ATLANTA REGIONAL MANAGED LANE SYSTEM PLAN

TRANSPORTATION INVESTMENT SCENARIOS

PREPARED FOR

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Technical Memorandum 5: Scenario Testing

Prepared for:

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TRANSPORTATION INVESTMENT SCENARIOS OF MANAGED LANES

A. Purpose

The purpose of the scenario testing effort was to assess potential impacts of policy and investment decisions on the feasibility and desirability of managed lane applications. This process helped account for, and quantify, the uncertainty and dynamic context of transportation project implementation. The primary driver of managed lane use is congestion. Investments and policies that potentially reduce congestion may impact the feasibility of a managed lane investment and will certainly impact performance.

Candidate System

The initial candidate system includes seventeen limited access corridors. Each analysis corridor is being considered for managed lanes strategies as part of the Atlanta Regional Managed Lane System Plan. A wide variety of lane management strategies are being evaluated along these study corridors such as High Occupancy Toll (HOT) lanes, Express Toll Lanes (ETL)[1], and Truck Only Toll lanes (TOT)[2]. The initial managed lane corridors are as follows:

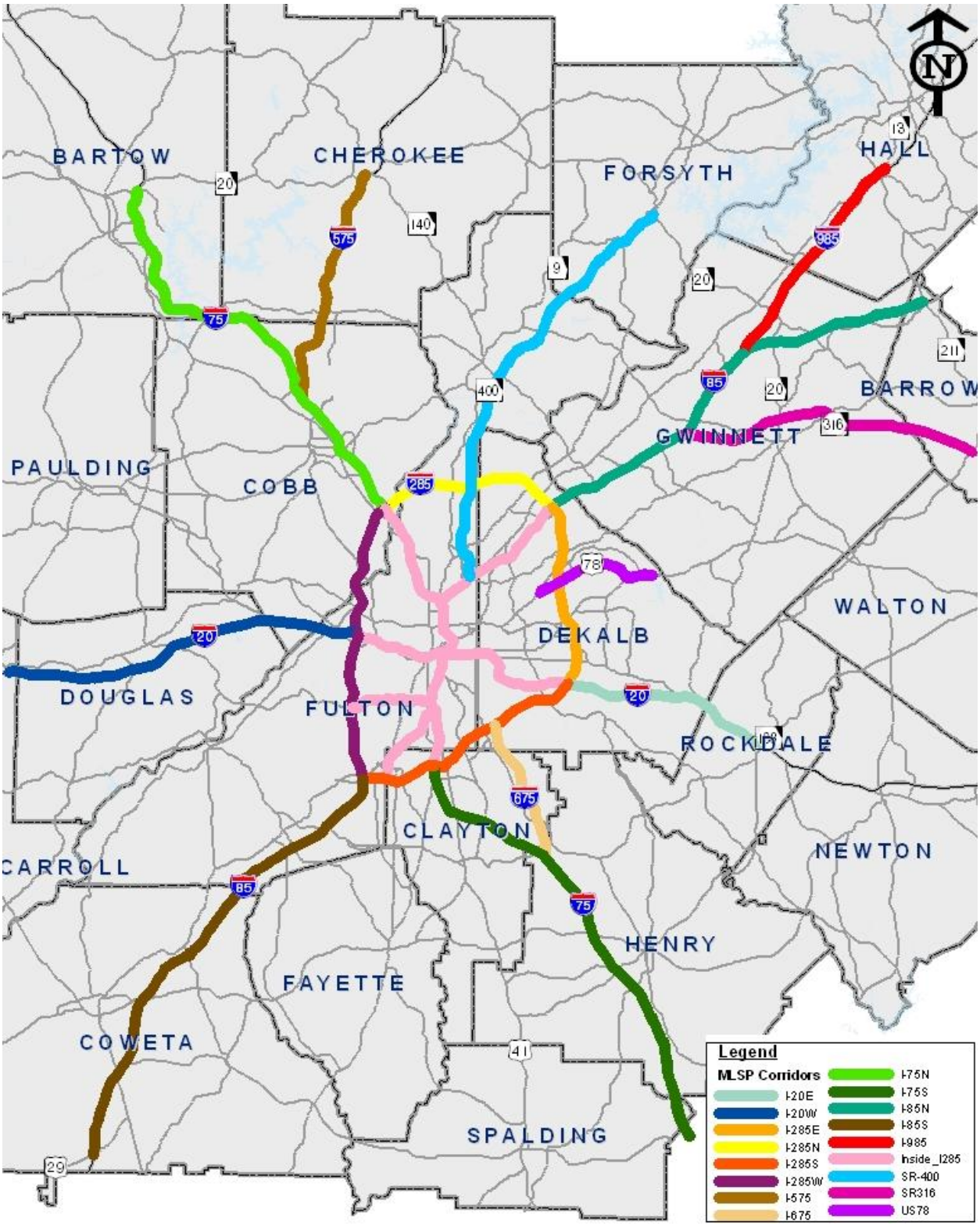
- I-75 North from I-285 North to SR 20;
- I-75 South from I-285 South to SR 16;
- I-85 North from I-285 North to SR 211;
- I-85 South from I-285 South to US 29;
- I-20 East from I-285 East to SR 138;
- I-20 West from I-285 West to Post Road;
- I-285 East from I-20 East to I-85 North;
- I-285 North from I-85 North to I-75 North;
- I-285 West from I-75 North to I-85 South;
- I-285 South from I-85 South to I-20 East;

[1] ETL means that all vehicles in the managed lanes pay a toll. Trucks are not permitted in the managed lanes.
[2] TOT means the managed lanes are reserved for trucks willing to pay a toll.

- Inside I-285
  - Segment 1: Downtown Connector (overlapping part of I-85 and I-75)
  - Segment 2: I-85 N to I-285 NE
  - Segment 3: I-20 E to I-285 E
  - Segment 4: I-75 S to I-285 S
  - Segment 5: I-85 S to I-285 SW
  - Segment 6: Langford Parkway
  - Segment 7: I-20 W to I-285 W
  - Segment 8: I-75 N to I-285 NE
- I-575 from I-75 to SR 20;
- I-675 from I-75 to I-285;
- I-985 from I-85 to SR 13;
- SR 400 from I-85 to SR 20;
- SR 316 from I-85 to SR 81; and
- US 78 from N Druid Hills Road to Rockbridge Road.

Figure 1 displays the initial managed lane corridors.

Figure 1: Initial Managed Lane Corridors



B. Transportation Investment Scenarios

Over the last several decades, a range of funding initiatives has accelerated project delivery in Georgia through allocation of additional revenue for transportation investment (i.e., "Free the Freeways", "Fast Forward", and Innovative Project Delivery). It is important that the Managed Lane System Plan recognize these challenges and opportunities and provide a flexible implementation framework.

To better understand the impact of additional investments on the implementation of managed lanes, four roadway and one transit "what-if" scenarios were developed and employed for testing and quantifying the impacts of a broad range of transportation investments that currently fall beyond the Atlanta Regional Commission's Long Range Transportation Plan. For this analysis, impacts were considered as a reduction in traffic and the resulting reduction in congestion. These investment scenarios were developed through coordination with GDOT management and represent "big idea" projects. The testing of these "what-if" projects in the context of the Managed Lane System Plan does **not** indicate that any of these projects are under consideration beyond this high level of analysis. The five tested investments scenarios are listed as below:

- Scenario 1: East-West Connector
- Scenario 2: Outer Loop
- Scenario 3: Mini Arc
- Scenario 4: Downtown Tunnel
- Scenario 5: Various Transit Investments

Each of the investment scenarios are described in greater detail on the following pages.

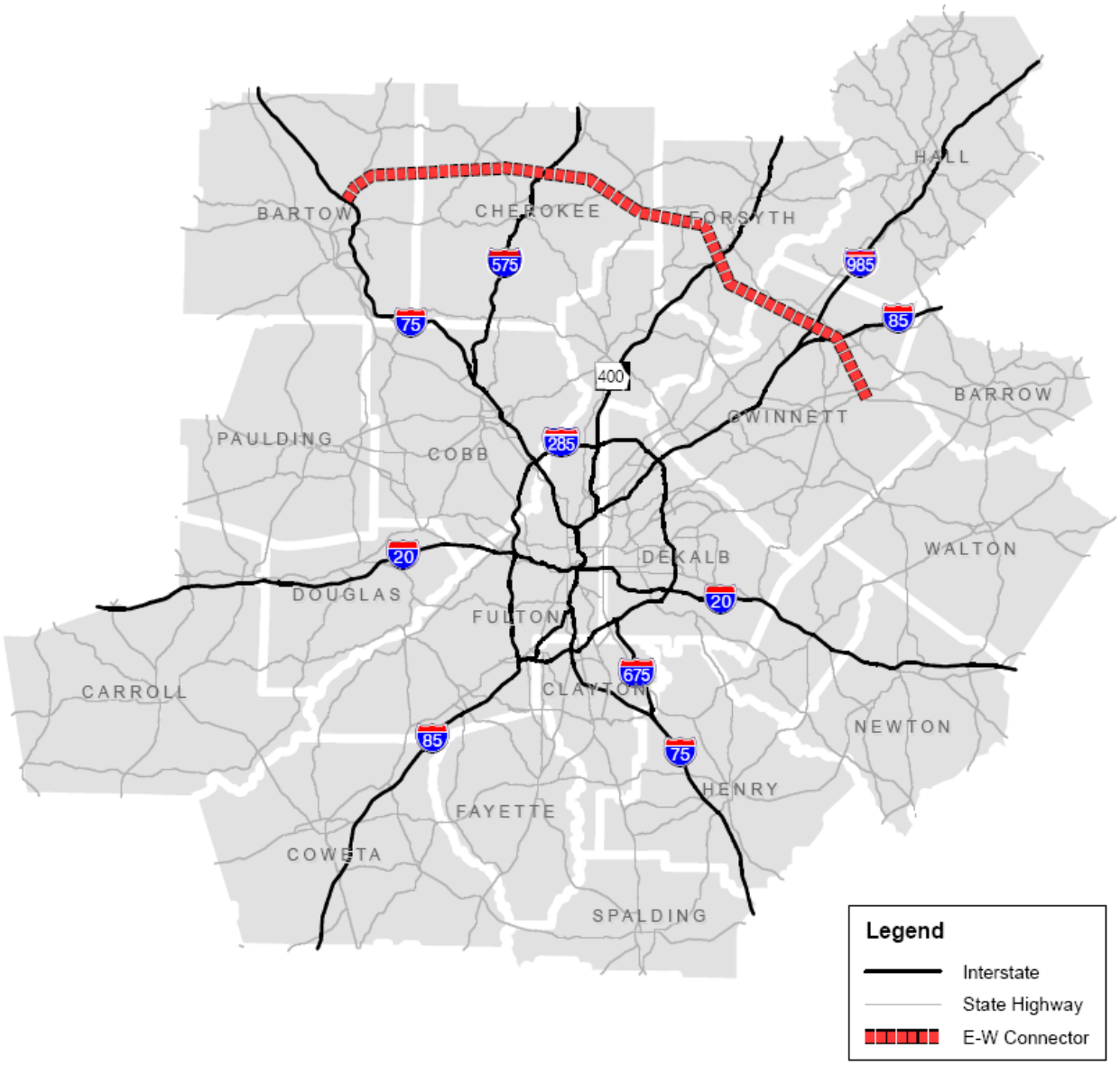
None of these investment scenarios are in the current Regional Transportation Plan (RTP). The current RTP maintained by the Atlanta Regional Commission's (ARC) is called Envision6. The benefit of analyzing investment scenarios outside of the RTP allows for quantifying the impacts on congestion if significant transportation investments were made.

For the purpose of this analysis, it was assumed that each of the investment scenarios is **not** tolled. This provided the analysis with the greatest impacts on the managed lane candidate system. A loss in revenue could be expected on a corridor that experiences significant impacts under each investment scenario. On the other hand, a corridor that receives marginal impacts under any investment scenario could be considered as less of a risk in the estimated traffic demand. This relationship is important when considering the success of implementing managed lanes along a particular corridor.

"What-if" Scenario 1: East-West Connector

An East-West Connector investment scenario would provide a continuous gateway for east-west travel in Metro Atlanta's northern suburbs. This potential corridor could extend from the proposed interchange along SR 316 at Sugarloaf Parkway Extension in Gwinnett County, crossing Forsyth and Cherokee Counties, and connecting to I-75 in Bartow County. The general corridor of an East-West Connector is shown in Figure 2. For the purpose of this analysis, the East-West Connector was evaluated as a four-lane expressway facility with limited access. The facility was conceptually evaluated as a major east-west alternative gateway to provide east west mobility and provide congestion relief to existing facilities.

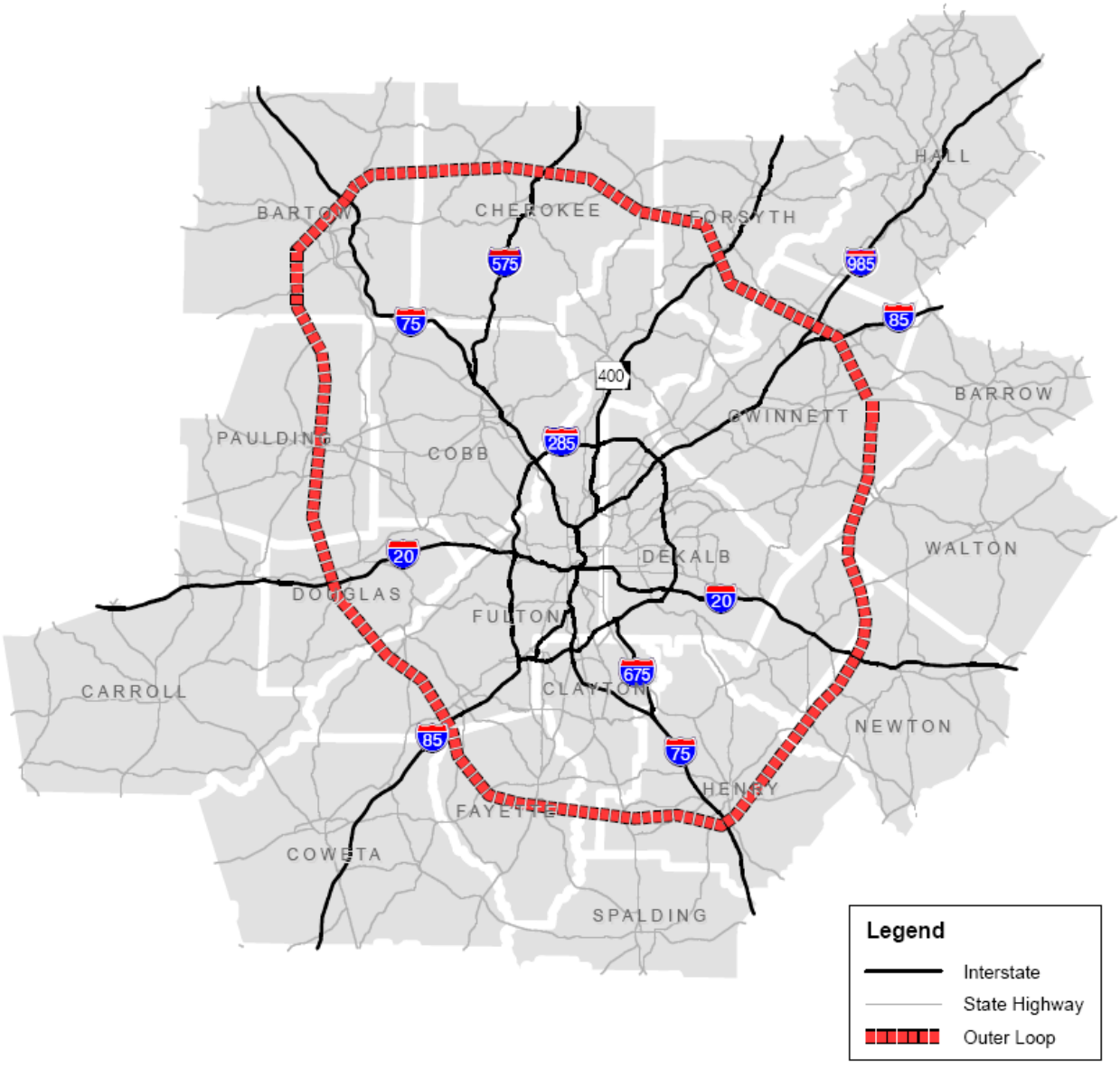
Figure 2: Scenario 1: East-West Connector



"What-if" Scenario 2: Outer Loop

An Outer Loop investment scenario would encompass the entire Atlanta region. This scenario incorporates the East-West Connector (Scenario 1) and extends as a complete loop around Atlanta, similar to I-285. An Outer Loop represents approximately 135 miles of new four-lane limited access freeway (compared to I-285 which has approximately 65 miles). As a whole, Scenario 2 would serve as an outer "beltline" providing mobility options in Atlanta's quickly developing suburban areas. The general corridor of this scenario is shown in Figure 3.

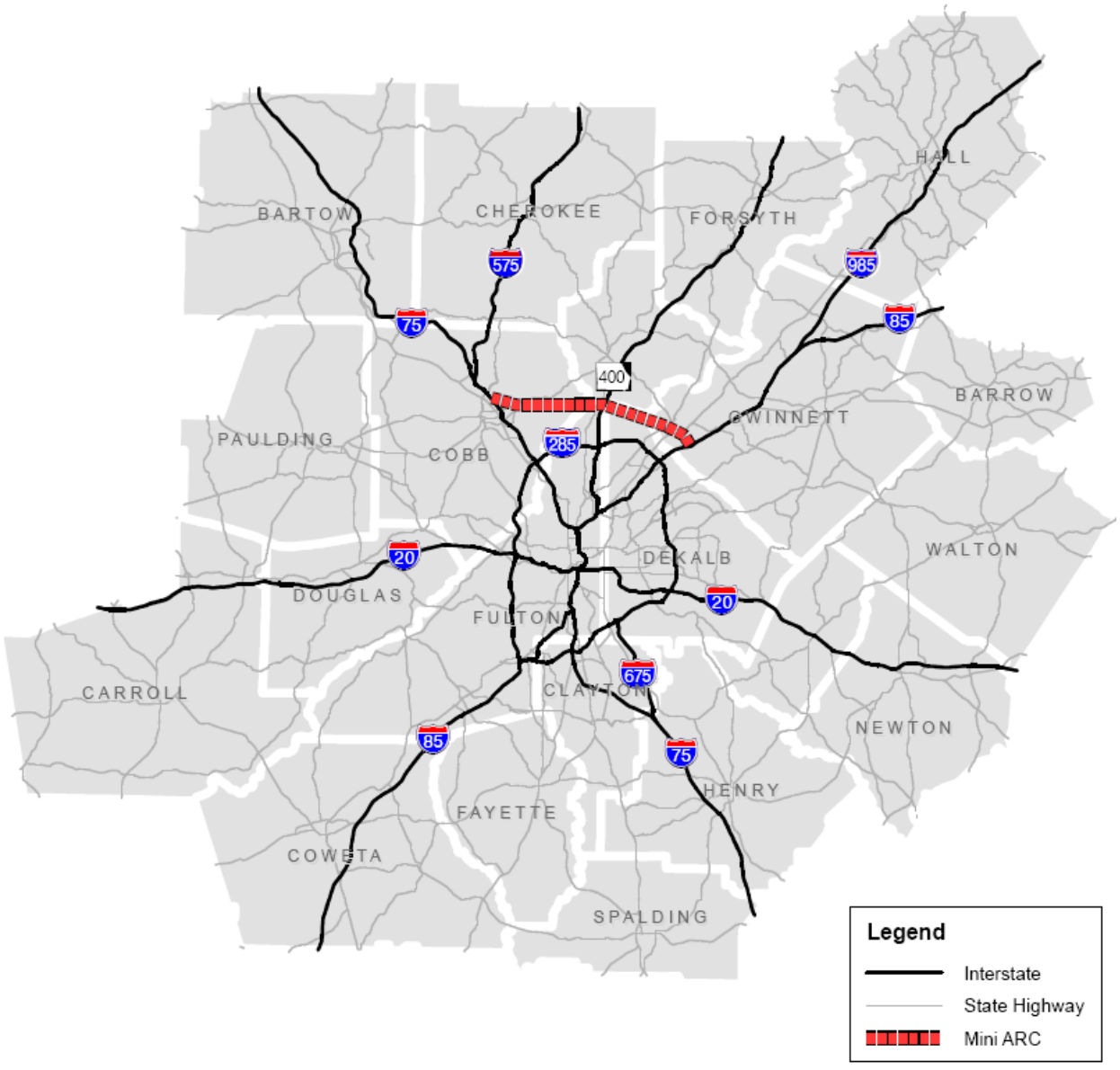
Figure 3: Scenario 2: Outer Loop



"What-if" Scenario 3: Mini Arc

A Mini Arc scenario would be located just north of I-285 between I-75 and I-85. A Mini Arc would serve as a parallel route to the north portion of I-285 and could be expected to help accommodate east-west traffic in northern Atlanta. For the purpose of the analysis, this scenario has been evaluated as a four-lane expressway facility with limited access, originating from I-85 just north of I-285 in Gwinnett County, continuing west to I-75 outside of I-285 in Cobb County. A majority of the alignment follows a power easement. Figure 4 illustrates the general corridor alignment of the Mini Arc.

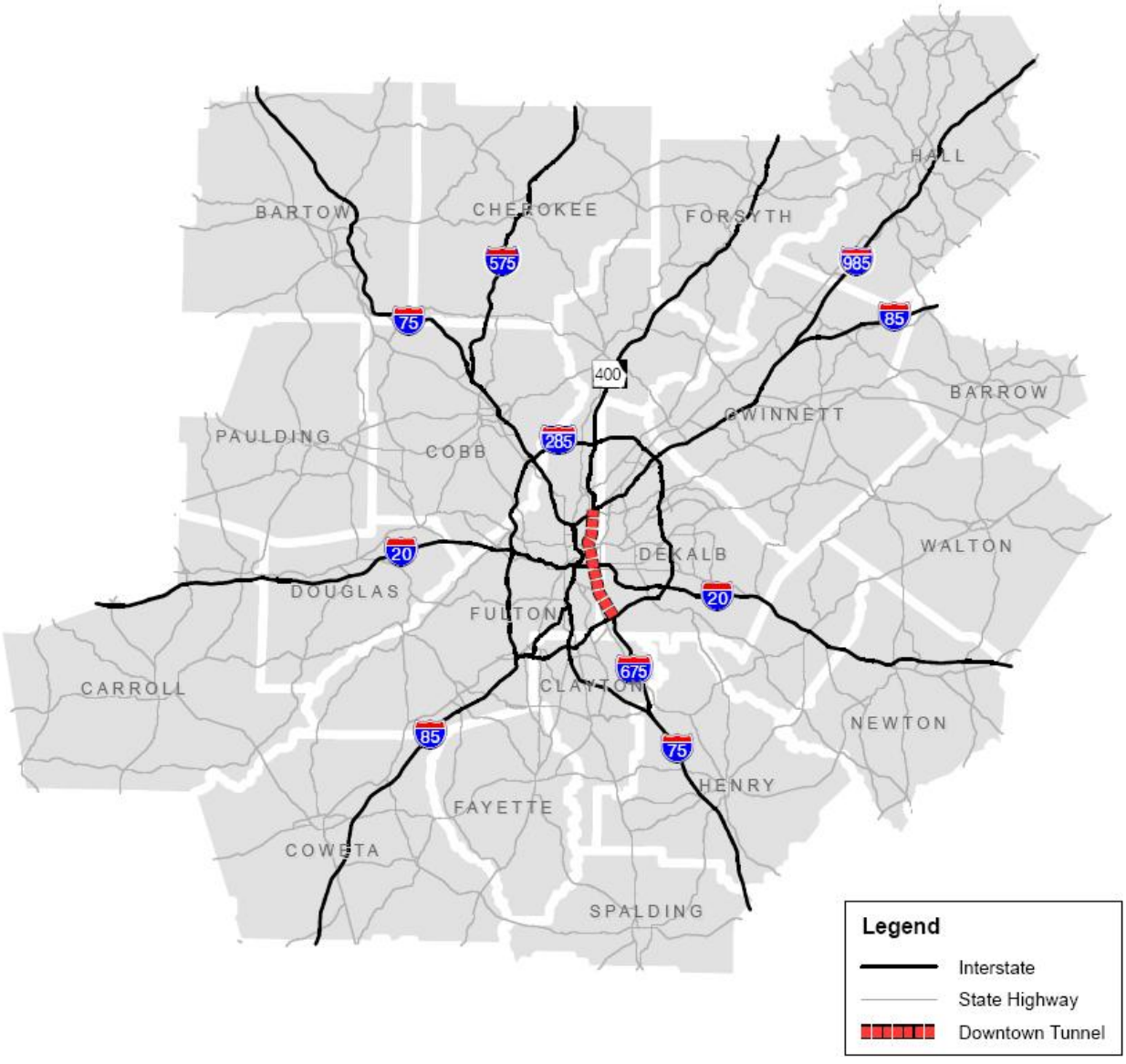
Figure 4: Scenario 3: Mini Arc



"What-if" Scenario 4: Downtown Tunnel

The Downtown Tunnel scenario would be a four-lane north-south freeway facility running parallel to the Downtown Connector. The Downtown Tunnel would connect I-675 in the south to SR 400 in the north, with two intermediate interchanges provided at I-20 and Freedom Parkway. Providing the direct connection between I-675 and SR 400 and serving as a significant north-south corridor, the Downtown Tunnel scenario could be expected to improve traffic conditions in downtown Atlanta particularly along the Downtown Connector. The Downtown Tunnel's general corridor is shown in Figure 5.

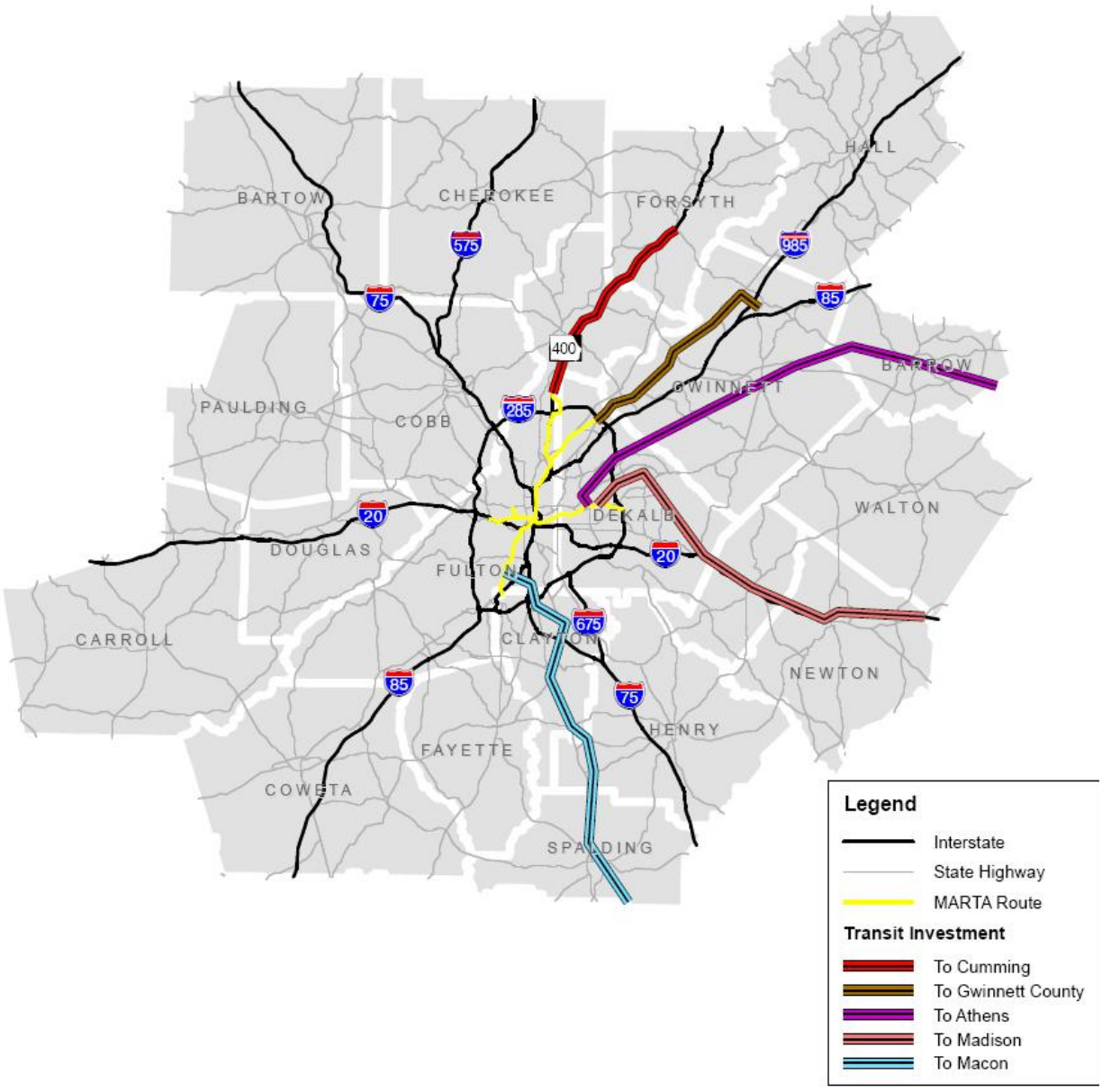
Figure 5: Scenario 4: Downtown Tunnel



"What-if" Scenario 5: Various Transit Investments

A transit investment scenario includes two expanded transit routes and three completely new transit routes. For the purpose of this analysis, a two-way rail line was developed approximately following the alignment of the proposed MARTA North Line (SR 400) corridor and serves as an extension to the existing MARTA North-South rail line. A transit line would extend from the North Springs Station along SR 400 to SR 20 (Cumming). The second expanded route would involve an extension of MARTA's Northeast-South rail line into Gwinnett County. Potential extensions into North Fulton County and Gwinnett County are consistent with MARTA's long-range vision. This transit line would extend from the Doraville Station north of I-85 to SR 20 (Mall of Georgia). In addition, originating from downtown Atlanta, three-commuter rail lines are proposed to Athens, Madison and Macon and are consistent with GDOT's Commuter Rail Plan. Figure 6 shows the general alignments of the proposed transit routes in this scenario.

Figure 6: Scenario 5: Various Transit Investments



C. Scenario Analysis

The primary analysis tool used to evaluate the impact of these additional investments on the demand for managed lane corridors is ARC's Year 2030 Envision6 regional travel demand model. The most current version of the model is based on the most recent regional transportation plan, Envision6, and it reflects the most up-to-date short- and long-term project lists for the 20-County Atlanta region.

Each of the transportation investment scenarios was coded into the Envision6 travel demand model. The same land use patterns and socioeconomic growth were assumed while testing each scenario. The travel demand forecasting was conducted for a future year of 2030 and the model results illustrate the demand impacts to each of the managed lane corridors resulting from these investments, including changes in daily and peak period traffic volumes.

The five transportation investment scenarios were compared to the baseline 2030 Envision6 (Baseline) model. The performance changes on the managed lanes candidate system were analyzed under each scenario in the following sections.

Change in Daily Volumes

In order to assess impacts, the 2030 daily traffic volumes on the managed lane candidate system for each investment scenario were compared to the Baseline alternative (Envision6). By reviewing the change in daily traffic, the effects of these investment scenarios could be quantified to determine the level of impact they may have on the managed lane corridors. Figures 7 through 11 show 2030 daily traffic volume changes resulted from each investment scenario.

The change in traffic is shown at six different levels:

- Reduction of daily traffic of 10,000 vehicles or more;
- Reduction of daily traffic between 5,000 and 10,000 vehicles;
- Reduction of daily traffic between 0 and 5,000 vehicles;
- Increase of daily traffic between 0 and 5,000 vehicles;
- Increase of daily traffic between 5,000 and 10,000 vehicles; and
- Increase of daily traffic of 10,000 vehicles or more.

Findings

The investment scenarios could be expected to change some traffic patterns in the region. While this could result in a reduction of trips along a majority of the managed lane corridors, some corridors could be expected to have a marginal increase in traffic.

Figure 7: Scenario 1: East-West Connector vs. Envision6 (2030 Daily Traffic)

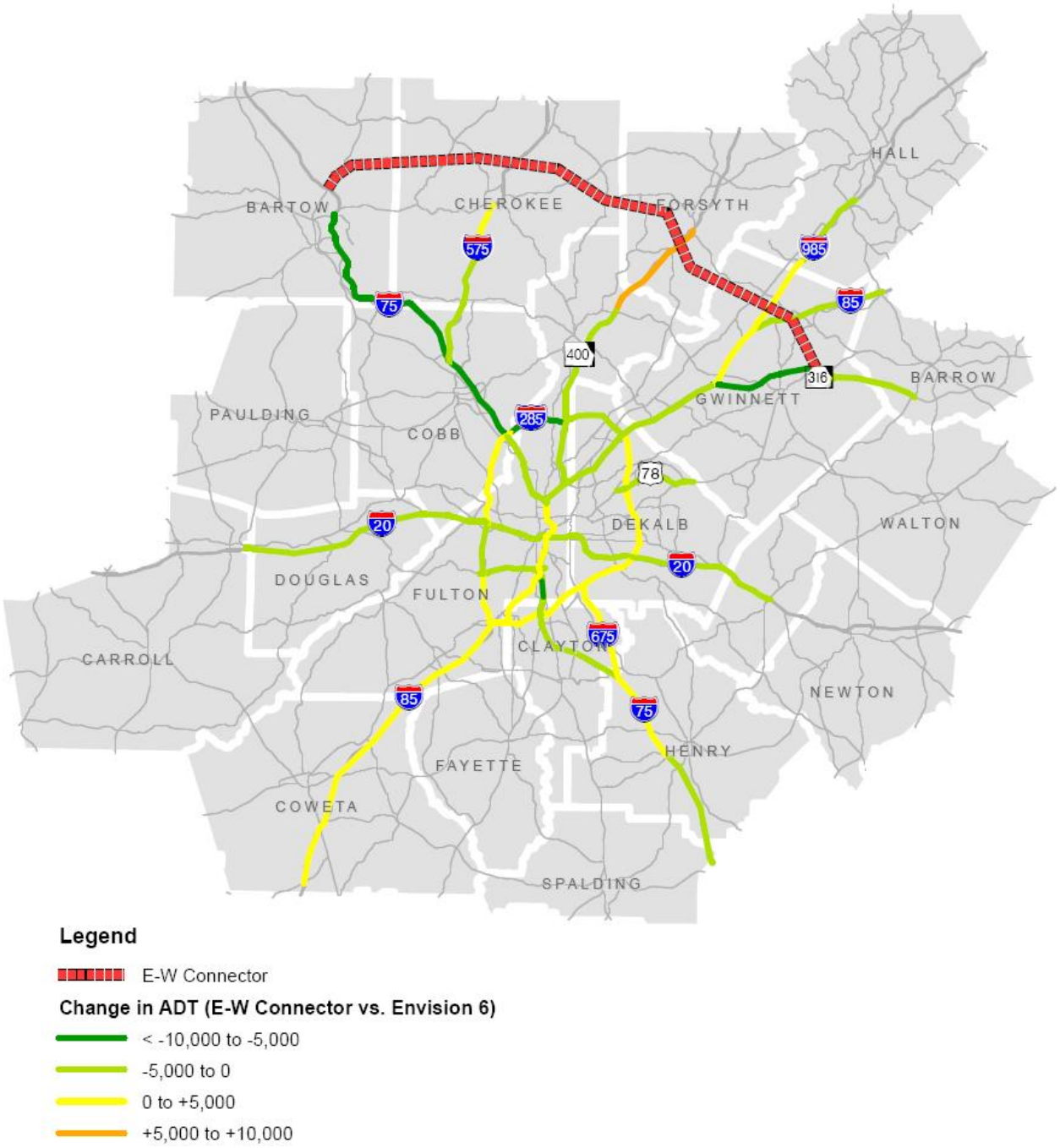


Figure 8: Scenario 2: Outer Loop vs. Envision6 (2030 Daily Traffic)

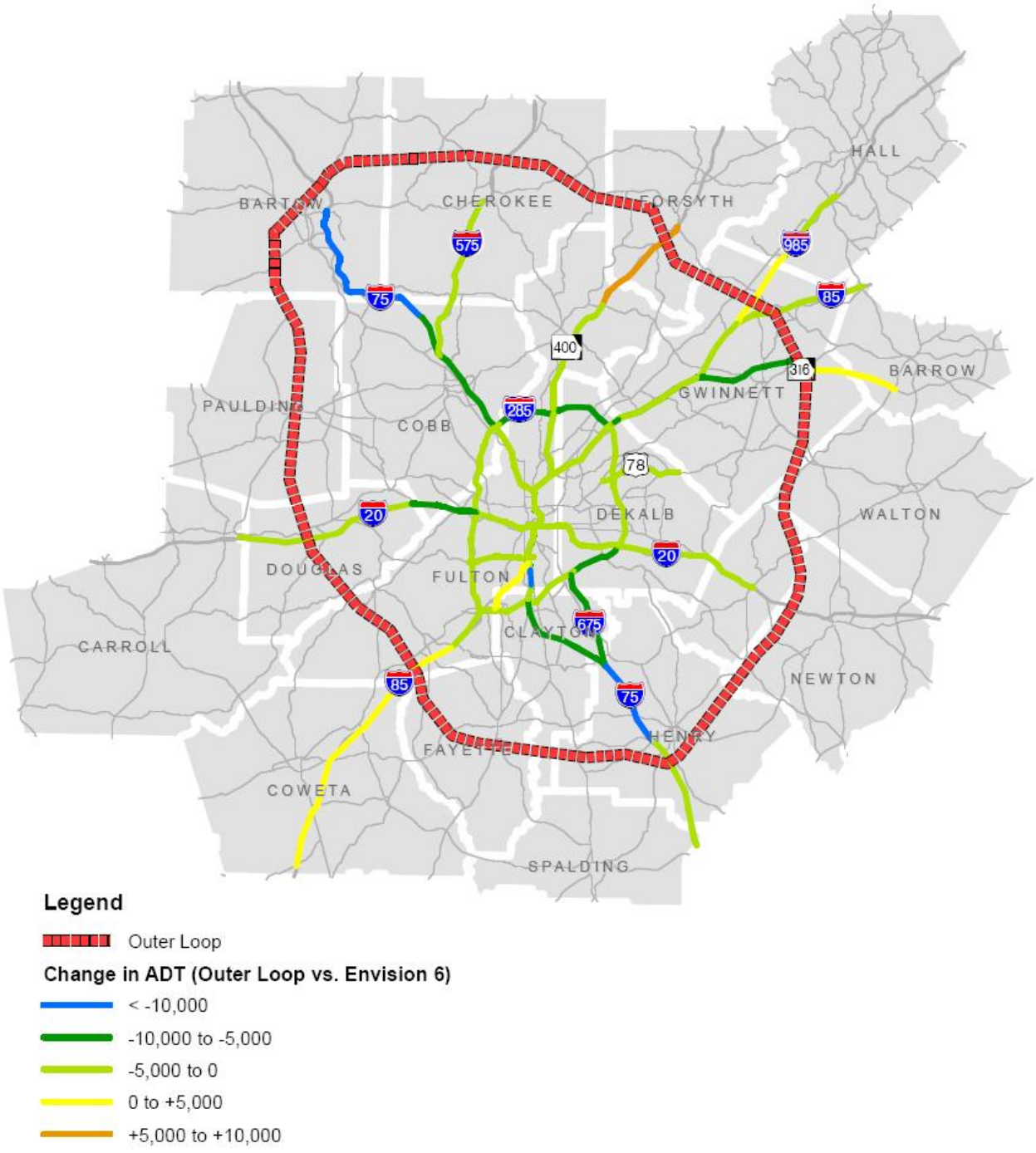


Figure 9: Scenario 3: Mini Arc vs. Envision6 (2030 Daily Traffic)

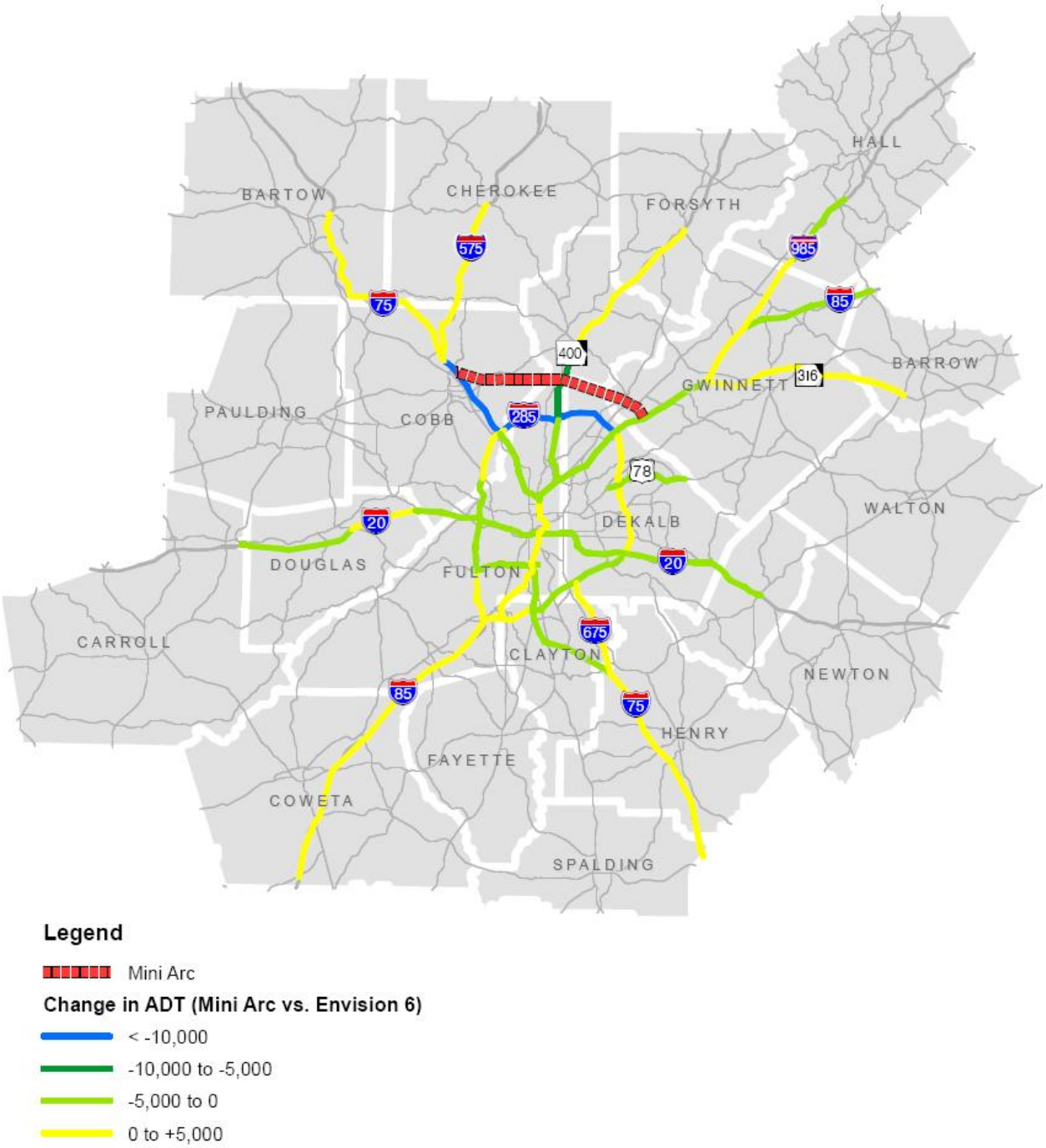


Figure 10: Scenario 4: Downtown Tunnel vs. Envision 6 (2030 Daily Traffic)

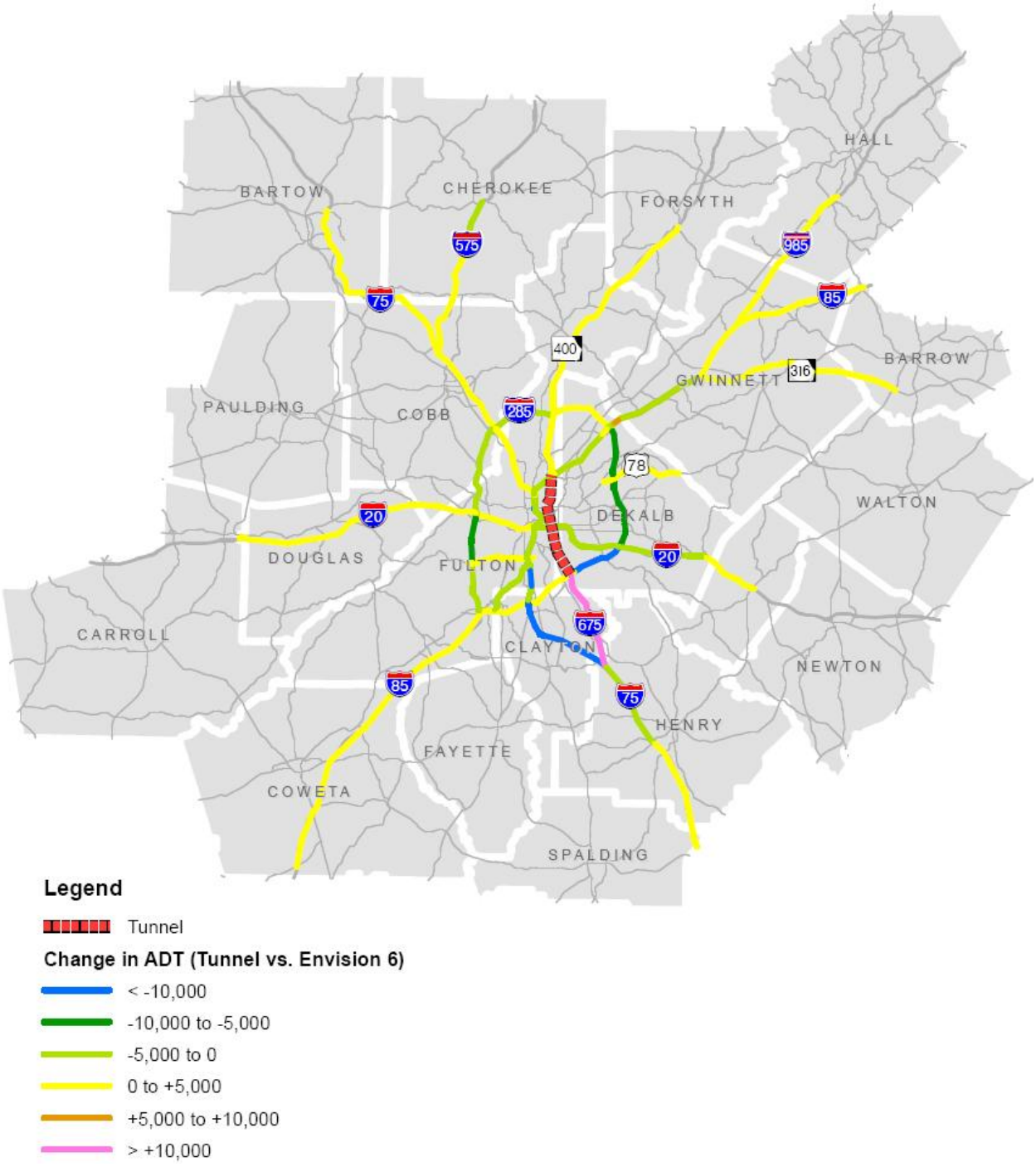
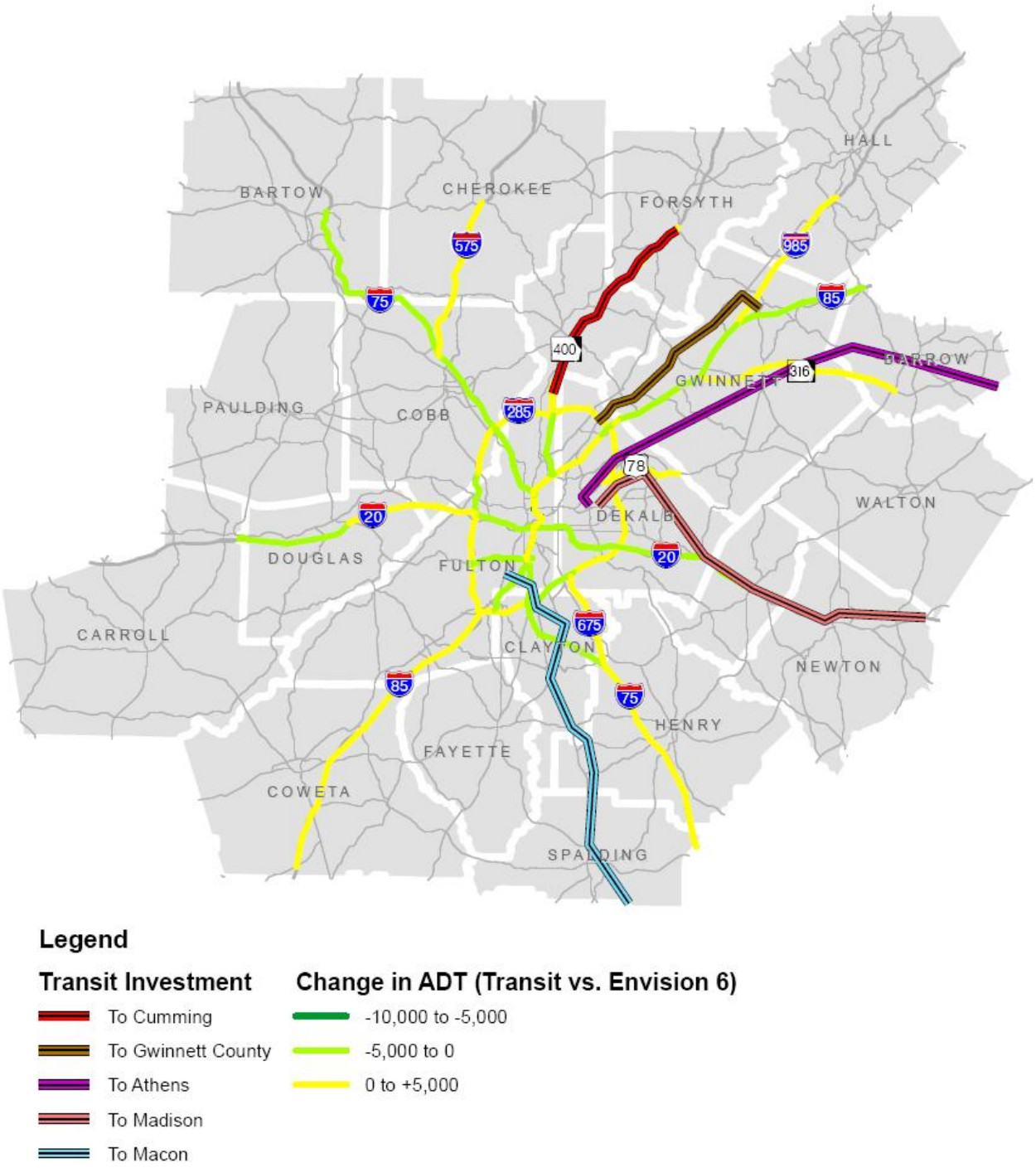


Figure 11: Scenario 5: Various Transit Investments vs. Envision6 (2030 Daily Traffic)



For each managed lane study corridor, the 2030 average daily traffic volume change was obtained by aggregating corridor segments. Then, four categories were determined to represent different levels of impacts each of the investment scenarios can be expected to have on the study corridors. The impact categories were defined as:

- High – upper 1/3 percentile of daily traffic decrease (-19,043 ~ -12,696)
- Medium – middle 1/3 percentile of daily traffic decrease (-12,695 ~ -6,347)
- Low – lower 1/3 percentile of daily traffic decrease (-6,348 ~ 0)
- None – increase of daily traffic

Table 1 shows the impact category for each managed lane study corridor under each tested investment scenario.

Table 1: Scenario Impacts Measured by Daily Volume Change

Corridor		Investment Scenario Impacts				
		East-West Connector	Outer Loop	Mini Arc	Downtown Tunnel	Transit Investment
I-75 N		Medium	**High**	Low	None	Low
I-75 S		Low	Medium	Low	Medium	None
I-85 N		Low	Low	Low	None	None
I-85 S		None	None	None	None	None
I-20 E		Low	Low	Low	None	Low
I-20 W		Low	Low	Low	None	None
I-285 E		None	Low	None	Medium	None
I-285 N		Low	Medium	**High**	Low	None
I-285 W		None	Low	Low	Low	None
I-285 S		None	Low	Low	Low	None
Inside I-285	Segment 1	Medium	Medium	Low	**High**	Low
	Segment 2	Low	Low	Low	None	Low
	Segment 3	Low	Low	Low	Low	Low
	Segment 4	Low	Medium	Low	**High**	Low
	Segment 5	None	None	None	Low	Low
	Segment 6	Low	Low	Low	None	Low
	Segment 7	Low	Low	Low	None	Low
	Segment 8	Low	Low	Low	None	Low
I-575		None	Low	None	None	None
I-675		None	Low	None	None	None
I-985		None	None	None	None	None
SR 400		None	None	Low	None	None
SR 316		Low	Low	None	None	None
US 78		Low	Low	Low	None	None

Percent in AM/PM Traffic Volumes

Since the traffic volumes vary significantly on different roadway segments of the managed lanes candidate system and concentrate in peak periods, it is more reasonable to use relative traffic volume changes in AM/PM periods as a measurement to evaluate different investment scenarios. In this study, the AM/PM traffic volumes are analyzed to assess the impacts of each investment scenarios on the managed lane corridors during the most congested periods. Figures 12 through 16 illustrate the managed lanes candidate system with the percent in AM/PM traffic volumes by comparing each scenario to the Baseline alternative (Envision 6) in 2030.

The percent in AM/PM traffic volumes is shown at six different levels:

- 92% or less of the Baseline alternative (Envision6) AM/PM traffic volume
- 92% ~ 96% of the Baseline alternative (Envision6) AM/PM traffic volume
- 96% ~ 100% of the Baseline alternative (Envision6) AM/PM traffic volume
- 100% ~ 104% of the Baseline alternative (Envision6) AM/PM traffic volume
- 104% ~ 108% of the Baseline alternative (Envision6) AM/PM traffic volume
- 108% or more of the Baseline alternative (Envision6) AM/PM traffic volume

Findings

Similar to the daily traffic volume changes, the investment scenarios result in relatively low traffic volumes in AM/PM periods along a majority of the managed lane corridors. Some corridors can be expected to have relatively high traffic volumes because the investment scenarios would change some traffic patterns in the region.

Figure 12: Scenario 1: East-West Connector vs. Envision6 (2030 Peak Hour Traffic)

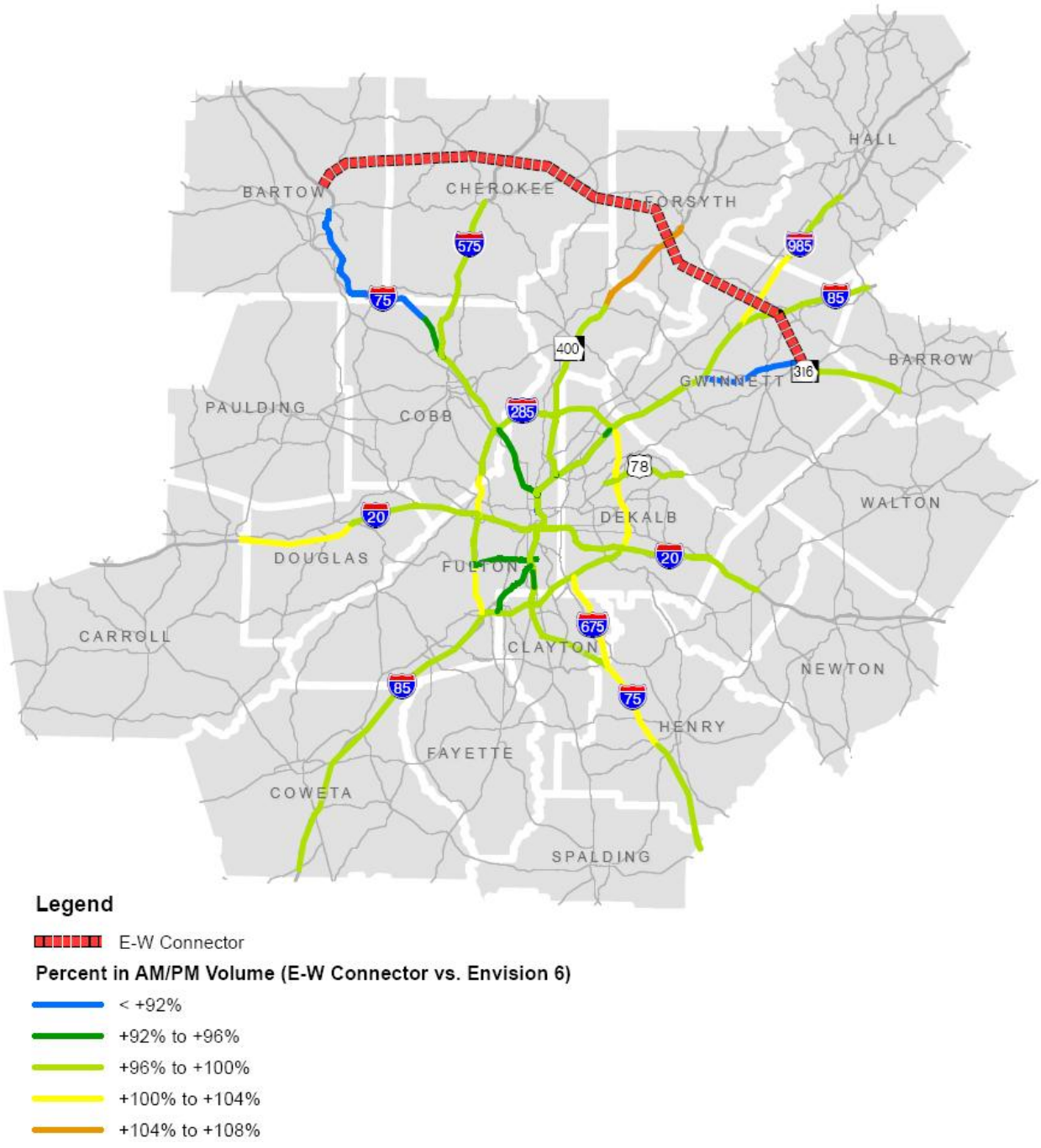


Figure 13: Scenario 2: Outer Loop vs. Envision6 (2030 Peak Hour Traffic)

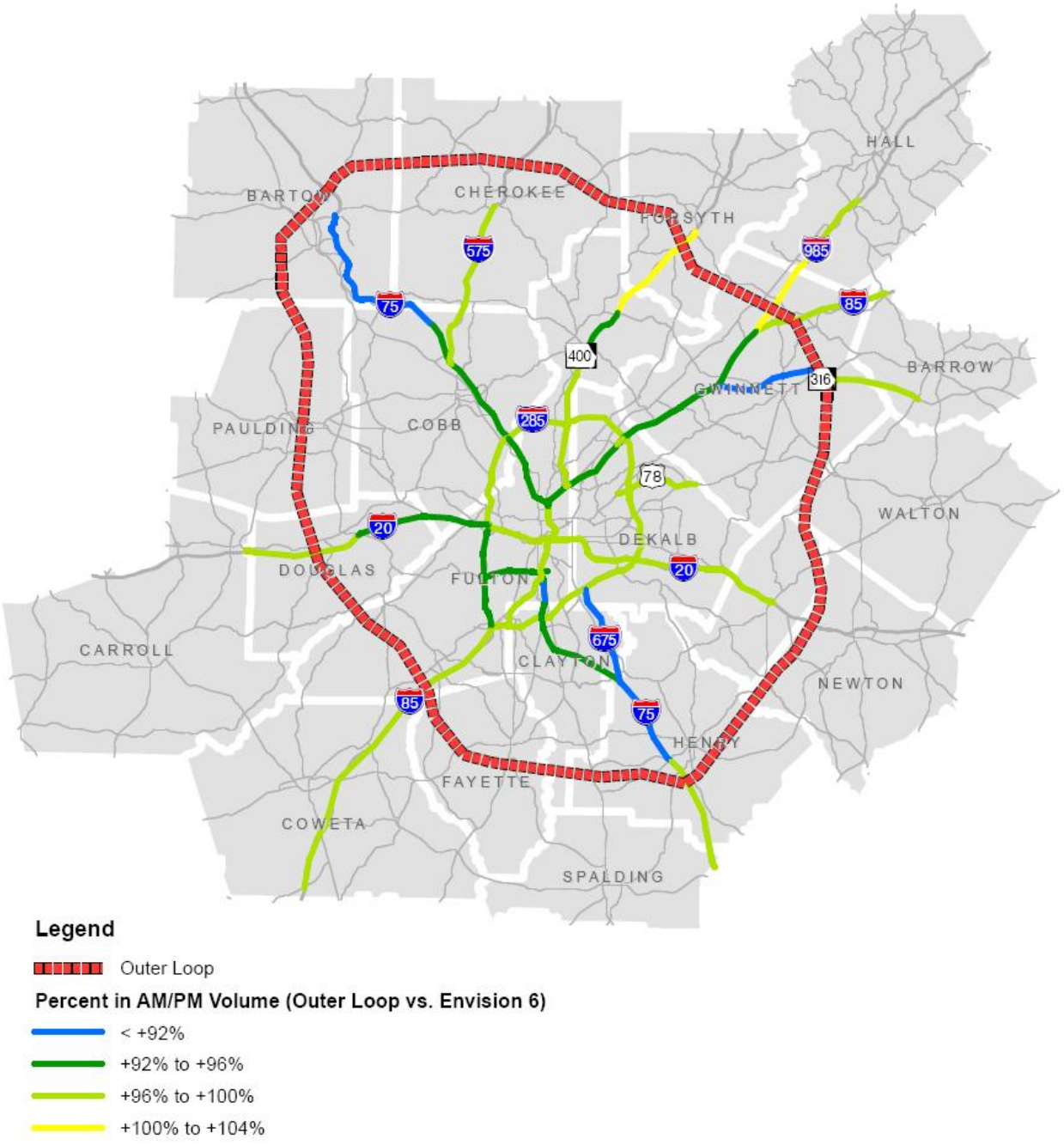


Figure 14: Scenario 3: Mini Arc vs. Envision6 (2030 Peak Hour Traffic)

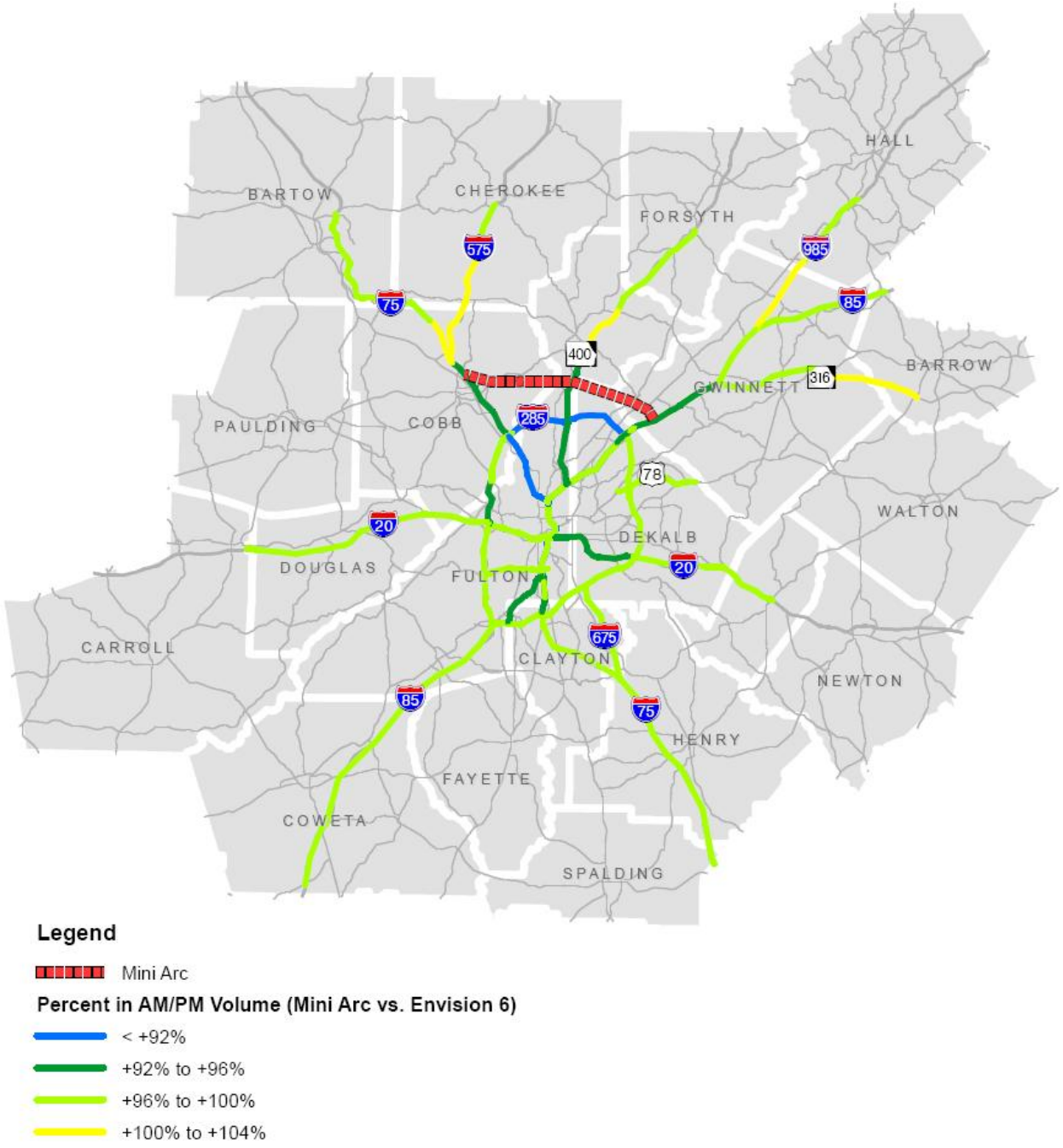


Figure 15: Scenario 4: Downtown Tunnel vs. Envision6 (2030 Peak Hour Traffic)

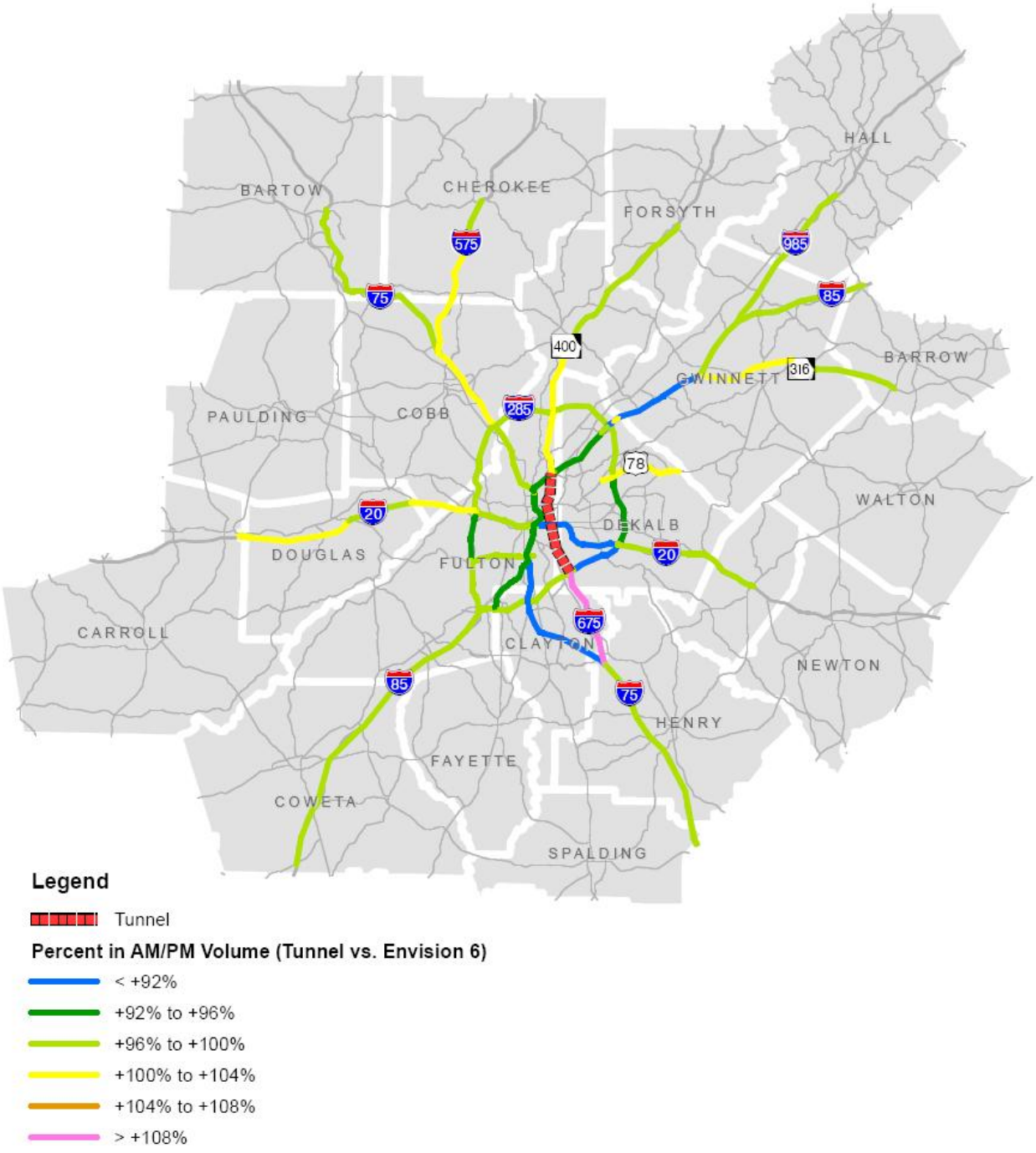
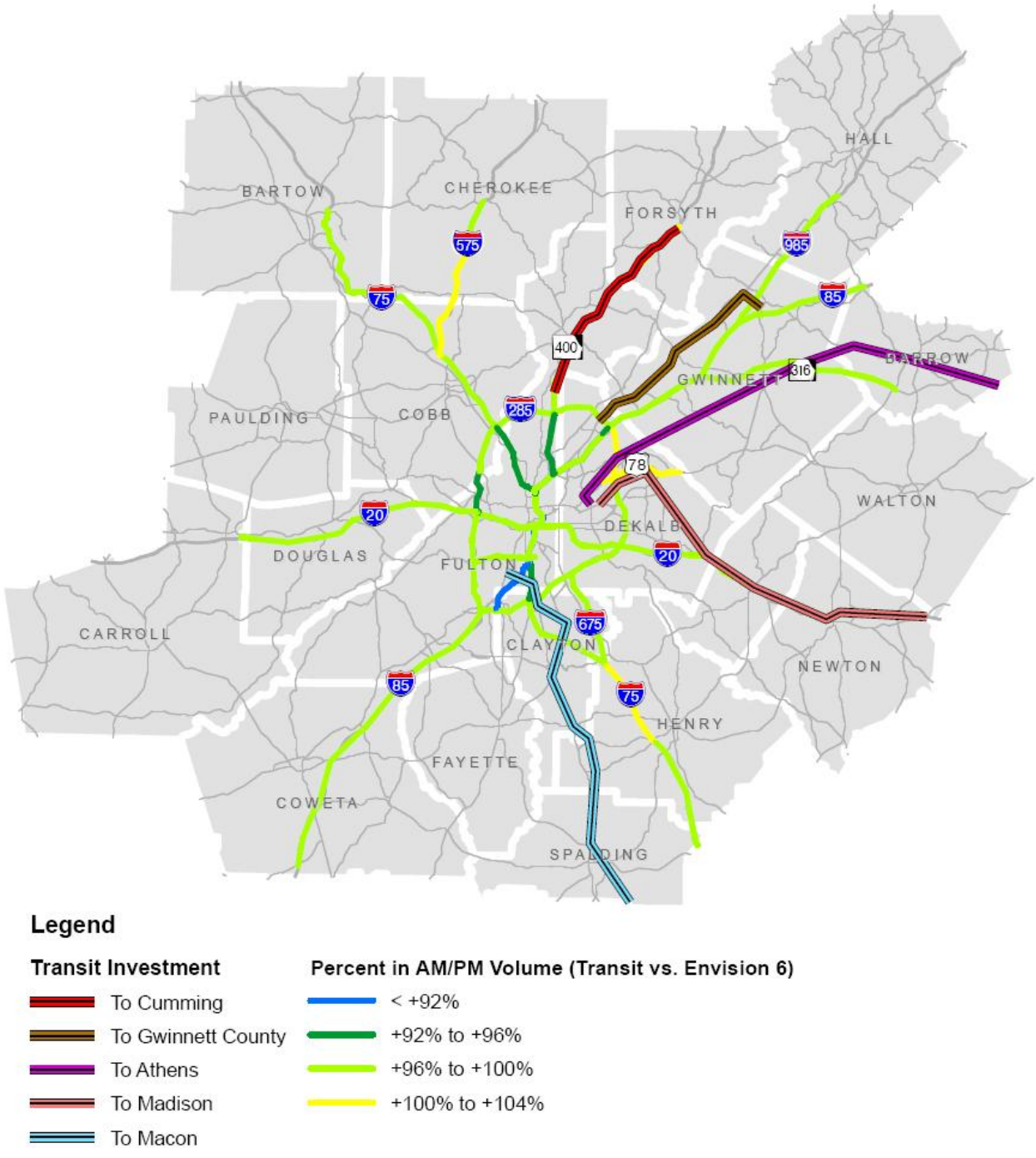


Figure 16: Scenario 5: Various Transit Investments vs. Envision6 (2030 Peak Hour Traffic)



All segments along each study corridor were aggregated to obtain an average percent in AM/PM traffic volume at a corridor level. Based on the resulting corridor-based percentages, four categories were developed to represent different levels of impacts on the managed land study corridors resulted by the tested investment scenario. The categories were defined as:

- High – upper 1/3 percentile of decreased percent in AM/PM traffic (85% ~ 90%)
- Medium – middle 1/3 percentile of decreased percent in AM/PM traffic (90% ~ 95%)
- Low – lower 1/3 percentile of decreased percent in AM/PM traffic (95% ~ 100%)
- None – percent in AM/PM traffic is greater than 100% (increase in traffic)

Table 2 shows the impact category for each managed lane study corridor under each tested investment scenario.

Table 2: Scenario Impacts Measured by Percent in AM/PM Volumes

Corridor		Investment Scenario Impacts				
		East-West Connector	Outer Loop	Mini Arc	Downtown Tunnel	Transit Investment
I-75 N		Medium	**High**	Low	None	Low
I-75 S		Low	Medium	Low	Medium	Low
I-85 N		Low	Low	Low	Low	Low
I-85 S		Low	Low	Low	Low	Low
I-20 E		Low	Low	Low	Low	Low
I-20 W		Low	Low	Low	None	Low
I-285 E		None	Low	Low	Medium	Low
I-285 N		Low	Low	Medium	Low	Low
I-285 W		None	Low	Low	Low	Low
I-285 S		Low	Low	Low	Low	Low
Inside I-285	Segment 1	Medium	Low	**High**	Medium	**High**
	Segment 2	Medium	Low	Medium	Low	Medium
	Segment 3	Low	Low	Low	Low	Low
	Segment 4	Medium	Medium	Low	**High**	Low
	Segment 5	Medium	Low	Medium	Medium	Medium
	Segment 6	Low	Medium	Low	Low	Low
	Segment 7	Low	Low	Low	Low	Low
	Segment 8	Low	Low	Low	None	Low
I-575		Low	Low	None	Low	None
I-675		None	**High**	Low	None	Low
I-985		None	None	Low	Low	Low
SR 400		Low	Low	Low	Low	Low
SR 316		Low	Medium	None	None	Low
US 78		Low	Low	Low	None	None

D. Summary

In this document, the investment scenarios' impacts on the managed lane study corridors were evaluated by two different measures: change in daily volumes and percent in AM/PM traffic volumes. For each corridor under each investment scenario, an impact score can be determined by a scoring mechanism as defined in Table 3. Impacts are defined as high, medium and low and refer to a change in overall demand which could negatively impact managed lane revenue. Only potential impacts to revenue were considered in this score. There is no consideration for other benefits or costs associated with these scenarios.

Table 3: Scoring Mechanism

Impact Category	Score
High (greatest potential impact on managed lane investments)	3
Medium	2
Low (lowest potential impact on managed lane investments)	1
None	0

Then, the overall scores representing the magnitude of comprehensive scenario impacts were developed by aggregating the impact scores of the two performance measures conducted above. Table 4 shows the overall score matrix and Table 5 shows the resulting impact categories.

Among the five investment scenarios, Scenario 2 (Outer Loop) has the highest overall score with value of 57, which implies the greatest impact on the entire managed lane study corridors. This can be attributed to the overall length of the facility and its impact on all of Metro Atlanta's radial interstate network. This investment scenario can be expected to have a high impact on I-75 N and moderate impacts on I-75 S, I-285 N, several corridor segments inside I-285 (Segment 1: Downtown Connector; Segment 4: I-75 S; Segment 6: Langford Parkway), I-675, and SR 316.

Scenario 3 (Mini Arc) has the second highest overall score with value of 46. It can be expected to impact a majority of the managed lane study corridors as well. This investment scenario can be expected to have a high impact on its parallel corridor I-285 N and moderate impacts on two corridor segments inside I-285 (Segment 1: Downtown Connector and Segment 2: I-85 N).

With the third highest overall score equal to 42, Scenario 1 (East-West Connector) results in moderate or low impacts on study corridors inside I-285 and a few corridors outside of I-285 (e.g., I-75, I-85 N, I-20, I-285 N, SR 316 and US 78).

Scenario 4 (Downtown Tunnel) has a moderate overall score with value of 39. This scenario can be expected to have impacts to its parallel corridors inside I-285 (Segment 1: Downtown Connector and Segment 4: I-75 S). It also has moderate impacts on I-75 S, I-285 E, and corridor Segment 5 (I-85 S inside of I-285).

Scenario 5 (Transit Investment) has the lowest overall score. The benefit of this scenario concentrates on managed lane study corridors inside I-285 with moderate or low level impacts. It also brings slight improvement to I-75 N and I-20 E.

Table 4: Overall Score Matrix

Corridor		Overall Score				
		East-West Connector	Outer Loop	Mini Arc	Downtown Tunnel	Transit Investment
I-75 N		4	6	2	0	2
I-75 S		2	4	2	4	1
I-85 N		2	2	2	1	1
I-85 S		1	1	1	1	1
I-20 E		2	2	2	1	2
I-20 W		2	2	2	0	1
I-285 E		0	2	1	4	1
I-285 N		2	3	5	2	1
I-285 W		0	2	2	2	1
I-285 S		1	2	2	2	1
Inside I-285	Segment 1	4	3	4	5	4
	Segment 2	3	2	3	1	3
	Segment 3	2	2	2	2	2
	Segment 4	3	4	2	6	2
	Segment 5	2	1	2	3	3
	Segment 6	2	3	2	1	2
	Segment 7	2	2	2	1	2
	Segment 8	2	2	2	0	2
I-575		1	2	0	1	0
I-675		0	4	1	0	1
I-985		0	0	1	1	1
SR 400		1	1	2	1	1
SR 316		2	3	0	0	1
US 78		2	2	2	0	0
Total Overall Score		**42**	**57**	**46**	**39**	**36**

Table 5: Scenario Impacts Measured by Overall Score

Corridor		Investment Scenario Impacts *				
		East-West Connector	Outer Loop	Mini Arc	Downtown Tunnel	Transit Investment
I-75 N		Medium	**High**	Low	None	Low
I-75 S		Low	Medium	Low	Medium	None
I-85 N		Low	Low	Low	None	None
I-85 S		None	None	None	None	None
I-20 E		Low	Low	Low	None	Low
I-20 W		Low	Low	Low	None	None
I-285 E		None	Low	None	Medium	None
I-285 N		Low	Medium	**High**	Low	None
I-285 W		None	Low	Low	Low	None
I-285 S		None	Low	Low	Low	None
Inside I-285	Segment 1	Medium	Medium	Medium	**High**	Medium
	Segment 2	Medium	Low	Medium	None	Medium
	Segment 3	Low	Low	Low	Low	Low
	Segment 4	Medium	Medium	Low	**High**	Low
	Segment 5	Low	None	Low	Medium	Medium
	Segment 6	Low	Medium	Low	None	Low
	Segment 7	Low	Low	Low	None	Low
	Segment 8	Low	Low	Low	None	Low
I-575		None	Low	None	None	None
I-675		None	Medium	None	None	None
I-985		None	None	None	None	None
SR 400		None	None	Low	None	None
SR 316		Low	Medium	None	None	None
US 78		Low	Low	Low	None	None

* High: $4.5 \leq \text{score} \leq 6.0$
Medium: $3.0 \leq \text{score} < 4.5$
Low: $1.5 \leq \text{score} < 3.0$
None: $0.0 \leq \text{score} < 1.5$

This analysis evaluates the impacts of corridor demand on the managed lane candidate system assuming the investment scenarios are **not** tolled. The proportional change in managed lane revenue generation might not be equal to the proportional change in corridor demand, in other words, these two variables might not be directly related and change at the same rate. The responsiveness of managed lane revenue generation to changes in corridor demand will vary corridor by corridor depending on a range of other variables, such as congestion level along the corridor, number of general purpose lanes etc. The elasticity between the change in corridor demand and the resulting change in managed lane revenue will be further evaluated in the risk assessment of the Preliminary Traffic and Revenue Analysis.