# Spalding County Freight Cluster Plan

## Traffic Study Report

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For

Spalding COUNTY

In cooperation with

ARC ATLANTA REGIONAL COMMISSION

Griffin Growing TOGETHER

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# 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.

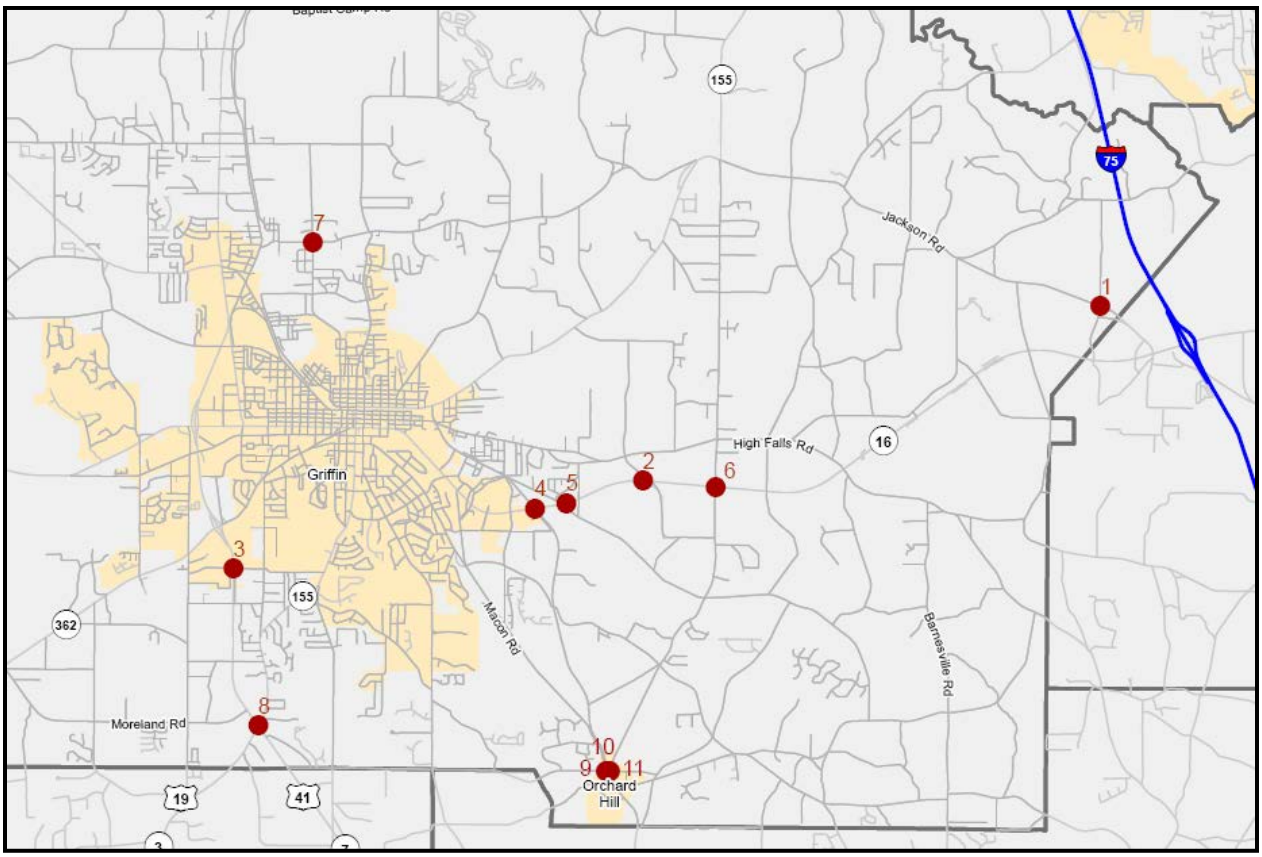
# 2. Selection of Intersections for the Traffic Study

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*

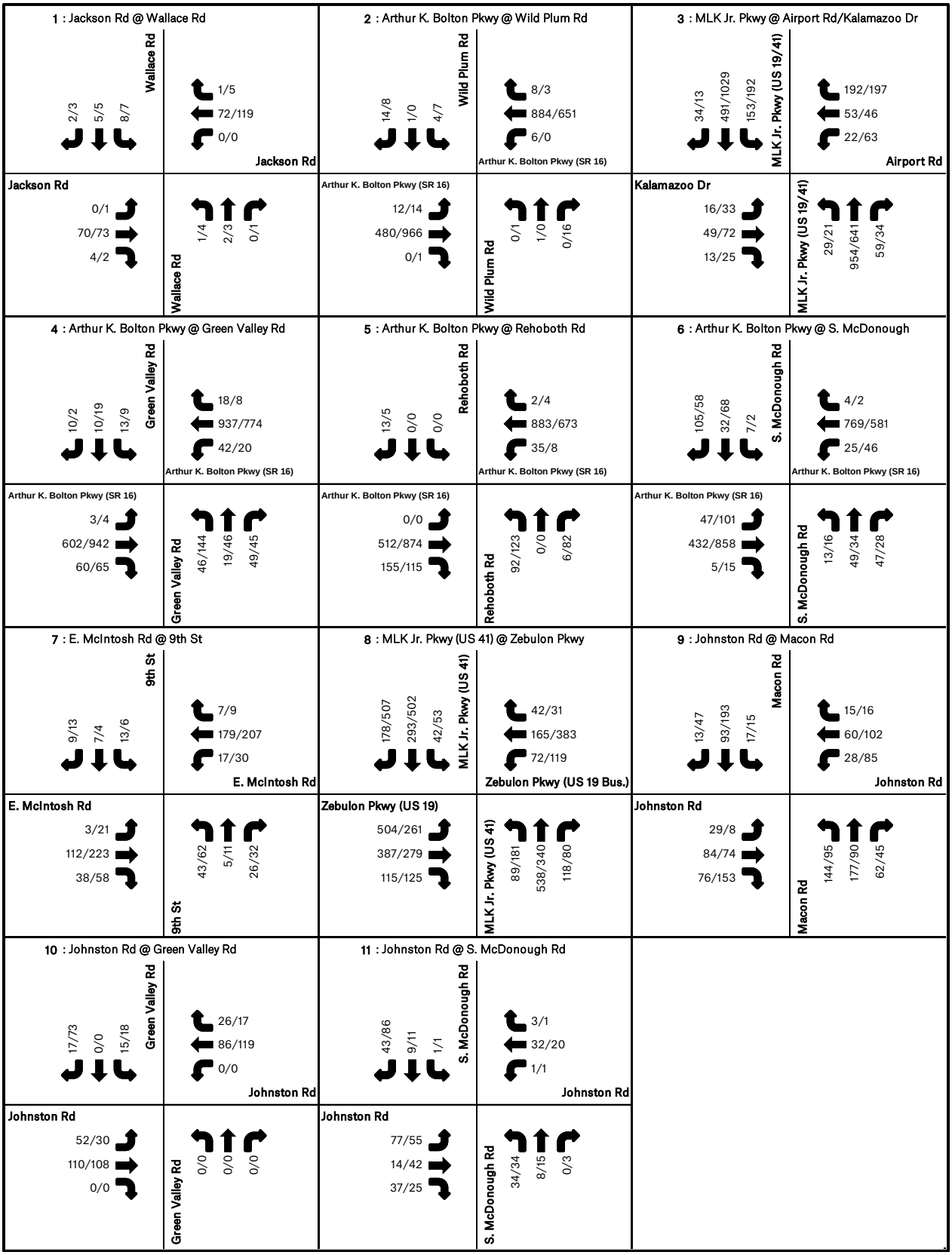



# 3. Existing Conditions

## 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<br>50% angle |
| MLK Jr. Pkwy. (US 19/41) @ Airport Rd./Kalamazoo Dr. | 11 | 25% | 0 | 66% rear end<br>24% angle |
| Arthur K. Bolton Pkwy. (SR 16) @ Green Valley Rd. | 6 | 32% | 0 | 52% rear-end<br>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<br>38% angle |
| Arthur K. Bolton Pkwy. (SR 16) @ S. McDonough Rd. | 7 | 38% | 0 | 43% not a collision with motor vehicle<br>22% rear-end |
| E. McIntosh Rd. @ 9th St. | 4 | 50% | 0 | 40% angle<br>30% not a collision with motor vehicle |
| MLK Jr. Pkwy. (US 41) @ Zebulon Pkwy. (US 19 Bus.) | 24 | 39% | 1 | 64% rear-end<br>21% angle |
| Johnston Rd. @ Macon Rd. | 6 | 50% | 0 | 22% angle<br>45% rear-end |
| Johnston Rd. @ Green Valley Rd. | 1 | 25% | 0 | 36% angle<br>38% rear-end |
| Johnston Rd. @ S. McDonough Rd. | 1 | 0% | 0 | 66% angle<br>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

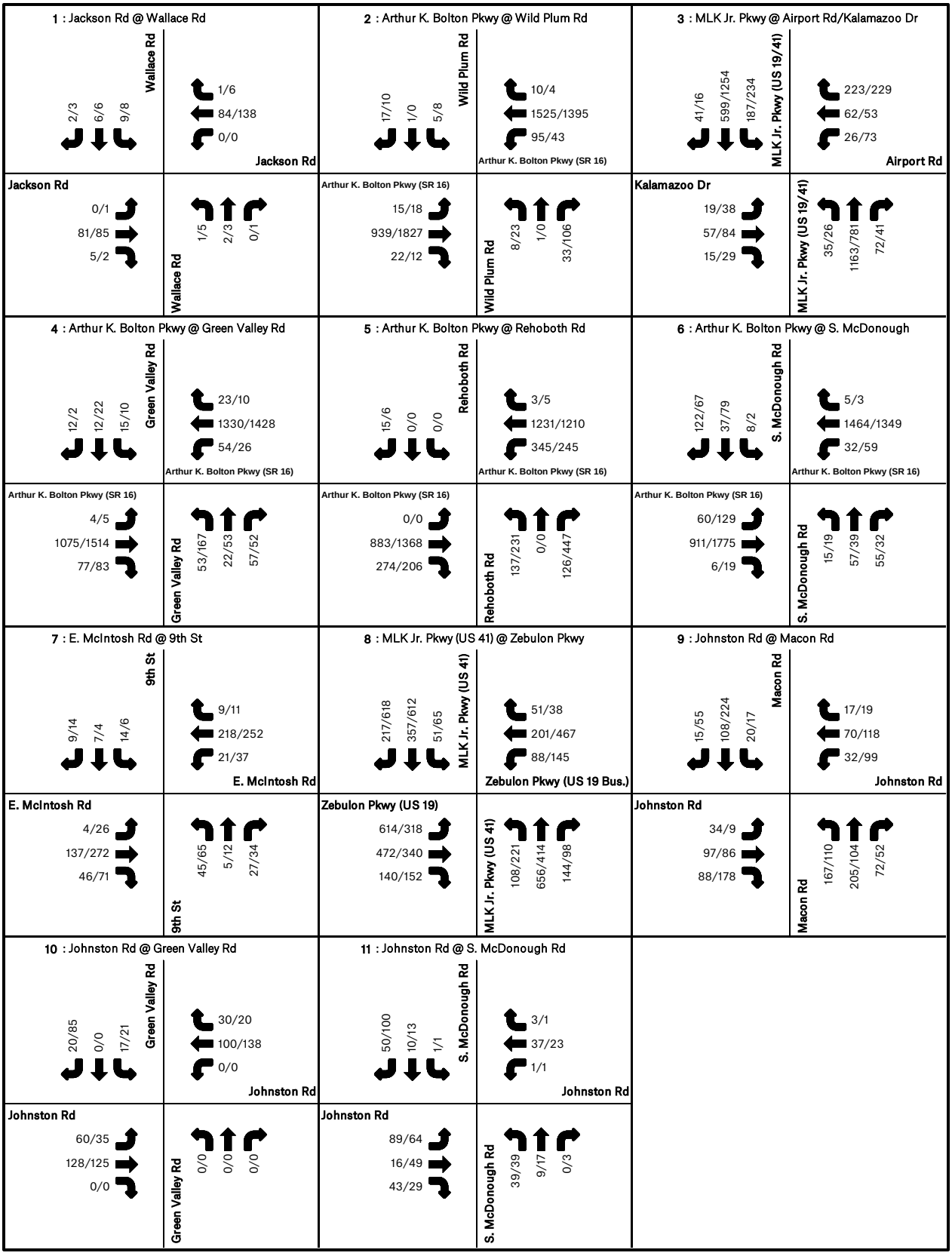
   The River Park development is proposed to be a multi-use development with both industrial and commercial uses just east of the I-75/ SR 16 interchange in Butts County. The rezoning for this development was approved in December 2019. This development is proposed to include 18 million s.f. of industrial 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)* | 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