Interchange Justification Report

I-75 at Bethlehem Road
Henry County

Prepared for:
Henry County

September 2018

POND

Table of Contents

TABLE OF FIGURES

APPENDICES

Appendix A: Traffic Volume Figures

Appendix B: Planned Area Development Trip Distribution Figures

Appendix C: HCS Basic Freeway Analysis

Appendix D: HCS Merge/Diverge Analysis

Appendix D: Synchro Intersection Analysis

EXECUTIVE SUMMARY

The purpose of this Interchange Justification Report (IJR) is to analyze and document the need for a new interchange on I-75 between Bill Gardner Parkway (Exit 212) and State Route (SR) 155 (Exit 216) in Henry County, Georgia (see Figure 1.1 for map of study area). In accordance with Federal Highway Administration (FHWA) and Georgia Department of Transportation (GDOT) guidance on the installation of new access points, this IJR examines operations at the requested interchange location, as well as the adjacent interchanges upstream and downstream of the requested access break at Bethlehem Road.

The need for a new break in access along I-75 between Bill Gardner Pkwy and SR 155 was examined in relation to the two policy requirements outlined by the FHWA in their May 22, 2017 Policy on Access to the Interstate System. The following presents an examination of the results of the analysis contained within this report and how they relate to these two criteria. In order for an interchange to be recommended, both criteria must be met.

Policy #1: Operational Analysis

An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, and ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (Title 23, Code of Federal Regulations (CFR), paragraphs 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, should be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access should include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute, and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request should also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

The proposed interchange at Bethlehem Road would provide a much-needed additional access point to I-75 within the study area. As presented in this report, freeway segments and ramp junctions all operate at acceptable level of service (LOS) under existing conditions, however, most intersections at and adjacent to the existing interchanges at SR 155 and Bill Gardner Pkwy currently experience LOS D conditions in the peak periods. As documented in this report, there are several major developments planned or underway within the study area. These developments, along with normal background growth, are expected to generate a significant increase in traffic volumes utilizing these two existing interchanges.

While all freeway segments and ramp junctions are expected to operate at acceptable LOS in the 2025 No-Build condition, the LOS at most intersections at or adjacent to the existing interchanges is expected to operate at LOS E and F conditions without the implementation of the proposed interchange. As with the 2025 No-Build condition, all freeway segments and ramp junctions are expected to operate at acceptable LOS in the 2025 Build condition, however by balancing area access demands at three interchanges instead of two, the project does improve the operation at the SR 155 and Bill Gardner Pkwy interchange ramps as evidenced by reductions in LOS and densities. As presented in the report, the traffic relief provided by the proposed interchange will significantly reduce delay and improve LOS at most SR 155 and Bill Gardner Pkwy intersections. Importantly, this traffic relief will allow the I-75 NB and SB ramp intersections at both existing interchanges to operate at LOS D or better conditions in 2025.

As with the 2025 Opening Year, all freeway and ramp junctions are expected to operate at LOS D or better in the 2045 No-Build condition with LOS and densities improving in the 2045 Build condition. By 2045, planned widening projects are expected to be complete on SR 155 and Bill Gardner Pkwy in order to accommodate growing traffic demands. While these improvements are expected to improve LOS and reduce delay at study intersections, most intersections on these roadways would still experience LOS E and F conditions including both I-75 ramp intersections at Bill Gardner Pkwy and the I-75 SB ramp at SR 155. As with the 2025 conditions, the proposed interchange is expected to significantly improve 2045 LOS and delay at these intersections and allow the I-75 NB and SB ramp intersections at both existing interchanges to operate at LOS D or better conditions by 2045

Policy #2: Access Connections & Design

The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access, such as managed lanes (e.g., transit or high occupancy vehicle and high occupancy toll lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)). In rare instances where all basic movements are not provided by the proposed design, the report should include a full-interchange option with a comparison of the operational and safety analyses to the partial-interchange option. The report should also include the mitigation proposed to compensate for the missing movements, including wayfinding signage, impacts on local intersections, mitigation of driver expectation leading to wrong-way movements on ramps, etc. The report should describe whether future provision of a full interchange is precluded by the proposed design.

The proposed interstate access would connect to an existing public road (Bethlehem Road) and would provide for all traffic movements. Of all interchange alternatives considered in this IJR, the preferred alternative at Bethlehem Road provide the most efficient and direct access to study area public roadway network. The proposed interchange would be constructed to meet or exceed current design standards in order to provide safe and efficient traffic operations with minimal impacts to the surrounding environment.

Conclusions

As presented in this report, the proposed interchange at Bethlehem Road provides a much-needed additional access point for the growing number of trips travelling to and from the study area. This is especially true for the truck traffic as this important freight cluster further develops to accommodate an ever-growing demand for freight movement between the Port of Savannah and metro-Atlanta. The proposed interchange at Bethlehem Road would accomplish the following two primary project goals:

- **Satisfy the two FHWA policy requirements for new Interstate access.** As documented in this IJR, the proposed interchange at Bethlehem Road would not have an adverse impact on the safety and operation of I-75. In fact, the proposed interchange would improve safety and operations for adjacent interchanges and surface streets. Additionally, the proposed interchange would connect to a public road only and would provide for all traffic movements
- **Improve access and provide congestion relief:** Upon opening to traffic, the proposed interchange would provide much needed congestion relief to SR 155 and Bill Gardner Parkway. By balancing traffic demands at three interchanges rather than two, the proposed interchange would improve safety and traffic operations for all users while meeting the mobility and access needs of study area business and residents. Additionally, the new interchange would support existing and future economic growth and development by facilitating the efficient movement of freight into and out of the study area.

1. INTRODUCTION AND PLANNING BACKGROUND

1.1 Study Area

The IJR study area is located in southern Henry County and includes the City of Locust Grove and McDonough in the southern and northern portions of the study area, respectively. As presented in **Figure 1.1**, the study area boundaries for this IJR generally consist of Bill Gardner Pkwy to the south, State Route (SR) 155 to the north and west, and SR 42 to the east. The analysis area includes the interchange to the south of Bethlehem Road at Bill Gardner Pkwy at I-75 (Exit 212) and the interchange to the north at SR 155 at I-75 (Exit 216). The study area was established based on the expected traffic influence area of the proposed interchange and the potential environmental impact area of the interchange and associated improvements to Bethlehem Road. While the SR 20 (Exit 218) was originally included in this analysis, it is not included in this report since the analysis revealed that the traffic operations at that interchange are not affected (positively or negatively) by the implementation of the proposed interchange.

1.2 Planning Background

The proposed interchange has been recommended by and included in several local and regional transportation planning studies and plans. These were reviewed to ensure consistency of the proposed project with other applicable long-range planning projects. Below is a brief description of these studies/plans and how the proposed project is included or recommended.

ARC 2040 Regional Transportation Plan (RTP)

The RTP is the long-range transportation plan for the Atlanta regional Commission (ARC) 20-county Metropolitan Planning Organization (MPO) area. The plan is financially constrained, meaning project costs and revenue streams are balanced. The proposed project is included in the fiscally constrained RTP as project AR-955 (I-75 South: New Interchange at Bethlehem Road). The project is shown Long Range with a network year of 2040 and a cost of $25,000,000.

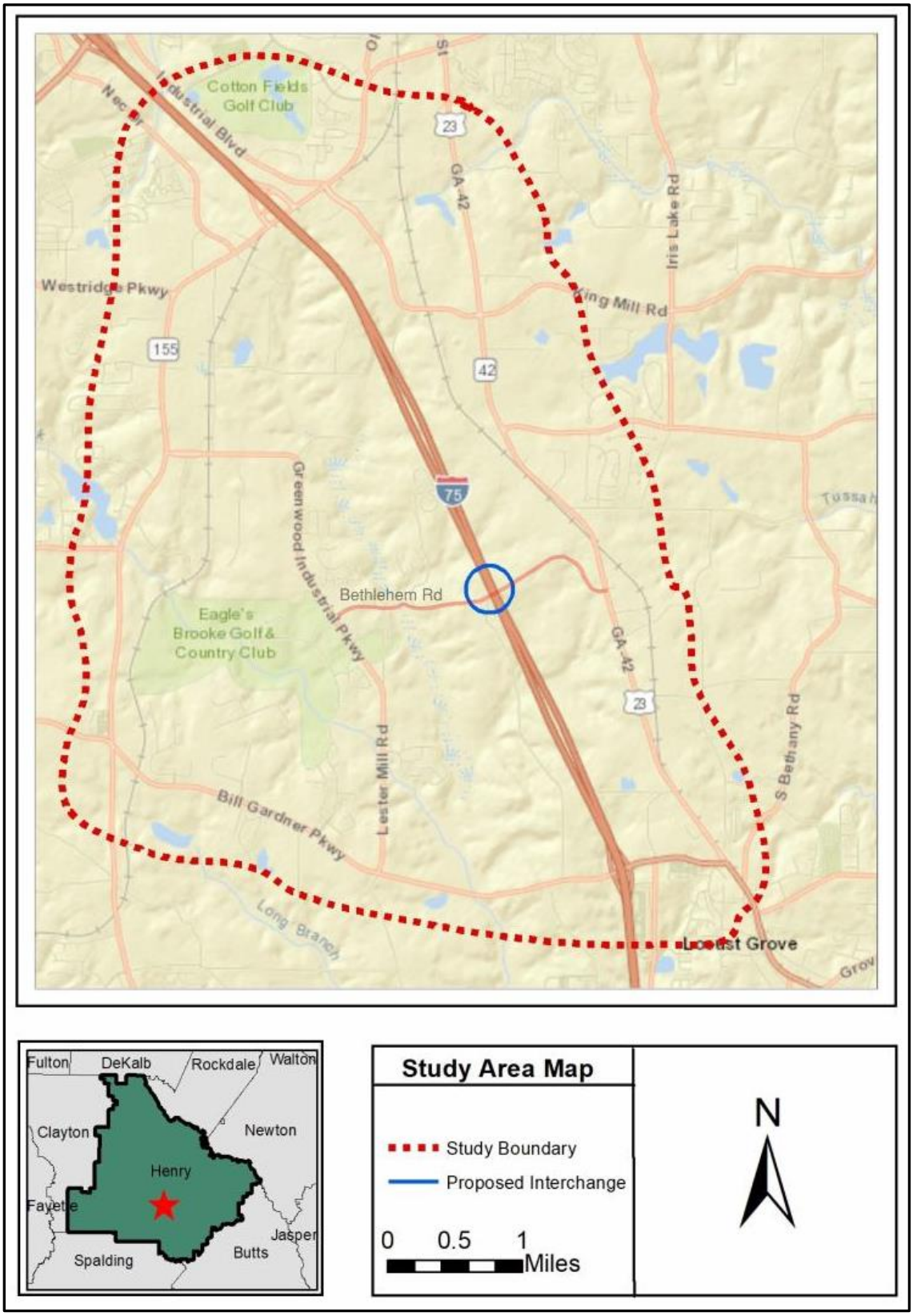
Henry County Joint County/Cities Transportation Plan - 2016

This Comprehensive Transportation Plan Update assesses current and projected transportation needs through the year 2040 and involves Henry County and the cities of Hampton, Locust Grove, McDonough, and Stockbridge. A new interchange at Bethlehem Road is recommended to help relieve pressure on the SR 155 and Bill Gardner Pkwy interchanges. The proposed project is listed as R-72(A), a mid-range (2022-2030) recommendation with a total cost of $47,037,229.

Atlanta Regional Freight Mobility Plan Update - 2016

In 2016, ARC completed its update of the Atlanta Regional Freight Mobility Plan. This serves as the freight plan for the metropolitan Atlanta Region. The goal of the plan is to enhance the region's economic competitiveness by providing efficient, reliable, and safe freight transportation while maintaining the quality of life in the region's communities. The new interchange at Bethlehem Road is identified as a Tier 1 freight project that would 'help to improve accessibility to and mobility within the McDonough/Henry County freight cluster'. The plan also identified the interchange as providing congestion relief to the SR 155 and Bill Gardner Pkwy interchanges.

Figure 1.1: IJR Study Area Map



Interchange Feasibility Study - 2015

In 2015, Henry County completed an Interchange Feasibility Study for a new interchange located between SR 155 and Bill Gardner Pkwy. This study identified the need for a new interchange for this freight activity area. This study identified several location alternatives and provided an evaluation of the traffic benefits of the interchange. The study was submitted to GDOT who's acceptance allowed the project to move into the Interchange Justification Report phase.

1.3 Project Need and Purpose

The 2016 Henry County Transportation Plan, Atlanta Region Mobility Freight Plan Update, and the 2015 Interchange Feasibly Study all present evidence as to why a new interchange is needed within the study area. This report provides a detailed operational analysis which demonstrates that a new interchange is needed. The following provides an in-depth discussion of the development and traffic trends that have precipitated the need for a new interchange.

Over the past three decades, rapid commercial and residential growth has driven a steady increase in traffic volumes and congestion in Henry County. The County's population grew from 58,741 in 1990 to 218,364 by 2015, a 372% increase. During this same time period, commercial development within the IJR study area has witnessed an even greater expansion. Area development, comprised mainly of distribution, warehousing, and light industrial facilities, expanded from less than two million square feet in the early 1990's to over 25 million square feet by 2017. **Figure 1.2** presents aerial photography illustrating the expansion of industrial development within the study area during this period.

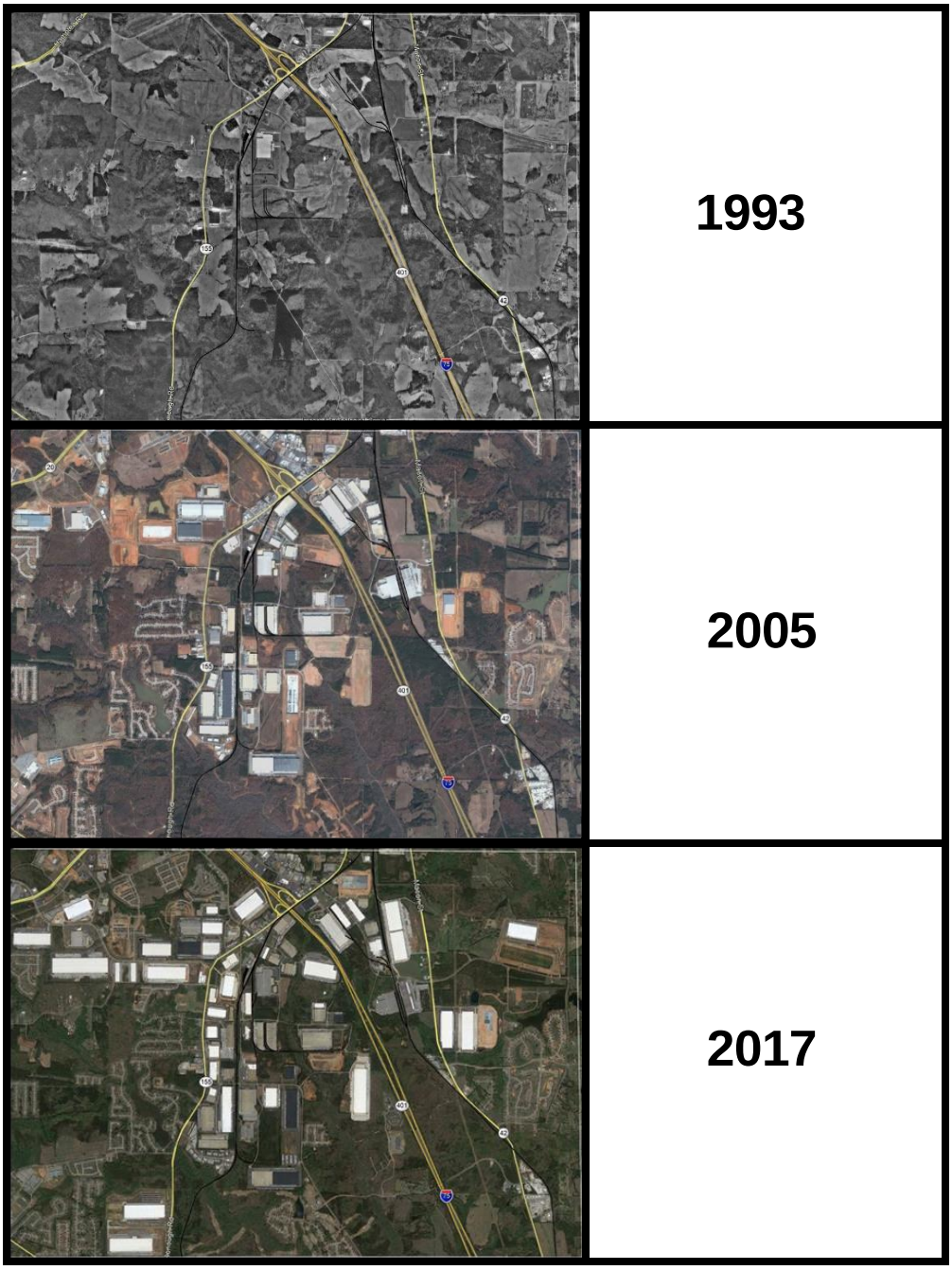
As shown in Figure 1.2, the area surrounding the SR 155 interchange has attracted a large number of warehousing and distribution facilities. This area was identified as a major 'freight cluster' in the ARC's Freight Mobility Plan. This location has experienced significant growth for several reasons including industrial zoning by Henry County and the City of Locust Grove, proximity to metro-Atlanta, as well as proximity to the Port of Savannah. The study area is the only metro-Atlanta freight cluster located close enough to the Port of Savannah to allow truck drivers to make a return trip in the same day. Because of rules set forth by the Federal Motor Carrier Safety Administration (FMCSA), truck drivers are generally limited to driving no more than 11 hours in a 14-hour window. Given these constraints, the SR 155 study area is a natural turning point for same-day freight deliveries from the Port of Savannah to the Atlanta region.

The number of truck trips to and from the study area is expected to continue to grow for the foreseeable future. The ARC projects that freight traffic in the region will see a 76% increase by 2040. Population growth in the Atlanta region is expected to fuel this freight growth along with the expansion of the Panama Canal and Port of Savannah. With the completion of the Panama Canal lock expansion, freight movement in and out of the Port of Savannah is expected to increase dramatically as larger ships are now able to cost effectively serve east coast ports. The Savannah Harbor Expansion Project, expected to be completed in 2019, will allow the port to accommodate these larger ships.

The growth of warehousing and distribution facilities within the study area is in direct response to the increasing movement of freight in the region. In order to facilitate the efficient flow of freight

between the Port and metro-Atlanta, Georgia Governor Nathan Deal and GDOT have announced the planned construction of the I-75 Commercial Vehicle Lanes (CVL) project. This project would construct two, non-tolled truck lanes on I-75 northbound from I-475 in Macon to a terminus point between Bill Gardner Pkwy and SR 155. By providing a direct access to the existing and planned warehousing/distribution facilities within the study area, the proposed interchange at Bethlehem Road would help provide a logical terminus point for the CVL project.

Figure 1.2: Study Area Industrial Development



Source – Google Earth

In order to meet the growing demand for freight movement and distribution, several developments of regional impact (DRIs) are underway or planned within the study area. As detailed later in this IJR, these ongoing and planned developments are expected to generate an additional 31 thousand daily trips on area roadways, many of which are truck trips.

In addition to growing freight demands, the Henry County roadway network will need to accommodate significant commuter traffic growth over the next few decades. According to the ARC, Henry County is expected to add 133,327 new residents between 2015 and 2040, a 61% increase for a total of 351,691 by 2040. The ARC also predicts that Henry County will add 31,845 jobs in that same period, for a total of 100,413 jobs, an increase of 46%. This population and employment growth will generate even greater pressure on the state route and interstate facilities within the County. As detailed later in this report, traffic congestion on SR 155 has led to crash and injury accident rates far higher than stateside averages.

The proposed interchange is needed to accommodate the expected growth of freight and commuter traffic within this area of Henry County. The project would improve safety and traffic operations for all users while balancing the mobility and access needs of study area business and residents. Additionally, the new interchange would support existing and future economic growth and development by providing improved access for freight movement between the Port of Savannah and metro-Atlanta.

1.4 Land Use

Existing land uses within the unincorporated northern half of the study area are primarily light and general industrial with some commercial along SR 155 west of I-75 (See **Figure 1.3**). The industrial zoning in the northern portion of the study area is expected given the level of industrial development over the past two decades.

As shown in **Figure 1.4**, the southern half of the study area within the City of Locust Grove includes some light and general industrial zoning east of I-75 along with residential agricultural west of I-75 and primarily commercial land uses surrounding the Bill Gardner Pkwy interchange with I-75. As presented in the next section, the more than 300-acre Locust Grove-Clayco warehousing development is currently being rezoned for industrial use. This site is located within City limits west of I-75 and immediately south of Bethlehem Road.

As presented in **Figure 1.5**, the adopted 2030 unincorporated Future Land Use Map shows an expansion of industrial land uses in the northern portion of the study area. The same is true for the Locust Grove portion of the study area (see **Figure 1.6**). It is important to note that the land surrounding the interchange of Bill Gardner Pkwy at I-75 is designated as Gateway Town Center and the land north of this is designated Mixed Use District in the future land use map for Locust Grove. As supported by these land use recommendations, it is the intention of Locust Grove that Bill Gardner Pkwy be utilized as a gateway into the City for visitors and residents. By providing an alternative, and more efficient, route for truck traffic, the proposed interchange at Bethlehem Road is critical to the City of Locust Grove's vision for Bill Gardner Pkwy and their town center.

Figure 1.3: Existing Zoning within Unincorporated Portion of Study Area

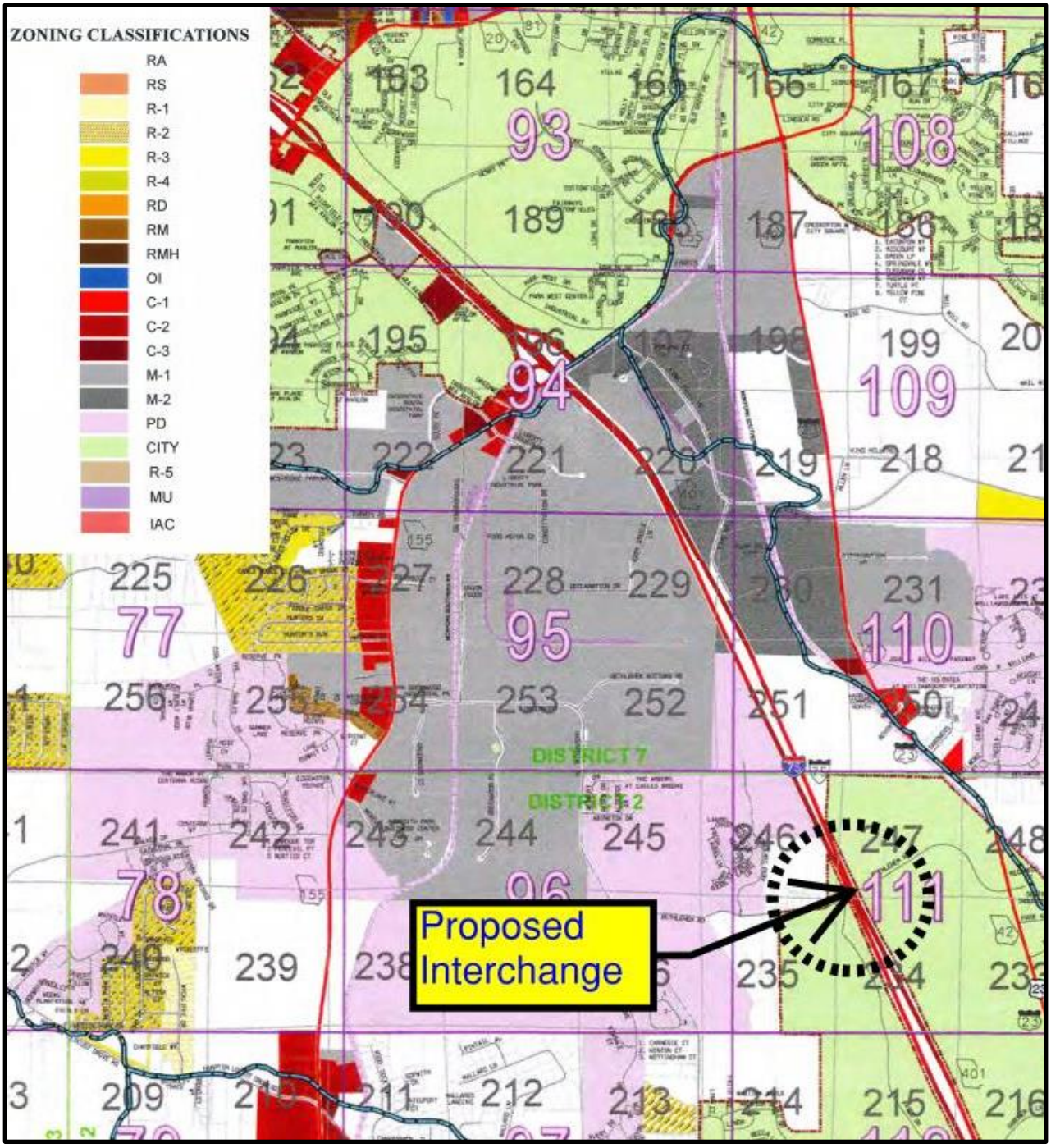


Figure 1.4: Existing Zoning within Locust Grove Portion of Study Area

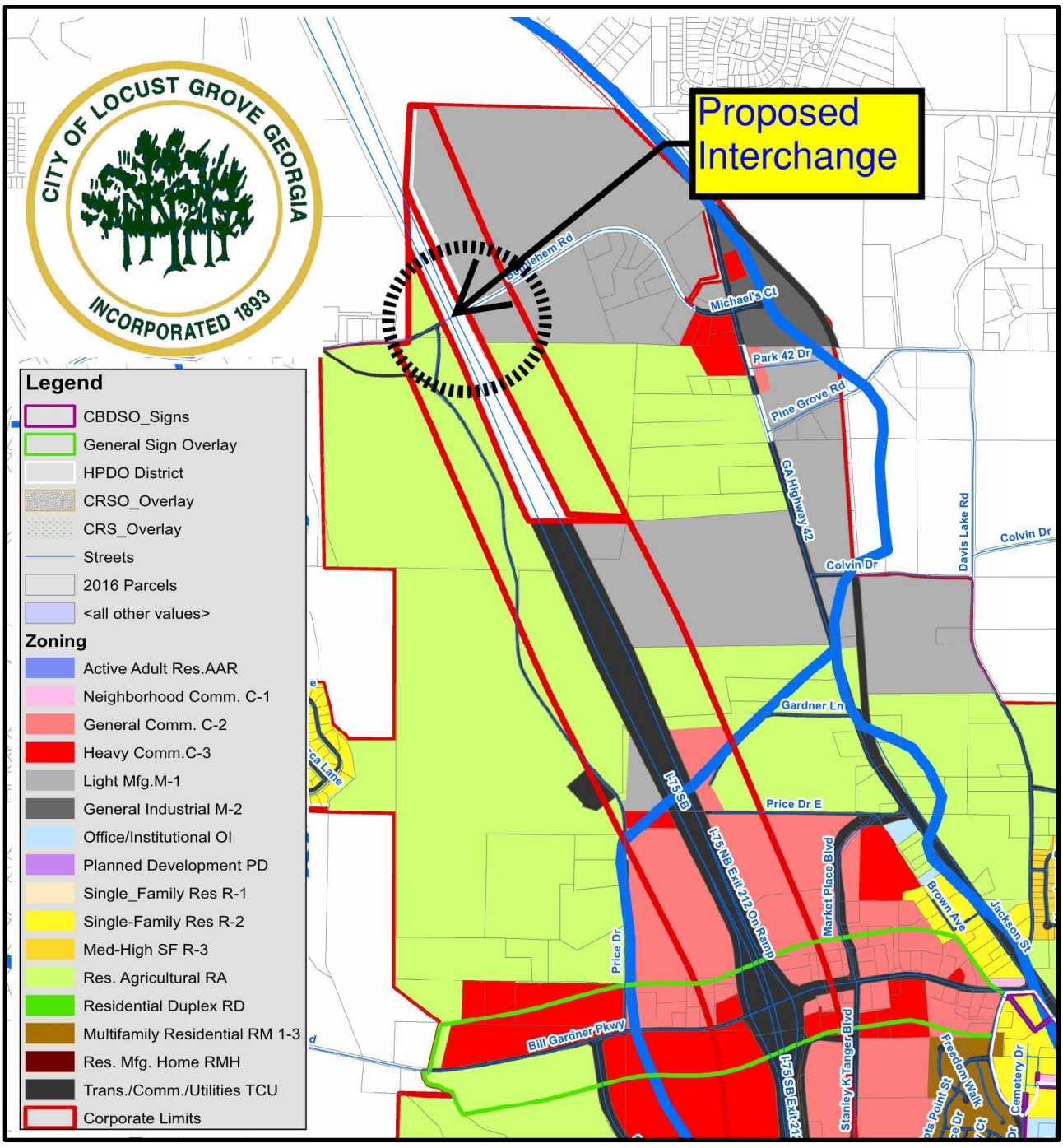


Figure 1.5: Future Land Use Map within Unincorporated Portion of Study Area

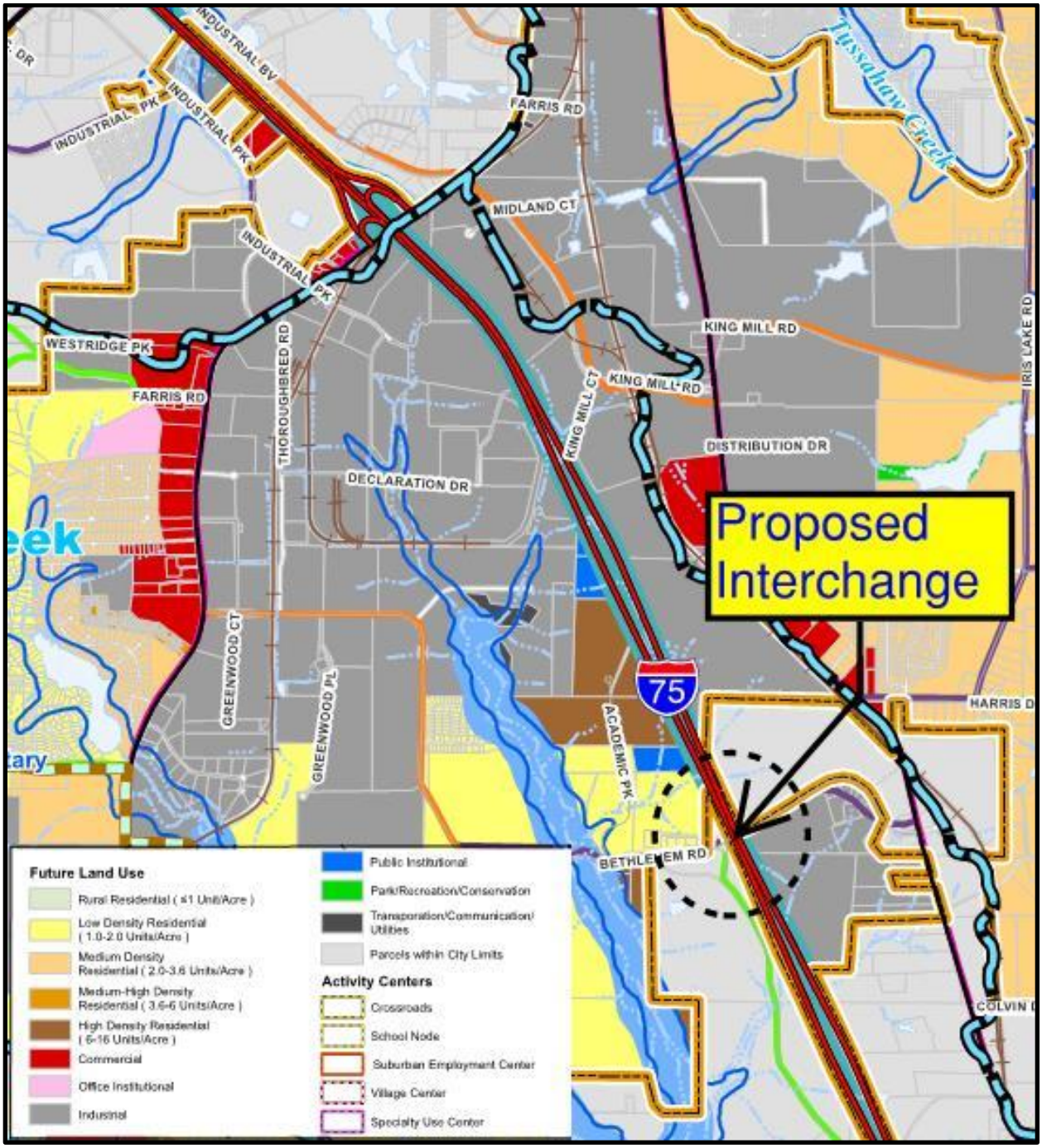
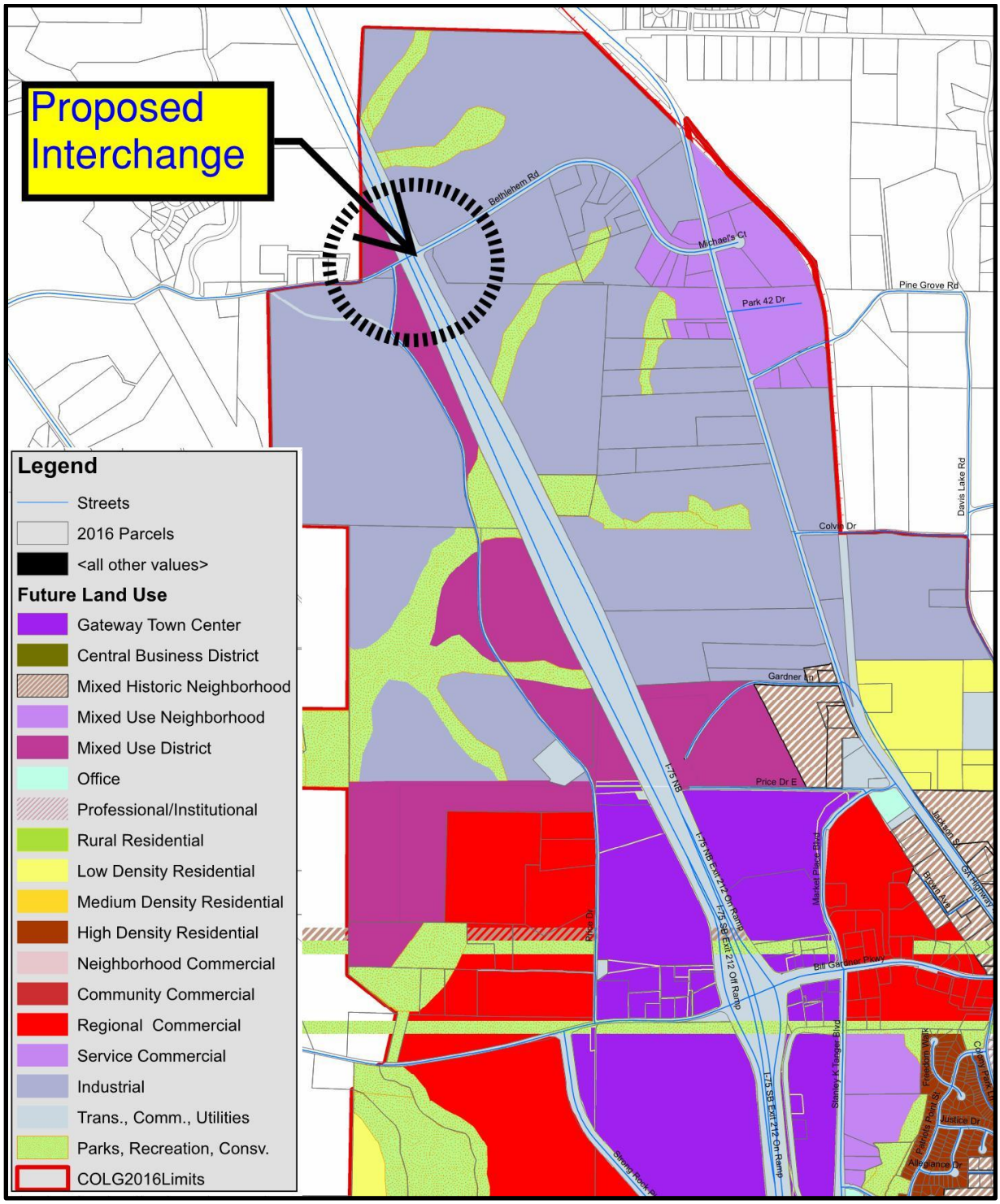


Figure 1.6: Future Land Use Map for Locust Grove Portion of Study Area



1.5 Planned Area Development

As described above, there are several major warehousing/distribution facilities underway or planned within the study area. As shown in **Table 1.1** and presented in **Figure 1.7**, these six developments represent more than 15 million additional square feet of warehousing/distribution development and 60 acres of intermodal yard within close proximity to I-75. Both the Locust Grove-Clayco site and the Norfolk Southern warehousing and intermodal site would have their primary access points on Bethlehem Road upon construction of the proposed interchange. As shown in Table 1.1, these developments are expected to add an additional thirty-one thousand vehicle trips per day to the study area roadway network.

Table 1.1: Planned Area Industrial Developments

Development Name	Development Type	Size	Daily Trips Generated
Lambert Farms	Warehousing/Distribution	4,817,200 sf	8,093
King Mill*	Warehousing/Distribution	3,048,300 sf	5,121
Locust Grove-Clayco Phases I & II*	Warehousing/Distribution	4,089,993 sf	6,886
Trammel Crow Site	Warehousing/Distribution	1,190,160 sf	1,999
Midland Logistics*	Warehousing/Distribution	669,732 sf	1,125
Norfolk Southern Warehousing	Warehousing/Distribution	1,846,500 sf	3,102
SUBTOTAL		**15,670,885 sf**	**26,326**
Norfolk Southern Intermodal Site	Intermodal Truck Terminal	60 Acres	4,914
TOTAL			**31,240**

*Project under construction

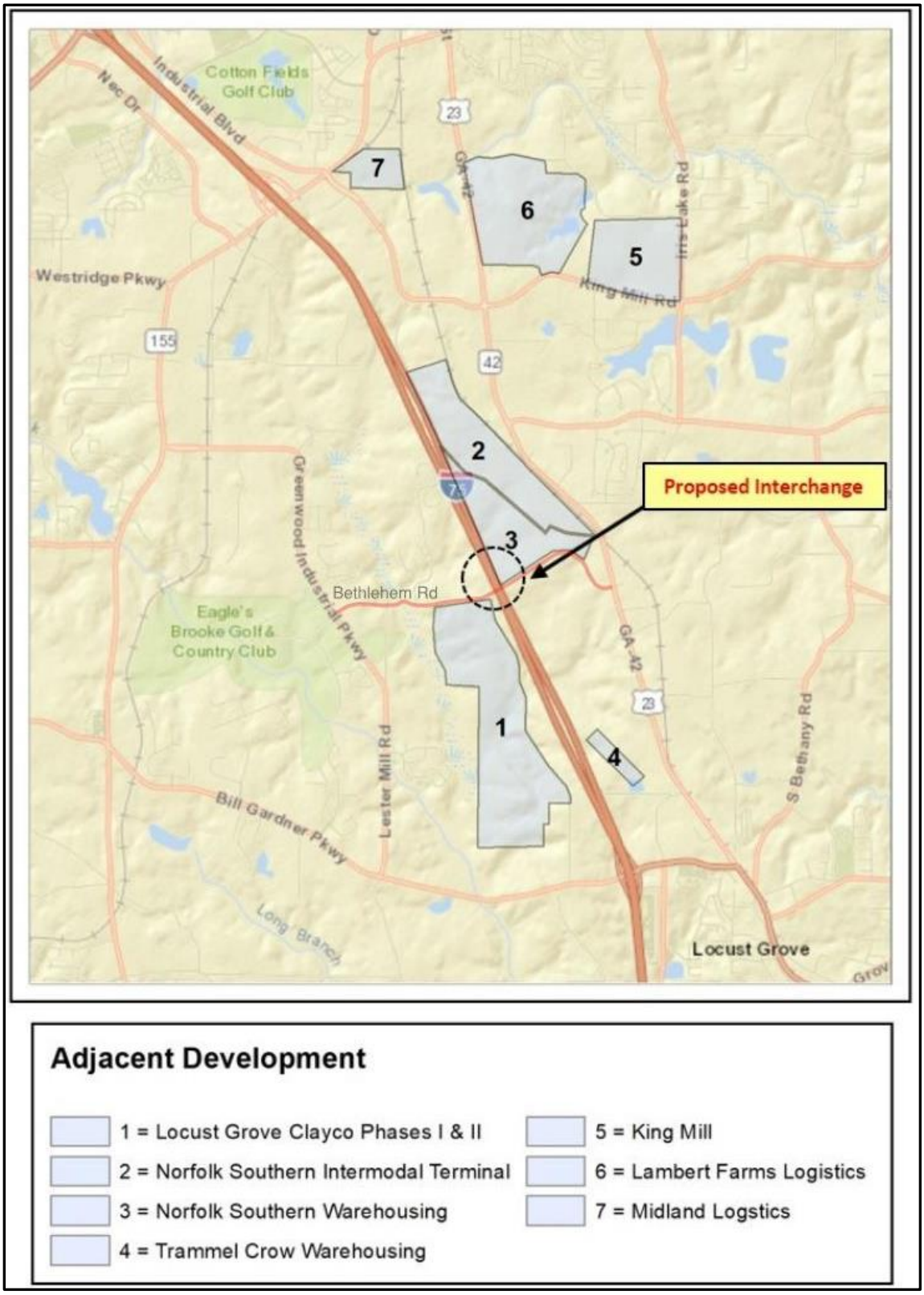
1.6 Planned Transportation Improvements

A review of all planned and programmed projects within the study area was completed in order to understand how adjacent transportation improvements would influence the need and effectiveness of the proposed interchange. **Table 1.2** presents all major planned state and local transportation improvements within the study area.

Table 1.2: Programmed Area Transportation Projects

Project	Project Type	GDOT PI# / ARC #	Total Cost	Construction Date
SR 155 from I-75 to Bill Gardner Pkwy	Widening	0015284 / N/A	$72M	2029
SR 155 from I-75 to SR 42/US 23	Widening	0007856/ HE-113	$42M	2022
Bill Gardner Pkwy from SR 155 to I-75	Widening	0000562/HE126B	$20M	2026
I-75 Commercial Vehicle Lanes (NB) from I-475 to SR 155	Widening	0014203	$723M	2025

Figure 1.7: Planned Area Developments



2. EXISTING CONDITIONS

2.1 Interchange Spacing

When determining the appropriate location for a new interchange within the study area, the spacing and distance between interchanges is an important consideration. Per FHWA guidance, the proposed access should not have a significant adverse effect on the safety and operation of the interstate. As such, the spacing between interchanges is important in that sufficient area must be provided to safely accommodate weaving, diverging, merging, and allow for understandable directional signing. GDOT policy on interchange spacing is presented in **Table 2.1**.

Table 2.1: GDOT Interchange Spacing Guidelines

Area Classification	Minimum Spacing	Average Spacing
Urban	1 mile	2 miles
Suburban	2 miles	4 miles
Rural	2 miles	8 miles

According to the 2010 Census – Urban Area Reference Map, a large portion of the study area, including the SR 155 and bill Gardner Pkwy interchanges are located within an urbanized area. The entire study area will likely be included as urbanized by the 2020 Census. **Figure 2.1** presents the existing interchange spacing from Exit 205 to Exit 222. The average interchange spacing for this segment of I-75 under existing conditions is 3.44 miles. With the addition of the proposed interchange at Bethlehem Road would be 2.87 miles, which is greater than the minimum recommended average spacing for an urban area. Furthermore, the minimum spacing between all interchanges would be greater than the recommended minimum.

As presented by the American Association of State Highway and Transportation Officials (AASHTO) in A Policy of Geometric Design of Highways and Street (Green Book), a general rule of thumb for minimum interchange spacing is one-mile in urban areas and two miles in rural areas. The minimum spacing is measured between the centerlines of interchange cross streets. AASHTO further offers design guidance regarding the minimum spacing of consecutive interchange ramps. For the study area, the minimum spacing for consecutive entrance and exit ramps is 1,600ft.

2.2 Crash Analysis

In order to identify potential safety issues and crash trends at the existing interchanges within the study area, the most recent available crash data (2013-2016) was analyzed. Crash rates and injury accident rates for SR 155, Bill Gardner Pkwy, SR 42, and Bethlehem Road were calculated in terms of crashes and injury accidents per one hundred million vehicle miles of travel, and were compared to GDOT statewide average crash and injury accident rates for urban minor arterials (see **Table 2.2**). As presented in Table 2.2, SR 155 within the study area experienced crash rates significantly above statewide averages for all analysis years. Similarly, SR 155 experienced injury accident rates that were more than double the statewide averages for all years.

Figure 2.1: Study Area Interchange Spacing

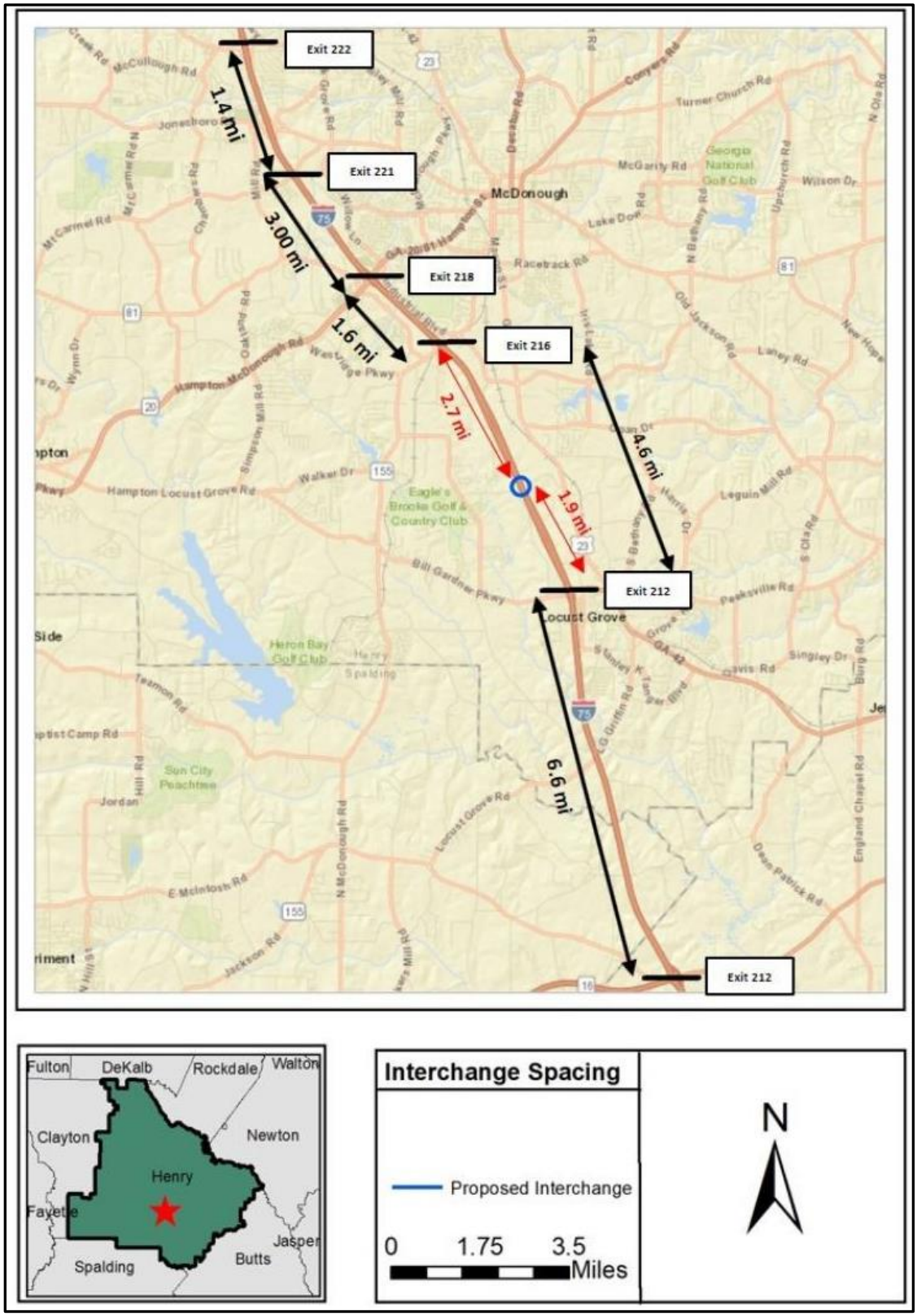


Table 2.2: Summary of Crash Rates

SR 155 from SR 42 to Bill Gardner Pkwy (3.4 miles) – Urban Minor Arterial						
Year	**No. of Crashes**	**Crash Rate***	**Statewide Average Crash Rate**	**No of Injury Accidents**	**Injury Accident Rate***	**Statewide Injury Accident Rate**
2013	219	1,009	606	69	318	128
2014	215	975	604	64	290	124
2015	299	1,298	637	88	382	156
2016	323	1,319	Not Available	94	384	Not Available
Bill Gardner Pkwy from SR 42 to SR 155 (3.84 miles) – Urban Minor Arterial						
Year	**No. of Crashes**	**Crash Rate***	**Statewide Average Crash Rate**	**No of Injury Accidents**	**Injury Accident Rate***	**Statewide Injury Accident Rate**
2013	126	581	606	26	120	128
2014	120	544	604	18	82	124
2015	177	768	637	31	134	156
2016	271	1,107	Not Available	36	147	Not Available
SR 42 from SR 155 to Bill Gardner Pkwy (5.46 miles) – Urban Minor Arterial						
Year	**No. of Crashes**	**Crash Rate***	**Statewide Average Crash Rate**	**No of Injury Accidents**	**Injury Accident Rate***	**Statewide Injury Accident Rate**
2013	84	388	606	26	120	128
2014	103	433	604	33	139	124
2015	104	400	637	23	88	156
2016	146	566	Not Available	45	174	Not Available
Bethlehem Road from Greenwood Rd to SR 42 (1.88 miles) – Urban Local Road						
Year	**No. of Crashes**	**Crash Rate***	**Statewide Average Crash Rate**	**No of Injury Accidents**	**Injury Accident Rate***	**Statewide Injury Accident Rate**
2013	11	1,444	315	1	131	59
2014	10	1,313	290	4	525	53
2015	12	1,521	257	3	380	50
2016	8	988	Not Available	4	494	Not Available

* Values for rate of crashes and injury accidents are per 100 million vehicle-miles.

While statewide averages are not yet available for 2016, the crash data was presented to better understand the increasing trend of crashes along this segment of roadway. A review of the data

also reveals an upward trend in the number of crashes and injury accidents for this four-year period. These rates are indicative of a heavily congested arterial roadway. Crash and injury accidents on Bill Gardner Pkwy and SR 42, while exhibiting an increasing trend, were generally lower or similar to statewide averages for similar facilities. Crash and injury accident rates on Bethlehem Road were significantly higher that statewide averages however this was due to the very low overall traffic volumes on this roadway.

In order to better understand the crash data and trends within the study area, crash types were analyzed for each study roadway. **Table 2.3** presents the total number of crashes by type for study roadways. As shown in this table, rear-end and angle accidents represent the majority of crashes for the four-year period. The high percentage of rear-end crashes, especially on SR 155, is indicative of heavy traffic congestion.

Based on growth trends within the study area, traffic volumes and congestion are expected to worsen significantly over the next 20 years. Given the expected increase in commuter and truck trips, without improved connectivity and accessibility to the study area, the current increasing trend of injury accidents and overall crashes is expected to worsen.

Table 2.3: Summary of Crash Types

SR 155 from SR 42 to Bill Gardner Pkwy (3.4 miles) – Urban Minor Arterial					
Years	**Accident Type**				
	Rear-End	**Angle**	**Sideswipe**	**Other**	**Total**
2013-2016	575	326	83	72	1,056
% of Total	54%	31%	8%	7%	
Bill Gardner Pkwy from SR 42 to SR 155 (3.84 miles) – Urban Minor Arterial					
Years	**Accident Type**				
	Rear-End	**Angle**	**Sideswipe**	**Other**	**Total**
2013-2016	191	272	124	107	694
% of Total	28%	39%	18%	15%	
SR 42 from SR 155 to Bill Gardner Pkwy (5.46 miles) – Urban Minor Arterial					
Years	**Accident Type**				
	Rear-End	**Angle**	**Sideswipe**	**Other**	**Total**
2013-2016	267	81	17	66	431
% of Total	62%	19%	4%	15%	
Bethlehem Road from Greenwood Rd to SR 42 (1.88 miles) – Urban Local Road					
Years	**Accident Type**				
	Rear-End	**Angle**	**Sideswipe**	**Other**	**Total**
2013-2016	7	12	2	21	42
% of Total	17%	29%	5%	50%	

2.3 Existing Conditions Capacity Analysis

Traffic counts were collected for all study ramps, intersections, as well I-75. The existing AM and PM peak hour traffic volumes are presented in Appendix A. The existing peak hour traffic volumes were analyzed to determine existing conditions on all freeway segments, at the ramp junctions, and major intersections within the study area. Existing traffic conditions within the study area roadway network were analyzed using the latest version of the Highway Capacity Software (HCS+) for freeway segments and ramp junctions. SYNCHRO 9.0 was utilized for signalized and unsignalized intersection analyses. Output results were based on HCM 2010 methodology. Existing cycle lengths on all coordinated traffic signals were utilized for all analysis years. No weaving areas are contained in the existing or Build condition within the study area, therefore no weaving analysis is required.

2.3.1 Basic Freeway Analysis

Freeway segment analysis was conducted for one-way segments of I-75 between study interchanges. This analysis was performed according to the procedures outlined in the HCM. The resulting LOS values for each segment are presented in **Table 2-4** below. As shown in this table, all freeway segments operate at LOS A-C under existing conditions.

Table 2.4: Basic Freeway LOS Analysis: Existing Conditions (2017)

Freeway Segment	Travel Direction	LOS (Density*)	
		AM	PM
I-75 South of Bill Gardner Pkwy	NB	A (11.0)	C (20.8)
I-75 South of Bill Gardner Pkwy	SB	B (12.5)	B (14.1)
I-75 from Bill Gardner Pkwy to SR 155	NB	B (17.0)	C (22.7)
I-75 from Bill Gardner Pkwy to SR 155	SB	B (13.3)	C (18.5)
I-75 North of SR 155	NB	C (20.5)	C (23.6)
I-75 North of SR 155	SB	B (16.1)	C (23.1)

**Density = (pc/mi/ln)*

2.3.2 Ramp Merge/Diverge Analysis

Ramp junctions at SR 155 and Bill Gardner Pkwy were analyzed for existing conditions. This analysis was performed according to the procedures outlined in the HCM. The resulting LOS and densities for each merge or diverge are presented in **Table 2-5**. As shown in this table, there are no existing deficiencies on study area ramps as all ramp junctions operate at LOS A-C under existing conditions.

Table 2.5: Ramp Junction LOS Analysis: Existing Conditions (2017)

Ramp Junction	Type	LOS (Density*)	
		AM	PM
I-75 NB Off-Ramp to Bill Gardner Pkwy	Diverge	B (13.8)	C (24.5)
I-75 SB On-Ramp from Bill Gardner Pkwy	Merge	B (13.9)	B (15.7)
I-75 NB On-Ramp from Bill Gardner Pkwy	Merge	C (21.4)	C (25.1)
I-75 SB Off-Ramp to Bill Gardner Pkwy	Diverge	B (16.9)	C (23.9)
I-75 NB Off-Ramp to SR 155	Diverge	B (13.8)	B (19.3)
I-75 SB On-Ramp from SR 155	Merge	B (11.9)	B (16.5)
I-75 NB On-Ramp from SR 155	Merge	C (23.6)	C (24.4)
I-75 SB Off-Ramp to SR 155	Diverge	B (19.5)	C (26.9)

**Density = (pc/mi/ln)*

2.3.3 Intersection Analysis

All study area intersections were analyzed for existing conditions using Synchro 9.0. In accordance with the procedures outlined in the HCM, the resulting delay and LOS values for each intersection are presented in **Table 2-6**. As shown in this table all signalized intersections operate at LOS D or better under existing conditions with the exception of the SR 155 at SR 42/US 23 intersection. Most study area unsignalized intersections experience unacceptable levels of service (LOS E or F) for their stop sign controlled side street approaches. This is not uncommon for stop sign controlled approaches in urbanized areas.

Table 2.6: Intersection LOS Analysis: Existing Conditions (2017)

Intersection	Traffic Control	LOS (Delay - sec)	
		AM	PM
Bill Gardner Pkwy @ SR 42/US 23	Signalized	C (27.3)	D (49.1)
Bill Gardner Pkwy @ Tanger Blvd/Mkt Pl Blvd	Signalized	D (43.3)	D (46.4)
Bill Gardner Pkwy @ I-75 NB Ramp	Signalized	C (21.2)	C (28.2)
Bill Gardner Pkwy @ I-75 SB Ramp	Signalized	C (22.9)	D (35.1)
Bill Gardner Pkwy @ Lester Mill Rd*	Stop Control Side Street	D(27.1)	E(37.2)
Bill Gardner Pkwy @ SR 155	Signalized	E (65.7)	E (56.5)
Bethlehem Rd @ SR 42/US 23*	Stop Control Side Street	F (226.6)	F (466.5)
Bethlehem Rd @ Greenwood*	Stop Control Side Street	D(25.7)	C(19.0)
Greenwood Industrial Pkwy @ SR 155*	Stop Control Side Street	F (55.0)	F (147.7)
SR 42/US 23 @ King Mill Road	Signalized	B (13.9)	B (16.8)
SR 155 @ SR 42/US 23	Signalized	D (36.7)	E (55.2)
SR 155 @ Henry Pkwy	Signalized	B (12.8)	C (33.5)
SR 155 @ King Mill Road	Signalized	D (42.9)	D (47.1)
SR 155 @ I-75 NB Ramp	Signalized	C (32.6)	D (35.9)
SR 155 @ I-75 SB Ramp	Signalized	C (30.7)	D (51.6)
SR 155 @ Avalon Pkwy	Signalized	D (37.0)	D (47.4)

** For unsignalized intersections LOS shown is for stop controlled side street*

3. ALTERNATIVES CONSIDERED

Several locations and alignments were evaluated for the proposed new interchange between Bill Gardner Pkwy (Exit 212) and SR 155 (Exit 216). Considerations of locations and alignments included proximity to existing and planned area development, connectivity to the area roadway network, as well as spacing with adjacent interchanges. The following is a description of each interchange alternative along with a brief evaluation of why each was either dropped from further consideration or advanced for further concept development.

3.1 Interchange Alternative 1

Interchange Alternative 1 is presented in **Figure 3.1**. This interchange would be located in the northern portion of the study area approximately 1.1 miles south of the SR 155 interchange. This interchange location was identified due to its proximity to existing warehousing facilities. This alternative would extend Bethlehem Bottoms Road in a northeasterly direction across I-75 to an intersection with King Mill Road east of I-75. A comparison of the benefits and disadvantages of this interchange alternative is presented in **Table 3.1**. For the reasons listed in this table, Interchange Alternative 1 was dropped from further consideration. **Figures 3.3, 3.4**, and **3.5** present the typical sections for this and all alternatives as the roadway, bridge, and ramp segment typical sections do not vary between the alternatives. Similarly, all alternatives would include 1,000' of limited access control beyond each ramp terminal on the cross street. **Table 3.2** presents the conceptual engineering, right-of-way, and construction costs for Alternative 1.

Table 3.1: Interchange Alternative 1 - Advantages & Disadvantages

Advantages	1. Location in close proximity to existing industrial development 2. Limited potential for environmental and community impacts
Disadvantages	1. Connectivity/accessibility for trucks and commuters limited by: o Circuitous connection to SR 155 on west and SR 42 on east o Three at-grade railroad crossings on King Mill Road on east o Slow (35mph) curve on Bethlehem Bottoms Rd extension not optimal for high truck volumes 2. Interchange spacing less than desirable: o Close proximity (1.1 miles) to SR 155 interchange could cause operational/safety issues due to high truck volumes.

Table 3.2: Alternative 1 Cost Breakdown

CONSTRUCTION	$26,949,000.00
RIGHT-OF-WAY	$2,891,000.00
UTILITIES	$1,348,000.00
PRELIMINARY ENGINEERING	$2,695,000.00
SUBTOTAL:	$33,883,000.00
CONTINGENCY at 20%:	$6,776,600.00
TOTAL:	$40,659,600.00
Rounded TOTAL	**$40,700,000.00**

3.2 Interchange Alternative 2

Interchange Alternative 2 is presented in **Figure 3.2**. This interchange would also be located in the northern portion of the study area approximately 1.4 miles south of the SR 155 interchange. As with Interchange Alternative 1, this interchange location was identified due to its proximity to existing warehousing facilities. This alternative would extend Bethlehem Bottoms Road to the north then east across I-75 to an intersection with SR 42 east of I-75. A comparison of the benefits and disadvantages of this interchange alternative is presented in **Table 3.3**. For the reasons listed in this table, Interchange Alternative 2 was dropped from further consideration. **Table 3.4** presents the conceptual engineering, right-of-way, and construction costs for Alternative 2.

Table 3.3: Interchange Alternative 2 - Advantages & Disadvantages

Advantages	1. Location in close proximity to existing industrial development 2. Good connectivity to SR 42 on east side of I-75 3. Limited potential for environmental and community impacts
Disadvantages	1. Connectivity/accessibility for trucks and commuters on west side limited by: o Circuitous connection to SR 155 on west o Slow (35mph) reverse curve on Bethlehem Bottoms Rd extension not optimal for high truck volumes. 2. Interchange spacing less than desirable: o Close proximity (1.4 miles) to SR 155 interchange could cause operational/safety issues due to high truck volumes. 3. Would require bridging over Norfolk Southern railroad leaving 1/4 mile to return to grade for intersection with SR 42.

Table 3.4: Alternative 2 Cost Breakdown

CONSTRUCTION	$31,713,000.00
RIGHT-OF-WAY	$4,077,000.00
UTILITIES	$1,586,000.00
PRELIMINARY ENGINEERING	$3,172,000.00
SUBTOTAL:	$40,548,000.00
CONTINGENCY at 20%:	$8,109,600.00
TOTAL:	$48,657,600.00
Rounded TOTAL:	**$48,700,000.00**

Figure 3.1: Interchange Alternative 1

Figure 3.2: Interchange Alternative 2

Figure 3.3: Roadway Typical Section

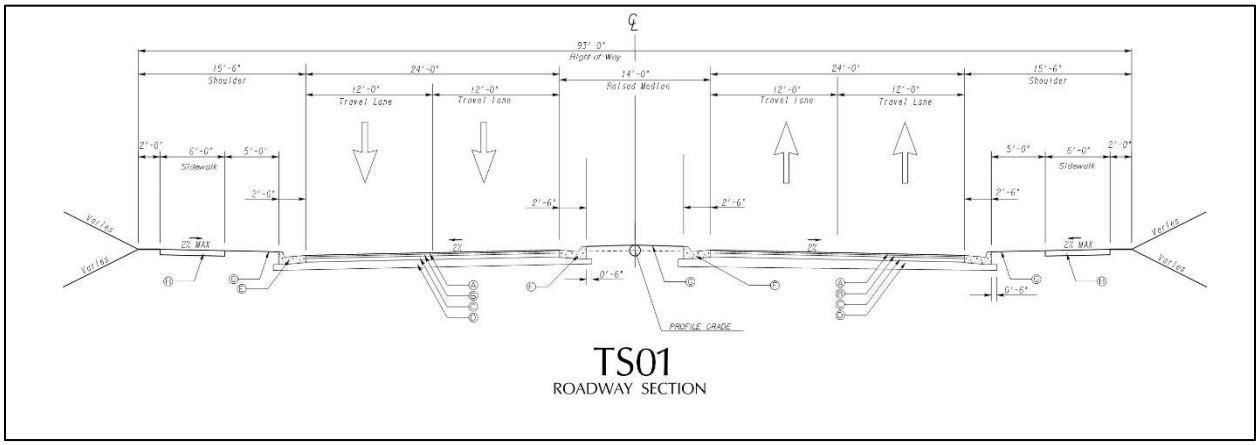


Figure 3.4: Bridge Typical Section

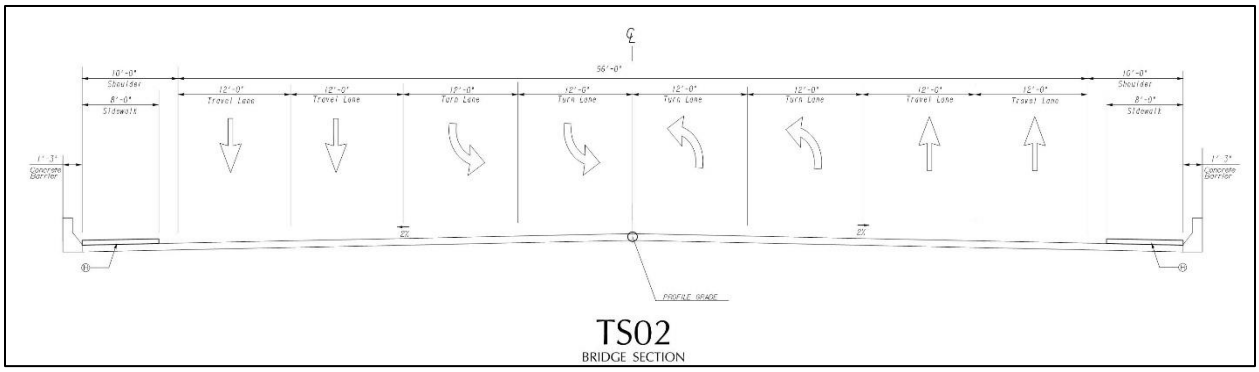
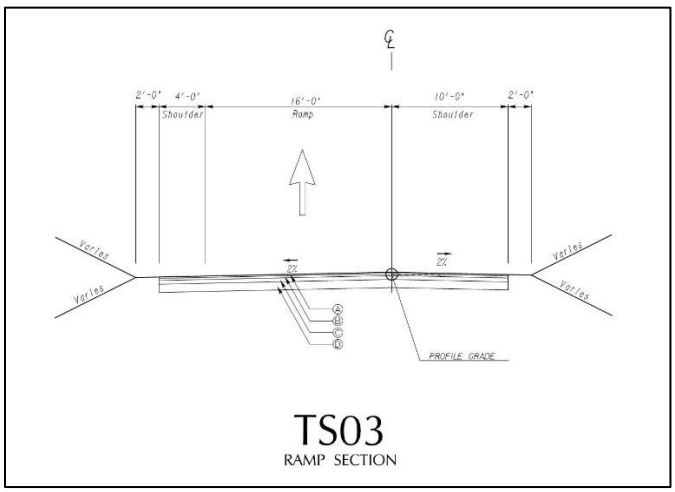


Figure 3.5: Ramp Typical Section



3.3 Interchange Alternative 3

Interchange Alternative 3 is presented in **Figure 3.6**. This interchange would utilize the existing alignment of Bethlehem Road and construct an interchange at the existing I-75 overpass. West of I-75, the alignment would follow a new location alignment for a short distance to avoid the Bethlehem Baptist Church and associated cemetery. This interchange location was identified because of Bethlehem Road's better than average connectivity with the existing roadway network, optimal spacing between existing interchanges, and proximity to planned and ongoing industrial development adjacent to Bethlehem Road (see Figure 1.7). A comparison of the benefits and disadvantages of this interchange alternative is presented in **Table 3.5**. Interchange Alternative 3 has significant advantages when compared to Alternatives 1 and 2. However, the substandard curves along the existing alignment, combined with the potential for impacts to the Bethlehem Baptist Church and the potential Environmental Justice (EJ) community on the north side of Bethlehem Road led to the development of Interchange Alternative 4. **Table 3.6** presents the conceptual engineering, right-of-way, and construction costs for Alternative 3.

Table 3.5: Interchange Alternative 3 - Advantages & Disadvantages

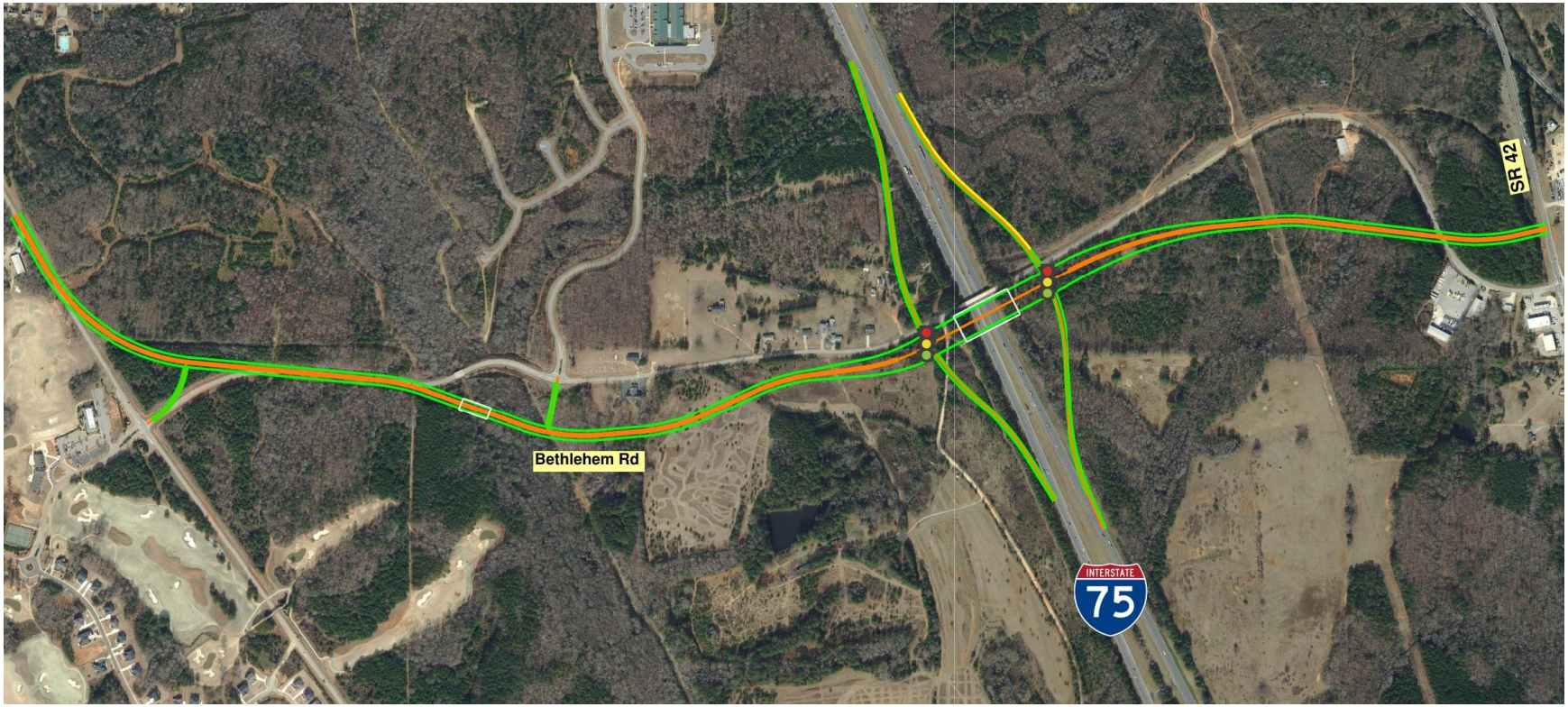
Advantages	1. Bethlehem Road provides good connectivity and accessibility for trucks and commuters to the west and east 2. Provides optimal spacing between adjacent interchanges 3. Location in close proximity to ongoing and planned adjacent industrial development 4. No new at-grade or grade separated crossing of NS railroad
Disadvantages	1. Existing horizontal curves on Bethlehem Rd less than optimal for high truck traffic 2. Would prevent Bethlehem Baptist Church plans for expansion to the north 3. Widening existing roadway could result in impacts to potential Environmental Justice (EJ) community on north side of Bethlehem Road west of I-75

Table 3.6: Alternative 3 Cost Breakdown

CONSTRUCTION	$23,478,000.00
RIGHT OF WAY	$4,077,000.00
UTILITIES	$3,522,000.00
PRELIMINARY ENGINEERING	$2,348,000.00
SUBTOTAL:	$33,425,000.00
CONTINGENCY at 20%:	$6,685,000.00
TOTAL:	$40,110,000.00
Rounded TOTAL:	**$40,200,000.00**

Figure 3.6: Interchange Alternative 3

Figure 3.7: Interchange Alternative 4



3.4 Interchange Alternative 4

Interchange Alternative 4 is presented in **Figure 3.7** (above). This interchange alternative was developed in order to take advantages of the benefits of Alternative 3 yet avoid the potential disadvantages of that alignment. As shown in Figure 3.7, this alternative would realign the Greenwood Road to tie directly into Bethlehem Road on the western end. Directly connecting Bethlehem Road with Greenwood Road would provide a continuous route for trucks and commuters to easily access I-75 with minimal delay, encouraging the use of the new interchange.

This alignment would follow the existing Bethlehem Road alignment to the east then diverge slightly to the south and continue east to I-75 on new alignment. This new alignment section is necessary to avoid a low speed reverse curve at Bethlehem Bottoms Creek as well as the Bethlehem Baptist Church and cemetery. Since the church has plans to expand to the north of Bethlehem Road, this southerly alignment avoids potential impacts. The alignment continues east past the church to I-75 on new alignment to avoid impacts to the potential EJ community located on the north side of Bethlehem Road.

The relocated Bethlehem Road would then cross I-75 a new bridge and interchange just south of the existing overpass. This new location alignment and bridge would reduce impacts and allow for staged construction of the interchange and bridge without a bridge closure and detour for traffic on Bethlehem Road. East of the new interchange, the relocated Bethlehem Road would remain on new location and follow an easterly alignment to a new intersection with SR 42. This segment of new location alignment is necessary avoid the existing 35mph curves and provide a greater speed design to safely accommodate expected truck and commuter traffic.

A comparison of the benefits and disadvantages of this interchange alternative is presented in **Table 3.7**. Interchange Alternative 4 has significant advantages when compared to Alternatives 1,2, and 3. This alternative would provide safe and efficient connectivity to the existing roadway network to the west and east, allow for optimal spacing of interchanges along I-75, and provide direct access to planned and ongoing industrial development adjacent to Bethlehem Road (See Figure 1.7) while avoiding the potential community impacts associated with Interchange Alternative 3. **Table 3.8** presents the conceptual engineering, right-of-way, and construction costs for Alternative 4.

Table 3.7: Interchange Alternative 4 - Advantages & Disadvantages

Advantages	1. Bethlehem Road provides good connectivity and accessibility for trucks and commuters to the west and east 2. Optimal spacing between adjacent interchanges 3. Location in close proximity to ongoing and planned adjacent industrial development 4. No new at-grade or grade separated crossing of NS railroad 5. Alignment designed to safely and efficiently accommodate truck traffic
Disadvantages	1. New location alignment will require new bridge over Bethlehem Bottoms Creek which will incur minor impacts to this stream and associated wetlands

Table 3.8: Alternative 4 Cost Breakdown

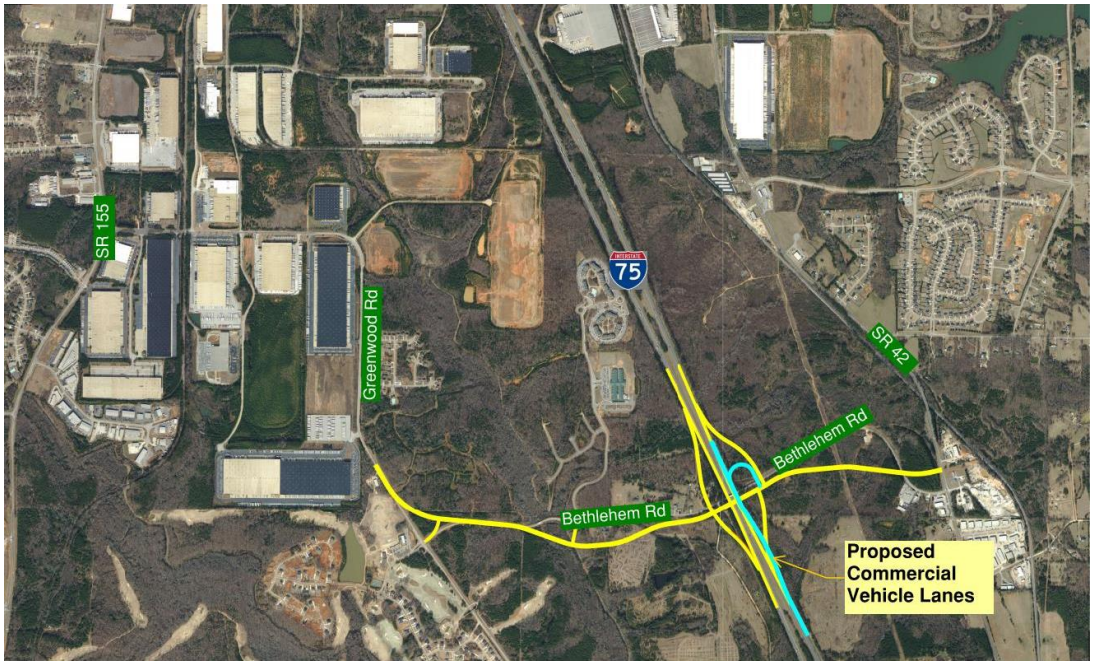
CONSTRUCTION	$26,560,000.00
RIGHT OF WAY	$2,891,000.00
UTILITIES	$3,984,000.00
PRELIMINARY ENGINEERING	$2,656,000.00
SUBTOTAL:	$36,091,000.00
CONTINGENCY at 20%:	$7,218,200.00
TOTAL:	$43,309,200.00
Rounded TOTAL:	**$43,400,000.00**

3.5 Interchange Alternative 4A

As mentioned earlier in this report, the GDOT Commercial Vehicles Lanes (CVL) project is expected to terminate in the vicinity of the proposed Bethlehem Road interchange. The purpose of this estimated $1.8B project is to safely improve mobility for freight movement between the Port of Savannah and the metro-Atlanta region. Since a primary purpose of the proposed interchange is to improve truck access to this major freight cluster in Henry County, coordination between these two freight movement projects is essential and beneficial. While each project has independent utility if the other is not implemented, their coordinated implementation will further support each projects' objective of providing safe and efficient movement of people and goods to and from the study area.

While the CVL project is only expected to begin construction in 2025, as each project progresses, close coordination will continue between Henry County and GDOT to ensure that both projects are designed to complement and not preclude the other. As such, Interchange Alternative 4A was developed to demonstrate how the proposed interchange could be designed to accommodate a truck-only ramp connection with the CVL project. With the CVL project proposed to terminate in this general vicinity, a direct connection into the Henry County freight cluster via the proposed interchange at Bethlehem Road would help facilitate safe and efficient truck access to this area. Since no traffic projections for the CVL project are available at his time, this alternative was developed to demonstrate that Interchange Alternative 4 could be modified to accommodate a connection with the CVL project.

Figure 3.8: Interchange Alternative 4A



3.6 Interstate Signage Layouts

Figures 3.9 and **3.10** present the interstate signage that would be required for each alternative. While Alternatives 1 and 2 are significantly closer to SR 155 than 3 and 4, these alternatives would still meet minimum signage distances to safely sign for the new interchange. Since the interchange locations for Alternatives 1 and 2 are very similar, as are Alternatives 3 and 4, the signage layouts are presented for Alternatives 1 and 2 as well as 3 and 4 respectively.

Figure 3.9: Interstate Signage Layout for Alternatives 1 & 2

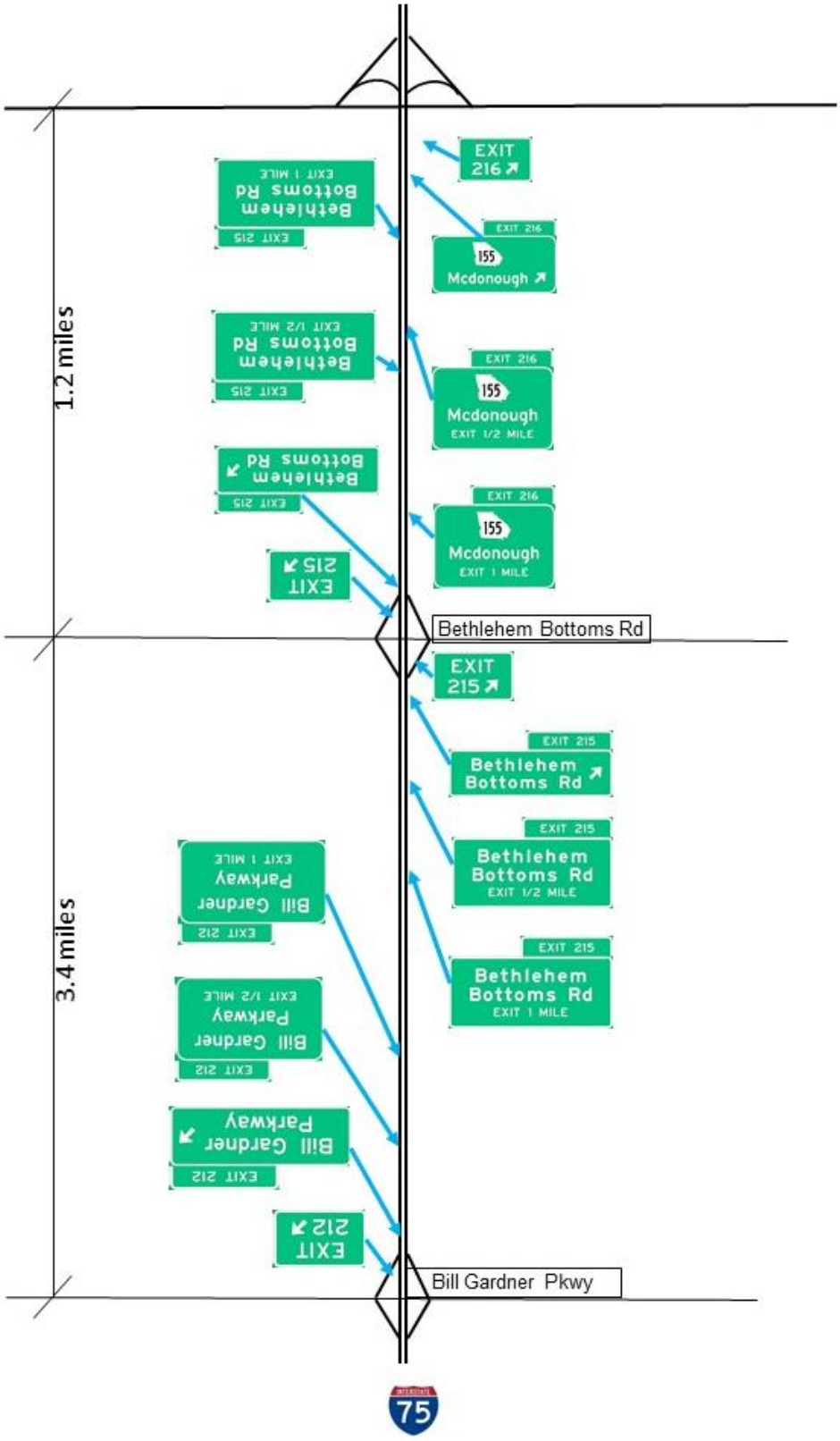
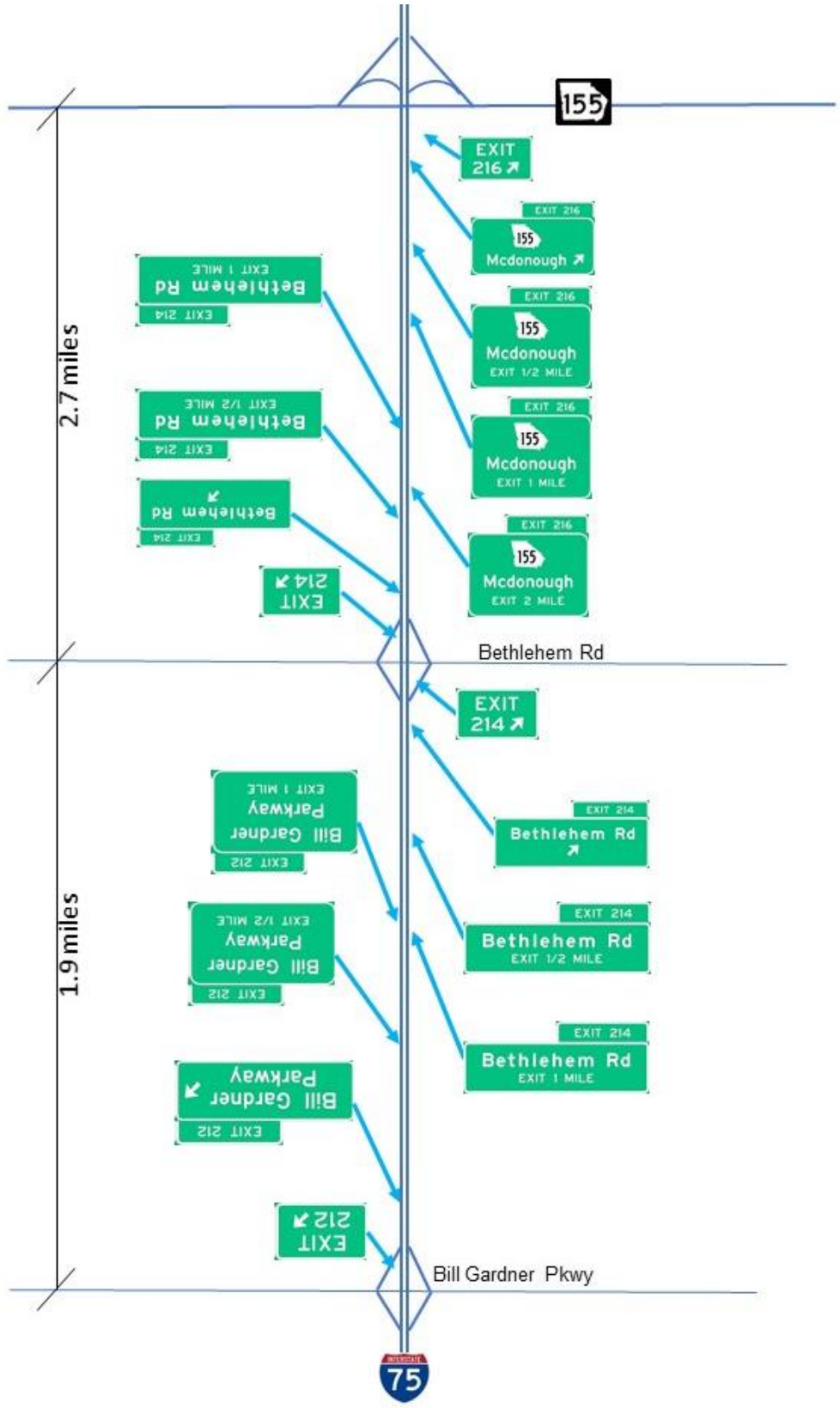


Figure 3.10: Interstate Signage Layout for Alternatives 3 & 4



4. FUTURE CONDITIONS

4.1 Forecast of Future Traffic

Upon discussion with GDOT and Henry County, it was determined that 2025 was an appropriate Opening Year for the interchange given the project will need to go through the full NEPA and GDOT PDP processes. With 2025 as an Opening Year, 2045 would be the 20-design year. The development of traffic projections for this IJR followed a multi-step process approved though a methodology coordination meeting with the GDOT Office of Planning. This traffic projection process for all study years and conditions is described below.

The ARC's travel demand model would typically play a large role in the forecasting of traffic volumes for a new interchange, however a review and analysis of the recently developed Activity Based Model (ABM) for the Atlanta region revealed issues that deemed it inappropriate as a forecasting tool for this study. A review of the RTP model revealed 2040 model volumes on certain study roadways to be lower than existing counts. For example, the 2040 model forecast for SR 155 west of I-75 was just over 27,000 vehicles per day while the existing count showed more than 31,000 vehicles per day. The same is true for Bill Gardner Pkwy east of I-75 with the model showing almost 33,000 vehicles per day in 2040 and the existing count showing over 37,000 vehicles per day.

The 2040 model was run with and without the proposed interchange at Bethlehem Road. Since the 2040 model does not project any capacity constraints on SR 155 or Bill Gardner Pkwy, relatively few trips were reassigned to the new interchange despite the LOS D, E, and F conditions at these interchanges under existing conditions as presented in Section 2 of this report. Large travel demand models are often difficult to calibrate near the edge of the modeled area. This is likely the case with the IJR study area close to the edge of the ARC regional model. The ARC travel demand model was examined when identifying appropriate growth rates for the study area.

4.1.1 2025 Opening Year

Traffic projections were prepared for 2025 No-Build and Build conditions as described below. The No-Build condition assumes the proposed interchange is not constructed and the Build condition assumes the construction of the proposed interchange at Bethlehem Road. Based on the current programming dates, no widening of SR 155 or Bill Gardner Pkwy is assumed by 2025.

4.1.1.1 Background Growth

The projection of traffic begins with an analysis of the current traffic growth trends on area roadways. GDOT historical traffic coverage counts were examined to determine traffic growth trends utilized to project 2025 volumes. For this IJR, background traffic growth assumes those increases in traffic volumes on study area roadways due to population and employment growth trends in the southern portion of Henry County. Because the large planned area developments within the IJR study area (listed previously) have the potential to significantly affect traffic patterns and volumes, they are addressed separately from the background traffic growth.

Background traffic growth rates utilized to project 2025 traffic were based on the GDOT historical traffic counts between 2010 and 2016. Including historical traffic volumes from before 2010

resulted in unrealistically low growth rates due to the reduction in traffic volumes as a result of the Great Recession. Given the relatively short-term projection period between 2017 and 2025, the more recent growth trend was utilized.

As presented in Table 4.1, the 2010 – 2016 GDOT traffic counts were utilized to identify growth rates for surface streets and I-75 separately. As shown in this table, I-75 has experienced significantly lower growth than the surface streets. This is expected as the volumes on I-75 are so high that the actual traffic increases represent a far lower percentage change than with the surface streets. Based on these growth trends, the growth rates used to project 2025 traffic were 1.75% for surface streets and 0.5% for I-75.

Table 4.1: Study Area Historical Traffic Growth Rates

SURFACE STREETS										
TC Station	**Location**	**Description**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**Compound Annual Growth**
1510167	SR 20	West of Westridge Pkwy	17,250	16,670	20,020	20,470	21,900	22,700	22,700	3.14%
1510169	SR 20	East of Regency Plaza Blvd	17,780	23,380	22,980	22,720	22,700	22,200	22,900	1.28%
1510105	SR 155	East of King Mill Rd	14,340	14,090	16,590	16,530	17,400	18,000	20,300	2.51%
1510103	SR 155	South of Greenwood Industrial Blvd	17,560	17320	17230	18120	18100	18400	19000	0.98%
1518137	Greenwood Industrial Pkwy	South of Bethlehem Bottoms Rd	-	1,090	1,070	1,090	3,640	3,790	3,880	6.96%
1518119	Bethlehem Rd	East of I 75	-	1,110	1,090	1,110	1,110	1,150	1,180	1.46%
1510336	SR 42	North of Bethlehem Rd	8,670	8,500	11,940	11,860	14,000	15,100	14,500	3.24%
1510378	Bill Gardner Pkwy	West of Lester Mill Rd	6,120	5,910	6,320	6,460	6,460	6,950	9,090	2.61%
1510381	Bill Gardner Pkwy	East of Lester Mill Rd	5130	4960	4890	7680	7680	8260	8530	3.35%
1510383	Bill Gardner Pkwy	East of Tanger Blvd	22520	20160	19860	20300	20300	20800	21300	-0.32%
1510334	SR 42	South of Bill Gardner Pkwy	20590	21540	21430	23070	23100	21900	22600	0.93%
								Weighted Average		**1.76%**
INTERSTATE 75										
035-0127	I-75	2 mi N of SR 36 @ colwell Rd	74400	71450	72040	71898	74700	79300	76200	0.80%
1510404	I 75	South of SR 20	108,200	102,350	102,340	102,340	105,000	105,000	109,200	0.29%
1510402	I75	North of Bethlehem Rd	89,980	83,820	84,610	84,610	88,500	88,500	89,000	0.33%
								Weighted Average		**0.45%**

For the 2025 No-Build condition, the background growth was applied to all Existing conditions volumes. However, the 2025 Build condition includes a new interchange between Bill Gardner Pkwy and SR 155. In order to develop the 2025 Build condition with background growth volumes, a portion of the traffic travelling to and from the study area via I-75 was redistributed to the new interchange at Bethlehem Road. The amount of traffic expected to utilize the new interchange was based on the new interchange's proximity to existing area development and congestion at the existing interchanges.

Based on the LOS and delay along SR 155 under existing conditions, it is expected that 20% of traffic utilizing the SR 155 interchange would utilize the new interchange at Bethlehem Road upon construction. Additionally, since the north facing ramps at Bill Gardner Pkwy experiences heavy traffic volumes, it is expected that 25% of this traffic would utilize the new interchange to avoid congestion and delay. Traffic from the south facing ramps at the Bill Gardner Pkwy interchange is relatively low and does not experience significant delay. This traffic is not expected to utilize the new interchange as they the use of the new interchange would represent over four miles of additional travel if their destination was generally in Locust Grove.

4.1.1.2 Adjacent Development Trips

As presented in Section 1.5, there are several major developments either underway or planned within the study area. Since these developments are located directly on study area roadways and have the potential to significantly affect traffic patterns and volumes when compared to normal background growth, the traffic associated with these developments was estimated separately then added to the background growth. **Figure 4.1** presents a simplified graphic of the study area with the planned developments and the access points for each development.

The Institute of Transportation Engineers' (ITE) Trip Generation Manual was utilized to estimate the number of vehicles generated by each development in the peak hours and daily. The trip generation calculations are presented in **Table 4.2.** For those developments with approved DRI traffic studies, the trip generation from that study was utilized. As shown in Table 4.2, these developments are expected to generate more than 31,000 trips per day along with more than 2,400 trips in both the AM and PM peak hours. All developments are expected to reach build out by 2025.

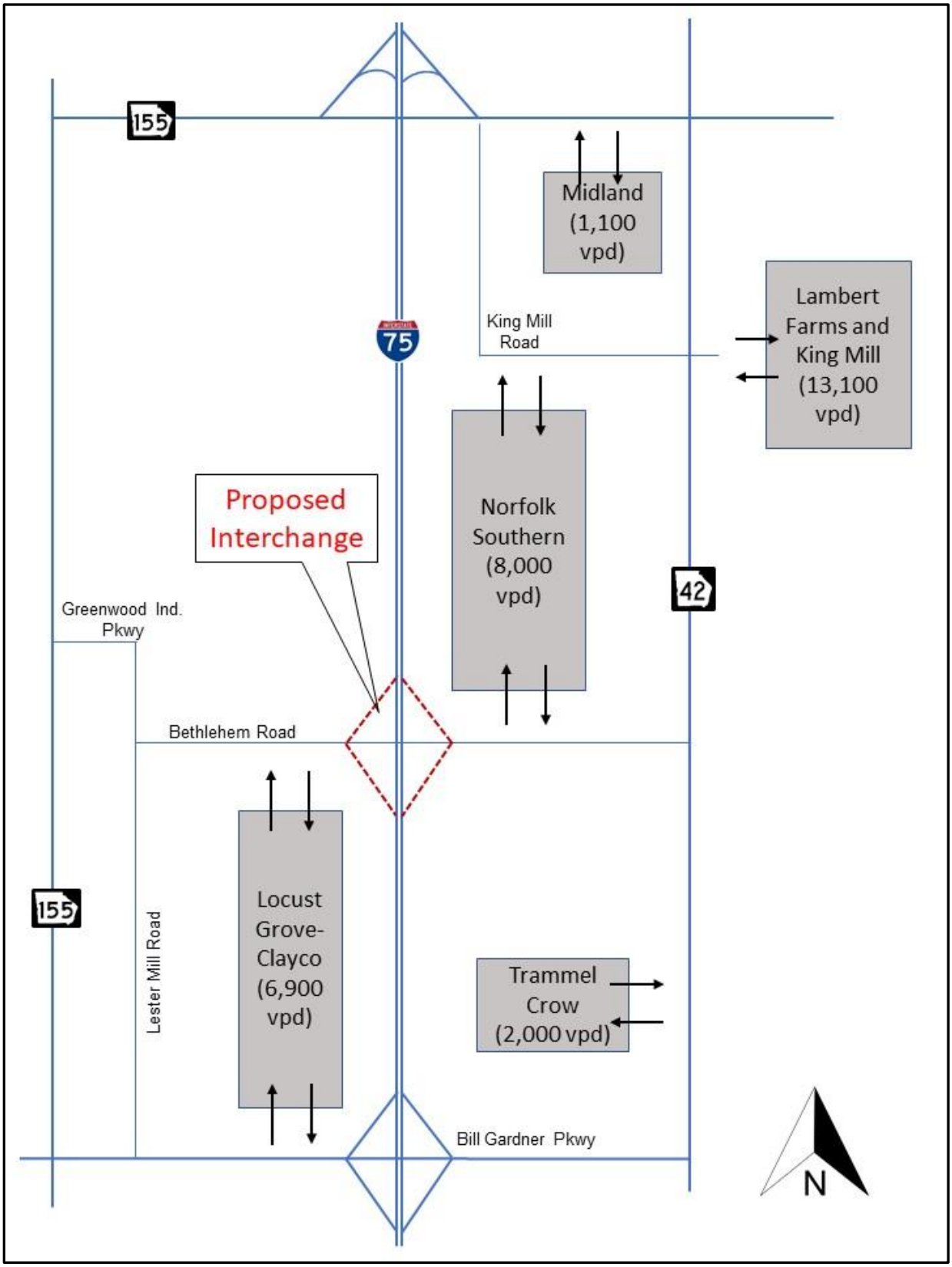
Table 4.2: Area Development Trip Generation

Bethlehem Road Area Development - TRIP GENERATION									
ITE Code	Land Use	Intensity	Daily Trips	AM Peak Hour			PM Peak Hour		
				Total	In	Out	Total	In	Out
152	High- Cube Warehouse/ Distribution Centre (Norfolk Southern Site)	1846500 Sq. Ft.	**3,102**	233	161	72	236	73	163
152	High- Cube Warehouse/ Distribution Centre (Locust Grove- Clayco Phases I & II)	4098993 Sq. Ft.	**6,886**	548	378	170	529	164	365
152	High- Cube Warehouse/ Distribution Centre (Trammel Crow Site)	1190160 Sq. Ft.	**1,999**	141	97	44	151	47	104
152	High- Cube Warehouse/ Distribution Centre (Lambert Farms)	4817200 Sq. Ft.	**8,093**	649	448	201	623	193	430
152	High- Cube Warehouse/ Distribution Centre (Midland Logistics Park)	669732 Sq. Ft.	**1,125**	68	47	21	83	26	57
152	High- Cube Warehouse/ Distribution Centre (King Mill - Lambert)	3048300 Sq. Ft.	**5,121**	401	277	124	393	122	271
30	Intermodal Truck Terminal (Norfolk Southern Site)	60 Acres	**4,914**	437	179	258	393	169	224
Total Trips			**31,240**	**2,477**	**1,587**	**890**	**2,408**	**794**	**1,614**

The next step in the preparation of the traffic projections is to assign and distribute the new development trips onto the study area roadways and add these to the background traffic to develop the final 2025 traffic volumes. The trips were assigned and distributed onto the roadway network based on proximity to major roadways and I-75. In the case of developments with approved DRI traffic studies, the assignment and distribution from those studies was utilized.

The assignment of development trips onto study area roadways differed between the No-Build and Build conditions because of the addition of a new interchange with I-75 in the Build condition. For the No-Build condition, all development trips to and from the interstate were routed to the SR 155 or Bill Gardner Pkwy interchanges based on proximity. For example, interstate trips to and

Figure 4.1: Study Area Major Developments



from the Locust Grove-Clayco site were all assigned to the Bill Gardner at I-75 interchange since vehicles would not use the SR 155 interchange to access this development. Similarly, interstate trips travelling to and from the Midland site would not use the Bill Gardner Pkwy at I-75 interchange. The 2025 No-Build condition trip distribution for each development site is presented in Appendix B.

As stated above, the 2025 Build condition trip assignment differs from the No-Build because of the proximity of the proposed interchange at Bethlehem Road. With the implementation of the proposed interchange, a portion of all development trips will shift from the adjacent interchanges to the new interchange. In the case of the Locust Grove-Clayco and Norfolk Southern sites, a large percentage of trips will now utilize the new interchange since these developments' primary access points will now be onto Bethlehem Road. The 2025 Build condition trip distribution for each development is presented in Appendix B. The background traffic growth combined with the development traffic described above was utilized to develop the 2025 and 2045 No-Build and Build traffic volumes, both of which are presented in Appendix A.

4.2 Future Conditions Capacity Analysis

4.2.1 2025 No-Build and Build Conditions

The following includes the analysis of the 2025 No-Build condition as well as the 2025 Build condition for all Build alternatives. Since the interchange location of Alternative 3 and 4 are essentially identical, the analysis and results are presented for both in a single column.

4.2.1.1 Basic Freeway Analysis

The LOS and density values for each freeway segment for both 2025 No-Build and Build conditions are presented in **Table 4.3.** As presented in this table, all freeway segments are expected to operate at LOS A-C conditions in 2025 under No-Build and Build conditions.

4.2.1.2 Ramp Merge/Diverge Analysis

Table 4.4 presents the ramp junction analysis results for the 2025 No-Build and Build conditions. While all ramp junctions are expected to operate at acceptable LOS in the No-Build and Build conditions, by balancing area access demands at three interchanges instead of two, the project does improve the operation at the SR 155 and Bill Gardner Pkwy interchange ramps as evidenced by improvements in LOS and densities for all Build alternatives.

4.2.1.3 Intersection Analysis

Table 4.5 presents the intersection analysis results for the 2025 No-Build and all Build alternative conditions. A review of this table reveals that many signalized intersections are expected to operate at LOS E or F conditions in the 2025 No-Build condition including the I-75 NB and SB ramp intersections at Bill Gardner Pkwy and the I-75 SB ramp intersection at SR 155. As shown in this table, the traffic relief provided by all three Build alternatives will significantly reduce delay and improve LOS at most signalized intersections. Most importantly, this traffic relief will allow the I-75 NB and SB ramp intersections at the SR 155 and Bill Gardner Pkwy interchanges to operate at LOS D or better conditions in 2025 under any of the Build alternative conditions. Additionally, the I-75 NB and SB ramp intersections at the proposed Bethlehem Road interchange in Alternative 3 and 4 and the Bethlehem Bottoms Road interchange under Alternatives 1 and 2 are expected to operate at LOS C or better in the 2025 Build condition.

The results of the 2025 analysis reveals that Alternatives 1, 2, 3, and 4 are all expected to operate almost identically. This is expected since all alternatives provide traffic relief to the SR 155 and Bill Gardner Pkwy interchanges. As such, the results of the traffic analysis does not favor any of the four Build alternatives.

Table 4.3: Basic Freeway LOS Analysis: 2025 No-Build and Build Conditions

Freeway Segment	Travel Direction	2025 No-Build LOS (Density)		2025 Build Alt 1 LOS (Density)		2025 Build Alt 2 LOS (Density)		2025 Build Alt 3/4 LOS (Density)	
		AM	AM	AM	PM	AM	PM	AM	PM
I-75 South of Bill Gardner Pkwy	NB	B (11.4)	B (17.9)	B (11.4)	B (17.9)	B (11.4)	B (17.9)	B (11.4)	B (17.9)
I-75 South of Bill Gardner Pkwy	SB	B (12.6)	B (17.7)	B (12.6)	B (17.7)	B (12.6)	B (17.7)	B (12.6)	B (17.7)
I-75 from Bill Gardner Pkwy to Bethlehem /Bethlehem Bottoms Rd	NB			B (17.1)	C (19.9)	B (17.1)	C (19.9)	B (16.0)	C (18.4)
I-75 from Bill Gardner Pkwy to Bethlehem /Bethlehem Bottoms Rd	SB			B (14.7)	C (22.6)	B (14.7)	C (22.6)	B (12.7)	C (20.6)
I-75 from Bethlehem /Bethlehem Bottoms Rd to SR 155	NB			C (19.8)	C (23.8)	C (19.8)	C (23.8)	C (18.4)	C (21.2)
I-75 from Bethlehem /Bethlehem Bottoms Rd to SR 155	SB			B (17.7)	D (27.6)	B (17.7)	D (27.6)	B (16.0)	C (24.4)
I-75 from Bill Gardner Pkwy to SR 155	NB	B (17.7)	C (20.1)						
I-75 from Bill Gardner Pkwy to SR 155	SB	B (13.9)	C (22.7)						
I-75 North of SR 155	NB	C (22.6)	C (23.4)	C (22.6)	C (23.4)	C (22.6)	C (23.4)	C (22.6)	C (23.4)
I-75 North of SR 155	SB	C (19.1)	D (30.5)	C (19.1)	D (30.5)	C (19.1)	D (30.5)	C (19.1)	D (30.5)

Table 4.4: Ramp Junction LOS Analysis: 2025 No-Build and Build Conditions

Ramp Junction	Type	2025 No-Build LOS (Density)		2025 Build ALT 1 LOS (Density)		2025 Build ALT 2 LOS (Density)		2025 Build ALT 3/4 LOS (Density)	
		AM	AM	AM	PM	AM	PM	AM	PM
I-75 NB Off-Ramp to Bill Gardner Pkwy	Diverge	B (14.9)	C (22.2)	B (13.2)	C (20.7)	B (13.2)	C (20.7)	B (14.5)	C (21.9)
I-75 SB On-Ramp from Bill Gardner Pkwy	Merge	B (14.7)	C (20.2)	B (15.4)	C (20.9)	B (15.4)	C (20.9)	B (14.3)	B (19.5)
I-75 NB On-Ramp from Bill Gardner Pkwy	Merge	C 22.9)	C (23.5)	C (18.6)	C (21.8)	C (18.6)	C (21.8)	C (20.0)	C (20.7)
I-75 SB Off-Ramp to Bill Gardner Pkwy	Diverge	B (18.1)	D (28.8)	B (15.9)	C (24.6)	B (15.9)	C (24.6)	B (16.1)	C (28.8)
I-75 NB Off-Ramp to Bethlehem/Bethlehem Bottoms Rd	Diverge			C (18.3)	C (21.1)	C (18.3)	C (21.1)	B (18.7)	C (20.9)
I-75 SB On-Ramp from Bethlehem/Bethlehem Bottoms Rd	Merge			B (15.9)	C (24.7)	B (15.9)	C (24.7)	B (13.6)	C (21.7)
I-75 NB On-Ramp from Bethlehem/Bethlehem Bottoms Rd	Merge			C (21.9)	C (25.8)	C (21.9)	C (25.8)	C (22.3)	B (25.0)
I-75 SB Off-Ramp to Bethlehem/Bethlehem Bottoms Rd	Diverge			C (19.2)	D (28.5)	C (19.2)	D (28.5)	C (20.3)	D (28.4)
I-75 NB Off-Ramp to SR 155	Diverge	B (14.7)	B (17.1)	B (21.3)	C (24.8)	B (21.3)	C (24.8)	B (16.0)	B (18.8)
I-75 SB On-Ramp from SR 155	Merge	B (12.6)	C (20.3)	B (17.1)	C (25.6)	B (17.1)	C (25.6)	B (14.2)	C (21.2)
I-75 NB On-Ramp from SR 155	Merge	C 26.5)	C (26.1)	C (24.5)	C (24.8)	C (24.5)	C (24.8)	C (25.1)	C (24.5)
I-75 SB Off-Ramp to SR 155	Diverge	C 23.8)	D (32.2)	C (22.3)	D (33.5)	C (22.3)	D (33.5)	C (22.7)	D (31.4)

Table 4.5: Intersection LOS Analysis: 2025 No-Build and Build Conditions

Intersection	2025 No-Build LOS (Delay)		2025 Build ALT 1 LOS (Delay)		2025 Build ALT 2 LOS (Delay)		2025 Build ALT 3/4 LOS (Delay)	
	AM	AM	AM	PM	AM	PM	AM	PM
Bill Gardner Pkwy @ SR 42/US 23	F (94.4)	F (247.9)	D (35.2)	F (96.4)	D (35.2)	F (96.4)	C (29.9)	F (98.1)
Bill Gardner Pkwy @ Tanger Blvd/Mkt Pl Blvd	E (59.0)	F (119.5)	D (49.5)	D (66.3)	D (49.5)	E (63.3)	D (49.3)	D (59.9)
Bill Gardner Pkwy @ I-75 NB Ramp	D (43.5)	B (18.1)	D (47.1)	B (15.7)	D (47.1)	B (15.7)	C (39.4)	B (13.4)
Bill Gardner Pkwy @ I-75 SB Ramp	C (30.9)	F (90.5)	C (29.8)	D (42.0)	C (29.8)	D (42.0)	C (26.9)	D (48.0)
Bill Gardner Pkwy @ Greenwood	B (13.1)	C (24.8)	B (19.6)	B (18.9)	B (19.6)	B (18.9)	D (46.6)	D (54.9)
Bill Gardner Pkwy @ SR 155	D (49.6)	D (36.3)	D (54.8)	E (66.6)	D (54.8)	E (66.6)	D (54.8)	E (66.6)
Bethlehem Rd @ SR 42/US 23*	B (12.7)	C (20.9)	C (22.7)	C (31.5)	C (22.9)	C (32.9)	C (29.9)	C (30.6)
Bethlehem Bottoms @SR 42					B (17.4)	C (23.9)		
Bethlehem Rd @ Greenwood*	B (12.6)	B (14.6)	C (22.1)	C (15.3)	C (17.4)	B (16.5)	A (8.7)	A (7.7)
Bethlehem/Bethlehem Bottoms Rd @ I-75 NB Ramp			C (22.6)	B (18.5)	C (22.2)	B (19.2)	C (20.4)	B (18.6)
Bethlehem/Bethlehem Bottoms Rd @ I-75 SB Ramp			C (31.2)	D (36.0)	C (30.9)	D (37.5)	C (29.7)	C (31.9)
Greenwood Industrial Pkwy @ SR 155	B (12.7)	B (11.5)	C (24.6)	B (13.0)	C (24.6)	B (13.0)	C (24.6)	B (13.0)
SR 42/US 23 @ King Mill Road	D (39.6)	D (44.3)	C (33.1)	C (33.3)	B (14.6)	D (36.5)	B (15.8)	D (36.3)
SR 155 @ SR 42/US 23	D (42.1)	E (57.2)	D (39.5)	D (42.7)	D (39.5)	D (42.7)	D (39.5)	D (42.7)
SR 155 @ Henry Pkwy	B (13.8)	C (21.3)	B (12.9)	D (38.8)	B (12.9)	D (38.8)	B (12.9)	D (38.8)
SR 155 @ King Mill Road	F (82.8)	E (71.5)	D (48.7)	D (47.9)	D (48.7)	D (47.9)	D (52.3)	D (52.4)
SR 155 @ I-75 NB Ramp	D (37.8)	D (42.9)	D (37.8)	C (22.6)	D (37.8)	C (22.6)	D (36.9)	C (22.7)
SR 155 @ I-75 SB Ramp	E (69.6)	E (60.1)	C (29.5)	D (47.1)	C (29.5)	D (47.1)	C (31.7)	D (49.4)
SR 155 @ Avalon Pkwy	D (40.2)	D (52.9)	D (40.9)	D (51.1)	D (40.9)	D (51.1)	D (40.9)	D (51.1)

4.2.2 2045 No-Build & Build Conditions

The following includes the analysis of the 2045 No-Build condition as well as the 2045 Build condition for all Build alternatives. Since the interchange location of Alternative 3 and 4 are essentially identical, the analysis and results are presented for both in a single column.

4.2.2.1 Basic Freeway Analysis

The LOS and density values for each freeway segment for both 2045 No-Build and Build conditions are presented in **Table 4.6.** As with the 2025 analysis, all freeway segments would operate at LOS A-C conditions in 2045 under No-Build and Build conditions.

4.2.2.2 Ramp Merge/Diverge Analysis

Table 4.7 presents the ramp junction analysis results for the 2045 No-Build and Build conditions. While all ramp junctions are expected to operate at acceptable LOS in the No-Build and Build conditions, by balancing area access demands at three interchanges instead of two, the project does improve the operation at the SR 155 and Bill Gardner Pkwy interchange ramps as evidenced by improvements in LOS and densities.

4.2.2.3 Intersection Analysis

Table 4.8 presents the intersection analysis results for the 2045 No-Build and Build conditions. By 2045, planned widening projects are expected to be complete on SR 155 and Bill Gardner Pkwy in order to accommodate growing traffic demands. While these improvements are expected to improve LOS and reduce delay at study intersections, most intersections on these roadways would still experience LOS E and F conditions in the No-Build condition including both I-75 ramp intersections at Bill Gardner Pkwy and the I-75 SB ramp at SR 155.

As with the 2025 conditions, the proposed interchange associated with any of the four Build alternatives are expected to significantly improve 2045 LOS and delay at these intersections and allow the I-75 NB and SB ramp intersections at both existing interchanges to operate at LOS D or better with the exception of the I-75 SB Ramp to Bill Gardner Pkwy. However, all build alternatives are expected to improve the LOS F (128.2 seconds of delay) experienced in the No-Build to a LOS E (63.5 – 71.3 seconds of delay). Additionally, the I-75 NB and SB ramp intersections at the proposed Bethlehem Road and Bethlehem Bottoms Road interchanges are expected to operate at LOS D or better with all 2045 Build Alternatives. This analysis reveals that even with major improvements to SR 155 and Bill Gardner Pkwy, these interchanges will be unable to adequately accommodate 2045 traffic demands.

As with the results of the 2025 analysis, the 2045 reveals that Alternatives 1, 2, 3, and 4 are all expected to operate almost identically. This is expected since all alternatives provide traffic relief to the SR 155 and Bill Gardner Pkwy interchanges. As such, the results of the traffic analysis does not favor any of the four Build alternatives.

Table 4.6: Basic Freeway LOS Analysis: 2045 Build and No-Build Conditions

Freeway Segment	Travel Direction	2045 No-Build LOS (Density)		2045 Build ALT 1 LOS (Density)		2045 Build ALT 2 LOS (Density)		2045 Build ALT 3/4 LOS (Density)	
		AM	AM	AM	PM	AM	PM	AM	PM
I-75 South of Bill Gardner Pkwy	NB	B (12.5)	C (20.5)	B (12.5)	C (20.5)	B (12.5)	C (20.5)	B (12.5)	C (20.5)
I-75 South of Bill Gardner Pkwy	SB	B (13.8)	B (17.0)	B (13.8)	B (17.0)	B (13.8)	B (17.0)	B (13.8)	B (17.0)
I-75 from Bill Gardner Pkwy to Bethlehem Rd	NB			C (18.8)	C (22.2)	C (18.8)	C (22.2)	B (17.5)	C (20.1)
I-75 from Bill Gardner Pkwy to Bethlehem Rd	SB			B (15.9)	C (22.9)	B (15.9)	C (22.9)	B (13.9)	C (20.6)
I-75 from Bethlehem Rd to SR 155	NB			C (22.6)	D (27.4)	C (22.6)	D (27.4)	C (20.5)	C (23.9)
I-75 from Bethlehem Rd to SR 155	SB			C (19.9)	D (29.0)	C (19.9)	D (29.0)	B (17.9)	C (25.5)
I-75 from Bill Gardner Pkwy to SR 155	NB	C (18.7)	C (21.3)						
I-75 from Bill Gardner Pkwy to SR 155	SB	B (15.3)	C (23.3)						
I-75 North of SR 155	NB	C (26.2)	D (27.1)	D (26.2)	D (27.1)	D (26.2)	D (27.1)	D (26.2)	D (27.1)
I-75 North of SR 155	SB	C (21.8)	D (33.9)	C (21.8)	D (33.9)	C (21.8)	D (33.9)	C (21.8)	D (33.9)

Table 4.7: Ramp Junction LOS Analysis: 2045 Build and No-Build Conditions

Ramp Junction	Type	2045 No-Build LOS (Density)		2045 Build ALT 1 LOS (Density)		2045 Build ALT 2 LOS (Density)		2045 Build ALT 3/4 LOS (Density)	
		AM	PM	AM	PM	AM	PM	AM	PM
I-75 NB Off-Ramp to Bill Gardner Pkwy	Diverge	B (15.8)	C (24.2)	B (13.9)	C (22.8)	B (13.9)	C (22.8)	B (15.3)	C (23.9)
I-75 SB On-Ramp from Bill Gardner Pkwy	Merge	B (16.2)	C (20.1)	B (16.3)	C (20.2)	B (16.3)	C (20.2)	B (15.8)	B (19.2)
I-75 NB On-Ramp from Bill Gardner Pkwy	Merge	C (25.6)	C (26.1)	C (20.5)	C (24.2)	C (20.5)	C (24.2)	C (22.1)	C (22.6)
I-75 SB Off-Ramp to Bill Gardner Pkwy	Diverge	B (20.0)	D (30.3)	B (17.3)	C (25.1)	B (17.3)	C (25.1)	B (17.6)	C (26.1)
I-75 NB Off-Ramp to Bethlehem Rd	Diverge			C (20.1)	C (23.3)	C (20.1)	C (23.3)	C (20.3)	C (22.6)
I-75 SB On-Ramp from Bethlehem Rd	Merge			B (17.2)	C (25.0)	B (17.2)	C (25.0)	B (14.9)	C (22.0)
I-75 NB On-Ramp from Bethlehem Rd	Merge			C (24.7)	D (29.3)	C (24.7)	D (29.3)	C (24.8)	D (34.0)
I-75 SB Off-Ramp to Bethlehem Rd	Diverge			C (22.3)	D (29.8)	C (22.3)	D (29.8)	B (22.7)	D (29.7)
I-75 NB Off-Ramp to SR 155	Diverge	B (16.6)	B (19.2)	B (23.8)	C (27.8)	B (23.8)	C (27.8)	B (18.1)	C (21.2)
I-75 SB On-Ramp from SR 155	Merge	B (14.1)	C (21.1)	B (19.3)	C (26.8)	B (19.3)	C (26.8)	B (16.0)	C (22.2)
I-75 NB On-Ramp from SR 155	Merge	D (30.3)	D (29.5)	D (28.5)	D (28.4)	D (28.5)	D (28.4)	D (28.7)	C (27.5)
I-75 SB Off-Ramp to SR 155	Diverge	C (27.0)	D (34.4)	C (25.4)	D (36.1)	C (25.4)	D (36.1)	C (25.5)	D (33.3)

Table 4.8: Intersection LOS Analysis: 2045 Build and No-Build Conditions

Intersection	2045 No-Build LOS (Delay)		2045 Build ALT 1 LOS (Delay)		2045 Build ALT 2 LOS (Delay)		2045 Build ALT 3/4 LOS (Delay)	
	AM	PM	AM	PM	AM	PM	AM	PM
Bill Gardner Pkwy @ SR 42/US 23	F (171.5)	F (247.9)	E (69.2)	F (202.1)	E (69.2)	F (202.1)	E (59.7)	F (208.4)
Bill Gardner Pkwy @ Tanger Blvd/Mkt Pl Blvd	F (125.7)	F (119.5)	F (82.2)	F (96.3)	F (82.1)	F (96.3)	F (82.1)	F (92.8)
Bill Gardner Pkwy @ I-75 NB Ramp	E (58.0)	B (18.1)	B (17.7)	B (16.7)	B (17.7)	B (16.7)	B (16.3)	B (12.8)
Bill Gardner Pkwy @ I-75 SB Ramp	C (32.2)	F (128.2)	C (24.4)	E (63.5)	C (24.4)	E (63.5)	C (21.6)	E (71.3)
Bill Gardner Pkwy @ Greenwood	B (10.7)	C (22.5)	B (12.4)	D (36.1)	B (12.4)	D (36.1)	B (12.4)	D (36.1)
Bill Gardner Pkwy @ SR 155	C (33.8)	D (36.3)	C (34.5)	D (37.2)	C (34.7)	D (37.2)	C (34.7)	D (37.2)
Bethlehem Bottoms @ SR 42					C (29.6)	D (35.2)		
Bethlehem Rd @ SR 42/US 23*	B (27.2)	E (65.4)	C (29.8)	E (68.4)	D (36.2)	E (65.6)	D (38.2)	D (40.5)
Bethlehem Rd @ Greenwood*	B (19.3)	C (22.4)	E (59.5)	C (26.1)	D (28.7)	C (22.7)	D (28.7)	C (24.5),
Bethlehem/Bethlehem Bottoms Rd @ I-75 NB Ramp			C (24.7)	B (19.3)	C (24.4)	B (19.7)	C (22.1)	B (19.2)
Bethlehem/Bethlehem Bottoms Rd @ I-75 SB Ramp			C (30.7)	D (38.2)	C (29.7)	D (38.3)	C (29.6)	C (34.2)
Greenwood Industrial Pkwy @ SR 155	B (15.9)	B (11.5)	C (23.9)	B (13.0)	C (23.8)	B (12.9)	C (23.8)	B (12.9)
SR 42/US 23 @ King Mill Road	D (49.3)	D (44.3)	E (57.1)	F (121.6)	C (20.1)	D (51.3)	C (34.9)	D (53.2)
SR 155 @ SR 42/US 23	D (35.6)	E (57.2)	C (34.5)	D (44.4)	C (34.6)	D (44.2)	C (34.6)	D (44.2)
SR 155 @ Henry Pkwy	B (12.9)	C (21.3)	B (13.3)	B (20.0)	B (13.3)	B (20.0)	B (13.3)	B (20.0)
SR 155 @ King Mill Road	D (42.1)	E (71.5)	C (33.3)	E (55.8)	D (37.1)	E (55.8)	D (36.7)	E (58.9)
SR 155 @ I-75 NB Ramp	D (33.2)	D (42.9)	C (27.6)	D (35.6)	C (27.6)	D (35.6)	C (28.2)	D (35.3)
SR 155 @ I-75 SB Ramp	D (33.9)	E (60.1)	C (24.6)	D (42.4)	C (24.6)	D (42.4)	C (25.1)	D (43.1)
SR 155 @ Avalon Pkwy	C (28.0)	D (52.9)	C (28.6)	E (55.1)	C (28.6)	E (55.1)	C (28.6)	E (55.1)

4.3 Benefit Cost Analysis of IJR Alternatives

A benefit to cost (B/C) ratio for all study alternatives was calculated using GDOT's latest B/C methodology. A benefit cost ratio over 1.0 represents a project whose benefits are greater than its costs. Benefits are calculated by assigning monetary values to the reduction in automobile delay and truck delay and by accounting for fuel cost savings. Project benefits are initially calculated based on the travel time savings for each Build alternative compared to the No-Build multiplied by the AADT for each alternative. These benefits are then annualized based on the assumption of 250 working days per year. Project costs are annualized over a 20-year design life assuming 7% interest.

Since the proposed interchange is expected to reduce delay and improve mobility on SR 155 and Bill Gardner Pkwy, travel time savings were calculated by subtracting the Build alternative travel time from the No-Build alternative for each alternative. Travel times were calculated by adding the free flow travel times for each roadway to the average AM and PM period east-west vehicle delays at each intersection from the Synchro analysis for all alternatives. These travel times were entered into the B/C spreadsheet along with ADT volumes for cars, trucks, and total in order to calculate the person time savings benefit, commercial/truck time savings benefit, and fuel savings benefit respectively.

Table 4.9 presents the travel times savings for each Build alternative (in minutes and hours), ADT average, annualized benefit, annualized cost, and B/C ratio.

Table 4.9: Benefit Cost Analysis

Build Alternative	Travel Time Savings (min)	Travel Time Savings (hrs)	ADT (cars & trucks)	Annualized Benefit	Annualized Cost	B/C Ratio
Build Alt 1	2.65	0.0441	36,812	$7.149M	$3.842M	**1.86**
Build Alt 2	2.65	0.0441	36,812	$7.149M	$4.597M	**1.56**
Build Alt 3	2.80	0.0467	38,136	$7.852M	$3.795M	**2.07**
Build Alt 4	2.80	0.0467	38,136	$7.852M	$4.096M	**1.92**

5. ENVIRONMENTAL SCREENING

Since the proposed interchange would require a new access break on I-75 and construction within federal right-of-way, a National Environmental Policy Act (NEPA) environmental document would be required to determine the direct, indirect, and cumulative impacts of the proposed action. For this IJR, an environmental screening of the proposed interchange at Bethlehem Road was conducted in order to identify any sensitive environmental resources that could serve to preclude the implementation of the proposed project.

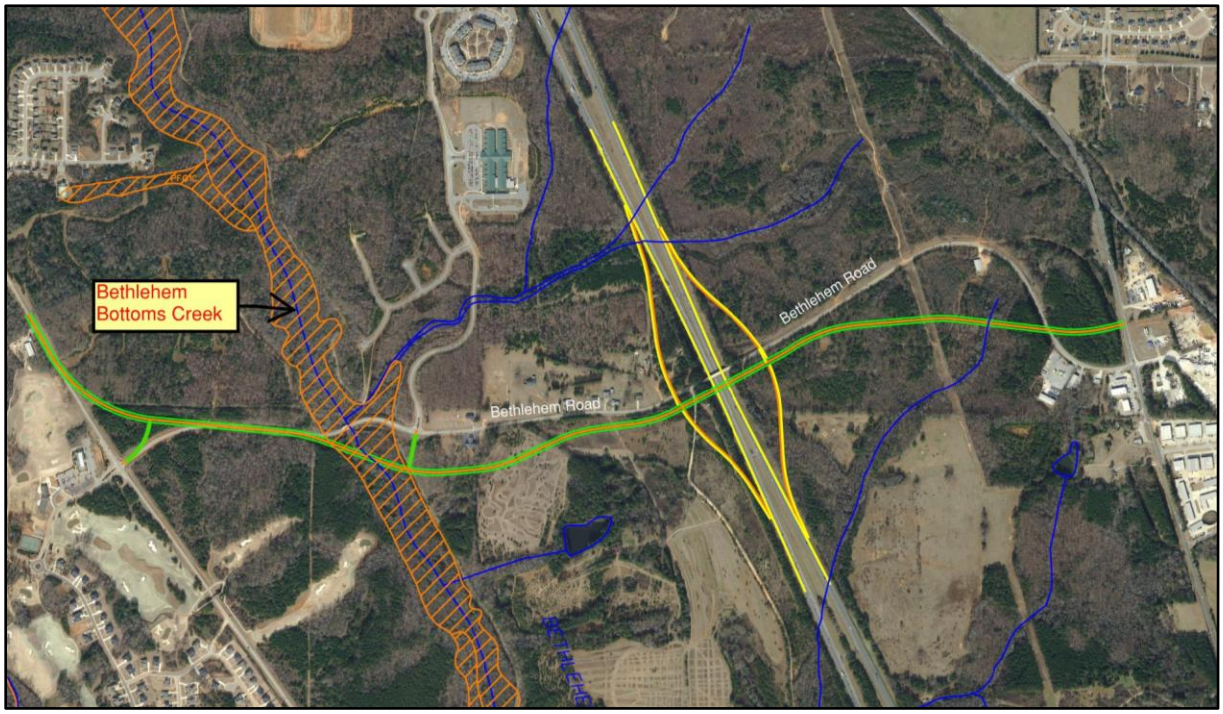
The environmental screening consisted of a site visit and database search to identify any sensitive natural, cultural, or community resources. The following are the findings of this screening.

5.1 Ecological Resources

5.1.1 Jurisdictional Waters

Jurisdictional waters of the U.S. are defined by 33 CFR Part 328.3(b) and are protected by Section 404 of the Clean Water Act (33 USC 1344), which is administered and enforced by the U.S. Army Corps of Engineers (ACOE). A windshield and database survey identified multiple jurisdictional waters within the proposed interchange study area including streams, wetlands, and open waters (see **Figure 5.1**). The proposed improvements to Bethlehem Road would require a new bridge crossing over Bethlehem Bottoms Creek, a perennial stream. This crossing would likely result in minor stream impacts as well as impacts to adjacent wetlands. The project would also result in minor impacts to several intermittent streams. While full delineation of jurisdictional waters will be required as part of the NEPA studies, it appears that the impacts could be permitted with a Nationwide or Regional 404 Permit.

Figure 5.1: Jurisdictional Waters



5.1.2 Threatened & Endangered Species

According to the US Fish and Wildlife Service (USFWS), seven federally protected species are known to occur in Henry County. These include four clams, two plants, and one fern/ally. A review of the known occurrences and habitats for these species reveals that the project area is unlikely to contain suitable habitat. A habitat assessment and possible protected species surveys would be performed as part of the NEPA studies.

5.2 Cultural Resources

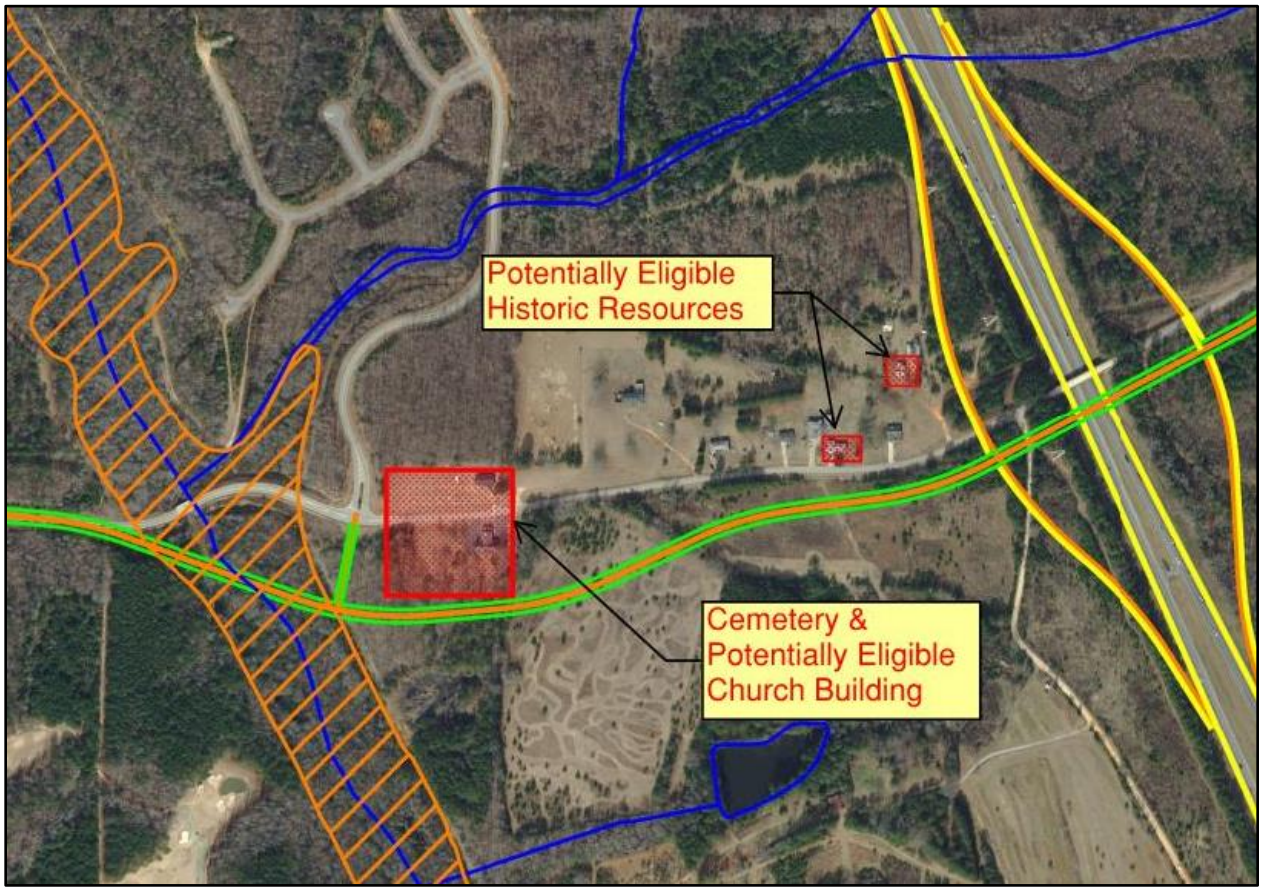
5.2.1 Historic Resources

A windshield survey and database search identified three structures within the study area older than 50 years. These potentially eligible historic resources are presented in **Figure 5.2**. Full historic resource surveys will need to be completed to determine the eligibility of these resources. Even if deemed eligible, the project, as proposed, would not adversely affect these resources.

5.2.2 Archaeological Resources

The project area contains the Bethlehem Baptist Church cemetery (see Figure 5.2). This cemetery is located on both sides of Bethlehem Road. In order to avoid this resource, the project would realign Bethlehem Road on new location south of the cemetery. A Phase I archaeology survey will be completed as part of the required NEPA studies.

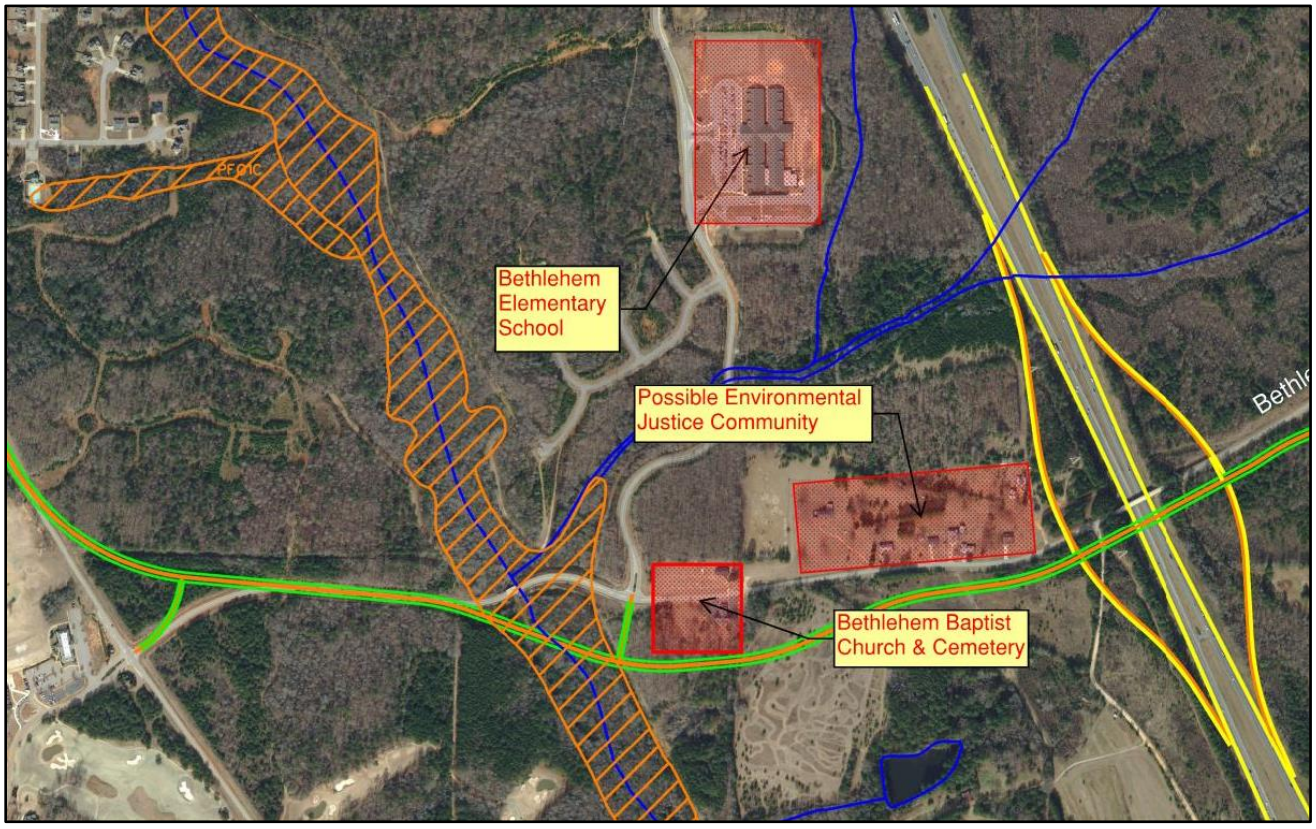
Figure 5.2: Cultural Resources



5.3 Community Resources

Through coordination with Henry County and the City of Locust Grove, a potential Environmental Justice (EJ) community. Executive Order 12898, Federal Actions to Address Environmental Justice (EJ) in Minority and Low-Income Populations (EO) directed all Federal departments and Federal agency heads to take the appropriate steps to identify and address any disproportionately high and adverse human health or environmental effects of Federal programs, policies, and activities on minority and low-income populations (EJ Populations). This project proposes to realign Bethlehem Road to the south to avoid potential impacts to this community (see **Figure 5.3**). The project would also not affect the Bethlehem Elementary School or the Bethlehem Baptist Church, both community resources.

Figure 5.3: Community Resources



6. RECOMMENDATIONS

As presented in this report, this area of Henry County has experienced significant commercial and residential growth of the past few decades. This growth has driven a steady increase in traffic volumes and congestion at the SR 155 and Bill Gardner Pkwy interchanges. This growth is expected to continue as multiple major industrial developments are approved and underway within the immediate study area. An analysis of crash data trends reveals that the number of crashes on area roadways is increasing dramatically due to increasing traffic demands. Without the much-needed additional access provided by a new interchange, the study area roadways are expected to experience LOS F conditions at both existing interchanges. As presented in the report, even with major improvements to SR 155 and Bill Gardner Pkwy, most intersections these two arterials would still experience LOS E and F conditions in the No-Build condition including both I-75 ramp intersections at Bill Gardner Pkwy and the I-75 SB ramp at SR 155.

This report identifies and evaluated four Build alternatives. The capacity analysis reveals that each of the four Build Alternatives provides virtually identical benefits to the area roadways. As such, the traffic analysis does not favor any of the four Build alternatives.

As presented in Section 3, interchange Alternative 4 does offer significant advantages when compared to Alternatives 1, 2, and 3. This alternative would provide safe and efficient connectivity to the existing roadway network to the west and east, allow for optimal spacing of interchanges along I-75, and provide direct access to planned and ongoing industrial development adjacent to Bethlehem Road while avoiding the potential community impacts associated with Interchange Alternative 3. For these reasons, Interchange Alternative 4 is recommended as the preferred alternative.