Freight Cluster Plan

Powered by Aerotropolis Atlanta CIDs

TASK 5: TRAFFIC STUDY

TECHNICAL MEMORANDUM

REVISED NOVEMBER 2020

PREPARED BY:

Gresham Smith

MODERN MOBILITY partners

PLANNERS FOR ENVIRONMENTAL QUALITY
PEQ
Urban Planning Consultants

Acknowledgements

PREPARED FOR AEROTROPOLIS ATLANTA COMMUNITY IMPROVEMENT DISTRICTS IN ASSOCIATION WITH LOCAL PARTNERS:

AEROTROPOLIS ATLANTA ALLIANCE

ATLANTA REGIONAL COMMISSION

CITY OF COLLEGE PARK

CITY OF EAST POINT

CITY OF FOREST PARK

CITY OF HAPEVILLE

CITY OF SOUTH FULTON

CLAYTON COUNTY

FULTON COUNTY

GEORGIA DEPARTMENT OF TRANSPORTATION

HARTSFIELD-JACKSON ATLANTA INTERNATIONAL AIRPORT

PREPARED BY: Gresham Smith

IN PARTNERSHIP WITH: MODERN MOBILITY partners

PLANNERS FOR ENVIRONMENTAL QUALITY PEQ Urban Planning Consultants

ON COVER: VIEW OF I-285 FROM SOUTH LOOP RD.

ALL IMAGES COURTESY OF GRESHAM SMITH, MODERN MOBILITY PARTNERS, OR PEQ UNLESS OTHERWISE SPECIFIED

Table of Contents

Acknowledgements ii
1) Introduction and Overview 1
2) Selection of Intersections for the Traffic Study 1
3) Existing Conditions 4
Traffic Volumes 4
Crash History 6
Field Review 17
Intersection Capacity Analysis 35
4) Future Conditions 38
Traffic Volumes 38
Intersection Capacity Analysis – without Improvements 44
Proposed Improvements 47
Intersection Capacity Analysis – with Improvements 56
5) Conclusion and Summary of Findings 60
Appendices 61

1) Introduction and Overview

As part of this Freight Cluster Plan, a detailed traffic study was conducted at several key intersections within the study area. 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

Intersections were selected for the traffic study by conducting a quantitative and qualitative assessment of key intersections within the study area. The quantitative assessment was based on the following factors:

- total intersection entering volume – sum of all approach volumes at the intersection, as obtained from the ARC's activity-based travel demand model (ABM),
- total intersection entering truck volume – sum of all approach truck volumes at the intersection as obtained from the ABM,
- percent trucks – percentage of trucks entering the intersection, as obtained from the ARC's activity-based travel demand model (ABM),
- number of crashes – number of all reported crashes at the intersection in the last year (2018),
- crashes involving a commercial vehicle – number of all reported crashes at the intersection in the last five years (2014 – 2018) involving a commercial vehicle,[1]
- total crash rate – rate of crash occurrence at the intersection normalized by the total intersection entering volume (a ratio expressed as number of crashes per million entering vehicles), and
- percent truck crashes – percentage of reported crashes involving a commercial vehicle.

The qualitative factors considered were as follows:

- whether the intersection is located in or adjacent to an industrial or commercial area,
- whether the intersection is identified in a prior plan or study as needing improvements,
- whether the intersection is included in a proposed or planned project,
- whether the intersection is within the AACIDs boundary, and
- whether the intersection is within one of the eight partner jurisdictions for this freight cluster plan (City of Atlanta, Clayton County, City of College Park, City of East Point, City of Forest Park, City of Hapeville, City of South Fulton, and City of Union City)

[1] A five-year period was selected for the collection of crashes involving commercial vehicles in order to obtain a statistically significant representation of these crashes.

Twenty three (23) candidate intersections were identified based on discussions with this Freight Cluster Plan's Project Management Team. These were identified based on a review of the study area with respect to observed traffic congestion, logical routes to and from traffic generators and major roadway facilities. These candidate intersections were then evaluated based on the aforementioned quantitative and qualitative factors and the following ten (10) intersections were selected for the traffic study. A detailed evaluation matrix analyzing the candidate intersections with respect to the factors and selection of the ten (10) intersections is included in Appendix A.

- Ben Hill Road @ Welcome All Road
- Loop Road @ Charles W. Grant Parkway/Maynard H. Jackson Jr. Boulevard
- North Commerce Drive @ Washington Road
- Riverdale Road (SR 139) @ Phoenix Boulevard/Forest Parkway (SR 331)
- South Fulton Parkway (SR 14) @ Majestic Place
- Old National Highway (SR 279) @ Sullivan Road
- Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway
- Camp Creek Parkway (SR 6) @ North Commerce Drive
- Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3)
- Loop Road @ Toffie Terrace

In addition to the ten (10) intersections listed above, eight (8) more intersections were selected based on stakeholder input. Input from stakeholders were solicited through a series of activities including a bus tour, freight forum, telephone interviews, and intercept surveys. These eight (8) intersections are as follows:

- Riverdale Road (SR 139) @ Sullivan Road
- South Loop Road @ Lake Mirror Road
- Clark Howell Highway @ Lake Mirror Road
- North Commerce Drive @ Centre Parkway
- Riverdale Road (SR 139) @ West Fayetteville Road (SR 314)
- Riverdale Road (SR 139) @ Global Gateway Connector
- Welcome All Road @ Scarborough Road
- Camp Creek Parkway (SR 6) @ Washington Road

The eighteen (18) intersections, ten (10) based on a quantitative and qualitative analysis and eight (8) additional based on stakeholder input were selected for the traffic study are shown in Figure 5-1.

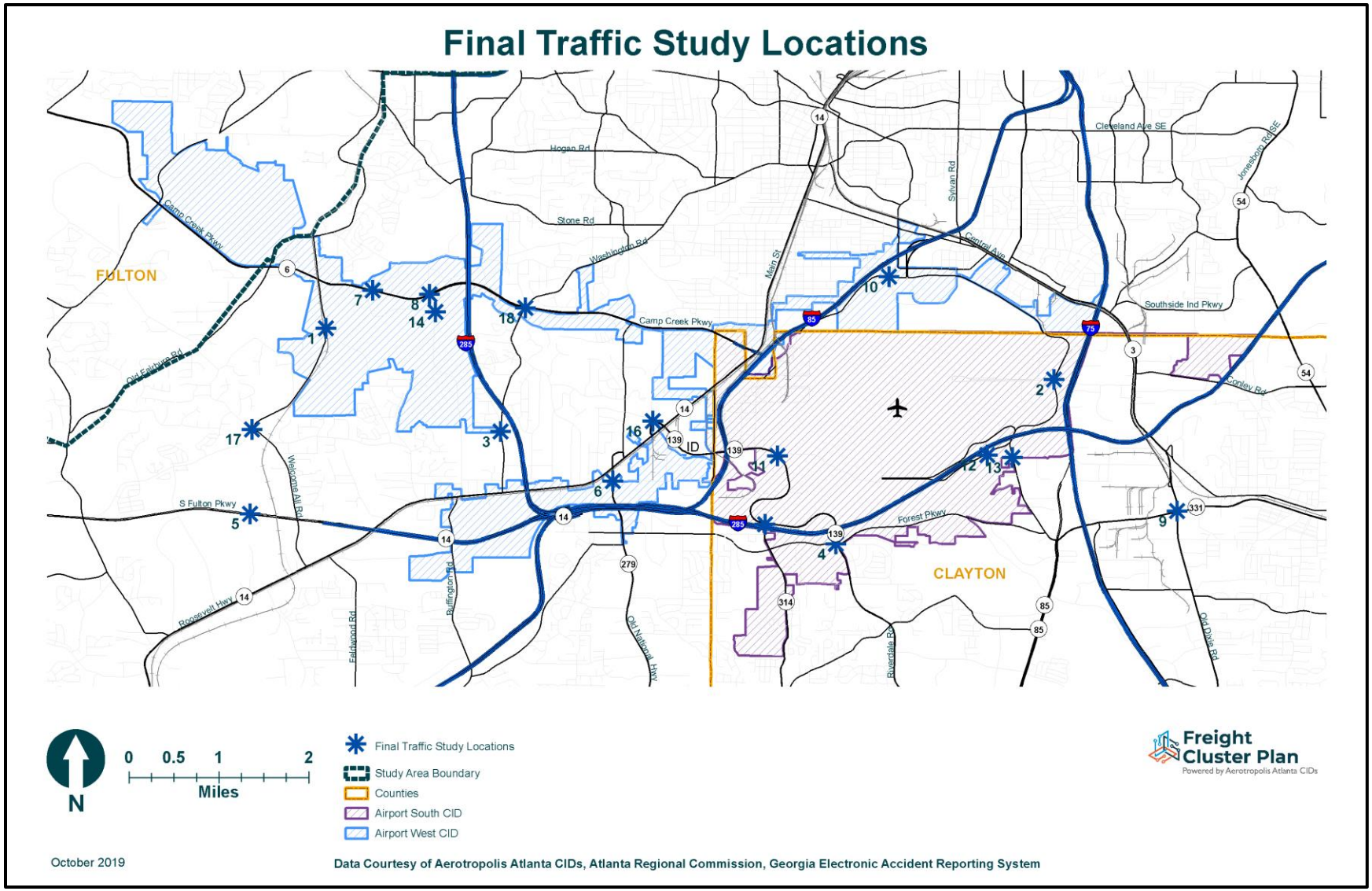

FIGURE 5-1. TRAFFIC STUDY LOCATIONS

3) Existing Conditions

Traffic Volumes

AM and PM peak period turning movement counts were obtained at the eighteen (18) study intersections by National Data & Surveying Services. The counts were collected on September 12, 2019 and November 07, 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 B. The raw traffic turning movement counts at the eighteen (18) study intersections are included in Appendix C. The existing year (2019) AM and PM peak hour traffic volumes based on the counts are shown in Figure 5-2 and Figure 5-3.

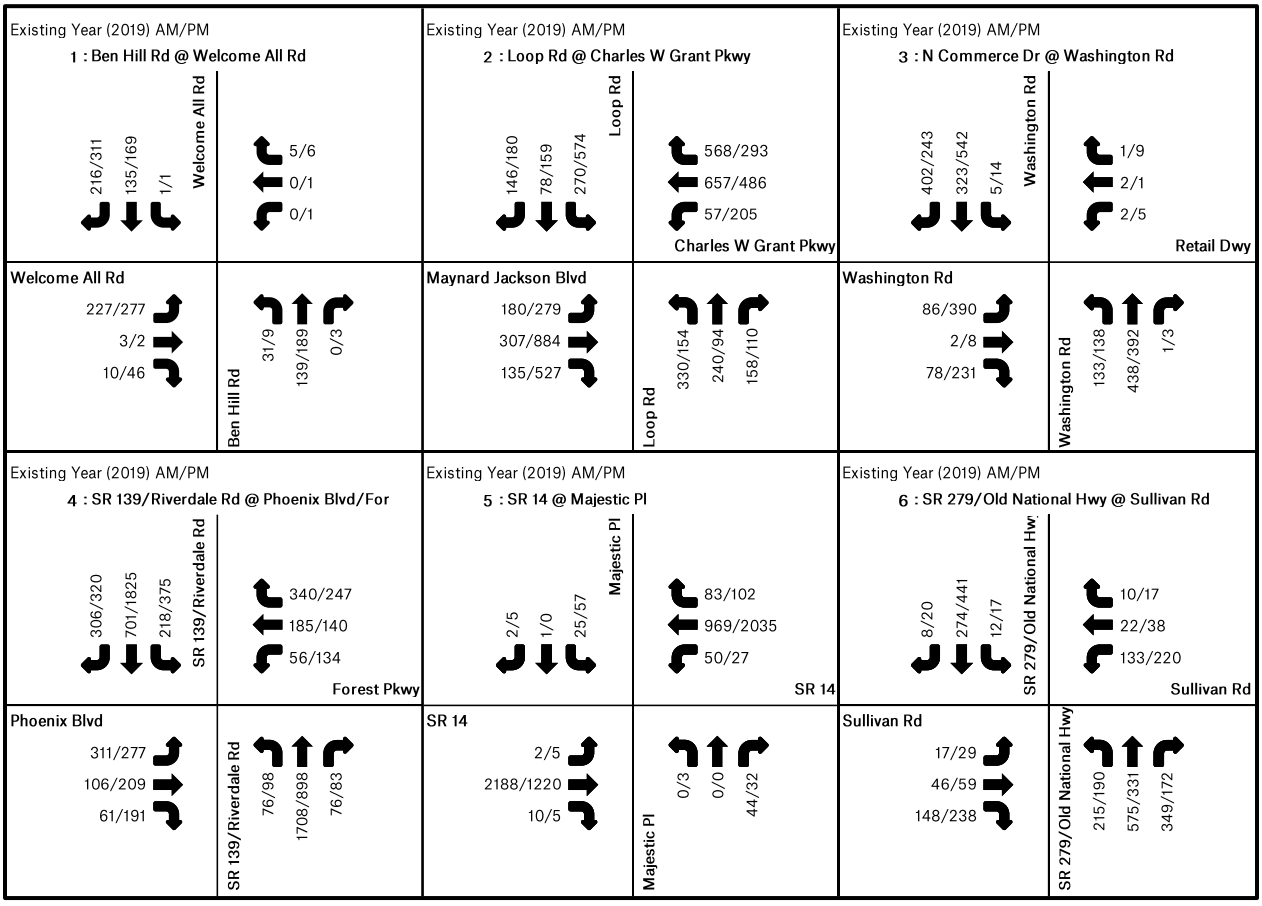

FIGURE 5-2. EXISTING YEAR (2019) AM AND PM PEAK HOUR TRAFFIC VOLUMES

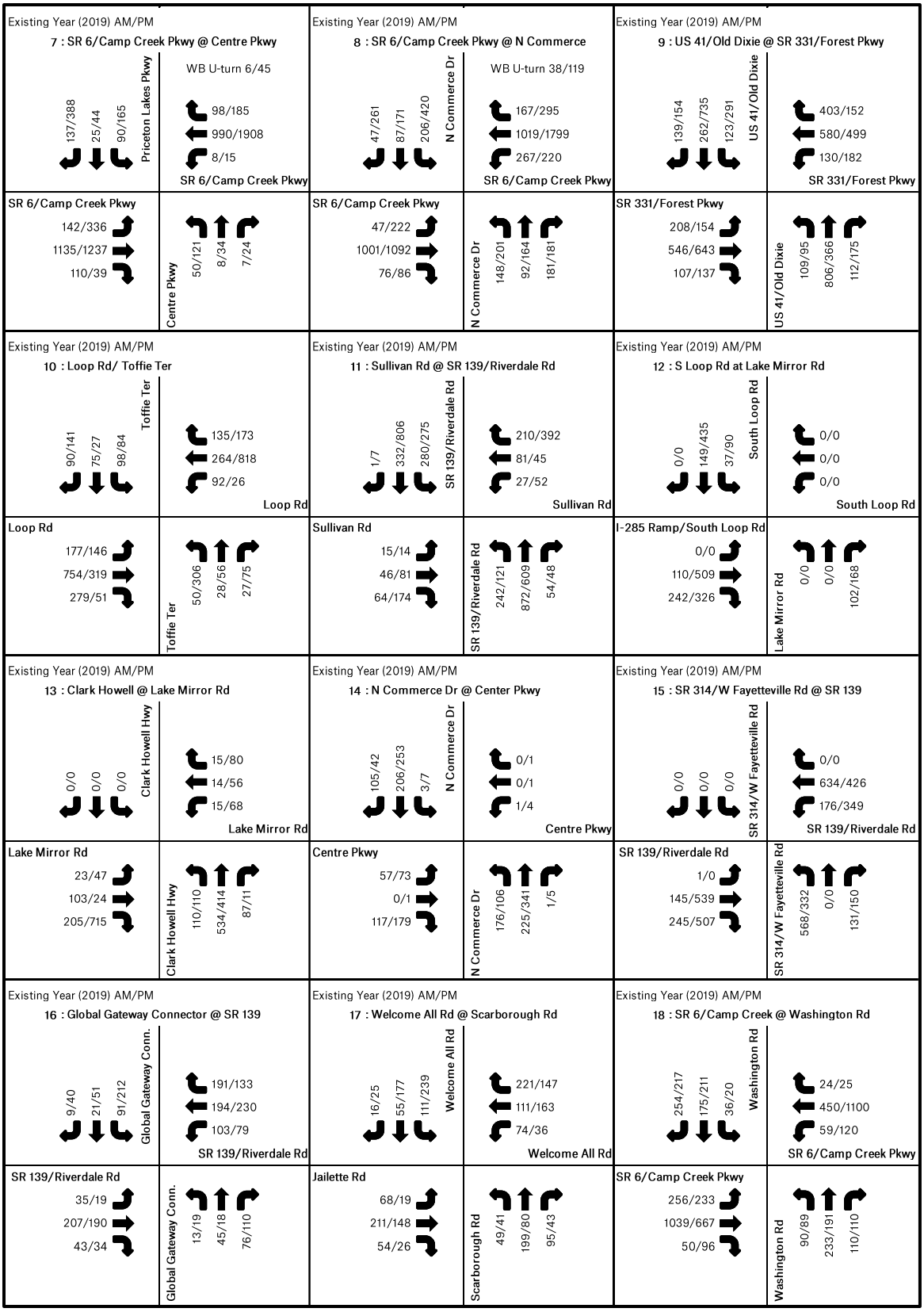

FIGURE 5-3. EXISTING YEAR (2019) AM AND PM PEAK HOUR TRAFFIC VOLUMES (CONTINUED)

A brief summary of the traffic volumes at the intersections as shown in Figure 5-2 and Figure 5-3 are included in the following sections.

Ben Hill Road @ Welcome All Road

Welcome All Road makes a turn at this intersection from north to west and represents the north and west legs of this intersection. Consequently, the heaviest traffic flows at this intersection is the southbound right turn from Welcome All Road to westbound Ben Hill Road and the eastbound left turn from Ben Hill Road to northbound Welcome All Road. These two turning movements that have to drive over the at-grade railroad crossing just west of this intersection contribute to several operational challenges at this intersection.

Loop Road @ Charles W. Grant Parkway/Maynard H. Jackson Jr. Boulevard

The west leg at this intersection (Maynard H. Jackson Jr. Boulevard) is the entrance to the Atlanta International Terminal. The east leg at this intersection (Charles W. Grant Parkway) has an interchange along I-75. The north and south legs at this intersection provide access to the airport offices and cargo locations. There are heavy traffic volumes at this intersection in all directions including turning movements especially oriented towards and from the Atlanta International Terminal and I-75. The traffic volumes at this intersection are expected to be impacted by the South Cargo expansion and relocation. The Mountainview development and the Conley Road extension to Charles W. Grant Parkway is also expected to add traffic to this intersection.

North Commerce Drive @ Washington Road

Washington Road north of the intersection has an interchange along I-285. The west leg at this intersection (North Commerce Drive) provides access to key freight activity centers including the Duke Realty property off of North Commerce Drive and Camp Creek Marketplace in the northwest quadrant of Camp Creek Parkway (SR 6) and I-285. Consequently, the heaviest traffic flows at this intersection include the southbound right turn from Washington Road to westbound North Commerce Drive and the eastbound left turn from North Commerce Drive to northbound Washington Road. The northbound left turn from Washington Road to westbound North Commerce Drive and the eastbound right turn from North Commerce Drive to southbound Washington Road also exhibit substantial turning traffic at this intersection.

Riverdale Road (SR 139) @ Phoenix Boulevard/Forest Parkway (SR 331)

Riverdale Road (SR 139) is a major north-south roadway in Clayton County and the north leg at this intersection provides direct access to I-285 via an interchange. The traffic volumes are considerably high along all legs of this intersection to and from I-285 along the north leg of this intersection, including the southbound right turn from Riverdale Road (SR 139) to westbound Phoenix Boulevard, the southbound left turn from Riverdale Road (SR 139) to

eastbound Forest Parkway (SR 331), the westbound right turn from Forest Parkway (SR 331) to northbound Riverdale Road (SR 139) and the eastbound left turn from Phoenix Boulevard to northbound Riverdale Road (SR 139). This intersection is expected to see increased levels of traffic due to the South Cargo expansion and relocation.

South Fulton Parkway (SR 14) @ Majestic Place

The majority of traffic at this unsignalized intersection is the eastbound through traffic and the westbound through traffic along South Fulton Parkway (SR 14). The traffic oriented to and from the north and south legs of this intersection (Majestic Place) is oriented towards the east. The east leg at this intersection provides access to Roosevelt Highway (US 29), I-85, and I-285. There are several DRIs (DRI 2737, DRI 2745, DRI 2759, DRI 2767, and DRI 2854) in the area that are expected to significantly increase the traffic volumes at this intersection.

Old National Highway (SR 279) @ Sullivan Road

The majority of traffic at this intersection is along Old National Highway (SR 279). Old National Highway (SR 279) south of this intersection has an interchange along I-285 and the east leg of this intersection (Sullivan Road) provides access to the Airport. Consequently the northbound right turn from Old National Highway (SR 279) to eastbound Sullivan Road and the westbound left turn from Sullivan Road to southbound Old National Highway (SR 279) exhibit heavy traffic volumes. This intersection is expected to see increased levels of traffic due to the South Cargo expansion and relocation.

Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway

There is very heavy traffic along eastbound and westbound Camp Creek Parkway (SR 6) at this intersection. The north leg at this intersection (Princeton Lakes Parkway) provides access to the retail developments within the Camp Creek Marketplace. The turning movements in and out of the Camp Creek Marketplace (north leg of the intersection) exhibit heavy volumes, especially the southbound right turn from Princeton Lakes Parkway to westbound Camp Creek Parkway (SR 6) and the eastbound left turn from Camp Creek Parkway (SR 6) to northbound Princeton Lakes Parkway. There are also several westbound U-turning vehicles along Camp Creek Parkway (SR 6) at this intersection coming from Carmia Drive east of this intersection that are destined to go east along Camp Creek Parkway (SR 6) towards I-285. At the time of collecting traffic counts at this intersection, the I-285 at Camp Creek Parkway (SR 6) interchange was under construction. The queuing and congestion caused by the construction and motorists avoiding the interchange due to construction likely resulted in a lower levels of traffic volume at this intersection. With the completion of the interchange construction, higher levels of traffic volumes could be expected at this intersection. Therefore a higher growth rate will be assumed (higher than indicated by the historical data and growth rates indicated by the ARC's activity-based travel demand model) for future analysis. This intersection is expected to see increased levels of traffic due to the South Cargo expansion and relocation and also due to several DRIs in the area (2896 and 3063).

Camp Creek Parkway (SR 6) @ North Commerce Drive

There is very heavy traffic along eastbound and westbound Camp Creek Parkway (SR 6) at this intersection. Camp Creek Parkway (SR 6) east of this intersection has an interchange along I-285. The north leg at this intersection (North Commerce Drive) provides access to the retail developments within the Camp Creek Marketplace. The turning movements in and out of the Camp Creek Marketplace (north leg of the intersection) exhibit heavy volumes, especially the southbound left turn from North Commerce Drive to eastbound Camp Creek Parkway (SR 6). There are also several westbound U-turning vehicles along Camp Creek Parkway (SR 6) at this intersection coming from Marketplace Boulevard east of this intersection that are destined to go east along Camp Creek Parkway (SR 6) towards I-285. At the time of collecting traffic counts at this intersection, the I-285 at Camp Creek Parkway (SR 6) interchange was under construction. The queuing and congestion caused by the construction and motorists avoiding the interchange due to construction likely resulted in a lower levels of traffic volume at this intersection. With the completion of the interchange construction, higher levels of traffic volumes could be expected at this intersection. Therefore a higher growth rate will be assumed (higher than indicated by the historical data and growth rates indicated by the ARC's activity-based travel demand model) for future analysis. This intersection is expected to see increased levels of traffic due to the South Cargo expansion and relocation and also due to several DRIs in the area (2896 and 3063).

Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3)

Both Forest Parkway (SR 331) and Old Dixie Road (US 19/41/SR 3) are heavily traveled roadways at this intersection. Forest Parkway (SR 331) west of the intersection has an interchange along I-75. Old Dixie Road (US 19/41/SR 3) north of the intersection has an interchange along I-285. All left turns at this intersection and the westbound right turn from Old Dixie Road (US 19/41/SR 3) to northbound Forest Parkway (SR 331) exhibit heavy turning traffic at this intersection. This intersection is expected to see increased levels of traffic due to the South Cargo expansion and relocation and also due to the Mountainview development.

Loop Road @ Toffie Terrace

The west leg of this intersection (Loop Road) provides access to and from I-85 South and the east leg provides access to I-85 North and also to airport cargo facilities. The south leg of the intersection provides access to airport offices. Other than the eastbound and westbound through traffic volumes, the northbound left turn from Toffie Terrace to westbound Loop Road during the PM peak hour and the eastbound right turn from Loop Road to southbound Toffie Terrace during the AM peak hour exhibit substantial turning traffic at this intersection.

Riverdale Road (SR 139) @ Sullivan Road

Riverdale Road (SR 139) north of the intersection provides access to I-85 and south of the intersection provides access to I-285 and the east leg of this intersection (Sullivan Road)

provides access to the Airport. The left turns along Riverdale Road (SR 139) and the westbound right turn from Sullivan Road to northbound Riverdale Road (SR 139) exhibit heavy traffic volumes. This intersection is expected to see increased levels of traffic due to the South Cargo expansion and relocation.

South Loop Road @ Lake Mirror Road

South Loop Road forms the one-way west and north legs of the intersection; west of the intersection South Loop Road carries traffic from an eastbound exit along I-285 and north of the intersection carries traffic from a westbound exit along I-285. The east leg of this intersection provides access to both directions of I-285. This intersection carries modest amount of commuter traffic and large amount of airport cargo destined to and from I-285. This intersection is expected to see increased levels of traffic due to the South Cargo expansion and relocation.

Clark Howell Highway @ Lake Mirror Road

The one-way north leg of this intersection (Clark Howell Highway) provides access to both directions of I-285. This intersection carries modest amount of traffic, with the eastbound right turn from Lake Mirror Road to southbound Clark Howell Highway and the northbound through traffic along Clark Howell Highway being the heaviest. This intersection is expected to see increased levels of traffic due to the South Cargo expansion and relocation.

North Commerce Drive @ Centre Parkway

This intersection provides access to key freight activity centers including the Duke Realty property off of North Commerce Drive and Camp Creek Marketplace in the northwest quadrant of Camp Creek Parkway (SR 6) and I-285. This unsignalized intersection carries considerable amount of traffic along North Commerce Drive with heavy turning traffic associated with the northbound left turn from North Commerce Drive to westbound Centre Parkway and the eastbound right turn from Centre Parkway to southbound North Commerce Drive.

Riverdale Road (SR 139) @ West Fayetteville Road (SR 314)

There is modest amount of eastbound through and westbound through traffic along Riverdale Road (SR 139) at this intersection. The northbound left turn from West Fayetteville Road (SR 314) to westbound Riverdale Road (SR 139) and the eastbound right turn from Riverdale Road (SR 139) to southbound West Fayetteville Road (SR 314) exhibit heavy turning traffic at this intersection. This is a key intersection used by the airport workforce to access various employment locations near and around the airport. This intersection is expected to see increased levels of traffic due to the South Cargo expansion and relocation.

Riverdale Road (SR 139) @ Global Gateway Connector

Riverdale Road (SR 139) makes a turn at this intersection to and from the south leg and the east leg. This intersection carries modest amount of traffic and includes traffic oriented towards the airport and nearby residential subdivisions. This intersection is expected to see increased levels of traffic due to several DRIs in the area (2896 and 3063).

Welcome All Road @ Scarborough Road

Welcome All Road makes a turn at this intersection to and from the north leg and the east leg. All four legs of this all-way stop-controlled intersection carries modest amount of traffic with the southbound left turn from Welcome All Road to eastbound Welcome All Road and the westbound right turn from Welcome All Road to northbound Welcome All Road being the heaviest.

Camp Creek Parkway (SR 6) @ Washington Road

The west leg (Camp Creek Parkway) and the south leg (Washington Road) of this intersection provide access to I-285. There is very heavy traffic along eastbound and westbound Camp Creek Parkway (SR 6) at this intersection. The southbound right turn from Washington Road to westbound Camp Creek Parkway (SR 6) and the eastbound left turn from Camp Creek Parkway (SR 6) to northbound Washington Road exhibit heavy turning traffic volumes. This intersection is expected to see increased levels of traffic due to the South Cargo expansion and relocation and also due to several DRIs in the area (2896 and 3063).

Crash History

Crash data at the eighteen (18) 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 5-1. Detailed analysis of the crash data at the study intersections is included in Appendix D.

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.

TABLE 5-1. SUMMARY OF CRASH HISTORY AT STUDY INTERSECTIONS

Study Intersection	Avg. Crashes per Year	% injury Crashes	Fatal Crashes	Frequent Crash Type
Ben Hill Road @ Welcome All Road	11	13%	0	32% - same direction sideswipe
Loop Road @ Charles W. Grant Parkway/Maynard H. Jackson Jr. Boulevard	35	20%	0	30% angle 46% rear-end
North Commerce Drive @ Washington Road	12	40%	0	55% angle
Riverdale Road (SR 139) @ Phoenix Boulevard/Forest Parkway (SR 331)	56	24%	0	63% rear-end
South Fulton Parkway (SR 14) @ Majestic Place	9	36%	0	47% angle
Old National Highway (SR 279) @ Sullivan Road	27	22%	0	31% angle 38% rear-end
Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway	52	18%	0	67% rear-end
Camp Creek Parkway (SR 6) @ North Commerce Drive	114	15%	0	63% rear-end
Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3)	55	23%	0	22% angle 45% rear-end
Loop Road @ Toffie Terrace	13	23%	0	36% angle 38% rear-end
Riverdale Road (SR 139) @ Sullivan Road	22	51%	0	66% angle 22% rear-end
South Loop Road @ Lake Mirror Road	7	31%	0	46% angle 31% rear-end
Clark Howell Highway @ Lake Mirror Road	2	25%	0	25% angle 33% rear-end
North Commerce Drive @ Centre Parkway	5	23%	0	39% angle 27% rear-end
Riverdale Road (SR 139) @ West Fayetteville Road (SR 314)	23	33%	1	51% angle 22% rear-end
Riverdale Road (SR 139) @ Global Gateway Connector	5	56%	0	63% angle 31% rear-end
Welcome All Road @ Scarborough Road	6	26%	0	65% angle
Camp Creek Parkway (SR 6) @ Washington Road	72	23%	2	65% rear-end

A brief summary of this detailed crash analysis is included in the following sections.

Ben Hill Road @ Welcome All Road

There were an average of 11 reported crashes per year at this intersection with same-direction sideswipe type crashes being the most frequent, which accounted for a third of all crashes. Several of these crashes occurred along Welcome All Road (west leg) as the vehicles were making a left turn (eastbound left from Welcome All Road to northbound Welcome All Road) from one of the dual left turn lanes. The presence of an active rail line crossing the

west leg and sharp curvature of the west leg approaching the stop bar appeared to be contributing to these crashes. There were also 4 crashes in these 5 years involving a train. Three of these involved a truck where the trailer was hit by a train and the other crash involved a bus. All four of the crashes occurred when these vehicles (truck/ bus) were stopped at the traffic signal facing a red traffic signal indication and could not get out of the tracks in time to avoid the collision.

Loop Road @ Charles W. Grant Parkway/Maynard H. Jackson Jr. Boulevard

There were an average of 35 reported crashes per year at this intersection with almost half of the crashes being rear-end type crashes and about a third being angle type crashes. A large portion of the rear-end crashes occurred along Loop Road in the southbound direction. This is most likely due to congestion and queuing as a result of heavy traffic, including the southbound left turn movement from Loop Road to eastbound Charles W. Grant Parkway and the southbound right-turn movement from Loop Road to westbound Maynard H. Jackson Jr. Boulevard. Even though there is a slight horizontal curve along Loop Road in the southbound direction, the field review did not indicate a lack of sight distance. A majority of the angle crashes were left turn crashes evenly distributed in all directions.

North Commerce Drive @ Washington Road

There were an average of 12 reported crashes per year at this intersection with more than half of the crashes being angle type crashes. Left turning vehicles and those especially along North Commerce Drive in the northbound direction contributed to a large portion of the angle type crashes. This maneuver is a permissive only operation with no exclusive left turn phase. The crashes at this intersection exhibited high severity with almost 40% of the crashes resulting in an injury. There was one crash involving a pedestrian, where a vehicle traveling along Washington Road in the northbound direction lost control due to a tire blow-out and hit a pedestrian who was sitting on the MARTA bench located north of the intersection.

Riverdale Road (SR 139) @ Phoenix Boulevard/Forest Parkway (SR 331)

An average of 56 crashes per year were reported at this intersection with rear-end type crashes being the most frequent type of crashes at almost 63%. Most of the rear-end crashes were along Riverdale Road (SR 139) in the northbound direction (going towards I-285) attributable to traffic congestion. There was one crash involving a pedestrian. This crash occurred south of the intersection where a vehicle traveling south along Riverdale Road (SR 139) hit a pedestrian who was crossing Riverdale Road (SR 139) at an unmarked location (not at a crosswalk).

South Fulton Parkway (SR 14) @ Majestic Place

An average of 9 crashes per year were reported at this intersection with almost half of the crashes being angle type crashes. Most of the angle crashes were attributable to left turning

vehicles failing to yield to oncoming traffic most likely selecting inadequate gaps in traffic (due to high speed of traffic along South Fulton Parkway) to make the left turn. The crashes at this intersection exhibited high severity with more than a third of the crashes resulting in an injury.

Old National Highway (SR 279) @ Sullivan Road

There were an average of 27 reported crashes per year at this intersection with almost a third of the crashes being rear-end type crashes and about a third being angle type crashes. A large portion of these rear-end crashes occurred along Old National Highway (SR 279) in the northbound direction. Most of the angle crashes were also left turn related crashes along Old National Highway (SR 279) in the northbound direction and along Sullivan Road in the westbound direction. Both of these movements have permissive only operations with no exclusive left turn phase. There was one crash involving a bicyclist. This crash occurred north of the intersection and was the result of a motorist traveling south along Old National Highway (SR 279) improperly passing a bicyclist also traveling south along Old National Highway (SR 279).

Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway

An average of 52 crashes per year were reported at this intersection with rear-end type crashes being the most frequent type of crashes at almost 67%. Most of the rear-end crashes occurred along Camp Creek Parkway (SR 6) in the eastbound and westbound directions and were attributable to traffic congestion.

Camp Creek Parkway (SR 6) @ North Commerce Drive

An average of 114 crashes per year were reported at this intersection with rear-end type crashes being the most frequent type of crashes at almost 63%. A high fraction of the rear-end crashes (approximately 35%) occurred along Camp Creek Parkway (SR 6) in the westbound direction and were attributable to traffic congestion. There were three crashes involving a pedestrian. Two of these crashes occurred east of the intersection where a pedestrian was crossing Camp Creek Parkway (SR 6) at an unmarked location and was hit by a motorist traveling west along Camp Creek Parkway (SR 6). The third occurred west of the intersection near the crosswalk across Camp Creek Parkway (SR 6) where a pedestrian was crossing Camp Creek Parkway (SR 6) during a “DO NOT WALK” pedestrian signal indication and was hit by a motorist traveling east along Camp Creek Parkway (SR 6).

Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3)

An average of 55 crashes per year were reported at this intersection with almost half of the crashes being rear-end type crashes evenly distributed along all four legs of the intersection. These crashes are attributable to traffic congestion. There was one crash involving a bicyclist. This crash was the result of a motorist traveling westbound along Forest Parkway (SR 331)

turning right to go northbound on Old Dixie Road (US 19/41/SR 3). The motorist did not yield to a bicyclist in the crosswalk who was crossing Old Dixie Road (US 19/41/SR 3) during a green traffic signal indication. The crash report did not indicate whether the "WALK" pedestrian signal was active or not, but cited the motorist for not yielding to the bicyclist in the crosswalk.

Loop Road @ Toffie Terrace

There were an average of 13 reported crashes per year at this intersection with almost a third of the crashes being rear-end type crashes and about a third being angle type crashes. A large portion of the angle type crashes involved left turning vehicles along Loop Road in the southbound direction which is a permissive only operation with no exclusive left turn phase.

Riverdale Road (SR 139) @ Sullivan Road

An average of 22 crashes per year were reported at this intersection with almost 65% of the crashes being angle type crashes evenly distributed along all four legs of the intersection. Most of the angle crashes were attributable to left turning vehicles mostly due to the left turning traffic not yielding to the oncoming traffic. The northbound and southbound left turns along Riverdale Road (SR 139) have a protected and permissive phase, whereas the eastbound and westbound left turns along Sullivan Road are controlled by a permissive phase only. The crashes at this intersection exhibited high severity with more than half of the crashes resulting in an injury.

South Loop Road @ Lake Mirror Road

There were an average of 7 reported crashes per year at this intersection with almost half of the crashes being angle type crashes and about a third being rear-end type crashes. Most of these crashes occurred likely due to lack of intersection signage and pavement marking resulting in driver confusion regarding not knowing which lane to choose to go to major destinations, including I-285 east and west. A large portion of the angle crashes occurred along South Loop Road in the southbound direction. The crashes at this intersection exhibited high severity with almost a third of the crashes resulting in an injury.

Clark Howell Highway @ Lake Mirror Road

The average of 2 reported crashes per year at this intersection. The crash history doesn't indicate a safety issue at this intersection.

North Commerce Drive @ Centre Parkway

There were an average of 5 reported crashes per year at this intersection evenly distributed along all legs of the intersection with a third of the crashes being angle type crashes and about a fourth being rear-end type crashes. Most of these crashes were likely the result of

the amount of traffic from the stop-controlled approach of Centre Parkway not yielding to the traffic along North Commerce Drive.

Riverdale Road (SR 139) @ West Fayetteville Road (SR 314)

An average of 23 crashes per year were reported at this intersection with almost half of the crashes being angle type crashes. Most of the angle crashes were attributable to left turning vehicles along Riverdale Road (SR 139) in the westbound direction failing to yield to oncoming traffic. The westbound left turn movement is controlled by a protected and permissive signal phase. The crashes at this intersection exhibited high severity with almost a third of the crashes resulting in an injury. There was also one fatal crash reported at this intersection which was the result of a single vehicle crash where a motorcycle traveling west negotiating a horizontal curve along Riverdale Road left the roadway and hit a utility pole. Traveling too fast for the conditions was determined to be the cause for the motorcycle leaving the roadway.

Riverdale Road (SR 139) @ Global Gateway Connector

An average of 5 crashes per year were reported at this intersection with almost 63% of the crashes being angle type crashes. The crashes at this intersection exhibited high severity with almost 56% of the crashes resulting in an injury. There were a higher proportion of crashes along Riverdale Road (SR 139) in the westbound direction due to the higher proportion of traffic on this leg of the intersection.

Welcome All Road @ Scarborough Road

An average of 6 crashes per year were reported at this intersection evenly distributed along all legs of the intersection with almost 65% of the crashes being angle type crashes. Most of the angle crashes were attributable to vehicles not obeying the all-way stop sign control at the intersection.

Camp Creek Parkway (SR 6) @ Washington Road

An average of 72 crashes per year were reported at this intersection with almost 65% of the crashes being rear-end type crashes attributable to traffic congestion. Most of the rear-end crashes occurred along Camp Creek Parkway (SR 6) in the eastbound and westbound directions and were attributable to traffic congestion. There were two fatal crashes reported at this intersection. One was the result of a head-on collision where a motorist traveling southbound north of the intersection crossed the centerline and hit another motorist. The crash report indicated that the motorist fell unconscious while driving and before crossing the centerline. The second fatal crash was the result of a motorist traveling eastbound along Camp Creek Parkway east of the intersection hitting a pedestrian walking along the south side shoulder of the roadway.

Field Review

Ben Hill Road @ Welcome All Road

FIGURE 5-4. TRUCK ATTEMPTING A LEFT TURN MANEUVER ALONG THE WEST LEG OF THE INTERSECTION ALMOST ENCROACHING ONTO THE RAILROAD TRACKS. LOOKING NORTH TOWARDS WELCOME ALL ROAD FROM THE SOUTHWEST CORNER

- Pedestrian signal on SW corner of intersection missing and MARTA stop for Bus Route 82 in front of Southmeadow Business Park does not have sidewalk access
- Road skew on west leg makes sight distance a challenge
- Railroad crossing very close to intersection; trucks observed blocking the tracks often
- No truck parking signs on Welcome All Road south of Camp Creek Parkway
- Trucks traveling southbound along the north leg of Welcome All Road appear to continue onto Ben Hill Road (south leg) and onto Welcome All Road (west leg) in similar proportions. Similar patterns and distributions appeared in the reverse direction also; trucks traveling northbound along the north leg of Welcome All Road appear to come from Ben Hill Road (south leg) and from Welcome All Road (west leg) in similar proportions. This appears to be counterintuitive because of the land uses along Ben Hill Road (south leg) and Welcome All Road (west leg). There are more industrial buildings along Welcome All Road (west leg) than Ben Hill Road (south leg). Ben Hill Road (south leg) is also predominantly residential in nature except for the two industrial buildings via Southmeadow E Parkway just south of this intersection. Some trucks traveling south along Ben Hill Road (south leg) were destined to these two industrial buildings, however several trucks were observed continuing south along

Ben Hill Road (south leg) to access US 29/SR 14, even though there are roadside signs restricting truck traffic along Ben Hill Road (south leg).

Loop Road @ Charles W. Grant Parkway/Maynard H. Jackson Jr. Boulevard

FIGURE 5-5. INTERSECTION LOOKING FROM THE NORTHEAST CORNER TOWARDS THE INTERNATIONAL TERMINAL ALONG MAYNARD H. JACKSON JR. BOULEVARD WEST OF THE INTERSECTION

- No sidewalks, crosswalks, or pedestrian signals present
- Inadequate signage – missing yield signs and directional signs
- Damage to curbs and guardrails on SE and NE corners of intersection – from truck traffic related to I-75 immediately to the east
- Overgrown vegetation in east leg and wayfinding improvements needed

North Commerce Drive @ Washington Road

FIGURE 5-6. INTERSECTION LOOKING SOUTH ALONG WASHINGTON ROAD FROM THE NORTHEAST CORNER; U-HAUL DRIVEWAY IN CLOSE PROXIMITY TO THE INTERSECTION

- Fair pavement and marking condition; some worn out patches
- MARTA has bus stops on north leg in both directions – northbound has a bench adjacent to a sidewalk while southbound has a bus shelter where the sidewalk dead ends 50 feet south of it
- Trucks turn right onto southbound Washington Road from I-285 then right on North Commerce Drive towards warehouse facilities; in afternoon, there is a large left turn queue off of North Commerce Drive onto Washington Road towards I-285
- Potential conflicts exist on east side of Washington Road with driveways

Riverdale Road (SR 139) @ Phoenix Boulevard/Forest Parkway (SR 331)

FIGURE 5-7. INTERSECTION LOOKING TOWARDS NORTHWEST QUADRANT; PERSISTENT QUEUING ON THE EASTBOUND LEFT TURN LANE ALONG PHOENIX BOULEVARD TO NORTHBOUND RIVERDALE ROAD (SR 139)

- Sidewalks and curbs present on both sides of the west leg but only on one side of the east leg of the intersection; crossing infrastructure present in all four corners of the intersection
- Broken curb on NE corner of intersection along with broken glass and debris near crossing islands is a sign of problems at this location, indicative of narrow curb radius and apparent crashes related to the westbound right turning traffic along Riverdale Road (SR 139)
- Prevalent no parking signage along ROW; truck observed using a right turn lane to park east of the McDonalds
- MARTA bus stop signs present in area but no benches or shelters
- Eastbound traffic signal timing not nearly long enough (not all vehicles pass through) during the afternoon hours

South Fulton Parkway (SR 14) @ Majestic Place

FIGURE 5-8. INTERSECTION LOOKING SOUTH ALONG MAJESTIC PLACE FROM THE NORTHWEST CORNER; NUMEROUS TRUCK CONFLICTS AT THE INTERSECTION

- No sidewalks, crosswalks, or pedestrian signals present
- Not signalized – minor stop with stop signs on Majestic Place and right turn yields
- Hill present on east leg (westbound traffic) along with trees in median which obstructs sight distances – this problem further exacerbated by turning conflicts created by industrial facilities, especially in the morning hours
- Lighting not present on South Fulton Parkway – only on the properties near the intersection
- MARTA stops present along South Fulton Parkway but have no sidewalks or pedestrian accommodations and debris in close proximity to it

Old National Highway (SR 279) @ Sullivan Road

FIGURE 5-9. INTERSECTION LOOKING EAST ALONG SULLIVAN ROAD FROM THE SOUTHWEST CORNER; HEAVY WESTBOUND QUEUEING ALONG SULLIVAN ROAD; WEST POINT AVE (EAST OF THE INTERSECTION) IN CLOSE PROXIMITY TO THE INTERSECTION

- Hills on Old National Highway (SR 279) in both north and south legs; observed turning conflicts on east leg to access facilities along West Point Avenue
- MARTA bus stop signs in east and south legs of the intersection; bus stop along the east leg is not connected by sidewalks; sidewalks are only present along the south leg of the intersection; ADA curb-ramps are present on all corners of the intersection; crosswalks and pedestrian signals are present to cross all four legs of the intersection
- Some curb damage on SE corner of intersection from turning trucks and tight curb radii
- Queuing in east leg significantly more prevalent in the morning than in the afternoon
- Southbound Old National Highway (SR 279) queuing around 6 PM towards Sullivan Road

Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway

FIGURE 5-10. INTERSECTION LOOKING TOWARDS SOUTHEAST QUADRANT

- Hill along the east leg of Camp Creek Parkway (SR 6) approaching the intersection impacts sight distance, especially when making a right turn from Princeton Lakes Parkway onto Camp Creek Parkway (SR 6) westbound
- A large amount of westbound U-turn movements at the intersection come from Carmia Drive which causes weaving issues along Camp Creek Parkway (SR 6)
- No sidewalk along south side of Camp Creek Parkway (SR 6) or along Centre Parkway but present in other legs of intersection; crosswalks and pedestrian signals present to cross all four legs of the intersection
- Eastbound traffic is heavier in the morning hours – currently 2 lanes eastbound while 3 lanes westbound with the right lane ending approximately 1000 feet west of the intersection; this may be due in part to the reconstruction of the adjacent interchange at I-285
- Pavement and markings fairly new and in excellent condition; however, skid marks on turning islands

Camp Creek Parkway (SR 6) @ North Commerce Drive

FIGURE 5-11. INTERSECTION LOOKING TOWARDS SOUTHEAST QUADRANT

- A large amount of westbound U-turn movements at the intersection coming from retail driveway (Marketplace Boulevard) east of the intersection causing weaving issues along Camp Creek Parkway
- Observed several people using sidewalk; MARTA stops present on North Commerce Drive
- Broken curbs observed along with debris in NE, NW, and SE crossing islands; guard rails are present along the SW and SE corners of intersection. The guardrail along the SE corner appeared to be hit but not damaged or in need of replacement.
- Sidewalks present along all four legs, crosswalks and pedestrian signals present to cross all four legs of the intersection
- Queuing of cars increasing after 4 PM on the northbound (south) leg and westbound (east) leg; all queues clear the intersection except for the westbound (east) leg; more trucks traveling east on Camp Creek Parkway in the afternoon than in the morning
- Driveway conflicts at the RaceTrac and Starbucks in the south leg of the intersection; the driveway intersection to access the RaceTrac and Starbucks along North Commerce Drive south of the intersection consistently observed to be blocked by vehicles entering and exiting RaceTrac and Starbucks.

- Confusing pavement striping was observed along the southbound approach of the intersection. The outside lane approaching the intersection appeared to be striped as a right turn only lane; however it should striped as a shared right-through lane

Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3)

FIGURE 5-12. INTERSECTION LOOKING TOWARDS NORTHWEST QUADRANT

- Median present only on Forest Parkway and not on Old Dixie Road; adjacent land uses include commercial parcels and gas stations – driveway conflicts on Old Dixie Road
- No sidewalks present on west leg of Forest Parkway; sidewalks present along all other legs; crosswalks and pedestrian signals present to cross all four legs of the intersection.
- Observed truck rolling over curb at NE corner of intersection and a bicyclist using the sidewalk
- Large freight movements on both roadways, especially eastbound and northbound
- Length of eastbound left turn lane along with signal timing on Forest Parkway (onto NB Old Dixie Road) needs to be longer since not all vehicles can fit and there is spill over onto through travel lanes

Loop Road @ Toffie Terrace

FIGURE 5-13. INTERSECTION LOOKING WEST ALONG LOOP ROAD FROM THE NORTHEAST CORNER; LACKS PEDESTRIAN ACCOMMODATION ON THREE LEGS

- Sidewalks and curb ramps only exist on Toffie Terrace (north leg of intersection; NW and NE corners of intersection)
- No pedestrian signals present nor crosswalk pavement markings with the exception of the north leg of the intersection; MARTA stops nearby with no pedestrian connections to them
- Some lighting is present but not at all street corners
- Sections of curbing appeared to be missing along the south leg of the intersection (southeast corner); ROW markers on the southeast corner also appeared to be damaged or possible hit by vehicles
- Pedestrian worn paths were observed along the southeast quadrant of the intersection

Riverdale Road (SR 139) @ Sullivan Road

FIGURE 5-14. INTERSECTION LOOKING WEST ALONG SULLIVAN ROAD FROM THE NORTHEAST CORNER

- Signalized intersection with horizontal curves along both the northbound and southbound approaches and sight distance issues along Riverdale Road; can be problematic for turning traffic and bicycles utilizing existing bike lanes
- Flashing yellow arrow left turn signals on Riverdale Road – appeared to be installed recently
- Curb ramps along Riverdale Road are new, but channelized right turn lanes are too narrow and curb radii are damaged with tire tread marks, broken glass, and cracked sidewalks – especially in the northwest corner of the intersection
- Queuing exists on east leg of Sullivan Road during both morning and afternoon peak hours
- Trucks queuing along northbound Riverdale Road during morning peak hours for turning onto Sullivan Road westbound

South Loop Road @ Lake Mirror Road

FIGURE 5-15. INTERSECTION LOOKING EAST ALONG SOUTH LOOP ROAD FROM THE MEDIAN ALONG THE WEST LEG; NEEDS BETTER OVERHEAD SIGNAGE AND PAVEMENT MARKINGS

- Lack of maintenance and evidence of collisions at this intersection due to damaged concrete islands and tire marks on grass as well as broken bumpers and other debris
- No sidewalks or crosswalks exist at this intersection

Clark Howell Highway @ Lake Mirror Road

FIGURE 5-16. INTERSECTION LOOKING NORTH ALONG CLARK HOWELL HIGHWAY FROM THE SOUTHEAST CORNER; LACKS PEDESTRIAN ACCOMMODATIONS

- No pedestrian facilities exist at this intersection; but two pedestrians were observed walking south on Clark Howell Highway and MARTA Route 191 utilizes the intersection
- Fair pavement and pavement marking conditions on all legs of the intersection
- No curb exists on the northwest corner of the intersection, but curb damage and tire marks observed on all other corners of the intersection
- Heavy truck movement during both morning and afternoon - trucks primarily observed using two patterns; northbound traffic travels straight through the intersection while trucks from the west leg turn right to go southbound on Clark Howell Highway

North Commerce Drive @ Centre Parkway

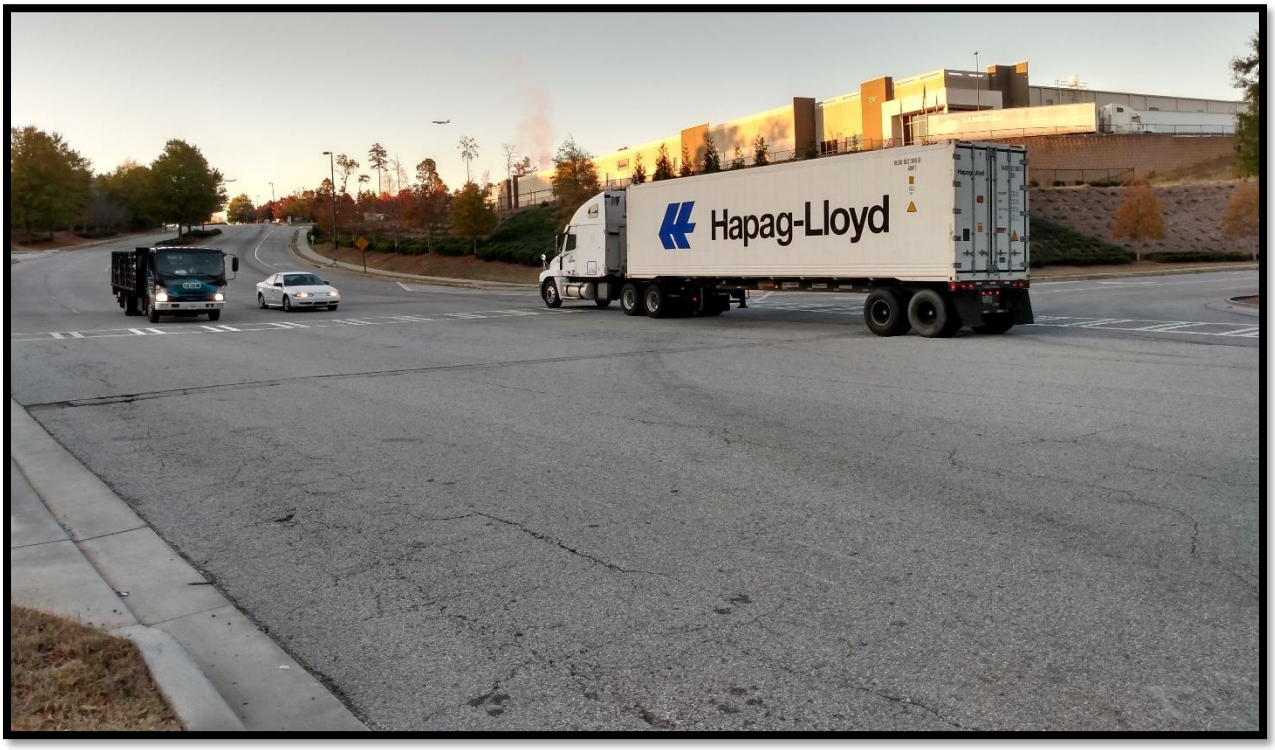

FIGURE 5-17. INTERSECTION LOOKING ALONG NORTH COMMERCE DRIVE TOWARDS SOUTHWEST QUADRANT; UNSIGNALIZED INTERSECTION WITH UNPROTECTED PEDESTRIAN CROSSWALKS

- This is a minor stop intersection with stop signs on Centre Parkway with little to no queuing observed
- Centre Parkway is two lanes (one lane in each direction) with one right turn lane at the intersection; North Commerce Drive is four lanes (two lanes each direction) with one left turn lane into Centre Parkway and the FedEx driveway on the east leg of the intersection
- Sidewalks present on both sides of North Commerce and only on the south side of Centre Parkway; damaged curb radii, signage, storm drain and sidewalks due to turning vehicles
- Blind spot looking north for eastbound vehicles turning right from Centre Parkway onto North Commerce Drive going southbound; deficient sight distance caused due to slight intersection skew, trees along the north leg of North Commerce Drive and location of stop bar across Centre Parkway further away from the intersection than ideal
- Most trucks are traveling north towards Camp Creek Parkway and I-285

Riverdale Road (SR 139) @ West Fayetteville Road (SR 314)

FIGURE 5-18. INTERSECTION LOOKING ALONG WEST FAYETTEVILLE ROAD TOWARDS NORTHEAST CORNER; DAMAGED SOUTHWEST CURB

- Signalized three-way intersection where West Fayetteville Road (SR 314) begins and ends towards City of Fayetteville
- Adjacent to both the airport and an I-285 underpass
- Some glass on traffic island at the southeast corner of the intersection; major curb damage and broken storm drain at the southwest corner of the intersection due to trucks turning southbound onto West Fayetteville Road (SR 314)
- ADA curb-ramps, crosswalks and pedestrian signals are present on all corners of the intersection; however there are no sidewalks along any legs of the intersection. There are sidewalks along West Fayetteville Road (SR 314) just south of the intersection but are not connected to the curb-ramps at the intersection.
- Heavier traffic and queuing experienced along West Fayetteville Road (SR 314) during morning peak hours compared to midday and evening peak hours

Riverdale Road (SR 139) @ Global Gateway Connector

FIGURE 5-19. INTERSECTION LOOKING TOWARDS NORTHWEST QUADRANT; SIGNAL EQUIPMENT NEEDING MAINTENANCE

- Signal malfunctioning; signal heads are missing hoods
- Sidewalk on south side of Riverdale Road on west leg and on west side of Global Gateway Connector south leg only; crosswalk on three of four legs (except for east leg) but signals do not work
- Curb damage exists on the northeast corner of the intersection for westbound traffic turning northbound onto Global Gateway Connector

Welcome All Road @ Scarborough Road

FIGURE 5-20. INTERSECTION LOOKING TOWARDS NORTHEAST QUADRANT

- This is a four-way stop intersection that experiences minor queuing during morning peak hours primarily on the north and east legs; afternoon peak hour did not have as severe queuing as in the morning
- Truck prohibitions exist on three of the four legs in this intersection (except the east leg of Welcome All Road)
- Sidewalks are absent only on the northeast corner of the intersection where drainage issues and curb radii damage exist
- Trucks primarily turning onto Welcome All Road (east to north leg or vice-versa) to access Camp Creek Parkway, South Fulton Parkway, and warehouses in the vicinity
- Pavement condition on Welcome All Road was relatively poor and needs better markings

Camp Creek Parkway (SR 6) @ Washington Road

FIGURE 5-21. INTERSECTION LOOKING SOUTH ALONG WASHINGTON ROAD FROM THE NORTHEAST CORNER

- Signalized intersection with a lead/lag interval on Camp Creek Parkway (eastbound left turning traffic first and westbound last; flashing yellow arrow signals installed
- Skew angle exists at this intersection which also affects sight distance; further, a traffic island with a utility pole on the northeast corner of the intersection affects sight distance on the east leg, especially for vehicles turning right onto Washington Road northbound
- Crosswalks exist on all four sides; however, damage exists on the southeast corner of the intersection and broken glass was found on all corners; Median damage exists on the west leg where it extends too far into the intersection
- No sidewalks exist on any legs of this intersection but curb ramps are present; desire paths exist along Camp Creek Parkway
- Queuing problems are especially prevalent on the north leg of the intersection along Washington Road, and this is further exacerbated by the close proximity of Ale Circle to the signalized intersection where a “Do Not Block The Intersection” box is present in pavement markings

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 relatively favorable operating conditions, 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 5-2. Level of Service Criteria for Signalized Intersections summarizes the LOS criteria for signalized intersections, as described in the HCM (Transportation Research Board, 2016).

TABLE 5-2. 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 is 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 5-3. Level of Service Criteria for Unsignalized Intersections shows LOS criteria for unsignalized intersections.

TABLE 5-3. 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 5-4. As shown, all study intersections operate at LOS D or better in the AM and PM peak hours with two (2) exceptions. The South Fulton Parkway (SR 14) @ Majestic Place intersection, which is an unsignalized minor street stop controlled intersection, currently operates at LOS F in the AM and PM peak hours primarily due to the delay experienced by left turning vehicles from the side street (Majestic Place). Though these vehicles experience high delay and operate under LOS F, 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 experience high delay. The major movements at the intersection, namely the through and right turn movements along South Fulton Parkway (SR 14) operate with no delay. The Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3), a signalized intersection operates at LOS E in the AM peak hour. *The LOS at the Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway intersection and the Camp Creek Parkway (SR 6) @ North Commerce Drive intersection are likely worse than reported because these LOS were based on traffic counts collected during construction of the Camp Creek Parkway (SR 6) @ I-285 interchange; due to the reconstruction of the interchange and associated lane closures, some motorists are likely diverting to other roadways, contributing to a lower volume of traffic in the vicinity of Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway and Camp Creek Parkway (SR 6) @ North Commerce Drive, and therefore a lower volume of traffic counts that were collected.* Detailed HCM analyses, including capacity analysis worksheets, can be found in Appendix E. A summary of other findings from the detailed capacity analysis is listed below.

- The eastbound left turn movement from Phoenix Boulevard to northbound Riverdale Road (SR 139), the northbound through movement along Riverdale Road (SR 139) and the southbound left turn movement from Riverdale Road (SR 139) to eastbound Forest Parkway (SR 331) at the Riverdale Road (SR 139) @ Phoenix Boulevard/Forest Parkway (SR 331) intersection operate at LOS F in the AM peak hour.

- The northbound left turn movement from North Commerce Drive to westbound Camp Creek Parkway and the southbound through movement along Camp Creek Parkway at the Camp Creek Parkway (SR 6) @ North Commerce Drive intersection operate at LOS F in the PM peak hour.
- The westbound right turn movement from Old Dixie Road (US 19/41/SR 3) to northbound Forest Parkway (SR 331) in the AM peak hour and the northbound through movement along Old Dixie Road (US 19/41/SR 3) in the PM peak hour at the Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3) intersection operate at LOS F.
- For the Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3) intersection, the traffic volumes are very similar in the AM and PM peak hours. However, the AM peak hour has higher turning volumes for eastbound left-turns and westbound right-turns, resulting in higher delays. The delays associated with these movements contribute to the AM delay being worse than the PM delay.
- The southbound right turn movement from Toffie Terrace to westbound Loop Road at the Loop Road @ Toffie Terrace intersection operates at LOS F in the PM peak hour.

TABLE 5-4. EXISTING YEAR (2019) INTERSECTION LEVEL OF SERVICE

Study Intersection	Intersection Control Type	Existing Year (2019)	
		AM LOS *Delay (s)*	PM LOS *Delay (s)*
Ben Hill Road @ Welcome All Road	Signal	A *7.5*	B *11.1*
Loop Road @ Charles W. Grant Parkway/Maynard H. Jackson Jr. Boulevard	Signal	C *28.2*	C *28.6*
North Commerce Drive @ Washington Road	Signal	A *6.6*	B *12.3*
Riverdale Road (SR 139) @ Phoenix Boulevard/Forest Parkway (SR 331)	Signal	D *48.2*	D *36.1*
South Fulton Parkway (SR 14) @ Majestic Place	Minor Stop	F *>100.0*	F *>100.0*
Old National Highway (SR 279) @ Sullivan Road	Signal	B *12.9*	C *21.6*
Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway	Signal	B *14.9*	D *37.3*
Camp Creek Parkway (SR 6) @ North Commerce Drive	Signal	C *23.5*	D *36.7*
Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3)	Signal	E *59.8*	D *44.8*
Loop Road @ Toffie Terrace	Signal	C *21.9*	D *39.2*
Riverdale Road (SR 139) @ Sullivan Road	Signal	C *23.8*	C *25.2*
South Loop Road @ Lake Mirror Road	Signal	B *14.1*	B *16.3*

Study Intersection	Intersection Control Type	Existing Year (2019)	
		AM LOS *Delay (s)*	PM LOS *Delay (s)*
Clark Howell Highway @ Lake Mirror Road	Signal	A *7.0*	A *7.5*
North Commerce Drive @ Centre Parkway	Minor Stop	E *35.2*	D *30.9*
Riverdale Road (SR 139) @ West Fayetteville Road (SR 314)	Signal	B *13.5*	B *14.0*
Riverdale Road (SR 139) @ Global Gateway Connector	Signal	B *13.2*	B *13.7*
Welcome All Road @ Scarborough Road	All Way Stop	C *24.4*	C *23.1*
Camp Creek Parkway (SR 6) @ Washington Road	Signal	C *25.0*	C *33.2*

Minor street stop controlled intersections show results for the worst movement at the intersection.

4) Future Conditions

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 or diversions due to other projects 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

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 5-5. Detailed growth rate analysis worksheets are included in Appendix F.

TABLE 5-5. AVERAGE ANNUAL TRAFFIC GROWTH RATE AT STUDY INTERSECTIONS

Study Intersection	Growth Rate	
	Mainline	Sidestreet
Ben Hill Road @ Welcome All Road	1.75%	1.75%
Loop Road @ Charles W. Grant Parkway/Maynard H. Jackson Jr. Boulevard	0.75%	0.75%
North Commerce Drive @ Washington Road	1.00%	1.00%
Riverdale Road (SR 139) @ Phoenix Boulevard/Forest Parkway (SR 331)	0.50%	1.00%
South Fulton Parkway (SR 14) @ Majestic Place	0.75%	0.75%
Old National Highway (SR 279) @ Sullivan Road	1.00%	1.00%
Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway	1.50%	0.50%
Camp Creek Parkway (SR 6) @ North Commerce Drive	1.50%	1.00%
Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3)	1.25%	1.25%
Loop Road @ Toffie Terrace	1.50%	0.50%
Riverdale Road (SR 139) @ Sullivan Road	0.75%	0.75%
South Loop Road @ Lake Mirror Road	2.50%	1.25%
Clark Howell Highway @ Lake Mirror Road	1.25%	1.25%
North Commerce Drive @ Centre Parkway	1.00%	0.50%
Riverdale Road (SR 139) @ West Fayetteville Road (SR 314)	0.75%	0.75%
Riverdale Road (SR 139) @ Global Gateway Connector	1.50%	1.50%
Welcome All Road @ Scarborough Road	1.75%	1.50%
Camp Creek Parkway (SR 6) @ Washington Road	1.00%	1.00%

Other Developments

The traffic generated by the following developments were also accounted for in developing the projected traffic volumes. Anticipated net trips generated by each development were added to the study intersections. The information related to these developments are included in Appendix F.

1. DRI 2737 – MAC IV – Derrick Road

   The proposed project consists of approximately 550,000 SF of warehouse/distribution space in a single building on 63 acres located off of South Fulton Parkway and Derrick Road in the City of Union City.

2. DRI 2745 – South Fulton Parkway at Stonewall Tell

   The proposed project is approximately two million SF of warehouse/distribution space in four buildings on 222 acres located southwest of the intersection of South Fulton Parkway and Stonewall Tell Road in the City of Union City.

3. DRI 2759 – Southpoint Farms Logistics Center

   The proposed project consists of approximately 550,000 SF of warehouse/distribution space in a single building on 63 acres located off of South Fulton Parkway and Derrick Road in the City of Union City.

4. DRI 2767 – Hillwood Hall Road Site

   The proposed project consists of 572,000 SF of high-cube warehouse/distribution space in a single building on 57 acres at the northwest corner of Campbellton-Fairburn Road (SR 92) and South Fulton Parkway, in the City of Union City.

5. DRI 2896 – College Park Hotel Mixed-Use

   The proposed mixed-use development will include an 800-room hotel and conference center (approximately 575,000 SF) in three buildings; 470,000 SF of office in three buildings; and 10,000 SF of retail space.

6. DRI 2854 – Crossroads Business Center

   The proposed project consists of 1.3 million SF of warehouse/distribution space in two buildings. Site access is proposed via one driveway onto SR 92 across from Rosewood Place, approximately 0.7 miles south of the intersection of SR 92 and South Fulton Parkway.

7. DRI 3063 – ATL Airport City

   ATL Airport City College Park is a proposed 420-acre mixed use development located west of H-JAIA on the north side of Camp Creek Parkway (SR 6) across from the Georgia International Convention Center. The proposed development will include approximately 5,000,000 SF of office space, up to six hotels, and 758,000 SF of retail. The City of College Park approved the master plan for this site development in August 2019. The DRI review process for this project is ongoing.

8. ATL Airport Cargo Expansion and Cargo Relocation from North Cargo to South Cargo

   Relocation of airport cargo operation from North Cargo area to South Cargo would involve shifting 1.5 million s.f. of cargo operation from North Cargo to South Cargo. The airport also recently completed cargo building C (130,000 s.f.) which is expected to be fully operational in the near future. The airport is also seeking to develop a 65 acre parcel near the South Cargo area as part of the cargo relocation and expansion

plans. The trips associated with these three cargo areas is accounted for in this traffic study as additional traffic above and beyond the background traffic growth.

9. Mountainview Development

   The Mountainview development proposal is a planning effort led by the Development Authority of Clayton County (DACC) to spur development in the Mountainview area – along Charles W. Grant Parkway between Old Dixie Highway and I-285. The phase 1 of the development according to the Mountain View Master Plan indicates 150,000 s.f. of office space and 260,000 s.f. of retail to be completed and occupied by 2026. Therefore the trips associated with 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 based on the growth rates shown in Table 5-5 and traffic generated by the other developments identified in the study area are shown in Figure 5-22 and Figure 5-23.

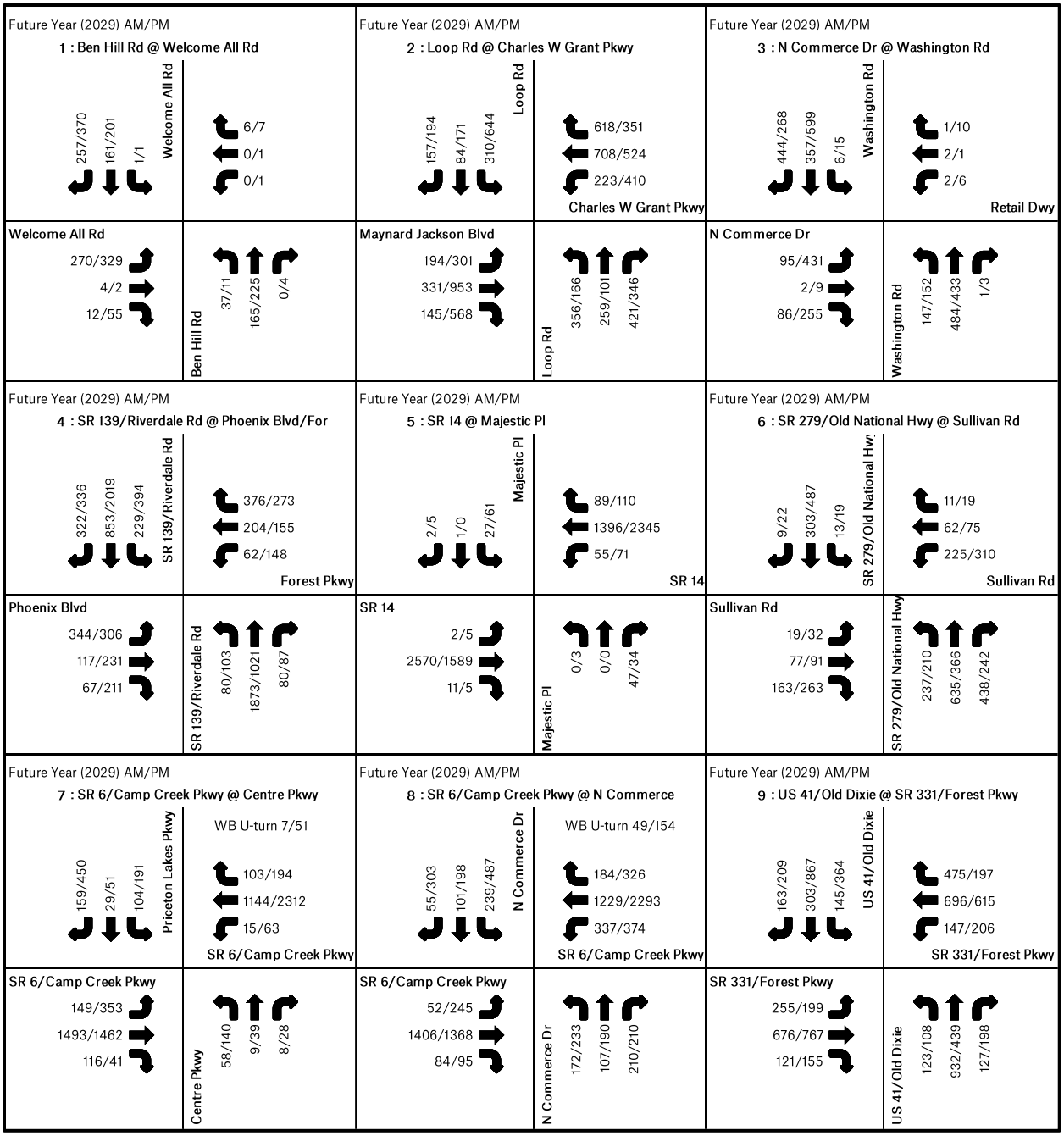

FIGURE 5-22. FUTURE YEAR (2029) AM AND PM PEAK HOUR TRAFFIC VOLUMES

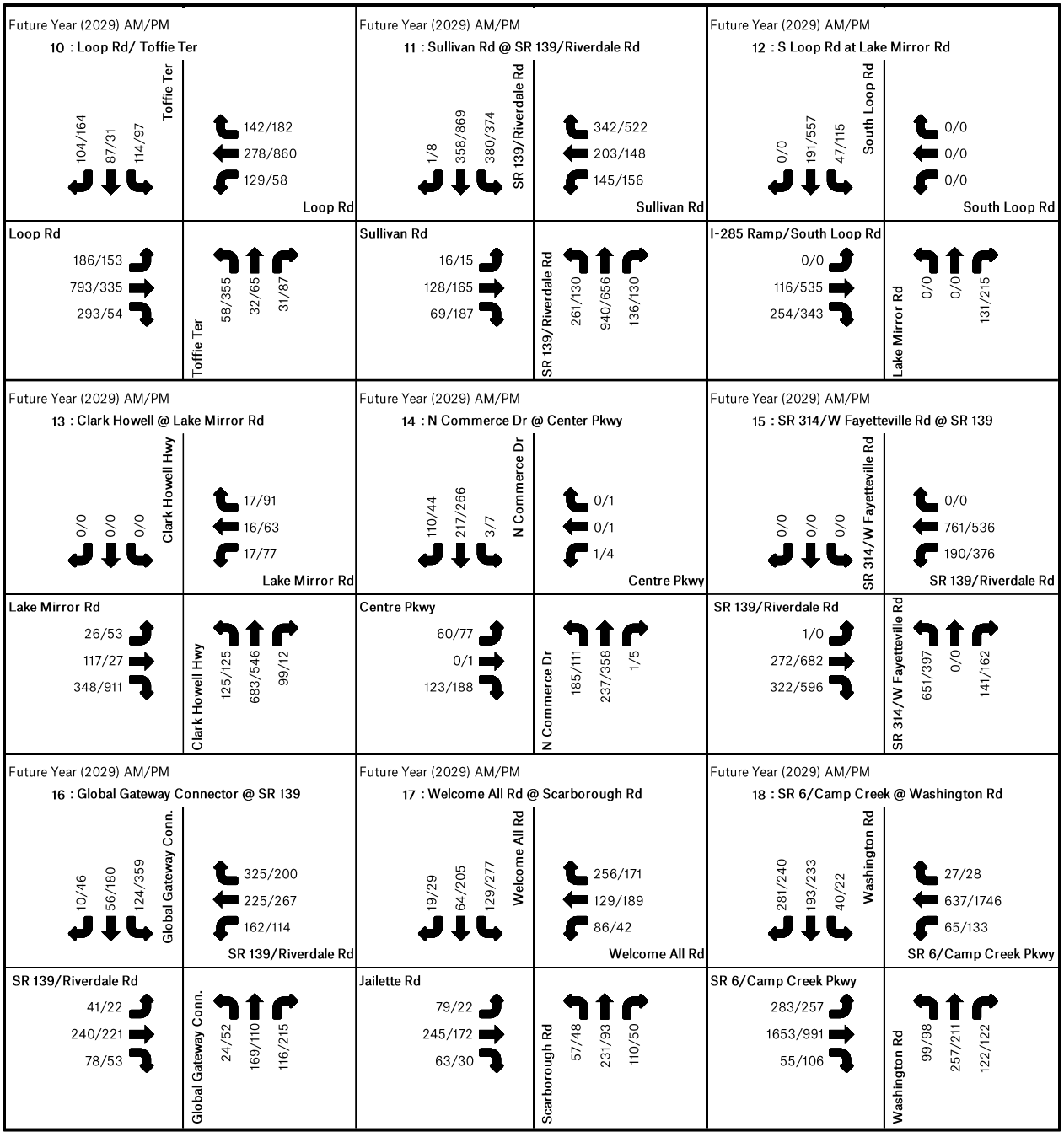

FIGURE 5-23. FUTURE YEAR (2029) AM AND PM PEAK HOUR TRAFFIC VOLUMES (CONTINUED)

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 5-6. Detailed HCM analyses, including capacity analysis worksheets, are included in Appendix E.

TABLE 5-6. FUTURE YEAR (2029) INTERSECTION LEVEL OF SERVICE – WITHOUT IMPROVEMENTS

Study Intersection	Intersection Control Type	Future Year (2029) – without Improvements	
		AM LOS *Delay (s)*	PM LOS *Delay (s)*
Ben Hill Road @ Welcome All Road	Signal	A *7.7*	B *11.5*
Loop Road @ Charles W. Grant Parkway/Maynard H. Jackson Jr. Boulevard	Signal	C *31.9*	D *43.1*
North Commerce Drive @ Washington Road	Signal	A *6.8*	B *14.0*
Riverdale Road (SR 139) @ Phoenix Boulevard/Forest Parkway (SR 331)	Signal	F *97.9*	E *60.6*
South Fulton Parkway (SR 14) @ Majestic Place	Minor Stop	F *>100.0*	F *>100.0*
Old National Highway (SR 279) @ Sullivan Road	Signal	C *21.5*	C *34.0*
Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway	Signal	B *17.5*	D *51.3*
Camp Creek Parkway (SR 6) @ North Commerce Drive	Signal	C *25.1*	D *52.2*
Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3)	Signal	F *83.5*	E *62.8*
Loop Road @ Toffie Terrace	Signal	B *18.7*	D *51.0*
Riverdale Road (SR 139) @ Sullivan Road	Signal	E *74.7*	E *55.5*
South Loop Road @ Lake Mirror Road	Signal	C *23.7*	C *24.1*
Clark Howell Highway @ Lake Mirror Road	Signal	A *7.2*	A *8.1*
North Commerce Drive @ Centre Parkway	Minor Stop	E *40.2*	D *33.8*
Riverdale Road (SR 139) @ West Fayetteville Road (SR 314)	Signal	B *15.7*	B *18.4*
Riverdale Road (SR 139) @ Global Gateway Connector	Signal	B *17.3*	B *17.2*
Welcome All Road @ Scarborough Road	All Way Stop	F *64.7*	E *49.8*
Camp Creek Parkway (SR 6) @ Washington Road	Signal	D *36.1*	E *62.6*

Minor street stop controlled intersections show results for the worst movement at the intersection.

As shown in Table 5-6, seven (7) out of eighteen study intersections operate at LOS E or worse in the AM and PM peak hours. A summary of findings from the detailed capacity analysis is included in Table 5-7:

TABLE 5-7. SUMMARY OF FINDINGS FROM INTERSECTION CAPACITY ANALYSIS – WITHOUT IMPROVEMENTS

Study Intersection	Intersection Capacity Analysis – without Improvements
Ben Hill Road @ Welcome All Road	All movements operate at LOS C or better.
Loop Road @ Charles W. Grant Parkway/Maynard H. Jackson Jr. Boulevard	The southbound left turn from Loop Road to Charles W. Grant Parkway eastbound and the westbound left turn from Charles W. Grant Parkway to Loop Road southbound operate at LOS E during the PM peak hour.
North Commerce Drive @ Washington Road	All movements operate at LOS B or better.
Riverdale Road (SR 139) @ Phoenix Boulevard/Forest Parkway (SR 331)	The intersection operates at LOS F and LOS E in the AM and PM peak hours respectively with several movements operating at LOS E or worse.
South Fulton Parkway (SR 14) @ Majestic Place	The intersection operates at LOS F in the AM and PM peak hours primarily due to the delay experienced by left turning vehicles from the side street (Majestic Place).
Old National Highway (SR 279) @ Sullivan Road	The westbound left turn from Sullivan Road to Old National Highway (SR 279) southbound and the northbound left turn from Old National Highway (SR 279) to Sullivan Road westbound operate at LOS F and LOS E during the PM peak hour respectively.
Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway	Several movements including all left turns at the intersection operate at LOS E or worse. **The intersection LOS is likely worse than reported because these LOS were based on traffic counts collected during construction of the Camp Creek Parkway (SR 6) @ I-285 interchange, which were likely lower due to motorists choosing alternate routes to avoid lane closures associated with the construction activities.**
Camp Creek Parkway (SR 6) @ North Commerce Drive	Several movements including all left turns at the intersection operate at LOS E or worse. **The intersection LOS is likely worse than reported because these LOS were based on traffic counts collected during construction of the Camp Creek Parkway (SR 6) @ I-285 interchange, which were likely lower due to motorists choosing alternate routes to avoid lane closures associated with the construction activities.**
Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3)	Several movements, including all left turns at the intersection, operate at LOS E or worse. The traffic volumes are very similar in the AM and PM peak hours. However, the AM peak hour has higher turning volumes for eastbound left-turns and westbound right-turns, resulting in higher delays. The delays associated with these movements contribute to the AM delay being worse than the PM delay.

Study Intersection	Intersection Capacity Analysis – without Improvements
Loop Road @ Toffie Terrace	All movements operate at LOS D or better.
Riverdale Road (SR 139) @ Sullivan Road	The westbound right turn from Sullivan Road to Riverdale Road (SR 139) northbound operates at LOS F during the AM and PM peak hours.
South Loop Road @ Lake Mirror Road	All movements operate at LOS C or better.
Clark Howell Highway @ Lake Mirror Road	All movements operate at LOS B or better.
North Commerce Drive @ Centre Parkway	The intersection operates at LOS E in the AM peak hour primarily due to the delay experienced by left turning vehicles from the side street (Centre Parkway).
Riverdale Road (SR 139) @ West Fayetteville Road (SR 314)	All movements operate at LOS C or better.
Riverdale Road (SR 139) @ Global Gateway Connector	All movements operate at LOS C or better.
Welcome All Road @ Scarborough Road	The intersection operates at LOS F and LOS E in the AM and PM peak hours respectively with several movements operating at LOS E or worse.
Camp Creek Parkway (SR 6) @ Washington Road	The intersection operates at LOS E in the PM peak hour with several movements operating at LOS E or worse.

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.

Ben Hill Road @ Welcome All Road

- Restripe the west leg of the intersection and relocate the stop bars west of the railroad tracks.
- Add supplemental signal heads and "stop here on red" signs on the west leg west of the railroad tracks to discourage vehicles queuing on the railroad tracks.
- Rebuild raised islands at the intersection and install raised pavement markers and median nose delineators.
- Retrofit the pedestrian poles and pedestrian signal heads on the southwest quadrant of the intersection.
- Install sidewalks along both sides of Welcome All Road (5 feet sidewalk plus 2 feet buffer on the west side and 12 feet multi-use path plus 6 feet buffer on the east side) to connect transit stops and the Southmeadow Business Park. Extend the sidewalk along the east side of Welcome All Road to cross the railroad tracks and along the west side of Ben Hill Road to the Southmeadow Business Park.
- A roundabout was also considered at this intersection, but wasn't advanced as a recommended improvement because the intersection operates at a good level of service under the traffic signal control and the crash history did not indicate a high number of crashes correctable by a roundabout.

Loop Road @ Charles W. Grant Parkway/Maynard H. Jackson Jr. Boulevard

- Restripe the intersection and install raised pavement markers and median nose delineators.
- Retrofit curb radii to accommodate WB-67 truck turning movements and replace guardrails along the southeast and northeast quadrants of the intersection.
- Cut trees back along the east leg to improve sight lines.
- Install directional signage to I-75 at the intersection including overhead signage and route shield pavement markings.
- Install raised islands on the northwest and northeast quadrants of the intersection.
- Add pedestrian accommodation to cross all four legs of the intersection including crosswalks and pedestrian signal heads.
- Upgrade and maintain lighting at the intersection.
- Install an additional eastbound left turn lane from Maynard H. Jackson Jr. Boulevard to northbound Loop Road to make dual turn lanes and protected only movements.

- Convert westbound Charles W. Grant Parkway left turn signal indication to a flashing yellow arrow.
- Add an overlap phase and corresponding flashing yellow arrow indication to the southbound right turn movement from Loop Road to westbound Maynard H. Jackson Jr. Boulevard. Install the flashing yellow arrow indication per MUTCD Section 4D.24 and GDOT Policy 6785-2.

North Commerce Drive @ Washington Road

- Extend sidewalk (5 feet sidewalk plus 2 feet buffer) to the bus shelter along the west side of Washington Road north of the intersection.
- Extend sidewalk (5 feet sidewalk plus 2 feet buffer) to the next bus stop along the east side of Washington Road south of the intersection.
- Convert northbound Washington Road left turn signal phasing to Protected + Permissive and install a left turn flashing yellow arrow signal head.
- Close the U-Haul driveway along the east side of Washington Road south of the intersection.
- Adjust the pedestrian signal heads at the intersection to be displayed along the crosswalks.
- Install directional signage to US 29 and I-285 at the intersection including overhead signage and route shield pavement markings.

Riverdale Road (SR 139) @ Phoenix Boulevard/Forest Parkway (SR 331)

- Restripe the intersection and install raised pavement markers and median nose delineators.
- Install directional signage to I-285 at the intersection including overhead signage and route shield pavement markings.
- Increase the turning radii and upgrade the curb radii to accommodate WB-67 truck turning movements along the westbound right turn lane in the northeast quadrant of the intersection.
- Reconfigure the northeast quadrant of the intersection to align the eastbound left turn lanes from Forest Parkway to the outside receiving lanes on northbound Riverdale Road (SR 139) and install a yield bar pavement marking to the westbound right turn lane from Forest Parkway to northbound Riverdale Road (SR 139).
- In the short-term, add one barrier-separated continuous right turn lane from Forest Parkway westbound to the I-285 eastbound on-ramp.
- In the long-term convert the intersection into a Median-U-turn (MUT) intersection with signalized dual lane U-turns along Phoenix Boulevard/Forest Parkway (SR 331); by eliminating left turns at the intersection along the eastbound Phoenix Boulevard and westbound Forest Parkway (SR 331) by converting them into through and downstream U-turn movements. Design the MUT intersection and the U-turn crossovers with loons

to accommodate WB-67 truck turning movements per guidance from the FHWA Median U-Turn Intersection Informational Guide. These rerouted movements are relatively low truck volume movements (less than 5 trucks per hour within the peak hours) and can be accommodated within the MUT design. Additionally the MUT design has the added advantage of aligning the traffic form Phoenix Boulevard and Forest Parkway (SR 331) destined to I-285 EB and I-285 WB along the east side of Riverdale Road (SR 139) going northbound which is the same side as the on-ramps to I-285 EB and I-285 WB and therefore reducing the weaving along Riverdale Road (SR 139).

South Fulton Parkway (SR 14) @ Majestic Place

- Install raised pavement markers and median nose delineators.
- Cut trees back along the north and south sides of South Fulton Parkway (SR 14) to improve sight lines.
- Add signage along Majestic Place north and south of the intersection to redirect left turns to the adjacent signalized intersection at South Fulton Parkway (SR 14) and Mason Road.
- Convert the intersection into an unsignalized Restricted Crossing U-turn intersection.
- Install sidewalks along both sides of South Fulton Parkway (5 feet sidewalk plus 2 feet buffer on the south side and 12 feet multi-use path plus 6 feet buffer on the north side to connect transit stops and the distribution centers along South Fulton Parkway (SR 14).

Old National Highway (SR 279) @ Sullivan Road

- Install sidewalks along both sides of Sullivan Road east of the intersection (5 feet sidewalk plus 2 feet buffer) to connect transit stops and the existing sidewalk along the south leg of the intersection along Old National Highway (SR 279). Rebuild and expand the pedestrian landing space on the northwest quadrant of the intersection to allow a larger pedestrian waiting area.
- Convert northbound Old National Highway (SR 279) left turn and westbound Sullivan Road left turn signal phasing to Protected + Permissive and install left turn flashing yellow arrow signal heads.
- Add a channelized yield controlled eastbound right turn lane from Sullivan Road to Old National Highway (SR 279) southbound separated from the intersection by a raised concrete island with adequate turn radius for WB-67 trucks.
- Convert the northbound right turn lane from Old National Highway (SR 279) to eastbound Sullivan Road to a channelized yield controlled movement separated from the intersection by a raised concrete island with adequate turn radius for WB-67 trucks.
- Mitigate vehicular conflicts due to the closely spaced West Point Avenue intersection by either converting West Point Avenue into a right-in-right-out approach or relocating West Point Avenue further east of the intersection.

- Install directional signage to the airport, US 29, and I-285 at the intersection including overhead signage and route shield pavement markings.

Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway

- Relocate the Camp Creek Business Center monument sign along Centre Parkway south of the intersection to the west side of the road; restripe northbound Centre Parkway as two approach lanes – an inside exclusive left turn lane and an outside shared through and right turn lane; add a protected + permissive northbound left turn signal phasing and install a left turn flashing yellow arrow signal head.
- Extend the westbound left turn lane from Camp Creek Parkway (SR 6) to Centre Parkway southbound beyond Carmia Drive and install flexible delineator posts along the westbound left turn lane to prohibit vehicles exiting right-out from Carmia Drive weaving across three lanes of Camp Creek Parkway (SR 6) to make a westbound U-turn movement at the intersection.
- Install signage along Carmia Drive to redirect traffic destined eastbound along Camp Creek Parkway (SR 6) to Princeton Lakes Parkway so that they make a southbound left turn at the intersection.
- Implement recommendations from the GDOT State Route 6 Access Management Study to reduce circulating retail traffic on Camp Creek Parkway (SR 6) and direct them to use frontage roads between Princeton Lakes Parkway and Desert Drive.
- When implementing recommendations to redirect traffic, consideration should be given to operations and traffic control at the intersections along Princeton Lakes Parkway at Princeton Lakes Court SW and at Carmia Drive, and at Redwine Road.
- Cut trees back along the north and south sides of Camp Creek Parkway (SR 6) to improve sight lines.

Camp Creek Parkway (SR 6) @ North Commerce Drive

- Restripe the north leg of the intersection and install new pavement markings with correct lane assignments, specifically the southbound approach lanes along North Commerce Drive between Shelby Lane and Camp Creek Parkway (SR 6).
- Install "No U-Turn" sign along westbound Camp Creek Parkway (SR 6) to prohibit vehicles exiting right-out from Marketplace Boulevard (retail driveway west of the intersection) weaving across three lanes of Camp Creek Parkway (SR 6) to make a westbound U-turn movement at the intersection.
- Install signage along Marketplace Boulevard to redirect traffic destined eastbound along Camp Creek Parkway (SR 6) to North Commerce Drive so that they make a southbound left turn at the intersection.
- Add the North Commerce Drive @ Shelby Lane traffic signal to the Camp Creek Parkway (SR 6) Regional Traffic Operations Program (RTOP) signal system and coordinate its operation to the Camp Creek Parkway (SR 6) @ North Commerce Drive intersection so that discharges from the eastbound left turn and northbound through

movements from the Camp Creek Parkway (SR 6) @ North Commerce Drive don't get caught at a red indication at the North Commerce Drive @ Shelby Lane intersection.

- Implement recommendations from the GDOT State Route 6 Access Management Study to reduce retail circulating traffic on Camp Creek Parkway (SR 6) and direct them to use frontage roads between Princeton Lakes Parkway and Desert Drive.
- Install directional signage to I-285 at the intersection including overhead signage and route shield pavement markings.
- When implementing recommendations to redirect traffic, consideration should be given to operations and traffic control at the intersections along North Commerce Drive at Shelby Lane at Marketplace Boulevard, and at Redwine Road.
- Cut trees back along the north and south sides of Camp Creek Parkway (SR 6) to improve sight lines.
- Install a raised median along the south leg of North Commerce Drive from Camp Creek Parkway (SR 6) to Creek Pointe Way.
- Install "Don't Block the Box" pavement markings at the Creek Pointe Way intersection. In the medium term, evaluate the need to restrict left turn movements from Creek Pointe Way.
- Retrofit curb radii and adjacent sidewalks along all quadrants of the intersection. Retrofit the drainage structure along the northeast quadrant.

Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3)

- Install raised pavement markers and median nose delineators.
- Install an additional left turn lane in the eastbound Forest Parkway (SR 331), southbound Old Dixie Road (US 19/41/SR 3), and westbound Forest Parkway (SR 331) directions to make dual turn lanes and protected only movements.
- Convert northbound left turn from Old Dixie Road (US 19/41/SR 3) to westbound Forest Parkway (SR 331) signal indication to a flashing yellow arrow.
- Add a channelized yield controlled northbound right turn lane from Old Dixie Road (US 19/41/SR 3) to Forest Parkway (SR 331) eastbound separated from the intersection by a raised concrete island with adequate turn radius for WB-67 trucks.
- Add an overlap phase and corresponding flashing yellow arrow indication to the westbound right turn from Forest Parkway (SR 331) to northbound Old Dixie Road (US 19/41/SR 3) movement Install the flashing yellow arrow indication per MUTCD Section 4D.24 and GDOT Policy 6785-2.
- Restripe the crosswalk across the east leg (Forest Parkway/ SR 331) of the intersection to remove the kink.
- Rebuild the raised concrete island separating the intersection and the yield controlled southbound right turn lane from Old Dixie Road (US 19/41/SR 3) to westbound Forest Parkway (SR 331).
- Install sidewalks on the west leg of Forest Parkway (SR 331) along both the north and south sides (5 feet sidewalk plus 2 feet buffer on the south side and 12 feet multi-use

path plus 6 feet buffer on the north side) to connect transit stops and destinations along Forest Parkway (SR 331).
- Install directional signage to the I-75 and I-285 at the intersection including overhead signage and route shield pavement markings.

Loop Road @ Toffie Terrace

- Restripe the intersection and install raised pavement markers and median nose delineators.
- Add pedestrian accommodation at the intersection including crosswalks and pedestrian signal heads to cross the west, south and east legs of the intersection. Install sidewalks on Loop Road along both the north and south sides (5 feet sidewalk plus 2 feet buffer on the south side and 12 feet multi-use path plus 6 feet buffer on the north side) to connect to the transit stops. Install sidewalks on Toffie Terrace along the east side (5 feet sidewalk plus 2 feet buffer) to connect to the sidewalks at the intersection.
- Convert the outside southbound through lane along Toffie Terrace to an exclusive right turn lane. Add an overlap phase and corresponding flashing yellow arrow indication to the southbound right turn movement from Toffie Terrace to westbound Loop Road.
- Add a flashing yellow indication for the permissive southbound left turn movement.
- Convert the inside northbound through lane along Toffie Terrace to an exclusive left turn lane to make dual turn lanes (with the existing left turn lane) and protected only movement.
- Convert eastbound and westbound left turn signal indications along Loop Road to flashing yellow arrows.
- Convert the outside eastbound through lane along Loop Road to an exclusive right turn lane.
- Install directional signage to the airport cargo area, I-85, and I-75 at the intersection including overhead signage and route shield pavement markings.

Riverdale Road (SR 139) @ Sullivan Road

- Add a channelized yield controlled westbound right turn lane separated from the intersection by a raised concrete island with adequate turn radius for WB-67 trucks. Add an overlap phase and corresponding flashing yellow arrow indication to the westbound right turn movement.
- Increase the turning radii and upgrade the curb radii to accommodate WB-67 truck turning movements along the southbound and northbound right turn lane in northwest and southeast quadrants of the intersection respectively.
- Install directional signage to the airport, I-85, and I-285 at the intersection including overhead signage and route shield pavement markings.

South Loop Road @ Lake Mirror Road

- Restripe the intersection and install raised pavement markers and median nose delineators.
- Add pavement skip lines from the southbound South Loop Road approach to guide left turn movements to eastbound South Loop Road lane and to I-285 eastbound on-ramp.
- Install directional signage to I-285 at the intersection including overhead signage and route shield pavement markings.
- Rebuild the raised medians and islands at the intersection.
- Replace guardrails along the northeast and the southeast quadrants of the intersection.

Clark Howell Highway @ Lake Mirror Road

- Install raised pavement markers at the intersection.
- Install directional signage to I-285 at the intersection including overhead signage and route shield pavement markings.
- Install sidewalks along Clark Howell Highway and Lake Mirror Road connecting the bus stops to warehouse destinations near the intersection.
- Add pedestrian accommodation at the intersection including a crosswalk and pedestrian signal heads to cross the south leg of the intersection (Lake Mirror Road). Install sidewalks on Clark Howell Highway south of the intersection along both the east and west sides (5 feet sidewalk plus 2 feet buffer) to connect to the transit stops. Install sidewalks on Lake Mirror Road along the south side (12 feet multi-use path plus 6 feet buffer) to connect to the transit stops and warehouse driveways.
- Retrofit curb radii to accommodate WB-67 truck turning movements along the southwest and southeast quadrants of the intersection.

North Commerce Drive @ Centre Parkway

- Restripe the intersection and install raised pavement markers and median nose delineators.
- Remove the striped crosswalk across North Commerce Drive at the intersection (south leg). Install a marked crosswalk, a Rectangular Rapid Flashing Beacon (RRFB) and a raised median refuge island on North Commerce Drive south of the intersection to facilitate pedestrian crossings across North Commerce Drive away from the intersection. Install advance pedestrian crossing warning signage along northbound North Commerce Drive approaching the RRFB.
- Retrofit the drainage structure along the northwest quadrant of the intersection.

Riverdale Road (SR 139) @ West Fayetteville Road (SR 314)

- Restripe the intersection and install raised pavement markers and median nose delineators.
- Convert the westbound left turn signal indication along Riverdale Road (SR 139) to a flashing yellow arrow signal head.
- Rebuild the southwest quadrant of the intersection to accommodate WB-67 truck turning movements. Relocate the stop bar on the northbound West Fayetteville Road (SR 314) approach to the intersection farther away from the intersection.
- Retrofit the drainage structure along the southwest quadrant of the intersection.
- Upgrade and maintain lighting at the intersection.
- Extend sidewalks along West Fayetteville Road (SR 314) south of the intersection along both sides to connect to the Riverdale Road (SR 139) intersection crosswalks and also to the Godby Road/Phoenix Boulevard intersection.
- Install sidewalks on Riverdale Road (SR 139) east of the intersection along the south side (5 feet sidewalk plus 2 feet buffer) to connect to the transit stop.
- Install directional signage to the airport, I-85, and I-285 at the intersection including overhead signage and route shield pavement markings.

Riverdale Road (SR 139) @ Global Gateway Connector

- Restripe the intersection and install raised pavement markers.
- Retrofit curb radii to accommodate WB-67 truck turning movements along northeast quadrant of the intersection.
- Install directional signage to the airport, SR 139, US 29, and I-85 at the intersection including overhead signage and route shield pavement markings.
- Upgrade traffic signal equipment, signal heads and signal wiring.

Welcome All Road @ Scarborough Road

- Coordinate with Fulton County T-SPLOST project CSF-159.
- Restripe the intersection and install raised pavement markers.
- Rebuild concrete curbing and install pedestrian ADA ramps in the northeast corner of the intersection. Install sidewalks on Welcome All Road east of the intersection along the north side (5 feet sidewalk plus 2 feet buffer) to connect to the transit stop. Install crosswalks at the intersection to cross all four legs of the intersection.
- Narrow the intersection legs and curb radii along Jailette Road and Scarborough Road to reinforce the residential character of these roadways.
- Install signage along Welcome All Road directing trucks to stay on Welcome All Road to complement existing signage prohibiting trucks on Jailette Road and Scarborough Road.

Camp Creek Parkway (SR 6) @ Washington Road

- Coordinate with City of East Point (Fulton County T-SPLOST) project EP-181 to relocate Ale Circle further north of the intersection.
- Extend the existing eastbound left turn lane along Camp Creek Parkway (SR 6) to provide 650 feet of full-width storage.
- Install 12 feet multi-use path plus 6 feet buffer on Camp Creek Parkway (SR 6) along the south side connecting the bus stops and destinations along Camp Creek Parkway (SR 6).
- Install sidewalks (5 feet sidewalk plus 2 feet buffer) on Washington Road along both the east and west sides connecting the bus stops along Washington Road.

Intersection Capacity Analysis – with Improvements

Based on the future year (2029) AM and PM peak hour turning movement traffic volumes, and the proposed improvements, 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 improvements made are summarized in Table 5-8. Detailed HCM analyses, including capacity analysis worksheets, are included in Appendix E.

TABLE 5-8. FUTURE YEAR (2029) INTERSECTION LEVEL OF SERVICE – WITH IMPROVEMENTS

Study Intersection	Intersection Control Type	Future Year (2029) – with Improvements	
		AM LOS *Delay (s)*	PM LOS *Delay (s)*
Ben Hill Road @ Welcome All Road	Signal	A *7.7*	B *11.5*
Loop Road @ Charles W. Grant Parkway/Maynard H. Jackson Jr. Boulevard	Signal	C *29.5*	D *42.8*
North Commerce Drive @ Washington Road	Signal	A *9.1*	B *18.7*
Riverdale Road (SR 139) @ Phoenix Boulevard/Forest Parkway (SR 331)	Signal (Short Term)	E *66.5*	D *50.7*
	Signalized Median U-turn	D *40.2*	D *41.4*
South Fulton Parkway (SR 14) @ Majestic Place	Unsignalized RCUT	A *5.0*	A *3.0*
Old National Highway (SR 279) @ Sullivan Road	Signal	B *19.2*	C *28.0*
Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway	Signal	B *15.7*	C *31.6*
Camp Creek Parkway (SR 6) @ North Commerce Drive	Signal	C *25.8*	D *53.7*
Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3)	Signal	D *42.5*	D *39.8*
Loop Road @ Toffie Terrace	Signal	B *18.4*	D *35.1*
Riverdale Road (SR 139) @ Sullivan Road	Signal	C *29.2*	C *26.8*
South Loop Road @ Lake Mirror Road	Signal	C *23.7*	C *24.1*
Clark Howell Highway @ Lake Mirror Road	Signal	A *7.2*	A *8.1*
North Commerce Drive @ Centre Parkway	Minor Stop	E *40.2*	D *33.8*
Riverdale Road (SR 139) @ West Fayetteville Road (SR 314)	Signal	B *15.7*	B *18.4*
Riverdale Road (SR 139) @ Global Gateway Connector	Signal	B *17.3*	B *17.2*
Welcome All Road @ Scarborough Road	All Way Stop	F *64.7*	E *49.8*
Camp Creek Parkway (SR 6) @ Washington Road	Signal	C *36.1*	E *62.6*

Minor street stop controlled intersections show results for the worst movement at the intersection.

As shown in Table 5-8, with the proposed improvements all study intersections are projected to operate at LOS D or better in the AM and PM peak hours with three (3) exceptions.

- The North Commerce Drive @ Centre Parkway intersection is projected to operate at LOS E in the AM peak hour, primarily due to the delay experienced by the Centre Parkway approach which is the stop-controlled approach at this unsignalized two-way stop-controlled intersection. Though this approach 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 North Commerce Drive operate with no delay. If an LOS of D or better is desired in the future, a roundabout could be considered at this intersection.
- The Welcome All Road @ Scarborough Road intersection is projected to operate at LOS F and LOS E in the AM peak hour and PM peak hour respectively primarily due to the overall traffic volumes and the all-way stop-control at this intersection. Though this intersection experiences high delay, the volumes do not warrant a traffic signal. If an LOS of D or better is desired in the future, an urban compact roundabout could be considered at this intersection. The recommended improvements at this intersection should be coordinated with the Fulton County T-SPLOST project CSF-159, which is programmed to provide capacity and geometrical improvements at this intersection.
- The Camp Creek Parkway (SR 6) @ Washington Road intersection is projected to operate at LOS E in the PM peak hour, primarily due to the delay experienced by the eastbound left turn movement from Camp Creek Parkway (SR 6) to northbound Washington Road and the westbound through movement along Camp Creek Parkway (SR 6). Consideration should be given to widen Camp Creek Parkway (SR 6) from four lanes to six lanes in the future to achieve an LOS of D or better at this intersection.
- With the short-term improvement, the Riverdale Road (SR 139) @ Phoenix Boulevard/Forest Parkway (SR 331) intersection is projected to operate at LOS E and LOS D in the AM peak hour and PM peak hour respectively. With the installation of the long-term Median U-turn recommendation this intersection is projected to operate at LOS D in the AM and PM peak hours.
- *The LOS at the Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway intersection and the Camp Creek Parkway (SR 6) @ North Commerce Drive intersection are likely worse that reported because these LOS were based on traffic counts collected during construction of the Camp Creek Parkway (SR 6) @ I-285 interchange; due to the reconstruction of the interchange and associated lane closures, some motorists are likely diverting to other roadways, contributing to a lower volume of traffic in the vicinity of Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway and Camp Creek Parkway (SR 6) @ North Commerce Drive, and therefore a lower volume of traffic counts that were collected.*

Consideration should be given to installing an additional southbound through lane along North Commerce Drive and an additional northbound left turn lane from North Commerce Drive to Camp Creek Parkway (SR 6) westbound to improve the LOS at the Camp Creek Parkway (SR 6) @ North Commerce Drive intersection.

5) Conclusion and Summary of Findings

1. Under the existing year (2019) conditions, nearly all the study intersections operate at LOS D or better in the AM and PM peak hours. There are two exceptions. At the South Fulton Parkway (SR 14) @ Majestic Place intersection, the stop-controlled Majestic Place approach operates at LOS F in the AM and PM peak hours. (The through and right-turn movements on South Fulton Parkway (SR 14) operate with no delay.) At the Forest Parkway (SR 331) @ Old Dixie Road (US 19/41/SR 3), the intersection operates at LOS E in the AM peak hour.
2. Based on the expected growth in traffic at the study intersections, if no improvements are made seven (7) out of eighteen (18) study intersections are projected to operate at LOS E or worse in the AM and PM peak hours.
3. Based on the future year 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 D or better in the AM and PM peak hours except for the North Commerce Drive @ Centre Parkway intersection, the Welcome All Road @ Scarborough Road intersection and the Camp Creek Parkway (SR 6) @ Washington Road intersection.
5. A roundabout could be considered at the North Commerce Drive @ Centre Parkway intersection in the future to attain an LOS of D or better.
6. An urban compact roundabout could be considered at the Welcome All Road @ Scarborough Road intersection in the future to attain an LOS of D or better.
7. Consideration should be given to widen Camp Creek Parkway (SR 6) from four lanes to six lanes in the future to achieve an LOS of D or better at the Camp Creek Parkway (SR 6) @ Washington Road intersection.
8. With the short-term improvement, the Riverdale Road (SR 139) @ Phoenix Boulevard/Forest Parkway (SR 331) intersection is projected to operate at LOS E and LOS D in the AM peak hour and PM peak hour respectively. With the installation of the long-term Median U-turn recommendation this intersection is projected to operate at LOS D in the AM and PM peak hours.
9. *The LOS at the Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway intersection and the Camp Creek Parkway (SR 6) @ North Commerce Drive intersection are likely worse that reported because these LOS were based on traffic counts collected during construction of the Camp Creek Parkway (SR 6) @ I-285 interchange; due to the reconstruction of the interchange and associated lane closures, some motorists are likely diverting to other roadways, contributing to a lower volume of traffic in the vicinity of Camp Creek Parkway (SR 6) @ Centre Parkway/Princeton Lakes Parkway and Camp Creek Parkway (SR 6) @ North Commerce Drive, and therefore a lower volume of traffic counts that were collected.* Consideration should be given to installing an additional southbound through lane

along North Commerce Drive and an additional northbound left turn lane from North Commerce Drive to Camp Creek Parkway (SR 6) westbound to improve the LOS at the Camp Creek Parkway (SR 6) @ North Commerce Drive intersection.

Appendices

- Intersection Selection Matrix
- Hourly Distribution of Traffic Volumes from GDOT's TADA Count Stations
- Raw Traffic Counts
- Detailed Crash Analysis
- Intersection Capacity Analyses
- Intersection Growth Rate Analyses