

	Out	U-Turn	Left	Thru	Right
Lanes		0	0	1	0
PM	92	0	62	11	32
NOON	0	0	0	0	0
AM	62	0	43	5	26

CONTROL

4-Way Stop

	AM	NOON	PM
TEV	459	0	676
PHF	0.91		0.93

Cars (AM)

	Left	Thru	Right
Southbound	12	7	9
Eastbound	3	110	38
Westbound	15	169	7
Northbound	42	5	24

HT (AM)

	Left	Thru	Right
Southbound	1	0	0
Eastbound	0	2	0
Westbound	2	10	0
Northbound	1	0	2

Cars (NOON)

	Left	Thru	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

HT (NOON)

	Left	Thru	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

Cars (PM)

	Left	Thru	Right
Southbound	6	4	13
Eastbound	21	216	57
Westbound	27	197	8
Northbound	59	11	31

HT (PM)

	Left	Thru	Right
Southbound	0	0	0
Eastbound	0	7	1
Westbound	3	10	1
Northbound	3	0	1

Pedestrians (Crosswalks)

	AM	NOON	PM
North crosswalk (eastbound)	0	0	0
North crosswalk (westbound)	0	0	0
West crosswalk (southbound)	0	0	0
West crosswalk (northbound)	0	0	0
East crosswalk (southbound)	0	0	0
East crosswalk (northbound)	0	0	0
South crosswalk (eastbound)	0	0	0
South crosswalk (westbound)	0	0	0
NW diagonal	0	0	0
NE diagonal	0	0	0
SW diagonal	0	0	0
SE diagonal	0	0	0

Prepared by National Data & Surveying Services

US 41/US 19/SR 3/Martin Luther King Jr Pkwy & US 19/SR 3/Zebulon Rd

Peak Hour Turning Movement Count

ID: 19-09765-008
City: Griffin

Day: Tuesday
Date: 12/10/2019

PEAK HOURS	COUNT PERIODS
07:30 AM - 08:30 AM	07:00 AM - 09:00 AM
NONE	NONE
05:00 PM - 06:00 PM	04:00 PM - 06:00 PM

US 41/US 19/SR 3/Martin Luther King Jr Pkwy — SOUTHBOUND

	Right	Thru	Left	U-Turn	Exiting
AM	178	293	35	7	1091
NOON	0	0	0	0	0
PM	507	502	41	12	644
Lanes	1	2	1	0	

US 19/SR 3/Zebulon Rd — EASTBOUND

	AM	NOON	PM	Lanes
Exiting	430	0	1063	
U-Turn	0	0	0	0
Left	504	0	261	1
Thru	387	0	279	1
Right	115	0	125	1

US 19/SR 3/Zebulon Rd — WESTBOUND

	PM	NOON	AM	Lanes
Right	31	0	42	0.5
Thru	383	0	165	0.5
Left	119	0	72	1
U-Turn	0	0	0	0
Exiting	400	0	540	

US 41/US 19/SR 3/Martin Luther King Jr Pkwy — NORTHBOUND

	Exiting	U-Turn	Left	Thru	Right
Lanes		0	1	2	1
PM	754	8	173	340	80
NOON	0	0	0	0	0
AM	482	2	87	538	118

CONTROL: Signalized

	AM	NOON	PM
TEV	2543	0	2861
PHF	0.93		0.94

Cars (AM)

Approach	Left	Thru	Right
Southbound	33	270	165
Eastbound	480	382	110
Westbound	70	156	38
Northbound	85	511	116

HT (AM)

Approach	Left	Thru	Right
Southbound	2	23	13
Eastbound	24	5	5
Westbound	2	9	4
Northbound	2	27	2

Cars (NOON)

Approach	Left	Thru	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

HT (NOON)

Approach	Left	Thru	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

Cars (PM)

Approach	Left	Thru	Right
Southbound	40	496	496
Eastbound	246	271	123
Westbound	117	379	30
Northbound	171	324	78

HT (PM)

Approach	Left	Thru	Right
Southbound	1	9	11
Eastbound	15	8	2
Westbound	2	4	1
Northbound	2	16	2

Pedestrians (Crosswalks)

Location	PM	NOON	AM
North crosswalk, westbound	0	0	0
North crosswalk, eastbound	0	0	0
South crosswalk, westbound	1	0	0
South crosswalk, eastbound	1	0	0
West crosswalk, southbound	0	0	0
West crosswalk, northbound	0	0	0
East crosswalk, southbound	0	0	0
East crosswalk, northbound	1	0	0
NW corner diagonal	0	0	0
NE corner diagonal	0	0	0
SW corner diagonal	0	0	0
SE corner diagonal	0	0	0

Prepared by National Data & Surveying Services

Macon Rd & County Line Rd/Johnston Rd

Peak Hour Turning Movement Count

ID: 19-09765-009
City: Griffin

Day: Tuesday
Date: 12/10/2019

	PEAK HOURS	COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:45 PM - 05:45 PM	04:00 PM - 06:00 PM

Macon Rd — SOUTHBOUND

	Right	Thru	Left	U-Turn	Out
AM	13	93	17	0	221
NOON	0	0	0	0	0
PM	47	193	15	0	114
Lanes	0	1	0	0	

County Line Rd/Johnston Rd — EASTBOUND

	AM	NOON	PM	Lanes
Out	217	0	244	
U-Turn	0	0	0	0
Left	29	0	8	0
Thru	84	0	74	1
Right	76	0	153	0

County Line Rd/Johnston Rd — WESTBOUND

	Lanes	PM	NOON	AM
Right	0	16	0	15
Thru	1	102	0	60
Left	0	85	0	28
U-Turn	0	0	0	0
Out		134	0	163

Macon Rd — NORTHBOUND

	Out	U-Turn	Left	Thru	Right
Lanes		0	0	1	0
PM	431	0	95	90	45
NOON	0	0	0	0	0
AM	197	0	144	177	62

CONTROL

2-Way Stop(EB/WB)

	AM	NOON	PM
TEV	798	0	923
PHF	0.91		0.82

Cars (AM)

Approach			
Southbound	12	87	15
Eastbound	29	81	73
Westbound	15	57	28
Northbound	140	168	61

HT (AM)

Approach			
Southbound	1	9	2
Eastbound	0	3	3
Westbound	0	3	0
Northbound	4	9	1

Cars (NOON)

Approach			
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

HT (NOON)

Approach			
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

Cars (PM)

Approach			
Southbound	47	192	15
Eastbound	8	72	152
Westbound	15	101	84
Northbound	94	84	45

HT (PM)

Approach			
Southbound	0	1	0
Eastbound	0	2	1
Westbound	1	1	1
Northbound	1	6	0

Pedestrians (Crosswalks)

Crosswalk	AM	NOON	PM
North (eastbound crossing)	0	0	0
North (westbound crossing)	0	0	0
South (eastbound crossing)	0	0	0
South (westbound crossing)	0	0	0
West (southbound crossing)	0	0	0
West (northbound crossing)	0	0	0
East (southbound crossing)	0	0	0
East (northbound crossing)	0	0	0
NW diagonal	0	0	0
NE diagonal	0	0	0
SW diagonal	0	0	0
SE diagonal	0	0	0

Prepared by National Data & Surveying Services

Green Valley Rd & County Line Rd/Johnston Rd

Peak Hour Turning Movement Count

ID: 19-09765-010
City: Griffin

Day: Tuesday
Date: 12/10/2019

	PEAK HOURS	COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:30 PM - 05:30 PM	04:00 PM - 06:00 PM

Green Valley Rd – SOUTHBOUND

	Right	Thru	Left	U-Turn	Departing
AM	17	0	15	0	78
NOON	0	0	0	0	0
PM	73	0	18	0	47
Bikes/Peds	0	1	0	0	

County Line Rd/Johnston Rd – EASTBOUND

	AM	NOON	PM	
Departing	103	0	192	
U-Turn	0	0	0	0
Left	52	0	30	0
Thru	110	0	108	1
Right	0	0	0	0

County Line Rd/Johnston Rd – WESTBOUND

		PM	NOON	AM
Right	0	17	0	26
Thru	1	119	0	86
Left	0	0	0	0
U-Turn	0	0	0	0
Departing		126	0	125

Green Valley Rd – NORTHBOUND

	Departing	U-Turn	Left	Thru	Right
Bikes/Peds		0	0	0	0
PM	0	0	0	0	0
NOON	0	0	0	0	0
AM	0	0	0	0	0

CONTROL

1-Way Stop(SB)

	AM	NOON	PM
TEV	306	0	365
PHF	0.92		0.75

Cars (AM)

	Left	Thru	Right
Southbound	13	0	17
Eastbound	51	105	0
Westbound	0	84	26
Northbound	0	0	0

HT (AM)

	Left	Thru	Right
Southbound	2	0	0
Eastbound	1	5	0
Westbound	0	2	0
Northbound	0	0	0

Cars (NOON)

	Left	Thru	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

HT (NOON)

	Left	Thru	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

Cars (PM)

	Left	Thru	Right
Southbound	16	0	72
Eastbound	30	105	0
Westbound	0	116	17
Northbound	0	0	0

HT (PM)

	Left	Thru	Right
Southbound	2	0	1
Eastbound	0	3	0
Westbound	0	3	0
Northbound	0	0	0

Pedestrians (Crosswalks)

Crosswalk	AM	NOON	PM
North (EB / WB)	0 / 0	0 / 0	0 / 0
South (EB / WB)	0 / 0	0 / 0	0 / 0
West (NB / SB)	0 / 0	0 / 0	0 / 0
East (NB / SB)	0 / 0	0 / 0	0 / 0
NW diagonal	0	0	0
NE diagonal	0	0	0
SW diagonal	0	0	0
SE diagonal	0	0	0

Prepared by National Data & Surveying Services

S McDonough Rd & County Line Rd/Johnston Rd

Peak Hour Turning Movement Count

ID: 19-09765-011
City: Griffin

Day: Tuesday
Date: 12/10/2019

PEAK HOURS		COUNT PERIODS
AM	07:00 AM - 08:00 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:45 PM - 05:45 PM	04:00 PM - 06:00 PM

S McDonough Rd — SOUTHBOUND

	Right	Thru	Left	U-Turn	Exiting
AM	43	9	1	0	88
NOON	0	0	0	0	0
PM	86	11	1	0	71
Lanes	0	1	0	0	

County Line Rd/Johnston Rd — EASTBOUND

Movement	AM	NOON	PM	Lanes
Exiting	109	0	140	
U-Turn	0	0	0	0
Left	77	0	55	0
Thru	14	0	42	1
Right	37	0	25	0

County Line Rd/Johnston Rd — WESTBOUND

Movement	PM	NOON	AM	Lanes
Right	1	0	3	0
Thru	20	0	32	1
Left	1	0	1	0
U-Turn	0	0	0	0
Exiting	46	0	15	

S McDonough Rd — NORTHBOUND

	Exiting	U-Turn	Left	Thru	Right
Lanes		0	0	1	0
PM	37	0	34	15	3
NOON	0	0	0	0	0
AM	47	0	34	8	0

CONTROL

2-Way Stop(NB/SB)

	AM	NOON	PM
TEV	259	0	294
PHF	0.85		0.88

Cars (AM)

Approach	Left	Thru	Right
Southbound	0	9	41
Eastbound	75	14	33
Westbound	1	32	3
Northbound	33	8	0

HT (AM)

Approach	Left	Thru	Right
Southbound	1	0	2
Eastbound	2	0	4
Westbound	0	0	0
Northbound	1	0	0

Cars (NOON)

Approach	Left	Thru	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

HT (NOON)

Approach	Left	Thru	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

Cars (PM)

Approach	Left	Thru	Right
Southbound	1	11	86
Eastbound	53	42	23
Westbound	1	20	1
Northbound	33	15	3

HT (PM)

Approach	Left	Thru	Right
Southbound	0	0	0
Eastbound	2	0	2
Westbound	0	0	0
Northbound	1	0	0

Pedestrians (Crosswalks)

Crosswalk	AM	NOON	PM
North leg	0	0	0
South leg	0	0	0
East leg	0	0	0
West leg	0	0	0
NW corner (diagonal)	0	0	0
NE corner (diagonal)	0	0	0
SW corner (diagonal)	0	0	0
SE corner (diagonal)	0	0	0

Appendix C

Detailed Crash Analysis

Spalding County Freight Cluster Study Crash Analysis
Jackson Rd @ Wallace Rd
Years 2014 to 2018

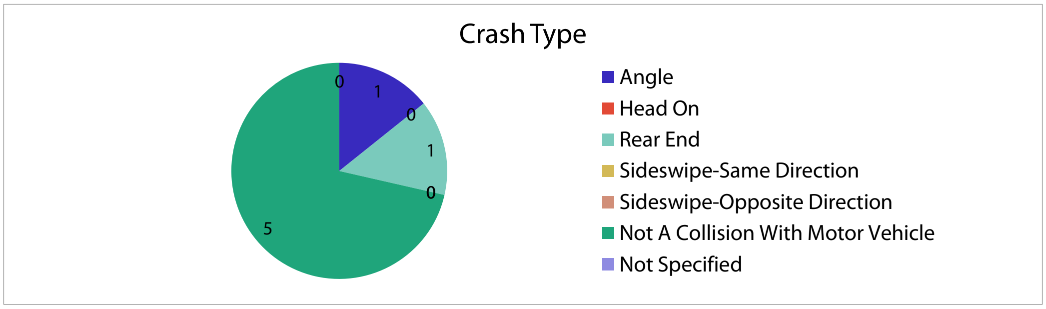
Year	Crash Type							Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	Not Specified	
2014	1	0	0	0	0	1	0	2
2015	0	0	0	0	0	1	0	1
2016	0	0	0	0	0	1	0	1
2017	0	0	0	0	0	0	0	0
2018	0	0	1	0	0	2	0	3
Total	1	0	1	0	0	5	0	7
	14.3%	0.0%	14.3%	0.0%	0.0%	71.4%	0.0%	100.0%

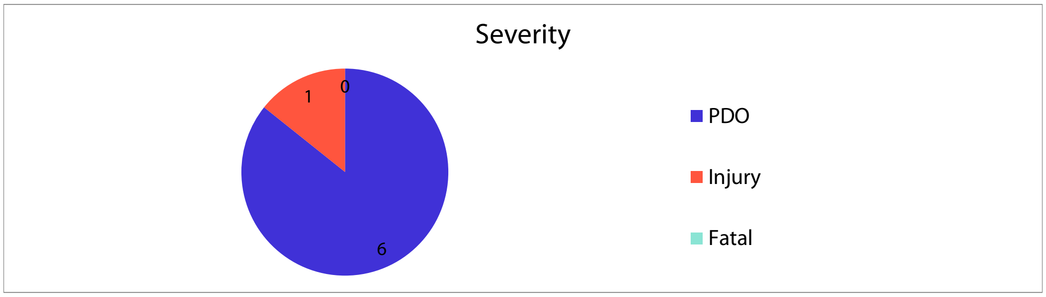
Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	1	1	0	2
2015	1	0	0	1
2016	1	0	0	1
2017	0	0	0	0
2018	3	0	0	3
Total	6	1	0	7
	86%	14%	0%	100.0%

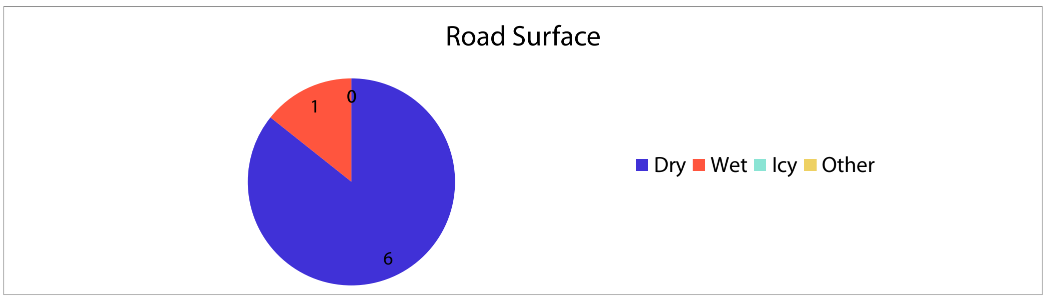
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	2	0	0	0	2
2015	1	0	0	0	1
2016	1	0	0	0	1
2017	0	0	0	0	0
2018	2	1	0	0	3
Total	6	1	0	0	7
	86%	14%	0%	0%	100.0%

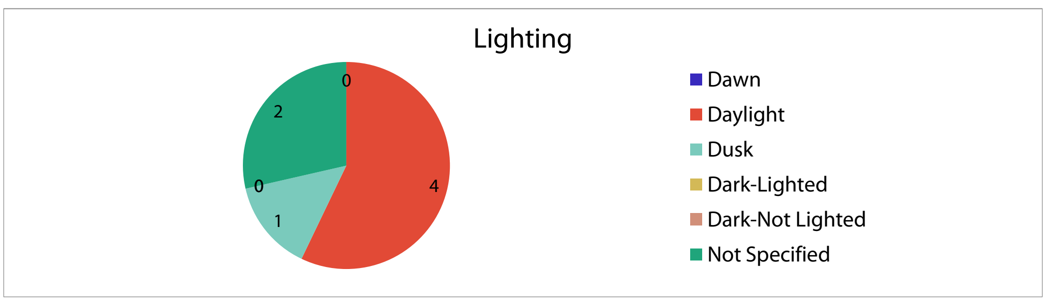
Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	2	0	0	0	0	2
2015	0	1	0	0	0	0	1
2016	0	0	1	0	0	0	1
2017	0	0	0	0	0	0	0
2018	0	1	0	0	0	2	3
Total	0	4	1	0	0	2	7
	0%	57%	14%	0%	0%	29%	100.0%

Spalding County Freight Cluster Study Crash Analysis
Jackson Rd @ Wallace Rd
Years 2014 to 2018









Spalding County Freight Cluster Study Crash Analysis
SR 16 @ Wild Plum Rd
Years 2014 to 2018

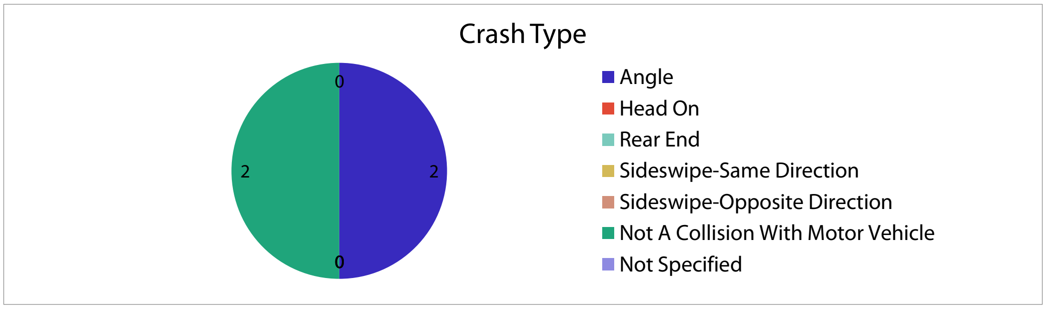
Year	Crash Type							Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	Not Specified	
2014	0	0	0	0	0	1	0	1
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	2	0	0	0	0	1	0	3
2018	0	0	0	0	0	0	0	0
Total	2	0	0	0	0	2	0	4
	50.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	100.0%

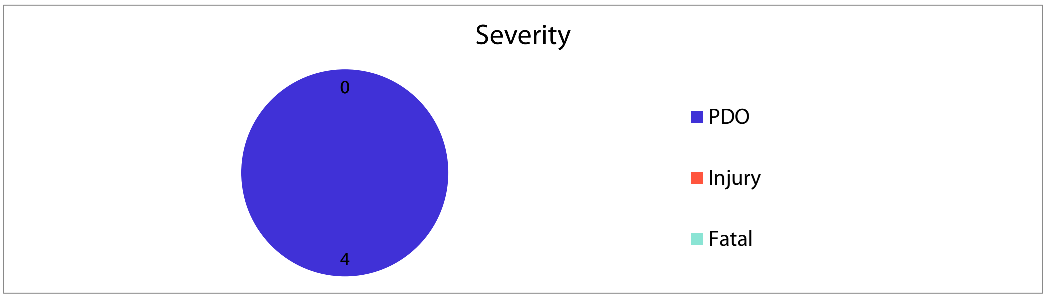
Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	1	0	0	1
2015	0	0	0	0
2016	0	0	0	0
2017	3	0	0	3
2018	0	0	0	0
Total	4	0	0	4
	100%	0%	0%	100.0%

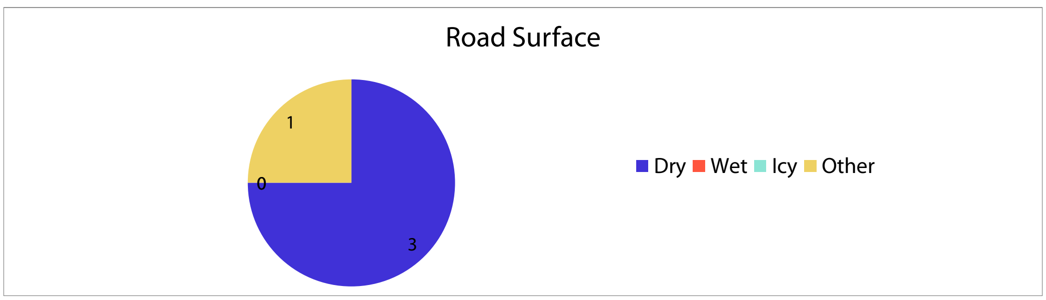
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	0	0	0	1	1
2015	0	0	0	0	0
2016	0	0	0	0	0
2017	3	0	0	0	3
2018	0	0	0	0	0
Total	3	0	0	1	4
	75%	0%	0%	25%	100.0%

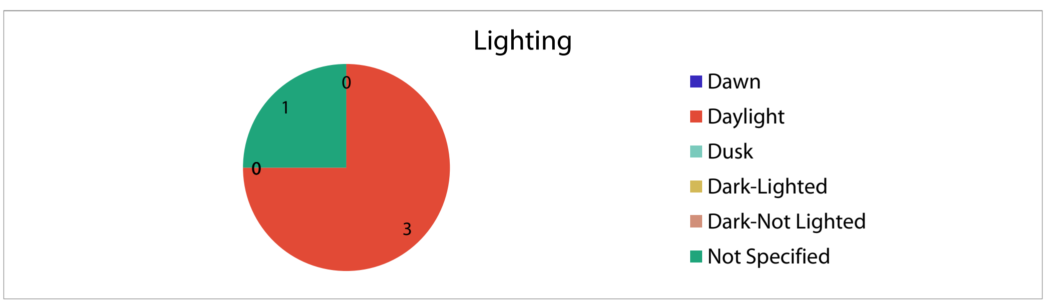
Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	1	0	0	0	0	1
2015	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0
2017	0	2	0	0	0	1	3
2018	0	0	0	0	0	0	0
Total	0	3	0	0	0	1	4
	0%	75%	0%	0%	0%	25%	100.0%

Spalding County Freight Cluster Study Crash Analysis
SR 16 @ Wild Plum Rd
Years 2014 to 2018









Spalding County Freight Cluster Study Crash Analysis
US 19/41 @ Airport Rd
Years 2014 to 2018

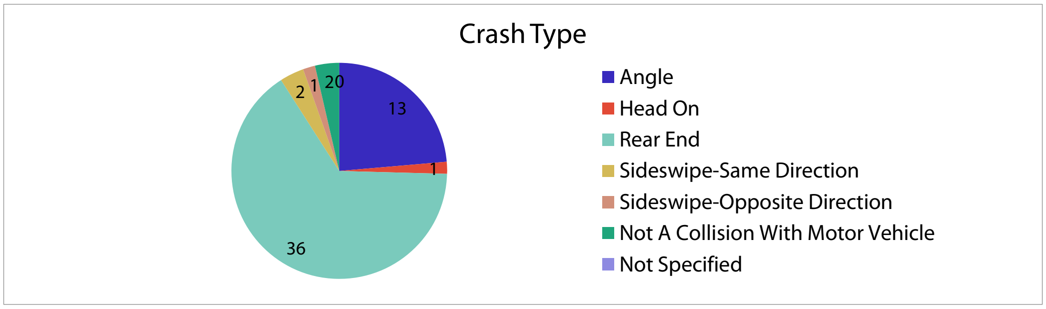
Year	Crash Type							Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	Not Specified	
2014	3	0	2	1	0	0	0	6
2015	1	1	4	0	0	1	0	7
2016	1	0	5	1	0	0	0	7
2017	3	0	11	0	0	0	0	14
2018	5	0	14	0	1	1	0	21
Total	13	1	36	2	1	2	0	55
	23.6%	1.8%	65.5%	3.6%	1.8%	3.6%	0.0%	100.0%

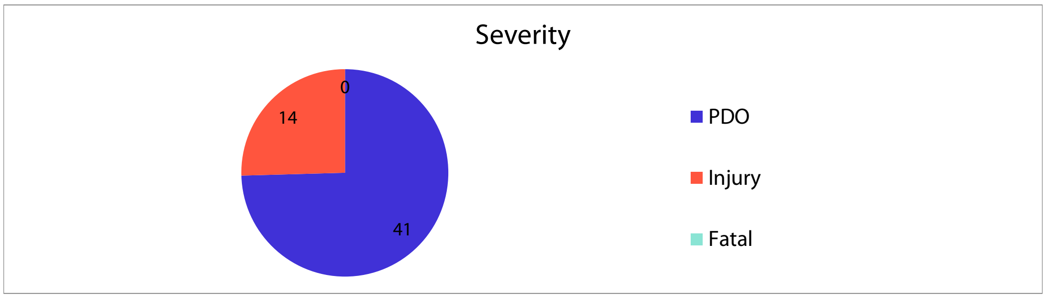
Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	2	4	0	6
2015	6	1	0	7
2016	5	2	0	7
2017	14	0	0	14
2018	14	7	0	21
Total	41	14	0	55
	75%	25%	0%	100.0%

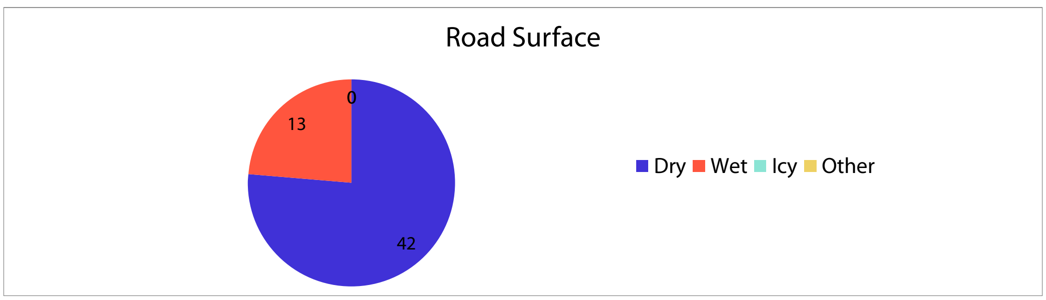
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	5	1	0	0	6
2015	5	2	0	0	7
2016	5	2	0	0	7
2017	11	3	0	0	14
2018	16	5	0	0	21
Total	42	13	0	0	55
	76%	24%	0%	0%	100.0%

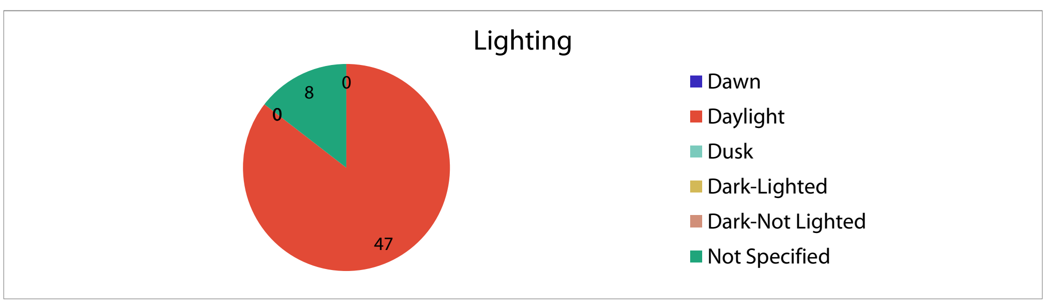
Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	5	0	0	0	1	6
2015	0	7	0	0	0	0	7
2016	0	7	0	0	0	0	7
2017	0	11	0	0	0	3	14
2018	0	17	0	0	0	4	21
Total	0	47	0	0	0	8	55
	0%	85%	0%	0%	0%	15%	100.0%

Spalding County Freight Cluster Study Crash Analysis
US 19/41 @ Airport Rd
Years 2014 to 2018









Spalding County Freight Cluster Study Crash Analysis
SR 16 @ Green Valley Rd
Years 2014 to 2018

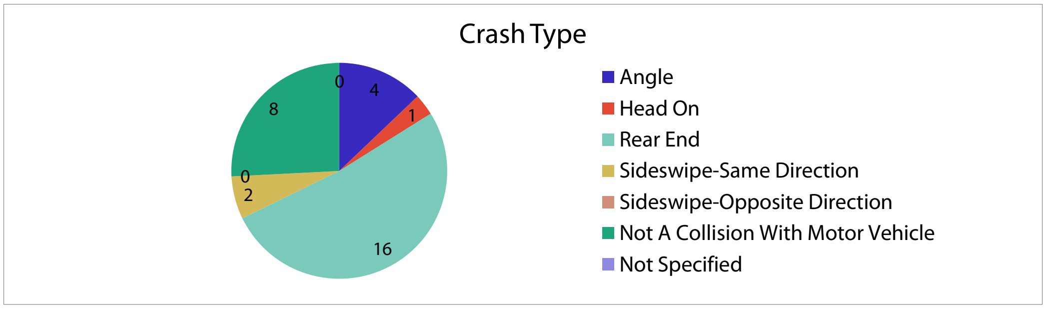
Year	Crash Type							Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	Not Specified	
2014	1	0	1	2	0	2	0	6
2015	0	0	2	0	0	1	0	3
2016	1	0	2	0	0	0	0	3
2017	0	0	6	0	0	5	0	11
2018	2	1	5	0	0	0	0	8
Total	4	1	16	2	0	8	0	31
	12.9%	3.2%	51.6%	6.5%	0.0%	25.8%	0.0%	100.0%

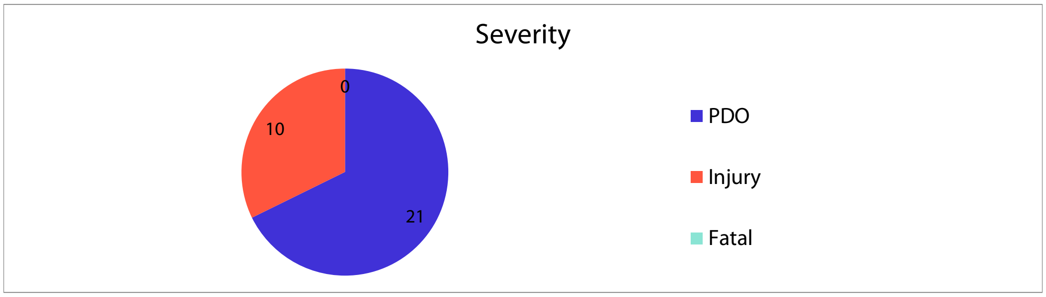
Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	6	0	0	6
2015	2	1	0	3
2016	0	3	0	3
2017	7	4	0	11
2018	6	2	0	8
Total	21	10	0	31
	68%	32%	0%	100.0%

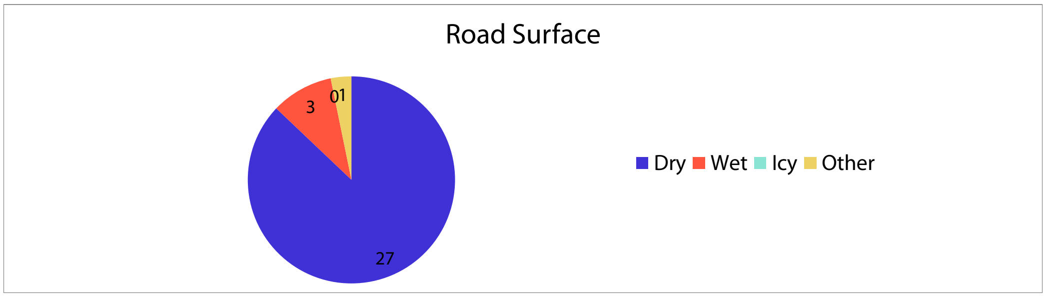
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	6	0	0	0	6
2015	3	0	0	0	3
2016	3	0	0	0	3
2017	8	3	0	0	11
2018	7	0	0	1	8
Total	27	3	0	1	31
	87%	10%	0%	3%	100.0%

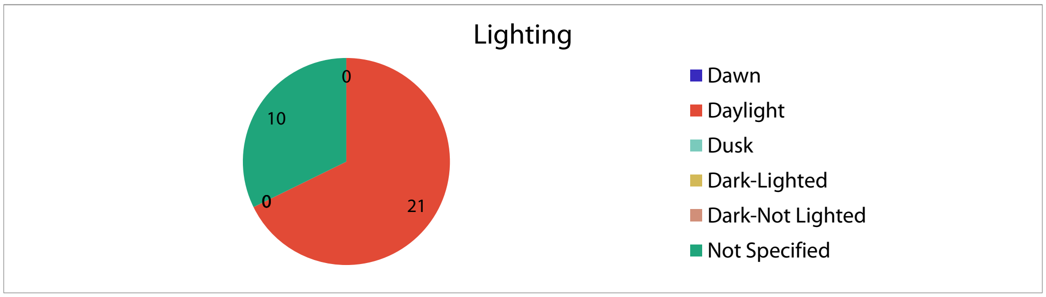
Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	5	0	0	0	1	6
2015	0	1	0	0	0	2	3
2016	0	3	0	0	0	0	3
2017	0	6	0	0	0	5	11
2018	0	6	0	0	0	2	8
Total	0	21	0	0	0	10	31
	0%	68%	0%	0%	0%	32%	100.0%

Spalding County Freight Cluster Study Crash Analysis
SR 16 @ Green Valley Rd
Years 2014 to 2018









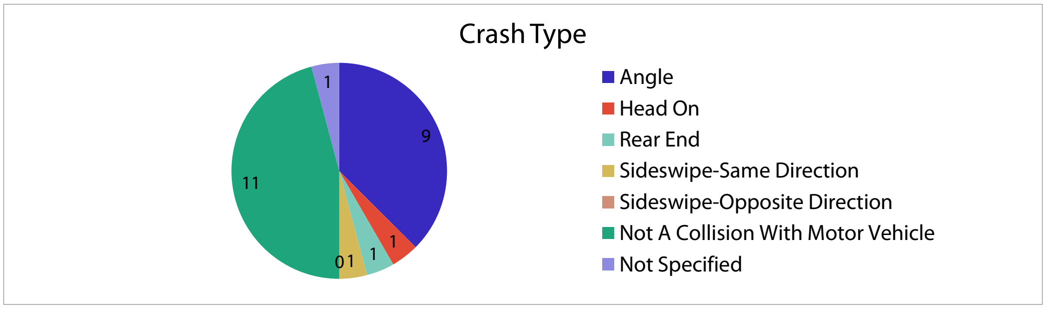
Spalding County Freight Cluster Study Crash Analysis
SR 16 @ Reheboth Rd
Years 2014 to 2018

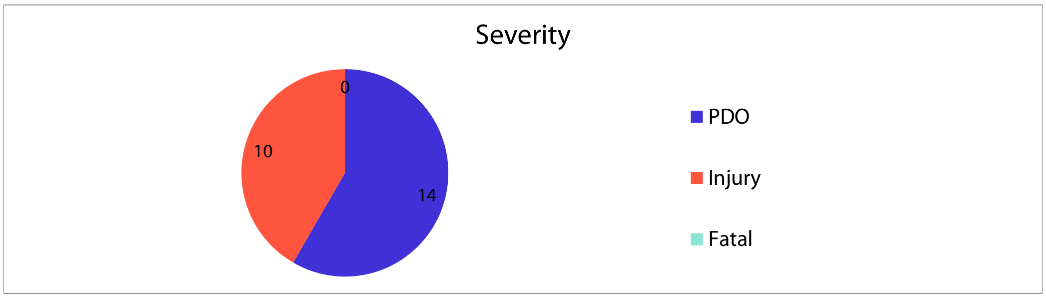
Year	Crash Type							Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	Not Specified	
2014	2	0	0	0	0	2	0	4
2015	2	0	0	0	0	1	0	3
2016	3	1	0	0	0	3	0	7
2017	2	0	0	0	0	2	1	5
2018	0	0	1	1	0	3	0	5
Total	9	1	1	1	0	11	1	24
	37.5%	4.2%	4.2%	4.2%	0.0%	45.8%	4.2%	100.0%

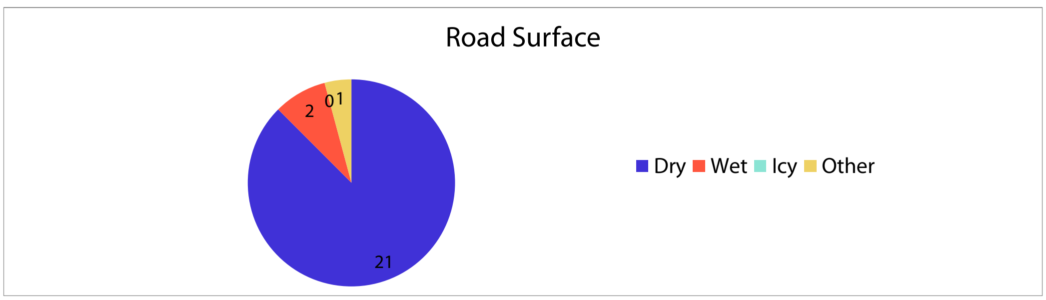
Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	1	3	0	4
2015	2	1	0	3
2016	4	3	0	7
2017	3	2	0	5
2018	4	1	0	5
Total	14	10	0	24
	58%	42%	0%	100.0%

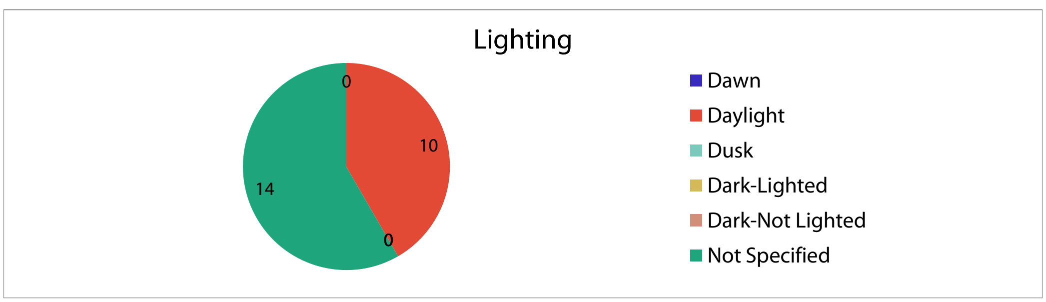
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	3	1	0	0	4
2015	3	0	0	0	3
2016	7	0	0	0	7
2017	4	0	0	1	5
2018	4	1	0	0	5
Total	21	2	0	1	24
	88%	8%	0%	4%	100.0%

Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	1	0	0	0	3	4
2015	0	2	0	0	0	1	3
2016	0	2	0	0	0	5	7
2017	0	2	0	0	0	3	5
2018	0	3	0	0	0	2	5
Total	0	10	0	0	0	14	24
	0%	42%	0%	0%	0%	58%	100.0%


Crash Type
1
9
11
1
0 1
1
Angle
Head On
Rear End
Sideswipe-Same Direction
Sideswipe-Opposite Direction
Not A Collision With Motor Vehicle
Not Specified


Severity
0
10
14
PDO
Injury
Fatal


Road Surface
2
0 1
21
Dry
Wet
Icy
Other


Lighting
0
10
14
0
Dawn
Daylight
Dusk
Dark-Lighted
Dark-Not Lighted
Not Specified

Spalding County Freight Cluster Study Crash Analysis
SR 16 @ McDonough Rd
Years 2014 to 2018

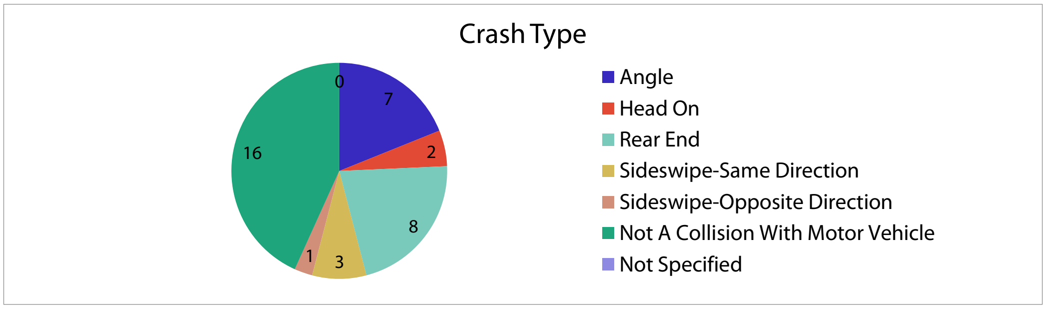
Year	Crash Type							Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	Not Specified	
2014	4	0	1	0	0	2	0	7
2015	1	1	2	2	1	2	0	9
2016	2	1	2	0	0	5	0	10
2017	0	0	2	1	0	4	0	7
2018	0	0	1	0	0	3	0	4
Total	7	2	8	3	1	16	0	37
	18.9%	5.4%	21.6%	8.1%	2.7%	43.2%	0.0%	100.0%

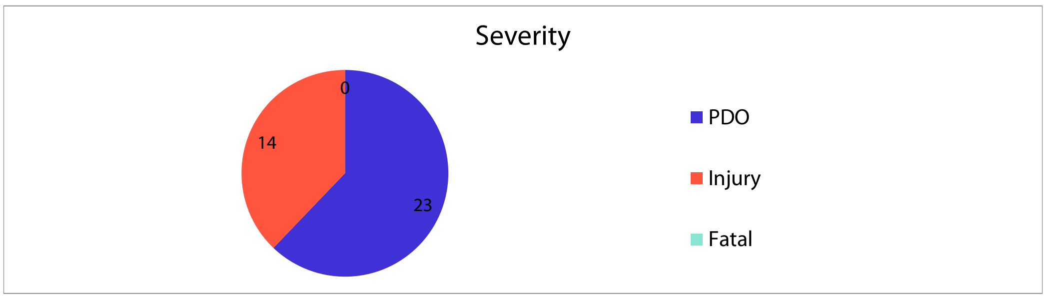
Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	3	4	0	7
2015	5	4	0	9
2016	7	3	0	10
2017	4	3	0	7
2018	4	0	0	4
Total	23	14	0	37
	62%	38%	0%	100.0%

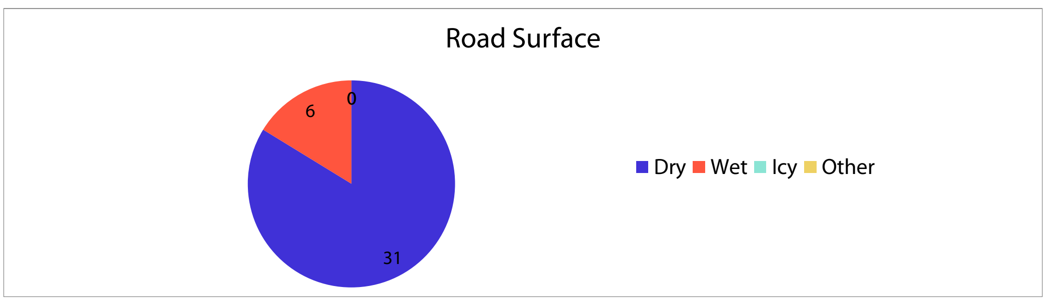
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	7	0	0	0	7
2015	7	2	0	0	9
2016	9	1	0	0	10
2017	6	1	0	0	7
2018	2	2	0	0	4
Total	31	6	0	0	37
	84%	16%	0%	0%	100.0%

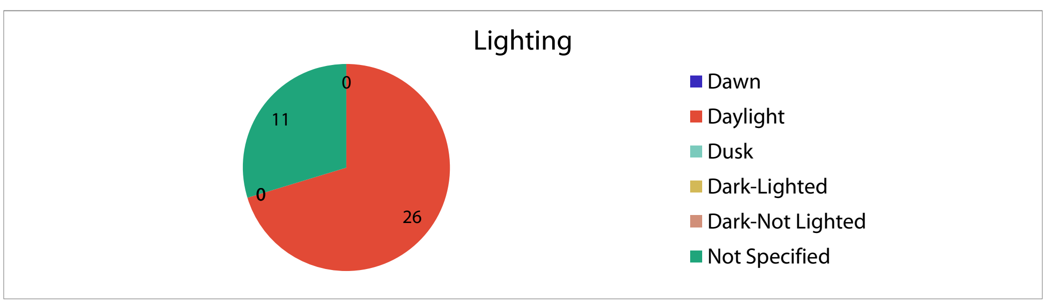
Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	6	0	0	0	1	7
2015	0	7	0	0	0	2	9
2016	0	8	0	0	0	2	10
2017	0	3	0	0	0	4	7
2018	0	2	0	0	0	2	4
Total	0	26	0	0	0	11	37
	0%	70%	0%	0%	0%	30%	100.0%

Spalding County Freight Cluster Study Crash Analysis
SR 16 @ McDonough Rd
Years 2014 to 2018









Spalding County Freight Cluster Study Crash Analysis
McIntosh Rd @ 9th St
Years 2014 to 2018

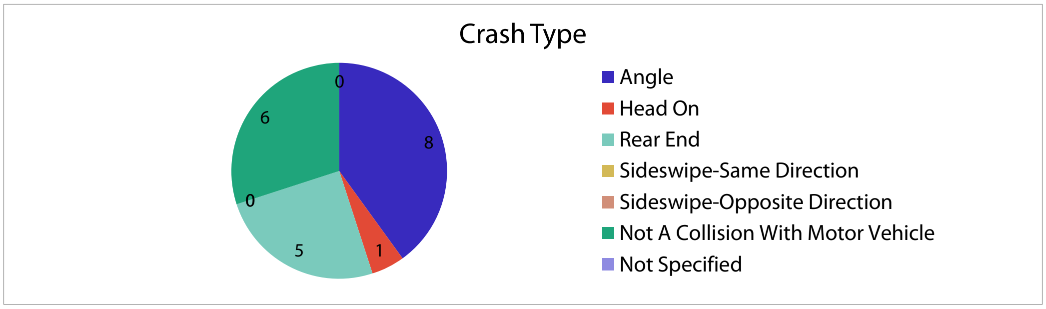
Year	Crash Type: Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	Not Specified	Total Crashes
2014	0	0	0	0	0	0	0	0
2015	2	1	0	0	0	1	0	4
2016	1	0	1	0	0	2	0	4
2017	5	0	3	0	0	2	0	10
2018	0	0	1	0	0	1	0	2
Total	8	1	5	0	0	6	0	20
	40.0%	5.0%	25.0%	0.0%	0.0%	30.0%	0.0%	100.0%

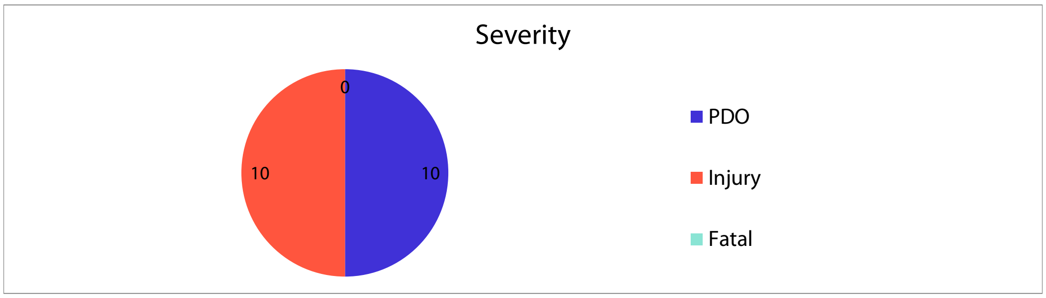
Year	Severity: PDO	Injury	Fatal	Total Crashes
2014	0	0	0	0
2015	3	1	0	4
2016	2	2	0	4
2017	4	6	0	10
2018	1	1	0	2
Total	10	10	0	20
	50%	50%	0%	100.0%

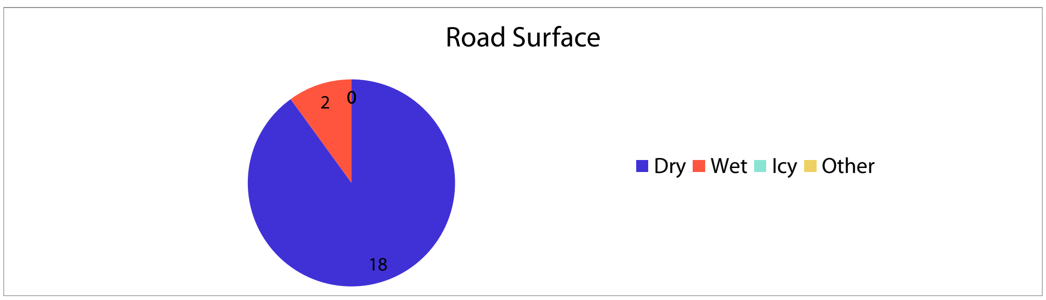
Year	Road Surface: Dry	Wet	Icy	Other	Total Crashes
2014	0	0	0	0	0
2015	3	1	0	0	4
2016	4	0	0	0	4
2017	10	0	0	0	10
2018	1	1	0	0	2
Total	18	2	0	0	20
	90%	10%	0%	0%	100.0%

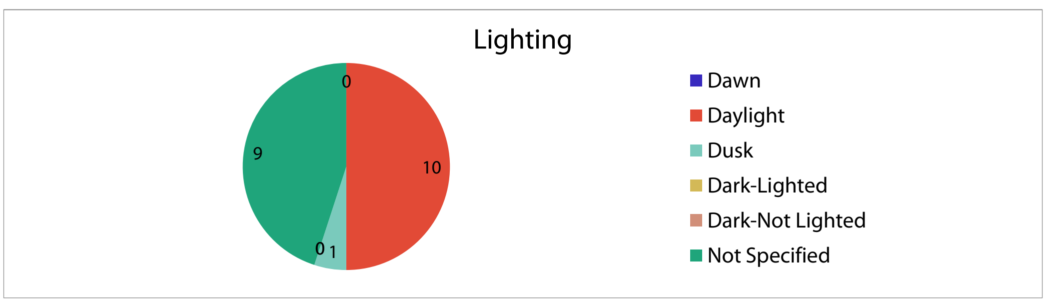
Year	Lighting: Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	Total Crashes
2014	0	0	0	0	0	0	0
2015	0	4	0	0	0	0	4
2016	0	1	0	0	0	3	4
2017	0	5	1	0	0	4	10
2018	0	0	0	0	0	2	2
Total	0	10	1	0	0	9	20
	0%	50%	5%	0%	0%	45%	100.0%

Spalding County Freight Cluster Study Crash Analysis
McIntosh Rd @ 9th St
Years 2014 to 2018









Spalding County Freight Cluster Study Crash Analysis
US 19/41 @ US 19 Bus/SR 155
Years 2014 to 2018

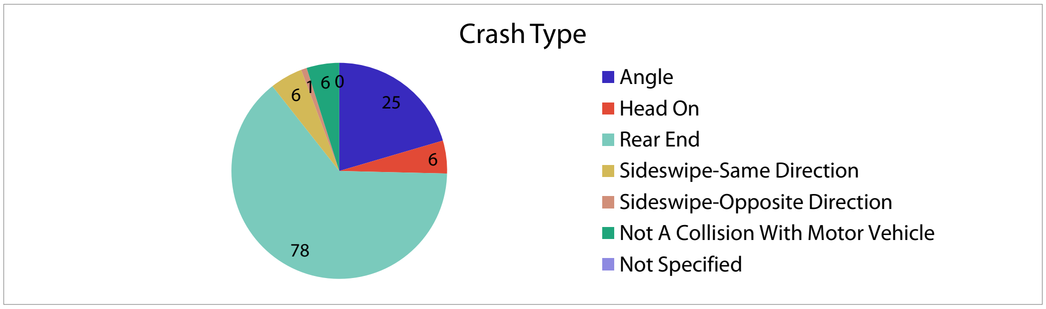
Year	Crash Type							Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	Not Specified	
2014	1	0	10	2	0	2	0	15
2015	1	2	17	0	0	2	0	22
2016	4	2	18	1	0	0	0	25
2017	6	0	18	2	0	0	0	26
2018	13	2	15	1	1	2	0	34
Total	25	6	78	6	1	6	0	122
	20.5%	4.9%	63.9%	4.9%	0.8%	4.9%	0.0%	100.0%

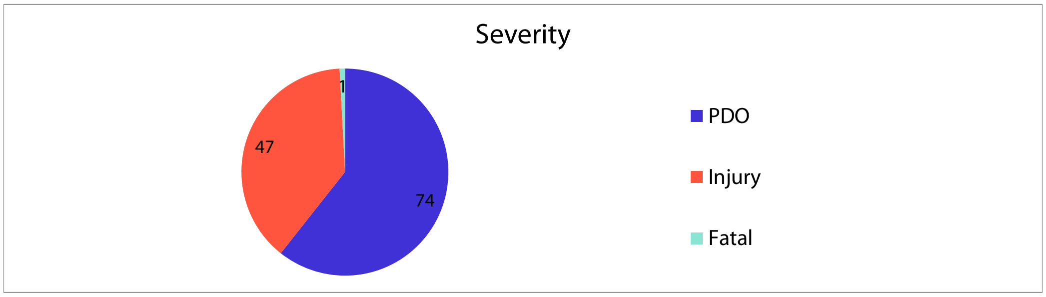
Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	11	4	0	15
2015	14	8	0	22
2016	15	10	0	25
2017	18	7	1	26
2018	16	18	0	34
Total	74	47	1	122
	61%	39%	1%	100.0%

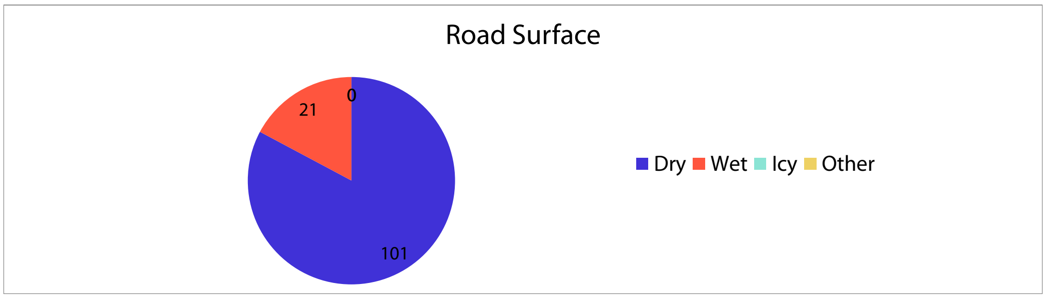
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	14	1	0	0	15
2015	16	6	0	0	22
2016	24	1	0	0	25
2017	23	3	0	0	26
2018	24	10	0	0	34
Total	101	21	0	0	122
	83%	17%	0%	0%	100.0%

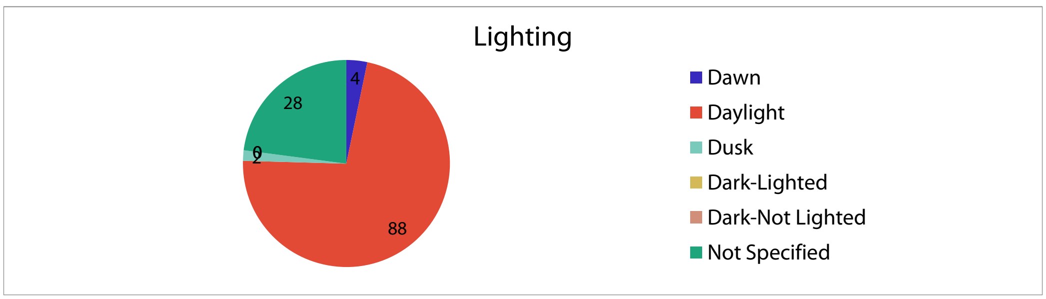
Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	11	1	0	0	3	15
2015	0	18	0	0	0	4	22
2016	0	21	0	0	0	4	25
2017	2	13	1	0	0	10	26
2018	2	25	0	0	0	7	34
Total	4	88	2	0	0	28	122
	3%	72%	2%	0%	0%	23%	100.0%

Spalding County Freight Cluster Study Crash Analysis
US 19/41 @ US 19 Bus/SR 155
Years 2014 to 2018









GDOT Georgia Department of Transportation

Gresham Smith

Spalding County Freight Cluster Study Crash Analysis
Johnston Rd @ Macon Rd
Years 2014 to 2018

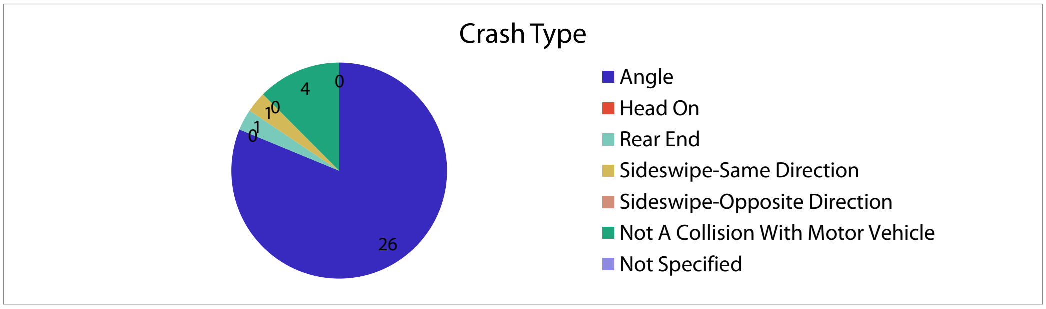
Year	Crash Type							Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	Not Specified	
2014	3	0	0	0	0	0	0	3
2015	3	0	0	0	0	2	0	5
2016	7	0	1	1	0	2	0	11
2017	9	0	0	0	0	0	0	9
2018	4	0	0	0	0	0	0	4
Total	26	0	1	1	0	4	0	32
	81.3%	0.0%	3.1%	3.1%	0.0%	12.5%	0.0%	100.0%

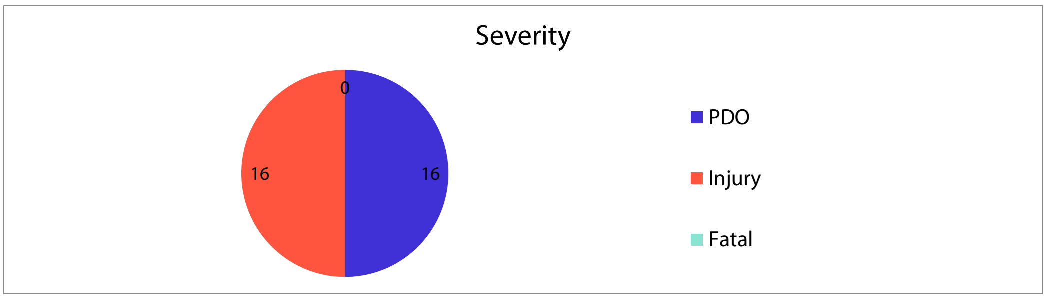
Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	3	0	0	3
2015	1	4	0	5
2016	6	5	0	11
2017	5	4	0	9
2018	1	3	0	4
Total	16	16	0	32
	50%	50%	0%	100.0%

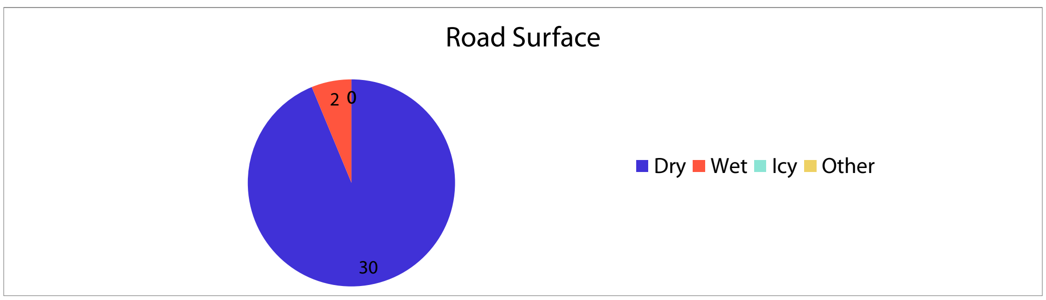
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	3	0	0	0	3
2015	3	2	0	0	5
2016	11	0	0	0	11
2017	9	0	0	0	9
2018	4	0	0	0	4
Total	30	2	0	0	32
	94%	6%	0%	0%	100.0%

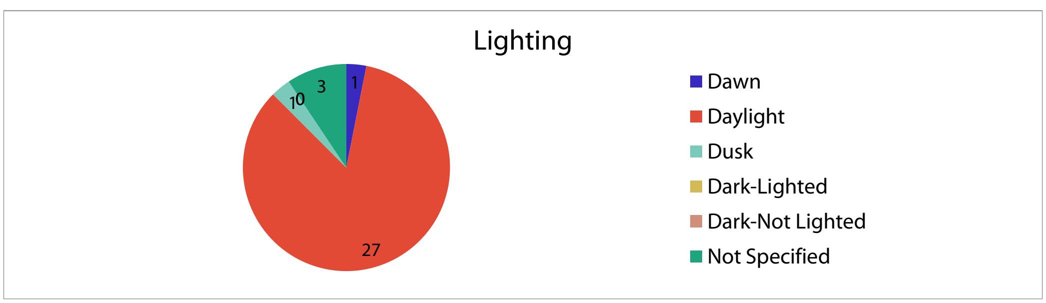
Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	2	0	0	0	1	3
2015	0	3	1	0	0	1	5
2016	1	10	0	0	0	0	11
2017	0	9	0	0	0	0	9
2018	0	3	0	0	0	1	4
Total	1	27	1	0	0	3	32
	3%	84%	3%	0%	0%	9%	100.0%

Spalding County Freight Cluster Study Crash Analysis
Johnston Rd @ Macon Rd
Years 2014 to 2018









Georgia Department of Transportation

Gresham Smith

Spalding County Freight Cluster Study Crash Analysis
Johnston Rd @ Green Valley Rd
Years 2014 to 2018

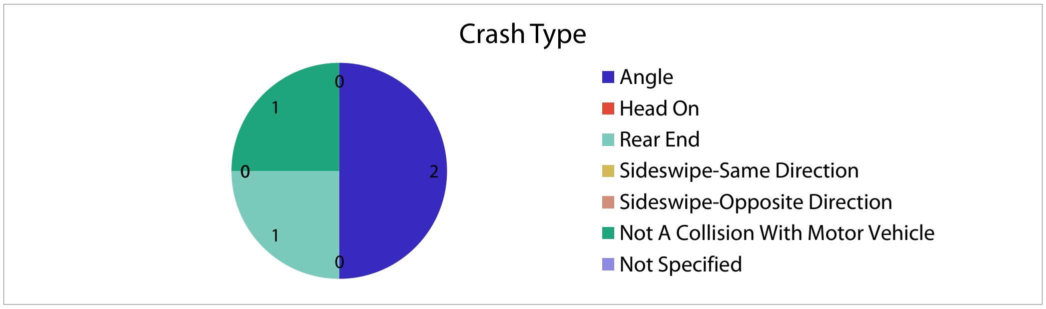
Year	Crash Type							Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	Not Specified	
2014	0	0	0	0	0	0	0	0
2015	1	0	0	0	0	0	0	1
2016	0	0	0	0	0	0	0	0
2017	0	0	1	0	0	0	0	1
2018	1	0	0	0	0	1	0	2
Total	2	0	1	0	0	1	0	4
	50.0%	0.0%	25.0%	0.0%	0.0%	25.0%	0.0%	100.0%

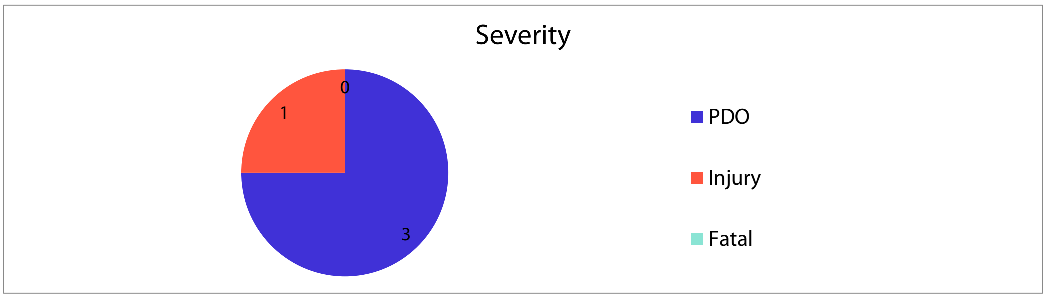
Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	0	0	0	0
2015	0	1	0	1
2016	0	0	0	0
2017	1	0	0	1
2018	2	0	0	2
Total	3	1	0	4
	75%	25%	0%	100.0%

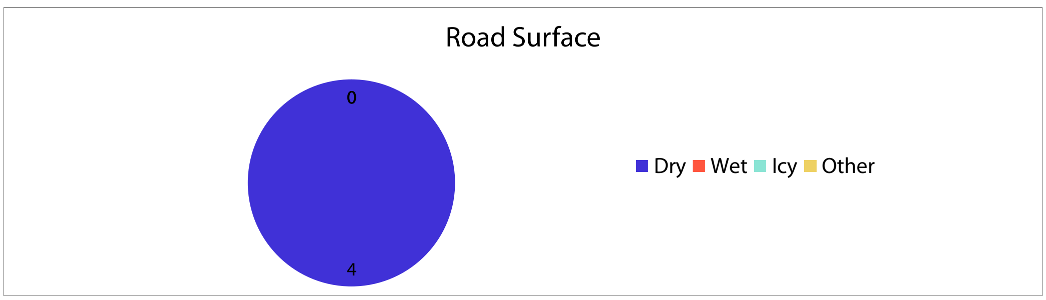
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	0	0	0	0	0
2015	1	0	0	0	1
2016	0	0	0	0	0
2017	1	0	0	0	1
2018	2	0	0	0	2
Total	4	0	0	0	4
	100%	0%	0%	0%	100.0%

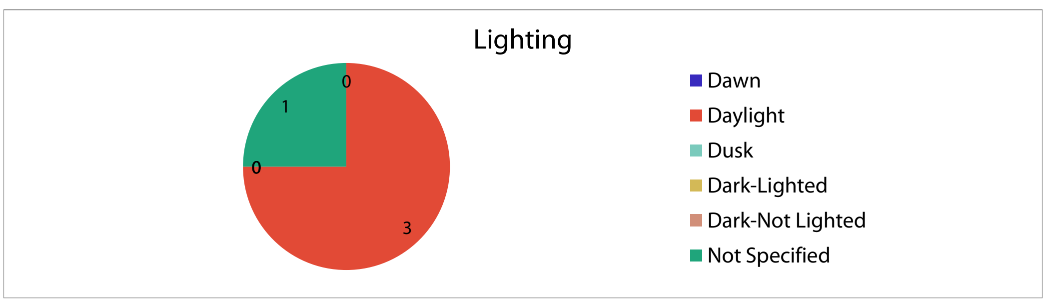
Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	0	0	0	0	0	0
2015	0	1	0	0	0	0	1
2016	0	0	0	0	0	0	0
2017	0	1	0	0	0	0	1
2018	0	1	0	0	0	1	2
Total	0	3	0	0	0	1	4
	0%	75%	0%	0%	0%	25%	100.0%

Spalding County Freight Cluster Study Crash Analysis
Johnston Rd @ Green Valley Rd
Years 2014 to 2018









Spalding County Freight Cluster Study Crash Analysis
Johnston Rd @ S. McDonough Rd
Years 2014 to 2018

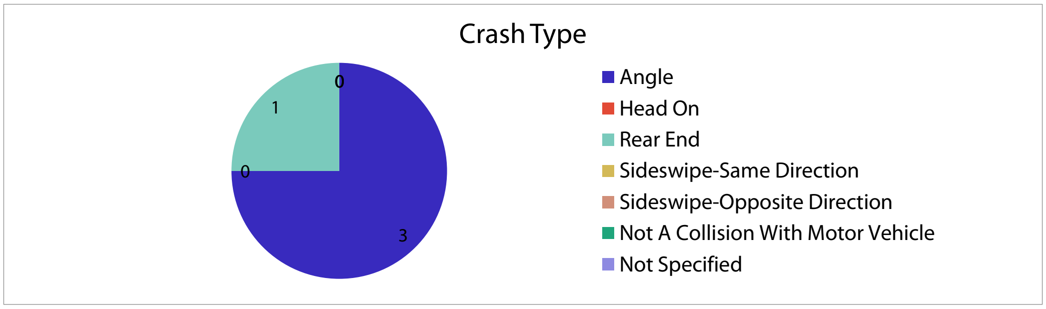
Year	Crash Type							Total Crashes
	Angle	Head On	Rear End	Sideswipe-Same Direction	Sideswipe-Opposite Direction	Not A Collision With Motor Vehicle	Not Specified	
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	2	0	0	0	0	0	0	2
2018	1	0	1	0	0	0	0	2
Total	3	0	1	0	0	0	0	4
	75.0%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	100.0%

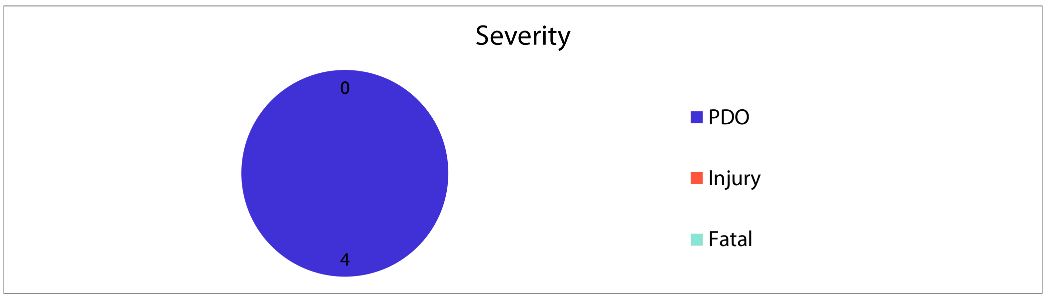
Year	Severity			Total Crashes
	PDO	Injury	Fatal	
2014	0	0	0	0
2015	0	0	0	0
2016	0	0	0	0
2017	2	0	0	2
2018	2	0	0	2
Total	4	0	0	4
	100%	0%	0%	100.0%

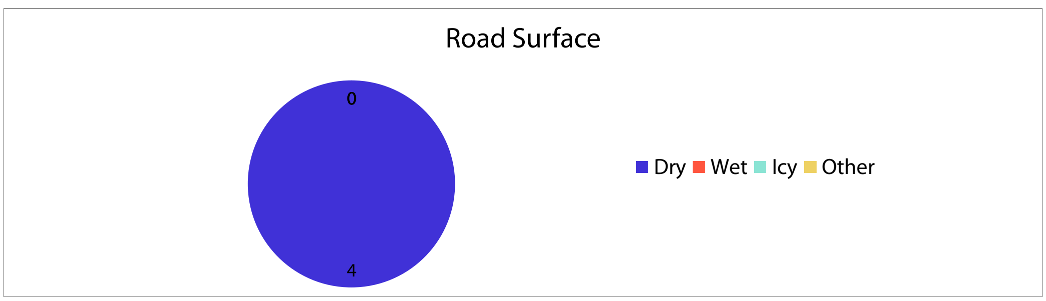
Year	Road Surface				Total Crashes
	Dry	Wet	Icy	Other	
2014	0	0	0	0	0
2015	0	0	0	0	0
2016	0	0	0	0	0
2017	2	0	0	0	2
2018	2	0	0	0	2
Total	4	0	0	0	4
	100%	0%	0%	0%	100.0%

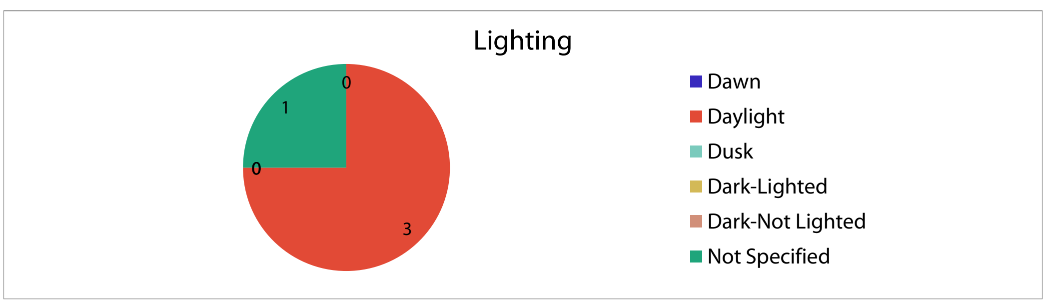
Year	Lighting						Total Crashes
	Dawn	Daylight	Dusk	Dark-Lighted	Dark-Not Lighted	Not Specified	
2014	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0
2017	0	2	0	0	0	0	2
2018	0	1	0	0	0	1	2
Total	0	3	0	0	0	1	4
	0%	75%	0%	0%	0%	25%	100.0%

Spalding County Freight Cluster Study Crash Analysis
Johnston Rd @ S. McDonough Rd
Years 2014 to 2018









Appendix D

Intersection Capacity Analyses

Existing Year (2019) Intersection Capacity Analysis

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	0	70	4	0	72	1	1	2	0	8	5	2
Future Vol, veh/h	0	70	4	0	72	1	1	2	0	8	5	2
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles, %	0	8	17	0	12	25	0	0	0	0	0	25
Mvmt Flow	0	90	5	0	92	1	1	3	0	10	6	3
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.7	7.8	7.4	7.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	33%	0%	0%	53%
Vol Thru, %	67%	95%	99%	33%
Vol Right, %	0%	5%	1%	13%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	3	74	73	15
LT Vol	1	0	0	8
Through Vol	2	70	72	5
RT Vol	0	4	1	2
Lane Flow Rate	4	95	94	19
Geometry Grp	1	1	1	1
Degree of Util (X)	0.005	0.108	0.109	0.023
Departure Headway (Hd)	4.406	4.113	4.206	4.252
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	817	869	850	828
Service Time	2.406	2.151	2.242	2.349
HCM Lane V/C Ratio	0.005	0.109	0.111	0.023
HCM Control Delay	7.4	7.7	7.8	7.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0	0.4	0.4	0.1

Intersection												
Int Delay, s/veh	0.5											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	480	0	6	884	8	0	1	0	4	1	14
Future Vol, veh/h	12	480	0	6	884	8	0	1	0	4	1	14
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	-	-	Yield	-	-	Yield	-	-	Yield	-	-	None
Storage Length	250	-	125	250	-	150	-	-	220	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	19	11	0	14	6	18	0	0	0	10	100	5
Mvmt Flow	14	545	0	7	1005	9	0	1	0	5	1	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1005	0	0	545	0	0	1090	1592	273	1320	1592	503
Stage 1	-	-	-	-	-	-	573	573	-	1019	1019	-
Stage 2	-	-	-	-	-	-	517	1019	-	301	573	-
Critical Hdwy	4.48	-	-	4.38	-	-	7.5	6.5	6.9	7.7	8.5	7
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.7	7.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.7	7.5	-
Follow-up Hdwy	2.39	-	-	2.34	-	-	3.5	4	3.3	3.6	5	3.35
Pot Cap-1 Maneuver	591	-	-	941	-	-	172	108	731	107	42	506
Stage 1	-	-	-	-	-	-	477	507	-	239	161	-
Stage 2	-	-	-	-	-	-	515	317	-	661	316	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	591	-	-	941	-	-	159	105	731	104	41	506
Mov Cap-2 Maneuver	-	-	-	-	-	-	159	105	-	104	41	-
Stage 1	-	-	-	-	-	-	466	495	-	233	160	-
Stage 2	-	-	-	-	-	-	492	315	-	644	308	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	39.7	24.1
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	105	-	591	-	-	941	-	-	210
HCM Lane V/C Ratio	0.011	-	0.023	-	-	0.007	-	-	0.103
HCM Control Delay (s)	39.7	0	11.2	-	-	8.9	-	-	24.1
HCM Lane LOS	E	A	B	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0	-	0.1	-	-	0	-	-	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	49	13	22	53	192	29	954	59	153	491	34
Future Volume (veh/h)	16	49	13	22	53	192	29	954	59	153	491	34
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1900	1673	1900	1900	1832	1827	1810	1792	1863	1810	1712	1759
Adj Flow Rate, veh/h	18	54	9	24	59	132	32	1060	41	170	546	23
Adj No. of Lanes	0	1	0	0	1	1	1	2	1	1	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	7	7	7	4	4	4	5	6	2	5	11	8
Cap, veh/h	95	147	21	113	177	195	75	1569	730	240	1810	832
Arrive On Green	0.13	0.13	0.13	0.13	0.13	0.13	0.04	0.46	0.46	0.14	0.56	0.56
Sat Flow, veh/h	193	1170	170	300	1413	1553	1723	3406	1583	1723	3252	1495
Grp Volume(v), veh/h	81	0	0	83	0	132	32	1060	41	170	546	23
Grp Sat Flow(s),veh/h/ln	1533	0	0	1713	0	1553	1723	1703	1583	1723	1626	1495
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	5.0	1.1	15.1	0.9	5.8	5.5	0.4
Cycle Q Clear(g_c), s	2.8	0.0	0.0	2.6	0.0	5.0	1.1	15.1	0.9	5.8	5.5	0.4
Prop In Lane	0.22		0.11	0.29		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	264	0	0	290	0	195	75	1569	730	240	1810	832
V/C Ratio(X)	0.31	0.00	0.00	0.29	0.00	0.68	0.43	0.68	0.06	0.71	0.30	0.03
Avail Cap(c_a), veh/h	434	0	0	482	0	376	167	2309	1074	445	2730	1255
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	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	0.0	0.0	24.8	0.0	25.9	28.9	13.1	9.2	25.5	7.3	6.2
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.5	0.0	4.1	3.8	0.5	0.0	3.8	0.1	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	1.3	0.0	0.0	1.3	0.0	2.4	0.6	7.2	0.4	3.0	2.4	0.2
LnGrp Delay(d),s/veh	25.6	0.0	0.0	25.3	0.0	30.0	32.7	13.6	9.3	29.3	7.4	6.2
LnGrp LOS	C			C		C	C	B	A	C	A	A
Approach Vol, veh/h		81			215			1133			739	
Approach Delay, s/veh		25.6			28.2			14.0			12.4	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.6	34.5		13.8	7.7	40.5		13.8
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	15.0	42.0		15.0	5.0	52.0		15.0
Max Q Clear Time (g_c+I1), s	7.8	17.1		4.8	3.1	7.5		7.0
Green Ext Time (p_c), s	0.2	11.4		0.9	0.0	14.1		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	15.3
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
4: Green Valley Rd & Arthur K. Bolton Pkwy (SR 16)

04/06/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	602	60	42	937	18	46	19	49	13	10	10
Future Volume (veh/h)	3	602	60	42	937	18	46	19	49	13	10	10
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1583	1733	1900	1557	1809	1900	1667	1634	1900	1473	1721	1900
Adj Flow Rate, veh/h	3	634	63	44	986	19	48	20	32	14	11	7
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	20	9	9	22	5	5	14	12	12	29	17	17
Cap, veh/h	38	1457	145	430	1779	34	247	45	73	210	79	50
Arrive On Green	0.03	0.48	0.48	0.04	0.52	0.52	0.08	0.08	0.08	0.08	0.08	0.08
Sat Flow, veh/h	1508	3026	300	1483	3448	66	1243	567	907	1065	984	626
Grp Volume(v), veh/h	3	345	352	44	491	514	48	0	52	14	0	18
Grp Sat Flow(s),veh/h/ln	1508	1646	1680	1483	1718	1797	1243	0	1474	1065	0	1611
Q Serve(g_s), s	0.1	6.2	6.2	0.7	8.7	8.7	1.7	0.0	1.5	0.6	0.0	0.5
Cycle Q Clear(g_c), s	0.1	6.2	6.2	0.7	8.7	8.7	2.1	0.0	1.5	2.1	0.0	0.5
Prop In Lane	1.00		0.18	1.00		0.04	1.00		0.62	1.00		0.39
Lane Grp Cap(c), veh/h	38	793	809	430	886	927	247	0	118	210	0	129
V/C Ratio(X)	0.08	0.43	0.44	0.10	0.55	0.55	0.19	0.00	0.44	0.07	0.00	0.14
Avail Cap(c_a), veh/h	235	1832	1869	639	1988	2079	534	0	459	456	0	502
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	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.4	7.6	7.6	5.8	7.4	7.4	20.2	0.0	19.7	20.7	0.0	19.2
Incr Delay (d2), s/veh	0.9	0.4	0.4	0.1	0.5	0.5	0.4	0.0	2.6	0.1	0.0	0.5
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	0.0	2.9	2.9	0.3	4.2	4.4	0.6	0.0	0.7	0.2	0.0	0.2
LnGrp Delay(d),s/veh	22.2	8.0	8.0	5.9	7.9	7.9	20.6	0.0	22.3	20.8	0.0	19.7
LnGrp LOS	C	A	A	A	A	A	C		C	C		B
Approach Vol, veh/h		700			1049			100			32	
Approach Delay, s/veh		8.1			7.8			21.5			20.2	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.7	27.6		9.6	6.1	29.2		9.6
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	8.0	50.0		14.0	6.0	52.0		14.0
Max Q Clear Time (g_c+I1), s	2.7	8.2		4.1	2.1	10.7		4.1
Green Ext Time (p_c), s	0.0	12.5		0.3	0.0	12.5		0.3

Intersection Summary			
HCM 2010 Ctrl Delay			8.9
HCM 2010 LOS			A

HCM Signalized Intersection Capacity Analysis
5: Rehoboth Rd & Arthur K. Bolton Pkwy (SR 16)

04/06/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	512	155	35	883	2	92	0	6	0	0	13
Future Volume (vph)	0	512	155	35	883	2	92	0	6	0	0	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	4.0	4.0	6.0		6.0			6.0
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00		1.00			1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00		0.85			0.86
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95		1.00			1.00
Satd. Flow (prot)		3252	1524	1719	3406	1615	1687		1380			1565
Flt Permitted		1.00	1.00	0.44	1.00	1.00	0.95		1.00			1.00
Satd. Flow (perm)		3252	1524	798	3406	1615	1687		1380			1565
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	563	170	38	970	2	101	0	7	0	0	14
RTOR Reduction (vph)	0	0	92	0	0	0	0	0	6	0	0	0
Lane Group Flow (vph)	0	563	78	38	970	2	101	0	1	0	0	14
Heavy Vehicles (%)	0%	11%	6%	5%	6%	0%	7%	0%	17%	0%	0%	5%
Turn Type		NA	Perm	D.P+P	NA	custom	Prot		Perm			Perm
Protected Phases		2		1	Free!	Free	3!					
Permitted Phases			2	2		Free	3!		3			1 2 3
Actuated Green, G (s)		22.6	22.6	24.8	49.5	49.5	6.7		6.7			49.5
Effective Green, g (s)		22.6	22.6	24.8	49.5	49.5	6.7		6.7			49.5
Actuated g/C Ratio		0.46	0.46	0.50	1.00	1.00	0.14		0.14			1.00
Clearance Time (s)		6.0	6.0	6.0			6.0		6.0			
Vehicle Extension (s)		3.0	3.0	3.0			3.0		3.0			
Lane Grp Cap (vph)		1484	695	440	3406	3230	228		186			1565
v/s Ratio Prot		c0.17		0.00	0.28	0.00	0.06					
v/s Ratio Perm			0.05	0.04		0.00			0.00			0.01
v/c Ratio		0.38	0.11	0.09	0.28	0.00	0.44		0.01			0.01
Uniform Delay, d1		8.8	7.7	6.3	0.0	0.0	19.7		18.5			0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00
Incremental Delay, d2		0.2	0.1	0.1	0.2	0.0	1.4		0.0			0.0
Delay (s)		9.0	7.8	6.4	0.2	0.0	21.1		18.5			0.0
Level of Service		A	A	A	A	A	C		B			A
Approach Delay (s)		8.7			0.4			20.9			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	4.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	49.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	47	432	5	25	769	4	13	49	47	7	32	105
Future Volume (veh/h)	47	432	5	25	769	4	13	49	47	7	32	105
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1881	1696	1712	1863	1776	1520	1845	1845	1881	1583	1863	1881
Adj Flow Rate, veh/h	52	480	3	28	854	3	14	54	32	8	36	72
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	1	12	11	2	7	25	3	3	1	20	2	1
Cap, veh/h	106	1377	621	78	1391	533	243	165	143	216	156	134
Arrive On Green	0.06	0.43	0.43	0.04	0.41	0.41	0.01	0.09	0.09	0.01	0.08	0.08
Sat Flow, veh/h	1792	3223	1455	1774	3374	1292	1757	1845	1599	1508	1863	1599
Grp Volume(v), veh/h	52	480	3	28	854	3	14	54	32	8	36	72
Grp Sat Flow(s),veh/h/ln	1792	1612	1455	1774	1687	1292	1757	1845	1599	1508	1863	1599
Q Serve(g_s), s	1.5	5.3	0.1	0.8	10.6	0.1	0.4	1.5	1.0	0.3	1.0	2.3
Cycle Q Clear(g_c), s	1.5	5.3	0.1	0.8	10.6	0.1	0.4	1.5	1.0	0.3	1.0	2.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	106	1377	621	78	1391	533	243	165	143	216	156	134
V/C Ratio(X)	0.49	0.35	0.00	0.36	0.61	0.01	0.06	0.33	0.22	0.04	0.23	0.54
Avail Cap(c_a), veh/h	269	2597	1172	233	2655	1017	383	415	360	345	419	360
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.3	10.3	8.8	24.8	12.3	9.2	21.9	22.8	22.6	22.1	22.8	23.5
Incr Delay (d2), s/veh	3.5	0.2	0.0	2.7	0.4	0.0	0.1	1.1	0.8	0.1	0.7	3.3
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	0.8	2.4	0.0	0.5	4.9	0.0	0.2	0.8	0.5	0.1	0.5	1.1
LnGrp Delay(d),s/veh	27.8	10.4	8.8	27.5	12.8	9.2	22.0	23.9	23.4	22.2	23.6	26.8
LnGrp LOS	C	B	A	C	B	A	C	C	C	C	C	C
Approach Vol, veh/h		535			885			100			116	
Approach Delay, s/veh		12.1			13.2			23.5			25.5	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.4	28.8	6.7	10.5	8.1	28.0	6.4	10.8
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	6.0	43.0	5.0	12.0	7.0	42.0	5.0	12.0
Max Q Clear Time (g_c+I1), s	2.8	7.3	2.4	4.3	3.5	12.6	2.3	3.5
Green Ext Time (p_c), s	0.0	9.9	0.0	0.4	0.0	9.4	0.0	0.4

Intersection Summary		
HCM 2010 Ctrl Delay		14.4
HCM 2010 LOS		B

Intersection	
Intersection Delay, s/veh	8.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	3	112	38	17	179	7	43	5	26	13	7	9
Future Vol, veh/h	3	112	38	17	179	7	43	5	26	13	7	9
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	17	5	7	6	4	0	1	0	5	7	0	0
Mvmt Flow	3	123	42	19	197	8	47	5	29	14	8	10
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.8	9.2	8.4	8.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	58%	2%	8%	45%
Vol Thru, %	7%	73%	88%	24%
Vol Right, %	35%	25%	3%	31%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	74	153	203	29
LT Vol	43	3	17	13
Through Vol	5	112	179	7
RT Vol	26	38	7	9
Lane Flow Rate	81	168	223	32
Geometry Grp	1	1	1	1
Degree of Util (X)	0.107	0.213	0.276	0.044
Departure Headway (Hd)	4.757	4.563	4.461	4.925
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	753	787	805	727
Service Time	2.788	2.587	2.484	2.958
HCM Lane V/C Ratio	0.108	0.213	0.277	0.044
HCM Control Delay	8.4	8.8	9.2	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.8	1.1	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↱		↰	↑↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	504	387	115	72	165	42	89	538	118	42	293	178
Future Volume (veh/h)	504	387	115	72	165	42	89	538	118	42	293	178
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1810	1863	1827	1863	1813	1900	1827	1810	1863	1827	1743	1712
Adj Flow Rate, veh/h	542	416	77	77	177	28	96	578	79	45	315	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	5	2	4	2	4	4	4	5	2	4	9	11
Cap, veh/h	631	721	601	319	233	37	144	761	351	78	608	267
Arrive On Green	0.28	0.39	0.39	0.05	0.15	0.15	0.08	0.22	0.22	0.04	0.18	0.00
Sat Flow, veh/h	1723	1863	1553	1774	1528	242	1740	3438	1583	1740	3312	1455
Grp Volume(v), veh/h	542	416	77	77	0	205	96	578	79	45	315	0
Grp Sat Flow(s),veh/h/ln	1723	1863	1553	1774	0	1770	1740	1719	1583	1740	1656	1455
Q Serve(g_s), s	19.1	13.7	2.5	2.8	0.0	8.6	4.2	12.2	3.2	2.0	6.7	0.0
Cycle Q Clear(g_c), s	19.1	13.7	2.5	2.8	0.0	8.6	4.2	12.2	3.2	2.0	6.7	0.0
Prop In Lane	1.00		1.00	1.00		0.14	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	631	721	601	319	0	270	144	761	351	78	608	267
V/C Ratio(X)	0.86	0.58	0.13	0.24	0.00	0.76	0.67	0.76	0.23	0.58	0.52	0.00
Avail Cap(c_a), veh/h	740	865	721	344	0	320	224	931	429	112	683	300
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.4	18.8	15.3	25.8	0.0	31.5	34.5	28.3	24.7	36.3	28.6	0.0
Incr Delay (d2), s/veh	8.9	0.7	0.1	0.4	0.0	8.6	5.2	2.9	0.3	6.5	0.7	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	10.6	7.1	1.1	1.4	0.0	4.9	2.2	6.1	1.4	1.1	3.1	0.0
LnGrp Delay(d),s/veh	26.3	19.5	15.4	26.2	0.0	40.1	39.8	31.2	25.1	42.8	29.2	0.0
LnGrp LOS	C	B	B	C		D	D	C	C	D	C	
Approach Vol, veh/h		1035			282			753			360	
Approach Delay, s/veh		22.8			36.3			31.6			30.9	
Approach LOS		C			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.5	23.2	9.9	36.0	11.4	20.2	28.1	17.8
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	4.0	21.0	5.0	36.0	9.0	16.0	27.0	14.0
Max Q Clear Time (g_c+I1), s	4.0	14.2	4.8	15.7	6.2	8.7	21.1	10.6
Green Ext Time (p_c), s	0.0	3.0	0.0	3.5	0.0	3.1	1.0	1.2

Intersection Summary	
HCM 2010 Ctrl Delay	28.3
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	12.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	29	84	76	28	60	15	144	177	62	17	93	13
Future Vol, veh/h	29	84	76	28	60	15	144	177	62	17	93	13
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	0	3	3	2	4	0	2	5	4	9	6	5
Mvmt Flow	32	92	84	31	66	16	158	195	68	19	102	14
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.8	10	15	10
HCM LOS	B	A	B	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	38%	15%	27%	14%
Vol Thru, %	46%	44%	58%	76%
Vol Right, %	16%	40%	15%	11%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	383	189	103	123
LT Vol	144	29	28	17
Through Vol	177	84	60	93
RT Vol	62	76	15	13
Lane Flow Rate	421	208	113	135
Geometry Grp	1	1	1	1
Degree of Util (X)	0.588	0.309	0.18	0.208
Departure Headway (Hd)	5.032	5.358	5.734	5.546
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	720	671	625	646
Service Time	3.061	3.395	3.778	3.586
HCM Lane V/C Ratio	0.585	0.31	0.181	0.209
HCM Control Delay	15	10.8	10	10
HCM Lane LOS	B	B	A	A
HCM 95th-tile Q	3.9	1.3	0.7	0.8

Intersection						
Int Delay, s/veh	2.3					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	52	110	86	26	15	17
Future Vol, veh/h	52	110	86	26	15	17
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, %	5	3	2	3	13	7
Mvmt Flow	57	120	93	28	16	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	121	0	-	0	341	107
Stage 1	-	-	-	-	107	-
Stage 2	-	-	-	-	234	-
Critical Hdwy	4.15	-	-	-	6.53	6.27
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	2.245	-	-	-	3.617	3.363
Pot Cap-1 Maneuver	1448	-	-	-	633	934
Stage 1	-	-	-	-	891	-
Stage 2	-	-	-	-	780	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1448	-	-	-	606	934
Mov Cap-2 Maneuver	-	-	-	-	606	-
Stage 1	-	-	-	-	854	-
Stage 2	-	-	-	-	780	-

Approach	EB	WB	SB
HCM Control Delay, s	2.4	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1448	-	-	-	745
HCM Lane V/C Ratio	0.039	-	-	-	0.047
HCM Control Delay (s)	7.6	0	-	-	10.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	77	14	37	1	32	3	34	8	0	1	9	43
Future Vol, veh/h	77	14	37	1	32	3	34	8	0	1	9	43
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	0	12	0	0	0	2	0	0	25	0	3
Mvmt Flow	91	16	44	1	38	4	40	9	0	1	11	51

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	42	0	0	60	0	0	293	264	38	267	284	40
Stage 1	-	-	-	-	-	-	220	220	-	42	42	-
Stage 2	-	-	-	-	-	-	73	44	-	225	242	-
Critical Hdwy	4.12	-	-	4.1	-	-	7.12	6.5	6.2	7.35	6.5	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.5	-	6.35	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.5	-	6.35	5.5	-
Follow-up Hdwy	2.218	-	-	2.2	-	-	3.518	4	3.3	3.725	4	3.327
Pot Cap-1 Maneuver	1567	-	-	1556	-	-	659	645	1040	641	628	1028
Stage 1	-	-	-	-	-	-	782	725	-	917	864	-
Stage 2	-	-	-	-	-	-	937	862	-	728	709	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1567	-	-	1556	-	-	589	606	1040	604	590	1028
Mov Cap-2 Maneuver	-	-	-	-	-	-	589	606	-	604	590	-
Stage 1	-	-	-	-	-	-	735	682	-	862	863	-
Stage 2	-	-	-	-	-	-	879	861	-	675	666	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.5	0.2	11.6	9.3
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	592	1567	-	-	1556	-	-	902
HCM Lane V/C Ratio	0.083	0.058	-	-	0.001	-	-	0.069
HCM Control Delay (s)	11.6	7.4	0	-	7.3	0	-	9.3
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0.2	-	-	0	-	-	0.2

Intersection	
Intersection Delay, s/veh	8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	73	2	0	119	5	4	3	1	7	5	3
Future Vol, veh/h	1	73	2	0	119	5	4	3	1	7	5	3
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	50	4	0	0	4	9	0	0	0	0	0	33
Mvmt Flow	1	78	2	0	127	5	4	3	1	7	5	3
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.5	7.8	7.5	7.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	50%	1%	0%	47%
Vol Thru, %	38%	96%	96%	33%
Vol Right, %	12%	3%	4%	20%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	8	76	124	15
LT Vol	4	1	0	7
Through Vol	3	73	119	5
RT Vol	1	2	5	3
Lane Flow Rate	9	81	132	16
Geometry Grp	1	1	1	1
Degree of Util (X)	0.01	0.11	0.148	0.019
Departure Headway (Hd)	4.438	4.88	4.048	4.377
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	811	733	881	823
Service Time	2.438	2.92	2.094	2.377
HCM Lane V/C Ratio	0.011	0.111	0.15	0.019
HCM Control Delay	7.5	8.5	7.8	7.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0	0.4	0.5	0.1

Intersection												
Int Delay, s/veh	0.4											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	966	1	0	651	3	1	0	16	7	0	8
Future Vol, veh/h	14	966	1	0	651	3	1	0	16	7	0	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	-	-	Yield	-	-	Yield	-	-	Yield	-	-	None
Storage Length	250	-	125	250	-	150	-	-	220	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	5	0	100	5	22	0	0	5	12	0	0
Mvmt Flow	15	1028	1	0	693	3	1	0	17	7	0	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	693	0	0	1028	0	0	1405	1751	514	1237	1751	347
Stage 1	-	-	-	-	-	-	1058	1058	-	693	693	-
Stage 2	-	-	-	-	-	-	347	693	-	544	1058	-
Critical Hdwy	4.16	-	-	6.1	-	-	7.5	6.5	7	7.74	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.74	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.74	5.5	-
Follow-up Hdwy	2.23	-	-	3.2	-	-	3.5	4	3.35	3.62	4	3.3
Pot Cap-1 Maneuver	891	-	-	301	-	-	101	87	498	122	87	655
Stage 1	-	-	-	-	-	-	244	304	-	377	448	-
Stage 2	-	-	-	-	-	-	648	448	-	466	304	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	891	-	-	301	-	-	98	86	498	116	86	655
Mov Cap-2 Maneuver	-	-	-	-	-	-	98	86	-	116	86	-
Stage 1	-	-	-	-	-	-	240	299	-	371	448	-
Stage 2	-	-	-	-	-	-	640	448	-	442	299	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	14.2	23.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	98	498	891	-	-	301	-	-	207
HCM Lane V/C Ratio	0.011	0.034	0.017	-	-	-	-	-	0.077
HCM Control Delay (s)	42.1	12.5	9.1	-	-	0	-	-	23.8
HCM Lane LOS	E	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0	0.1	0.1	-	-	0	-	-	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	72	25	63	46	197	21	641	34	192	1029	13
Future Volume (veh/h)	33	72	25	63	46	197	21	641	34	192	1029	13
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1900	1817	1900	1900	1865	1845	1759	1810	1845	1863	1863	1439
Adj Flow Rate, veh/h	36	79	17	69	51	134	23	704	23	211	1131	9
Adj No. of Lanes	0	1	0	0	1	1	1	2	1	1	2	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	4	4	4	3	3	3	8	5	3	2	2	32
Cap, veh/h	114	149	27	215	128	230	64	1367	624	294	1859	643
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.04	0.40	0.40	0.17	0.53	0.53
Sat Flow, veh/h	248	1020	187	806	876	1568	1675	3438	1568	1774	3539	1223
Grp Volume(v), veh/h	132	0	0	120	0	134	23	704	23	211	1131	9
Grp Sat Flow(s),veh/h/ln	1455	0	0	1682	0	1568	1675	1719	1568	1774	1770	1223
Q Serve(g_s), s	1.7	0.0	0.0	0.0	0.0	4.7	0.8	9.1	0.5	6.6	13.1	0.2
Cycle Q Clear(g_c), s	5.2	0.0	0.0	3.5	0.0	4.7	0.8	9.1	0.5	6.6	13.1	0.2
Prop In Lane	0.27		0.13	0.57		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	291	0	0	343	0	230	64	1367	624	294	1859	643
V/C Ratio(X)	0.45	0.00	0.00	0.35	0.00	0.58	0.36	0.51	0.04	0.72	0.61	0.01
Avail Cap(c_a), veh/h	539	0	0	582	0	481	200	1934	882	665	2896	1001
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	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.4	0.0	0.0	22.9	0.0	23.4	27.5	13.4	10.8	23.2	9.7	6.7
Incr Delay (d2), s/veh	1.1	0.0	0.0	0.6	0.0	2.3	3.3	0.3	0.0	3.3	0.3	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	2.1	0.0	0.0	1.8	0.0	2.2	0.4	4.4	0.2	3.5	6.4	0.1
LnGrp Delay(d),s/veh	24.5	0.0	0.0	23.5	0.0	25.7	30.8	13.7	10.8	26.4	10.0	6.7
LnGrp LOS	C			C		C	C	B	B	C	B	A
Approach Vol, veh/h		132			254			750			1351	
Approach Delay, s/veh		24.5			24.6			14.1			12.6	
Approach LOS		C			C			B			B	
Timer	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	14.7	29.3		14.6	7.3	36.8		14.6				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	21.0	33.0		18.0	6.0	48.0		18.0				
Max Q Clear Time (g_c+I1), s	8.6	11.1		7.2	2.8	15.1		6.7				
Green Ext Time (p_c), s	0.4	12.2		1.4	0.0	15.1		1.4				
Intersection Summary												
HCM 2010 Ctrl Delay			14.9									
HCM 2010 LOS			B									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	942	65	20	774	8	144	46	45	9	19	2
Future Volume (veh/h)	4	942	65	20	774	8	144	46	45	9	19	2
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1900	1805	1900	1863	1808	1900	1863	1802	1900	1900	1900	1900
Adj Flow Rate, veh/h	5	1135	78	24	933	10	173	55	34	11	23	1
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	0	5	5	2	5	5	2	2	2	0	0	0
Cap, veh/h	38	1711	118	275	1886	20	336	180	112	281	313	14
Arrive On Green	0.02	0.53	0.53	0.02	0.54	0.54	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	1810	3257	224	1774	3481	37	1381	1043	645	1329	1808	79
Grp Volume(v), veh/h	5	597	616	24	460	483	173	0	89	11	0	24
Grp Sat Flow(s),veh/h/ln	1810	1715	1766	1774	1717	1801	1381	0	1688	1329	0	1886
Q Serve(g_s), s	0.2	16.3	16.3	0.4	10.8	10.8	7.7	0.0	3.0	0.5	0.0	0.7
Cycle Q Clear(g_c), s	0.2	16.3	16.3	0.4	10.8	10.8	8.4	0.0	3.0	3.4	0.0	0.7
Prop In Lane	1.00		0.13	1.00		0.02	1.00		0.38	1.00		0.04
Lane Grp Cap(c), veh/h	38	901	928	275	930	976	336	0	292	281	0	326
V/C Ratio(X)	0.13	0.66	0.66	0.09	0.49	0.49	0.51	0.00	0.30	0.04	0.00	0.07
Avail Cap(c_a), veh/h	141	1254	1291	347	1255	1317	548	0	551	485	0	616
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	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.9	11.1	11.1	8.9	9.2	9.2	25.8	0.0	23.2	24.7	0.0	22.3
Incr Delay (d2), s/veh	1.6	0.8	0.8	0.1	0.4	0.4	1.2	0.0	0.6	0.1	0.0	0.1
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	0.1	7.8	8.1	0.2	5.1	5.3	3.0	0.0	1.4	0.2	0.0	0.4
LnGrp Delay(d),s/veh	32.5	12.0	11.9	9.0	9.6	9.6	27.0	0.0	23.8	24.8	0.0	22.4
LnGrp LOS	C	B	B	A	A	A	C		C	C		C
Approach Vol, veh/h		1218			967			262			35	
Approach Delay, s/veh		12.0			9.6			25.9			23.1	
Approach LOS		B			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.4	39.8		17.1	6.3	40.8		17.1
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	4.0	47.0		21.0	4.0	47.0		21.0
Max Q Clear Time (g_c+I1), s	2.4	18.3		5.4	2.2	12.8		10.4
Green Ext Time (p_c), s	0.0	15.4		0.9	0.0	16.9		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	12.7
HCM 2010 LOS	B

HCM Signalized Intersection Capacity Analysis
5: Rehoboth Rd & Arthur K. Bolton Pkwy (SR 16)

04/06/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	874	115	8	673	4	123	0	82	0	0	5
Future Volume (vph)	0	874	115	8	673	4	123	0	82	0	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	4.0	4.0	6.0		6.0			6.0
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00		1.00			1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00		0.85			0.86
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95		1.00			1.00
Satd. Flow (prot)		3438	1553	1805	3438	1615	1719		1615			1644
Flt Permitted		1.00	1.00	0.22	1.00	1.00	0.95		1.00			1.00
Satd. Flow (perm)		3438	1553	417	3438	1615	1719		1615			1644
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	0	1005	132	9	774	5	141	0	94	0	0	6
RTOR Reduction (vph)	0	0	69	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1005	63	9	774	5	141	0	94	0	0	6
Heavy Vehicles (%)	0%	5%	4%	0%	5%	0%	5%	0%	0%	0%	0%	0%
Turn Type		NA	Perm	D.P+P	NA	custom	Prot		Perm			Perm
Protected Phases		2		1	Free!	Free	3!					
Permitted Phases			2	2		Free	3!		3			1 2 3
Actuated Green, G (s)		26.8	26.8	27.6	56.0	56.0	10.4		10.4			56.0
Effective Green, g (s)		26.8	26.8	27.6	56.0	56.0	10.4		10.4			56.0
Actuated g/C Ratio		0.48	0.48	0.49	1.00	1.00	0.19		0.19			1.00
Clearance Time (s)		6.0	6.0	6.0			6.0		6.0			
Vehicle Extension (s)		3.0	3.0	3.0			3.0		3.0			
Lane Grp Cap (vph)		1645	743	225	3438	3230	319		299			1644
v/s Ratio Prot		c0.29		0.00	0.23	0.00	c0.08					
v/s Ratio Perm			0.04	0.02		0.00			0.06			0.00
v/c Ratio		0.61	0.09	0.04	0.23	0.00	0.44		0.31			0.00
Uniform Delay, d1		10.8	7.9	7.6	0.0	0.0	20.2		19.7			0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00
Incremental Delay, d2		0.7	0.0	0.1	0.2	0.0	1.0		0.6			0.0
Delay (s)		11.4	8.0	7.7	0.2	0.0	21.2		20.3			0.0
Level of Service		B	A	A	A	A	C		C			A
Approach Delay (s)		11.0			0.2			20.9			0.0	
Approach LOS		B			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	56.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	101	858	15	46	581	2	16	34	28	2	68	58
Future Volume (veh/h)	101	858	15	46	581	2	16	34	28	2	68	58
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1881	1792	1900	1845	1792	1900	1900	1900	1900	1900	1863	1881
Adj Flow Rate, veh/h	111	943	10	51	638	1	18	37	19	2	75	40
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	1	6	0	3	6	0	0	0	0	0	2	1
Cap, veh/h	175	1534	728	99	1393	661	203	170	145	228	139	119
Arrive On Green	0.10	0.45	0.45	0.06	0.41	0.41	0.02	0.09	0.09	0.00	0.07	0.07
Sat Flow, veh/h	1792	3406	1615	1757	3406	1615	1810	1900	1615	1810	1863	1599
Grp Volume(v), veh/h	111	943	10	51	638	1	18	37	19	2	75	40
Grp Sat Flow(s),veh/h/ln	1792	1703	1615	1757	1703	1615	1810	1900	1615	1810	1863	1599
Q Serve(g_s), s	3.4	12.1	0.2	1.6	7.8	0.0	0.5	1.0	0.6	0.1	2.2	1.4
Cycle Q Clear(g_c), s	3.4	12.1	0.2	1.6	7.8	0.0	0.5	1.0	0.6	0.1	2.2	1.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	175	1534	728	99	1393	661	203	170	145	228	139	119
V/C Ratio(X)	0.63	0.61	0.01	0.52	0.46	0.00	0.09	0.22	0.13	0.01	0.54	0.34
Avail Cap(c_a), veh/h	438	2615	1240	245	2259	1071	298	365	310	350	358	307
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	12.0	8.7	26.3	12.3	10.0	23.9	24.2	24.0	24.5	25.6	25.2
Incr Delay (d2), s/veh	3.8	0.4	0.0	4.1	0.2	0.0	0.2	0.6	0.4	0.0	3.3	1.6
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	1.9	5.7	0.1	0.9	3.7	0.0	0.3	0.6	0.3	0.0	1.3	0.7
LnGrp Delay(d),s/veh	28.6	12.4	8.7	30.4	12.5	10.0	24.1	24.8	24.4	24.5	28.8	26.8
LnGrp LOS	C	B	A	C	B	B	C	C	C	C	C	C
Approach Vol, veh/h		1064			690			74			117	
Approach Delay, s/veh		14.0			13.9			24.6			28.1	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.2	31.8	7.0	10.3	10.6	29.4	6.1	11.1
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	7.0	44.0	4.0	11.0	13.0	38.0	4.0	11.0
Max Q Clear Time (g_c+I1), s	3.6	14.1	2.5	4.2	5.4	9.8	2.1	3.0
Green Ext Time (p_c), s	0.0	11.8	0.0	0.3	0.1	11.5	0.0	0.4

Intersection Summary	
HCM 2010 Ctrl Delay	15.2
HCM 2010 LOS	B

Intersection	
Intersection Delay, s/veh	10.2
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	223	58	30	207	9	62	11	32	6	4	13
Future Vol, veh/h	21	223	58	30	207	9	62	11	32	6	4	13
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	0	2	1	6	3	6	3	0	3	0	6	0
Mvmt Flow	23	240	62	32	223	10	67	12	34	6	4	14
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.5	10.3	9.3	8.4
HCM LOS	B	B	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	59%	7%	12%	26%
Vol Thru, %	10%	74%	84%	17%
Vol Right, %	30%	19%	4%	57%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	105	302	246	23
LT Vol	62	21	30	6
Through Vol	11	223	207	4
RT Vol	32	58	9	13
Lane Flow Rate	113	325	265	25
Geometry Grp	1	1	1	1
Degree of Util (X)	0.164	0.402	0.347	0.035
Departure Headway (Hd)	5.238	4.461	4.716	5.115
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	681	805	759	694
Service Time	3.303	2.505	2.763	3.193
HCM Lane V/C Ratio	0.166	0.404	0.349	0.036
HCM Control Delay	9.3	10.5	10.3	8.4
HCM Lane LOS	A	B	B	A
HCM 95th-tile Q	0.6	2	1.6	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	261	279	125	119	383	31	181	340	80	53	502	507
Future Volume (veh/h)	261	279	125	119	383	31	181	340	80	53	502	507
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1810	1845	1863	1881	1860	1900	1863	1792	1863	1863	1845	1863
Adj Flow Rate, veh/h	278	297	82	127	407	20	193	362	53	56	534	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	5	3	2	1	2	2	2	6	2	2	3	2
Cap, veh/h	361	610	523	416	467	23	248	933	434	92	651	294
Arrive On Green	0.14	0.33	0.33	0.07	0.27	0.27	0.14	0.27	0.27	0.05	0.19	0.00
Sat Flow, veh/h	1723	1845	1583	1792	1759	86	1774	3406	1583	1774	3505	1583
Grp Volume(v), veh/h	278	297	82	127	0	427	193	362	53	56	534	0
Grp Sat Flow(s),veh/h/ln	1723	1845	1583	1792	0	1845	1774	1703	1583	1774	1752	1583
Q Serve(g_s), s	9.4	10.8	3.1	4.3	0.0	18.6	8.8	7.3	2.1	2.6	12.3	0.0
Cycle Q Clear(g_c), s	9.4	10.8	3.1	4.3	0.0	18.6	8.8	7.3	2.1	2.6	12.3	0.0
Prop In Lane	1.00		1.00	1.00		0.05	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	361	610	523	416	0	489	248	933	434	92	651	294
V/C Ratio(X)	0.77	0.49	0.16	0.31	0.00	0.87	0.78	0.39	0.12	0.61	0.82	0.00
Avail Cap(c_a), veh/h	372	679	583	417	0	548	274	933	434	147	707	320
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	20.1	22.5	19.9	20.2	0.0	29.6	35.0	24.8	23.0	39.1	32.9	0.0
Incr Delay (d2), s/veh	9.3	0.6	0.1	0.4	0.0	13.4	12.2	0.3	0.1	6.3	7.1	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	5.3	5.6	1.4	2.1	0.0	11.3	5.2	3.5	0.9	1.4	6.6	0.0
LnGrp Delay(d),s/veh	29.4	23.1	20.0	20.6	0.0	42.9	47.1	25.1	23.1	45.4	40.1	0.0
LnGrp LOS	C	C	C	C		D	D	C	C	D	D	
Approach Vol, veh/h		657			554			608			590	
Approach Delay, s/veh		25.4			37.8			31.9			40.6	
Approach LOS		C			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.4	29.1	11.9	33.8	16.8	21.7	17.4	28.3
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	6.0	23.0	6.0	31.0	12.0	17.0	12.0	25.0
Max Q Clear Time (g_c+I1), s	4.6	9.3	6.3	12.8	10.8	14.3	11.4	20.6
Green Ext Time (p_c), s	0.0	4.5	0.0	3.9	0.1	1.3	0.1	1.7

Intersection Summary			
HCM 2010 Ctrl Delay			33.6
HCM 2010 LOS			C

Intersection	
Intersection Delay, s/veh	15.2
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	8	74	153	85	102	16	95	90	45	15	193	47
Future Vol, veh/h	8	74	153	85	102	16	95	90	45	15	193	47
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles, %	6	4	1	1	2	8	2	9	1	4	1	0
Mvmt Flow	10	90	187	104	124	20	116	110	55	18	235	57
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	14.7	14.6	15.2	16.2
HCM LOS	B	B	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	41%	3%	42%	6%
Vol Thru, %	39%	31%	50%	76%
Vol Right, %	20%	65%	8%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	230	235	203	255
LT Vol	95	8	85	15
Through Vol	90	74	102	193
RT Vol	45	153	16	47
Lane Flow Rate	280	287	248	311
Geometry Grp	1	1	1	1
Degree of Util (X)	0.489	0.482	0.444	0.534
Departure Headway (Hd)	6.276	6.058	6.457	6.183
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	572	593	557	582
Service Time	4.336	4.115	4.517	4.241
HCM Lane V/C Ratio	0.49	0.484	0.445	0.534
HCM Control Delay	15.2	14.7	14.6	16.2
HCM Lane LOS	C	B	B	C
HCM 95th-tile Q	2.7	2.6	2.3	3.1

Intersection						
Int Delay, s/veh	3.2					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	30	108	119	17	18	73
Future Vol, veh/h	30	108	119	17	18	73
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	75	75	75	75	75	75
Heavy Vehicles, %	4	3	3	0	11	1
Mvmt Flow	40	144	159	23	24	97

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	182	0	-	0	395	171
Stage 1	-	-	-	-	171	-
Stage 2	-	-	-	-	224	-
Critical Hdwy	4.14	-	-	-	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	5.51	-
Critical Hdwy Stg 2	-	-	-	-	5.51	-
Follow-up Hdwy	2.236	-	-	-	3.599	3.309
Pot Cap-1 Maneuver	1381	-	-	-	593	875
Stage 1	-	-	-	-	838	-
Stage 2	-	-	-	-	792	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1381	-	-	-	575	875
Mov Cap-2 Maneuver	-	-	-	-	575	-
Stage 1	-	-	-	-	812	-
Stage 2	-	-	-	-	792	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1381	-	-	-	793
HCM Lane V/C Ratio	0.029	-	-	-	0.153
HCM Control Delay (s)	7.7	0	-	-	10.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	55	42	25	1	20	1	34	15	3	1	11	86
Future Vol, veh/h	55	42	25	1	20	1	34	15	3	1	11	86
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	3	0	10	0	0	0	4	0	0	0	0	3
Mvmt Flow	63	48	28	1	23	1	39	17	3	1	13	98

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	24	0	0	76	0	0	269	214	62	224	228	24
Stage 1	-	-	-	-	-	-	188	188	-	26	26	-
Stage 2	-	-	-	-	-	-	81	26	-	198	202	-
Critical Hdwy	4.13	-	-	4.1	-	-	7.14	6.5	6.2	7.1	6.5	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.227	-	-	2.2	-	-	3.536	4	3.3	3.5	4	3.327
Pot Cap-1 Maneuver	1584	-	-	1536	-	-	680	687	1009	736	675	1050
Stage 1	-	-	-	-	-	-	809	748	-	997	878	-
Stage 2	-	-	-	-	-	-	922	878	-	808	738	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1584	-	-	1536	-	-	588	657	1009	696	646	1050
Mov Cap-2 Maneuver	-	-	-	-	-	-	588	657	-	696	646	-
Stage 1	-	-	-	-	-	-	775	717	-	955	877	-
Stage 2	-	-	-	-	-	-	823	877	-	753	707	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.3	0.3	11.4	9.2
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	622	1584	-	-	1536	-	-	976
HCM Lane V/C Ratio	0.095	0.039	-	-	0.001	-	-	0.114
HCM Control Delay (s)	11.4	7.4	0	-	7.3	0	-	9.2
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	0.4

Future Year (2029) Capacity Analysis – without Improvements

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	81	5	0	84	1	1	2	0	9	6	2
Future Vol, veh/h	0	81	5	0	84	1	1	2	0	9	6	2
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles, %	0	8	17	0	12	25	0	0	0	0	0	25
Mvmt Flow	0	104	6	0	108	1	1	3	0	12	8	3
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.8	7.9	7.5	7.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	33%	0%	0%	53%
Vol Thru, %	67%	94%	99%	35%
Vol Right, %	0%	6%	1%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	3	86	85	17
LT Vol	1	0	0	9
Through Vol	2	81	84	6
RT Vol	0	5	1	2
Lane Flow Rate	4	110	109	22
Geometry Grp	1	1	1	1
Degree of Util (X)	0.005	0.126	0.128	0.027
Departure Headway (Hd)	4.479	4.126	4.223	4.427
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	804	864	846	814
Service Time	2.48	2.172	2.267	2.427
HCM Lane V/C Ratio	0.005	0.127	0.129	0.027
HCM Control Delay	7.5	7.8	7.9	7.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0	0.4	0.4	0.1

Intersection	
Int Delay, s/veh	8.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	910	22	95	1483	10	8	1	33	5	1	17
Future Vol, veh/h	15	910	22	95	1483	10	8	1	33	5	1	17
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	-	-	Yield	-	-	Yield	-	-	Yield	-	-	None
Storage Length	250	-	125	250	-	150	-	-	220	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	19	12	25	24	8	18	25	0	25	10	100	5
Mvmt Flow	17	1034	25	108	1685	11	9	1	38	6	1	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1685	0	0	1034	0	0	2127	2969	517	2453	2969	843
Stage 1	-	-	-	-	-	-	1068	1068	-	1901	1901	-
Stage 2	-	-	-	-	-	-	1059	1901	-	552	1068	-
Critical Hdwy	4.48	-	-	4.58	-	-	8	6.5	7.4	7.7	8.5	7
Critical Hdwy Stg 1	-	-	-	-	-	-	7	5.5	-	6.7	7.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	5.5	-	6.7	7.5	-
Follow-up Hdwy	2.39	-	-	2.44	-	-	3.75	4	3.55	3.6	5	3.35
Pot Cap-1 Maneuver	307	-	-	551	-	-	21	14	447	14	3	301
Stage 1	-	-	-	-	-	-	199	301	-	65	39	-
Stage 2	-	-	-	-	-	-	202	118	-	466	149	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	307	-	-	551	-	-	~ 9	11	447	10	2	301
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 9	11	-	10	2	-
Stage 1	-	-	-	-	-	-	188	284	-	61	31	-
Stage 2	-	-	-	-	-	-	146	95	-	402	141	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.8	201.3	$ 509.7
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	9	447	307	-	-	551	-	-	22
HCM Lane V/C Ratio	1.136	0.084	0.056	-	-	0.196	-	-	1.188
HCM Control Delay (s)	$ 889	13.8	17.4	-	-	13.1	-	-	$ 509.7
HCM Lane LOS	F	B	C	-	-	B	-	-	F
HCM 95th %tile Q(veh)	2	0.3	0.2	-	-	0.7	-	-	3.4

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	57	15	26	62	223	35	1163	72	187	599	41
Future Volume (veh/h)	19	57	15	26	62	223	35	1163	72	187	599	41
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1900	1673	1900	1900	1832	1827	1810	1792	1863	1810	1712	1759
Adj Flow Rate, veh/h	21	63	10	29	69	154	39	1292	50	208	666	28
Adj No. of Lanes	0	1	0	0	1	1	1	2	1	1	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	7	7	7	4	4	4	5	6	2	5	11	8
Cap, veh/h	84	153	21	104	181	203	74	1666	775	269	1960	901
Arrive On Green	0.13	0.13	0.13	0.13	0.13	0.13	0.04	0.49	0.49	0.16	0.60	0.60
Sat Flow, veh/h	195	1167	162	324	1388	1553	1723	3406	1583	1723	3252	1495
Grp Volume(v), veh/h	94	0	0	98	0	154	39	1292	50	208	666	28
Grp Sat Flow(s),veh/h/ln	1524	0	0	1712	0	1553	1723	1703	1583	1723	1626	1495
Q Serve(g_s), s	0.1	0.0	0.0	0.0	0.0	7.3	1.7	23.7	1.3	8.8	7.8	0.6
Cycle Q Clear(g_c), s	4.0	0.0	0.0	3.7	0.0	7.3	1.7	23.7	1.3	8.8	7.8	0.6
Prop In Lane	0.22		0.11	0.30		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	257	0	0	285	0	203	74	1666	775	269	1960	901
V/C Ratio(X)	0.37	0.00	0.00	0.34	0.00	0.76	0.53	0.78	0.06	0.77	0.34	0.03
Avail Cap(c_a), veh/h	335	0	0	373	0	286	136	1928	896	363	2270	1044
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	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.4	0.0	0.0	30.3	0.0	31.9	35.6	16.0	10.2	30.7	7.5	6.1
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.7	0.0	7.2	5.8	1.8	0.0	7.0	0.1	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	1.9	0.0	0.0	1.9	0.0	3.5	0.9	11.4	0.6	4.7	3.5	0.2
LnGrp Delay(d),s/veh	31.3	0.0	0.0	31.0	0.0	39.1	41.4	17.7	10.3	37.8	7.6	6.1
LnGrp LOS	C			C		D	D	B	B	D	A	A
Approach Vol, veh/h		94			252			1381			902	
Approach Delay, s/veh		31.3			35.9			18.1			14.5	
Approach LOS		C			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	16.9	43.2		15.9	8.2	51.8		15.9
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	15.0	43.0		14.0	5.0	53.0		14.0
Max Q Clear Time (g_c+I1), s	10.8	25.7		6.0	3.7	9.8		9.3
Green Ext Time (p_c), s	0.2	11.4		1.0	0.0	19.2		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	19.1
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	1064	77	54	1322	23	53	22	57	15	12	12
Future Volume (veh/h)	4	1064	77	54	1322	23	53	22	57	15	12	12
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1583	1721	1900	1557	1792	1900	1667	1633	1900	1473	1719	1900
Adj Flow Rate, veh/h	4	1120	81	57	1392	24	56	23	37	16	13	8
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	20	10	10	22	6	6	14	12	12	29	17	17
Cap, veh/h	29	1872	135	314	2193	38	198	48	77	157	85	52
Arrive On Green	0.02	0.61	0.61	0.04	0.64	0.64	0.08	0.08	0.08	0.08	0.08	0.08
Sat Flow, veh/h	1508	3093	224	1483	3425	59	1239	565	908	1057	997	614
Grp Volume(v), veh/h	4	592	609	57	691	725	56	0	60	16	0	21
Grp Sat Flow(s),veh/h/ln	1508	1635	1681	1483	1702	1781	1239	0	1473	1057	0	1611
Q Serve(g_s), s	0.2	14.9	14.9	0.9	16.4	16.4	2.9	0.0	2.6	1.0	0.0	0.8
Cycle Q Clear(g_c), s	0.2	14.9	14.9	0.9	16.4	16.4	3.7	0.0	2.6	3.6	0.0	0.8
Prop In Lane	1.00		0.13	1.00		0.03	1.00		0.62	1.00		0.38
Lane Grp Cap(c), veh/h	29	990	1018	314	1090	1141	198	0	125	157	0	137
V/C Ratio(X)	0.14	0.60	0.60	0.18	0.63	0.64	0.28	0.00	0.48	0.10	0.00	0.15
Avail Cap(c_a), veh/h	113	1327	1365	390	1433	1500	317	0	266	258	0	291
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	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.1	8.1	8.1	6.3	7.3	7.3	29.9	0.0	29.0	30.7	0.0	28.2
Incr Delay (d2), s/veh	2.1	0.6	0.6	0.3	0.6	0.6	0.8	0.0	2.8	0.3	0.0	0.5
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	0.1	6.7	6.9	0.4	7.7	8.0	1.0	0.0	1.1	0.3	0.0	0.4
LnGrp Delay(d),s/veh	34.2	8.7	8.7	6.6	7.9	7.8	30.7	0.0	31.9	31.0	0.0	28.7
LnGrp LOS	C	A	A	A	A	A	C		C	C		C
Approach Vol, veh/h		1205			1473			116			37	
Approach Delay, s/veh		8.8			7.8			31.3			29.7	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.6	46.3		11.6	6.3	48.6		11.6
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	6.0	54.0		12.0	4.0	56.0		12.0
Max Q Clear Time (g_c+I1), s	2.9	16.9		5.6	2.2	18.4		5.7
Green Ext Time (p_c), s	0.0	23.4		0.3	0.0	23.6		0.3

Intersection Summary			
HCM 2010 Ctrl Delay			9.5
HCM 2010 LOS			A

HCM Signalized Intersection Capacity Analysis
5: Rehoboth Rd & Arthur K. Bolton Pkwy (SR 16)

04/06/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	883	263	303	1231	3	129	0	97	0	0	15
Future Volume (vph)	0	883	263	303	1231	3	129	0	97	0	0	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	4.0	4.0	6.0		6.0			6.0
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00		1.00			1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00		0.85			0.86
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95		1.00			1.00
Satd. Flow (prot)		3252	1495	1583	3406	1615	1656		1357			1565
Flt Permitted		1.00	1.00	0.18	1.00	1.00	0.95		1.00			1.00
Satd. Flow (perm)		3252	1495	299	3406	1615	1656		1357			1565
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	970	289	333	1353	3	142	0	107	0	0	16
RTOR Reduction (vph)	0	0	174	0	0	0	0	0	91	0	0	0
Lane Group Flow (vph)	0	970	115	333	1353	3	142	0	16	0	0	16
Heavy Vehicles (%)	0%	11%	8%	14%	6%	0%	9%	0%	19%	0%	0%	5%
Turn Type		NA	Perm	D.P+P	NA	custom	Prot		Perm			Perm
Protected Phases		2		1	Free!	Free	3!					
Permitted Phases			2	2		Free	3!		3			1 2 3
Actuated Green, G (s)		28.8	28.8	43.7	72.5	72.5	10.8		10.8			72.5
Effective Green, g (s)		28.8	28.8	43.7	72.5	72.5	10.8		10.8			72.5
Actuated g/C Ratio		0.40	0.40	0.60	1.00	1.00	0.15		0.15			1.00
Clearance Time (s)		6.0	6.0	6.0			6.0		6.0			
Vehicle Extension (s)		3.0	3.0	3.0			3.0		3.0			
Lane Grp Cap (vph)		1291	593	444	3406	3230	246		202			1565
v/s Ratio Prot		c0.30		c0.15	0.40	0.00	0.09					
v/s Ratio Perm			0.08	0.30		0.00			0.01			0.01
v/c Ratio		0.75	0.19	0.75	0.40	0.00	0.58		0.08			0.01
Uniform Delay, d1		18.8	14.3	11.3	0.0	0.0	28.7		26.6			0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00
Incremental Delay, d2		2.5	0.2	7.0	0.3	0.0	3.3		0.2			0.0
Delay (s)		21.3	14.4	18.3	0.3	0.0	32.0		26.7			0.0
Level of Service		C	B	B	A	A	C		C			A
Approach Delay (s)		19.7			3.9			29.7			0.0	
Approach LOS		B			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	72.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	882	6	32	1422	5	15	57	55	8	37	122
Future Volume (veh/h)	60	882	6	32	1422	5	15	57	55	8	37	122
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1881	1681	1712	1863	1727	1520	1845	1845	1881	1583	1863	1881
Adj Flow Rate, veh/h	67	980	4	36	1580	3	17	63	38	9	41	84
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	1	13	11	2	10	25	3	3	1	20	2	1
Cap, veh/h	107	1879	856	70	1864	734	185	154	134	157	143	123
Arrive On Green	0.06	0.59	0.59	0.04	0.57	0.57	0.02	0.08	0.08	0.01	0.08	0.08
Sat Flow, veh/h	1792	3195	1455	1774	3282	1292	1757	1845	1599	1508	1863	1599
Grp Volume(v), veh/h	67	980	4	36	1580	3	17	63	38	9	41	84
Grp Sat Flow(s),veh/h/ln	1792	1597	1455	1774	1641	1292	1757	1845	1599	1508	1863	1599
Q Serve(g_s), s	3.0	15.0	0.1	1.6	33.0	0.1	0.7	2.7	1.8	0.5	1.7	4.2
Cycle Q Clear(g_c), s	3.0	15.0	0.1	1.6	33.0	0.1	0.7	2.7	1.8	0.5	1.7	4.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	107	1879	856	70	1864	734	185	154	134	157	143	123
V/C Ratio(X)	0.62	0.52	0.00	0.51	0.85	0.00	0.09	0.41	0.28	0.06	0.29	0.68
Avail Cap(c_a), veh/h	131	1904	867	129	1956	770	243	179	156	217	181	156
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.7	10.1	7.0	38.7	14.8	7.7	34.2	35.8	35.4	34.6	35.8	37.0
Incr Delay (d2), s/veh	6.4	0.2	0.0	5.7	3.6	0.0	0.2	1.7	1.2	0.2	1.1	8.3
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	1.7	6.6	0.0	0.9	15.6	0.0	0.4	1.4	0.8	0.2	0.9	2.1
LnGrp Delay(d),s/veh	44.1	10.3	7.0	44.5	18.4	7.7	34.4	37.5	36.5	34.7	36.9	45.3
LnGrp LOS	D	B	A	D	B	A	C	D	D	C	D	D
Approach Vol, veh/h		1051			1619			118			134	
Approach Delay, s/veh		12.4			18.9			36.7			42.0	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.2	54.4	7.3	12.3	9.9	52.7	6.7	12.9
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	5.0	49.0	4.0	8.0	5.0	49.0	4.0	8.0
Max Q Clear Time (g_c+I1), s	3.6	17.0	2.7	6.2	5.0	35.0	2.5	4.7
Green Ext Time (p_c), s	0.0	22.6	0.0	0.1	0.0	11.7	0.0	0.3

Intersection Summary	
HCM 2010 Ctrl Delay	18.4
HCM 2010 LOS	B

Intersection	
Intersection Delay, s/veh	9.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	137	46	21	218	9	45	5	27	14	7	9
Future Vol, veh/h	4	137	46	21	218	9	45	5	27	14	7	9
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	17	5	7	6	4	0	1	0	5	7	0	0
Mvmt Flow	4	151	51	23	240	10	49	5	30	15	8	10
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.4	9.9	8.7	8.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	58%	2%	8%	47%
Vol Thru, %	6%	73%	88%	23%
Vol Right, %	35%	25%	4%	30%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	77	187	248	30
LT Vol	45	4	21	14
Through Vol	5	137	218	7
RT Vol	27	46	9	9
Lane Flow Rate	85	205	273	33
Geometry Grp	1	1	1	1
Degree of Util (X)	0.117	0.265	0.343	0.047
Departure Headway (Hd)	4.963	4.641	4.525	5.149
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	720	773	793	693
Service Time	3.007	2.676	2.556	3.2
HCM Lane V/C Ratio	0.118	0.265	0.344	0.048
HCM Control Delay	8.7	9.4	9.9	8.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	1.1	1.5	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	614	472	140	88	201	51	108	656	144	51	357	217
Future Volume (veh/h)	614	472	140	88	201	51	108	656	144	51	357	217
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1810	1863	1827	1863	1813	1900	1827	1810	1863	1827	1743	1712
Adj Flow Rate, veh/h	660	508	93	95	216	34	116	705	96	55	384	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	5	2	4	2	4	4	4	5	2	4	9	11
Cap, veh/h	644	770	642	298	222	35	163	767	353	89	598	263
Arrive On Green	0.32	0.41	0.41	0.06	0.15	0.15	0.09	0.22	0.22	0.05	0.18	0.00
Sat Flow, veh/h	1723	1863	1553	1774	1529	241	1740	3438	1583	1740	3312	1455
Grp Volume(v), veh/h	660	508	93	95	0	250	116	705	96	55	384	0
Grp Sat Flow(s),veh/h/ln	1723	1863	1553	1774	0	1770	1740	1719	1583	1740	1656	1455
Q Serve(g_s), s	29.0	19.7	3.3	4.0	0.0	12.6	5.8	17.9	4.5	2.8	9.6	0.0
Cycle Q Clear(g_c), s	29.0	19.7	3.3	4.0	0.0	12.6	5.8	17.9	4.5	2.8	9.6	0.0
Prop In Lane	1.00		1.00	1.00		0.14	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	644	770	642	298	0	257	163	767	353	89	598	263
V/C Ratio(X)	1.03	0.66	0.14	0.32	0.00	0.97	0.71	0.92	0.27	0.62	0.64	0.00
Avail Cap(c_a), veh/h	644	770	642	298	0	257	175	768	354	97	598	263
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	22.3	21.2	16.4	30.2	0.0	38.1	39.4	34.0	28.8	41.6	34.0	0.0
Incr Delay (d2), s/veh	42.1	2.1	0.1	0.6	0.0	48.3	11.9	16.1	0.4	10.0	2.3	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	23.3	10.5	1.5	2.0	0.0	9.6	3.3	10.2	2.0	1.6	4.6	0.0
LnGrp Delay(d),s/veh	64.3	23.3	16.5	30.8	0.0	86.4	51.3	50.1	29.2	51.7	36.3	0.0
LnGrp LOS	F	C	B	C		F	D	D	C	D	D	
Approach Vol, veh/h		1261			345			917			439	
Approach Delay, s/veh		44.3			71.1			48.1			38.3	
Approach LOS		D			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	26.0	11.0	43.0	13.4	22.2	35.0	19.0
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	4.0	20.0	5.0	37.0	8.0	16.0	29.0	13.0
Max Q Clear Time (g_c+I1), s	4.8	19.9	6.0	21.7	7.8	11.6	31.0	14.6
Green Ext Time (p_c), s	0.0	0.0	0.0	4.0	0.0	2.5	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	47.7
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	16
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	34	97	88	32	70	17	167	205	72	20	108	15
Future Vol, veh/h	34	97	88	32	70	17	167	205	72	20	108	15
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	0	3	3	2	4	0	2	5	4	9	6	5
Mvmt Flow	37	107	97	35	77	19	184	225	79	22	119	16
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	12.3	11	20.7	11.1
HCM LOS	B	B	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	38%	16%	27%	14%
Vol Thru, %	46%	44%	59%	76%
Vol Right, %	16%	40%	14%	10%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	444	219	119	143
LT Vol	167	34	32	20
Through Vol	205	97	70	108
RT Vol	72	88	17	15
Lane Flow Rate	488	241	131	157
Geometry Grp	1	1	1	1
Degree of Util (X)	0.717	0.383	0.224	0.258
Departure Headway (Hd)	5.292	5.722	6.155	5.92
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	678	626	579	603
Service Time	3.347	3.791	4.235	3.997
HCM Lane V/C Ratio	0.72	0.385	0.226	0.26
HCM Control Delay	20.7	12.3	11	11.1
HCM Lane LOS	C	B	B	B
HCM 95th-tile Q	6.1	1.8	0.9	1

Intersection						
Int Delay, s/veh	2.4					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	60	128	100	30	17	20
Future Vol, veh/h	60	128	100	30	17	20
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, %	5	3	2	3	13	7
Mvmt Flow	65	139	109	33	18	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	142	0	-	0	395	126
Stage 1	-	-	-	-	126	-
Stage 2	-	-	-	-	269	-
Critical Hdwy	4.15	-	-	-	6.53	6.27
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	2.245	-	-	-	3.617	3.363
Pot Cap-1 Maneuver	1423	-	-	-	589	911
Stage 1	-	-	-	-	873	-
Stage 2	-	-	-	-	751	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1423	-	-	-	560	911
Mov Cap-2 Maneuver	-	-	-	-	560	-
Stage 1	-	-	-	-	829	-
Stage 2	-	-	-	-	751	-

Approach	EB	WB	SB
HCM Control Delay, s	2.4	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1423	-	-	-	707
HCM Lane V/C Ratio	0.046	-	-	-	0.057
HCM Control Delay (s)	7.7	0	-	-	10.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Int Delay, s/veh	6.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	89	16	43	1	37	3	39	9	0	1	10	50
Future Vol, veh/h	89	16	43	1	37	3	39	9	0	1	10	50
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	0	12	0	0	0	2	0	0	25	0	3
Mvmt Flow	105	19	51	1	44	4	46	11	0	1	12	59

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	48	0	0	70	0	0	339	305	45	308	328	46
Stage 1	-	-	-	-	-	-	255	255	-	48	48	-
Stage 2	-	-	-	-	-	-	84	50	-	260	280	-
Critical Hdwy	4.12	-	-	4.1	-	-	7.12	6.5	6.2	7.35	6.5	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.5	-	6.35	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.5	-	6.35	5.5	-
Follow-up Hdwy	2.218	-	-	2.2	-	-	3.518	4	3.3	3.725	4	3.327
Pot Cap-1 Maneuver	1559	-	-	1544	-	-	615	612	1031	602	594	1021
Stage 1	-	-	-	-	-	-	749	700	-	910	859	-
Stage 2	-	-	-	-	-	-	924	857	-	697	683	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1559	-	-	1544	-	-	539	569	1031	561	552	1021
Mov Cap-2 Maneuver	-	-	-	-	-	-	539	569	-	561	552	-
Stage 1	-	-	-	-	-	-	697	651	-	846	858	-
Stage 2	-	-	-	-	-	-	858	856	-	638	635	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.5	0.2	12.4	9.4
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	544	1559	-	-	1544	-	-	886
HCM Lane V/C Ratio	0.104	0.067	-	-	0.001	-	-	0.081
HCM Control Delay (s)	12.4	7.5	0	-	7.3	0	-	9.4
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0.2	-	-	0	-	-	0.3

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	1	85	2	0	138	6	5	3	1	8	6	3
Future Vol, veh/h	1	85	2	0	138	6	5	3	1	8	6	3
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	50	4	0	0	4	9	0	0	0	0	0	33
Mvmt Flow	1	90	2	0	147	6	5	3	1	9	6	3
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.7	8	7.6	7.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	56%	1%	0%	47%
Vol Thru, %	33%	97%	96%	35%
Vol Right, %	11%	2%	4%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	9	88	144	17
LT Vol	5	1	0	8
Through Vol	3	85	138	6
RT Vol	1	2	6	3
Lane Flow Rate	10	94	153	18
Geometry Grp	1	1	1	1
Degree of Util (X)	0.012	0.128	0.173	0.022
Departure Headway (Hd)	4.541	4.904	4.062	4.475
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	793	728	876	805
Service Time	2.541	2.953	2.118	2.475
HCM Lane V/C Ratio	0.013	0.129	0.175	0.022
HCM Control Delay	7.6	8.7	8	7.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0	0.4	0.6	0.1

Intersection	
Int Delay, s/veh	24.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	1787	12	43	1353	4	23	0	106	8	0	10
Future Vol, veh/h	18	1787	12	43	1353	4	23	0	106	8	0	10
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	-	-	Yield	-	-	Yield	-	-	Yield	-	-	None
Storage Length	250	-	125	250	-	150	-	-	220	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	8	23	25	10	22	24	0	21	12	0	0
Mvmt Flow	19	1901	13	46	1439	4	24	0	113	9	0	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1439	0	0	1901	0	0	2751	3470	951	2520	3470	720
Stage 1	-	-	-	-	-	-	1939	1939	-	1531	1531	-
Stage 2	-	-	-	-	-	-	812	1531	-	989	1939	-
Critical Hdwy	4.16	-	-	4.6	-	-	7.98	6.5	7.32	7.74	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.98	5.5	-	6.74	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.98	5.5	-	6.74	5.5	-
Follow-up Hdwy	2.23	-	-	2.45	-	-	3.74	4	3.51	3.62	4	3.3
Pot Cap-1 Maneuver	462	-	-	231	-	-	~ 7	7	228	12	7	375
Stage 1	-	-	-	-	-	-	52	113	-	111	181	-
Stage 2	-	-	-	-	-	-	295	181	-	246	113	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	462	-	-	231	-	-	~ 6	5	228	~ 5	5	375
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 6	5	-	~ 5	5	-
Stage 1	-	-	-	-	-	-	50	108	-	106	145	-
Stage 2	-	-	-	-	-	-	230	145	-	119	108	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.7	$ 484.5	$ 1032
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	6	228	462	-	-	231	-	-	11
HCM Lane V/C Ratio	4.078	0.495	0.041	-	-	0.198	-	-	1.741
HCM Control Delay (s)	$ 2554.8	35.3	13.1	-	-	24.4	-	-	$ 1032
HCM Lane LOS	F	E	B	-	-	C	-	-	F
HCM 95th %tile Q(veh)	4.4	2.5	0.1	-	-	0.7	-	-	3.2

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	38	84	29	73	53	229	26	781	41	234	1254	16
Future Volume (veh/h)	38	84	29	73	53	229	26	781	41	234	1254	16
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1900	1817	1900	1900	1866	1845	1759	1810	1845	1863	1863	1439
Adj Flow Rate, veh/h	42	92	20	80	58	156	29	858	28	257	1378	11
Adj No. of Lanes	0	1	0	0	1	1	1	2	1	1	2	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	4	4	4	3	3	3	8	5	3	2	2	32
Cap, veh/h	97	152	28	195	121	268	64	1404	640	328	1965	679
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.04	0.41	0.41	0.19	0.56	0.56
Sat Flow, veh/h	195	892	162	677	709	1568	1675	3438	1568	1774	3539	1223
Grp Volume(v), veh/h	154	0	0	138	0	156	29	858	28	257	1378	11
Grp Sat Flow(s),veh/h/ln	1249	0	0	1387	0	1568	1675	1719	1568	1774	1770	1223
Q Serve(g_s), s	2.7	0.0	0.0	0.0	0.0	6.6	1.2	14.2	0.8	10.0	20.5	0.3
Cycle Q Clear(g_c), s	9.2	0.0	0.0	6.6	0.0	6.6	1.2	14.2	0.8	10.0	20.5	0.3
Prop In Lane	0.27		0.13	0.58		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	277	0	0	316	0	268	64	1404	640	328	1965	679
V/C Ratio(X)	0.56	0.00	0.00	0.44	0.00	0.58	0.45	0.61	0.04	0.78	0.70	0.02
Avail Cap(c_a), veh/h	376	0	0	411	0	369	139	1620	739	541	2452	848
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	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.2	0.0	0.0	27.3	0.0	27.5	34.0	16.8	12.9	28.0	11.7	7.2
Incr Delay (d2), s/veh	1.7	0.0	0.0	1.0	0.0	2.0	4.9	0.5	0.0	4.1	0.7	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	3.0	0.0	0.0	2.6	0.0	3.0	0.7	6.8	0.3	5.2	9.9	0.1
LnGrp Delay(d),s/veh	29.9	0.0	0.0	28.3	0.0	29.5	38.9	17.4	12.9	32.1	12.4	7.2
LnGrp LOS	C			C		C	D	B	B	C	B	A
Approach Vol, veh/h		154			294			915			1646	
Approach Delay, s/veh		29.9			28.9			17.9			15.4	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	18.4	35.5		18.3	7.8	46.1		18.3
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	21.0	34.0		17.0	5.0	50.0		17.0
Max Q Clear Time (g_c+I1), s	12.0	16.2		11.2	3.2	22.5		8.6
Green Ext Time (p_c), s	0.5	12.9		1.1	0.0	17.6		1.4

Intersection Summary			
HCM 2010 Ctrl Delay			18.2
HCM 2010 LOS			B

HCM 2010 Signalized Intersection Summary
4: Green Valley Rd & Arthur K. Bolton Pkwy (SR 16)

04/06/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	1503	83	26	1418	10	167	53	52	10	22	2
Future Volume (veh/h)	5	1503	83	26	1418	10	167	53	52	10	22	2
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1900	1774	1900	1863	1758	1900	1863	1803	1900	1900	1900	1900
Adj Flow Rate, veh/h	6	1811	100	31	1708	12	201	64	39	12	27	1
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	0	7	7	2	8	8	2	2	2	0	0	0
Cap, veh/h	32	1943	106	145	2094	15	302	180	110	237	313	12
Arrive On Green	0.02	0.60	0.60	0.02	0.62	0.62	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	1810	3250	178	1774	3401	24	1377	1050	640	1312	1821	67
Grp Volume(v), veh/h	6	932	979	31	838	882	201	0	103	12	0	28
Grp Sat Flow(s),veh/h/ln	1810	1685	1743	1774	1671	1754	1377	0	1690	1312	0	1888
Q Serve(g_s), s	0.3	43.4	45.1	0.6	33.8	33.9	12.5	0.0	4.7	0.7	0.0	1.1
Cycle Q Clear(g_c), s	0.3	43.4	45.1	0.6	33.8	33.9	13.6	0.0	4.7	5.4	0.0	1.1
Prop In Lane	1.00		0.10	1.00		0.01	1.00		0.38	1.00		0.04
Lane Grp Cap(c), veh/h	32	1007	1042	145	1029	1080	302	0	290	237	0	324
V/C Ratio(X)	0.19	0.92	0.94	0.21	0.81	0.82	0.67	0.00	0.35	0.05	0.00	0.09
Avail Cap(c_a), veh/h	104	1023	1058	183	1029	1080	302	0	290	237	0	324
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	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.3	15.8	16.1	19.8	12.9	13.0	36.1	0.0	31.9	34.3	0.0	30.4
Incr Delay (d2), s/veh	2.8	13.5	15.3	0.7	5.2	5.0	5.5	0.0	0.7	0.1	0.0	0.1
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	23.7	25.9	0.5	16.8	17.7	5.2	0.0	2.3	0.3	0.0	0.6
LnGrp Delay(d),s/veh	45.1	29.3	31.4	20.5	18.1	17.9	41.6	0.0	32.6	34.4	0.0	30.5
LnGrp LOS	D	C	C	C	B	B	D		C	C		C
Approach Vol, veh/h		1917			1751			304			40	
Approach Delay, s/veh		30.4			18.0			38.5			31.7	
Approach LOS		C			B			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.1	58.2		21.0	6.5	59.8		21.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	4.0	53.0		15.0	4.0	53.0		15.0
Max Q Clear Time (g_c+I1), s	2.6	47.1		7.4	2.3	35.9		15.6
Green Ext Time (p_c), s	0.0	5.1		0.8	0.0	16.1		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		25.7
HCM 2010 LOS		C

HCM Signalized Intersection Capacity Analysis
5: Rehoboth Rd & Arthur K. Bolton Pkwy (SR 16)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1368	195	203	1210	5	221	0	407	0	0	6
Future Volume (vph)	0	1368	195	203	1210	5	221	0	407	0	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	4.0	4.0	6.0		6.0			6.0
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00		1.00			1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00		0.85			0.86
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95		1.00			1.00
Satd. Flow (prot)		3374	1495	1492	3343	1615	1656		1417			1644
Flt Permitted		1.00	1.00	0.09	1.00	1.00	0.95		1.00			1.00
Satd. Flow (perm)		3374	1495	143	3343	1615	1656		1417			1644
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	0	1572	224	233	1391	6	254	0	468	0	0	7
RTOR Reduction (vph)	0	0	113	0	0	0	0	0	25	0	0	0
Lane Group Flow (vph)	0	1572	111	233	1391	6	254	0	443	0	0	7
Heavy Vehicles (%)	0%	7%	8%	21%	8%	0%	9%	0%	14%	0%	0%	0%
Turn Type		NA	Perm	D.P+P	NA	custom	Prot		pm+ov			Perm
Protected Phases		2		1	Free!	Free	3!		1			
Permitted Phases			2	2		Free	3!		3			1 2 3
Actuated Green, G (s)		43.9	43.9	55.5	88.5	88.5	15.0		26.6			88.5
Effective Green, g (s)		43.9	43.9	55.5	88.5	88.5	15.0		26.6			88.5
Actuated g/C Ratio		0.50	0.50	0.63	1.00	1.00	0.17		0.30			1.00
Clearance Time (s)		6.0	6.0	6.0			6.0		6.0			
Vehicle Extension (s)		3.0	3.0	3.0			3.0		3.0			
Lane Grp Cap (vph)		1673	741	266	3343	3230	280		521			1644
v/s Ratio Prot		c0.47		0.11	0.42	0.00	0.15		c0.11			
v/s Ratio Perm			0.07	0.43		0.00			0.20			0.00
v/c Ratio		0.94	0.15	0.88	0.42	0.00	0.91		0.85			0.00
Uniform Delay, d1		21.0	12.1	24.1	0.0	0.0	36.1		29.1			0.0
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00
Incremental Delay, d2		10.7	0.1	25.9	0.4	0.0	30.5		12.3			0.0
Delay (s)		31.7	12.2	50.0	0.4	0.0	66.6		41.4			0.0
Level of Service		C	B	D	A	A	E		D			A
Approach Delay (s)		29.3			7.5			50.2			0.0	
Approach LOS		C			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	24.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	88.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	129	1735	19	59	1307	3	19	39	32	2	79	67
Future Volume (veh/h)	129	1735	19	59	1307	3	19	39	32	2	79	67
Number	5	2	12	1	6	16	3	8	18	7	4	14
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
Adj Sat Flow, veh/h/ln	1881	1727	1900	1845	1712	1900	1900	1900	1900	1900	1863	1881
Adj Flow Rate, veh/h	142	1907	13	65	1436	2	21	43	22	2	87	46
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	1	10	0	3	11	0	0	0	0	0	2	1
Cap, veh/h	194	1918	944	103	1737	863	149	164	139	177	131	112
Arrive On Green	0.11	0.58	0.58	0.06	0.53	0.53	0.02	0.09	0.09	0.00	0.07	0.07
Sat Flow, veh/h	1792	3282	1615	1757	3252	1615	1810	1900	1615	1810	1863	1599
Grp Volume(v), veh/h	142	1907	13	65	1436	2	21	43	22	2	87	46
Grp Sat Flow(s),veh/h/ln	1792	1641	1615	1757	1626	1615	1810	1900	1615	1810	1863	1599
Q Serve(g_s), s	6.6	49.3	0.3	3.1	31.5	0.0	0.9	1.8	1.1	0.1	3.9	2.4
Cycle Q Clear(g_c), s	6.6	49.3	0.3	3.1	31.5	0.0	0.9	1.8	1.1	0.1	3.9	2.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	194	1918	944	103	1737	863	149	164	139	177	131	112
V/C Ratio(X)	0.73	0.99	0.01	0.63	0.83	0.00	0.14	0.26	0.16	0.01	0.67	0.41
Avail Cap(c_a), veh/h	209	1918	944	103	1737	863	200	178	151	257	174	149
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.9	17.6	7.5	39.4	16.6	9.3	36.1	36.5	36.2	36.9	38.8	38.1
Incr Delay (d2), s/veh	11.4	19.2	0.0	12.0	3.4	0.0	0.4	0.8	0.5	0.0	5.7	2.4
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	3.8	27.1	0.1	1.8	14.8	0.0	0.5	1.0	0.5	0.0	2.2	1.1
LnGrp Delay(d),s/veh	48.3	36.8	7.5	51.4	20.1	9.3	36.5	37.4	36.7	36.9	44.5	40.5
LnGrp LOS	D	D	A	D	C	A	D	D	D	D	D	D
Approach Vol, veh/h		2062			1503			86			135	
Approach Delay, s/veh		37.4			21.4			37.0			43.0	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	56.0	7.6	12.0	14.3	51.7	6.2	13.4
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	4.0	50.0	4.0	8.0	9.0	45.0	4.0	8.0
Max Q Clear Time (g_c+I1), s	5.1	51.3	2.9	5.9	8.6	33.5	2.1	3.8
Green Ext Time (p_c), s	0.0	0.0	0.0	0.2	0.0	10.9	0.0	0.3

Intersection Summary			
HCM 2010 Ctrl Delay			31.3
HCM 2010 LOS			C

Intersection	
Intersection Delay, s/veh	11.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	26	272	71	37	252	11	65	12	34	6	4	14
Future Vol, veh/h	26	272	71	37	252	11	65	12	34	6	4	14
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	0	2	1	6	3	6	3	0	3	0	6	0
Mvmt Flow	28	292	76	40	271	12	70	13	37	6	4	15
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	12.3	11.6	9.9	8.8
HCM LOS	B	B	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	59%	7%	12%	25%
Vol Thru, %	11%	74%	84%	17%
Vol Right, %	31%	19%	4%	58%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	111	369	300	24
LT Vol	65	26	37	6
Through Vol	12	272	252	4
RT Vol	34	71	11	14
Lane Flow Rate	119	397	323	26
Geometry Grp	1	1	1	1
Degree of Util (X)	0.183	0.504	0.434	0.04
Departure Headway (Hd)	5.532	4.574	4.841	5.548
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	641	782	739	649
Service Time	3.63	2.636	2.91	3.548
HCM Lane V/C Ratio	0.186	0.508	0.437	0.04
HCM Control Delay	9.9	12.3	11.6	8.8
HCM Lane LOS	A	B	B	A
HCM 95th-tile Q	0.7	2.9	2.2	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	318	340	152	145	467	38	221	414	98	65	612	618
Future Volume (veh/h)	318	340	152	145	467	38	221	414	98	65	612	618
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1810	1845	1863	1881	1860	1900	1863	1792	1863	1863	1845	1863
Adj Flow Rate, veh/h	338	362	100	154	497	25	235	440	65	69	651	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	5	3	2	1	2	2	2	6	2	2	3	2
Cap, veh/h	329	656	563	385	488	25	237	890	414	108	662	299
Arrive On Green	0.14	0.36	0.36	0.07	0.28	0.28	0.13	0.26	0.26	0.06	0.19	0.00
Sat Flow, veh/h	1723	1845	1583	1792	1756	88	1774	3406	1583	1774	3505	1583
Grp Volume(v), veh/h	338	362	100	154	0	522	235	440	65	69	651	0
Grp Sat Flow(s),veh/h/ln	1723	1845	1583	1792	0	1845	1774	1703	1583	1774	1752	1583
Q Serve(g_s), s	13.0	14.2	3.9	5.5	0.0	25.0	11.9	9.9	2.8	3.4	16.7	0.0
Cycle Q Clear(g_c), s	13.0	14.2	3.9	5.5	0.0	25.0	11.9	9.9	2.8	3.4	16.7	0.0
Prop In Lane	1.00		1.00	1.00		0.05	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	329	656	563	385	0	512	237	890	414	108	662	299
V/C Ratio(X)	1.03	0.55	0.18	0.40	0.00	1.02	0.99	0.49	0.16	0.64	0.98	0.00
Avail Cap(c_a), veh/h	329	656	563	385	0	512	237	890	414	177	662	299
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	24.8	23.3	19.9	21.5	0.0	32.5	39.0	28.2	25.6	41.3	36.4	0.0
Incr Delay (d2), s/veh	56.9	1.0	0.1	0.7	0.0	44.6	56.6	0.4	0.2	6.2	30.7	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	13.3	7.3	1.7	2.8	0.0	19.0	9.5	4.7	1.3	1.9	10.9	0.0
LnGrp Delay(d),s/veh	81.7	24.3	20.1	22.2	0.0	77.1	95.5	28.6	25.8	47.5	67.0	0.0
LnGrp LOS	F	C	C	C		F	F	C	C	D	E	
Approach Vol, veh/h		800			676			740			720	
Approach Delay, s/veh		48.0			64.6			49.6			65.2	
Approach LOS		D			E			D			E	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.5	29.5	12.0	38.0	17.0	23.0	19.0	31.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	8.0	20.0	6.0	32.0	11.0	17.0	13.0	25.0				
Max Q Clear Time (g_c+I1), s	5.4	11.9	7.5	16.2	13.9	18.7	15.0	27.0				
Green Ext Time (p_c), s	0.0	4.0	0.0	4.8	0.0	0.0	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			56.4									
HCM 2010 LOS			E									

Intersection	
Intersection Delay, s/veh	23
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	86	178	99	118	19	110	104	52	17	224	55
Future Vol, veh/h	9	86	178	99	118	19	110	104	52	17	224	55
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles, %	6	4	1	1	2	8	2	9	1	4	1	0
Mvmt Flow	11	105	217	121	144	23	134	127	63	21	273	67
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	22	20.9	22.8	25.8
HCM LOS	C	C	C	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	41%	3%	42%	6%
Vol Thru, %	39%	32%	50%	76%
Vol Right, %	20%	65%	8%	19%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	266	273	236	296
LT Vol	110	9	99	17
Through Vol	104	86	118	224
RT Vol	52	178	19	55
Lane Flow Rate	324	333	288	361
Geometry Grp	1	1	1	1
Degree of Util (X)	0.65	0.645	0.593	0.71
Departure Headway (Hd)	7.212	6.978	7.419	7.079
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	500	516	484	509
Service Time	5.297	5.063	5.506	5.16
HCM Lane V/C Ratio	0.648	0.645	0.595	0.709
HCM Control Delay	22.8	22	20.9	25.8
HCM Lane LOS	C	C	C	D
HCM 95th-tile Q	4.6	4.5	3.8	5.6

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	35	125	138	20	21	85
Future Vol, veh/h	35	125	138	20	21	85
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	75	75	75	75	75	75
Heavy Vehicles, %	4	3	3	0	11	1
Mvmt Flow	47	167	184	27	28	113

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	211	0	-	0	459	198
Stage 1	-	-	-	-	198	-
Stage 2	-	-	-	-	261	-
Critical Hdwy	4.14	-	-	-	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	5.51	-
Critical Hdwy Stg 2	-	-	-	-	5.51	-
Follow-up Hdwy	2.236	-	-	-	3.599	3.309
Pot Cap-1 Maneuver	1348	-	-	-	544	846
Stage 1	-	-	-	-	814	-
Stage 2	-	-	-	-	762	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1348	-	-	-	523	846
Mov Cap-2 Maneuver	-	-	-	-	523	-
Stage 1	-	-	-	-	783	-
Stage 2	-	-	-	-	762	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1348	-	-	-	754
HCM Lane V/C Ratio	0.035	-	-	-	0.187
HCM Control Delay (s)	7.8	0	-	-	10.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.7

Intersection	
Int Delay, s/veh	6.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	64	49	29	1	23	1	39	17	3	1	13	100
Future Vol, veh/h	64	49	29	1	23	1	39	17	3	1	13	100
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	3	0	10	0	0	0	4	0	0	0	0	3
Mvmt Flow	73	56	33	1	26	1	44	19	3	1	15	114

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	27	0	0	89	0	0	312	248	73	259	264	27
Stage 1	-	-	-	-	-	-	219	219	-	29	29	-
Stage 2	-	-	-	-	-	-	93	29	-	230	235	-
Critical Hdwy	4.13	-	-	4.1	-	-	7.14	6.5	6.2	7.1	6.5	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.227	-	-	2.2	-	-	3.536	4	3.3	3.5	4	3.327
Pot Cap-1 Maneuver	1580	-	-	1519	-	-	637	658	995	698	645	1046
Stage 1	-	-	-	-	-	-	779	726	-	993	875	-
Stage 2	-	-	-	-	-	-	909	875	-	777	714	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1580	-	-	1519	-	-	536	625	995	653	613	1046
Mov Cap-2 Maneuver	-	-	-	-	-	-	536	625	-	653	613	-
Stage 1	-	-	-	-	-	-	741	690	-	944	874	-
Stage 2	-	-	-	-	-	-	796	874	-	716	679	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.3	0.3	12.1	9.3
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	573	1580	-	-	1519	-	-	963
HCM Lane V/C Ratio	0.117	0.046	-	-	0.001	-	-	0.135
HCM Control Delay (s)	12.1	7.4	0	-	7.4	0	-	9.3
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.4	0.1	-	-	0	-	-	0.5

Future Year (2029) Capacity Analysis – with Improvements

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	915	23	95	1491	11	0	0	42	0	0	22
Future Vol, veh/h	15	915	23	95	1491	11	0	0	42	0	0	22
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	-	-	Yield	-	-	Yield	-	-	Yield	-	-	None
Storage Length	250	-	125	250	-	150	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	19	12	25	24	8	18	25	0	25	10	100	5
Mvmt Flow	17	1040	26	108	1694	13	0	0	48	0	0	25

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1694	0	0	1040	0	0	-	-	520	-	-	847
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	4.48	-	-	4.58	-	-	-	-	7.4	-	-	7
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.39	-	-	2.44	-	-	-	-	3.55	-	-	3.35
Pot Cap-1 Maneuver	305	-	-	548	-	-	0	0	445	0	0	299
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	305	-	-	548	-	-	-	-	445	-	-	299
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.8	14.1	18.1
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	445	305	-	-	548	-	-	299
HCM Lane V/C Ratio	0.107	0.056	-	-	0.197	-	-	0.084
HCM Control Delay (s)	14.1	17.5	-	-	13.2	-	-	18.1
HCM Lane LOS	B	C	-	-	B	-	-	C
HCM 95th %tile Q(veh)	0.4	0.2	-	-	0.7	-	-	0.3

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	947	0	6	0	1507	0	0
Future Vol, veh/h	947	0	6	0	1507	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	-	-	-	400	-	0	-
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88	88
Heavy Vehicles, %	12	2	10	2	8	2	2
Mvmt Flow	1076	0	7	0	1713	0	0

Major/Minor	Major1		Major2			Minor1	
Conflicting Flow All	0	-	1076	-	-	1947	538
Stage 1	-	-	-	-	-	1076	-
Stage 2	-	-	-	-	-	871	-
Critical Hdwy	-	-	6.6	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.6	-	-	3.52	3.32
Pot Cap-1 Maneuver	-	0	277	0	-	57	488
Stage 1	-	0	-	0	-	289	-
Stage 2	-	0	-	0	-	370	-
Platoon blocked, %	-				-		
Mov Cap-1 Maneuver	-	-	277	-	-	56	488
Mov Cap-2 Maneuver	-	-	-	-	-	56	-
Stage 1	-	-	-	-	-	289	-
Stage 2	-	-	-	-	-	361	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	WBU	WBT
Capacity (veh/h)	-	-	277	-
HCM Lane V/C Ratio	-	-	0.025	-
HCM Control Delay (s)	0	-	18.3	-
HCM Lane LOS	A	-	C	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Vol, veh/h	9	0	948	1588	0	0	0
Future Vol, veh/h	9	0	948	1588	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	-	400	-	-	-	0	-
Veh in Median Storage, #	-	-	0	0	-	0	-
Grade, %	-	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88
Heavy Vehicles, %	25	2	12	8	2	2	2
Mvmt Flow	10	0	1077	1805	0	0	0

Major/Minor	Major1			Major2		Minor2	
Conflicting Flow All	1805	-	0	-	0	2364	903
Stage 1	-	-	-	-	-	1805	-
Stage 2	-	-	-	-	-	559	-
Critical Hdwy	6.9	-	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	5.84	-
Follow-up Hdwy	2.75	-	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	76	0	-	-	0	29	280
Stage 1	-	0	-	-	0	117	-
Stage 2	-	0	-	-	0	536	-
Platoon blocked, %			-	-			
Mov Cap-1 Maneuver	76	-	-	-	-	25	280
Mov Cap-2 Maneuver	-	-	-	-	-	25	-
Stage 1	-	-	-	-	-	102	-
Stage 2	-	-	-	-	-	536	-

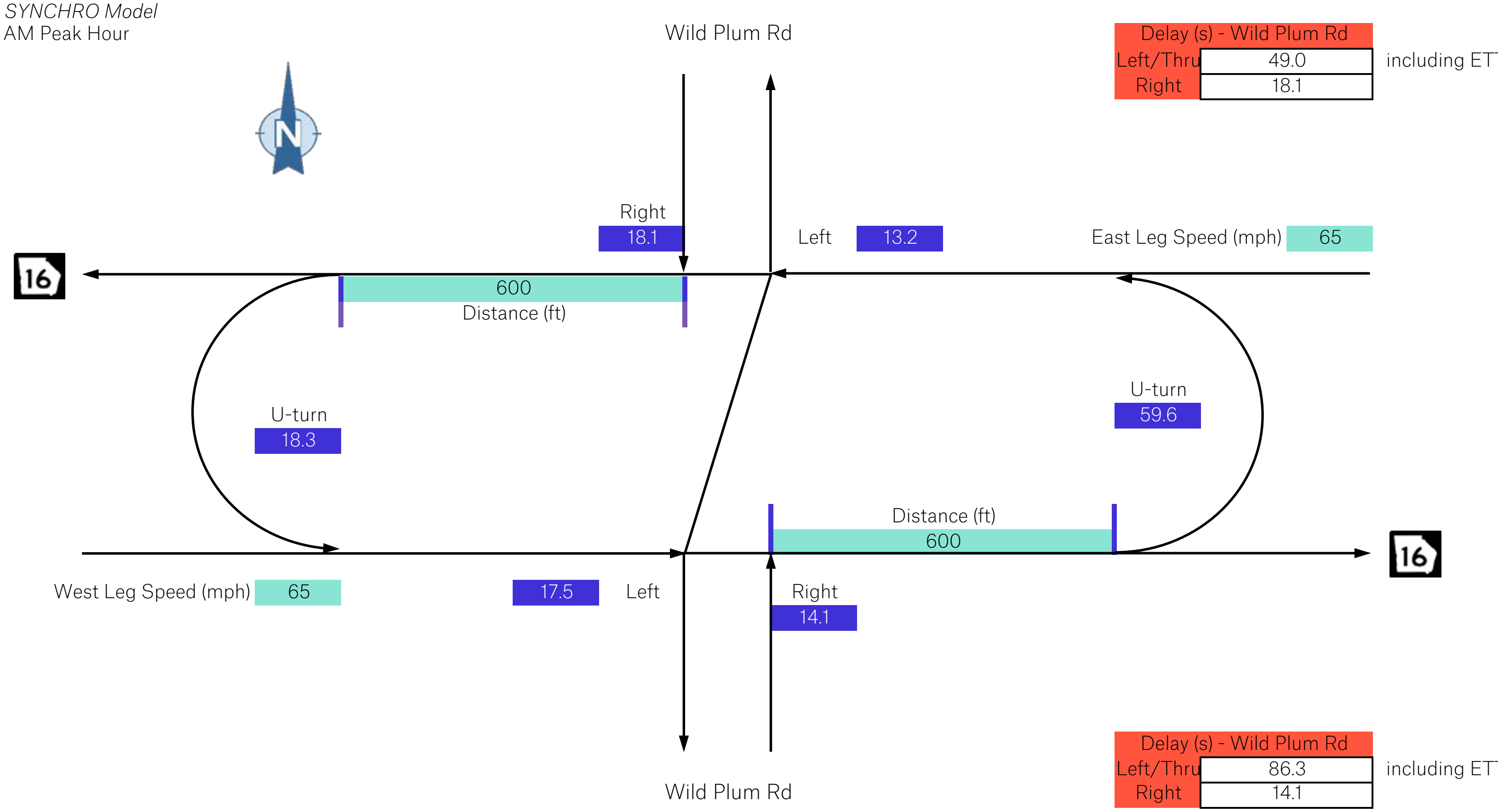
Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBU	EBT	WBT	SBLn1
Capacity (veh/h)	76	-	-	-
HCM Lane V/C Ratio	0.135	-	-	-
HCM Control Delay (s)	59.6	-	-	0
HCM Lane LOS	F	-	-	A
HCM 95th %tile Q(veh)	0.4	-	-	-

Peak Hour Delays

Based on SYNCHRO Model

2029 AM Peak Hour



	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	15	910	22	95	1483	10	8	1	33	5	1	17
Delay (s)	17.5	0	0	13.2	0	0	86.3	86.3	14.1	49.0	49.0	18.1

	EB	WB	NB	SB
Volume	947	1588	42	23
Delay (s)	0.3	0.8	29.6	26.2

Overall Delay (s)
1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	614	472	140	88	201	51	108	656	144	51	357	217
Future Volume (veh/h)	614	472	140	88	201	51	108	656	144	51	357	217
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1810	1863	1827	1863	1813	1900	1827	1810	1863	1827	1743	1712
Adj Flow Rate, veh/h	660	508	93	95	216	34	116	705	96	55	384	0
Adj No. of Lanes	2	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	5	2	4	2	4	4	4	5	2	4	9	11
Cap, veh/h	792	663	553	270	277	44	166	889	410	90	713	313
Arrive On Green	0.24	0.36	0.36	0.05	0.18	0.18	0.10	0.26	0.26	0.05	0.22	0.00
Sat Flow, veh/h	3343	1863	1553	1774	1529	241	1740	3438	1583	1740	3312	1455
Grp Volume(v), veh/h	660	508	93	95	0	250	116	705	96	55	384	0
Grp Sat Flow(s),veh/h/ln	1672	1863	1553	1774	0	1770	1740	1719	1583	1740	1656	1455
Q Serve(g_s), s	15.2	19.5	3.3	3.5	0.0	10.9	5.2	15.5	3.9	2.5	8.3	0.0
Cycle Q Clear(g_c), s	15.2	19.5	3.3	3.5	0.0	10.9	5.2	15.5	3.9	2.5	8.3	0.0
Prop In Lane	1.00		1.00	1.00		0.14	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	792	663	553	270	0	320	166	889	410	90	713	313
V/C Ratio(X)	0.83	0.77	0.17	0.35	0.00	0.78	0.70	0.79	0.23	0.61	0.54	0.00
Avail Cap(c_a), veh/h	909	783	652	270	0	372	193	1020	470	107	818	360
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	29.4	23.1	17.9	25.5	0.0	31.6	35.5	28.0	23.7	37.6	28.2	0.0
Incr Delay (d2), s/veh	6.0	3.9	0.1	0.8	0.0	8.9	8.8	3.8	0.3	7.0	0.6	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	7.6	10.7	1.4	1.8	0.0	6.1	2.9	7.8	1.7	1.4	3.8	0.0
LnGrp Delay(d),s/veh	35.4	26.9	18.0	26.3	0.0	40.6	44.3	31.8	24.0	44.6	28.8	0.0
LnGrp LOS	D	C	B	C		D	D	C	C	D	C	
Approach Vol, veh/h		1261			345			917			439	
Approach Delay, s/veh		30.7			36.6			32.6			30.8	
Approach LOS		C			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.2	26.9	10.0	34.8	12.7	23.4	24.2	20.6
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	4.0	24.0	4.0	34.0	8.0	20.0	21.0	17.0
Max Q Clear Time (g_c+I1), s	4.5	17.5	5.5	21.5	7.2	10.3	17.2	12.9
Green Ext Time (p_c), s	0.0	3.5	0.0	3.6	0.0	4.6	1.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	32.0
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	1795	12	43	1382	4	0	0	129	0	0	18
Future Vol, veh/h	18	1795	12	43	1382	4	0	0	129	0	0	18
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	-	-	Yield	-	-	Yield	-	-	Yield	-	-	None
Storage Length	250	-	125	250	-	150	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	8	23	25	10	22	24	0	21	12	0	0
Mvmt Flow	19	1910	13	46	1470	4	0	0	137	0	0	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1470	0	0	1910	0	0	-	-	955	-	-	735
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	4.16	-	-	4.6	-	-	-	-	7.32	-	-	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.23	-	-	2.45	-	-	-	-	3.51	-	-	3.3
Pot Cap-1 Maneuver	450	-	-	229	-	-	0	0	226	0	0	367
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	450	-	-	229	-	-	-	-	226	-	-	367
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.7	42.8	15.3
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	226	450	-	-	229	-	-	367
HCM Lane V/C Ratio	0.607	0.043	-	-	0.2	-	-	0.052
HCM Control Delay (s)	42.8	13.4	-	-	24.6	-	-	15.3
HCM Lane LOS	E	B	-	-	C	-	-	C
HCM 95th %tile Q(veh)	3.5	0.1	-	-	0.7	-	-	0.2

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	1817	0	8	0	1392	0	0
Future Vol, veh/h	1817	0	8	0	1392	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	-	-	-	400	-	0	-
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94	94
Heavy Vehicles, %	8	2	12	2	10	2	2
Mvmt Flow	1933	0	9	0	1481	0	0

Major/Minor	Major1		Major2			Minor1	
Conflicting Flow All	0	-	1933	-	-	2692	967
Stage 1	-	-	-	-	-	1933	-
Stage 2	-	-	-	-	-	759	-
Critical Hdwy	-	-	6.64	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.62	-	-	3.52	3.32
Pot Cap-1 Maneuver	-	0	72	0	-	17	254
Stage 1	-	0	-	0	-	99	-
Stage 2	-	0	-	0	-	423	-
Platoon blocked, %	-				-		
Mov Cap-1 Maneuver	-	-	72	-	-	15	254
Mov Cap-2 Maneuver	-	-	-	-	-	15	-
Stage 1	-	-	-	-	-	99	-
Stage 2	-	-	-	-	-	370	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	WBU	WBT
Capacity (veh/h)	-	-	72	-
HCM Lane V/C Ratio	-	-	0.118	-
HCM Control Delay (s)	0	-	61.6	-
HCM Lane LOS	A	-	F	-
HCM 95th %tile Q(veh)	-	-	0.4	-

Intersection							
Int Delay, s/veh	0.3						

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Vol, veh/h	23	0	1901	1406	0	0	0
Future Vol, veh/h	23	0	1901	1406	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	-	400	-	-	-	0	-
Veh in Median Storage, #	-	-	0	0	-	0	-
Grade, %	-	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94
Heavy Vehicles, %	24	2	8	10	2	2	2
Mvmt Flow	24	0	2022	1496	0	0	0

Major/Minor	Major1			Major2		Minor2	
Conflicting Flow All	1496	-	0	-	0	2555	748
Stage 1	-	-	-	-	-	1496	-
Stage 2	-	-	-	-	-	1059	-
Critical Hdwy	6.88	-	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	5.84	-
Follow-up Hdwy	2.74	-	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	126	0	-	-	0	22	355
Stage 1	-	0	-	-	0	172	-
Stage 2	-	0	-	-	0	295	-
Platoon blocked, %			-	-			
Mov Cap-1 Maneuver	126	-	-	-	-	18	355
Mov Cap-2 Maneuver	-	-	-	-	-	18	-
Stage 1	-	-	-	-	-	139	-
Stage 2	-	-	-	-	-	295	-

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

Minor Lane/Major Mvmt	EBU	EBT	WBT	SBLn1
Capacity (veh/h)	126	-	-	-
HCM Lane V/C Ratio	0.194	-	-	-
HCM Control Delay (s)	40.3	-	-	0
HCM Lane LOS	E	-	-	A
HCM 95th %tile Q(veh)	0.7	-	-	-

HCM 2010 Signalized Intersection Summary
8: MLK Jr. Pkwy (US 41) & Zebulon Pkwy

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	318	340	152	145	467	38	221	414	98	65	612	618
Future Volume (veh/h)	318	340	152	145	467	38	221	414	98	65	612	618
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1810	1845	1863	1881	1860	1900	1863	1792	1863	1863	1845	1863
Adj Flow Rate, veh/h	338	362	100	154	497	25	235	440	65	69	651	0
Adj No. of Lanes	2	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	5	3	2	1	2	2	2	6	2	2	3	2
Cap, veh/h	377	603	518	355	515	26	240	971	451	108	738	334
Arrive On Green	0.11	0.33	0.33	0.07	0.29	0.29	0.14	0.29	0.29	0.06	0.21	0.00
Sat Flow, veh/h	3343	1845	1583	1792	1756	88	1774	3406	1583	1774	3505	1583
Grp Volume(v), veh/h	338	362	100	154	0	522	235	440	65	69	651	0
Grp Sat Flow(s),veh/h/ln	1672	1845	1583	1792	0	1845	1774	1703	1583	1774	1752	1583
Q Serve(g_s), s	8.8	14.6	4.0	5.3	0.0	24.7	11.7	9.4	2.7	3.4	16.0	0.0
Cycle Q Clear(g_c), s	8.8	14.6	4.0	5.3	0.0	24.7	11.7	9.4	2.7	3.4	16.0	0.0
Prop In Lane	1.00		1.00	1.00		0.05	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	377	603	518	355	0	541	240	971	451	108	738	334
V/C Ratio(X)	0.90	0.60	0.19	0.43	0.00	0.97	0.98	0.45	0.14	0.64	0.88	0.00
Avail Cap(c_a), veh/h	377	603	518	355	0	541	240	971	451	180	790	357
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	38.8	25.0	21.4	20.7	0.0	30.9	38.2	26.0	23.6	40.7	33.9	0.0
Incr Delay (d2), s/veh	23.2	1.7	0.2	0.8	0.0	30.0	52.0	0.3	0.1	6.1	10.9	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	5.3	7.7	1.8	2.6	0.0	17.1	9.1	4.4	1.2	1.8	8.8	0.0
LnGrp Delay(d),s/veh	62.0	26.6	21.6	21.6	0.0	60.9	90.2	26.4	23.8	46.8	44.8	0.0
LnGrp LOS	E	C	C	C		E	F	C	C	D	D	
Approach Vol, veh/h		800			676			740			720	
Approach Delay, s/veh		40.9			51.9			46.4			45.0	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.4	31.3	12.0	35.0	17.0	24.7	15.0	32.0
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	8.0	23.0	6.0	29.0	11.0	20.0	9.0	26.0
Max Q Clear Time (g_c+I1), s	5.4	11.4	7.3	16.6	13.7	18.0	10.8	26.7
Green Ext Time (p_c), s	0.0	5.0	0.0	4.2	0.0	0.7	0.0	0.0

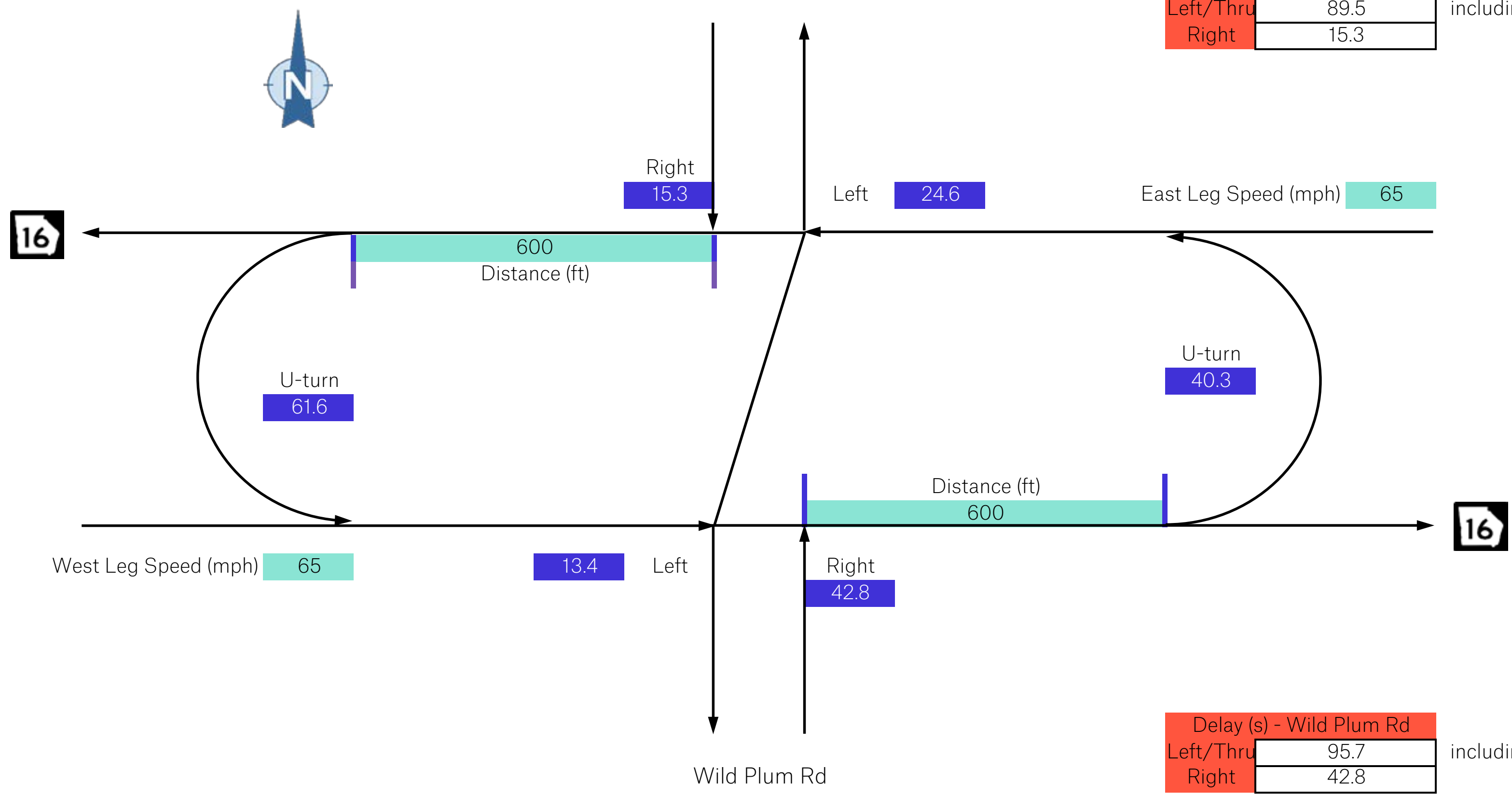
Intersection Summary	
HCM 2010 Ctrl Delay	45.8
HCM 2010 LOS	D

Peak Hour Delays

Based on SYNCHRO Model

2029 PM Peak Hour

Delay (s) - Wild Plum Rd		
Left/Thru	89.5	including ETT
Right	15.3	



Delay (s) - Wild Plum Rd		
Left/Thru	95.7	including ETT
Right	42.8	

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume	18	1787	12	43	1353	4	23	0	106	8	0	10
Delay (s)	13.4	0	0	24.6	0	0	95.7	95.7	42.8	89.5	89.5	15.3

	EB	WB	NB	SB
Volume	1817	1400	129	18
Delay (s)	0.1	0.8	52.2	48.3

Overall Delay (s)
2.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	614	559	309	0	0	217
Future Volume (vph)	614	559	309	0	0	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0	6.0			6.0
Lane Util. Factor	0.97	0.95	1.00			1.00
Frt	1.00	1.00	1.00			0.86
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3335	3505	1863			1611
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3335	3505	1863			1611
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	660	601	332	0	0	233
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	660	601	332	0	0	233
Heavy Vehicles (%)	5%	3%	2%	2%	2%	2%
Turn Type	Prot	NA	NA			custom
Protected Phases	7	5 6 7 8	5 6 8!			5 6 7 8!
Permitted Phases						
Actuated Green, G (s)	24.0	90.0	54.0			90.0
Effective Green, g (s)	25.0	90.0	54.0			90.0
Actuated g/C Ratio	0.28	1.00	0.60			1.00
Clearance Time (s)	6.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	926	3505	1117			1611
v/s Ratio Prot	c0.20	0.17	c0.18			0.14
v/s Ratio Perm						
v/c Ratio	0.71	0.17	0.30			0.14
Uniform Delay, d1	29.3	0.0	8.8			0.0
Progression Factor	1.00	1.00	1.15			1.00
Incremental Delay, d2	2.6	0.0	0.1			0.0
Delay (s)	31.9	0.0	10.2			0.0
Level of Service	C	A	B			A
Approach Delay (s)		16.7	10.2		0.0	
Approach LOS		B	B		A	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	614	0	0	688	677	217
Future Volume (vph)	614	0	0	688	677	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			6.0	6.0	4.0
Lane Util. Factor	0.97			0.95	0.91	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	0.95			1.00	1.00	1.00
Satd. Flow (prot)	3335			3406	5036	1583
Flt Permitted	0.95			1.00	1.00	1.00
Satd. Flow (perm)	3335			3406	5036	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	660	0	0	740	728	233
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	660	0	0	740	728	233
Heavy Vehicles (%)	5%	2%	2%	6%	3%	2%
Turn Type	Prot			NA	NA	Free
Protected Phases	7 8			5 6	5 6	
Permitted Phases						Free
Actuated Green, G (s)	40.2			37.8	37.8	90.0
Effective Green, g (s)	41.2			37.8	37.8	90.0
Actuated g/C Ratio	0.46			0.42	0.42	1.00
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)	1526			1430	2115	1583
v/s Ratio Prot	c0.20			c0.22	0.14	
v/s Ratio Perm						0.15
v/c Ratio	0.43			0.52	0.34	0.15
Uniform Delay, d1	16.5			19.3	17.7	0.0
Progression Factor	0.00			0.18	1.00	1.00
Incremental Delay, d2	0.1			0.3	0.1	0.2
Delay (s)	0.2			3.6	17.8	0.2
Level of Service	A			A	B	A
Approach Delay (s)	0.2			3.6	13.5	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	6.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	472	140	88	201	51	108	656	144	51	626	0
Future Volume (vph)	0	472	140	88	201	51	108	656	144	51	626	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		5.0	6.0	6.0	4.0	6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt		1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1863	1553	1770	1751		1736	3438	1583	1736	3312	
Flt Permitted		1.00	1.00	0.18	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1863	1553	331	1751		1736	3438	1583	1736	3312	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	508	151	95	216	55	116	705	155	55	673	0
RTOR Reduction (vph)	0	0	99	0	10	0	0	0	107	0	0	0
Lane Group Flow (vph)	0	508	52	95	261	0	116	705	48	55	673	0
Heavy Vehicles (%)	5%	2%	4%	2%	4%	10%	4%	5%	2%	4%	9%	11%
Turn Type		NA	Perm	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4		3	7 8		5	2		1	6	
Permitted Phases			4	7 8					2			
Actuated Green, G (s)		31.0	31.0	40.2	40.2		8.0	27.8	27.8	4.0	23.8	
Effective Green, g (s)		31.0	31.0	40.2	40.2		9.0	27.8	27.8	6.0	23.8	
Actuated g/C Ratio		0.34	0.34	0.45	0.45		0.10	0.31	0.31	0.07	0.26	
Clearance Time (s)		6.0	6.0	6.0			6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0	3.0	3.0			3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		641	534	199	782		173	1061	488	115	875	
v/s Ratio Prot		c0.27		0.02	c0.15		c0.07	c0.21		0.03	c0.20	
v/s Ratio Perm			0.03	0.20					0.03			
v/c Ratio		0.79	0.10	0.48	0.33		0.67	0.66	0.10	0.48	0.77	
Uniform Delay, d1		26.6	20.0	17.9	16.2		39.1	27.0	22.2	40.5	30.6	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.33	0.43	
Incremental Delay, d2		6.6	0.1	1.8	0.3		9.8	3.3	0.4	3.0	6.2	
Delay (s)		33.2	20.1	19.7	16.4		48.8	30.3	22.6	56.7	19.3	
Level of Service		C	C	B	B		D	C	C	E	B	
Approach Delay (s)		30.2			17.3			31.3			22.2	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	318	434	688	0	0	618
Future Volume (vph)	318	434	688	0	0	618
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0	6.0			6.0
Lane Util. Factor	0.97	0.95	1.00			1.00
Frt	1.00	1.00	1.00			0.86
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3335	3505	1863			1611
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3335	3505	1863			1611
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	338	462	732	0	0	657
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	338	462	732	0	0	657
Heavy Vehicles (%)	5%	3%	2%	2%	2%	2%
Turn Type	Prot	NA	NA			custom
Protected Phases	7	5 6 7 8	5 6 8!			5 6 7 8!
Permitted Phases						
Actuated Green, G (s)	20.0	90.0	58.0			90.0
Effective Green, g (s)	21.0	90.0	58.0			90.0
Actuated g/C Ratio	0.23	1.00	0.64			1.00
Clearance Time (s)	6.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	778	3505	1200			1611
v/s Ratio Prot	0.10	0.13	c0.39			c0.41
v/s Ratio Perm						
v/c Ratio	0.43	0.13	0.61			0.41
Uniform Delay, d1	29.4	0.0	9.4			0.0
Progression Factor	1.00	1.00	1.23			1.00
Incremental Delay, d2	0.4	0.0	0.6			0.2
Delay (s)	29.8	0.0	12.1			0.2
Level of Service	C	A	B			A
Approach Delay (s)		12.6	12.1		0.2	
Approach LOS		B	B		A	

Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	318	0	0	438	677	618
Future Volume (vph)	318	0	0	438	677	618
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			6.0	6.0	4.0
Lane Util. Factor	0.97			0.95	0.91	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	0.95			1.00	1.00	1.00
Satd. Flow (prot)	3335			3406	5036	1583
Flt Permitted	0.95			1.00	1.00	1.00
Satd. Flow (perm)	3335			3406	5036	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	338	0	0	466	720	657
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	338	0	0	466	720	657
Heavy Vehicles (%)	5%	2%	2%	6%	3%	2%
Turn Type	Prot			NA	NA	Free
Protected Phases	7 8			5 6	5 6	
Permitted Phases						Free
Actuated Green, G (s)	34.0			44.0	44.0	90.0
Effective Green, g (s)	35.0			44.0	44.0	90.0
Actuated g/C Ratio	0.39			0.49	0.49	1.00
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)	1296			1665	2462	1583
v/s Ratio Prot	0.10			0.14	0.14	
v/s Ratio Perm						c0.41
v/c Ratio	0.26			0.28	0.29	0.42
Uniform Delay, d1	18.7			13.6	13.7	0.0
Progression Factor	0.01			0.21	1.00	1.00
Incremental Delay, d2	0.1			0.1	0.1	0.8
Delay (s)	0.4			3.0	13.8	0.8
Level of Service	A			A	B	A
Approach Delay (s)	0.4			3.0	7.6	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	5.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	31.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: MLK Jr. Pkwy (US 41) & Zebulon Pkwy

04/08/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	340	152	145	467	38	221	414	98	65	612	0
Future Volume (vph)	0	340	152	145	467	38	221	414	98	65	612	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		5.0	6.0	6.0	5.0	6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt		1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1845	1583	1787	1838		1770	3406	1583	1770	3505	
Flt Permitted		1.00	1.00	0.55	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1845	1583	1026	1838		1770	3406	1583	1770	3505	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	362	162	154	497	40	235	440	104	69	651	0
RTOR Reduction (vph)	0	0	121	0	3	0	0	0	69	0	0	0
Lane Group Flow (vph)	0	362	41	154	534	0	235	440	35	69	651	0
Heavy Vehicles (%)	5%	3%	2%	1%	2%	5%	2%	6%	2%	2%	3%	2%
Turn Type		NA	Perm	custom	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4		3	7 8		5	2		1	6	
Permitted Phases			4	8					2			
Actuated Green, G (s)		23.0	23.0	13.0	34.0		15.0	30.6	30.6	7.4	23.0	
Effective Green, g (s)		23.0	23.0	13.0	34.0		16.0	30.6	30.6	8.4	23.0	
Actuated g/C Ratio		0.26	0.26	0.14	0.38		0.18	0.34	0.34	0.09	0.26	
Clearance Time (s)		6.0	6.0	6.0			6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0	3.0	3.0			3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		471	404	190	694		314	1158	538	165	895	
v/s Ratio Prot		0.20		0.04	c0.29		c0.13	0.13		0.04	c0.19	
v/s Ratio Perm			0.03	0.07					0.02			
v/c Ratio		0.77	0.10	0.81	0.77		0.75	0.38	0.07	0.42	0.73	
Uniform Delay, d1		31.0	25.6	36.3	24.6		35.1	22.5	20.1	38.5	30.6	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	0.90	0.55	
Incremental Delay, d2		7.4	0.1	22.3	5.1		9.4	0.9	0.2	1.7	5.0	
Delay (s)		38.4	25.7	58.7	29.7		44.5	23.5	20.3	36.3	22.0	
Level of Service		D	C	E	C		D	C	C	D	C	
Approach Delay (s)		34.5			36.2			29.4			23.4	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Appendix E

Intersection Growth Rate Analyses

ARC ABM Forecasted Growth Rates

Location	ARC Travel Demand Model Output (Mainline/ Sidestreet)		
	2015	2040	Growth Rate
Jackson Rd. @ Wallace Rd.	3,548/ -	4,938/ -	1.3%/ -
Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd.	15,636/ -	24,327/ -	1.8%/ -
MLK Jr. Pkwy. (US 19/41) @ Airport Rd./Kalamazoo Dr.	7,268/ 41,988	10,552/ 60,416	1.5%/ 1.5%
Arthur K. Bolton Pkwy. (SR 16) @ Green Valley Rd.	21,155/ 2,186	31,157/ 2,774	1.6%/ 1.0%
Arthur K. Bolton Pkwy. (SR 16) @ Rehoboth Rd.	18,737/ 1,925	28,981/ 2,652	1.8%/ 1.3%
Arthur K. Bolton Pkwy. (SR 16) @ S. McDonough Rd.	14,801/ 12,071	22,160/ 16,893	1.6%/ 1.4%
E. McIntosh Rd. @ 9th St.	7,483/ 4,985	12,270/ 5,337	2.0%/ .3%
MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.)	23,383/ 41,415	32,536/ 57,397	1.3%/ 1.3%
Johnston Rd. @ Macon Rd.	4,092/ 9,583	5,495/ 13,464	1.4%/ 1.2%
Johnston Rd. @ Green Valley Rd.	4,092/ -	5,495/ -	1.3%/ -
Johnston Rd. @ S. McDonough Rd.	4,092/ 4,090	5,495/ 5,813	1.4%/ 1.2%

Appendix F

Other Development Information

TRAFFIC IMPACT STUDY FOR

LIBERTY-BUTTS COUNTY INDUSTRIAL DRI 2678

Midway Road at Windy Lane, south of SR 16, in Butts County, GA

June 11, 2017

Prepared by:
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Executive Summary

A new warehouse/distribution center consisting of 1,082,400 square feet in two buildings is planned for the southeast quadrant of the intersection of Windy Lane and Midway Road in northwestern Butts County, Georgia to be completed in 2018. There will be five (5) full movement intersection vehicular access points to the development on Midway Road. Two (2) will be primarily for trucks and the other three (3) for personal vehicles. Windy Lane provides direct access to Arthur K Bolton Parkway (SR 16), and via SR 16 to I-75 east of the site.

When completed, the development is expected to generate approximately 87 entering and 39 exiting new vehicular trips during the morning peak volume hour. Approximately 42 entering and 95 exiting new evening peak hour vehicular trips are expected. A total of 1,818 new entering and exiting vehicular trips are expected daily, approximately 38% of these to be trucks.

Approximately 60% of the new personal vehicle trips are expected to originate and terminate east and 30% west of the site using SR 16, and 10% to the north using Jackson Road (aligns with Windy Lane at SR 16). Approximately 90% of the new truck trips are expected to originate and terminate east and 10% west of the site using SR 16. The directional distribution is consistent with the previously approved DRI 2549 on Jackson Road Traffic Impact Study.

The existing study intersections operate adequately and are expected to continue to operate adequately during weekday peak morning and evening hours with the new project trips in 2018 with the existing or planned intersection lane configurations and traffic control except for southbound left-turning Jackson Rd vehicles. All of the site driveways intersections on Midway Road are expected to operate adequately. The expected background peak hour intersection turning movement volumes include the traffic expected from the Jackson Road DRI 2549 and the Jones Petroleum Travel Center redevelopment DRI 2674 and an additional three (3) percent annual growth of the existing traffic counts collected on Thursday, May 25, 2017, when public schools were in session. A modern design single lane roundabout or installation of a traffic signal at the SR 16 and Jackson Road/Windy Lane intersection would be expected to provide adequate peak hour operations. However, a signal warrant study is required to show that minimum hourly volume requirements are met to consider installation of a traffic signal. Based on a preliminary analyses using the DRI 2549 trip generation, hour of the day trip distribution, and directional trip distribution with the 3% annual growth rate and the new project trips, it is unlikely the minimum eight (8) hour (Warrant 1) or four (4) hour (Warrant 2) hourly volumes will be met when the project opens by 2018. The hourly volume projections indicate the Warrant 2 volumes are likely to be met between 2020 and 2022 and the Warrant 1 volumes will be met by 2024. Typical weekday turning movement counts should be collected and analyzed when the DRI 2549 is operational to determine if consideration of allowing a traffic signal to be installed is warranted. A single lane roundabout designed to be easily expanded to two circulating lanes could provide adequate operations now and for 20 years.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CALYX #2017075

1. Introduction

A new warehouse/distribution center consisting of 1,082,400 square feet in two buildings is planned for the southeast quadrant of the intersection of Windy Lane and Midway Road in northwestern Butts County, Georgia. Windy Lane provides direct access to Arthur K Bolton Parkway (SR 16), and via SR 16 to I-75 east of the site.

There will be five (5) full movement intersection vehicular access points to the development on Midway Road. Two (2) will be primarily for trucks and the other three (3) for personal vehicles.

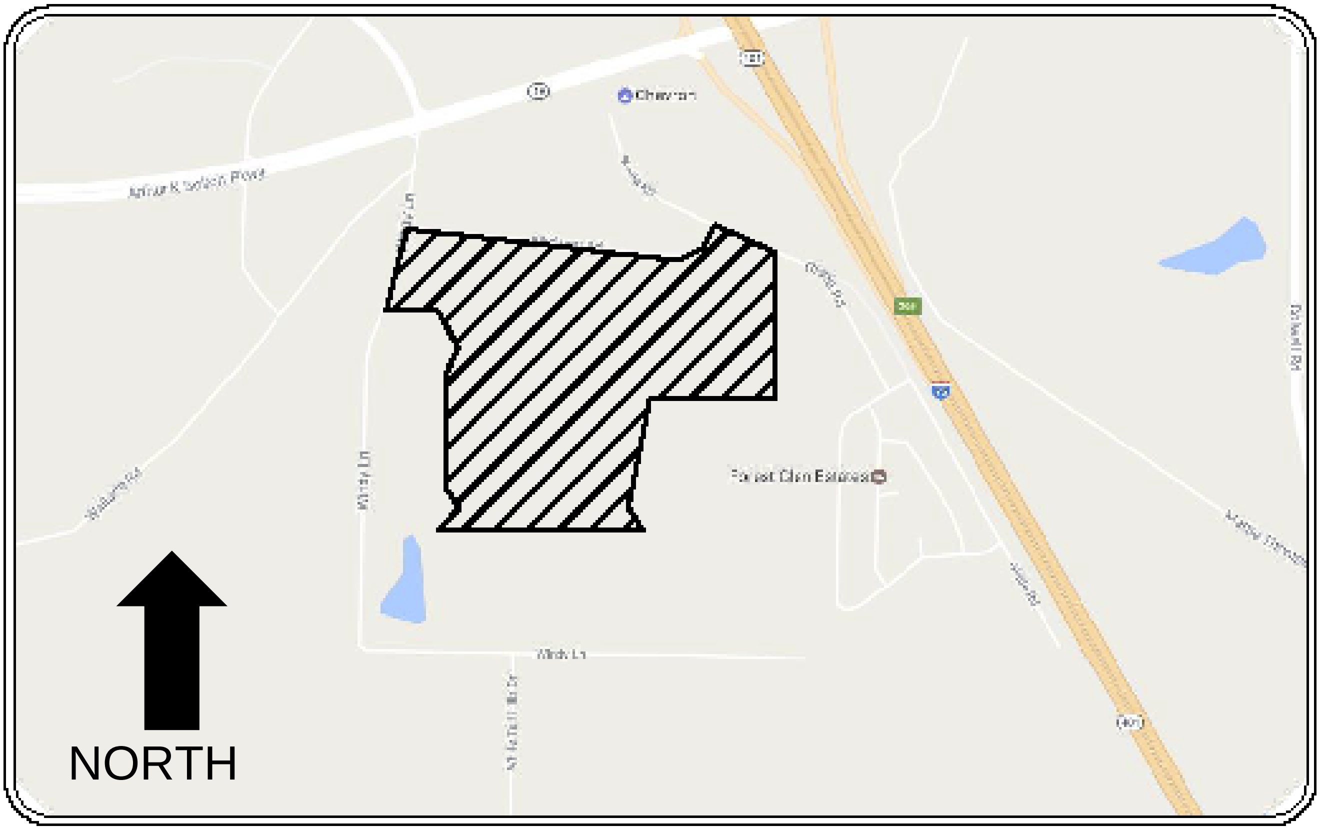
The development is expected to be completed in 2018. The traffic impact analyses are for a single phase of construction.

The traffic study includes existing traffic volumes, trip generation, directional distribution, and traffic impacts at the following intersections:

- Windy lane/Jackson Road at SR 16 (Arthur K Bolton Parkway)
- Windy Lane at Midway Road

Figure 1 shows the site location. The site plan is included with this report.

Figure 1: Vicinity Map



LOCATION MAP

N.T.S.

2. Existing Conditions

2.1. Transportation Facilities

Arthur K Bolton Parkway (SR 16) is an east-west principal arterial with two through lanes in each direction with a 55 MPH speed limit at the study intersection (the speed limit is posted as 65 MPH west of the intersection and 45 MPH to the east. The land uses along SR 16 in this area are primarily commercial, agricultural, and industrial. SR 16 provides access between Griffin and Jackson, and beyond. The intersections at the I-75 ramps are signalized, and most nearby intersections have turning lanes.

Windy Lane is a local dead-end north-south street with a single through lane in each direction and an assumed 35 MPH speed limit providing access to residential uses in the area. Windy Lane aligns with a median crossover on SR 16 at Jackson Road. The intersections are side-street stop sign controlled.

Midway Road is an east-west local street with a single through lane in each direction and a posted 35 MPH speed limit running between Windy Lane and Glade Road (Steele Road), providing access to residential uses in the area.

2.2. Traffic Volumes

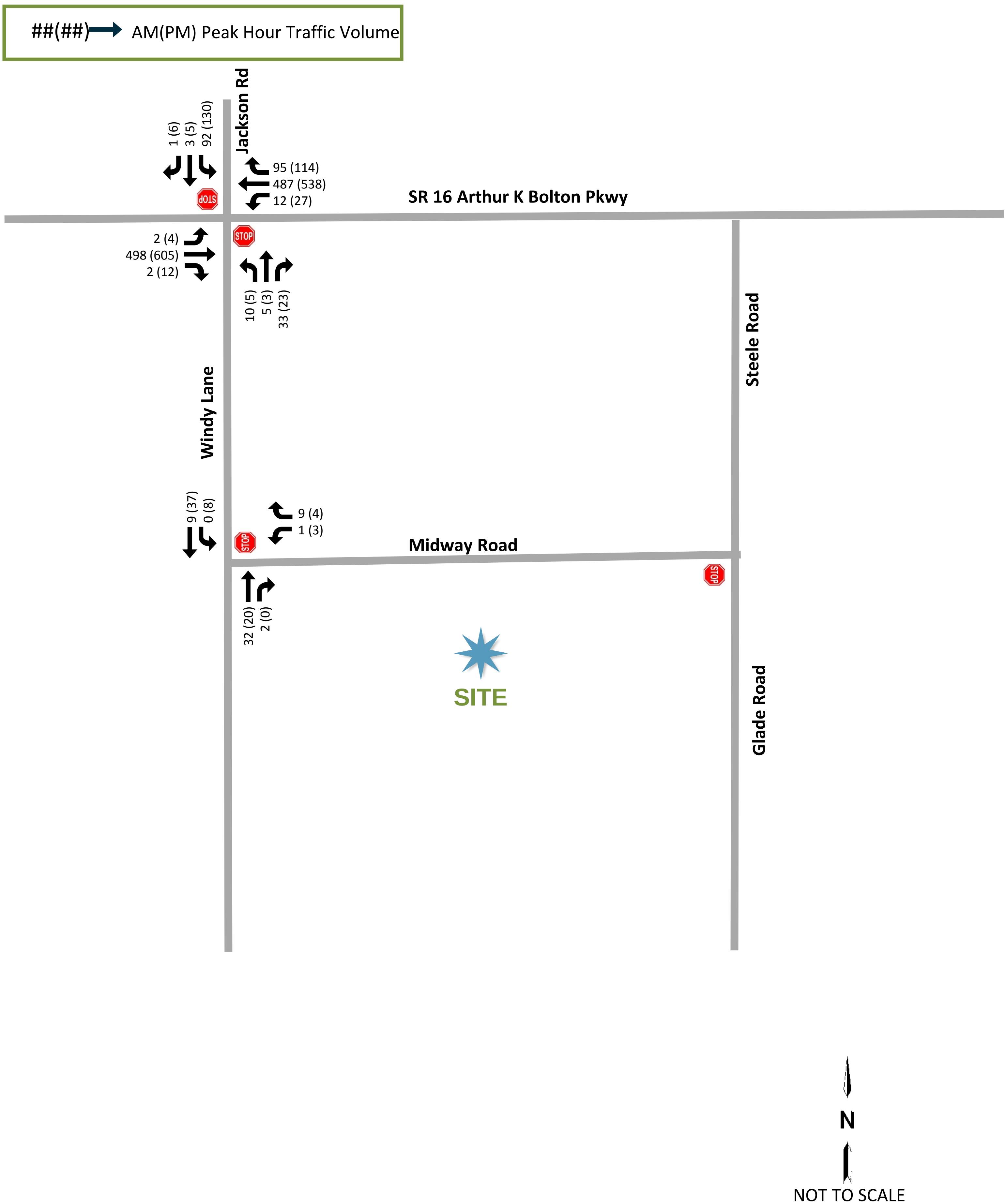
Traffic counts collected on Thursday, May 25, 2017, from 7 AM to 7 PM while schools were in session and on Tuesday, May 23, 2017 from 7-9 AM and 4-6 PM at the following intersections:

- Windy lane/Jackson Road at SR 16 (Arthur K Bolton Parkway)
- Windy Lane at Midway Road

Bi-directional vehicular traffic counts were also collected Thursday, May 25, 2017, on SR 16 and on Tuesday, May 23, 2017 on Windy Lane and on Midway Road. There were 16,706 vehicles counted on SR 16, including 2,252 single-unit and 1,602 combination trucks. On Windy Lane, 744 and on Midway Road 245 vehicles in both directions were counted.

The existing peak hour turning movement counts at the study intersections are shown in Figure 3. The count worksheets are included in the Appendix.

Figure 3: Existing Traffic Volumes



2.3. *Existing Capacity Analysis*

The results of the intersection capacity analysis are shown in Table 1 for existing volumes. Average vehicular delays are calculated and reported as Levels of Service (LOS) as defined by the Highway Capacity Manual (HCM).

Table 1: Existing Intersection Capacity Analyses

Intersection	Control	Approach	Peak Hour LOS	
			AM	PM
Windy Lane/Jackson Road at SR 16	Side-Street Stop-Signs	Eastbound	A	A
		Westbound	A	A
		Northbound Left	C	C
		Southbound Left	E	F
Windy Lane at Midway Road	Side-St Stop-Sign	Northbound	A	A
		Southbound	A	A
		Westbound	A	A

As can be seen in Table 1, all of the approaches to the existing study intersections operate adequately during weekday peak volume hours with the existing lane configuration and traffic controls except the southbound Jackson Road left-turning movement onto eastbound SR 16.

Installation of a modern design single-lane roundabout or a traffic signal would provide adequate operations; however, a signal warrant study is required to determine if consideration of permitting a traffic signal to be installed is appropriate at this time.

A preliminary analyses of the hourly existing counted turning movement volumes on May 25, 2017 indicates that Warrant 1B volumes are met for four of the eight required hours, Warrant 2 volumes are met for one of the four required hours, and Warrant 3A volumes (only) are met for four hours (based on the side-street shared turning and through movement existing lane configurations). No reduction for speeds over 40 MPH or inclusion of right-turn volumes was used in the analyses. Signal Warrant worksheets with turning movement volumes are included in the Appendix.

A roundabout would require reverse-curve deflection on the approaches to mitigate high vehicular speeds and a single circulating lane and approaches would provide adequate peak hour operations (until 2027 with the three DRI's traffic plus a 3% annual background growth).

Intersection capacity analyses worksheets are included in the Appendix.

3. Trip Generation

Table 2 summarizes the project trip generation using the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 9th Edition, 2012 rates and equations and *Trip Generation Handbook*, 3rd Edition, 2014, internal capture formulas, constrained between types of use.

Table 2: Project Trip Generation

Project Land Use (LUC)		Project Density		Total	IN	OUT
High-Cube Warehouse Distribution Center (152)		1,082.4	ksf			
	Daily			**1,818**	909	909
	AM Peak Hour			**126**	87	39
	PM Peak Hour			**137**	42	95

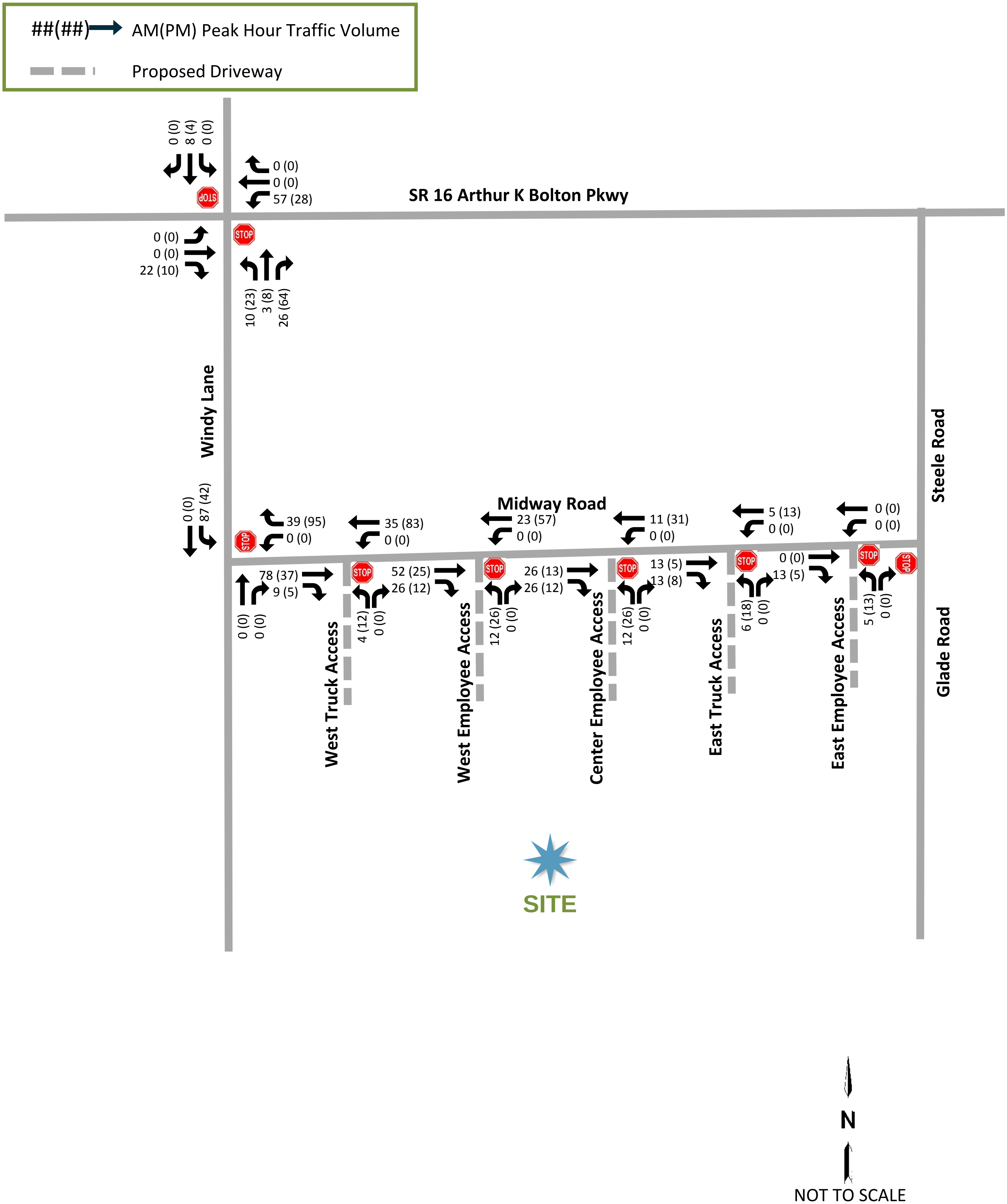
When completed, the development is expected to generate approximately 87 entering and 39 exiting new vehicular trips during the morning peak volume hour, 25% of these are expected to be trucks. Approximately 42 entering and 95 exiting new evening peak hour vehicular trips are expected, 31% trucks. A total of 1,818 new entering and exiting vehicular trips are expected daily, including approximately 38% trucks. Figure 4 shows the new peak hour intersection turning movement volumes. The Appendix includes the trip generation worksheet.

3.1. Trip Distribution and Assignment

The directional distribution of new project trips was based on the personal vehicle and truck directional distributions provided in the Wilburn Engineering, LLC. March 7, 2016 DRI 2549 Traffic Impact Study.

Approximately 60% of the new personal vehicle trips are expected to originate and terminate east and 30% west of the site using SR 16, and 10% to the north using Jackson Road (aligns with Windy Lane at SR 16). Approximately 90% of the new truck trips are expected to originate and terminate east and 10% west of the site using SR 16.

Figure 4: Project Traffic Volumes



4. Background Conditions Capacity Analysis

The existing peak hour intersection turning movement counts were increased by 3% per year for one year to approximate the background traffic growth from outside the study area and by the new trips expected to be generated by the Jackson Road DRI 2549 and the Jones Petroleum DRI 2674. The peak hour turning movement project trips from the Wilburn Engineering, LLC. March 7, 2016 DRI 2549 Traffic Impact Study and an estimation of the new peak hour trips expected to be generated by the DRI 2674 redevelopment of existing gas stations, convenience stores, and fast food restaurants based on the DCA DRI Form 2 4,472 daily trips reported, a 12% peak hour factor, 50% directional distribution, and 50% pass-by trip reduction distribution based on this type of land use, but without deducting the existing use trips to provide a more conservative analysis. The background growth rate was based on historical GDOT counts on area roadways. The results of the intersection capacity analysis are shown in Table 3 for background growth volumes shown in Figure 5.

Table 3: Background Conditions LOS

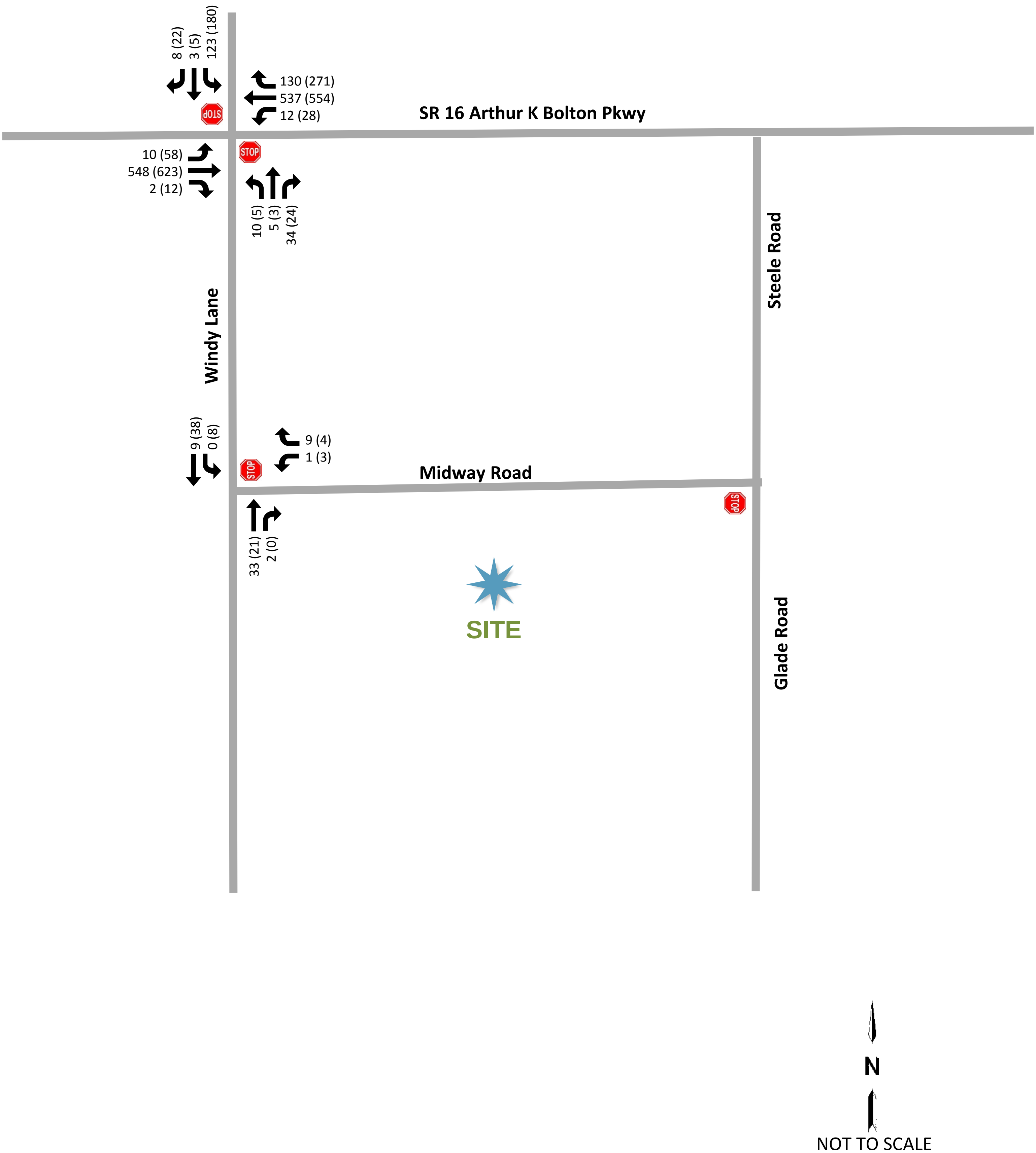
Intersection	Control	Approach	Peak Hour LOS	
			AM	PM
Windy Lane/Jackson Road at SR 16	Side-Street Stop-Signs	Eastbound	A	A
		Westbound	A	A
		Northbound Left	C	C
		Southbound Left	F	F
Windy Lane at Midway Road	Side-St Stop-Sign	Northbound	A	A
		Southbound	A	A
		Westbound	A	A

As can be seen in Table 3, all of the approaches to the existing study intersections are expected to continue to operate adequately in 2018 during weekday peak volume hours with the existing lane configuration and traffic controls except the southbound Jackson Road left-turning movement onto eastbound SR 16. Installation of a modern design single-lane roundabout or a traffic signal would provide adequate operations; however, a signal warrant study based on new counts to determine if consideration of permitting a traffic signal to be installed is appropriate at that time is required. A preliminary analyses of the background 2018 hourly volumes indicates that Warrant 1B volumes are met for four of the eight required hours, Warrant 2 volumes are met for one of the four required hours, and Warrant 3A volumes (only) are met for two hours (based on the planned side-street dedicated right-turning lanes configurations). No reduction for speeds over 40 MPH or inclusion of right-turn volumes was used in the analyses. A roundabout would require reverse-curve deflection on the approaches to mitigate high vehicular speeds and a single circulating lane and approaches would provide adequate peak hour operations (until 2027 with the three DRI's traffic plus a 3% annual background growth and with two circulating lanes and dual SR 16 approaches lanes until 2038).

Intersection capacity and signal warrant analyses worksheets are included in the Appendix.

Figure 5: Background Traffic Volumes

##(##) → AM(PM) Peak Hour Traffic Volume



5. Future Conditions Capacity Analysis

The results of the intersection capacity analysis are shown in Table 4 for existing with project volumes shown in Figure 6.

Table 4: Future with Project Trips LOS

Intersection	Control	Approach	Peak Hour LOS	
			AM	PM
Windy Lane/Jackson Road at SR 16	Side-Street Stop-Signs	Eastbound	A	A
		Westbound	A	A
		Northbound Left	C	C
		Southbound Left	F	F
	Signal	Overall	B	B
	Roundabout	Overall	B	C
Windy Lane at Midway Road	Side-St Stop-Sign	Northbound	A	A
		Southbound	A	A
		Westbound	A	A
at Midway Road	Side-St Stop-Sign	Eastbound	A	A
		Westbound	A	A
		Northbound	A	A
at Midway Road	Side-St Stop-Sign	Eastbound	A	A
		Westbound	A	A
		Northbound	A	A
at Midway Road	Side-St Stop-Sign	Eastbound	A	A
		Westbound	A	A
		Northbound	A	A
at Midway Road	Side-St Stop-Sign	Eastbound	A	A
		Westbound	A	A
		Northbound	A	A
at Midway Road	Side-St Stop-Sign	Eastbound	A	A
		Westbound	A	A
		Northbound	A	A

As can be seen in Table 4, all of the approaches to the study intersections, including the site driveways, are expected to continue to operate adequately in 2018 with the project trips during weekday peak volume hours with the existing and planned lane configurations and side-street stop-signs except the southbound Jackson Road left-turning movement onto eastbound SR 16.

Installation of a modern design single-lane roundabout or a traffic signal would provide adequate operations; however, a signal warrant study based on new counts to determine if consideration of permitting a traffic signal to be installed is appropriate at that time is required.

A preliminary analyses of the future Build 2018 hourly volumes indicates that Warrant 1A volumes are met for one hour with Warrant 1B volumes are met for four of the eight required hours, Warrant 2 volumes are met for two of the four required hours, and Warrant 3A volumes (only) are met for two hours (based on the planned side-street dedicated right-turning lanes configurations). No reduction for speeds over 40 MPH or inclusion of right-turn volumes was used in the analyses.

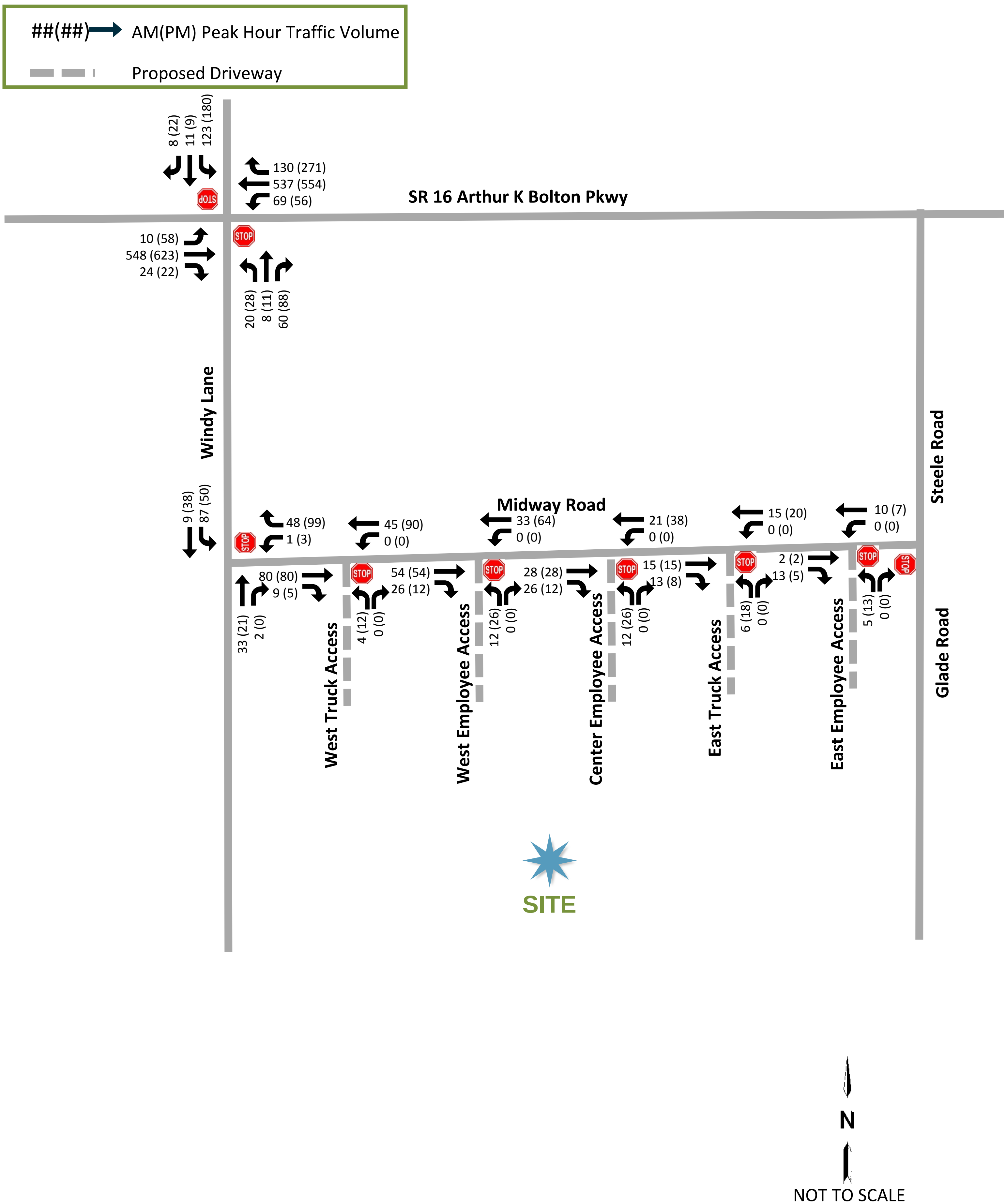
A roundabout would require reverse-curve deflection on the approaches to mitigate high vehicular speeds and a single circulating lane and approaches would provide adequate evening peak hour operations until 2027 with the three DRI's traffic plus a 3% annual background growth, and with two circulating lanes and dual SR 16 approaches lanes until at least 2038.

Installation of dedicated turning lanes on all approaches is recommended or required when installing a traffic signal. Installation of dedicated left-turning storage lanes at all site access exits on Midway Road are also recommended to avoid unnecessary delays to other exiting vehicles. As long as Glade Road does not allow through traffic on Steele Road to SR 16, the entrances on Midway Road will not have many, if any, left-turning vehicles; therefore, separate left-turning lanes into these site access points should not be necessary.

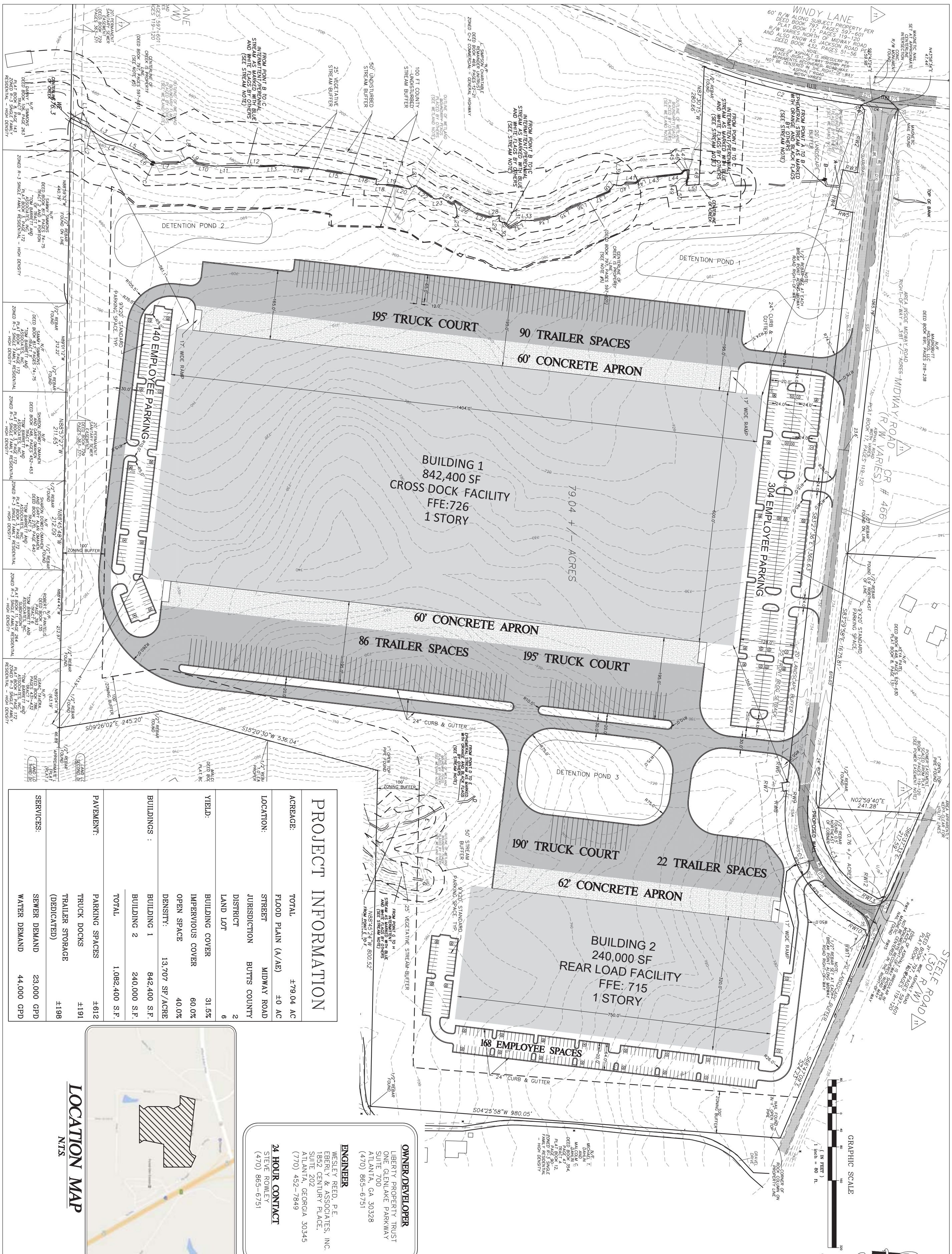
Weekday peak hour 95th percentile vehicular queuing analyses provide with the intersection capacity analyses showed most approaches with project trips will require less than one vehicle length storage capacity, although the evening peak hour northbound Windy Land at SR 16 planned combined left and through lane would have a queue of 2.1 vehicles when the project is completed. The 85-foot right-turn lane on this approach should be sufficient.

Intersection capacity and signal warrant analyses worksheets are included in the Appendix.

Figure 6: Build Traffic Volumes



Appendix



PROJECT INFORMATION

ACREAGE:	TOTAL	±79.04 AC
	FLOOD PLAIN (A/AE)	±0 AC
LOCATION:	STREET	MIDWAY ROAD
	JURISDICTION	BUTTS COUNTY
	DISTRICT	2
	LAND LOT	6
YIELD:	BUILDING COVER	31.5%
	IMPERVIOUS COVER	60.0%
	OPEN SPACE	40.0%
	DENSITY:	13,707 SF/ACRE
BUILDINGS :	BUILDING 1	842,400 S.F.
	BUILDING 2	240,000 S.F.
	TOTAL	1,082,400 S.F.
PAVEMENT:	PARKING SPACES	±612
	TRUCK DOCKS	±191
	TRAILER STORAGE (DEDICATED)	±198
SERVICES:	SEWER DEMAND	23,000 GPD
	WATER DEMAND	44,000 GPD

OWNER/DEVELOPER
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LOCATION MAP
N.T.S.

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CIVIL ENGINEERING
LANDSCAPE ARCHITECTURE

PROJECT:
LIBERTY
BUTTS COUNTY
LAND LOT 6
2ND DISTRICT
BUTTS COUNTY, GEORGIA

REVISIONS:

DRI SITE PLAN

SCALE:	1" = 80'
DATE:	04/26/17
DRAWN BY:	S. FREEMAN
PROJECT MANAGER:	W. REED
QA/QC CHECK:	

PROJECT NO. 16-122

SHEET NO. 1

TRAFFIC IMPACT STUDY FOR

LIBERTY COMMERCE CENTER 2
DRI 2765

Wallace Road, south of SR 16, in Butts & Spalding County, GA

January 22, 2018

Prepared by:
Randall Parker PTP PTOE PE

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770.452.7849

Executive Summary

A new warehouse/distribution center consisting of 1,195,000 square feet in two buildings is planned for the southwest quadrant of the intersection of Wallace Road and SR 16 in northwestern Butts County and southeastern Spalding County, Georgia to be completed by 2020. There will be two (2) vehicular access points for the development. A full-movement intersection on Wallace Road and a right in/out only access on SR 16 are planned. Wallace Road provides direct access to Arthur K Bolton Parkway (SR 16) at an existing median crossover, and via SR 16 to I-75 east of the site.

When completed, the development is expected to generate approximately 98 entering and 44 exiting new vehicular trips during the morning peak hour. Approximately 62 entering and 138 exiting new evening peak hour vehicular trips are expected. A total of 2,008 new entering and exiting vehicular trips are expected daily, approximately 38% of these to be trucks.

Approximately 70% of the new personal vehicle trips are expected to originate and terminate east and 20% west of the site using SR 16, and 10% to the north using Wallace Road to Jackson Road. Approximately 90% of the new truck trips are expected to originate and terminate east and 10% west of the site using SR 16. The directional distribution is consistent with warehouse use only located south of SR 16 between Windy Lane and Steele Road used in the Wilburn Engineering October 15, 2017 (revised 11/29/17) Traffic Impact Study (TIS).

The expected background peak hour intersection turning movement volumes include the traffic expected from the remaining 65% unoccupied Dollar General Distribution Center (DRI 2549) and the Jones Petroleum Travel Center redevelopment (DRI 2674) from the Wilburn TIS, and the traffic from the Liberty-Butts County Industrial (DRI 2678) CALYX June 11, 2017 TIS.

The existing study intersection operates adequately and is expected to continue to operate adequately during weekday peak morning and evening hours with the new project trips in 2020 with the existing lane configurations and traffic control. Both site driveways intersections on Wallace Road and SR 16 are expected to operate adequately.

However, the single morning and single evening peak hour vehicles southbound on Wallace Road turning left-turning to SR 16 movement is expected to operate at capacity during the peak hours (LOS E). There are no new project trips making this movement. Because of the low peak hour volumes and the existence of an alternative route via Jackson Road to SR 16 where a new traffic signal is planned to provide for these southbound left-turning vehicles, no mitigation is recommended at this time.

Weekday peak hour 95th percentile vehicular queuing analyses indicate less than one vehicle length storage capacity in both peak hours, except for a northbound Wallace Road three (3) vehicle queue during the evening peak hour. Although not required, providing a dedicated northbound left turn lane on Wallace Road at SR 16 with a full-width storage length of 150 feet would accommodate most peak hour personal vehicle and tractor-trailer queues.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CALYX #2017146

1. Introduction

A new warehouse/distribution center consisting of 1,195,000 square feet in two buildings is planned for the southwest quadrant of the intersection of Wallace Road and SR 16 in northwestern Butts County and southeastern Spalding County, Georgia.

There will be two (2) vehicular access points for the development. A full-movement intersection on Wallace Road and a right in/out only access on SR 16 are planned. Wallace Road provides direct access to Arthur K Bolton Parkway (SR 16) at an existing median crossover, and via SR 16 to I-75 east of the site.

The development is expected to be completed by 2020. The Traffic Impact Analyses assumes a single phase of construction.

The traffic study includes existing traffic volumes, trip generation, directional distribution, and traffic impacts at the intersection of Wallace Road at SR 16 (Arthur K Bolton Parkway) and the new site driveways.

Figure 1 shows the site location. The site plan is included with this report.

Figure 1: Vicinity Map

2. Existing Conditions

2.1. Transportation Facilities

Arthur K Bolton Parkway (SR 16) is an east-west principal arterial with two through lanes in each direction with a 65 MPH speed limit at the study intersection (the speed limit is posted as 55 MPH and 45 MPH to the east. The land uses along SR 16 in this area are primarily commercial, agricultural, and industrial. SR 16 provides access between Griffin and Jackson, and beyond. The intersections at the I-75 ramps are signalized, and most nearby intersections have turning lanes.

Wallace Road is a local north-south roadway with a single through lane in each direction and an assumed 35 MPH speed limit providing access to residential uses in the area. Wallace Road aligns with an existing median crossover on SR 16 and continues north to Jackson Road and beyond. Wallace Road also continues south of the site and then to the northwest to Windy Lane. The intersections are side-street stop sign controlled.

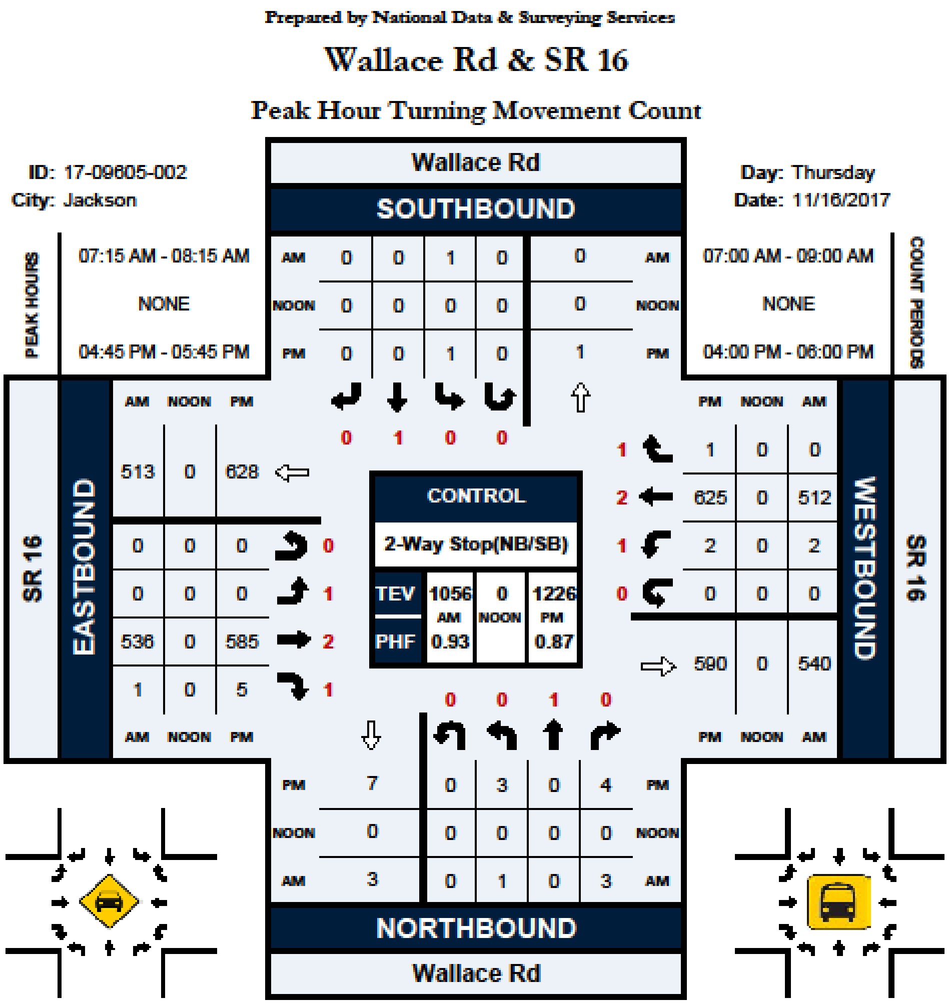
2.2. Traffic Volumes

Traffic counts collected on Thursday, November 16, 2017, from 7 to 9 AM and 4 to 6 PM while schools were in session at the intersection of Wallace Road and SR 115 (Arthur K Bolton Parkway)

Bi-directional vehicular traffic counts were also collected Thursday, November 16, 2017, on SR 16 There were 14,188 vehicles counted on SR 16, including 1,858 single-unit and 1,107 combination trucks.

The existing peak hour turning movement counts at the study intersections are shown in Figure 3. The count worksheets are included in the Appendix.

Figure 2: Existing Volumes



2.3. Existing Capacity Analysis

The results of the intersection capacity analysis are shown in Table 1 for existing volumes. Average vehicular delays are calculated and reported as Levels of Service (LOS) as defined by the Highway Capacity Manual (HCM) 6th Edition.

Table 1: Existing Intersection Capacity Analyses

Intersection	Control	Approach	Peak Hour LOS	
			AM	PM
Wallace Road at SR 16	Side-Street Stop-Signs	Eastbound	A	A
		Westbound	A	A
		Northbound Left	B	C
		Southbound Left	C	D

As can be seen in Table 1, all of the approaches to the existing study intersection operate adequately during weekday peak volume hours with the existing lane configuration and traffic controls.

Intersection capacity analyses worksheets are included in the Appendix.

3. Trip Generation

Table 2 summarizes the project trip generation using the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 9th Edition, 2012 rates and equations and *Trip Generation Handbook*, 3rd Edition, 2014, internal capture formulas, constrained between types of use.

Table 2: Project Trip Generation

Project Land Use (LUC)		Project Density		Total	IN	OUT
High-Cube Warehouse Distribution Center (152)		1,195	ksf			
	Daily			**2,008**	1,004	1,004
	AM Peak Hour			**142**	98	44
	PM Peak Hour			**200**	52	138

When completed, the development is expected to generate approximately 98 entering and 44 exiting new vehicular trips during the morning peak volume hour. Approximately 62 entering and 138 exiting new evening peak hour vehicular trips are expected. A total of 2,008 new entering and exiting vehicular trips are expected daily, approximately 38% of these to be trucks.

The Appendix includes the trip generation worksheet.

3.1. Trip Distribution and Assignment

The directional distribution of new project trips was based on the personal vehicle and truck directional distributions for the warehouse land use provided in the Wilburn Engineering October 15, 2017 (revised 11/29/17) Traffic Impact Study (TIS).

Approximately 70% of the new personal vehicle trips are expected to originate and terminate east and 20% west of the site using SR 16, and 10% to the north using Wallace Road to Jackson Road. Approximately 90% of the new truck trips are expected to originate and terminate east and 10% west of the site using SR 16.

The new project trips are shown in Figures 3, 4, & 5.

Figure 3: Project Volumes Wallace Rd at SR 16

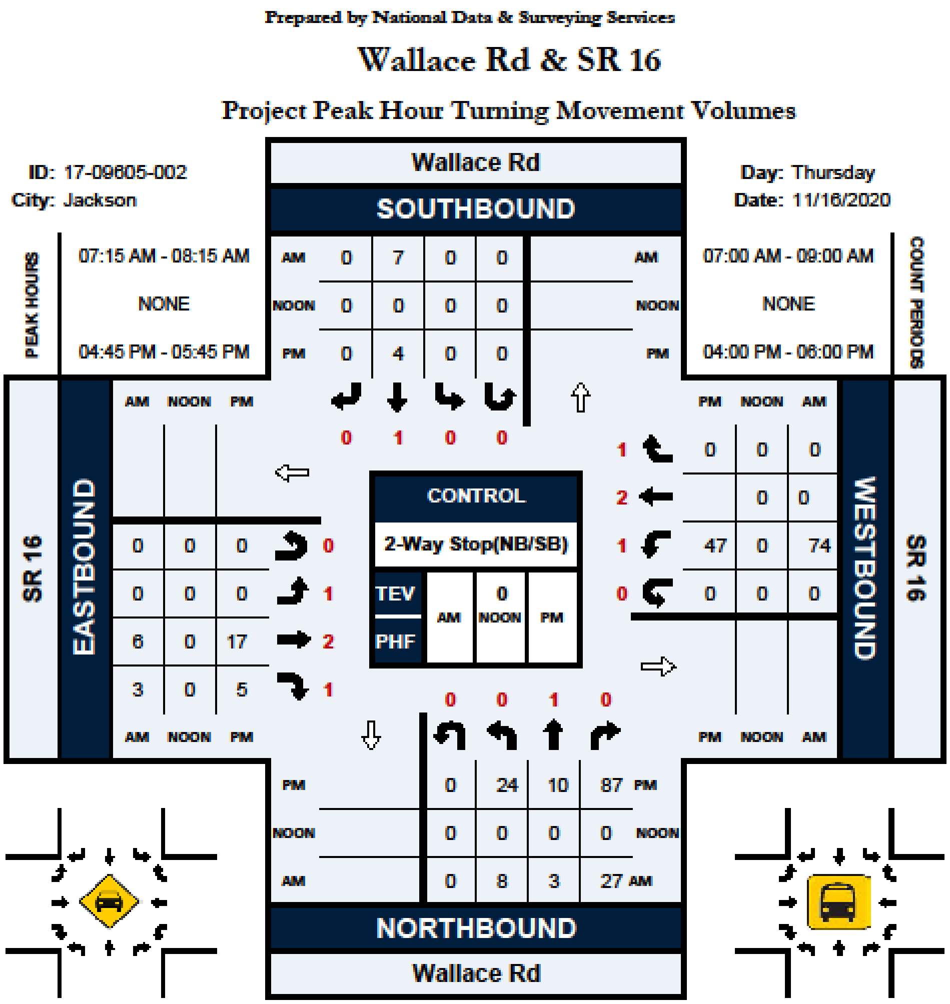


Figure 4: Project Volumes Wallace Rd at Site Dr

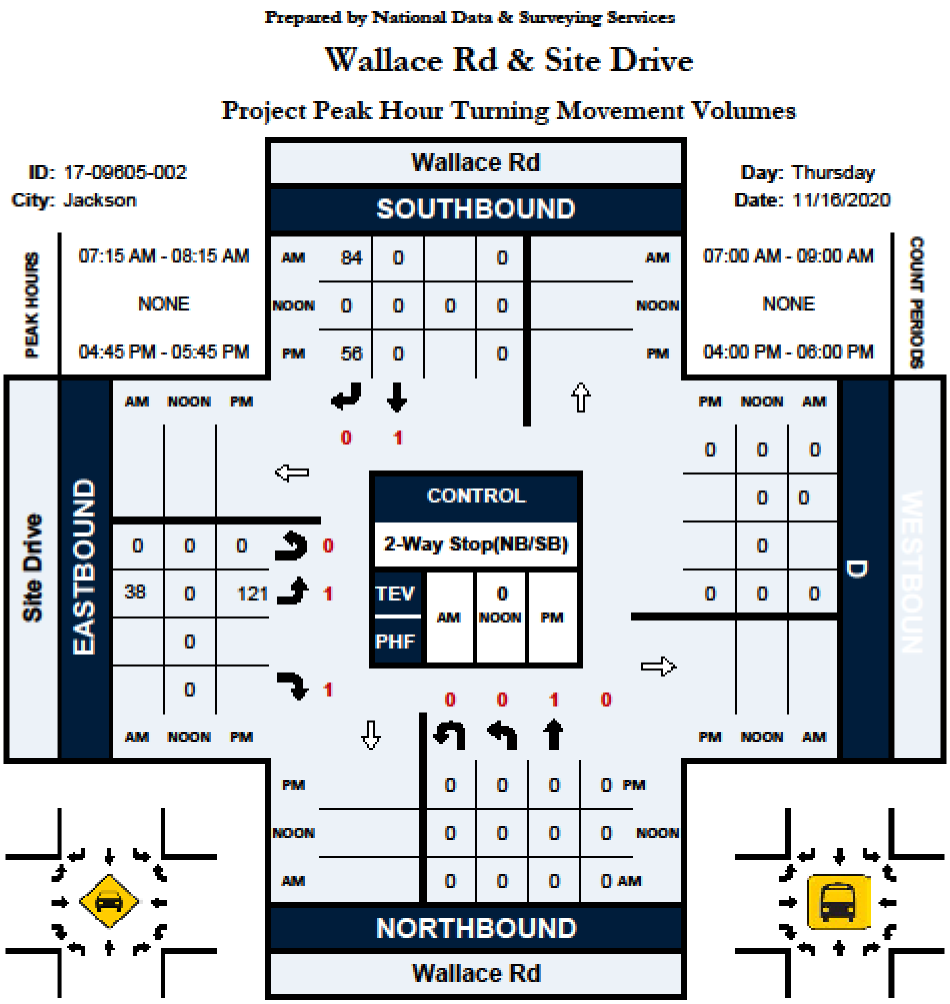
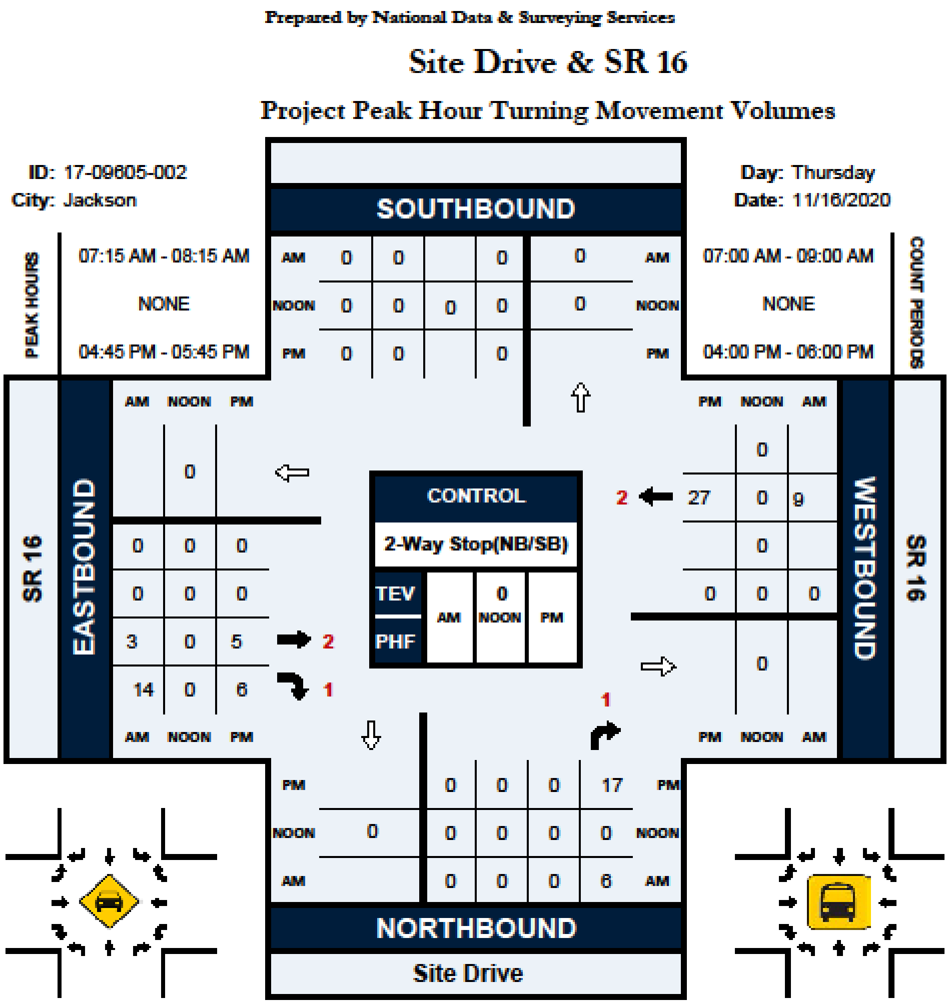


Figure 5: Project Volumes SR 16 at Site Dr



4. Background Conditions Capacity Analysis

The existing peak hour intersection turning movement counts were increased to include the traffic expected from the remaining 65% of the Dollar General Distribution Center (DRI 2549) expected when completely occupied and the new trips expected from Jones Petroleum Travel Center redevelopment (DRI 2674) when completed from the Wilburn Engineering October 15, 2017 (revised 11/29/17) Traffic Impact Study, and the new traffic expected from the Liberty-Butts County Industrial (DRI 2678) CALYX June 11, 2017 TIS.

The results of the intersection capacity analysis are shown in Table 3 for background growth volumes shown in Figure 6.

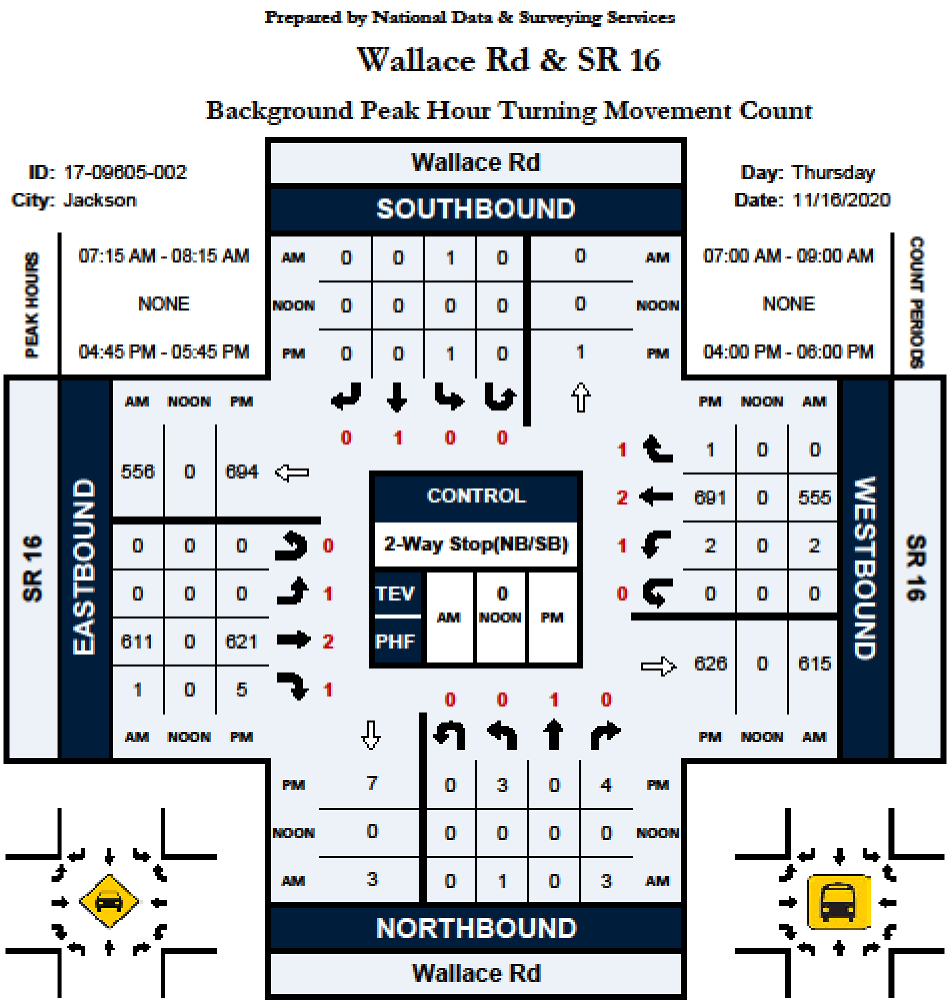
Table 3: Background Conditions LOS

Intersection	Control	Approach	Peak Hour LOS	
			AM	PM
Wallace Road at SR 16	Side-Street Stop-Signs	Eastbound	A	A
		Westbound	A	A
		Northbound Left	B	C
		Southbound Left	C	D

As can be seen in Table 3, all of the approaches to the existing study intersections are expected to continue to operate adequately in 2020 during weekday peak volume hours with the existing lane configuration and traffic controls.

Intersection capacity and signal warrant analyses worksheets are included in the Appendix.

Figure 6: Background Volumes



5. Future Conditions Capacity Analysis

The results of the intersection capacity analysis are shown in Table 4 for existing with project volumes shown in Figures 7, 8, & 9.

Table 4: Future with Project Trips LOS

Intersection	Control	Approach	Peak Hour LOS	
			AM	PM
Wallace Road at SR 16	Side-Street Stop-Signs	Eastbound	A	A
		Westbound	A	A
		Northbound Left-turn	C	D
		Southbound Left-turn	E	E
Site Drive at Wallace Road	Side-St Stop-Sign	Northbound	A	A
		Southbound	A	A
		Eastbound	A	A
Site Drive at SR 16	Side-St Stop-Sign	Eastbound	A	A
		Westbound	A	A
		Northbound	B	B

As can be seen in Table 4, all of the approaches to the study intersections, including the site driveways, are expected to continue to operate adequately in 2020 with the project trips during weekday peak volume hours with the existing and planned lane configurations and side-street stop-signs except for the (a single vehicle in each peak hour) southbound Wallace Road left-turning vehicles to SR 16 expected to operate at capacity during the peak hour-LOS E. There are no new project trips making this movement. Because of the low peak hour volumes and the existence of an alternative route via Jackson Road to SR 16 where a new traffic signal is planned to provide for these southbound left-turning vehicles, no mitigation is recommended at this time.

Weekday peak hour 95th percentile vehicular queuing analyses provided by the intersection capacity analyses showed most approaches with project trips will require less than one vehicle length storage capacity in both peak hours, although the evening peak hour northbound Wallace Road at SR 16 planned combined left and through lane is expected to have a three (3) vehicles queue when the project is completed. Although the expected northbound peak hour volumes are expected to be minimal, providing a dedicated northbound left turn lane on Wallace Road at SR 16 with a full-width storage length of 150 feet would accommodate most peak hour queues.

Intersection capacity analyses worksheets are included in the Appendix.

Figure 7: Future with Project Volumes Wallace Rd at SR 16

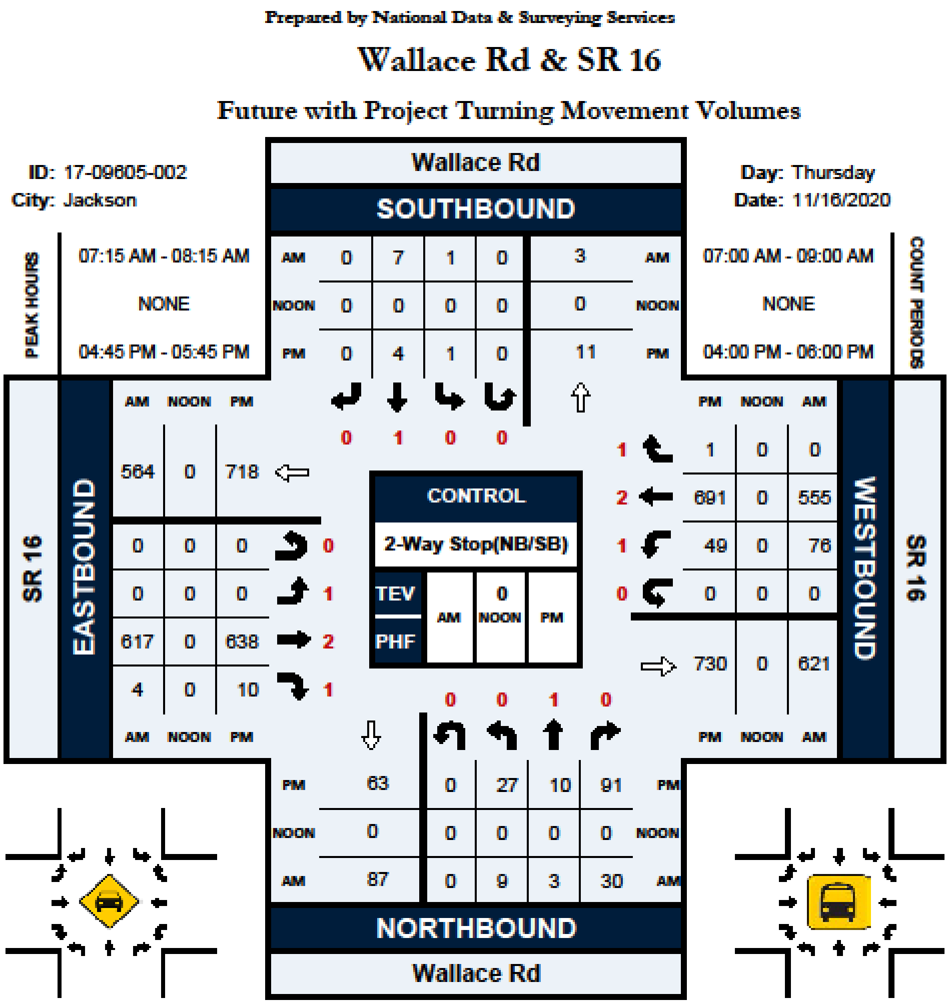


Figure 8: Future with Project Volumes Wallace Rd at Site Dr

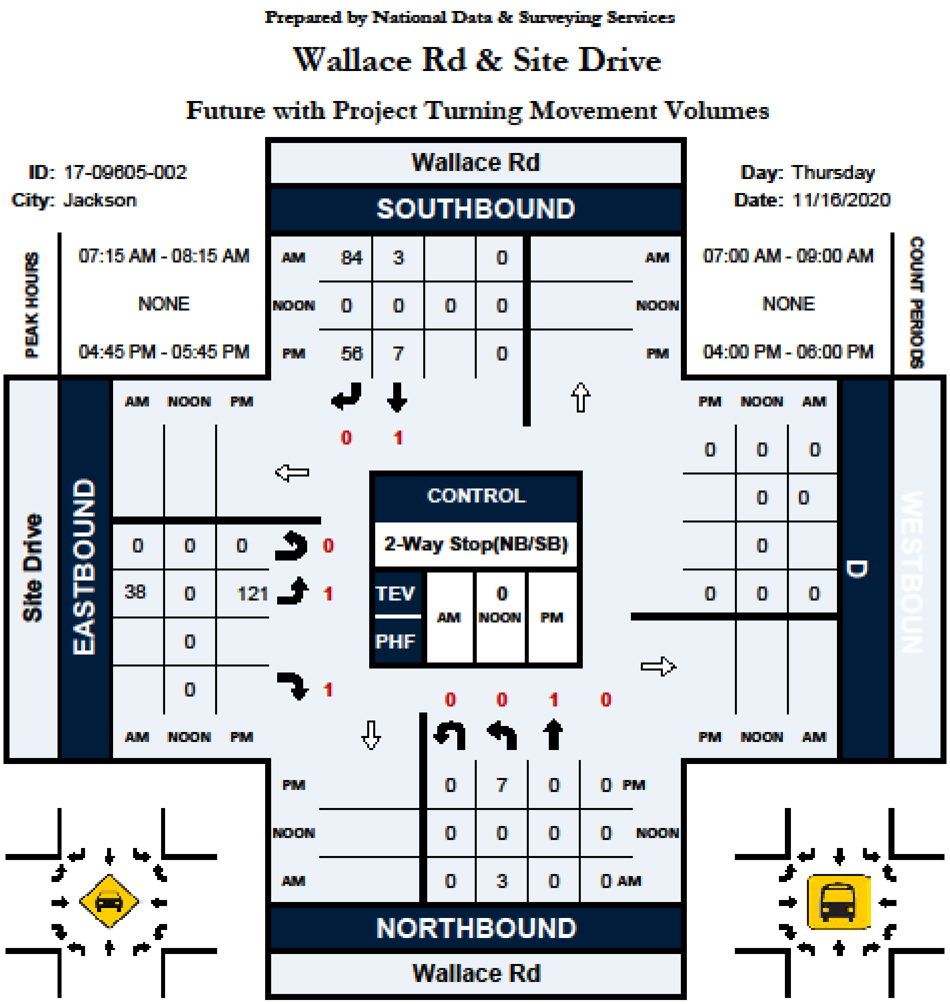
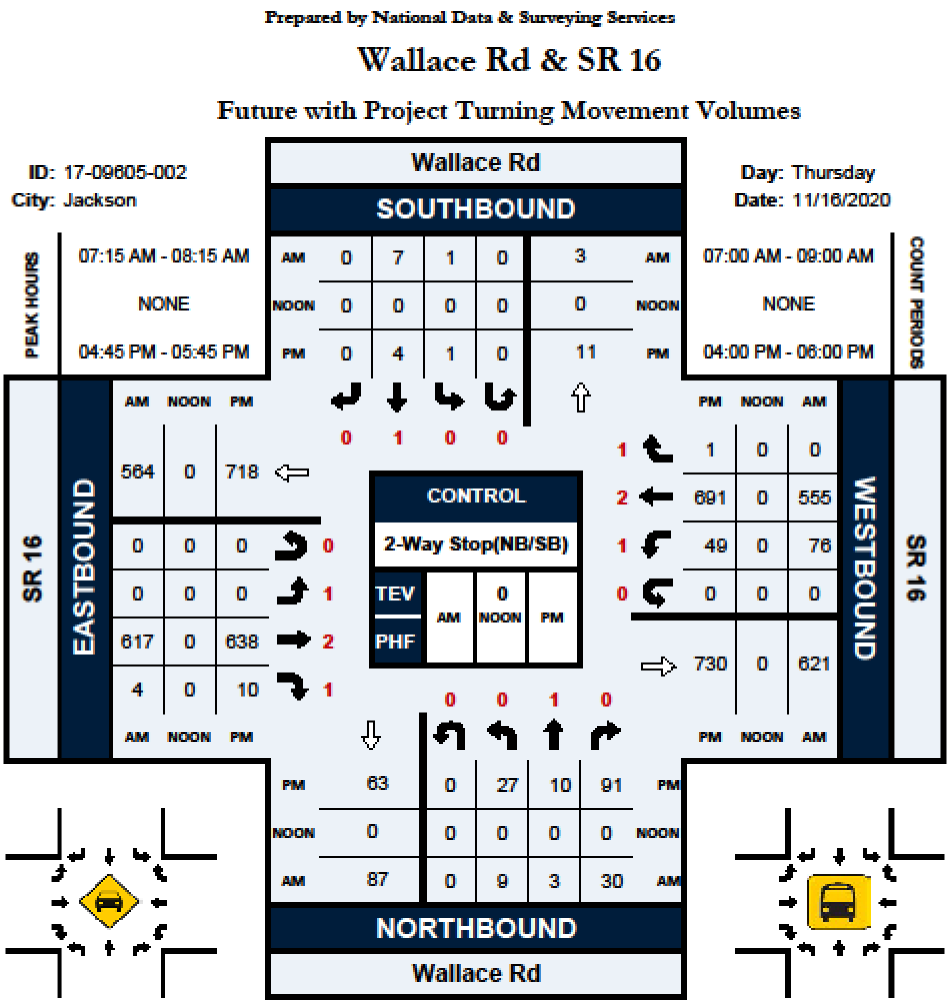


Figure 9: Future with Project Volumes Site Dr at SR 16



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REGIONAL COMMISSION
www.threeriversrc.com

Jim Thornton, Chairman
Kirk R. Fjelstul, Executive Director

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July 26, 2019

Ms. Christy Lawson
Butts County
625 West Third Street Suite 4
Jackson, GA 30233

Re: DRI #2982- River Park-Butts County

Dear Ms. Lawson:

The Three Rivers Regional Commission (TRRC) has completed its review of the Development of Regional Impact (DRI) for the project River Park in Butts County. The Three Rivers Regional Commission conducted a careful review of the information submitted by the local government and comments from potentially affected agencies. The following comments were received via email from various affected parties and areas, and are provided for your consideration below and as an enclosure with this letter:

From Middle Georgia Regional Commission:
Thank you for the opportunity to review DRI 2982. Comments from MGRC are attached.

From Butts County Water & Sewer Authority:
Please see attached letter from the Authority to the developer that explains that we will not be able to provide sewer service to the residential portion of the proposed development. Note that although both water and sewer mains are available to tie into on Hwy.16 lines will need to be extended within the development. Special accommodations will need to be made for fire protection water flow. While capacity is available at the present time, the Authority has made no commitment to guarantee water or sewer capacity availability for the life of the project.

The Three Rivers Regional Commission reviewed the proposed project with regards to regional and interjurisdictional impact and consistency with the Department of Community Affairs (DCA) Quality Community Objectives, Three Rivers Regional Plan, and the Three Rivers Regionally Important Resource Plan. After review of the information, TRRC staff notes that the proposed development site lies within the developing area of the Regional Development Patterns map of the 2013 Three Rivers Regional Plan. The proposed site also lies within the rapid development area of the Areas Requiring Special Attention map in the 2013 Three Rivers Regional Plan; the site is located near just east of Interstate 75 and Highway 16 in Butts County with a portion in Spalding County. This area is recommended to be used for highway corridors, industrial parks, suburban residential, and retirement communities.

Please be advised that this concludes the DRI Review Process and Butts County may proceed with the final official action it deems appropriate regarding the proposed project, but it is encouraged to take the materials presented in the DRI report into consideration when rendering its decision. The enclosed information is advisory in nature and under no circumstances should be considered as binding or infringing upon the host jurisdiction's right to determine for itself the appropriateness of development within its boundaries.

Sincerely,

Kimberly Dutton

Kimberly Dutton
Planner

Enclosure

Cc: Affected Local Governments and Other Interested Parties
Georgia Department of Community Affairs
LGS Industrial, LLC

Development of Regional Impact
Comments from Affected Parties

Project ID: DRI #2982– River Park **Butts County)**

Commenting Organization: Middle Georgia Regional Commission

Street Address: 175 Emery Highway, Suite C

City: Macon **State:** GA **Zip Code:** 31217

Contact Person: Greg Boike **Phone:** 478-751-6160 **Email:** gboike@mg-rc.org

Do you believe your jurisdiction will be affected by the proposed development? **YES** [X] **NO** [ ]

Please describe the effects (positive or negative) that the proposed project could have on your jurisdiction:

This project represents a significant new growth opportunity along the I-75 corridor and is a prime opportunity for continued intergovernmental collaboration in this area, as has already been deomstrated by local elected leaders. This project would certainly have substantial positive economic impacts across several counties, including into Middle Georgia in Monroe County.

As this project appears to occur in an "Area of Rapid Growth" as definied in the latest draft of the Three Rivers Regional Plan, we would recommend that the TRRC's recommended implementation measures for areas of rapid growth be considered. Of particular note, we would recommend that the developer's proposed stormwater management measures be reviewed locally to minimize impact from both point source and non-point source pollutants on the Towaliga River. This river feeds directly from the project site into the regionally-important High Falls State Park over a straightline distance of only 3-4 miles. The Middle Ocmulgee Regional Water Plan has additional implementation measures that should be consulted in this regard.

Form Completed by: Greg Boike **Title:** Director of Public Administration

Signature: Gregory A. Boike **Date:** July 10, 2019

Mail, Fax, or Email this form to:

Kimberly Dutton
Three Rivers Regional Commission
PO Box 1600
Franklin, GA 30217
P: 770-854-6026
F: 706-675-0448
E: ksdutton@threeriversrc.com

Comments on DRI #2982 will be accepted beginning on Monday, July 8, 2019.
All comments are due by Tuesday, July 23, 2019.

Development of Regional Impact

Comments from Affected Parties

Project ID: DRI #2982– River Park **Butts County)**

Commenting Organization: Butts County, et al. Water & Sewer Authority

Street Address: P.O. Box 145, 100 West Second Street

City: Jackson **State:** GA **Zip Code:** 30233

Contact Person: Marcie R.Seleb **Phone:** 770-775-0042 **Email:** mseleb@buttswsa.

Do you believe your jurisdiction will be affected by the proposed development? **YES** ☑ **NO** ☐

Please describe the effects (positive or negative) that the proposed project could have on your jurisdiction:

Please see attached letter from the Authority to the developer that explains that we will not be able to provide sewer service to the residential portion of the proposed development. Note that although both water and sewer mains are available to tie into on Hwy.16 lines will need to be extended within the development. Special accommodations will need to be made for fire protection water flow. While capacity is available at the present time, the Authority has made no commitment to guarantee water or sewer capacity availability for the life of the project.

Form Completed by: Marcie R. Seleb **Title:** General Manager

Signature: ____________________ **Date:** 7/18/2019

Mail, Fax, or Email this form to:

Kimberly Dutton
Three Rivers Regional Commission
PO Box 1600
Franklin, GA 30217
P: 770-854-6026
F: 706-675-0448
E: ksdutton@threeriversrc.com

Comments on DRI #2982 will be accepted beginning on Monday, July 8, 2019.
All comments are due by Tuesday, July 23, 2019.

Butts County

City of Flovilla, City of Jackson, and City of Jenkinsburg

Water & Sewer Authority

P.O. Box 145 *100 West Second Street *Jackson, Georgia 30233 *P (770) 775-0042 *F (770) 775-5009

June 18, 2019

Mr. Doug Adams
Owner's Representative
LGS Industrial, LLC
235 Corporate Center Drive, Suite 100
Stockbridge, GA 30281

RE: Water and Sewer Service to Proposed 1695.2 Acre Development in Butts and Spalding Counties

Dear Mr. Adams:

The Authority's board of directors met on June 18th to consider your request for water and sewer service for the proposed development as laid out in a concept plan dated May 28, 2019.

Based upon the Authority's limited sewer capacity and the anticipated future demand for sewer within the County, it is the policy of the Authority to give priority to properties of an industrial and commercial nature along the Interstate 75 corridor, on a development ready first come, first served basis. As such, the Authority will commit to providing sewer to such portions of the industrial and commercial zoned property as are ready for development, provided that there is capacity available at the time of development. At this time, the Authority cannot commit to servicing sewer to any residential portion of the property.

We do not anticipate any problems with providing water service to development as approved by the Butts County Board of Commissioners, provided capacity if available at the time of development.

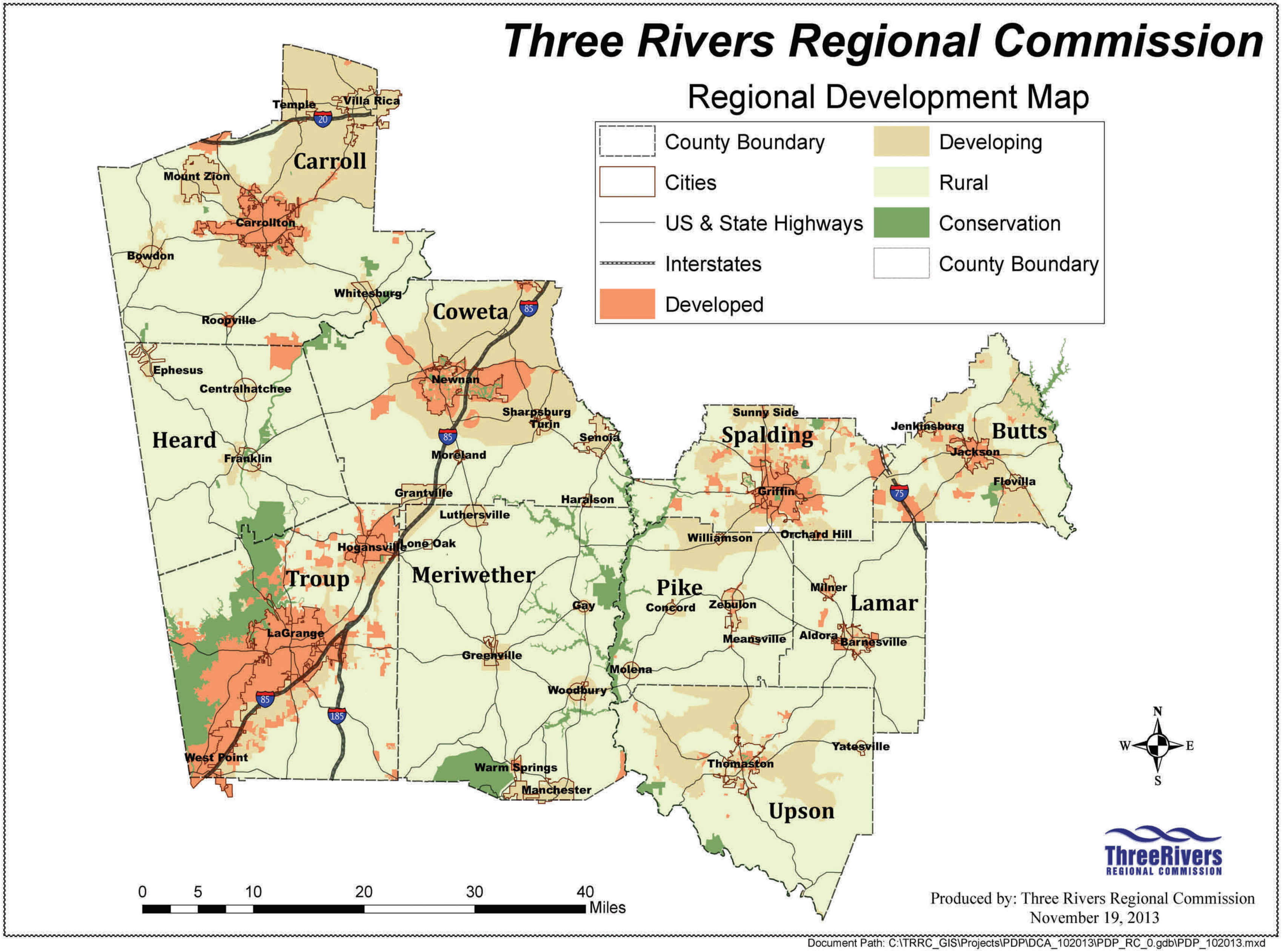
Sincerely,

Marcie R. Seleb
General Manager

MRS

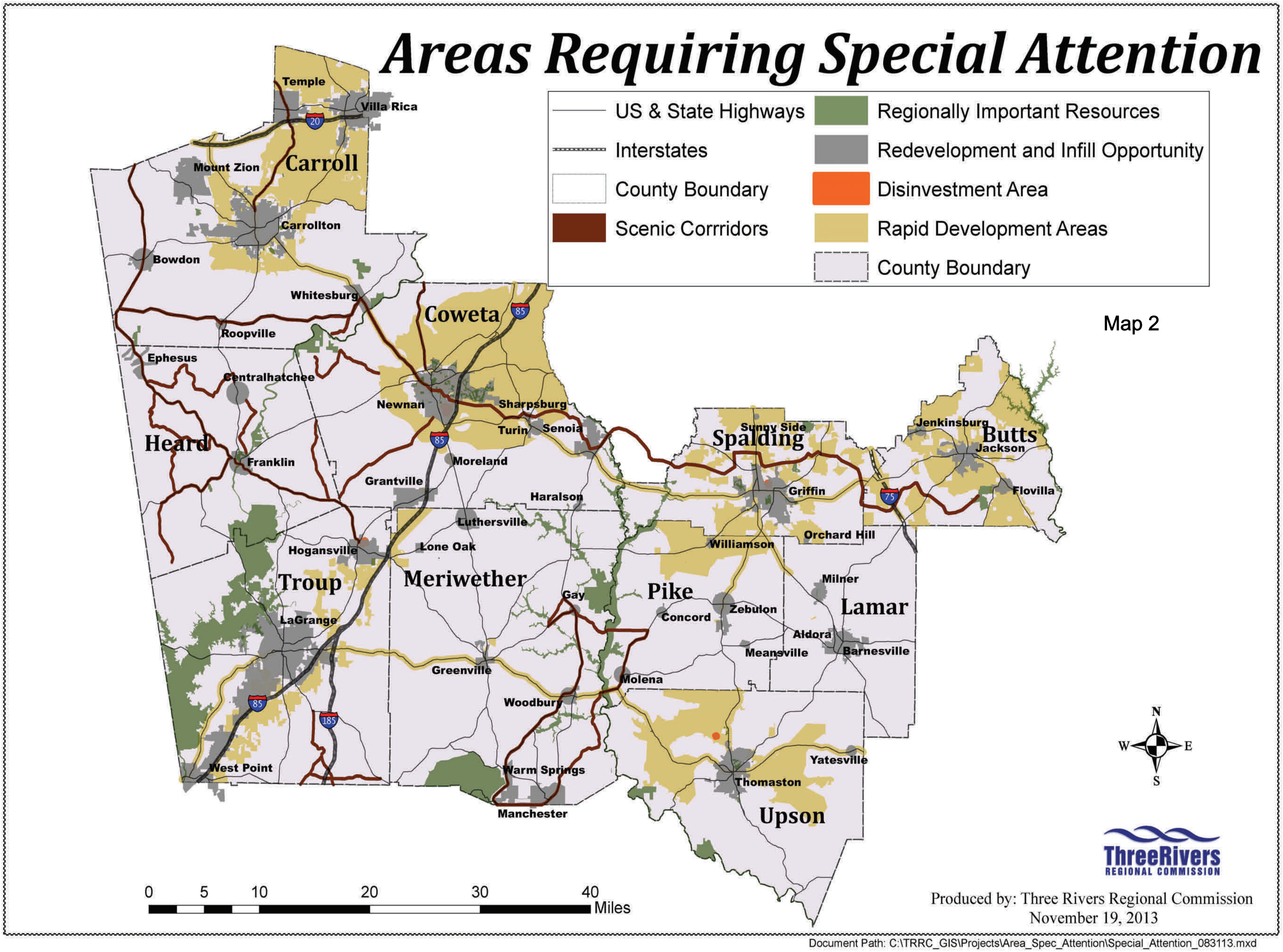
cc: Water Authority Board Members

Regional Development Map



AREAS REQUIRING SPECIAL ATTENTION MAP

Three Rivers Regional Commission



https://www.jacksonprogress-argus.com/news/massive-industrial-development-planned-in-butts-county/article_fbaa8b54-9da0-11e9-925e-9f467beb485f.html

FEATURED

Massive industrial development planned in Butts County

By Michael Davis mdavis@myjpa.com
Jul 3, 2019

River Park

River Park
Jul 3, 2019

Butts County commissioners to consider massive industrial development

Butts County commissioners to consider massive industrial development

Butts County commissioners delay vote on River Park development

Butts County commissioners delay vote on River Park development

A massive industrial development valued at $1.2 billion is planned for Ga. Highway 16 at I-75 in Butts County.

According to plans submitted to Butts County planning officials as part of a rezoning application, the development would include as many as 19 industrial buildings for a total of more than 16.1 million square feet. The industrially zoned property would be 1,225 acres.

The proposed development would also include 109.8 acres of commercial property and 89 acres of residential property.

According to a letter of intent submitted to Butts County's Community Development Department by the firm Falcon Design Consultants, on behalf of developers LGS Industrial LLC, the residential portion would contain no more than 200 single-family homes. Concept design plans show a gated subdivision developed along the north side of Ga. 16 on the eastern-most portion of the property.

A development of regional impact review form submitted June 28 to regional planning officials calls the project River Park, and indicates it could take until 2039 to finish.

According to the DRI report, the project would include more than 18 million square feet of industrial space — a contradiction with the letter of intent filed June 13 — and 800,000 square feet of commercial space. It would be worth $1.2 billion at build-out, according to DRI document.

Developments of regional impact are those that would have an impact beyond their host counties and trigger review by regional planning agencies.

It was not immediately clear when the rezoning applications would be heard by the Butts County Planning and Zoning Commission.

Michael Davis
Managing Editor

Michael Davis has been the editor of the Jackson Progress-Argus since 2010. He previously worked as an editor and reporter for the Henry Daily Herald and Clayton News-Daily.

THE LAKES AT GREEN VALLEY
INDUSTRIAL PARK

Gomez, Nithin

From:	Wade Carroll <wcarroll@metroanalytics.com>
Sent:	Tuesday, March 3, 2020 8:50 AM
To:	Young, Megha
Cc:	Gomez, Nithin; Smith, Andrew; Vincent Matheney
Subject:	FW: Industrial development info for Spalding County
Attachments:	Griffin-Spalding TLAGV Overall 05.29.2019.pdf; GDN Dec 2019 Mitsui.pdf; GDN August 2018 Rinnai announces new innovation initiative.pdf

See attached.

From: Kim Grist <kim@gsda.net>
Sent: Tuesday, March 3, 2020 8:48 AM
To: Wade Carroll <wcarroll@metroanalytics.com>; Chad Jacobs <cjacobs@spaldingcounty.com>; Michelle Irizarry <mirizarry@spaldingcounty.com>
Cc: David Luckie <david@gsda.net>
Subject: RE: Industrial development info for Spalding County

Good Morning,
Please see the attached map with a list of industries at The Lakes at Green Valley
I highlighted the lots that are available and also included Lot F, which is pending. We do not have an eta.

The Lakes at Green Valley:

Lot C- Otsuka Chemical
Lot E- Available
Lot F – Pending
Lot G- Available
Lots N/O – Toppan
Lots L/M – Marukan
Lots J/K – recently sold to Mitsui (see attached)
Lots H/I – Rinnai will relocate here (See attached They are currently in Griffin at another location near the High School 700 Hudson Road)

Feel free to contact me with any questions.
Also, our website has additional information which includes news/press releases such as the attached.

Thanks

Kim Grist

Assistant to David M. Luckie, CEcD

Griffin-Spalding Development Authority

109 E. Solomon Street, Suite 100

P.O. Box 1009

Griffin, Georgia 30224

770.412.9200 (O)

770.412.9222 (F)

www.gsda.net

From: Wade Carroll <wcarroll@metroanalytics.com>
Sent: Monday, March 2, 2020 5:00 PM
To: Chad Jacobs <cjacobs@spaldingcounty.com>; Michelle Irizarry <mirizarry@spaldingcounty.com>
Cc: Kim Grist <kim@gsda.net>
Subject: FW: Industrial development info for Spalding County

Can either of you provide more information regarding the Lakes at Green Valley below for input into the traffic study?

Wade

From: Young, Megha <megha.young@greshamsmith.com>
Sent: Monday, March 2, 2020 3:31 PM
To: Wade Carroll <wcarroll@metroanalytics.com>
Cc: Laura Beall <lbeall@eagleeyeplan.com>
Subject: RE: Industrial development info for Spalding County

Hi Wade,
We may not have been asking the correct questions of Spalding County and Griffin.
To close the loop on this hopefully – in order to complete the traffic study, we need to obtain the following information for the Lakes at Green Valley.

Based on the latest layout we have on the development:

- Of these sites, which have been developed?
- Which sites are remaining to be developed?
- Of what has not yet been developed, what is the estimated timeframe of when will they will be built and occupied? (A rough estimate/projection is fine)

Could you please take the above information, put it in a new email, and send to Kim, Chad, and Michelle?
Let me know if you have any questions or the other suggestions on the approach to this.

Thanks,

Megha D. Young, AICP
Gresham Smith
D: 678.518.3657

From: Wade Carroll <wcarroll@metroanalytics.com>
Sent: Tuesday, February 25, 2020 2:59 PM

To: Young, Megha <megha.young@greshamsmith.com>
Cc: Michelle Irizarry <mirizarry@spaldingcounty.com>
Subject: RE: Industrial development info for Spalding County

I do not have the square footage.

From: Young, Megha <megha.young@greshamsmith.com>
Sent: Tuesday, February 25, 2020 7:55 AM
To: Wade Carroll <wcarroll@metroanalytics.com>
Cc: Michelle Irizarry <mirizarry@spaldingcounty.com>
Subject: Re: Industrial development info for Spalding County

Hi Wade,
Kim indicated that they do not have traffic projections associated with the industrial park. If you have the latest layout with details on the buildout square footage, we can work with that data to generate trips.

Thanks,
Megha

Get Outlook for iOS

From: Wade Carroll <wcarroll@metroanalytics.com>
Sent: Tuesday, February 25, 2020 7:25 AM
To: Young, Megha
Cc: Michelle Irizarry
Subject: RE: Industrial development info for Spalding County

We were shown a map of the project, but certainly nothing regarding traffic projections. Maybe we contact Butts County? I copied Michelle since Chad is departing to Griffin to see if she may be able to help.

Wade

From: Young, Megha <megha.young@greshamsmith.com>
Sent: Friday, February 21, 2020 2:53 PM
To: Wade Carroll <wcarroll@metroanalytics.com>
Subject: Industrial development info for Spalding County

Hi Wade,
I spoke to Kim and she indicated that the county has provided all the information they have regarding industrial development, including the latest copies of the industrial park plan, etc. For the purposes of the traffic study, could you send me that information?

Thanks,
Megha

Megha D. Young, AICP
Transportation Planner

D: 678.518.3657

Gresham Smith
1125 Sanctuary Parkway, Suite 350
Alpharetta, GA 30009

GreshamSmith.com

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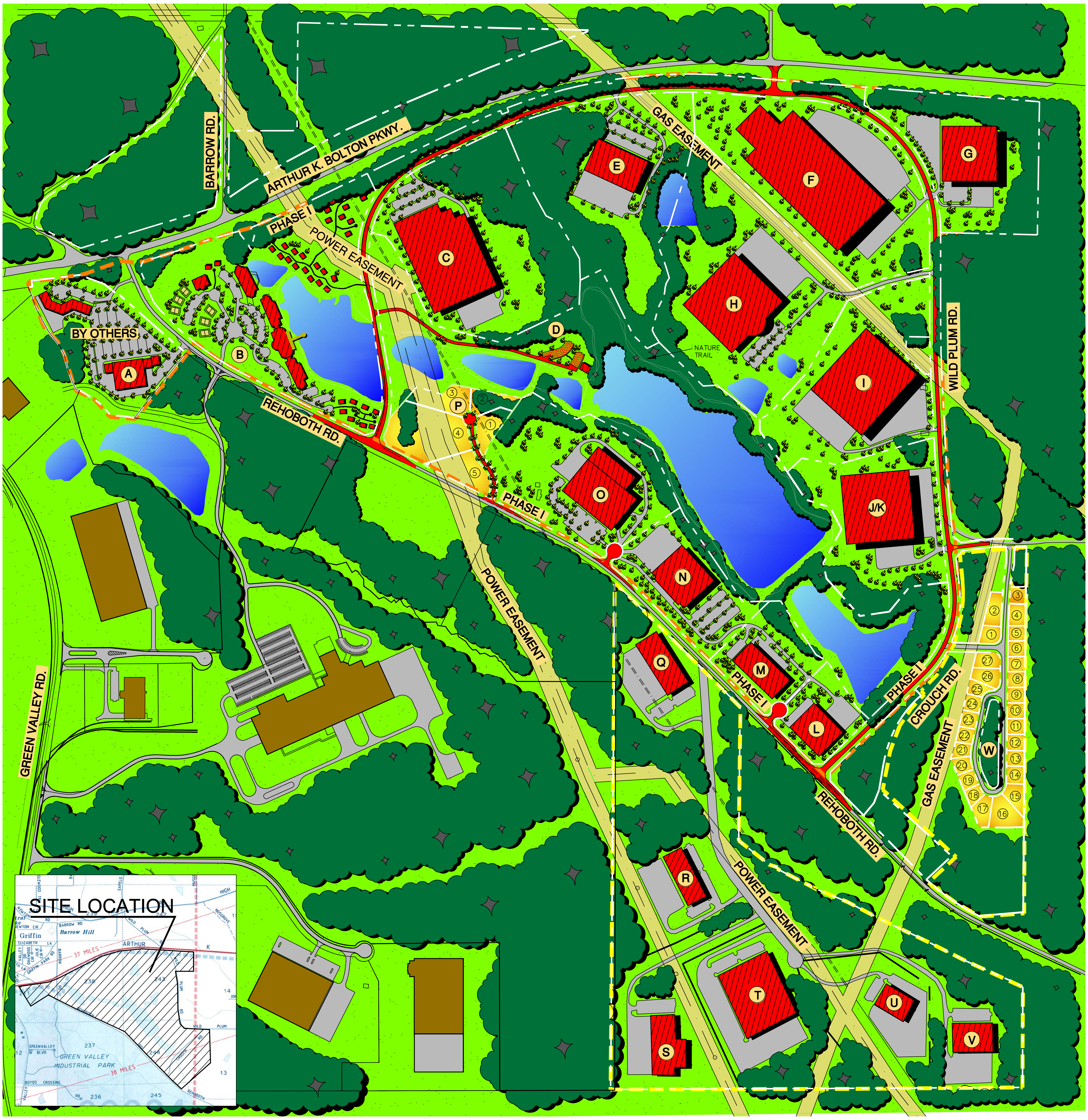


DEVELOPMENT DATA

(A) ±15.3 ACRES (BY OTHERS) (PDD – C–2)
45,000 S.F. GROCERY WITH 11,750 S.F. OF LEASE SPACE
27,500 S.F. RETAIL OUT PARCEL

(B) ±43 ACRES (PHASE I) (PDD – C–2)
72,000 S.F. CONFERENCE CENTER
150,000 S.F. HOTEL
25 COTTAGES AT 1,800 S.F.=61,200 S.F.
50,000 S.F. POOL AND SPA FACILITY AND
TENNIS COMPLEX

(C) ±34.0 ACRES (PHASE I) (PDD – C–2)
INDUSTRIAL BUILDING ±400,000 S.F. BUILDING

(D) ±78.0 ACRES (PHASE I) (PDD – C–2)
NATURE CENTER WITH WALKING TRAIL AND LAKES

(E) ±33 ACRES (PHASE I) (PDD – C–2)
INDUSTRIAL BUILDING ±100,000 S.F. BUILDING

(F) ±35 ACRES (PHASE I) (PDD – C–2)
INDUSTRIAL BUILDING ±525,000 S.F. BUILDING

(G) ±21.0 ACRES (PHASE I) (PDD – C–2)
INDUSTRIAL BUILDING ±160,000 S.F. BUILDING

(H) ±39 ACRES (PHASE I) (PDD – C–2)
INDUSTRIAL BUILDING ±275,000 S.F. BUILDING

(I) ±25.0 ACRES (PHASE I) (PDD – C–2)
INDUSTRIAL BUILDING ±300,000 S.F. BUILDING

(J/K) ±21.5 ACRES (PHASE I) (PDD – C–2)
INDUSTRIAL BUILDING ±250,000 S.F. BUILDING

(L) ±6.5 ACRES (PHASE I) (PDD – C–2)
INDUSTRIAL BUILDING ±75,000 S.F. BUILDING

(M) ±9 ACRES (PHASE I) (PDD – C–2)
INDUSTRIAL BUILDING ±80,000 S.F. BUILDING

(N) ±13.0 ACRES (PHASE I) (PDD – C–2)
INDUSTRIAL BUILDING ±110,000 S.F. BUILDING

(O) ±23.0 ACRES (PHASE I) (PDD – C–2)
INDUSTRIAL BUILDING ±250,000 S.F. BUILDING

(P) ±11 ACRES (PHASE I) (PDD – C–2)
5 – 1.5 ACRE OFFICE LOTS

(Q) ±16.25 ACRES (PDD – C–2)
INDUSTRIAL BUILDING ±80,000 S.F. BUILDING

(R) ±20.75 ACRES (PDD – C–2)
INDUSTRIAL BUILDING ±60,000 S.F. BUILDING

(S) ±20.0 ACRES (PDD – C–2)
INDUSTRIAL BUILDING ±90,000 S.F. BUILDING

(T) ±20 ACRES (PDD – C–2)
INDUSTRIAL BUILDING ±200,000 S.F. BUILDING

(U) ±16 ACRES (PDD – C–2)
INDUSTRIAL BUILDING ±40,000 S.F. BUILDING

(V) ±19 ACRES (PDD – C–2)
INDUSTRIAL BUILDING ±60,000 S.F. BUILDING

(W) ±43 ACRES (PDD – R–4)
RESIDENTIAL 27 – 0.5 ACRE LOTS
DEVELOPMENT WILL BE 70% GREENSPACE

THE LAKES AT GREEN VALLEY

OWNER/DEVELOPER
GRIFFIN-SPALDING DEVELOPMENT AUTHORITY
GRIFFIN, SPALDING CO., GEORGIA

REVISED: FEBRUARY 9, 2011

OVERALL

GRIFFIN-SPALDING
DEVELOPMENT AUTHORITY

PARAGON
consulting group
engineering • environmental • planning
118 n. expressway • griffin, georgia 30223
phone(770)412-7700 • fax (770)412-7744

Spalding County Freight Cluster Plan

Traffic Study Report

Prepared by

Gresham Smith

For

Spalding County

In cooperation with

Atlanta Regional Commission

Griffin Growing TOGETHER

Revised: September 2020

Table of Contents

Table of Figures

List of Tables

1. Introduction and Overview

As part of this freight cluster plan a detailed traffic study was conducted at several key intersections within Spalding County. The traffic study included capacity, operational and safety analysis of these intersections to identify deficiencies and recommend potential improvement projects to mitigate the deficiencies. The following sections of this technical memorandum detail the methodology followed for the selection of the intersections, the traffic analysis methodology and results, and description of proposed improvements.

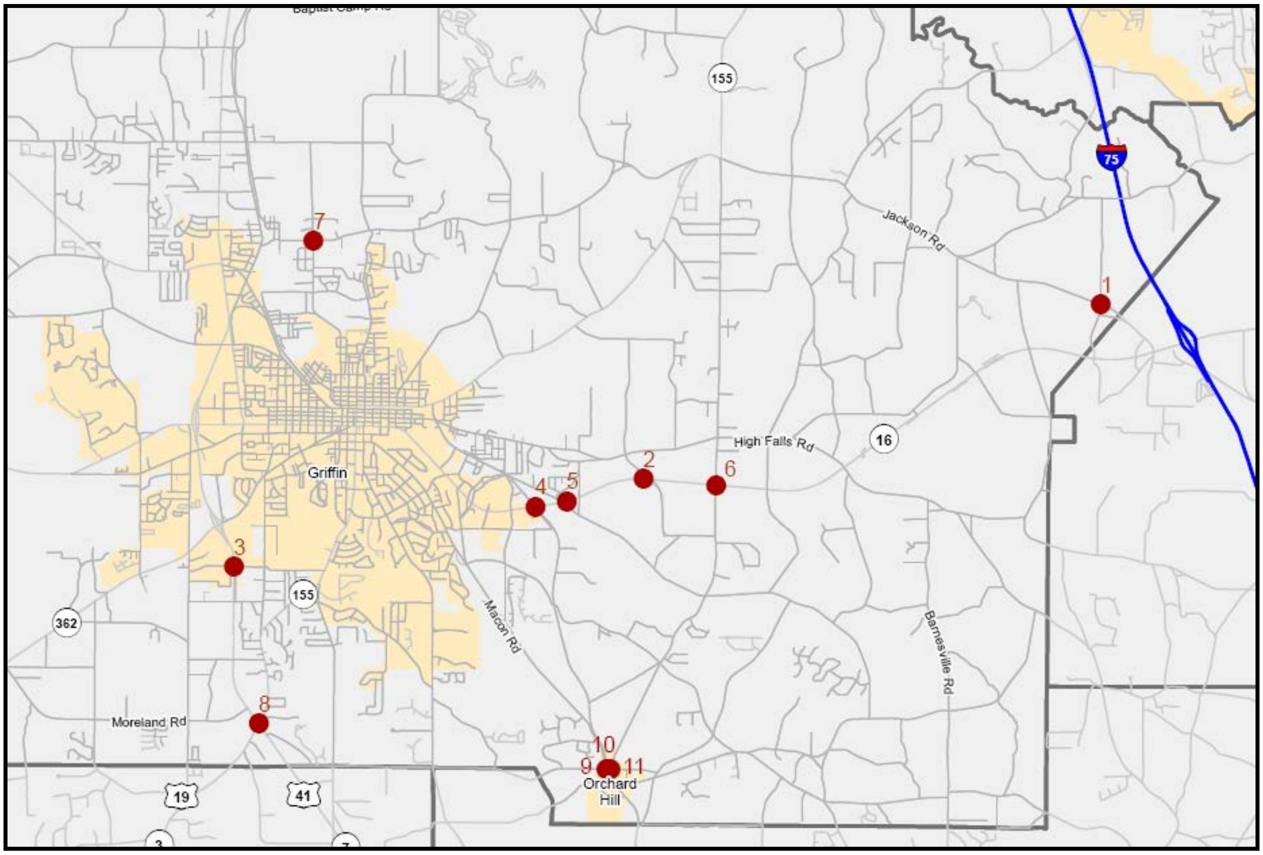
2. Selection of Intersections for the Traffic Study

Eleven intersections were selected based on input from this freight cluster plan's project management team. These eleven intersections are as follows:

1. Jackson Rd. @ Wallace Rd.
2. Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd.
3. MLK Jr. Pkwy. (US 19/41) @ Airport Rd./Kalamazoo Dr.
4. Arthur K. Bolton Pkwy. (SR 16) @ Green Valley Rd.
5. Arthur K. Bolton Pkwy. (SR 16) @ Rehoboth Rd.
6. Arthur K. Bolton Pkwy. (SR 16) @ S. McDonough Rd.
7. E. McIntosh Rd. @ 9th St.
8. MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.)
9. Johnston Rd. @ Macon Rd.
10. Johnston Rd. @ Green Valley Rd.
11. Johnston Rd. @ S. McDonough Rd.

The eleven intersections selected for the traffic study are shown in **Figure 1**.

Figure 1: Traffic Study Locations

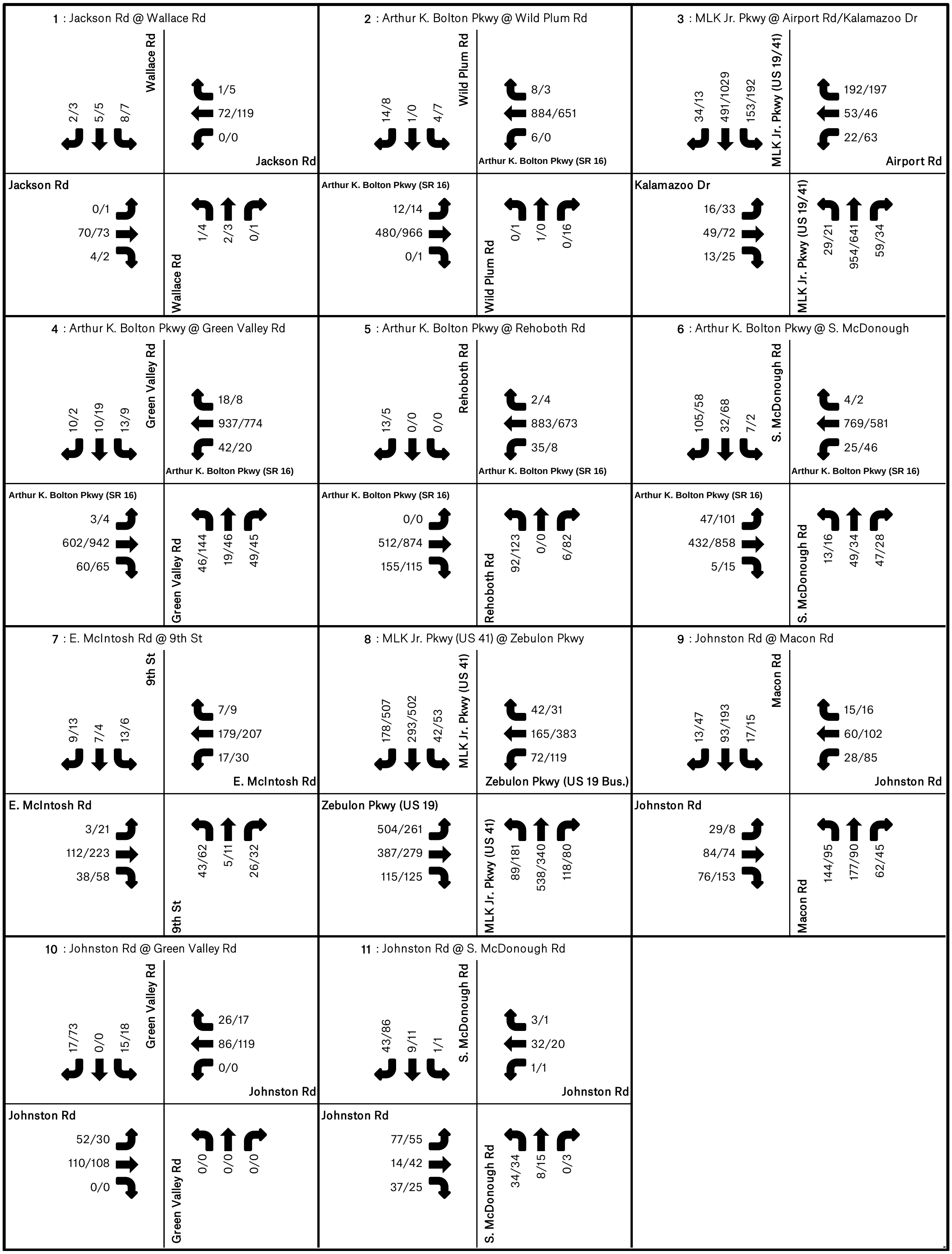


3. Existing Conditions

3.1. Traffic Volumes

AM and PM peak period turning movement counts were obtained at the eleven study intersections by National Data & Surveying Services. The counts were collected on December 10, 2019 from 7 AM – 9 AM and 4 PM – 6 PM. The selection of the 2-hour interval for the AM and PM peak period was based on review of traffic count data from GDOT's Traffic Analysis and Data Application (TADA). Daily traffic volumes with hourly distributions were reviewed along corridors near the study intersections. This hourly distribution of daily traffic volumes along key corridors is included in Appendix A. The raw traffic turning movement counts at the eleven study intersections are included in Appendix B. The existing year (2019) AM and PM peak hour traffic volumes based on the counts are shown in **Figure 2**.

Figure 2: Existing Year (2019) AM and PM Peak Hour Traffic Volumes



3.2. Crash History

Crash data at the eleven study intersections was obtained from the Georgia Electronic Accident Reporting System (GEARS) for the five year period between January 1, 2014 and December 31, 2018. A summary of this reported crash history is shown in **Table 1**. Detailed analysis of the crash data at the study intersections is included in Appendix C.

Table 1. Summary of Crash History at Study Intersections

Study Intersection	Av. Crashes per Year	% injury Crashes	Fatal Crashes	Frequent Crash Type
Jackson Rd. @ Wallace Rd.	1	14%	0	71% not a collision with motor vehicle
Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd.	1	0%	0	50% not a collision with motor vehicle 50% angle
MLK Jr. Pkwy. (US 19/41) @ Airport Rd./Kalamazoo Dr.	11	25%	0	66% rear end 24% angle
Arthur K. Bolton Pkwy. (SR 16) @ Green Valley Rd.	6	32%	0	52% rear-end 26% not a collision with motor vehicle
Arthur K. Bolton Pkwy. (SR 16) @ Rehoboth Rd.	5	42%	0	46% not a collision with motor vehicle 38% angle
Arthur K. Bolton Pkwy. (SR 16) @ S. McDonough Rd.	7	38%	0	43% not a collision with motor vehicle 22% rear-end
E. McIntosh Rd. @ 9th St.	4	50%	0	40% angle 30% not a collision with motor vehicle
MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.)	24	39%	1	64% rear-end 21% angle
Johnston Rd. @ Macon Rd.	6	50%	0	22% angle 45% rear-end
Johnston Rd. @ Green Valley Rd.	1	25%	0	36% angle 38% rear-end
Johnston Rd. @ S. McDonough Rd.	1	0%	0	66% angle 22% rear-end

The crash data was analyzed in detail by examining crash attributes to identify patterns and contributing factors. The factors considered in this analysis included:

- time of day and season of the year – to identify diurnal factors and sun-glare related crashes
- manner of collision – to identify crash patterns related to intersection geometry or traffic control
- injuries and fatalities – to identify severity of crashes
- lighting – to identify whether lack of lighting was a contributing factor to the crashes

- pavement condition – to identify whether wet or slick pavement was a contributing factor to the crashes
- location of the crash with respect to the roadway
- direction of vehicles involved – to identify crash patterns related to intersection geometry or traffic control
- maneuvers of vehicles involved – to identify crash patterns related to intersection geometry or traffic control
- involvement of pedestrians, bikes, or transit vehicles

A brief summary of this exercise is included in the following sections.

Jackson Rd. @ Wallace Rd.

An average of 1 crash per year was reported at this intersection. The crash history doesn't indicate a safety issue at this intersection.

Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd.

An average of 1 crash per year was reported at this intersection. The crash history doesn't indicate a safety issue at this intersection.

MLK Jr. Pkwy. (US 19/41) @ Airport Rd./Kalamazoo Dr.

An average of 11 crashes per year were reported at this intersection with rear-end type crashes being the most frequent, accounting for 66% of total crashes. Most of the rear end crashes occurred along MLK Jr. Pkwy. (US 19/41) in both northbound and southbound directions. A review of these crashes indicated that most crashes in the southbound directions are caused by motorists not expecting to come to a stop; this is likely due to the fact that MLK Jr. Pkwy. (US 19/41) transitions from a limited access facility to a signalized arterial, and the Airport Rd./Kalamazoo Dr. intersection is the first signalized intersection that motorists leaving the limited access facility encounter. In the northbound direction, most of the crashes are due to driver behaviors such as inattention and following too closely. Most of the angle crashes were attributable to vehicles disregarding the traffic signal at the intersection.

Arthur K. Bolton Pkwy. (SR 16) @ Green Valley Rd.

An average of 6 crashes per year were reported at this intersection with rear-end type crashes being the most frequent, accounting for 52% of total crashes. Most of the rear-end crashes occurred along Arthur K. Bolton Pkwy. (SR 16) in the eastbound and westbound directions. Over half of the rear-end crashes occurred when a vehicle was stopped for traffic ahead and was struck from behind by another vehicle. In two crashes, the railroad line was cited as a contributing factor; in each case, a driver heard the train horn and slowed down, hesitating to cross due to a reported delay/possible malfunction in the railroad, and was struck from behind. In two crashes, the driver stopped at the intersection for a stopped school bus and was struck from behind by another vehicle.

Arthur K. Bolton Pkwy. (SR 16) @ Rehoboth Rd.

An average of 5 crashes per year were reported at this intersection with single-vehicle crashes being the most frequent, accounting for 46% of total crashes. A high fraction of these single-vehicle crashes were wildlife-vehicle crashes during dark conditions.

Arthur K. Bolton Pkwy. (SR 16) @ S. McDonough Rd.

An average of 7 crashes per year were reported at this intersection with single-vehicle crashes being the most frequent, accounting for 43% of total crashes. Approximately half of these single-vehicle crashes were wildlife-vehicle crashes during dark conditions.

E. McIntosh Rd. @ 9th St.

An average of 4 crashes per year were reported at this intersection with angle type crashes being the most frequent, accounting for 40% of total crashes. Most of the angle crashes were attributable to vehicles not obeying the all-way stop sign control at the intersection.

MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.)

An average of 24 crashes per year were reported at this intersection with rear-end type crashes being the most frequent, accounting for 64% of total crashes. Most of the rear-end crashes occurred in the northbound and southbound directions. There were also four reported rear end crashes in the southbound direction within the free flow right turn lane. Though the crash reports did not identify any contributing factors to these crashes, the high speed approach curvature of this right turn, access conflicts within the right turn lane including the turn lane into the Ingles shopping center, and the free flow receiving lane of this southbound right turn lane resulting in weaving movements along the westbound direction of the Zebulon Pkwy. (US 19) leg are all likely contributing factors. In the northbound direction, most of the rear-end crashes were attributed to driver inattention and following too closely.

Johnston Rd. @ Macon Rd.

An average of 6 crashes per year were reported at this intersection with angle type crashes being the most frequent, accounting for 81% of total crashes. Most of the angle crashes were right angle crashes evenly distributed along all four legs of the intersection.

Johnston Rd. @ Green Valley Rd.

An average of 1 crash per year was reported at this intersection. The crash history doesn't indicate a safety issue at this intersection. However there was one reported crash in these five years involving a train where a motorist traveling east along Johnston Rd. failed to stop at the marked railroad crossing and was struck by a train resulting in injuries to the two occupants of the vehicle.

Johnston Rd. @ S. McDonough Rd.

An average of 1 crash per year was reported at this intersection. The crash history doesn't indicate a safety issue at this intersection.

3.3. Field Review

On January 16, 2020, a field review was conducted to observe traffic operations at the eleven intersections that are part of this traffic study. Observations were made during both morning and afternoon peak travel hours for these intersections.

3.3.1. Jackson Rd. @ Wallace Rd.

Figure 3: View of Jackson Rd. @ Wallace Rd. from South Leg of Intersection

- All-way stop-controlled intersection. Based on Google Street View, Jackson Rd. appeared to have double posted stop signs on both sides of the road. However field review indicated that one of these double posted signs were missing possibly due to being hit by vehicles.
- There is a horizontal curve along south leg of Wallace Rd. further south of the intersection and a slight vertical curve on west leg of Jackson Rd.
- Residential driveway in close proximity to the intersection along Wallace Rd. on the southwest quadrant of the intersection.
- Poor pavement markings along Wallace Rd.; fair to good pavement markings on Jackson Rd.
- Evidence of wear in vegetation and gravel present in all four corners; school bus observed leaving pavement to make right turn from eastbound Jackson Rd. to southbound Wallace Rd.
- There are “No Through Trucks” signs on the north and south legs (Wallace Rd.)

3.3.2. Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd.

Figure 4: East Leg of Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd. Looking West

- Intersection appeared to be operating fairly well with good pavement and fair pavement markings.
- Tight northwest quadrant of the intersection making the southbound right turn from Wild Plum Rd. to westbound SR 16 a difficult maneuver, especially with no dedicated right turn lane.

3.3.3. MLK Jr. Pkwy. (US 19/41) @ Airport Rd./Kalamazoo Dr.

Figure 5: Southeast Corner of MLK Jr. Pkwy. (US 19/41) @ Airport Rd./Kalamazoo Dr.

- Pavement markings in fair condition at the intersection, but there are several potholes within the intersection in need of repair.
- To the north of the intersection, MLK Jr. Pkwy. (US 19/41) becomes a limited access facility. Vehicles traveling south leaving the limited access segment of MLK Jr. Pkwy. (US 19/41) traverse through a horizontal curve as they approach this intersection from the north at a high rate of speed.
- There are closely spaced streets along Airport Rd. and Kalamazoo Dr. on both sides of the intersection - Enterprise Way to the east of the intersection and Industrial Dr. to the west of the intersection; both causing turning conflicts in the vicinity of this intersection.

3.3.4. Arthur K. Bolton Pkwy. (SR 16) @ Green Valley Rd.

Figure 6: View of Arthur K. Bolton Pkwy. @ Green Valley Rd. from North Leg of Intersection

- Norfolk Southern Railroad runs along Green Valley Rd. across the west leg of the intersection.
- Green Valley Rd. intersects Arthur K. Bolton Pkwy. (SR 16) at an angle and results in substandard skew at the intersection. The northbound right turn from Green Valley Rd. to eastbound Arthur K. Bolton Pkwy. (SR 16) and the southbound right turn from Green Valley Rd. to westbound Arthur K. Bolton Pkwy. (SR 16) are therefore tight and difficult maneuvers.
- The westbound left turn from Arthur K. Bolton Pkwy. (SR 16) to southbound Green Valley Rd. is also a tight maneuver, especially for trucks. Several trucks were seen encroaching onto adjacent lanes or leaving the intersection pavement completely to make that maneuver.
- The railroad grade crossing pavement marking on the south leg is placed close to the intersection STOP bar, which confuses the northbound left turning traffic from Green Valley Rd. to westbound Arthur K. Bolton Pkwy. (SR 16) as to where to stop exactly at the intersection. Several of these vehicles stop closer to the railroad grade crossing pavement marking (which has a horizontal white stripe) and do not get detected by the loop detector.
- The pavement and shoulder condition at the intersection corners along the west side of Green Valley Rd. near the railroad showed considerable distress and drainage problems.

3.3.5. Arthur K. Bolton Pkwy. (SR 16) @ Rehoboth Rd.

Figure 7: View of Arthur K. Bolton Pkwy. (SR 16) @ Rehoboth Rd. from East Leg of Intersection

- Signalized high-T intersection configuration with the south left operating as the high-T leg and the north leg as a right-in-right-out.
- Intersection appeared to be operating fairly well with good pavement and fair pavement markings.
- Several delineator posts appeared to be hit and missing at the intersection.
- Crosswalks present along Arthur K. Bolton Pkwy. (SR 16) across the north and south legs of the intersection.

3.3.6. Arthur K. Bolton Pkwy. (SR 16) @ S. McDonough Rd.

Figure 8: Intersection of Arthur K. Bolton Pkwy. (SR 16) @ S. McDonough Rd. Looking West

- Intersection appeared to be operating fairly well with good pavement and fair pavement markings.
- Crosswalks present along all four legs of the intersection.
- Trucks making an eastbound left turn maneuver from Arthur K. Bolton Pkwy. (SR 16) to northbound S. McDonough Rd. observed to be encroaching adjacent lane (southbound left turn lane) on S. McDonough Rd.
- Indication of truck parking along the west side shoulder of S. McDonough Rd. north and south of the intersection (worn vegetation).

3.3.7. E. McIntosh Rd. @ 9th St.

Figure 9: South Leg Approach of E. McIntosh Rd. @ 9th St.

- Intersection in a residential area with narrow travel lanes and turning radii.
- Observed evidence of vehicles leaving pavement to make turn maneuvers.
- A fuel truck was observed traveling westbound on E. McIntosh Rd.; the fuel truck was likely traveling from the TransMontaigne Pipeline Terminal, located just east of the study intersection at 643 E. McIntosh Rd. Due to the presence of the pipeline facility, E. McIntosh Road is part of the federally-designated National Highway Freight Network (NHFN).
- Fair/poor pavement and pavement markings at this intersection

3.3.8. MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.)

Figure 10: View of MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.) Intersection from Southeast Corner at Racetrac

- The intersection has a fairly tight skew angle making several turning maneuvers difficult for trucks.
- Pavement markings in fair condition at the intersection.
- Crosswalks present along all four legs of the intersection.
- The southbound right turn maneuver from MLK Jr. Pkwy. (US 41) to westbound Zebulon Pkwy. (US 19) is a free flow movement with a dedicated right turn lane and a dedicated receiving lane. However, there are driveways with right turn lanes into the parcel located in the northwest quadrant of the intersection (Ingles shopping center) off of this southbound right turn lane that causes vehicular conflicts at this corner of the intersection. Additionally, this free flow right turn also causes weaving movements along the westbound direction of the Zebulon Pkwy. (US 19) leg; with the southbound right turn movement and the westbound through movement weaving in a short segment.
- Left turn queues along both legs of Zebulon Pkwy. (US 19) do not clear in one cycle during peak hours.

3.3.9. Johnston Rd. @ Macon Rd.

Figure 11: North Leg of Johnston Rd. @ Macon Rd.

- Four-way stop with solar-powered stop signs for visibility on all legs
- Norfolk Southern railroad tracks located close to the intersection to the east
- Westbound sight distance over train tracks appears limited
- Severe pavement grade issues due to the railroad tracks on the east leg
- Poor pavement condition at railroad crossing

3.3.10. Johnston Rd. @ Green Valley Rd.

Figure 12: Johnston Rd. @ Green Valley Rd. Looking West Towards Macon Rd. and Norfolk Southern Railroad Crossing

- Intersection is located immediately to the east of Norfolk Southern railroad crossing
- Poor pavement condition and narrow lanes
- Washout along north leg around railroad tracks

3.3.11. Johnston Rd. @ S. McDonough Rd.

Figure 13: North leg of Johnston Rd. @ S. McDonough Rd. With Truck Prohibitions

- Intersection is located immediately to the east of Green Valley Rd. intersection.
- Fair pavement and pavement markings at the intersection.

3.4. Intersection Capacity Analysis

Based on the existing year (2019) AM and PM peak hour turning movement traffic volumes, and the existing traffic control and lane configurations, AM and PM peak hour traffic operations were analyzed at the study intersections using the methodologies outlined in the Highway Capacity Manual (HCM), and the Synchro 9.2 software program. According to the HCM, there are six levels of service (LOS) by which the operational performance of an intersection may be described. These levels of service range between LOS A, which indicates a relatively free-flowing condition, and LOS F, which indicates operational breakdown.

For signalized intersections, LOS is defined in terms of a weighted average control delay for all traffic movements at the intersection. Control delay is a complex measure that quantifies the increase in travel time that a vehicle experiences due to the traffic signal control, which is based on multiple variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Signalized intersection LOS is stated in terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). **Table 2** summarizes the LOS criteria for signalized intersections, as described in the HCM (Transportation Research Board, 2016).

Table 2. Level of Service Criteria for Signalized Intersections

Level of Service	Control Delay (sec/veh)	General Description
A	≤ 10 seconds	Free Flow
B	> 10 seconds and ≤ 20 seconds	Stable Flow (slight delays)
C	> 20 seconds and ≤ 35 seconds	Stable flow (acceptable delays)
D	> 35 seconds and ≤ 55 seconds	Approaching unstable flow
E	> 55 seconds and ≤ 80 seconds	Approaching intersection capacity unstable flow, unfavorable progression
F[1]	> 80 seconds	Forced flow, poor progression

Source: Highway Capacity Manual, 6th Edition, Transportation Research Board, 2016.

[1]If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned.

For unsignalized intersections (i.e. minor street stop-controlled intersections) LOS criteria are defined in terms of the average control delay for each minor-street movement as well as major-street left-turns. Major-street through vehicles are assumed to experience zero delay, because of minimal conflicts in operation. Several factors affect the control delay for unsignalized intersections, such as availability and distribution of gaps in the conflicting traffic stream. LOS A indicates excellent operations with minimal delay to motorists, while LOS F indicates insufficient gaps of acceptable size to allow vehicles on the minor street to cross safely, resulting in long delays and long queues. **Table 3** shows LOS criteria for unsignalized intersections.

Table 3. Level of Service Criteria for Unsignalized Intersections

Level of Service	Control Delay (sec/veh)	General Description
A	≤ 10 seconds	Minimal Delay
B	> 10 seconds and ≤ 15 seconds	Occasional Delay
C	> 15 seconds and ≤ 25 seconds	Moderate Delay
D	> 25 seconds and ≤ 35 seconds	Noticeable Delay
E	> 35 seconds and ≤ 50 seconds	Delay approaching tolerance
F[1]	> 50 seconds	Delay exceeding tolerance

Source: Highway Capacity Manual, 6th Edition, Transportation Research Board, 2016.

[1] If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned.

The results of the intersection LOS and delay analysis for the existing year (2019) conditions are summarized in **Table 4**. As shown, all study intersections operate at LOS C or better in the AM and PM peak hours with one exception. The northbound through and left-turn movements and the southbound approach at the Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd. intersection operate at LOS E in the AM and PM peak hours. Though these movements experiences high delay, the volumes do not warrant a traffic signal at this intersection. Stop controlled minor movements at a two-way stop-controlled intersection with heavy volumes on the unstopped approaches typically experiences high delay. The major movements at the intersection, namely the through and right turn movements along Arthur K. Bolton Pkwy. (SR 16) operate with no delay. Detailed HCM analyses, including capacity analysis worksheets, can be found in Appendix D. A summary of other findings from the detailed capacity analysis is listed below.

Table 4. Existing Year (2019) Intersection Level of Service

Study Intersection	Intersection Control Type	Existing Year (2019)	
		AM LOS *Delay (s)*	PM LOS *Delay (s)*
Jackson Rd. @ Wallace Rd.	All Way Stop	A *7.7*	A *8.0*
Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd.	Minor Stop	E *39.7*	E *42.1*
MLK Jr. Pkwy. (US 19/41) @ Airport Rd./Kalamazoo Dr.	Signal	B *15.3*	B *14.9*
Arthur K. Bolton Pkwy. (SR 16) @ Green Valley Rd.	Signal	A *8.9*	B *12.7*
Arthur K. Bolton Pkwy. (SR 16) @ Rehoboth Rd.	Signal	A *4.9*	A *8.1*
Arthur K. Bolton Pkwy. (SR 16) @ S. McDonough Rd.	Signal	B *14.4*	B *15.2*
E. McIntosh Rd. @ 9th St.	All Way Stop	A *8.9*	B *10.2*
MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.)	Signal	C *28.3*	C *33.6*
Johnston Rd. @ Macon Rd.	All Way Stop	B *12.6*	C *15.2*
Johnston Rd. @ Green Valley Rd.	Minor Stop	B *10.1*	B *10.4*
Johnston Rd. @ S. McDonough Rd.	Minor Stop	B *11.6*	B *11.4*

Minor street stop controlled intersections show results for the worst movement at the intersection.

4. Future Conditions

4.1. Traffic Volumes

To determine the appropriate improvements at the study intersections, future conditions were analyzed at each of the study intersections based on projected traffic volumes. The year 2029 was chosen as the horizon year to conduct the future conditions traffic analysis. To perform the future analysis, anticipated future traffic volumes were developed at each of the study intersections. The future conditions are defined as the existing condition traffic, plus the anticipated background growth in traffic at the study intersections including any anticipated traffic due to major developments near the study intersections. Hence, the following formula was used to calculate the future condition traffic volumes.

$$F = P\,(1 + r)^{n} + \text{Other Development Traffic}$$

Where:

F = future projected traffic volume (vehicles per hour)
P = existing traffic volume (vehicles per hour)
r = annual growth rate
n = number of projection years = future projection year – existing year

4.1.1. Growth Rate Analysis

The anticipated annual background growth in traffic was based on traffic assignments from the ARC's activity-based travel demand model (ABM). The total entering volumes at each of the study intersections from the 2015 and 2040 model were compared to calculate annual growth in traffic at each of the study intersections. Based on this analysis, the average annual growth rates proposed at each of the study intersections is shown in **Table 5**. Detailed growth rate analysis worksheets are included in Appendix E.

Table 5. Average Annual Traffic Growth Rate at Study Intersections

Study Intersection	Growth Rate	
	Mainline	Sidestreet
Jackson Rd. @ Wallace Rd.	1.50%	1.50%
Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd.	2.50%	1.75%
MLK Jr. Pkwy. (US 19/41) @ Airport Rd./Kalamazoo Dr.	2.00%	1.50%
Arthur K. Bolton Pkwy. (SR 16) @ Green Valley Rd.	2.50%	1.50%
Arthur K. Bolton Pkwy. (SR 16) @ Rehoboth Rd.	2.50%	1.50%
Arthur K. Bolton Pkwy. (SR 16) @ S. McDonough Rd.	2.50%	1.50%
E. McIntosh Rd. @ 9th St.	2.00%	0.50%
MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.)	2.00%	2.00%
Johnston Rd. @ Macon Rd.	1.50%	1.50%
Johnston Rd. @ Green Valley Rd.	1.50%	1.50%
Johnston Rd. @ S. McDonough Rd.	1.50%	1.50%

4.1.2. Other Developments

The traffic generated by the following developments were also accounted for in developing the projected traffic volumes. Information for each development, including traffic studies, size of development and anticipated opening years was obtained from the Three Rivers Regional Commission and the Griffin-Spalding Development Authority. Anticipated net trips generated by each development were added to the study intersections, according to the information provided. The information related to these developments are included in Appendix F.

1. DRI 2549 – Project Buffalo

   This is the Dollar General Distribution Center off Jackson Rd near SR 16 in Butts County. Since this development was open and fully occupied in May 2018, the traffic from this development is already accounted for in the traffic counts collected for this traffic study.

2. DRI 2674 – Jones Petroleum Travel Center

   Jones Petroleum Travel Center is located near the I-75/ SR 16 interchange in Butts County. Since this development was open and fully occupied in November 2019, the traffic from this development is already accounted for in the traffic counts collected for this traffic study.

3. DRI 2678 – Liberty-Butts County Industrial (Liberty Commerce Center 1)

Liberty Commerce Center is located along SR 16 in Butts County near the I-75 interchange. This development has been partially built and occupied. 840,000 s.f. of this distribution center was open in June 2019 and therefore already accounted for in the traffic counts collected for this traffic study. However, the anticipated traffic generated by the to-be-built 240,000 s.f. industrial space is accounted for in this traffic study as additional traffic above and beyond the background traffic growth.

4. DRI 2765 – Liberty Commerce Center 2

   This development is the second phase of the Liberty Commerce Center development. This phase is proposed to be two buildings totaling 1,195,000 s.f. of industrial/distribution space and is expected to be open in 2021. The anticipated traffic generated by this development is accounted for in this traffic study as additional traffic above and beyond the background traffic growth.

5. DRI 2982 – River Park

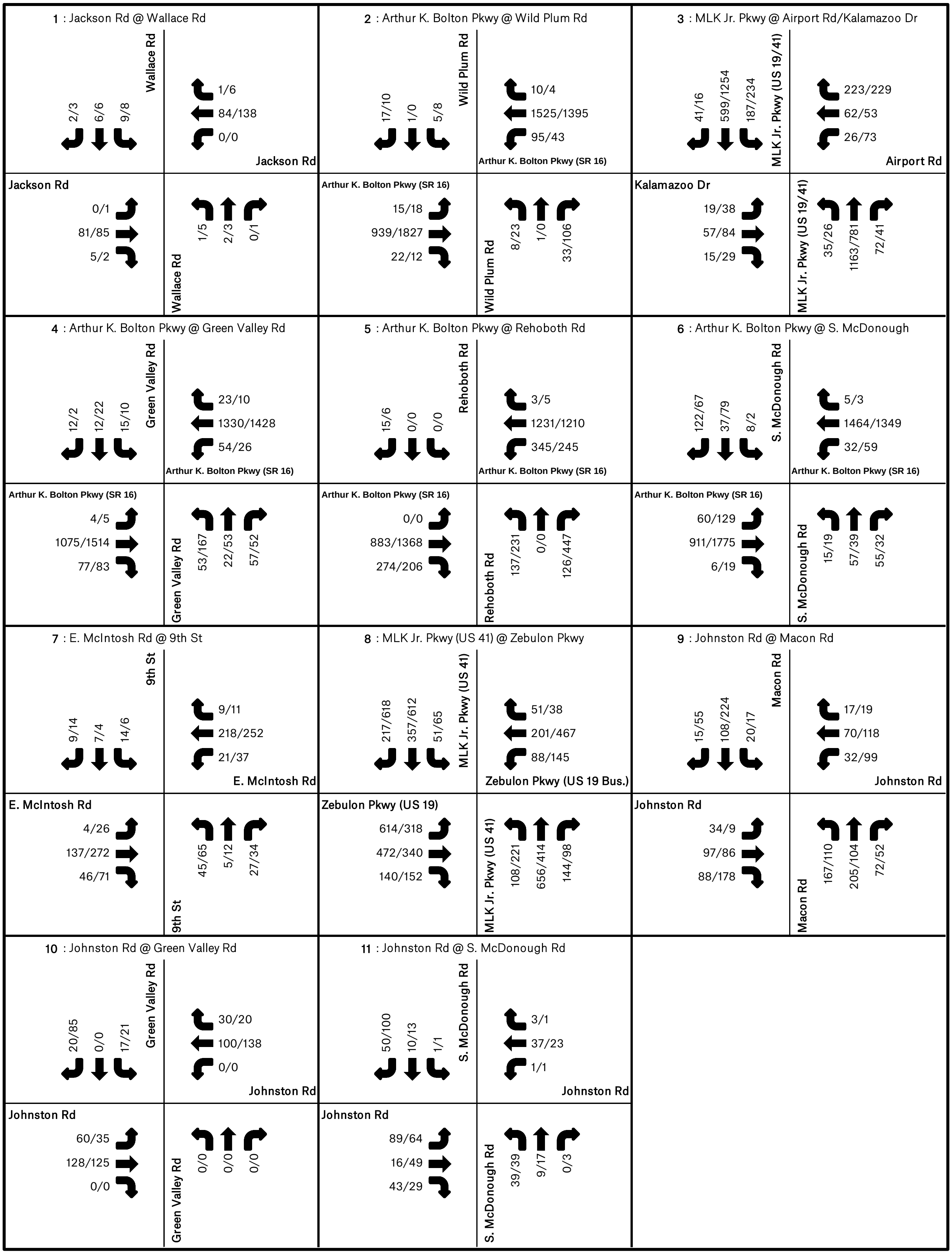
   The River Park development is proposed to be a multi-use development with both industrial and commercial uses just east of the I-75/ SR 16 interchange in Butts County. The rezoning for this development was approved in December 2019. This development is proposed to include 18 million s.f. of industrial space and 800,000 s.f. of commercial space and expected to be completely built by 2039. Since the expected to be built over 20 years, only half the anticipated traffic generated by this development is accounted for in this traffic study as additional traffic above and beyond the background traffic growth.

6. The Lakes at Green Valley Industrial Park

   The Lakes at Green Valley is a 570-acre mixed use development located along SR 16 near the intersection of Rehoboth Rd. in Spalding County. Some lots in this park are already occupied. But there are several lots yet to be built or occupied proposed to include 72,500 s.f., of retail space, 150,000 s.f. of hotel, approximately 100,000 s.f. of office space, and 2.25 million s.f. of industrial building space. These lots are expected to be built and occupied by 2029 and therefore the anticipated traffic generated by this development is accounted for in this traffic study as additional traffic above and beyond the background traffic growth.

The future year (2029) AM and PM peak hour traffic volumes are based on the background growth in traffic as shown in Table 5, and the added trips due to the proposed developments are shown in **Figure 14**.

Figure 14: Future Year (2029) AM and PM Peak Hour Traffic Volumes



4.2. Intersection Capacity Analysis – without Improvements

Based on the future year (2029) AM and PM peak hour turning movement traffic volumes, and the existing traffic control and lane configurations, AM and PM peak hour traffic operations were analyzed at the study intersections to determine the future condition intersection operations if no improvements were to be made. The results of the intersection LOS and delay analysis for the future year (2029) conditions with no improvements made are summarized in **Table 6**. Detailed HCM analyses, including capacity analysis worksheets, are included in Appendix D.

Table 6. Future Year (2029) Intersection Level of Service – without Improvements

Study Intersection	Intersection Control Type	Future Year (2029)	
		AM LOS *Delay (s)*	PM LOS *Delay (s)*
Jackson Rd. @ Wallace Rd.	All Way Stop	A *7.8*	A *8.2*
Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd.	Minor Stop	F *>100.0*	F *>100.0*
MLK Jr. Pkwy. (US 19/41) @ Airport Rd./Kalamazoo Dr.	Signal	B *19.1*	B *18.2*
Arthur K. Bolton Pkwy. (SR 16) @ Green Valley Rd.	Signal	A *9.5*	C *25.7*
Arthur K. Bolton Pkwy. (SR 16) @ Rehoboth Rd.	Signal	B *12.1*	C *24.3*
Arthur K. Bolton Pkwy. (SR 16) @ S. McDonough Rd.	Signal	B *18.4*	C *31.3*
E. McIntosh Rd. @ 9th St.	All Way Stop	A *9.5*	B *11.6*
MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.)	Signal	D *47.7*	E *56.4*
Johnston Rd. @ Macon Rd.	All Way Stop	C *16.0*	C *23.0*
Johnston Rd. @ Green Valley Rd.	Minor Stop	B *10.4*	B *10.9*
Johnston Rd. @ S. McDonough Rd.	Minor Stop	B *12.4*	B *12.1*

Minor street stop controlled intersections show results for the worst movement at the intersection.

As shown in **Table 6**, two out of eleven study intersections operate at LOS D or worse in at least one of the AM and PM peak hours. A summary of findings from the detailed capacity analysis is listed below:

- The northbound through and left-turn movements and the southbound approach at the Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd. intersection operate at LOS F in the AM and PM peak hours. Though these movements experiences high delay, the volumes do not warrant a traffic signal at this intersection. Stop controlled minor movements at a two-way stop-controlled intersection with heavy volumes on the unstopped approaches typically experiences high delay. The major movements at the intersection, namely the through and right turn movements along Arthur K. Bolton Pkwy. (SR 16) operate with no delay.

- The MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.) intersection operates at LOS D in the AM peak hour and at LOS E in the PM peak hour. There are several movements which operate at LOS E or F during either the AM or PM peak hour including the eastbound left-turn movement from Zebulon Pkwy. (US 19) to northbound MLK Jr. Pkwy. (US 41), the Zebulon Pkwy. (US 19 Bus.) westbound through movement, the northbound left turn movement from MLK Jr. Pkwy. (US 41) to westbound Zebulon Pkwy. (US 19), and the MLK Jr. Pkwy. (US 41) southbound through movement.

4.3. Proposed Improvements

Based on the future year traffic volumes, future year intersection capacity analysis, field observations, and the crash history at the study intersections, the following improvements are proposed to address and mitigate the safety, operational and capacity deficiencies at the study intersections.

Jackson Rd. @ Wallace Rd.

- Install splitter islands along Wallace Rd. approaches to the intersection. Improve the skew slightly by this application.
- Restripe intersection.
- Install raised pavement markers.
- Replace damaged & missing stop signs on east and west legs.
- Install signs restricting truck traffic on Wallace Rd.

Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd.

- Install a Restricted Crossing U-Turn (RCUT) intersection. The RCUT design and the directional crossover U-turns should accommodate WB-67 trucks by the use of expanded paved aprons (bum-outs or “loons”) in the shoulder area opposite to the crossover locations.
- Install signage along The Lakes Pkwy. to redirect traffic destined to SR 16 west (or Griffin downtown) to use the Rehoboth Rd. or the S. McDonough Rd. intersection.
- As more development is built at The Lakes at Green Valley industrial park, monitor traffic volumes; if and when traffic volumes warrant a signal, install a traffic signal.

MLK Jr. Pkwy. (US 19/41) @ Airport Rd./Kalamazoo Dr.

- Repave and restripe intersection.
- Install raised pavement markers and median nose delineators.
- Install backplates with retroreflective borders to the traffic signal head indications.
- Install flashing yellow arrow signal head indications for the eastbound and westbound left-turns.
- Install a warning beacon along MLK Jr. Pkwy. (US 19/41) in the southbound direction to warn the motorists approaching the intersection from the limited access section of MLK Jr. Pkwy. (US 19/41).

- Install the "BE PREPARED TO STOP" advance traffic control sign downstream of the existing Signal Ahead sign along the MLK Jr. Pkwy. (US 19/41) northbound and southbound directions.
- Install Advanced Dilemma-Zone Detection System along the MLK Jr. Pkwy. (US 19/41) northbound and southbound directions.

Arthur K. Bolton Pkwy. (SR 16) @ Green Valley Rd.

- Restripe intersection. In the northbound direction, place the grade crossing pavement marking away from the stop bar so that motorists don't confuse the grade crossing pavement marking for the stop bar.
- Install raised pavement markers.
- Install backplates with retroreflective borders to the traffic signal head indications.
- Install flashing yellow arrow signal head indications for the westbound, northbound and southbound left-turns.
- Install lane line extensions or skip markings through the intersection to assist westbound left turning motorists from Arthur K. Bolton Pkwy. (SR 16) to southbound Green Valley Rd. to maneuver through the intersection and prevent them from encroaching onto vehicles stopped at the northbound left turn lane.
- Repave shoulders with SafetyEdge treatment along the northwest and southwest intersection curb radii.
- Install advance signs interconnected to the traffic signal to warn motorists about train blocking the intersection at Green Valley Rd. Install these signs at Rehoboth Rd. to the east and Wilson Rd. to the west so that motorists can choose alternative routes to avoid the blocked intersection.

Arthur K. Bolton Pkwy. (SR 16) @ Rehoboth Rd.

- Restripe and reposition the stop bars on the eastbound through lanes closer to the traffic signal.
- Remove stop bar across the eastbound right turn lane and install yield bar and yield sign.
- Repair damaged delineator posts.

Arthur K. Bolton Pkwy. (SR 16) @ S. McDonough Rd.

- Restripe intersection. Relocate the stop bar on the southbound left turn lane from S. McDonough Rd. to eastbound Arthur K. Bolton Pkwy. (SR 16) further away from the intersection such that the eastbound left turning vehicles from Arthur K. Bolton Pkwy. (SR 16) to northbound S. McDonough Rd. do not conflict with the southbound left turning vehicles stopped at the stop bar. Install lane line extensions or skip markings through the intersection to assist eastbound left turning motorists from Arthur K. Bolton Pkwy. (SR 16) to northbound S. McDonough Rd. to maneuver through the intersection and prevent them from encroaching onto vehicles stopped at the southbound left turn lane.
- Install raised pavement markers and median nose delineators.
- Install backplates with retroreflective borders to the traffic signal head indications.
- Install flashing yellow arrow signal head indications for the northbound and southbound left-turns.

E. McIntosh Rd. @ 9th St.

- Upgrade pavement markings and install raised pavement markers.
- Repair damage at intersection corners.
- Add "No Through Truck" signs on the N. 9th St. and Pineview Rd. approaches.
- Install intersection ahead warning signs on all approaches.
- As a long term solution, if crashes are a persistent problem, install a roundabout.

MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.)

- Restripe intersection.
- Install raised pavement markers and median nose delineators.
- Construct a longer southbound right-turn lane (from MLK Jr. Pkwy. (US 41) to westbound Zebulon Pkwy.) to provide appropriate lane change and deceleration distances for 55 MPH MLK Jr. Pkwy. (US 41) per AASHTO requirements. In addition, extend the right-turn lane into the Ingles shopping center, and add a narrow concrete median between the two right-turn lanes.
- Install dual left-turn lanes for the eastbound left-turn movement from Zebulon Pkwy. (US 19) to northbound MLK Jr. Pkwy. (US 41). Install flashing yellow arrow signal head indications for the westbound left-turns.
- As a long term solution, install a single-legged Displaced Left-Turn (DLT) intersection by crossing over the eastbound left-turns. Include the corresponding free-flow right-turn bypass lane for the southbound right turn maneuver from MLK Jr. Pkwy. (US 41) to westbound Zebulon Pkwy. (US 19). As part of this design, improve the skew of the intersection by slightly realigning the eastbound Zebulon Pkwy. (US 19) approach and the westbound Zebulon Pkwy. (US 19 Bus./ SR 155) approaches. As an additional improvement displace and cross-over the westbound left turns from Zebulon Pkwy. (US 19 Bus./ SR 155) to southbound MLK Jr. Pkwy. (US 41) with due consideration for maintaining the access for the RaceTrac parcel.
- A long term potential project considered in the vicinity of the intersection (Spalding County CTP-03 Tri-County Crossing: Moreland Rd. extension) to connect Moreland Rd. from the west of MLK Jr. Pkwy. (US 41) to Clark Rd. east of Zebulon Pkwy. (US 19 Bus.) will also benefit the MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.) intersection operation by reducing the turning movement demand at the intersection; especially the southbound left turn movement from MLK Jr. Pkwy. (US 41) to eastbound Zebulon Pkwy. (US 19) and the westbound right turn movement from Zebulon Pkwy. (US 19 Bus./ SR 155) to northbound MLK Jr. Pkwy. (US 41). Though this connection is approximately 1000 feet from the MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.) intersection and therefore might not work as a true overall Quadrant Road intersection, the connection will still benefit the intersection operation.

Johnston Rd. @ Macon Rd.

- Reconstruct and repave Johnston Rd. between Macon Rd. and S. McDonough Rd. to correct the vertical sight lines at the intersection and improve the pavement conditions.
- Restripe intersection.
- Install raised pavement markers.

- As a long term solution, install a roundabout. A roundabout should be especially considered with the Phase 2 of the Griffin South Bypass project (GDOT P.I. # 007871).

Johnston Rd. @ Green Valley Rd.

- Repave and restripe intersection.
- Install raised pavement markers.
- As a long term solution, relocate Green Valley Rd. to intersect S. McDonough Rd. north of Johnston Rd. and eliminate the Johnston Rd. @ Green Valley Rd. intersection. This relocation should be especially considered with the Phase 2 of the Griffin South Bypass project (GDOT P.I. # 007871).

Johnston Rd. @ S. McDonough Rd.

- Install splitter islands along S. McDonough Rd. approaches to the intersection. Improve the skew slightly by this application.
- Repave and restripe intersection.
- Install raised pavement markers.
- A roundabout should be considered with the Phase 2 of the Griffin South Bypass project (GDOT P.I. # 007871).

4.5. Intersection Capacity Analysis – with Improvements

Based on the future year (2029) AM and PM peak hour turning movement traffic volumes, and the proposed traffic control and lane configurations, AM and PM peak hour traffic operations were analyzed at the study intersections to determine the benefits of the proposed improvements in the future condition. The results of the intersection LOS and delay analysis for the future year (2029) conditions with the proposed improvements are summarized in **Table 7**. There are several intersections where the proposed improvements are aimed at enhancing safety and operations at these intersections and are not expected to explicitly increase the capacity of these intersections. Therefore the LOS and delay at these intersections are not reported in **Table 7**. Detailed HCM analyses, including capacity analysis worksheets, are included in Appendix D.

Table 7. Future Year (2029) Intersection Level of Service – with Improvements

Study Intersection	Intersection Control Type	Future Year (2029) AM LOS *Delay (s)*	Future Year (2029) PM LOS *Delay (s)*
Jackson Rd. @ Wallace Rd.	All Way Stop	No capacity improvements.	
Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd.	RCUT	A *1.3*	A *2.6*
MLK Jr. Pkwy. (US 19/41) @ Airport Rd./Kalamazoo Dr.	Signal	No capacity improvements.	
Arthur K. Bolton Pkwy. (SR 16) @ Green Valley Rd.	Signal	No capacity improvements.	
Arthur K. Bolton Pkwy. (SR 16) @ Rehoboth Rd.	Signal	No capacity improvements.	
Arthur K. Bolton Pkwy. (SR 16) @ S. McDonough Rd.	Signal	No capacity improvements.	
E. McIntosh Rd. @ 9th St.	Roundabout	A *4.5*	A *5.4*
MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.)	Signal with EB dual left turn	C 32.0	D *45.8*
	Displaced Left-Turn (1-leg)	C 25.9	C *25.0*
Johnston Rd. @ Macon Rd.	Roundabout	A *6.6*	A *7.6*
Johnston Rd. @ Green Valley Rd.	Minor Stop	No capacity improvements.	
Johnston Rd. @ S. McDonough Rd.	Minor Stop	No capacity improvements.	

As shown in **Table 7**, all intersections where capacity improvements are proposed operate at LOS C or better during both the AM and PM peak hours. A summary of findings from the detailed capacity analysis are listed below:

Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd.

- With the installation of an RCUT, the overall intersection delay at the Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd. intersection is negligible. It should be noted that the side-street approaches (northbound and southbound Wild Plum Rd. approaches) still experiences considerable delay of approximately 30s in the AM peak hour and approximately 50s in the PM peak hour, predominantly due to the heavy traffic along mainline Arthur K. Bolton Pkwy. (SR 16). However, this delay is significantly better (more than 90%) compared to the minor stop intersection control condition (without improvement condition). Additionally, the RCUT is also better from a safety performance standpoint when compared to the minor stop intersection control condition by reducing Property-Damage-Only (PDO) crashes by approximately 30% and Injury/Fatal crashes by approximately 50%. As a project is developed to construct an RCUT, other intersection controls such as a conventional traffic signal and a roundabout should also be considered as potential alternatives. Though the projected future traffic volumes at this intersection based on current estimates does not meet thresholds for installing a traffic signal, the traffic volumes at this intersection should be monitored as more development is built and occupied at The Lakes at Green Valley Industrial Park.

E. McIntosh Rd. @ 9th St.

- A roundabout at the E. McIntosh Rd. @ 9th St. intersection operates at LOS A during both AM and PM peak hours which are comparable to the all-way stop-control condition. However, the roundabout is a far safer intersection control when compared to the all-way stop-control condition by significantly reducing angle crashes and crashes resulting in an injury or a fatality.

MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.)

- With the installation of a second left turn lane for the eastbound left-turn movement from Zebulon Pkwy. (US 19) to northbound MLK Jr. Pkwy. (US 41), the LOS is improved to a C during the AM peak hour and to LOS D during the PM peak hour at the MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.) intersection.
- With the installation of a Displaced Left-Turn intersection, the overall intersection delay at the MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.) intersection is significantly improved compared to the traffic signal control condition at the intersection and operates at a LOS C in both AM and PM peak hours.
- The long term potential project considered in the vicinity of the intersection to connect Moreland Rd. from the west of MLK Jr. Pkwy. (US 41) to Clark Rd. east of Zebulon Pkwy. (US 19 Bus.) will benefit the MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.) intersection operation by reducing the turning movement demand at the intersection.

Johnston Rd. @ Macon Rd.

- A roundabout at the Johnston Rd. @ Macon Rd. intersection operates at LOS A during both AM and PM peak hours and better than the all-way stop-control condition. Additionally, the roundabout is a far safer intersection control when compared to the all-way stop-control condition by significantly reducing angle crashes and crashes resulting in an injury or a fatality.

5. Conclusion and Summary of Findings

1. Under the existing year (2019) conditions, nearly all of the study intersections operate at LOS C or better in the AM and PM peak hours. The exception is the Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd. intersection; Wild Plum Road, which is an unsignalized and stop-controlled, currently operates at LOS E in the AM and PM peak hours due to the delay experienced by vehicles on the northbound and southbound approaches. Stop controlled minor movements at a two-way stop-controlled intersection with heavy volumes on the unstopped approaches typically experience high delay. The major movements at the intersection, namely the through and right turn movements along Arthur K. Bolton Pkwy. (SR 16), operate with no delay.
2. Based on the expected growth in traffic at the study intersections, if no improvements are made two out of eleven study intersections are projected to operate at LOS D or worse in at least one of the AM and PM peak hours during the future year (2029). These two intersections are the Arthur K. Bolton Pkwy. (SR 16) @ Wild Plum Rd. intersection and the MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.) intersection.
3. Based on the future year (2029) traffic volumes, future year intersection capacity analysis, field observations, and the crash history at the study intersections, several improvements are proposed to address and mitigate the safety, operational and capacity deficiencies at the study intersections.
4. With the proposed improvements all study intersections are projected to operate at LOS C or better in the AM and PM peak hours during the future year (2029).

6. Appendices

A. Hourly Distribution of Traffic Volumes from GDOT’s TADA Count Stations
B. Raw Traffic Counts
C. Detailed Crash Analysis
D. Intersection Capacity Analyses
E. Intersection Growth Rate Analyses
F. Other Development Information