HOV System Plan

HOV Strategic Implementation Plan

for the

Atlanta Region

Final Report

GDOT Georgia Department of Transportation

Submitted by:

The Parsons Team

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1.0 Introduction

In September 2001, the Georgia Department of Transportation (GDOT) initiated a contract to develop a High-Occupancy Vehicle (HOV) Strategic Implementation Plan for the Atlanta Region. This implementation plan builds on the early HOV planning efforts of the Atlanta Regional Commission's (ARC) 2025 Regional Transportation Plan (RTP). The purpose of this plan is to provide GDOT and its regional planning partners with a strategy for building HOV lanes now and in the future.

Because HOV lanes are just a piece of the transportation network puzzle, this study was coordinated with other modal planning efforts in the region. The methodology and recommendations take into account all transportation modes for all of the study corridors. A successful HOV system depends on a compatible transit system, system connectivity, strategically placed park and ride lots, etc. This plan will serve as a guide for building a total HOV system for the next several years. This plan is an aggressive undertaking to assure that maximum value will be attained from existing and future HOV lanes within the Atlanta region.

Phase I, the first six months of the study, consisted of a detailed analysis of HOV corridors identified in the ARC's 2025 RTP. Critical corridors that rated high in constructability, meaning that these projects are easier and less costly to construct based on current conditions, were presented in an Interim Implementation Prioritization List after the first 90 days of study. The highest-ranking projects from that list were presented to GDOT in November 2001 to commence work on these key projects. The following 90 days of the study expanded the evaluation of the 2025 RTP for both planning and constructability factors developed from new and updated data. An updated 180-day list was developed at this stage and did not vary much from the 90-day interim list, reaffirming the earlier findings.

Phase II, the final phase of the study, evaluated potential extensions of the HOV system within the 21-county Atlanta study area. The methodologies used in the previous phases were confirmed and refined for the purpose of this evaluation. Using the refined methodology, recommendations were proposed for the existing HOV network and for the proposed system extensions. The findings from this evaluation were presented at ten final public meetings held throughout the month of October 2002. These meetings offered draft recommendations, including project prioritization. Comments gathered at these meetings contributed to the recommendations of this final report. (Appendix A) Several additional tasks were performed in Phase II including: an air quality analysis of the HOV system, development of an enforcement plan for the HOV system and an initial evaluation of financial strategies. Reports for each of these tasks are included in the appendices.

This report presents Phase II of the HOV Strategic Implementation Plan for the Atlanta Region. It documents the steps taken to get to the final priorities and recommendations. The principal addition to this phase is the evaluation of corridors outside the 2025 RTP boundaries, referred to as the "blue corridors." This expands the HOV study area to the future non-attainment 21-county region. Analyses of these corridors are linked to the previous corridor analyses to form a complete Atlanta regional system-wide HOV plan. It includes the processes of developing guidelines for the blue corridors, presentation of the additional data considered in this analysis and a review of the final evaluation of all factors to complete the prioritization of HOV projects in the region, including how these projects were categorized into a tier system. This report concludes the final phase of the study scope and provides GDOT the appropriate information to move forward in expanding the HOV system and begin the process of implementation.

2.0 Determining Limits In 21-County Study Area

2.1 Task Description

The HOV Strategic Implementation Plan for the Atlanta Region study area includes major limited access facilities in the following 21 counties: Barrow, Bartow, Carroll, Cherokee, Clayton, Cobb, Coweta, Dawson, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Hall, Henry, Newton, Paulding, Rockdale, Spalding, and Walton. Though the first phase of the HOV study focused on facilities within the ten-county ARC region[1], Phase II examined the long-range implementation needs for HOV facilities over the entire 21-County area. The study area extended to the borders of the outer counties, each corridor type was given a color designation; red – 2025 RTP projects, green – existing HOV and blue – projects beyond the 2025 RTP. The purpose of this task was to establish the logical termini of the blue corridors for the design year 2025. Through a technical and planning review, the study area was refined.

2.2 Technical Review Process

The modeling team developed an effectiveness rating to evaluate the viability of HOV lanes in 2025 within the 21-County study area corridors. This rating compared estimated person trips carried by HOV lanes versus capacity of the general-purpose lanes. A preliminary analysis of the proposed additions to the system was completed to assess their potential for supporting an effective HOV facility. This evaluation did not include location-specific factors addressed in Phase I, such as constructability and access. Future volumes for the 2025 were projected based on 1990-2000 trends for those links not included in the ARC model link. This methodology accounted for capacity constraints on growth, nationwide trends in aggregate traffic growth, and the outward movement of development patterns. The volumes projected using this methodology were compared with data for outer links of the ARC model for 2025 and appear to be conservative as the ARC data is somewhat higher than the volumes used for this evaluation. The potential effectiveness of HOV lanes on each segment was estimated using a formula based on both distance and projected ADT/lane. An effectiveness rating of 1.0 or more indicated HOV lanes would be viable for a given segment of the system. (For more detailed description, please see Appendix B).

2.3 Planning Review

The results of the technical analysis were reviewed in a workshop format, considering planning factors such as the impact of current local development trends and future land uses on the operation of the

1 The ten-county Atlanta Regional Commission (ARC) region: Cherokee, Clayton, Cobb, DeKalb, Douglas, Fayette, Fulton, Gwinnett, Hall, Henry, and Rockdale.

highway system. The final determination of logical termini for the revised HOV study area was recommended based on both the effectiveness rating and planning factors. Table 2.1 summarizes the HOV blue corridor study area limits determined for study in Phase II. The final study phase combined the new limits of the blue corridors with the existing 2025 RTP corridors and existing HOV network to develop a complete system (See Appendix I).

Table 2.1 – HOV Study Area Limits – Blue corridors

Facility	Original Study Limits	Revised Study Limits
I-75 North	from SR 16 to SR 53	from SR 16 to SR 20
I-575	from I-75 to SR 108	from I-75 to J. E. Brown Memorial/SR 5 Bus.
I-85 North	from SR 54 to SR 53	from SR 14 to SR 211
I-675	from I-75 to I-285	Unchanged
I-985/U.S. 23	from I-85 to SR 384	from I-85 to SR 11
SR 400	from I-85 to SR 60	from I-85 to SR 306
I-20 East	from SR 100 to SR 83	from SR 100 to SR 142
SR 316	from I-85 to U.S. 78	Unchanged
SR 154/166	from I-285 to I-75/85	Unchanged
I-285	From 20 E to 20 W	Unchanged
SR 141	from I-285 to SR 140	Unchanged
I-85 South	from SR 74 to SR 54	from SR 74 to US 29
I-75 South	from SR 155 to SR 16	Unchanged
I-20 West	from McKoy Rd to SR 100	Unchanged

3.0 HOV Rating Criteria

3.1 HOV System Screening Process – Planning Evaluation Criteria

The purpose of the screening process of planning factors was to conduct a comparative analysis between the proposed HOV projects and to establish a logical implementation sequence. A review of the original HOV system guidelines that best met the established goals for the Atlanta Region were:

- Reduce and manage traffic congestion
- Maximize the use of carpools, vanpools and transit
- Ensure integration with transit
- Plan for a complete HOV system that is integral and critical to the entire transportation network
- Provide reliable travel time savings
- Increase person throughput
- Implement HOV only when congestion is persistent

Through each phase of the HOV study, similar evaluation criteria[2] from the guidelines were used so that facilities were measured in a consistent manner. For Phase I, the following general evaluation criteria topics were used: congestion, travel time, connectivity, and transit. In the final phase, two additional criteria were added: safety and reliability. Though essentially the same criteria were reviewed for each phase, the data requirements and planning horizon varied. The following table summarizes the criteria used for each prioritization analysis of the HOV study as well as the primary data sources.

2 Resource for the evaluation criteria – Texas Transportation Institute (TTI)

Table 3.1 – Comparison of Planning Evaluation Criteria for HOV Study

	90 Day Prioritization of ARC RTP projects	180 Day Prioritization of ARC RTP projects	21 County Needs analysis
Congestion	AADT per lane mile (Data: GDOT 2000 AADT)	Peak Hour Volume per lane mile (Data: 2005 ARC Model Peak Hour volumes)	AADT per lane surpassing congestion threshold (Data: 2025 ADT traffic forecast)
Travel Time	Time savings per mile for each project (Data: 1998 Skycomp Report)	Time savings per mile and total time savings (Data: 2005 ARC Model Peak Hour volumes)	Time savings per mile and total time savings (Data: 2025 ADT traffic forecast)
Connectivity	Connectivity to existing system and activity centers	Connectivity to existing system and activity centers	Connectivity to existing system, activity centers, and system significance
Transit	Proximity to current or planned Express Bus and complementary facilities	Proximity to current or planned Express Bus and complementary facilities	Proximity to current, planned or proposed transit service and complementary facilities
Safety/ Reliability			Accident rate correlation to existing system configuration and ADT volume (Data: GDOT accident rates 1995-1997)

3.2 Planning Criteria Ratings Methodology

The initial report, The 90 Day Interim Prioritization Report, briefly considered the planning criteria elements to ensure that higher priority projects reflect a potential for high utilization. The criteria ratings primarily focused on constructability issues in this report due to preliminary rankings of the projects. The planning criteria ratings were revisited in the Six Month Report with a more comprehensive review. The Six Month Report planning criteria served as measures of effectiveness for HOV construction within the surrounding transportation network. The key planning criteria focused on traffic congestion-related elements, access, landuse, park and ride lots and system connectivity. These two interim reports established the planning criteria permitted evaluation of the potential need for HOV within greater Atlanta. For the final prioritization process, the key planning elements focus on traffic congestion-related criteria, complementary network facilities, system connectivity and reliability. The planning horizon for Phase II was year 2025. The methodology for evaluating the entire Atlanta 21-county study area is summarized below.

3.2.1 Congestion: HOV Volume Threshold – 20,000 Annual Average Daily Volume (AADT) per Lane

Traffic volumes were forecasted to year 2025 for the Atlanta 21-county region using GDOT ten-year historical AADT. The traffic volume forecasts were completed in five-year increments up to year 2025. Using the forecasts, the corridors were evaluated based on annual average daily traffic per lane.

A methodology comparing the forecasted volumes to a HOV volume threshold provided a timeline as to when the corridor meets the congestion criteria. The Texas Transportation Institute set a threshold of

35,000 vehicles per lane per day as an indicator for successful HOV. However, for a long-term evaluation, a threshold of 20,000 to 25,000 vehicles per lane was used to indicate such time when HOV becomes viable. This recommendation is based upon a review of the Regional Transportation Plan (RTP) HOV corridors examined during Phase I. In Atlanta's existing HOV system, average daily volumes of 20,000 to 25,000 per lane carry levels of congestion that are sufficient to justify reasonable HOV demand. In addition, 25,000 vehicles per day per lane would equate to a volume of between 2,000 and 2,500 vehicles per lane per hour assuming a peak hour or "K" factor of approximately 8% to 10%, respectively. These peak hour volumes are considered very near or, in some cases, beyond capacity of a basic freeway lane, depending on the level of urbanization of an area. (Drivers in more suburban and rural areas typically have less tolerance for congestion than in highly urbanized areas. Thus, freeway lane capacities are somewhat less in these areas.)

If a location meets an assumed congestion threshold, it does not automatically mean that HOV is an appropriate transportation treatment for that location. Daily, predictable congestion is just one screen for HOV. It is also important that users can gain benefit from the HOV because services are in place to complement HOV and that a given section of highway corridor enhances the operation of the system overall.

Planning criteria ratings for congestion were assigned as follows:

Table 3.2 - Meets 20,000 ADT per Lane by Critical Year

Rating	Definition
2	Meets Threshold by 2005.
4	Meets Threshold by 2015.
6	Meets Threshold by 2025.
8	Does Not Meet Threshold or Does So Beyond 2025.

3.2.2 Travel Time Savings per Mile during the Peak Hour

Travel time savings benefit HOV users when they choose to carpool, vanpool or take transit. On a congested facility, a typical “LOS C” HOV lane generally provides a shorter and more reliable trip time than a single occupant vehicle (SOV) lanes. Travel time savings accrued by HOV lane users is a measure of effectiveness generally used to validate HOV effectiveness versus SOV on a general-purpose system. However, estimating travel time savings for the study area based on future travel demand provides another way to evaluate HOV potential in a corridor.

To estimate travel time savings, the 2025 traffic volume projections were used to estimate a peak hour volume. Based on observed and collected traffic volumes from the HOV system, an eight percent peak hour factor and a sixty/forty directional split during the peak hour were assumed. As in the first study phase, an average free flow speed of 70 mph in the HOV lanes is assumed. Speeds in the general-purpose lanes are correlated to the level-of-service or densities consistent with the GDOT Skycomp Report data and findings. The 1998 Skycomp Report conducted a series of aerial photo-surveys of highway traffic quality in the metropolitan Atlanta planning region. The purpose was to obtain level of service and traffic data to support regional planning activities. This study used this data for level of service and congestion analysis.

Travel time savings were estimated by calculating the difference between an average free flow speed at 70 mph[3] in an HOV lane and the estimated reduced speed in the congested SOV lanes. The total time saved in minutes was divided by the section length in miles, resulting in a time savings per mile. The relative rating system assigned to corridors is shown in Table 3.3:

Table 3.3 - Time Savings per Mile

Rating	Definition
2	Equal to or greater than 1 minute per mile time savings and/or greatly exceeding 5 minutes total travel time savings.
4	Equal to or greater than 0.75 but less than 1 minute per mile time savings and/or exceeding 5 minutes total travel time savings.
6	Equal to or greater than 0.5 but less than 0.75 minute per mile time savings.
8	Less than 0.5 minute per mile time savings.

3.2.3 Connectivity

This planning element summarizes the utility of the corridor in terms of connectivity to the existing system, major activity centers, and/or transit. The connectivity issues in the final planning evaluation are similar to the initial HOV screening process. However, during this phase of the study the focus was placed on how the greater Atlanta area corridors will phase into the plan for the existing system and planned RTP corridors. Not only is connectivity to the existing system and activity centers important, but system significance was identified, i.e., does this addition to the system provide value and better connectivity overall. Though the connectivity rating is subjective, it tries to answer, “How does this corridor addition to the HOV system enhance the overall HOV system and the transportation network?” The rating definitions are shown in Table 3.4.

[3] Defined by Skycomp, Inc., *Traffic Quality on the Atlanta Regional Highway System, Final Report, Fall 1998*.

Table 3.4 - Connectivity to Transportation Network

Rating	Definition
2	The corridor section directly extends and connects to the existing system.
4	The corridor section provides direct connectivity to the existing or future RTP system and has a high level of utility or value.
6	The corridor section has independent utility, and/or connects to sub-regional population or employment centers including towns.
8	The corridor section requires one or more project sections to be implemented to become fully operational.

3.2.4 Transit/Express Bus

Transit usage in an HOV system is critical to meet the facility's purpose, moving more people per lane than on a general-purpose lane. HOV lanes support Express Bus service by providing competitive travel times versus SOVs in congested conditions on the general-purpose lanes. In addition, direct access to and from the local roadway network can provide additional travel time savings and ease of operation.

The HOV study team coordinated with existing transit providers for the Atlanta region in the development of recommendations for the HOV system including: MARTA, Cobb Community Transit, Gwinnett County Transit and Clayton C-Tran Transit. In addition, the team coordinated with the Georgia Regional Transportation Authority (GRTA) as they developed the Regional Transit Action Plan (RTAP). In consultation with GRTA and the regional transit providers, the transit ratings used in Phase I were revised to reflect current plans for Express Bus service throughout the Atlanta Metropolitan area. The transit ratings used in Phase II are shown in Table 3.5:

Table 3.5 - Existence of Transit / Express Bus Service

Rating	Definition
4	The corridor currently has in operation or has programmed Express Bus service including park and ride facilities.
8	There is no Express Bus service currently in service or planned.

3.2.5 Potential HOV Lane Reliability

Providing a safe and reliable system is an important guideline for developing additional HOV lanes. Accident rates are related to HOV reliability because, as all highway users are aware, any accident, from minor rear-end collision to a traffic fatality incident in the general-purpose lanes may contribute to travel delay. The severity of the delay is not as important as the fact that the delay occurs. By building barrier-separated HOV lanes, the HOV user can avoid delay caused either by congestion or traffic incidents in the general-purpose lanes. A barrier separated system has been recommended for implementation, where feasible, based on guidelines established during the first 90 days of the study. Guidelines for the implementation of the HOV system may be found in *Technical Report Four, HOV Policy Guidelines*.

Incorporating safety and reliability into the list of planning evaluation criteria presented some data and information hurdles. Having collected traffic accident, injury and fatality rate information for the study area, the question of how the data could be transformed into meaningful information was considered.

It was determined that safety data correlate to reliability of the system based on the existing system configuration and traffic volume. Consequently, the frequency of accidents in any given corridor may be related to the prevailing geometric access and traffic conditions in each corridor. Variations in the Atlanta region's freeway corridors include:

- A total number of lanes from 4 to 16 total lanes
- Varying frequency (i.e., spacing) of interchanges
- Different number of interchanges in any given section of highway
- Varying degrees of traffic congestion

The relationship between the number of lanes, the number of interchanges, the average spacing of those interchanges, and traffic volume were examined to determine if the rate of accidents within a defined highway section correlated. The analyses showed that a correlation did exist between traffic volumes, interchange spacing, and increased accident rates. By using the historical accident data aggregated by corridor section, a pattern was found that could be used to rate the HOV corridors for reliability.

The reliability rating puts a premium on rating more unreliable, higher accident facilities over lower accident facilities since it is assumed that a barrier-separated HOV facilities would provide more travel reliability and less delay.

Table 3.6 – Potential Reliability For HOV Lanes versus General-purpose Lanes

Rating	Definition
2	The facility has a high average daily volume, closely spaced interchanges, and a high annual accident rate.
4	The facility has two of the following: a high average daily volume, closely spaced interchanges, and/or a high annual accident rate.
6	The facility has one of the following: a high average daily volume, closely spaced interchanges, and/or a high annual accident rate.
8	None – does not meet the conditions.

HOV Strategic Implementation Plan for the Atlanta Region
Table 3.7 - Planning Ratings

Description			Length (Miles)	AADT per Lane YR 2000	Planning Rating	Planning Factors				
Corridor	From	To				Congest-ion	Travel Time	Connect-ivity	Transit	Safety/ Reliability
I-20 East	Columbia Drive	Evans Mill Drive	8.0	22,700	**2**	2	2	2	4	2
I-20 East	Evans Mill Drive	SR 162/Salem Road	9.6	15,400	**5**	4	4	6	4	6
I-20 East	SR 162/Salem Road	SR 12/Clark Street (Exit 90)	6.2	10,700	**6**	6	8	4	8	6
I-20 East	SR 12/Clark Street (Exit 90)	SR 142	3.8	7,200	**7**	8	8	6	8	6
I-20 West	I-75/85	SR 280/Holmes Rd	5.1	21,100	**3**	2	2	4	4	2
I-20 West	SR 280/Holmes Rd	SR 6/Thornton Road	8.1	23,700	**3**	2	2	6	4	2
I-20 West	SR 6/Thornton Road	SR 5/Bill Arp Road	9.9	17,100	**4**	4	2	6	4	6
I-20 West	SR 5/Bill Arp Road	Liberty Road	8.1	17,000	**6**	4	2	8	8	6
I-20 West	Liberty Road	SR 113	7.4	14,200	**6**	4	4	8	8	6
I-20 West	SR 113	SR 1/US 27	7.7	10,900	**8**	8	8	8	8	6
I-20 West	SR 1/US 27	SR 100	6.4	9,600	**8**	8	8	8	8	6
I-285 (N)	I-75 North	I-85 North	13.1	24,500	**2**	2	2	2	4	2
I-285 (N)	I-20 East	I-85 North	13.0	22,700	**3**	2	2	6	4	2
I-285 (N)	I-20 West	I-75 North	9.6	18,400	**3**	2	2	6	4	2
I-285 (S)	I-20 East	I-675	6.1	16,500	**5**	4	6	6	4	6
I-285 (S)	I-675	I-75 South	5.8	16,700	**5**	4	2	8	4	6
I-285 (S)	I-75 South	I-85 South	4.0	16,400	**6**	4	4	8	8	4
I-285 (S)	I-85 South	I-85 South	1.3	12,100	**7**	6	8	8	8	4
I-285 (S)	I-85 South	I-20 West	10.5	17,000	**4**	4	2	6	4	4
I-575	Sixes Road	SR 20	7.5	10,900	**6**	6	8	8	4	6
I-575	SR 20	SR 5 Bus/JE Brown	2.1	5,800	**8**	8	8	8	8	6
SR 141	I-285	SR 140	3.6	21,700	**4**	2	2	4	4	6
I-75 South	Aviation Blvd	SR 54	6.4	20,800	**2**	2	2	2	4	2
I-75 South	SR 54	Eagles Landing Pkwy	8.2	14,400	**4**	4	2	6	4	6
I-75 South	Eagles Landing Pkwy	SR 155	7.8	18,800	**4**	2	2	6	4	6
I-75 South	SR 155	Bill Gardner Parkway	4.6	15,600	**5**	4	2	6	8	6
I-75 South	Bill Gardner Parkway	SR 16	6.6	14,700	**5**	4	2	6	8	6
I-75 North	Wade Green Road	SR 92/Alabama Road	4.7	17,300	**4**	4	2	4	4	6
I-75 North	SR 92/Alabama Road	Old Allatoona Road	6.6	17,100	**5**	4	2	6	8	6
I-75 North	Old Allatoona Road	SR 20/Canton Highway	6.7	11,400	**7**	6	8	6	8	6
I-85 North	SR 316	Hamilton Mill Road	13.8	15,400	**4**	4	4	2	4	6
I-85 North	Hamilton Mill Road	SR 211	6.3	11,000	**6**	6	8	4	8	6
I-85 South	I-75/I-85	S. of Riverdale Road	6.3	19,750	**2**	2	2	2	4	2
I-85 South	S. of Riverdale Road	S. of I-285	4.2	16,200	**3**	4	2	4	4	2
I-85 South	S. of I-285	SR 74	6.4	13,700	**6**	4	8	6	4	6
I-85 South	SR 74	SR 154	10.0	12,100	**6**	6	8	6	4	8
I-85 South	SR 154	US 29/SR 14	10.2	8,600	**7**	8	8	8	4	8
I-675	I-75	I-285	10.0	12,100	**7**	6	6	8	8	6
SR 316	I-85	SR 20	7.5	13,800	**4**	4	6	2	4	4
SR 316	SR 20	Drowning Creek Road	7.5	13,700	**6**	4	6	6	8	4
SR 316	Drowning Creek Road	SR 11	8.5	8,500	**8**	8	8	6	8	8
SR 316	SR 11	US 78	12.6	6,300	**8**	8	8	6	8	8
SR 400	I-85	Lenox Road/BH Loop	2.4	19,600	**4**	2	2	6	8	4
SR 400	Lenox Road/BH Loop	I-285	4.3	18,200	**4**	4	2	4	8	4
SR 400	I-285	Holcomb Bridge Rd	8.1	24,900	**3**	2	2	4	4	4
SR 400	Holcomb Bridge Rd	McFarland Road	8.9	22,500	**4**	2	2	6	4	4
SR 400	McFarland Road	SR 141/Bethelview Rd	4.2	15,300	**4**	4	2	4	4	6
SR 400	SR 141/Bethelview Rd	Bald Ridge Marina Rd	4.7	14,000	**4**	4	2	6	4	6
SR 400	Bald Ridge Marina Rd	Keith Bridge Road	3.6	10,400	**6**	6	8	8	4	6
SR 154	I-75/I-85	I-285	5.8	13,500	**5**	4	6	8	4	2
I-985	I-85	SR 20/Buford Drive	3.6	14,200	**4**	4	2	4	4	6
I-985	SR 20/Buford Drive	SR 347/Friendship Rd	4.4	11,400	**7**	6	8	6	8	6
I-985	SR 347/Friendship Rd	Mundy Mill Road	7.7	10,200	**7**	8	8	6	8	6
I-985	Mundy Mill Road	SR 369/JJ Parkway	8.2	7,800	**7**	8	8	6	8	6
US 78	I-285	East Park Place	8.9	15,500	**5**	4	4	8	4	4
US 78	East Park Place	SR 84	7.5	10,500	**6**	6	6	8	4	4

Figure 3.1 - HOV Planning Ratings

3.3 Methodology to Determine Constructability Criteria Ratings

Constructability ratings used for Phase II were the same as those used in Phase I. Engineering/design staff from the project team utilized the information gathered from bridge surveys, field surveys, aerial photography, knowledge of planned/programmed projects, and general knowledge of the project corridors to determine constructability criteria ratings for each project corridor. The criteria ratings for constructability were based upon a scale from 1 to 10, with one being the easiest to construct and 10 being the most difficult to construct. Four constructability factors were assigned ratings by consensus from the senior engineers and designers in an open forum setting. Representatives from GDOT and the FHWA participated in this assessment.

The four factors are as follows:

Available Right-of-Way (R/W) - Factor associated with the amount of land needed to construct HOV facility.

Typical Section - Factor associated with construction cost and overall difficulty of constructing the HOV facility.

Bridge Replacements - Factor associated with the number of bridges to be replaced, the construction costs, difficulty in maintaining traffic, and impacts to approach roadways.

Environmental - Factor associated with potential environmental impacts (e.g. 4(f) properties, large wetlands, environmental justice issues), and project development time.

Table 3.8 - Summary of Constructability Criteria

	1 (Best)	10 (Worst)	Affects
Available Right-of-Way (R/W)	Abundant R/W	No R/W Available	Required R/W, Ability to Build Desirable Typical Section, Retaining Walls Required, Project Development Time
Typical Section	Relatively low cost per mile	Relatively high cost per mile	Construction Cost
	Flat, Little Grade Change Across X-Section	Very Rough, 2:1 or Greater Slopes from Road	Earthwork, Retaining Wall Heights, Side Barrier or Guardrail Required
	Excessive Clear Zone, Few Barriers	Little Clear Zone, Mostly Barriers	Quantity of Side Barrier, Guardrail, or Retaining Walls
	Very Rural, Little Traffic Congestion	Very Urban, Heavy Traffic Congestion	Difficulty of Maintenance of Traffic, Noise Walls Required, Neighborhood Concerns
	Long Interchange Spacing, Few Cross-Roads	Short Interchange Spacing, Many Cross-Roads	Number of Bridges, Difficulty of Maintenance of Traffic
Bridge Replacements	Replace No Bridges	Replace Several Bridges	Bridge Costs, Construction Time, Maintenance of Traffic, Required R/W on Cross Street
Environmental	No Environmentally Sensitive Areas	Extensive Environmentally Sensitive Areas	Potential Environmental Impacts, Project Development Time

The rating criteria for bridge replacements was based upon horizontal bridge clearance data gathered during the field surveys (see Appendix C). Specifically, an analysis was performed comparing the existing horizontal bridge clearance data to the required minimum and desirable horizontal clearances for the selected HOV facility type for each project. The design team then identified those bridges to be replaced as part of each HOV project. Some existing bridges that would provide less than desirable horizontal clearance were identified to remain. Bridges were not proposed for reconstruction in cases where design exceptions were acceptable. Once the number of bridge replacements was determined, a rating for each corridor was established. Note that the bridge replacement rating does not represent the actual number required, but rather a qualitative priority rating value between 1 and 10 that corresponds to the number of bridges to be reconstructed, as compared to the other corridors.

Table 3.9 shows the constructability ratings and factors for each of the HOV projects, along with their estimated construction cost. Figure 3.2 graphically illustrates the constructability ratings for each of the HOV projects.

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Table 3.9 - Constructability Ratings

Description			Length (Miles)	Study Cost Estimate $ Million	Constructability Rating	Constructability Factors			
Corridor	From	To				Available R/W	Typical Section	Bridge Replacements	Environmental
I-20 East	Columbia Drive	Evans Mill Drive	8.0	$ 140.9	**5**	4	4	7	4
I-20 East	Evans Mill Drive	SR 162/Salem Road	9.6	$ 145.0	**4**	7	4	3	2
I-20 East	SR 162/Salem Road	SR 12/Clark Street (Exit 90)	6.2	$ 108.7	**4**	7	4	3	2
I-20 East	SR 12/Clark Street (Exit 90)	SR 142	3.8	$ 48.2	**4**	7	4	3	2
I-20 West	I-75/85	SR 280/Holmes Rd	5.1	$ 343.4	**8**	8	9	7	8
I-20 West	SR 280/Holmes Rd	SR 6/Thornton Road	8.1	$ 117.3	**3**	3	3	3	2
I-20 West	SR 6/Thornton Road	SR 5/Bill Arp Road	9.9	$ 136.1	**2**	2	2	2	2
I-20 West	SR 5/Bill Arp Road	Liberty Road	8.1	$ 90.5	**2**	2	2	2	2
I-20 West	Liberty Road	SR 113	7.4	$ 82.8	**2**	2	2	1	2
I-20 West	SR 113	SR 1/US 27	7.7	$ 85.1	**2**	2	2	1	2
I-20 West	SR 1/US 27	SR 100	6.4	$ 65.4	**2**	2	2	1	2
I-285 (N)	I-75 North	I-85 North	13.1	$1,078.5	**7**	8	8	8	4
I-285 (N)	I-20 East	I-85 North	13.0	$ 764.9	**7**	7	8	9	4
I-285 (N)	I-20 West	I-75 North	9.6	$ 418.7	**6**	7	7	7	4
I-285 (S)	I-20 East	I-675	6.1	$ 287.9	**5**	5	6	7	4
I-285 (S)	I-675	I-75 South	5.8	$ 102.9	**5**	6	6	7	2
I-285 (S)	I-75 South	I-85 South	4.0	$ 114.0	**6**	8	8	5	4
I-285 (S)	I-85 South	I-85 South	1.3	$ 15.0	**6**	8	8	3	4
I-285 (S)	I-85 South	I-20 West	10.5	$ 406.9	**6**	5	6	8	4
I-575	Sixes Road	SR 20	7.5	$ 115.4	**2**	2	3	1	2
I-575	SR 20	SR 5 Bus/JE Brown	2.1	$ 29.0	**3**	3	5	1	4
SR 141	I-285	SR 140	3.6	$ 56.3	**6**	8	8	3	4
I-75 South	Aviation Blvd	SR 54	6.4	$ 103.4	**5**	6	6	6	2
I-75 South	SR 54	Eagles Landing Pkwy	8.2	$ 167.8	**3**	3	4	2	2
I-75 South	Eagles Landing Pkwy	SR 155	7.8	$ 119.3	**3**	3	4	2	2
I-75 South	SR 155	Bill Gardner Parkway	4.6	$ 50.8	**3**	4	4	2	2
I-75 South	Bill Gardner Parkway	SR 16	6.6	$ 78.8	**3**	4	4	2	2
I-75 North	Wade Green Road	SR 92/Alabama Road	4.7	$ 62.0	**3**	3	4	1	4
I-75 North	SR 92/Alabama Road	Old Allatoona Road	6.6	$ 88.9	**3**	3	4	1	4
I-75 North	Old Allatoona Road	SR 20/Canton Highway	6.7	$ 81.3	**3**	3	4	1	4
I-85 North	SR 316	Hamilton Mill Road	13.8	$ 235.8	**3**	2	4	2	2
I-85 North	Hamilton Mill Road	SR 211	6.3	$ 65.8	**2**	2	4	2	2
I-85 South	I-75/I-85	S. of Riverdale Road	6.3	$ 176.8	**7**	8	7	8	6
I-85 South	S. of Riverdale Road	S. of I-285	4.2	$ 89.4	**7**	8	7	8	6
I-85 South	S. of I-285	SR 74	6.4	$ 61.2	**3**	3	4	3	2
I-85 South	SR 74	SR 154	10.0	$ 104.7	**3**	3	4	3	2
I-85 South	SR 154	US 29/SR 14	10.2	$ 111.8	**3**	3	4	2	2
I-675	I-75	I-285	10.0	$ 116.7	**2**	2	3	1	2
SR 316	I-85	SR 20	7.5	$ 159.1	**3**	3	3	2	3
SR 316	SR 20	Drowning Creek Road	7.5	$ 42.6	**3**	5	3	1	3
SR 316	Drowning Creek Road	SR 11	8.5	$ 47.7	**3**	4	4	1	2
SR 316	SR 11	US 78	12.6	$ 67.2	**3**	4	4	1	2
SR 400	I-85	Lenox Road/BH Loop	2.4	$ 112.0	**6**	8	8	2	4
SR 400	Lenox Road/BH Loop	I-285	4.3	$ 139.0	**5**	6	5	2	6
SR 400	I-285	Holcomb Bridge Rd	8.1	$ 148.7	**4**	5	4	5	4
SR 400	Holcomb Bridge Rd	McFarland Road	8.9	$ 135.5	**3**	3	3	2	2
SR 400	McFarland Road	SR 141/Bethelview Rd	4.2	$ 57.4	**3**	4	4	1	2
SR 400	SR 141/Bethelview Rd	Bald Ridge Marina Rd	4.7	$ 46.8	**3**	4	4	1	2
SR 400	Bald Ridge Marina Rd	Keith Bridge Road	3.6	$ 40.0	**3**	4	4	1	2
SR 154	I-75/I-85	I-285	5.8	$ 425.3	**8**	8	8	8	8
I-985	I-85	SR 20/Buford Drive	3.6	$ 51.5	**3**	3	4	2	2
I-985	SR 20/Buford Drive	SR 347/Friendship Rd	4.4	$ 44.3	**2**	2	4	2	2
I-985	SR 347/Friendship Rd	Mundy Mill Road	7.7	$ 106.0	**3**	2	4	2	2
I-985	Mundy Mill Road	SR 369/JJ Parkway	8.2	$ 89.5	**3**	3	4	2	2
US 78	I-285	East Park Place	8.9	$ 137.7	**4**	3	4	5	5
US 78	East Park Place	SR 84	7.5	$ 54.3	**5**	9	2	1	6

Figure 3.2 - HOV Constructability Ratings

3.4 Methodology for Developing Preliminary Cost Estimates

Cost estimates for the recommended typical section of each project were developed and are included in Table 3.9. A rational procedure for producing realistic cost estimates was developed for this study, and this procedure was coded into Microsoft Excel spreadsheets represented by the summary sheets found in Appendix D. Individual spreadsheets were produced for each of the study projects. The spreadsheet format facilitates "what if" analyses by modifying the input data and included provisions for side by side comparisons of different typical section types. Due to the relatively detailed data, the resulting cost estimates are believed to be significantly more accurate than typical planning/programming-level cost estimates, although not as accurate as conceptual cost estimates.

The cost estimates for each of the projects were developed by establishing a “Typical Section Cost”, then adding costs for bridge replacements required and for planned HOV interchanges, including system-to-system interchanges. The “Typical Section Cost” portion of the estimate allows inputs for project length, mainline bridge lengths, and existing and proposed typical section items such as: number of lanes by type, lane widths, shoulder widths, median widths, and clear zone widths. Ratings for clear zone and terrain were input for each project and are used by the spreadsheet to estimate guardrail lengths, side barrier lengths and retaining wall lengths and heights. These inputs allowed for detailed estimates for pavement, drainage, walls, barriers, mainline bridge widening, erosion control, signing & marking, ATMS, noise walls, and other items normally associated with the roadway typical section. All typical section unit costs were based on detailed estimate unit costs from projects recently constructed by the Department.

Right of Way costs along the typical section were typically not included as it was assumed that the facility could be built in the existing right of way by constructing retaining walls Estimated right of way costs were included for any bridge replacements and HOV interchanges.

Each existing bridge over the mainline was evaluated by comparing existing clear opening widths with typical section requirements for the HOV project. A decision was made to retain or replace the existing bridge. This is noted for each bridge on the project cost estimate summary sheets included in Appendix D along with a notation if a design exception is required for those bridges to remain. For those bridges without desirable clearance, the width the bridge is lacking for desirable clearance is included. Should future considerations change the decision to retain or replace a bridge; the cost can be easily added or subtracted as needed as replacement costs were typically included for all bridges. Replacement costs were not included for some bridges where it was anticipated that the bridge would be reconstructed under a separate RTP project prior to construction of the HOV facility. The replacement costs were based on estimated bridge dimensions and square foot costs, typical section costs for an appropriate length of the cross street, and estimated right of way costs.

A cost estimate for each anticipated HOV access or interchange is included on the summary sheets. These are listed individually for ease of updating the cost estimate as the project concept is adjusted. These cost estimates were developed in the same manner as the bridge replacement cost estimates with the addition of costs for the ramps.

Cost estimates were prepared for all potential system-to-system interchange movements. These were based on rough layouts for each movement to estimate length of ramps and bridges, and prepared in a manner similar to the bridge replacements. Each recommended system-to-system movement is itemized in the summary sheet. Summaries of all system-to-system movement cost estimates are included in Appendix D. Some of these include costs for reconstruction of freeway sections with existing HOV lanes to allow for the introduction of the system-to-system ramps into the median.

3.5 Methodology for Determining Total Project Ratings

Total project ratings were based on team consensus review of the planning and constructability elements. A collective decision-making process assessed each project for the following:

1. Planning factor rating
2. Constructability factor rating
3. Impending improvements funded in the Atlanta RTP
4. How the corridor fits into a "system of improvements."

The rating process has been redefined through the course of the study; both the 90-day and six-month priority rankings were a comparison of constructability and planning factors. These earlier prioritization lists favored constructability with special consideration towards projects in the 2025 RTP, and reflected the desire for early implementation of segments of the HOV system As the study progressed, it was determined that greater weight should be given to the planning factors for the final rating. This final rating indicated that each project was ranked not only on its individual criteria, but on its relationship to the entire HOV system and the progression of the transportation network as a whole. The final rating applied the planning rating twice and constructability rating once to determine the final average for each project (2 X planning rating + constructability rating/3 = total rating).

Once a final rating was assigned to all projects, projects were prioritized and grouped by tier, with each project from a tier having the same priority. Projects would be selected by tier, but in the event of budgetary constraints, a smaller, more affordable project could be chosen from another tier.

This tier system allows for more flexibility when GDOT begins to fund projects. Flexibility is needed in order to match projects to the amount of available funding.

The recommended tiers range from 1-7. Based on a similar level of funding for HOV projects in the 2025 RTP, tiers 1-4 are recommended for inclusion in the 2030 RTP. Tier 5 would be evaluated on a project-by-project basis for inclusion in the 2030 RTP. Tiers 6 and 7 should be part of the plan's text so that the public is aware of them at this early planning stage. As the RTP is updated, these projects may be evaluated for inclusion. An appropriate level of funding for HOV facilities must be determined for the 2030 RTP to ultimately determine project inclusion into the 2030 RTP update. Detailed information on funding scenarios and sources may be found in section 7.0.

HOV Strategic Implementation Plan for the Atlanta Region
Table 3.10 - Total Ratings

Description			Length (Miles)	Study Cost Estimate $ Million	Ratings			Other RTP Improvement
Corridor	From	To			Total	Planning Rating	Constructability Rating	
I-20 East	Columbia Drive	Evans Mill Drive	8.0	$ 140.9	**3.0**	**2**	**5**	2010-Widen 6 to 8
I-20 East	Evans Mill Drive	SR 162/Salem Road	9.6	$ 145.0	**4.7**	**5**	**4**	
I-20 East	SR 162/Salem Road	SR 12/Clark Street (Exit 90)	6.2	$ 108.7	**5.3**	**6**	**4**	
I-20 East	SR 12/Clark Street (Exit 90)	SR 142	3.8	$ 48.2	**6.0**	**7**	**4**	
I-20 West	I-75/85	SR 280/Holmes Rd	5.1	$ 343.4	**4.7**	**3**	**8**	
I-20 West	SR 280/Holmes Rd	SR 6/Thornton Road	8.1	$ 117.3	**3.0**	**3**	**3**	2007-C-D System & Basic
I-20 West	SR 6/Thornton Road	SR 5/Bill Arp Road	9.9	$ 136.1	**3.3**	**4**	**2**	
I-20 West	SR 5/Bill Arp Road	Liberty Road	8.1	$ 90.5	**4.7**	**6**	**2**	
I-20 West	Liberty Road	SR 113	7.4	$ 82.8	**4.7**	**6**	**2**	
I-20 West	SR 113	SR 1/US 27	7.7	$ 85.1	**6.0**	**8**	**2**	
I-20 West	SR 1/US 27	SR 100	6.4	$ 65.4	**6.0**	**8**	**2**	
I-285 (N)	I-75 North	I-85 North	13.1	$ 1,078.5	**3.7**	**2**	**7**	2010-Intrchng Reconstr(4)
I-285 (N)	I-20 East	I-85 North	13.0	$ 764.9	**4.3**	**3**	**7**	2006-Intrchng Reconstr(1)
I-285 (N)	I-20 West	I-75 North	9.6	$ 418.7	**4.0**	**3**	**6**	2006-Intrchng Reconstr(6)
I-285 (S)	I-20 East	I-675	6.1	$ 287.9	**5.0**	**5**	**5**	
I-285 (S)	I-675	I-75 South	5.8	$ 102.9	**5.0**	**5**	**5**	
I-285 (S)	I-75 South	I-85 South	4.0	$ 114.0	**6.0**	**6**	**6**	
I-285 (S)	I-85 South	I-85 South	1.3	$ 15.0	**6.7**	**7**	**6**	
I-285 (S)	I-85 South	I-20 West	10.5	$ 406.9	**4.7**	**4**	**6**	
I-575	Sixes Road	SR 20	7.5	$ 115.4	**4.7**	**6**	**2**	
I-575	SR 20	SR 5 Bus/JE Brown	2.1	$ 29.0	**6.3**	**8**	**3**	
SR 141	I-285	SR 140	3.6	$ 56.3	**4.7**	**4**	**6**	
I-75 South	Aviation Blvd	SR 54	6.4	$ 103.4	**3.0**	**2**	**5**	2005-Widen, Int Reconstr(2)
I-75 South	SR 54	Eagles Landing Pkwy	8.2	$ 167.8	**3.7**	**4**	**3**	2003-Intrchng Reconstr(2)
I-75 South	Eagles Landing Pkwy	SR 155	7.8	$ 119.3	**3.7**	**4**	**3**	2005-Intrchng Reconstr(2)
I-75 South	SR 155	Bill Gardner Parkway	4.6	$ 50.8	**4.3**	**5**	**3**	
I-75 South	Bill Gardner Parkway	SR 16	6.6	$ 78.8	**4.3**	**5**	**3**	
I-75 North	Wade Green Road	SR 92/Alabama Road	4.7	$ 62.0	**3.7**	**4**	**3**	
I-75 North	SR 92/Alabama Road	Old Allatoona Road	6.6	$ 88.9	**4.3**	**5**	**3**	
I-75 North	Old Allatoona Road	SR 20/Canton Highway	6.7	$ 81.3	**5.7**	**7**	**3**	
I-85 North	SR 316	Hamilton Mill Road	13.8	$ 235.8	**3.7**	**4**	**3**	2005-Widen, Int Reconstr(1)
I-85 North	Hamilton Mill Road	SR 211	6.3	$ 65.8	**4.7**	**6**	**2**	
I-85 South	I-75/I-85	S. of Riverdale Road	6.3	$ 176.8	**3.7**	**2**	**7**	
I-85 South	S. of Riverdale Road	S. of I-285	4.2	$ 61.2	**4.3**	**3**	**7**	
I-85 South	S. of I-285	SR 74	6.4	$ 130.9	**5.0**	**6**	**3**	
I-85 South	SR 74	SR 154	10.0	$ 104.7	**5.0**	**6**	**3**	
I-85 South	SR 154	US 29/SR 14	10.2	$ 111.8	**5.7**	**7**	**3**	
I-675	I-75	I-285	10.0	$ 116.7	**5.3**	**7**	**2**	
SR 316	I-85	SR 20	7.5	$ 159.1	**3.7**	**4**	**3**	
SR 316	SR 20	Drowning Creek Road	7.5	$ 42.6	**5.0**	**6**	**3**	2015-Lmtd Access Upgrade
SR 316	Drowning Creek Road	SR 11	8.5	$ 47.7	**6.3**	**8**	**3**	
SR 316	SR 11	US 78	12.6	$ 67.2	**6.3**	**8**	**3**	
SR 400	I-85	Lenox Road/BH Loop	2.4	$ 112.0	**4.7**	**4**	**6**	
SR 400	Lenox Road/BH Loop	I-285	4.3	$ 139.0	**4.3**	**4**	**5**	
SR 400	I-285	Holcomb Bridge Rd	8.1	$ 148.7	**3.3**	**3**	**4**	2008-C-D, Interchg Recon(1)
SR 400	Holcomb Bridge Rd	McFarland Road	8.9	$ 135.5	**3.7**	**4**	**3**	2015-Widen 4-6
SR 400	McFarland Road	SR 141/Bethelview Rd	4.2	$ 57.4	**3.7**	**4**	**3**	
SR 400	SR 141/Bethelview Rd	Bald Ridge Marina Rd	4.7	$ 46.8	**3.7**	**4**	**3**	
SR 400	Bald Ridge Marina Rd	Keith Bridge Road	3.6	$ 40.0	**5.0**	**6**	**3**	
SR 154	I-75/I-85	I-285	5.8	$ 425.3	**6.0**	**5**	**8**	
I-985	I-85	SR 20/Buford Drive	3.6	$ 51.5	**3.7**	**4**	**3**	
I-985	SR 20/Buford Drive	SR 347/Friendship Rd	4.4	$ 44.3	**5.3**	**7**	**2**	
I-985	SR 347/Friendship Rd	Mundy Mill Road	7.7	$ 106.0	**5.7**	**7**	**3**	
I-985	Mundy Mill Road	SR 369/JJ Parkway	8.2	$ 89.5	**5.7**	**7**	**3**	
US 78	I-285	East Park Place	8.9	$ 137.7	**4.7**	**5**	**4**	
US 78	East Park Place	SR 84	7.5	$ 54.3	**5.7**	**6**	**5.0**	2025-Lmtd Access Upgrade

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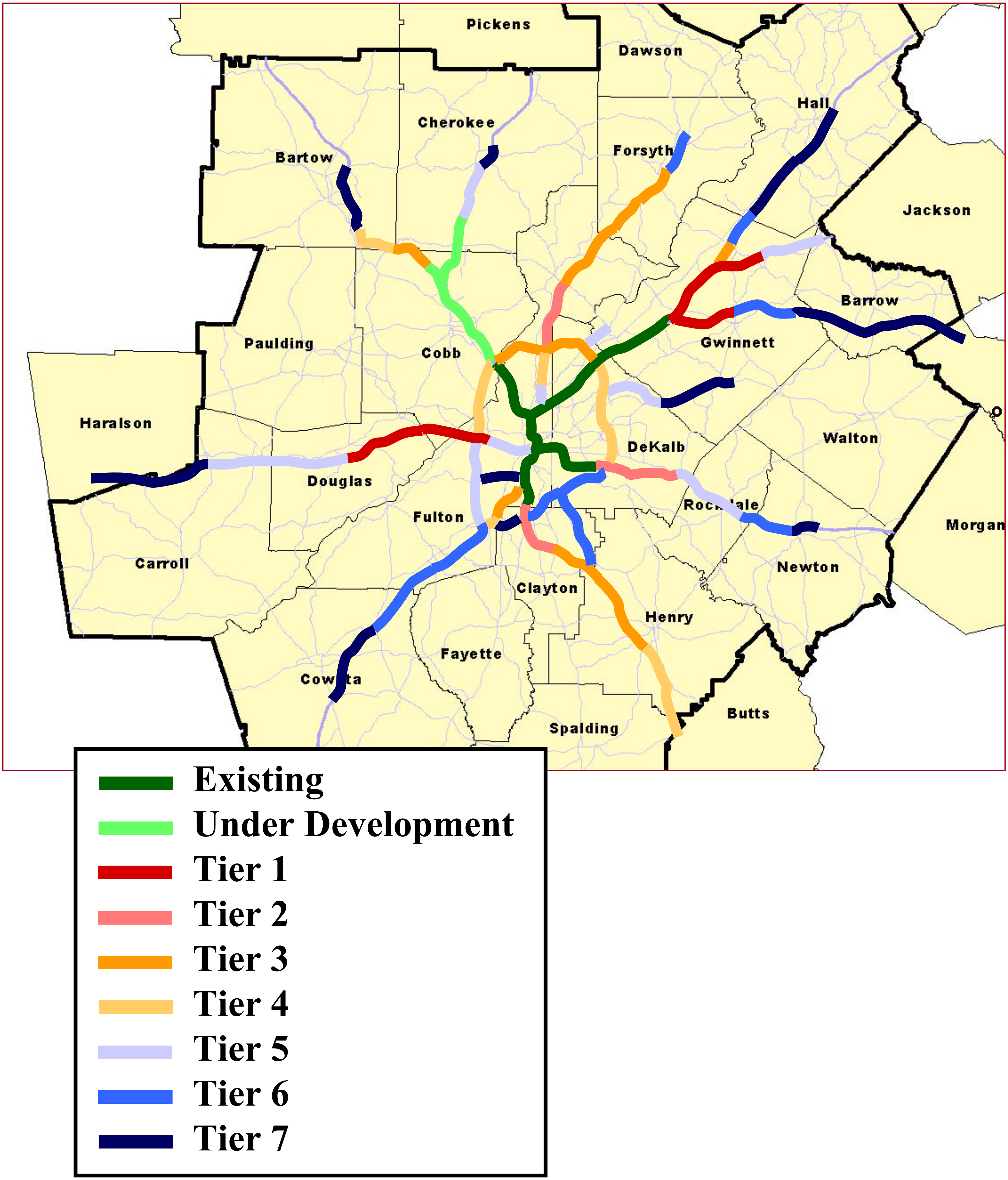
Table 3.11 - Project Prioritization Tiers

Tier	Description				Length (Miles)	Study Cost Estimate $ Million	AADT per Lane YR 2000	Ratings		
	Corridor	From	To	County				Total	Planning Rating	Construct-ability Rating
Tier 1	**I-85 North**	SR 316	Hamilton Mill Road	Gwinnett	13.8	$ 235.8	15,400	**3.7**	**4**	**3**
	SR 316	I-85	SR 20	Gwinnett	7.5	$ 159.1	13,800	**3.7**	**4**	**3**
	I-20 West	SR 280/Holmes Rd	SR 6/Thornton Road	Fulton/Cobb	8.1	$ 117.3	23,700	**3.0**	**3**	**3**
	I-20 West	SR 6/Thornton Road	SR 5/Bill Arp Road	Douglas	9.9	$ 136.1	17,100	**3.3**	**4**	**2**
Tier 2	**I-20 East**	Columbia Drive	Evans Mill Drive	DeKalb	8.0	$ 140.0	22,700	**3.0**	**2**	**5**
	I-75 South	Aviation Blvd	SR 54	Clayton	6.4	$ 103.4	20,800	**3.0**	**2**	**5**
	SR 400	I-285	Holcomb Bridge Rd	Fulton	8.1	$ 148.7	24,900	**3.3**	**3**	**4**
Tier 3	**I-285 (N)**	I-75 North	I-85 North	Cobb/Fulton/DeKalb	13.1	$ 1,078.5	24,500	**3.7**	**2**	**7**
	SR 400	Holcomb Bridge Rd	McFarland Road	Fulton/Forsyth	8.9	$ 135.5	22,500	**3.7**	**4**	**3**
	I-85 South	I-75/I-85	S. of Riverdale Road	Fulton	6.3	$ 176.8	19,750	**3.7**	**2**	**7**
	I-75 South	Eagles Landing Pkwy	SR 155	Henry	7.8	$ 119.3	18,800	**3.7**	**4**	**3**
	I-75 North	Wade Green Road	SR 92/Alabama Road	Cobb	4.7	$ 62.0	17,300	**3.7**	**4**	**3**
	SR 400	McFarland Road	SR 141/Bethelview Rd	Forsyth	4.2	$ 57.4	15,300	**3.7**	**4**	**3**
	I-75 South	SR 54	Eagles Landing Pkwy	Clayton/Henry	8.2	$ 167.8	14,400	**3.7**	**4**	**3**
	I-985	I-85	SR 20/Buford Drive	Gwinnett	3.6	$ 51.5	14,200	**3.7**	**4**	**3**
	SR 400	SR 141/Bethelview Rd	Bald Ridge Marina Rd	Forsyth	4.7	$ 46.8	14,000	**3.7**	**4**	**3**
Tier 4	**I-285 (N)**	I-20 West	I-75 North	Fulton/Cobb	9.6	$ 418.7	18,400	**4.0**	**3**	**6**
	I-285 (N)	I-20 East	I-85 North	DeKalb	13.0	$ 764.9	22,700	**4.3**	**3**	**7**
	SR 400	Lenox Road/BH Loop	I-285	Fulton	4.3	$ 139.0	18,200	**4.3**	**4**	**5**
	I-75 North	SR 92/Alabama Road	Old Allatoona Road	Bartow	6.6	$ 88.9	17,100	**4.3**	**5**	**3**
	I-85 South	S. of Riverdale Road	S. of I-285	Fulton	4.2	$ 61.2	16,200	**4.3**	**3**	**7**
	I-75 South	SR 155	Bill Gardner Parkway	Henry	4.6	$ 50.8	15,600	**4.3**	**5**	**3**
	I-75 South	Bill Gardner Parkway	SR 16	Henry/Spalding	6.6	$ 78.8	14,700	**4.3**	**5**	**3**
Tier 5	**SR 141**	I-285	SR 140	DeKalb/Gwinnett	3.6	$ 56.3	21,700	**4.7**	**4**	**6**
	I-20 West	I-75/85	SR 280/Holmes Rd	Fulton	5.1	$ 343.4	21,100	**4.7**	**3**	**8**
	SR 400	I-85	Lenox Road/BH Loop	Fulton	2.4	$ 112.0	19,600	**4.7**	**4**	**6**
	I-20 West	SR 5/Bill Arp Road	Liberty Road	Douglas	8.1	$ 90.5	17,000	**4.7**	**6**	**2**
	I-285 (S)	I-85 South	I-20 West	Clayton/Fulton	10.5	$ 406.9	17,000	**4.7**	**4**	**6**
	US 78	I-285	East Park Place	DeKalb	8.9	$ 137.7	15,500	**4.7**	**5**	**4**
	I-20 East	Evans Mill Drive	SR 162/Salem Road	DeKalb/Rockdale	9.6	$ 145.0	15,400	**4.7**	**5**	**4**
	I-20 West	Liberty Road	SR 113	Douglas/Carroll	7.4	$ 82.8	14,200	**4.7**	**6**	**2**
	I-85 North	Hamilton Mill Road	SR 211	Gwinnett/Barrow	6.3	$ 65.8	11,000	**4.7**	**6**	**2**
	I-575	Sixes Road	SR 20	Cherokee	7.5	$ 115.4	10,900	**4.7**	**6**	**2**
Tier 6	**I-285 (S)**	I-675	I-75 South	DeKalb/Fulton/Clayton	5.8	$ 102.9	16,700	**5.0**	**5**	**5**
	I-285 (S)	I-20 East	I-675	DeKalb	6.1	$ 287.9	16,500	**5.0**	**5**	**5**
	I-85 South	S. of I-285	SR 74	Fulton	6.4	$ 130.9	13,700	**5.0**	**6**	**3**
	SR 316	SR 20	Drowning Creek Road	Gwinnett	7.5	$ 42.6	13,700	**5.0**	**6**	**3**
	I-85 South	SR 74	SR 154	Fulton/Coweta	10.0	$ 104.7	12,100	**5.0**	**6**	**3**
	SR 400	Bald Ridge Marina Rd	Keith Bridge Road	Forsyth	3.6	$ 40.0	10,400	**5.0**	**6**	**3**
	I-675	I-75	I-285	Henry/DeKalb	10.0	$ 116.7	12,100	**5.3**	**7**	**2**
	I-985	SR 20/Buford Drive	SR 347/Friendship Rd	Gwinnett/Hall	4.4	$ 44.3	11,400	**5.3**	**7**	**2**
	I-20 East	SR 162/Salem Road	SR 12/Clark Street (Exit 90)	Rockdale/Newton	6.2	$ 108.7	10,700	**5.3**	**6**	**4**
Tier 7	**I-75 North**	Old Allatoona Road	SR 20/Canton Highway	Bartow	6.7	$ 81.3	11,400	**5.7**	**7**	**3**
	US 78	East Park Place	SR 84	Gwinnett	7.5	$ 54.3	10,500	**5.7**	**6**	**5**
	I-985	SR 347/Friendship Rd	Mundy Mill Road	Hall	7.7	$ 106.0	10,200	**5.7**	**7**	**3**
	I-85 South	SR 154	US 29/SR 14	Coweta	10.2	$ 111.8	8,600	**5.7**	**7**	**3**
	I-985	Mundy Mill Road	SR 369/JJ Parkway	Hall	8.2	$ 89.5	7,800	**5.7**	**7**	**3**
	I-285 (S)	I-75 South	I-85 South	Clayton	4.0	$ 114.0	16,400	**6.0**	**6**	**6**
	SR 154	I-75/I-85	I-285	Fulton	5.8	$ 425.3	13,500	**6.0**	**5**	**8**
	I-20 West	SR 113	SR 1/US 27	Carroll	7.7	$ 85.1	10,900	**6.0**	**8**	**2**
	I-20 West	SR 1/US 27	SR 100	Carroll/Haralson	6.4	$ 65.4	9,600	**6.0**	**8**	**2**
	I-20 East	SR 12/Clark Street (Exit 90)	SR 142	Newton	3.8	$ 48.2	7,200	**6.0**	**7**	**4**
	SR 316	Drowning Creek Road	SR 11	Gwinnett	8.5	$ 47.7	8,500	**6.3**	**8**	**3**
	SR 316	SR 11	US 78	Gwinnett/Barrow	12.6	$ 67.2	6,300	**6.3**	**8**	**3**
	I-575	SR 20	SR 5 Bus/JE Brown	Cherokee	2.1	$ 29.0	5,800	**6.3**	**8**	**3**
	I-285 (S)	I-85 South	I-85 South	Clayton	1.3	$ 15.0	12,100	**6.7**	**7**	**6**

Figure 3.3 - HOV Prioritization Tiers



4.0 Access

4.1 HOV Access Planning Evaluation

The success of Atlanta's expanding HOV system will depend, to some degree, on identifying the most appropriate access locations to enhance the transportation system as a whole. Access to the existing concurrent HOV lanes on Atlanta interstates is restricted because, with few direct access interchanges, HOV's are required to weave through the general-purpose lanes. The guidance provided in this study recommends that a barrier-separated HOV lane facility is the preferred option. Barrier-separated HOV lanes allow for more controlled access while providing a safer and efficient HOV system with fewer potential violators and weaving conflicts.

4.1.1 HOV Access Design Types

Overall, there are three basic designs of access to a HOV lane:

- Direct access between the arterial, local roadway network to the HOV system.
- Access between the general-purpose freeway lanes and the HOV system
- High-speed, continuous flow access between HOV facilities

Figures of access type typical sections may be found in Appendix E.

Figure 4.1 - I-75 at Northside Drive, Atlanta, GA

Direct access includes, drop ramps, half-drop ramps, T-ramps and direct ramps. Drop ramps provide exclusive HOV access to and from the local roadway network. Drop ramps are usually located in the center of the highway from the HOV lane to the roadway overpass. Full drop ramps provide access to and from the HOV system to all directions (either to and from the north and south or to and from the west and east). Half-drop ramps are similar to full drop ramps, but half ramps only have access to and from one direction. T-ramps provide exclusive HOV access to and from transit transfer stations and/or park and ride facilities from the HOV system. A T-ramp could also provide access to a local roadway network. T-ramps differ from drop ramps in that they only provide access to one side of the freeway. This access is called a T-ramp because it resembles a "T" intersection. Direct ramps provide exclusive HOV access to and from the local roadway network. Unlike drop ramps or T-ramps, direct ramps provide a seamless access to and from the HOV network from the local roadway. Direct access is required on barrier separated HOV facilities where as on concurrent facilities it is an option.

Figure 4.2 - I-75, Atlanta, GA

There are two basic types of access between HOV lanes and general-purpose lanes at grade: direct merge access and slip ramps. At direct merge access points, there is an opening in the HOV barriers (or skipped striping in a concurrent system) to allow motorists to enter and exit the HOV system. At direct merge access locations, both ingress (entering) and egress (exiting) are permitted. Other types of direct access include slip ramps and terminal slip ramps. Slip ramps are similar to direct merge access in that they provide an at-grade opportunity to enter or exit the HOV system from the general-purpose lanes. The primary difference between direct merge and slip ramp access is that slip ramps provide either ingress or egress. Separate slip ramps to enter the HOV lane from the general-purpose lanes and to exit the HOV lane are required. Terminal slip ramps allow at-grade access either into or out of the HOV system at the beginning or end of the HOV system to or from the general-purpose lanes.

System-to-system connections occur when two or more HOV system corridors meet. A system-to-system interchange allows a motorist on a HOV facility in one corridor to move seamlessly to an HOV facility in another corridor.

4.1.2 Selecting Access Locations

Through the planning and engineering review, locations for HOV access connections were identified from the local roadway network, between the general-purpose and HOV lanes and system-to-system. A detailed description of the planning evaluation process used for the RTP projects evaluated in Phase I is included in Appendix E of this document. The following section briefly reviews the evaluation process.

In evaluating locations for direct access (new connections with the local roadway system) and at-grade access (between general-purpose and HOV lanes), a rating system was derived from the following general criteria:

- Location in advance of severe traffic congestion
- Proximity to candidate HOV and/or Park and Ride system users
- Access location conditions: site availability, ease of implementation, and site development costs
- Good site accessibility and visibility (ingress and egress out of the proposed location for motorists as well as transit vehicles)
- Type and magnitude (existing and future) of the activity center(s) served
- Impacts on local community and adjacent properties
- Proximity to express bus services
- Facility spacing
- Desirability for the use of HOV and Park & Ride facilities based on work trip length
- Activity Center parking conditions

The Phase II methodology applied to extensions to the HOV system was similar to the evaluation performed in the earlier phase. However, the rating criteria were modified to reflect project requirements. During Phase I, the project's emphasis was on near-term implementation of HOV facilities, with a particular focus on constructability issues. For the final phase, the focus was on long-term implementation of a regional system plan.

The general evaluation criteria listed above were distilled into more precise rating criteria. In the earlier phase, rating categories were used to evaluate access locations. As a result, two of the original evaluation criteria were omitted, and three criteria were modified for the final phase. The two criteria omitted were, "Anticipated congestion level along access road," used to evaluate access locations and "Impact on adjacent land uses and community" used to evaluate park and ride lot potential at direct access locations. These changes were made to the rating system because data resources for these criteria are limited outside of the ARC 10-county area.

A numerical scale associated with each rating criteria was created to illustrate the relative strengths and weaknesses of each potential location. The scale ranged from two (2) to eight (8), with two intermediate points. Two represented the lowest (least desirable) score. Eight represented the highest (most desirable) score.

2	**4**	**6**	**8**
Least Desirable			Most Desirable

4.1.3 HOV Phase II Access Criteria

- Functional Classification (Good Regional or Sub-regional Access for Commuters)

2	4	6	8
Local Street	Collector Road	Minor Arterial Road	Major Arterial Road

- Potential for Park and Ride Associated with Access Location (Flexibility for Ancillary Transit Staging and SOV Parking)

2	4	6	8
None	Possible	Adequate	Definite

- Proximity to Town Centers or Activity Centers (Potential or Proposed) (Modified from proximity to major Activity Center in the initial phase)

2	4	6	8
No Direct Access	Indirect Access	Direct Access within Reasonable Proximity	Direct Access to Adjacent Centers

- Spacing that allows access for capture of potential HOV users. (Modified from appropriate spacing from adjacent SOV and HOV interchanges)

2	4	6	8
None	Low	Medium	High

- Future Land Use Compatibility (HOV Origins or Destinations) (Modified from adjacent to nearby land use impacts/sensitivity of access road penetration)

2	4	6	8
None	Low	Medium	High

- Potential for HOV Utilization

2	4	6	8
Low downstream congestion and close to Activity Center	Minimal downstream congestion and distance to Activity Center	Moderate downstream congestion and distance to Activity Center	High downstream congestion and greatest distance to Activity Center

4.1.4 Review Process

Following the planning analysis, the proposed access locations underwent a multi-faceted review process to determine if the access locations met the additional criteria from an engineering “constructability” standpoint, as well as local and state transportation and land use needs. As part of the engineering review, direct access locations were refined by physical constraints, operational issues, environmental concerns or cost factors.

Internal and external review workshops were conducted to examine and rate each potential HOV access and park and ride facility. Included in the internal review process were Georgia Department of Transportation (GDOT), Atlanta Regional Commission (ARC) and Georgia Regional Transportation Authority (GRTA) staff members. Coordination meetings with the GRTA Regional Transit Action Plan (RTAP) team to discuss HOV access and transit integration. Special consideration was given to how Express Buses could utilize and function within a HOV facility.

Additional access review occurred with local transportation and transit agency staff. Through workshops, the HOV team met with staff from MARTA, Cobb Community Transit (CCT) and Cobb County Transportation Department, Gwinnett Transit and Gwinnett County Transportation Department, C-Tran and Clayton County Transportation Department, and Douglas County Vanpool and Douglas County Transportation Department. Again, the emphasis was on the coordination of transit needs with HOV implementation. (See summary of transit meetings in Appendix F)

The public also had the opportunity to review and make comments on the proposed access locations during the public meetings held during the month of October 2002. The proposed access locations presented at these public meetings are summarized in Table 4.1. This list of proposed access locations differs from the interim lists prepared in Phase I because the original list only included projects from the 2025 RTP HOV project list. The overall HOV implementation plan encompasses 21 counties, so that in the final plan, terminal slip ramps, for example, were extended from the termini of the 2025 RTP defined project to the termini of the study area. By extending the study area, some access locations were modified to reflect the long-term implementation approach assumed for Phase II. The evaluation matrix may be found in Appendix E.

Table 4.1 – Proposed HOV Access Locations

LOCATION	ACCESS TYPE	Park & Ride	COMMENTS	ARC RTP#
I-20 West (from West to East)				
SR 61	Direct Merge Access			
Liberty Rd	Direct Merge Access		Access east of Liberty Rd at Tyson	AR 330D
Bright Star Rd	Full Drop Ramp	Proposed	Access west of Bill Arp Rd/SR 5	AR 330D
Prestley Mill Rd	Full Drop Ramp	Proposed	Douglas Cty developing Multimodal at Chapel Hill	AR 330C
Mt. Vernon Rd	Direct Merge Access			AR 330C
Factory Shoals Rd	Full Drop Ramp	Proposed	Catchment for Paulding Cty/Thornton Rd; Closer to Thornton Rd is preferable	AR 330B
Btwn Six Flags Rd/Fulton	Direct Merge Access		Access to Fulton Ind/I-285; Consider Wishbone to new C-D roads	AR 330B
I-285 and I-20 W	System-to-System			AR 336C
I-20 and I-285	Direct Merge Access		Access for MARTA Holmes Station	AR 330B
Spring St	Half Drop Ramp to West		Connection to downtown multi-modal a priority	AR 330A
I-20 East (from West to East)				
Martin Street	Half Drop Ramp to East		Access to CBD from East; Express Bus facilitation; Near Capitol Ave	
I-285 and I-20 E	System-to-System		East/West mainline constraints	AR 354A
Wesley Chapel	Direct Merge Access		Access to/from Wesley Chapel	AR 354A
Miller Rd	Full Drop Ramp	Proposed	Access to Panola Road	AR 354A
Klondike Rd	Full Drop Ramp	Proposed	Access to Evans Mill Road	AR 354B
Plunkett Rd/Iris Rd	Full Drop Ramp	Proposed	New connection; Access to P&R at Sigman	AR 354B
Btwn West Ave/Sigman Rd	Direct Merge Access		Access to/from SR 20	AR 354B
Salem Rd	Direct Merge Access		Access west near Harvest Grove Lane	AR 354B
Almon Rd	Direct Merge Access		Access west of Almon	
I-75 South (from South to North)				
SR 16	Terminal Slip Ramp		Entry/endpoint of system	
Bill Gardner	Direct Merge Access			
SR 20 Connector	Full Drop Ramp	Proposed	Propose new connection ½ mile south of SR 20; Express Bus access from McDonough	
Eagles Landing Connector	Full Drop Ramp	Planned	New connection north of Eagles Landing; P&R at Eagles Landing	AR 353C
I-75 S and I-675	System-to-System			AR 353B
Fielder Rd	Full Drop Ramp	Proposed	Express Bus from Stockbridge SR 138	AR 353B
Lynwood Dr	Direct Merge Access		Access from Jonesboro SR 54	AR 353A
Bob White Trail	Full Drop Ramp	Proposed		AR 353A
Penney	Direct Merge Access		Access to I-285	AR 353A
I-285 and I-75 S	System-to-System			
Aviation Blvd	Full Drop Ramp		Existing HOV ramp	AR 353A
I-85 S and I-75/I-85 Conn	System-to-System			AR 332A
I-75/85 and SR 154/166	System-to-System		Also look at connection to MARTA	
I-75 North (from South to North)				
14th St (South)	Half Drop Ramp			
15 th St (North)	Half Drop Ramp			
Mt. Paran Connector	T Ramp	Proposed		
I-285 and I-75 N	System-to-System			AR 336C
Hickory Grove Rd	Full Drop Ramp	Proposed	Contingent on access of the I-75/I-575 HOV study	
Old Alatoona	Direct Merge Access			

Table 4.1 – con't.

LOCATION	ACCESS TYPE	Park & Ride	COMMENTS	ARC RTP#
East Main St/SR 113	Terminal Slip Ramp			
I-85 South (from South to North)				
McCollum Sharpsburg/SR 154	Direct Merge Access			
Spence Rd	Direct Merge Access		Near Senoia Road	AR 332B
Jonesboro Rd Connector	Full Drop Ramp	Proposed	New Connection approx. 1/2 mile north of Jonesboro Road	AR 332B
Flat Shoals Connector	Full Drop Ramp	Proposed	New connection approx. 1/2 north of Flat Shoals Road	AR 332B
Buffington Rd	Direct Merge Access		Alternative to drop ramp at Flat Shoals	AR 332B
I-85 S and I-285	Direct Merge Access			AR 332A
Loop Rd	T Ramp		Access to Airport via Loop Road and Camp Creek Pkwy	AR 332A
Willingham Dr	Direct Merge Access			AR 332A
I-85 North (from South to North)				
SR 400 and I-85	System-to-System			
I-285 and I-85 N	System-to-System			AR 336A
Indian Trail Connector	T Ramp	Proposed		
Old Norcross	Full Drop Ramp		Connection to Gwinnett Transit transfer center	AR 355
I-85 N and SR 316	System-to-System			AR 355
Sugarloaf Pkwy Connector	Full Drop Ramp	Proposed	New connection; Gwinnett Transit transfer center	AR 355
Burnette Rd	Full Drop Ramp		Access to Lawrenceville-Suwanee Road	AR 355
I-85 N and I-985	System-to-System			AR 355
State Route 20	Direct Merge Access		SW of 20	AR 355
State Route 324	Full Drop Ramp	Proposed		AR 355
Btwn SR 211 & SR 324	Direct Merge Access		Consider merge access at such time when new access occurs	
SR 211	Terminal Slip Ramp		Entry/endpoint of system	
I-575 (from South to North)				
Old Rope Mill Rd	Direct Merge Access		Connect to planned HOV on 575	AR 318B
Ash St/ Old Canton Rd	Full Drop Ramp	Proposed	New connection	AR 318C
Hickory Flat Rd	Direct Merge Access			AR 318C
Marietta Rd	Direct Ramp		Direct ramp from SR 5 to I-575	AR 318C
SR 20 North interchange	Terminal Slip Ramp		Entry/endpoint of system	
S. R. 400 (from South to North)				
I-285 and SR 400	System-to-System			AR 336A
Hammond Dr	Direct Merge Access			AR 331-a
Mt. Vernon Rd	Full Drop Ramp			AR 331-a
Pitts Rd	Direct Merge Access		Access to I-285; N. Springs Station	AR 331-a
Dogwood/Old Alabama	Full Drop Ramp		New connection	AR 331-a
Holcomb Bridge Rd	Direct Merge Access			AR 331-b
Maxwell Rd	Full Drop Ramp		Possible relocation of P&R lot from Mansell to Maxwell	AR 331-b
Kimball Bridge Rd	Full Drop Ramp	Proposed	Relocate planned P&R from State Bridge to Kimball	AR 331-b
Windward/Morris/Westside	Full Drop Ramp	Proposed	New connection Morris/Westside; Possible MARTA rail; P&R at Windward	AR 331-b
McFarland Rd	Direct Merge Access			AR 331-b
SR 141 Connector	Full Drop Ramp	Proposed	1/2 mile south of SR 141	
Pilgrim Mill Rd	Direct Merge Access		South of Pilgrim Mill	

Table 4.1 –con't.

LOCATION	ACCESS TYPE	Park & Ride	COMMENTS	ARC RTP#
I-985 (from South to North)				
Suddeth Rd	Full Drop Ramp	Existing	Near SR 20	
Mulberry St	Full Drop Ramp	Proposed	Near Spout Springs	
Atlanta Hwy	Full Drop Ramp	Existing	1/2 mile north of SR 53/Mundy Mill Road	
SR 60	Direct Merge Access		1 mile south of SR 60	
S.R. 316 (from West to East)				
Herrington Rd	Full Drop Ramp	Proposed	316 Study 1/2 East	AR 356-a
Sugarloaf Pkwy	Direct Merge Access		Access I-85 N	AR 356-a
Walther Blvd	Full Drop Ramp	Proposed	316 Study 1/2 East	AR 356-b
High Hope Rd	Full Drop Ramp		316 Study: HOV West/SOV East	AR 356-b
Hurricane Trail	Direct Merge Access		Access from SR 8	AR 356-b
Drowning Creek Rd	Direct merge access		316 Study: HOV West/SOV East	AR 356-b
SR 324/SR 11/SR 53/SR 81	Access Type Undetermined		Coordinate with Winder bypass	
US 78	Terminal Slip Ramp		Entry/endpoint of system	
U.S. 78 (from West to East)				
Brockett Rd	Direct Merge Access		NE or Brockett	GW 124D3-a
Idlewood Rd	Full Drop Ramp	Proposed	Consider Direct Merge Access; explore social impacts	GW 124D3-a
Juliette Road	Direct Merge Access			GW 124D3-a
Jefferson Davis Dr	Terminal Slip Ramp		Entry/endpoint west of W. Park Place	GW 124D3-a
SR 141 (from South to North)				
I-285 and SR 141	System-to-System		Consider system-to-system opportunity with start at Peachtree Corners	
Jimmy Carter Blvd	Terminal Slip Ramp		Potential entry to system	
I-285 (Clockwise)				
Redwine Rd	Full Drop Ramp	Proposed		
I-285 and SR 154/166	System-to-System			
Benjamin E. Mays Dr	Full Drop Ramp	Proposed		
Bolton Rd	Direct Merge Access		Located South of Bolton Rd.	AR 336C
Orchard Rd	Full Drop Ramp		Alternative E/W Connector	AR 336C
Mt. Wilkinson Pkwy	Half Drop Ramp to South			
Cumberland Blvd	Half Drop Ramp to North		Access to CCT Transfer Station; Cumberland/Galleria	AR 336A
Mt. Vernon Rd	Direct Merge Access			AR 336A
Perimeter Ctr Pkwy	Full Drop Ramp		New connection	AR 336A
Shallowford Rd	Full Drop Ramp	Proposed		AR 336A
Henderson Rd	Direct Merge Access			AR 336B
Midvale	Direct Merge Access		Northbound	AR 336B
I-285 and US 78	System-to-System			AR 336B
N. Decatur Rd	Direct Merge Access			AR 336B
Durham Park Rd	Half Drop Ramp to North			AR 336B
Redan Rd	Half Drop Ramp to South			AR 336B
Glenwood Rd	Direct Merge Access			AR 336B
Panthersville Rd	Full Drop Ramp	Proposed		
I-285 and I-675	System-to-System			
Conley Rd	Full Drop Ramp	Proposed		

4.2 System-to-System Interchange Recommendations

The ARC 2025 RTP Travel Demand Model was used to determine projected daily HOV traffic volumes on all potential system-to-system interchange connections. Following coding of the HOV System Alternative and execution of the travel demand model, the forecast daily HOV volumes were reviewed on an individual basis for each of the system-to-system interchanges. Upon review of all the complimentary-movement pairs of volumes from the model (e.g. westbound-to-northbound movement and southbound-to-eastbound movement) and the typical commute patterns of the region, recommendations were made as to which connections should be constructed. A volume threshold of 3,000 AADT was set as the criteria to determine the need for a system-to-system interchange. The analysis follows the guideline to construct system-to-system connections only where warranted by demand. These recommendations are illustrated in Figure 4.3. The cost estimates for most of the recommended connections are substantial, warranting a thorough cost-benefit analysis prior to implementation. A list of the system-to-system interchange recommendations is shown in Table 4.2. Cost estimates for the recommended movements are included in the project cost estimates presented in section 3.0 and detailed in Appendix D.

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Figure 4.3 - HOV System to System Interchange Recommendations

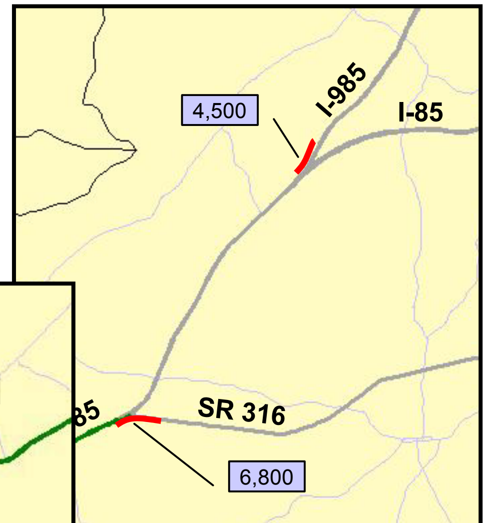
Legend

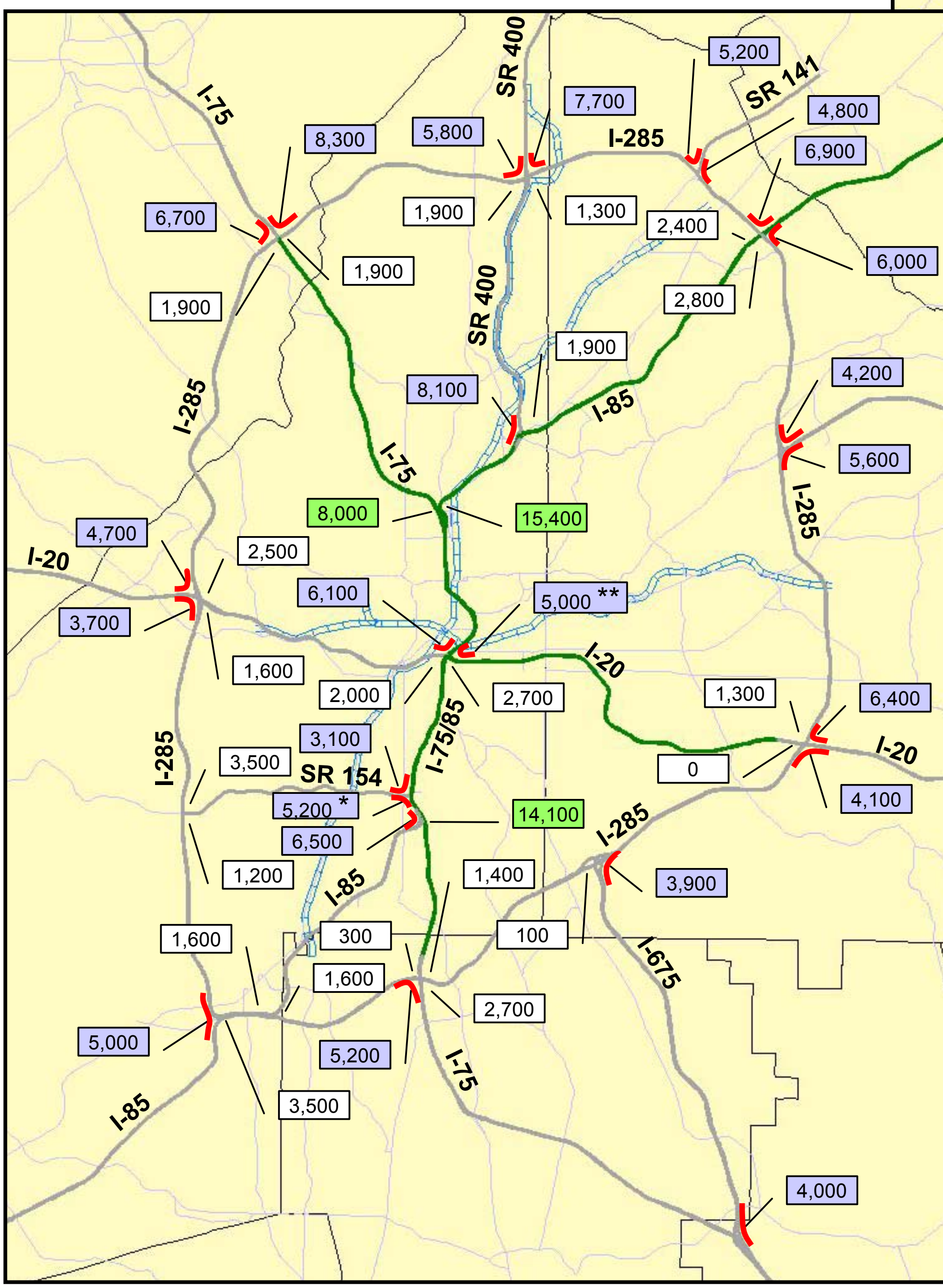
0,000 — Two-Way Ramp Recommended

0,000 — Two-Way Ramp Not Recommended

0,000 — Existing

AADT Volume (One-Way, Highest for Movement Pair)
(ND - Indicates Link Was Not Modeled)





* Further study required

**Recommendation on existing facility

HOV Strategic Implementation Plan for the Atlanta Region

Table 4.2 System-to-Sytem Interchange Recommendations

HOV System to System Interchange Recommendations (a)			
System to System Location / Movement	**HOV Model 2025 AADT Volume**	**Include Cost Estimate w/Project**	**Note**
I-285 at I-75 North			
I-285 Westbound (Out) to I-75 Northbound	**7,900**	**I-285 (N), I-75N to I-85N**	
I-75 Southbound to I-285 Eastbound	**8,300**		
I-285 Westbound (Out) to I-75 Southbound	1,900	Not Recommended	
I-75 Northbound to I-285 Eastbound	1,500		
I-285 Eastbound (In) to I-75 Northbound	**6,700**	**I-285 (N), I-20W to I-75N**	(b)
I-75 Southbound to I-285 Westbound	**6,400**		
I-285 Eastbound (In) to I-75 Southbound	1,500	Not Recommended	
I-75 Northbound to I-285 Westbound	1,900		
I-285 at SR 400			
I-285 Westbound (Out) to SR 400 Northbound	**7,700**	**I-285 (N), I-75N to I-85N**	
SR 400 Southbound to I-285 Eastbound	**6,800**		
I-285 Westbound (Out) to SR 400 Southbound	1,300	Not Recommended	
SR 400 Northbound to I-285 Eastbound	1,200		
I-285 Eastbound (In) to SR 400 Northbound	**5,800**	**I-285 (N), I-75N to I-85N**	
SR 400 Southbound to I-285 Westbound	**5,500**		
I-285 Eastbound (In) to SR 400 Southbound	1,900	Not Recommended	
SR 400 Northbound to I-285 Westbound	1,300		
I-285 at SR 141/Peachtree Ind'l			
I-285 Westbound (Out) to SR 141 Northbound	**2,800**	**I-285 (N), I-75N to I-85N**	
SR 141 Southbound to I-285 Eastbound	**4,800**		
I-285 Eastbound (In) to SR 141 Northbound	**3,300**	**I-285 (N), I-75N to I-85N**	
SR 141 Southbound to I-285 Westbound	**5,200**		
I-285 at I-85 North			
I-285 Westbound (Out) to I-85 Northbound	**6,000**	**I-285 (N), I-20E to I-85N**	
I-85 Southbound to I-285 Eastbound	**5,600**		
I-285 Westbound (Out) to I-85 Southbound	2,300	Not Recommended	
I-85 Northbound to I-285 Eastbound	2,800		
I-285 Eastbound (In) to I-85 Northbound	**6,800**	**I-285 (N), I-75N to I-85N**	
I-85 Southbound to I-285 Westbound	**6,900**		
I-285 Eastbound (In) to I-85 Southbound	2,400	Not Recommended	
I-85 Northbound to I-285 Westbound	2,200		
I-285 at US 78			
I-285 Northbound (Out) to US 78 Eastbound	**4,100**	**I-285 (N), I-20E to I-85N**	
US 78 Westbound to I-285 Southbound	**5,600**		
I-285 Southbound (In) to US 78 Eastbound	**4,100**	**I-285 (N), I-20E to I-85N**	
US 78 Westbound to I-285 Northbound	**4,200**		
I-285 at I-20 East			
I-285 Northbound (Out) to I-20 Eastbound	**4,100**	**I-285 (S), I-20E to I-675**	
I-20 Westbound to I-285 Southbound	**4,100**		
I-285 Northbound (Out) to I-20 Westbound	0	Not Recommended	
I-20 Eastbound to I-285 Southbound	0		
I-285 Southbound (In) to I-20 Eastbound	**6,000**	**I-285 (N), I-20E to I-85N**	
I-20 Westbound to I-285 Northbound	**6,400**		
I-285 Southbound (In) to I-20 Westbound	1,300	Not Recommended	
I-20 Eastbound to I-285 Northbound	1,300		
I-285 at I-675			
I-285 Westbound (In) to I-675 Southbound	**3,900**	**I-285 (S), I-20E to I-675**	
I-675 Northbound to I-285 Eastbound	**3,900**		
I-285 Eastbound (Out) to I-675 Southbound	100	Not Recommended	
I-675 Northbound to I-285 Westbound	0		
I-285 at I-75 South			
I-285 Westbound (In) to I-75 Northbound	1,400	Not Recommended	
I-75 Southbound to I-285 Eastbound	900		
I-285 Westbound (In) to I-75 Southbound	2,700	Not Recommended	
I-75 Northbound to I-285 Eastbound	2,300		
I-285 Eastbound (Out) to I-75 Northbound	200	Not Recommended	
I-75 Southbound to I-285 Westbound	300		
I-285 Eastbound (Out) to I-75 Southbound	**5,200**	**I-285 (S), I-75S to I-85S**	
I-75 Northbound to I-285 Westbound	**5,100**		

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Table 4.2 System-to-Sytem Interchange Recommendations

HOV System to System Interchange Recommendations (a)			
System to System Location / Movement	**HOV Model 2025 AADT Volume**	**Include Cost Estimate w/Project**	**Note**
I-285 at I-85 South			
I-285 Southbound (Out) to I-85 Southbound	**5,000**	**I-285 (S), I-85S to I-20W**	
I-85 Northbound to I-285 Northbound	**4,900**		
I-285 SB/EB (Out) to I-85 Northbound	1,200	Not Recommended	
I-85 Southbound to I-285 WB/NB	1,600		
I-285 Westbound (In) to I-85 Southbound	3,300	Not Recommended	
I-85 Northbound to I-285 Eastbound	3,500		
I-285 Westbound (In) to I-85 Northbound	1,200	Not Recommended	
I-85 Southbound to I-285 Eastbound	1,600		
I-285 at SR 154/166			
I-285 Northbound (In) to SR 154/166 Eastbound	900	Not Recommended	
SR 166/154 Westbound to I-285 Southbound	1,200		
I-285 Southbound (Out) to SR 154/166 Eastbound	3,500	Not Recommended	
SR 166/154 Westbound to I-285 Northbound	3,300		
I-285 at I-20 West			
I-285 Northbound (In) to I-20 Eastbound	1,600	Not Recommended	
I-20 Westbound to I-285 Southbound	1,500		
I-285 Northbound (In) to I-20 Westbound	**3,700**	**I-285 (S), I-85S to I-20W**	
I-20 Eastbound to I-285 Southbound	**3,600**		
I-285 Southbound (Out) to I-20 Eastbound	2,500	Not Recommended	
I-20 Westbound to I-285 Northbound	1,900		
I-285 Southbound (Out) to I-20 Westbound	**4,700**	**I-285 (N), I-20W to I-75N**	
I-20 Eastbound to I-285 Northbound	**4,100**		
I-75/85 at I-75 & I-85 North Split			
I-75 Southbound to I-85/75 Southbound	**8,000**	**Existing**	
I-75/85 Northbound to I-75 Northbound	**6,800**		
I-85 Southbound to I-75/85 Southbound	**14,600**	**Existing**	
I-75/85 Northbound to I-85 Northbound	**15,400**		
I-75/85 at I-20			
I-75/85 Northbound to I-20 Eastbound	2,700	Not Recommended	
I-20 Westbound to I-75/85 Southbound	1,500		
I-75/85 Northbound to I-20 Westbound	2,000	Not Recommended	
I-20 Eastbound to I-75/85 Southbound	1,700		
I-75/85 Southbound to I-20 Eastbound	5,000	Not Recommended	
I-20 Westbound to I-75/85 Northbound	4,900		
I-75/85 Southbound to I-20 Westbound	5,700	Not Recommended	
I-20 Eastbound to I-75/85 Northbound	6,100		
I-75/85 at SR 166/154			
I-75/85 Southbound to SR 166/154 Westbound	2,600	Not Recommended	
SR 166/154 Eastbound to I-75/85 Northbound	3,100		
I-75/85 Northbound to SR 166/154 Westbound	**5,200**	**SR 154, I-75/85 to I-285**	
SR 166/154 Eastbound to I-75/85 Southbound	**5,200**		
I-75/85 at I-85 & I-75 South Split			
I-75/85 Southbound to I-85 Southbound	**5,500**	**I-85S, I-75/85 to Riverdale Rd.**	
I-85 Northbound to I-75/85 Northbound	**6,500**		
I-75/85 Southbound to I-75 Southbound	**14,100**	**Existing**	
I-75 Northbound to I-75/85 Northbound	**12,800**		
I-75 at I-675			
I-75 Northbound to I-675 Northbound	**3,900**	**I-75S, SR 54 to Eagles Landing**	
I-675 Southbound to I-75 Southbound	**4,000**		
I-85 at SR 400			
I-85 Northbound to SR 400 Northbound	**8,100**	**SR 400, I-85 to Lenox Road**	
SR 400 Southbound to I-85 Southbound	**6,600**		
I-85 Southbound to SR 400 Northbound	1,300	Not Recommended	
SR 400 Southbound to I-85 Northbound	1,900		
I-85 at SR 316			
I-85 Northbound to SR 316 Eastbound	**6,800**	**SR 316, I-85 to SR 20**	(d)
SR 316 Westbound to I-85 Southbound	**6,800**		
I-85 at I-985			
I-85 Northbound to I-985 Northbound	**4,300**	**I-85N, SR 316 to Hamilton Mill**	
I-985 Southbound to I-85 Southbound	**4,500**		

Notes:
(a) Recommended movements always includes the reverse movement
(b) Confirm with I-75/I-575 HOV Design Project
(d) Confirm with Design Projects to include in I-85N Project or SR 316 Project

5.0 Park and Ride

5.1 HOV Park and Ride Consideration

HOV systems not only benefit from formal transit operations but also from the integration of complementary facilities such as park and ride lots. As part of the HOV access evaluation, it was recommended that park and ride lots be considered in conjunction with HOV direct access. The following describes the consideration of park and ride lots within the HOV context.

The first step in reviewing park and ride lots for HOV was to conduct an inventory of the existing and proposed park and ride lots. There were four primary resources for the park and ride inventory. The Georgia Department of Transportation and MARTA operate existing park and ride lots. The Atlanta Regional Commission's 2025 Regional Transportation Plan (RTP) catalogues planned park and ride lots, and the GRTA RTAP study proposes the development of additional park and ride lots that are currently not in the RTP. The HOV guidelines recommend providing exclusive HOV access for transit and park and ride facilities and this plan gives preference to this type of access. However, some proposed HOV access points coincide with existing or planned park and ride lot locations, while others are at locations that occur near but not at the existing or planned park and ride lot locations.

The evaluation of park and ride lots occurred in conjunction with the HOV access evaluation. Locations with existing or planned park and ride did not need evaluation. In coordinating with RTAP plans, approximately 90% of proposed park and ride facilities match. The planning rating criteria were as follows:

5.1.1 HOV Phase II Park and Ride Rating Criteria

- Available Developable Property (Adequate Adjacent Property in Close Proximity to HOV Interchange)

2	**4**	**6**	**8**
None Available	Minimal	Adequate	More than Adequate

- Site Accessibility (For Transit Vehicles and Potential Park and Ride Users)

2	**4**	**6**	**8**
Poor (Difficult to find or to access)	Fair Accessibility (Adequate wayfinding and access)	Good Accessibility (Easy wayfinding and access)	Excellent Accessibility (Direct access to/from major thoroughfares)

- Proximity to Transit Services

2	4	6	8
Poor (Long distance to transit routes/services)	Fair (Transit Service within 1 mile)	Good (Transit Service within ½ mile)	Excellent (Transit Service within 1/4 mile)

The park and ride lot inventory that includes HOV proposed park and ride lot locations is included in Appendix G.

5.1.2 Park and Ride Lot Siting and Development Issues

Additional park and ride lot issues were identified during the development of the HOV Implementation. These issues are briefly discussed here.

Park and ride lots vary in terms of usage. For instance, casual park and ride lots offer the opportunity for independent carpool and vanpool formation. This is generally a low-impact activity. However, a highly structured multi-modal center with park and ride facilities, formal transit access and other amenities provide great utility and activity. The HOV study does not make any recommendations for specific types of park and ride facilities, though locations providing transit services should achieve greater utilization.

A more pressing concern is the coordination of park and ride lot development and implementation. It became apparent, particularly upon coordinating with the GRTA RTAP study team, that the needs and requirements for park and ride lots for the HOV System, express bus and transit programs differ. While the HOV implementation plan is long-range to 2025 and beyond, the RTAP express bus plan focuses on near-term implementation over the next three years. The result is that recommendations for HOV System park and ride lot locations do not meet the immediate needs of near-term express bus implementation.

One example is the RTAP recommendation for a park and ride at I-20 East near Panola Road. The HOV study has recommended access at Miller Road, just west of Panola Road, diverting high-occupant vehicle traffic from Panola Road to Miller Road via a direct access HOV interchange. If the HOV system was in place, the express bus system could use the Miller Road park and ride lot as a transfer station. However, it is likely that express bus routes and services will be in place in the Panola Road area prior to the HOV extension as is envisioned in the plan for implementation. In such circumstances, going to a park and ride lot situated at Miller Road would be out of the way. Thus the implementation of express bus services in the I-20 East corridor may influence the future selection and design of access locations and park and ride lots within that corridor.

The success of HOV depends on transit integration as well as complementary facilities to encourage use of HOV, such as park and ride lots. The reality is that additional coordination must take place amongst GDOT, GRTA, ARC, MARTA and other transit agencies, as well as the applicable local jurisdictions, to determine the logical sequencing of the park and ride lot development to optimize both transit and HOV utilization.

Again, the HOV recommendations for park and ride lots are at the planning stage. The recommended locations will require considerable investigation during the design stages of HOV implementation.

6.0 Improvements to Existing HOV System

The corridors which have existing HOV facilities, referred to during the study as “Green Corridors”, were studied for possible improvements. Like the Blue Corridors, these projects are not currently listed in the RTP. These corridors were segmented for study purposes are shown in Table 6.1:

Table 6.1 – Existing HOV Corridors

CORRIDOR	FROM	TO	COUNTY	LENGTH (miles)
I-20 East	Capitol Avenue	Columbia Drive	Fulton/DeKalb	9.3
I-75 North	Northside Drive	Akers Mill Road	Fulton/Cobb	6.7
I-75 South	I-85	Aviation Boulevard	Fulton	3.4
I-75/I-85 South	I-20	I-85	Fulton	4.1
I-75/I-85 North	I-20	Williams Street	Fulton	2.2
I-75/I-85 North	Williams Street	Northside Dr/Peachtree St	Fulton	2.9/2.3
I-85 North	Peachtree Street	SR 400	Fulton	2.2
I-85 North	SR 400	I-285	Fulton/DeKalb	8.1
I-85 North	I-285	Old Norcross Road	DeKalb/Gwinnett	9.6

The existing HOV corridors were evaluated for various alternative improvements, including: barrier separated typical section, improved concurrent typical sections, improved concurrent typical sections with enforcement shoulders, and additional direct access locations. However, general widening of these corridors would typically result in serious constructability problems, major impacts to adjacent infrastructure, and comparatively high right of way and construction costs. Major HOV projects involving widening the typical section are not warranted in the near future, with a few exceptions. Some construction projects should be considered that would provide improved direct access or add a second HOV lane where required. These projects are shown in Table 6.2:

Table 6.2 – Alternative Improvements on Existing Corridors

Corridor	Proposed Project Description	From	To	Study Cost Estimate $ Million
I-20 East	Direct HOV Access to Martin Street (Half Drop to East)	Capitol Ave.	Hill Street	$ 16.0
I-20 East	Direct HOV Access to Pryor Street/Central Avenue Ramps (This project can be combined with the Martin Street Access Project)	Pryor Street	Hill Street	$ 64.0
I-75/85 South	Provide Two HOV Lanes in each direction, Concurrent with 4' buffer with delineators, no new bridges or major retaining walls, widen roadway 14' where possible to maintain full outside shoulder, reconfigure ramps, 4.0 miles	I-20	I-85	$ 12.0
I-75/85 North	System Interchange between I-20 East and I-75/85 North	Ellis Street (I-75/85)	Cherokee Ave. (I-20)	$ 230.0
I-75/85 North	Provide Two HOV Lanes in each direction, Concurrent with 4' buffer with delineators, no new bridges or major retaining walls, widen roadway 14' where possible to maintain full outside shoulder, reconfigure ramps, 1.5 miles	Williams Street	17th St.	Under Consideration by 17th St. Study
I-75/85 North	Direct Access to 14th Street/15th Street (Split Drop Ramp)	10th Street	17th St.	Under Consideration by 17th St. Study
I-75N	Direct Access to Northside Drive Park & Ride (T-Ramp)	Chattahoochee River	Northside Parkway	$ 27.0
I-85 N	Direct Access to Indian Trail Park & Ride (T-Ramp)	Indian Trail Road	Beaver Ruin Road	$ 25.0

During maintenance resurfacing projects, consideration should be given to increasing the width of the HOV buffer to 4' and installing vertical delineator posts where it is practical to reduce the shoulder widths. Additionally, consideration should be given to the design and installation of HOV enforcement areas where feasible. Detailed information on enforcement areas are described in the Enforcement Report completed as part of the study.

7.0 Financial Plan

The financial plan recommends funding approaches for the strategic implementation of HOV facilities in the Atlanta region. The methodology used in developing this plan is:

- A review of the traditional approach to highway financing and an estimate of a shortfall in its ability to finance the HOV system
- A review of recent developments in transportation finance and the potential application of those approaches to leverage traditional financing of the HOV system
- A review of various user fee approaches used by other states and municipalities, including the site visits of HOV systems by the study team
- An assessment of potential non-traditional revenue sources which might be considered for funding the identified shortfall for the Atlanta regional HOV system

The information presented has been organized to focus on the development of recommended alternatives and the assumptions and data that support these conclusions. Attached to this report, as Appendix H is supplemental information on the HOV systems in other metropolitan areas that were reviewed.

7.1 Traditional Approach to Highway Financing

The traditional approach to financing transportation infrastructure projects is tax-exempt financing with federal participation through grant funding. The majority of construction funding would be from state motor fuel tax revenues and from tax-exempt bond funds financed from Federal Highway Administration (FHWA) grants. Approximately 99% of the nation's highway transportation infrastructure has been financed by this method. Under this approach the Georgia Department of Transportation (GDOT) could fund the HOV Strategic Implementation Plan for the Atlanta Region.

7.1.1 General Limitations of Traditional Financing

Historically, the grant funding for highway projects has been on the basis of a majority (80%) of the funds coming from federal transportation dollars, principally from the FHWA and the Federal Transit Administration (FTA). Local sources (states, counties, municipalities, and/or specially constituted authorities) were required to "match" the federal funds with the remaining 20%. The public agency usually bore all the risk associated with the costs and completion of the project. Complete public funding allows little opportunity for private investment and ownership, or for sharing of the risk. Nevertheless, the availability of ‘twenty cent dollars’ through a federal funding process which was large enough to meet many states’ needs made these considerations secondary.

In recent years, however, the demand for highway transportation has outstripped the federal resources available. Growing population, higher vehicle use per capita, and deferred maintenance of highway infrastructure have all contributed to a strong growth in demand for funding highway projects. This has been accompanied by a lack of willingness to approve new federal taxes, such as the motor fuels taxes that generate revenue for the Highway Trust Fund. Future levels of federal highway and transit funding may ultimately support no more than a 50% match for state and local funds. Transportation funding is likely to occur in an increasingly politicized arena that will see more competition for federal funds among states and metropolitan areas.

This reduction in federal funding places a greater share of the burden of funding transportation infrastructure needs on the local communities. In Georgia’s case, the 1995 *Statewide Transportation Plan* acknowledged, “transportation for the next two decades will require more funding than can presently be identified”. It was recognized[4] in Georgia’s 2001 draft *Statewide Transportation Plan* that the state’s estimated transportation revenues from federal sources, providing a match of almost 64%, would also not be sufficient to meet the planned $51.5 billion (year 2000 dollars) of expenditure for the current transportation program meeting the state’s minimum needs for the years 2001-2025. For a proposed $66 billion transportation package planned to address future needs, the 64%-match shortfall would be even more acute, as shown in Table 7.1.

[4] Cambridge Systematics, Inc., Draft Final Report, Georgia Statewide Transportation Plan, June 2001.

Table 7.1 - Summary of Estimated Transportation Revenues and Expenditures for Georgia, 2001-2025[5]

	"Meet Current Program"	"Meet Future Needs"
Total Expenditure (millions of year 2000 dollars)	$51,500	$66,000
Projected Federal Funds (traditional sources)	$22,770	$22,770
Balance to Provided by State and Local Funds	$28,230	$43,230
Projected State Revenues from Current Sources[6]	$13,007	$13,007
Shortfall with Traditional Sources	$15,723	$30,223
Fraction Funded from Traditional Sources	69.5%	54.2%

7.1.2 Limitations on HOV Strategic Implementation Plan, 2003-2025 (Tiers 1-4)

The smaller 'meet current program' package to 2025 contained $3.6 billion for implementation of regional HOV projects. Assuming that allocation of the funding from traditional federal and state sources is even-handed across all projects in either package, these sources are unlikely to exceed about $1.95 billion (under a 'meet future needs' allocation), or $2.5 billion (under a 'meet current program' allocation). Although the HOV plan was included in the 'meet current program' package, it will likely be subject to further consideration in the context of total future needs as the Atlanta Region's planning process continues. Therefore it appears prudent to assume that no more than $1.95 billion should be expected from traditional sources over the period 2003-2025. Assuming that these revenues occur in proportion to the 2001 draft *Statewide Transportation Plan* projections, the corresponding annual amounts would be as shown in Table 7.2.

[5] Data extracted from Cambridge Systematics' Draft Final Report, Georgia Statewide Transportation Plan.

[6] 3% sales tax on motor fuel, and 7.5-cent excise tax.

Table 7.2 - Estimated Traditional-Source (State and Federal) Funding for the HOV System Plan, 2003-2025

Year	Funding (Y2000$)	Year	Funding (Y2000$)	Year	Funding (Y2000$)
2003	$89,848,000	2011	$86,321,000	2019	$82,363,000
2004	$90,018,000	2012	$85,826,000	2020	$81,870,000
2005	$89,454,000	2013	$85,331,000	2021	$81,376,000
2006	$88,901,000	2014	$84,836,000	2022	$80,883,000
2007	$88,362,000	2015	$84,341,000	2023	$80,391,000
2008	$87,835,000	2016	$83,847,000	2024	$79,899,000
2009	$87,320,000	2017	$83,352,000	2025	$79,408,000
2010	$86,818,000	2018	$82,857000	Total	$1,951,459,000

If Tiers 1 through 4 of the recommended HOV Strategic Implementation Plan were built over the period 2003-2025, as shown in Table 7.3, the total estimated cost of $4.54 billion would average about $200 million per year, well in excess of the $80 to $90 million available annually. The projected shortfall is shown graphically in Figure 7.1. Over the 2003-2025 timeframe, the total funding shortfall is estimated to be almost $2.59 billion year 2000 dollars, or about 31 percent of the total cost of Tiers 1-4.

Figure 7.1 Estimated Traditional Funds vs. HOV Plan Expenditures 2003-2025

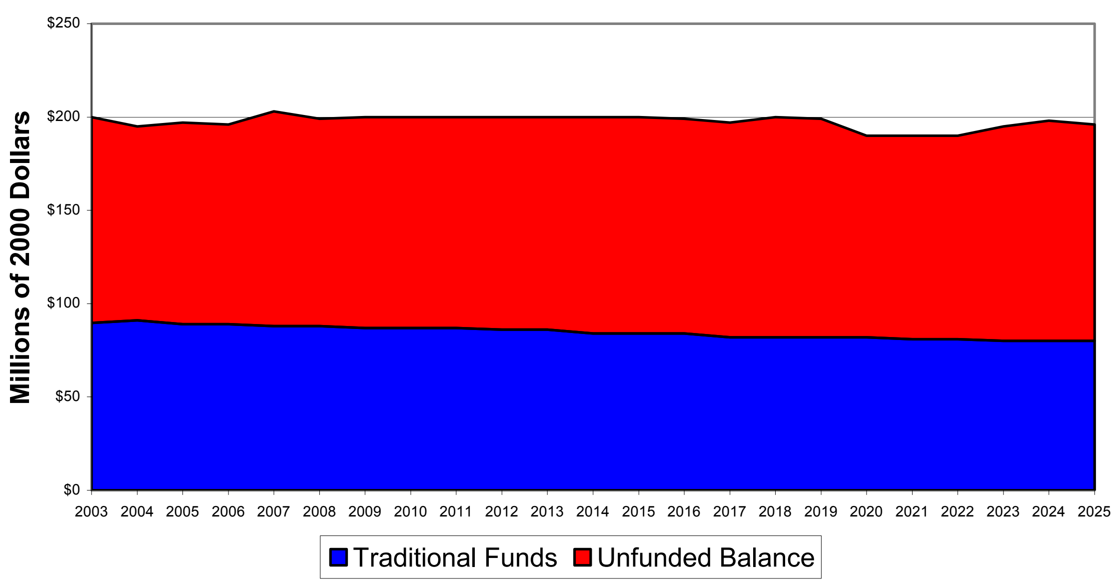


Table 7.3 - Funding Schedule for Tier 1-4 HOV System (Year 2000 Dollars) 2003-2025

	HOV System Tiers	Totals (Dollars - Thousands)	Funding Years
Tier 1	I-85 North	$236,000	(2003-2004)
	SR 316	$159,000	2004
	I-20 West - To SR 6	$117,000	2005
	I-20 West - To SR 5	$136,000	(2005-2006)
	Tier 1 Subtotal	**$648,000**	
Tier 2	I-20 East	$140,000	2006
	I-75 South	$103,000	2007
	SR 400 - to Holcomb Bridge	$149,000	(2007-2008)
	Tier 2 Subtotal	**$392,000**	
Tier 3	I-285 (N) - I-75 North to I-85 North	$1,078,000	(2008-2013)
	SR 400 - to McFarland	$136,000	(2013-2014)
	I-85 South	$177,000	(2014-2015)
	I-75 South	$119,000	(2014-2015)
	I-75 North	$62,000	(2015-2016)
	SR 400 - to SR 141	$57,000	2016
	I-75 South - to Eagles Landing	$168,000	(2016-2017)
	I-985 - to SR 20	$52,000	2017
	SR 400 - to Bald Ridge Marina Rd	$47,000	2017
	Tier 3 Subtotal	**$1,896,000**	
Tier 4	I-285 (N) - I-20 West to I-75 North	$419,000	(2017-2019)
	I-285 (N) - I-20 East to I-85 North	$765,000	(2019-2023)
	SR 400 - to I-285	$139,000	(2023-2024)
	I-75 North - to Allatoona Rd	$89,000	2024
	I-85 South - to south of I-285	$61,000	(2024-2025)
	I-75 South - to Bill Gardner Pky	$51,000	2025
	I-75 south - to SR 16	$79,000	2025
	Tier 4 Subtotal	**$1,603,000**	
	Total of Tier 1 – 4	**$4,539,000**	(2003-2025)
	Traditional Funds – Total	$1,951,459	(2003-2025)
	Unfunded Balance	**$2,587,541**	(2003-2025)

7.1.3 Extension of the HOV Program to Year 2030

For completion of Tiers 1-4 in the HOV Plan extending funding from 2025 to 2030 may be considered. Reallocation of the HOV program over an additional five years would reduce its requirements to an average of about $165 million per year within the plan period. Table 7.4 shows the re-scheduled expenditure amounts for this extension. If the same level of traditional funding[7] were continued from 2025

[7] i.e. if State revenues grew at a rate varying linearly as projected by Cambridge Systematics for 2020-2025, Federal funding grew at a rate equal to the smaller of the Cambridge Systematics rate for 2010-2025 or the State growth rate, and a constant 5.97% of traditional revenues were allocated to the HOV System.

through 2030, the estimated additional annual funding would be equal to $390 million as listed in Table 7.4 below, and shown in Figure 7.2.

Table 7.4 - Funding Schedule for Tier 1-4 HOV System (Year 2000 Dollars) 2003-2030

	HOV System Tiers	Totals (Dollars - Thousands)	Funding Years
Tier 1	I-85 North	$236,000	(2003-2004)
	SR 316	$159,000	(2004-2005)
	I-20 West - To SR 6	$117,000	(2005-2006)
	I-20 West - To SR 5	$136,000	2006
	Tier 1 Subtotal	**$648,000**	
Tier 2	I-20 East	$140,000	2007
	I-75 South	$103,000	(2007-2008)
	SR 400 - to Holcomb Bridge	$149,000	(2008-2009)
	Tier 2 Subtotal	**$392,000**	
Tier 3	I-285 (N) - I-75 North to I-85 North	$1,078,000	(2009-2016)
	SR 400 - to McFarland	$136,000	2016
	I-85 South	$177,000	2017
	I-75 South	$119,000	2018
	I-75 North	$62,000	(2018-2019)
	SR 400 - to SR 141	$57,000	2019
	I-75 South - to Eagles Landing	$168,000	(2019-2020)
	I-985 - to SR 20	$52,000	2020
	SR 400 - to Bald Ridge Marina Rd	$47,000	2021
	Tier 3 Subtotal	**$1,896,000**	
Tier 4	I-285 (N) - I-20 West to I-75 North	$419,000	(2021-2023)
	I-285 (N) - I-20 East to I-85 North	$765,000	(2023-2028)
	SR 400 - to I-285	$139,000	(2028-2029)
	I-75 North - to Allatoona Rd	$89,000	2029
	I-85 South - to south of I-285	$61,000	(2029-2030)
	I-75 South - to Bill Gardner Pky	$51,000	2030
	I-75 south - to SR 16	$79,000	2030
	Tier 4 Subtotal	**$1,603,000**	
	Total of Tier 1 – 4	**$4,539,000**	(2003-2030)
	Traditional Funds – Total	$1,951,459	(2003-2030)
	Unfunded Balance	**$2,587,541**	(2003-2030)

Figure 7.2 Estimated Annual Traditional Funds vs. HOV Plan Expenditures 2003-2030

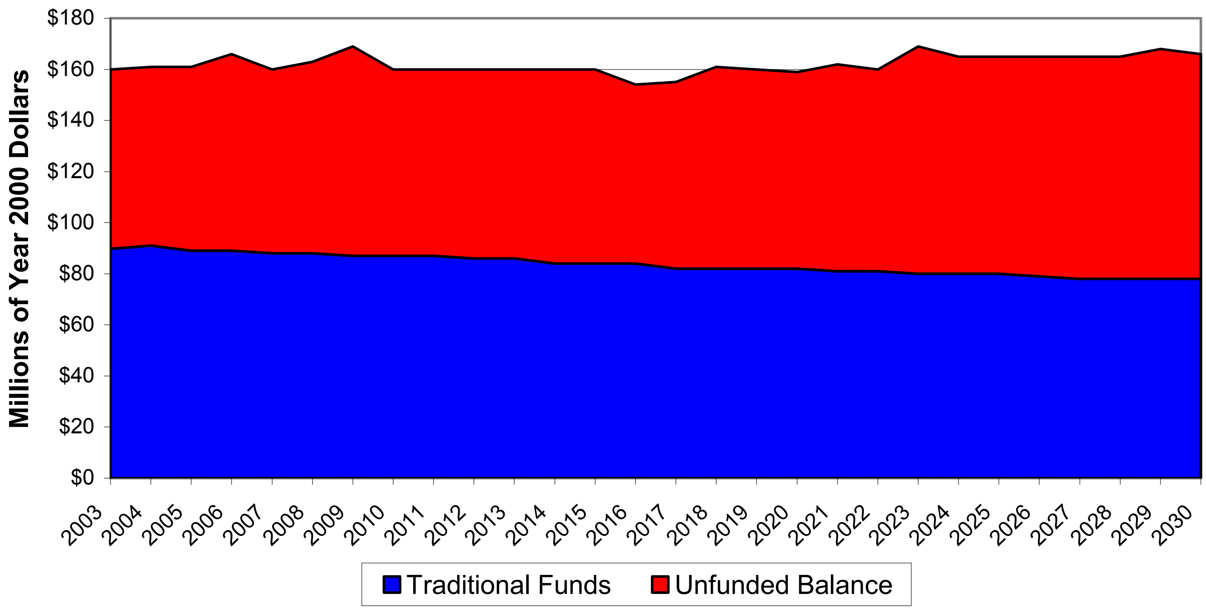
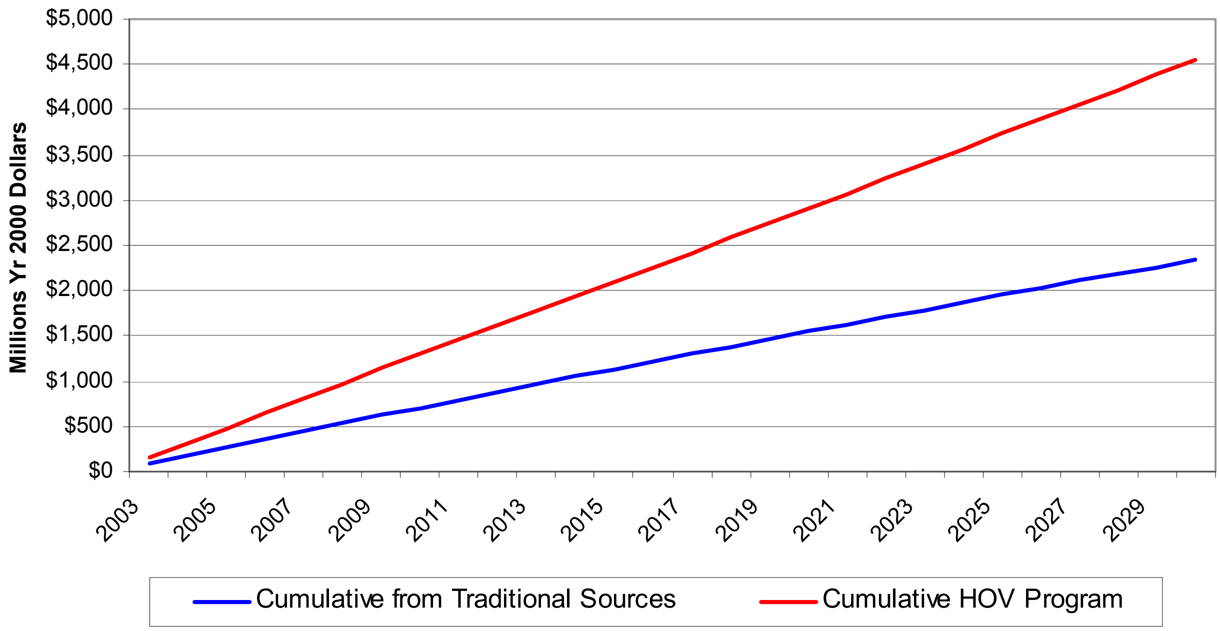


Table 7.5 - Annual HOV Funds from Extension of Revenues from 2025 to 2030 (Year 2000 Dollars)

Year	Funding (Y2000$)
Total Funding to 2025 (see Table 7.2)	$1,951,459,000
2026	$78,918,000
2027	$78,425,000
2028	$77,929,000
2029	$77,429,000
2030	$76,927,000
Total Funding to 2030	**$2,341,086,000**

Figure 7.3 Cumulative Expenditure vs. Revenues



Extending the HOV program to 2030 would allow planned expenditures for Tiers 1-4 to better match estimated traditional revenues during the period. This would leave a shortfall of $2.2 billion in year 2000 dollars to be made up by non-traditional sources between 2003 and 2030. The experience of other U.S. metropolitan areas points towards four broad strategies to make up such shortfalls:

- Rely on an increase in federal funding;
- Leverage the expected federal participation to increase the effective resources available to the project;
- Augment the state and local resources that traditionally match the federal participation; and
- Create one or more new dedicated sources of funding.

Each of these approaches is discussed in a separate section of this chapter, including both examples and an assessment of applicability to the Atlanta region's HOV system.

7.1.4 Prospects for Increased Federal Funding

All states will be impacted by the decreased availability of federal highway funds in the future. Prospects for a significant direct increases in the primary sources of this funding (e.g. federal motor fuels taxes) in the present tax-averse political environment do not appear good. The public's attitude towards increases in taxes is in tension with its desire for improved highway transportation. Highway use, as measured by vehicle-miles traveled (VMT) continues to grow faster than both income and population, but there are no strong signs of a change in public attitude towards federal taxes. This tension was evident in a "Statement of Administration Policy" issued on January 17, 2003 in response to a Senate appropriations bill which would have 'level funded' (i.e. provide no increase) in federal highway spending in fiscal 2003 versus spending for fiscal 2002. The statement termed the highway spending provision "an unsustainable level of spending for highways" that would "put the program on a path to an inevitable gas tax increase".

Although public support for a federal fuel tax increase may develop in future years, more modest proposals may hold the only prospect of stemming the erosion of federal participation. The American Association of State Highway and Transportation Officials (AASHTO) have drafted one such proposal. AASHTO submitted the draft proposal to create a national Transportation Finance Corporation (TFC) to policy makers in the spring of 2002.

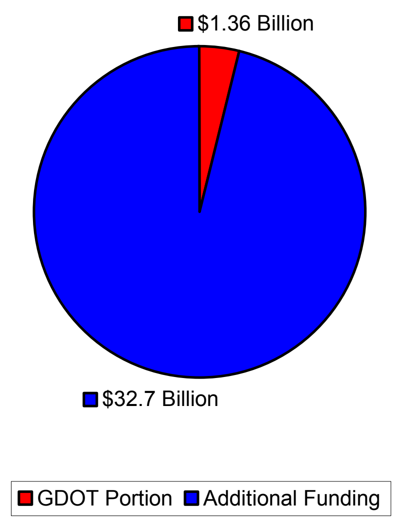
The TFC would issue long-term bonds, with the interest on the bonds in the form of a tax credit taken by the holders. The federal government would pay the bond interest in the form of annual tax credits to bondholders. The tax expenditures resulting from these annual credits would be spread over the 20-year term of the bonds, in effect, creating a multi-year capital budget for transportation infrastructure.

The proceeds from bonds issued by the TFC would be distributed to the states on a formula basis, with each state responsible for providing the necessary remaining matching funds. The proposed distribution of funds is 80% to the Highway Program Fund (via FHWA) and 20% to the Transit Program Fund (via FTA). In addition, a Capital Revolving Fund is proposed to provide credit support for highway and transit projects that might not be able to receive assistance through existing State Infrastructure Banks.

The federal budgetary cost of the Tax Credit Program would be paid from indexing federal fuels excise taxes to an inflation index. The estimated federal budgetary cost of the program was $5.6 billion over the first five years and $19.2 billion over the first 10 years. If enacted, these increased funds would enable a higher federal matching level than would otherwise prevail, or could allow more projects to be funded at lower matching levels. The program would yield about $34.1 billion in additional federal highway funds over the first five years. As shown in Figure 7.4, GDOT could expect an apportionment of an additional $272 million annually, or $1.36 billion over the five-year period. If the HOV Plan were to receive 5.97%, this would yield $81 million, or about 1.8 percent of the HOV Plan's cost.

The initial response to this proposal has been positive, but whether the Congress will make TFC a reality in the coming reauthorization has yet to be determined. Given the relatively small size of this proposal, and the present momentum towards decreasing federal participation, it would not be prudent to assume a level of federal participation higher than that incorporated in the 2001 draft *Statewide Transportation Plan*.

Figure 7.4 - Transportation Finance Corporation Proposal



* Based on average 1998-2003 Apportionment Estimates - FHWA

7.2 Leveraging Federal Participation

New options have been used or proposed to make better use of available federal funds. Although these do not increase the total resources available, they can in some circumstances 'stretch' the federal funding. If applied to projects already planned for construction, they could effectively increase the federal resources that might be applied to HOV projects. Two of these programs are discussed below: Grant Anticipation Revenue Vehicles (GARVEEs) and Transportation Infrastructure Finance Innovation Act (TIFIA) loans. An overview of each program is provided and followed by a conclusion as to its applicability to the HOV Strategic Implementation Plan.

7.2.1 Accelerated Use of Traditional Federal Sources – GARVEES

GARVEEs can accelerate the construction of a project relative to the traditional pay-as-you-go financing approach. FHWA grants, for example, are typically drawn upon on an “after expenditure” basis, meaning the agency (*e.g.* GDOT) incurs and funds the eligible expenditure. The receipt of federal funds is then on a “reimbursement basis”. Because this process requires the agency to provide the initial capital for the expenditure from its own resources, it often has to borrow funds to “bridge” the time between expenditure and reimbursement. These borrowings are typically of a short-term nature, but do add to the overall costs of the project.

The issuance of GARVEE bonds allows for these funds to be borrowed at a lower effective rate to more efficiently fund the initial project costs. The debt is layered with principal and interest payments over a longer period and is repaid primarily from the receipt of federal reimbursements. This has been an effective tool for many agencies, allowing the receipt of funds at the time of expenditure.

Candidates for GARVEE financings typically include:

- Large construction projects under critical time constraints. In these cases, the cost of delaying the project may outweigh the interest cost of the debt financing.
- Projects with a definable stream of future user fees such as tolls and fares. These projects can structure financings based on the anticipated revenues.
- Projects which must rely solely on future federal payments to structure the debt service payments for the financings, but whose schedule of expenditures makes a GARVEE preferable to shorter-term financing.

Because the individual states issue GARVEE financings, the sponsoring state must have a designated agency for issuing the debt. This is typically the state’s Department of Transportation (DOT) or an agency of the DOT that pledges to use the future grant revenues for debt service.

The estimated federal share of the $2.34 billion of traditional-source funding for the HOV system over 2003-2030 is 64 percent, or $1.49 billion. If this is effectively leveraged by the use of GARVEE bonds the schedule for HOV construction could be accelerated. Using federal and state traditional-source funding to leverage a GARVEE bond issue could support moving several million dollars of the HOV construction forward in time. This might be attractive if there were substantial benefits to building the outer portions of the HOV system earlier. However, because the need for Tiers 2,3, and 4 will occur later than for Tier 1, for example, the schedule allocating funding requirements evenly over the period 2003-2030 is appropriate. Financing with GARVEE bonds would not offer an advantage over short-term financing to bridge the 'gap' between expenditures and receipt of federal funds.

In Georgia, GARVEE financing appears to face an additional obstacle. The State Road and Tollway Authority (SRTA) is the agency within Georgia given the authority to issue GARVEE bonds. A lawsuit filed in August 2002 has challenged the constitutionality of the SRTA's authority to obligate the State of Georgia by issuing this type of debt. A Superior Court Judge in Fulton County ruled in favor of SRTA and the ruling was appealed to the State Supreme Court. The State Supreme Court supported the Superior Court ruling and held that the State could in fact issue the bonds. Although ruled legal, as a matter of law, the Governor has not embraced this type funding for any of the State's transportation plans.

7.2.2 Credit Assistance and Loans - TIFIA

As part of TEA-21, Congress passed the Transportation Infrastructure Finance and Innovation Act of 1998. TIFIA, as it is commonly called, established a new federal program under which the U.S. DOT may provide credit assistance to public agencies in the form of direct loans, loan guarantees or lines of credit.

Like GARVEEs, the TIFIA program was designed to leverage federal funds by attracting private and institutional investment into transportation infrastructure projects. Much like the FTA's New Starts Program, evaluation criteria are used to determine the "best use" of transportation dollars. Projects compete with each other for the TIFIA loan program through an application process that also includes a preliminary credit rating from one or more of the national credit rating agencies.

Projects must secure an "investment grade" rating from the rating agencies and a "Record of Decision" from their governing federal agency before becoming eligible for TIFIA assistance. Eligible total project cost must be at least equal to $100 Million, or to 50% of the state's federal aid highway apportionment, whichever is greater.

The advantage of a TIFIA loan is that the repayment schedule can be negotiated based on the needs of the project. The repayment of principal is often deferred to the latter years of the loan period, allowing revenue streams such as user fees to build up to a level that will allow ongoing operating and maintenance expenses to be paid in addition to the loan repayment. In that sense, a TIFIA loan program is more flexible in its ability to structure the repayment to match anticipated revenues.

A TIFIA loan application is primarily for the purpose of advancing a project where the benefits of earlier completion out-weigh the cost of the borrowing. As for the GARVEE option, this is not appropriate for the HOV system because the schedule of completion is more spread out or less even.

7.3 Augmenting Traditional State and Local Resources

New taxes and fees for any purpose are politically unpalatable, however, when a valid public need is articulated, support for such increases can sometimes be obtained. Critical to the success of any such approach is the ability to assure the public that the revenues will in fact be dedicated to the purposes for which they are raised.

7.3.1 Increasing Statewide Traditional Sources

Augmenting the traditional sources of state transportation funding would directly address the decrease in federal funding, allowing the traditional process to proceed at a lower federal participation level. Most appropriate for such use would be increases in state taxes and fees associated with highway transportation: e.g. motor fuel taxes, truck road user taxes, sales taxes on motor vehicles, and license and registration fees. As part of the development of the *Statewide Transportation Plan*[8], Cambridge Systematics assessed numerous established and potential sources of state transportation revenue in terms of diversity, flexibility, adjustability, efficiency, ability to support bonding, and achievement of social goals. This process identified three candidate sources: the 7.5-cent motor fuel excise tax, the 3% sales tax on motor fuels, and motor vehicle registration fees. For the purposes of supporting the HOV system, an additional consideration emerges: how closely the source can be related to the HOV.

<u>Motor Fuel Taxes</u>

As pointed out in the 2001 draft *Statewide Transportation Plan*, motor fuel taxes are the primary source of state transportation revenue in Georgia. For gasoline priced at $1.50 per gallon, these taxes yield 12 cents per gallon, or about 0.5 to 0.9 cents per VMT for personal motor vehicles, depending on their fuel economy. The draft *Statewide Transportation Plan* noted that these revenues were the third lowest of the 50 states in 2001, with only Alaska and New Jersey having lower taxes per gallon; the national average was 20.8 cents per gallon. As of July 2003, Georgia has the second lowest motor fuel tax per gallon in the nation, behind only Alaska. Over and above this relative observation, it is almost certain that these

[8] Cambridge Systematics, Draft Technical Memorandum Task 8a – Revenue Recommendations, Georgia Statewide Transportation Plan and Process, April 2001.

revenues are well below what it costs Georgia to keep its highways in good repair, let alone add to the system.

The 1997 USDOT "Federal Highway Cost Allocation Study"[9] included the information in Table 7.6 below, which roughly breaks down cost responsibility by vehicle classification and public expenditures. To the extent Georgia is typical of the nation overall, it is likely that the state will (in the long term) incur roughly 2-2.5 cents in annual expenditures for highway maintenance per VMT, and would realize perhaps 1/3 of this from motor fuel taxes.

Table 7.6 - Roadway Cost Responsibility Per Vehicle-Mile (1997 Dollars - USDOT)

Vehicle Class	VMT (million)	Federal Costs	State Costs	Local Costs	Total Costs
Autos	1,818,461	0.007	0.020	0.009	0.035
Pickups & Vans	669,198	0.007	0.020	0.009	0.037
Single Unit Trucks	83,100	0.038	0.067	0.041	0.146
CombinationTrucks	115,688	0.071	0.095	0.035	0.202
Buses	7,397	0.030	0.052	0.036	0.118

Ideally, an increase in statewide motor fuel taxes would make it possible to increase the state/local match for highway projects statewide, building the HOV system in the context of either the 'meet current program' or 'meet future needs' transportation package. In fact, in light of the decreasing federal participation discussed in the previous section, several states with fuel taxes higher than Georgia's have recently approved fuel tax increases. Movements to oppose such increases, or even to reduce state fuel taxes, are also active across the country. As for federal fuel taxes, there is a tension between a demand for more or better highways, and a reluctance to pay higher taxes. The emerging resolutions of this issue in different states are related to the perceived condition of the highway system, the public's perception of future needs, and the track records of state governments in directing fuel tax revenues towards transportation projects.

Given the present attitude of the Georgia public to tax increases, a statewide fuel tax increase should not be considered imminent. Allocation of new statewide revenue sources to the HOV system could also be

[9] *1997 Federal Highway Cost Allocation Study Final Report*, Federal Highway Administration, USDOT (www.ota.fhwa.dot.gov/hcas/final), 1997.

subject to criticism from taxpayers outside the Atlanta metropolitan area, who might feel that the state's overall transportation program is already heavily weighted towards that region.

7.3.2 Increasing Local Traditional Sources

Some transportation projects are so large that grant funding and local funds are not sufficient without impacting other planned projects. For this reason, states and agencies may choose to fund a portion of these projects with municipal debt. Issuing municipal bonds allows immediate capital in the form of bond proceeds to be directly used to construct the project. Local taxes and fees can provide a stream of revenue for servicing the debt and interest payments over the life of the bonds.

In Georgia, counties or cities may implement a one percent Special Purpose Local Option Sales Tax (SPLOST) for specified purposes for a specified number of years, after which the tax expires. These jurisdictions may also choose to institute a general one percent sales tax of unrestricted duration. Use of SPLOSTs or local general sales taxes to fund the Atlanta region HOV system is not recommended because:

- The HOV system's benefits extend outside a single jurisdiction, to the cities and counties of the non-attainment area, whether that be the 13-county current area or the 21-county potential non-attainment area; the local jurisdictions vary considerably as to whether they employ these taxes, and with respect to their durations and purposes. Achieving a uniform, consistent basis for funding in this framework is impractical. Various mechanisms have been developed to do this in other states, most often through some form of Joint Powers Authority (JPA). The creation of such an authority, however, amounts to creation of a new dedicated revenue source, and falls outside the scope of augmenting traditional sources.
- There is no logical linkage between transportation and the source of these revenues.

Georgia counties and municipalities also raise revenues for local purposes with *ad valorem* property taxes assessed on a millage basis, *i.e.* in terms of mills (thousandths of a dollar) per dollar of assessed value[10]. Within the 21-county study area, county millage rates range between \$0.024 and \$0.053 per dollar; most jurisdictions apply this to the assessed value of both automobiles and residences. Incremental *ad valorem* taxes could, in principle, be assessed against vehicles alone for the purposes of

[10] Unless otherwise provided, assessed value in Georgia is generally 40 percent of fair market value.

funding the HOV system. Over the period 2003-2030, an incremental millage rate of $0.008 to $0.011[11], net of collection and administration costs, is estimated to cover the $2.2 billion shortfall. A uniform increment in this range, applied across the area, would represent 17 to 44 percent of the present *ad valorem* tax load on automobiles, depending on the locality.

This approach has a number of shortcomings that excluded it from further consideration:

- *Ad valorem* taxes on personal motor vehicles provide no incentive either to make shorter trips or to operate more fuel-efficient vehicles;
- There would be an additional administrative load on counties or cities, which would need to revise collection procedures to reflect a separate tax rate for motor vehicles; and
- The use of this source to fund expenditures at a regional level is inconsistent with the established dedication of these funds for localities' use.

7.3.3 Public/Private Partnerships

Public/private partnerships (PPP) have been advocated as a means of leveraging public expenditures at the federal, state, and local level. Considering the regional scope of the HOV Strategic Implementation Plan, this chapter discusses PPPs as an option at the state/local level. The term PPP has been applied to many different approaches to project finance and construction, including:

- Private participation in project financing. In effect, this amounts to an analogue of GARVEE or TIFIA financing, with respect to state or local funding commitments to a project. As for the GARVEE and TIFIA programs, the schedule of HOV system funding requirements and the absence of a user fee revenue stream do not indicate a significant advantage for this approach over shorter-term financing.

- Joint development opportunities, in which the private sector may contribute to the construction costs either to obtain a franchise to operate a for-profit enterprise made feasible by the project, or to realize appreciation on real estate made more valuable by the project. Because the HOV system will be built in segments parallel to existing unpriced limited-access highways, prospects for this type of participation are limited.

[11] Estimation of a particular value would require additional research of county property tax data. This range represents a range of average personal motor vehicle values between $5,000 and $7,000 year 2000 dollars.

- Private participation in design and construction of projects. With a "design-build" approach, the state may save time and costs by entering a single contract with private firms for both design and construction, as opposed to the traditional 'design-bid-build' approach. Several states, including Georgia, have used design-build on a pilot or experimental basis for highway projects. According to a survey of these states by Science Applications International Corporation (SAIC) in 2002[12], time savings have been realized, but cost savings are more difficult to substantiate. Georgia and several other states are awaiting more definitive experience and findings before committing more fully to design-build. It is reasonable to presume that if Georgia determines this process to be in its interests, it would be applied to HOV system components. Early design-build experience reported in the SAIC survey suggests that any cost savings would be substantially less than the 48 percent ($2.2 billion) shortfall estimated for the HOV system over the period 2003-2030.

- Private design, construction, ownership and operation. An extension of the design-build concept into a franchise for almost all aspects of highway development, this approach has been used successfully for toll roads such as SR 125 in California, the Dulles Greenway in Virginia, and the Express Toll Route 407 (ETR-407) in Toronto, Ontario. The nearest analogue for non-toll highways may be Massachusetts' Route 3 widening. These examples warrant further discussion to assess the applicability of this approach to Atlanta's HOV system.

SR 125 in California used a combination of many of the innovations used for the funding of other projects to date. SR 125 used a Joint Powers Authority (JPA) sale of the franchise to the JPA in order to qualify for tax-exempt financings, TIFIA credit enhancement, direct equity investment by private partners, design-build construction, out-sourcing to a private contractor for construction, fixed-price toll collection, and outsourcing to the state DOT for maintenance.

In the SR 125 agreements, the private sector negotiated for certain protections and the public agencies agreed to certain responsibilities. The contractor has no tort liability for accidents or damages other than those related to design and construction. The state agreed to accelerate the process of eminent domain and condemnation. The contractor also has the exclusive ability to set and modify tolls based on market conditions without public agency interference.

[12] SAIC conducted a survey of State DOTs in Delaware, Washington, Maryland, Virginia, Pennsylvania, Georgia, North Carolina, New Jersey, Florida, and South Carolina on behalf of Illinois DOT.

As to the financial arrangements, toll revenues are projected to cover both the debt service requirements and the return to the equity investors. Much of the initial interest expenses will be capitalized in order to allow for adequate cash flow in the early years for operation and maintenance expenses. The fact that all three rating agencies have rated the senior and subordinate debt as at least investment grade is encouraging as a sign that the financial market recognizes the need and value of private investment in public transportation projects.

In metropolitan Toronto, Ontario, ETR-407 is a new 66-mile value-priced[13] freeway between the province's unpriced freeway system at the Queen Elizabeth Way near Hamilton and Highway 48 in Markham. It is owned by a Crown (public) corporation, the Ontario Transport Capital Corporation (OTCC), which contracted for design, construction, finance, and operation with the Canadian Highways International Corporation (CHIC) consortium. The highway is now operated by 407-ETR International, Inc., a consortium of Cintra Concesiones de Infrastructuras de Transporte, SNC-Lavalin Group, Inc., and Macquarie Infrastructure Group. The Government of Ontario chose this course in 1993, when it determined that the highway would require decades to build using traditional financing; construction was completed in 1998.

The Virginia General Assembly authorized the private development of toll roads, including design and construction, in 1988. The fourteen-mile value-priced[14] Dulles Greenway between Leesburg and the Dulles International Airport was completed in 1995, six months ahead of schedule. Toll Road Investors Partnership II, owners and developers of the Greenway, consists of: the Bryant/Crane family of Middleburg; AIE, L.L.C, and Kellogg, Brown & Root, Inc. The owners have contracted with Autostrade International of Virginia, O/M, Inc for operation and maintenance of the Greenway.

These examples demonstrate that substantial private-sector involvement can be successful when a stable source of toll revenue can be anticipated, resulting in advanced completion of major projects. Provided a sufficient alternative source of revenues can be offered, a similar model can be used for an unpriced roadway.

[13] Tolls are set at about 10 cents ($US) per mile in peak periods, about 8 cents per mile off-peak, and about 4 cents per mile at night.

[14] Weekend tolls are lower than on weekdays.

In October 2000, the Massachusetts Highway Department (MassHighway) held a groundbreaking ceremony for the $385 million Route 3 North Project, which will widen 21 miles of freeway between circumferential Route 128 (the equivalent of Atlanta's I-285) and the New Hampshire state line. As reported by the March 2001 issue of FHWA's web-based *Innovative Finance Quarterly*:

> *This new project delivery approach was authorized by the Massachusetts Legislature in August 1999 through a bill that enabled the creation of a public-private partnership to finance, design, build, operate, and maintain the Route 3 North Project. Through a competitive process, the MassHighway selected Modern Continental as the developer to finance, design, and build the project and then operate and maintain the facility for 30 years upon its completion.*
>
> *The project encompasses a number of innovative features:*

- *Through the use of design-build procurement, project delivery is expedited and cost certainty is established early in the project's development. Developer selection was made on a "best value" basis, where the design-build price bid was a significant, but not the sole, criterion for selection…[p]rice is guaranteed and secured by the developer.*

- *A special purpose, not-for-profit corporation - or 63-20 corporation - was formed by the MassHighway and the developer to issue $394.5 million in tax-exempt lease revenue bonds to finance the project on the Commonwealth's behalf. The bonds are secured by a 34-year lease of the facility between MassHighway and the 63-20 corporation known as the Route 3 North Transportation Improvements Association ("the Association"). MassHighway's rent payments to cover debt service and the cost of operations and maintenance are subject to an annual appropriation of the Legislature.*

- *Three components of the project financing plan have reduced the Route 3 bond size by an estimated $54 million. First, the scheduling of annual lease payment due dates well into the Commonwealth's fiscal year eliminated the need for a liquidity debt service reserve, which would otherwise have been required to address risk associated with potential delays in adoption of the state budget. Second, an up-front payment was made by the project's senior banker (Salomon Smith Barney) to the Association of nearly $9 million in connection with an innovative forward purchase agreement. Third, project risk insurance was purchased, with the developer serving as a co-insurer. This requires the developer to establish a contingency fund to meet unexpected changes in the amount of*

10 percent of the design-build price, or approximately $38 million.

- *The bonds held underlying ratings of A+ by Fitch and Aa3 by Moody's. The Association's purchase of bond insurance from MBIA resulted in insured ratings of AAA by Fitch, Aaa by Moody's, and AAA by Standard & Poor's. By comparison, the Commonwealth's general obligation bond ratings are rated AA- by Fitch, Aa2 by Moody's, and AA- by Standard & Poor's. The project was thus financed at a lower interest rate than the Commonwealth could obtain on its own general obligation credit.*

- *The developer may pursue surface, sub-surface, and air rights development to generate non-project revenues. Planned development includes installation of fiber optic cable during construction with the developer sharing in the sale of fiber optic rights. Other potential plans include construction and sublease of a service plaza, which is estimated to result in non-project revenues of approximately $500,000 per year, and development on land adjacent to the highway and interchanges. The developer has a strong financial incentive to pursue development rights, receiving 40 percent of ancillary development revenues under the negotiated Development Agreement.*

In this case, joint development opportunities served in lieu of anticipated toll revenues to supplement future payments pledged by a government agency. Absent either an anticipated toll revenue stream or significant joint development opportunities, there does not appear to be a compelling reason to put a form of PPP more substantial than design-build forward for Atlanta's HOV system.

7.4 New Dedicated Funding Sources

Even with the modest increase in federal participation that might be funded through AASHTO's TFC proposal, absent an increase in general state revenues for highway transportation there will be a shortfall of funding necessary to build the HOV system. This indicates a need to consider new funding sources that could be dedicated to it. This section presents some of the possibilities. Three alternatives that have a transportation linkage with the HOV system are discussed in this section:

- Roadway Use Fees
- Area-Specific Motor Fuel Taxes
- Area-Specific Vehicle Registration Fees

7.4.1 Roadway Use Fees

Tolls and other forms of roadway user fees or charges are quickly becoming an alternative to pay for transportation projects. Recent research and experience have shown that many highway users are willing to pay to avoid the levels of congestion that they currently experience. With the emergence of modern electronic technology that makes it possible to collect user fees automatically[15], and to vary the fees by time of day or level of congestion, interest in tolls and user fees has increased.

User fee financing is based on the revenue stream created by user charges from a project once it is operational. Repayment of the principal and interest is structured based on the forecast of user fee revenues. Debt service payments are generally made monthly from user fee revenues prior to any other use of funds for operation and maintenance. Reserve funds are usually established requiring deposits to equal 125-130% of scheduled amounts of debt service. This "over funding" provides bondholders and rating agencies additional assurance that adequate funds will be available to make principal and interest payments on the debt when due.

Toll highways in Georgia, like SR 400, have been very successful. Revenues to date have exceeded the required debt service and annual operating and maintenance expenses. SR 400 has demonstrated that Atlanta area commuters will pay a toll of up to eight cents a mile to avoid congestion and improve travel time.

A useful distinction can be made among three forms of user fees:

- <u>Fixed tolls</u> charged to all highway users to defray the cost of building and maintaining a roadway that could not otherwise have been funded, generally in a corridor that has no existing alternative facility in the same functional class. GA 400 is an example of this approach.
- <u>Congestion pricing</u>, where user charges are imposed on an existing unpriced facility in relation to the degree of congestion, with the aim of inducing travelers to change their behavior, resulting in less congestion.
- <u>Value pricing</u>, where congestion-related charges are imposed on a new facility built in a corridor where there is already an unpriced facility of the same functional class. Under value pricing, users of a new highway parallel to an existing 'free' or 'unpriced' highway are charged a variable fee to use it, depending on the extent of time savings versus the unpriced roadway.

[15] Automation of collection from personal motor vehicles is routine. Vehicle classification is an emerging technology. Technology to accurately determine vehicle occupancy does not presently exist.

Congestion pricing is difficult to implement politically, because it imposes a charge on a facility that is already ‘paid for’ from the point of view of most of its users. In the absence of an unpriced alternative, congestion pricing is almost always perceived by the public as a new form of tax. Because the HOV system projects would parallel existing unpriced roadways (except for SR 400), congestion pricing would not be applicable in any case.

Fixed tolls and value pricing have both been accepted as means of financing new capacity that would not otherwise be funded. Fixed tolls distribute the charges uniformly to all users in each vehicle class, while congestion pricing recovers at least some portion of the true economic value of the time saved under congested conditions. As shown by SR 400 and toll highways around the world, tolling all traffic on a highway can provide a revenue stream more than adequate to fund its construction and maintenance.

General tolls (applicable to all traffic on the HOV system) could possibly fully finance its projected funding shortfall. For the HOV system, however, the imposition of tolls could have the effect of discouraging HOV traffic, particularly where the HOV lanes are parallel to unpriced general-purpose freeways. Half-rate tolls have been recently imposed on HOVs on California’s SR 91, and have not been found to discourage HOV traffic. This cannot be taken for granted in Atlanta, however, where daily traffic volumes per freeway lane-mile are still substantially less than in greater Los Angeles.

For HOV lanes being added to an existing corridor, value pricing takes the form of high-occupancy toll (HOT) lanes, under which vehicles with less than the required minimum occupancy (either HOV-2 or HOV-3) are allowed to use the HOV lane(s) for a toll. This concept has proven successful on two different projects in California:

- On privately financed State Route 91 in Orange County, all traffic pays a variable toll to use new ‘FasTrak’ median lanes, but HOV-3s pay only one half of the toll applicable to SOVs and HOV-2s.
- On Interstate I-15 in the San Diego area, SOVs are allowed to use the HOV lanes for a toll, while HOV-2s travel free.

Results to date from both HOT lanes and new toll roads in other cities indicate a willingness to pay per-mile costs that will cover long-term roadway maintenance and toll collection costs (4 to 5 cents per personal motor vehicle mile) *plus* 15 to 25 cents per minute saved versus parallel unpriced freeway lanes. A smaller market segment (such as travelers to and from airports) is willing to pay up to 80 cents a minute for time saved.

Parsons has examined the feasibility of HOT in Atlanta as it relates to expected traffic density for the following assumptions:

- The most prevalent limited-access highway configuration (four directional freeway mainline lanes prior to adding HOV lanes);
- A willingness-to-pay characteristic of the general public using successful HOT and new privately-financed toll highways (such as Toronto's ETR-400): 4 cents per vehicle-mile plus 20 cents per vehicle-minute saved versus unpriced lanes; and
- Free access to the HOT lanes for HOV-2s and higher occupancy vehicles.

Parsons estimated the relationship between total traffic density and HOT use based on these assumptions and a model[16] of the tradeoff between traffic congestion and the desirability of traveling by time-of-day, assuming the following proportion of total person travel demand by trip purpose:

- 30 percent work travel with destination 'downstream';
- 8 percent work travel with destination 'upstream';
- 4 percent local social/recreational travel;
- 34 percent other local home-based travel; and
- 24 percent non-local 'through' travel.

These values are intended to represent a wide range of trip purpose 'mixes' that would be encountered on the region's limited access highways; the results are not highly sensitive to small changes in these assumptions.

[16] Connecticut Department of Transportation*, Interstate Route 95: New Haven Harbor Crossing. Technical Report Number One: Screening Report*, April 1997.

Figure 7.5 - Standard Traffic Assumptions for 4 directional mainline lanes

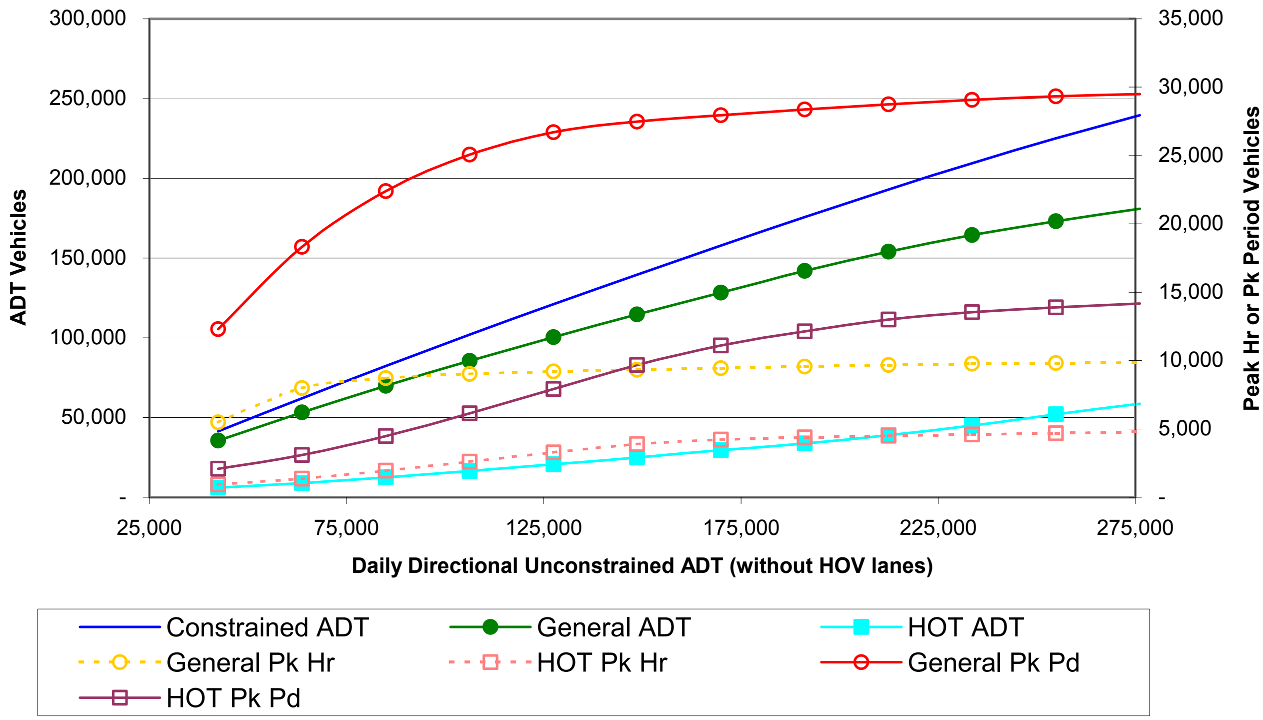


Figure 7.5 shows the typical results of the model for various levels of total unconstrained[17] average daily traffic (ADT) in terms of total directional (one-way) demand for a freeway facility with four lanes each way and no HOV or HOT lanes. Figure 7.5 indicates that:

1. For relatively low total demand, constrained demand (i.e. as would be projected by the ARC's regional model) is equal to unconstrained demand.

2. As total demand increases, constrained demand decreases relative to total demand; traffic will seek alternative routes, and average vehicle occupancy (persons per vehicle) will increase as congestion increases.

3. HOT traffic becomes a higher proportion of ADT as congestion increases;

4. Growth in non-HOT peak period traffic begins to fall off at about 60,000 unconstrained ADT, as a result of congestion. Growth in peak period (maximum 3 hours) no-HOT traffic begins to fall off at about 80,000 unconstrained ADT; and

[17] 'Unconstrained' demand represents the underlying demand for travel assuming all highways are always uncongested. ARC's travel demand model (and those of all major metropolitan areas) contains elements that restrict the amount of travel estimated to occur on congested highways.

5. Growth in peak hour HOT traffic begins to fall off at about 125,000 unconstrained ADT, as the HOT lanes begin to experience congestion.

Figure 7.6 - Typical Operational Characteristics (for 4 directional mainline lanes)

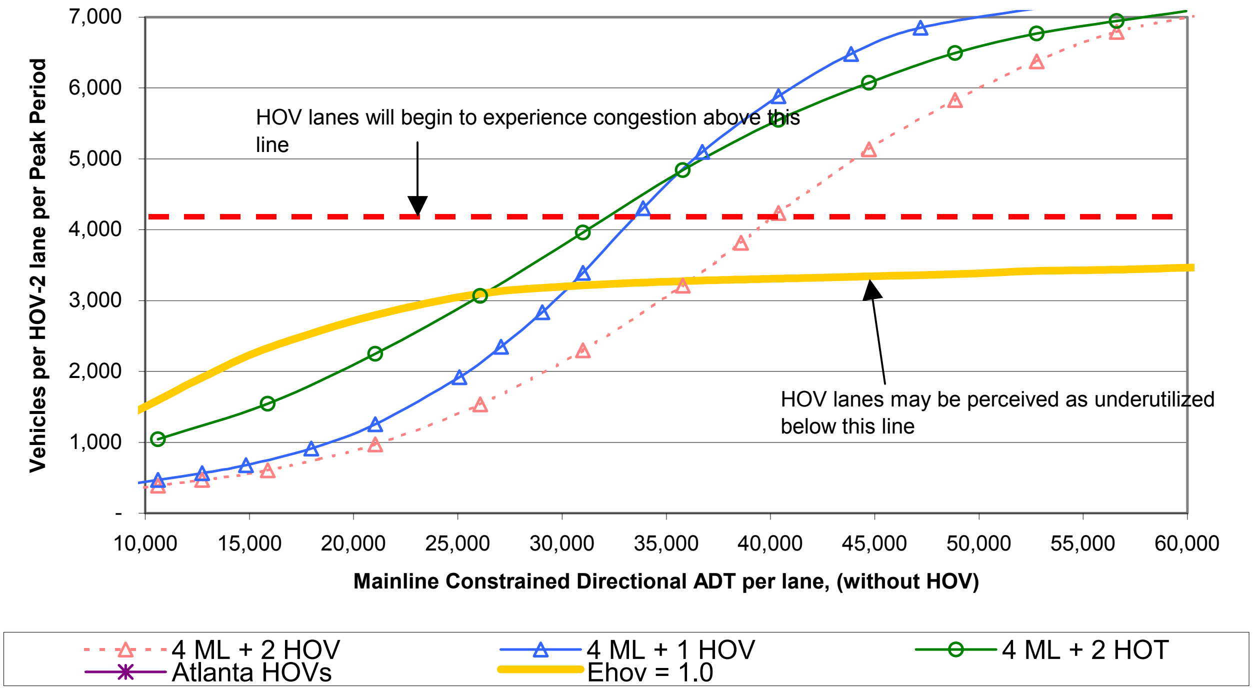


Figure 7.6 generalizes the model results on a per-lane basis, in terms of constrained directional ADTs. Results for three-lane and five-lane directional freeway sections would not be dramatically different, for example. This figure also shows comparative results for a single-lane HOV-2 and a two-lane HOV-2 facility in the same corridor. From these data, the following conclusions can be reached:

1. A single-lane HOV facility may be perceived as underutilized below about 27,000 constrained ADT per freeway mainline lane; at this point, the HOV-2 lane would reach an HOV effectiveness of 1.0, where it would carry as many people per lane over the peak period as the general purpose lanes.

2. A single HOV-2 lane will become congested at or about 33,000 constrained ADT per freeway mainline lane. This does not provide much room for growth between the perceptions of 'underutilized' and 'congested'.

3. A dual HOV-2 lane (two lanes in each direction) will raise the levels of both utilization (to about 36,000 constrained ADT per lane) and congestion (about 40,000 constrained ADT per lane), with a limited 'working margin' between them.

4. Opening two HOV-2 lanes to SOVs paying a toll (i.e. converting them to HOT lanes) will result in effective utilization at a lower ADT level, but will also move the onset of HOT congestion down to about 34,000 constrained ADT per mainline lane.

Figure 7.7 - Speeds and Revenues vs. ADT/lane (for 4 directional mainline lanes)

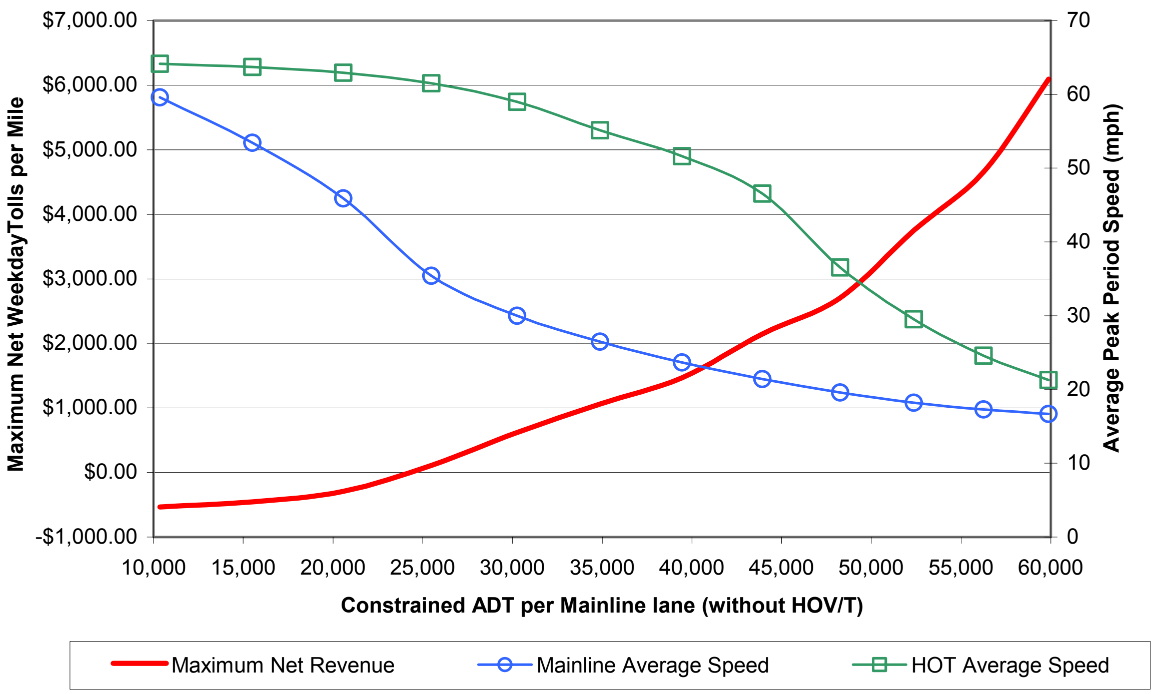


Figure 7.7 presents estimates of the revenues and peak period operating characteristics of a typical HOV-2 system segment from the HOV Strategic Implementation Plan's Tiers 1-4, averaging 8.4 miles in length. Given the typical spacing of access point, and assuming all SOVs would exit the segment at the 'downstream' end before encountering a more congested segment, the average distance traveled by a toll-paying SOV is estimated as 4.4 miles.

Figure 7.7 shows the estimated average operating speed over the three peak hours for both the general purpose and HOT lanes. Between about 25,000 and 40,000 constrained ADT per mainline lane (without HOV), HOT lanes have the potential to generate net revenues while avoiding high levels of congestion that might deter HOV use. The net revenue indicated in Figure 7.7 assumes a minimum level of staffing, transaction costs, and financing of toll facilities in addition to already planned HOV facilities; actual costs for specific segments could be higher. Staffing of at least one lane per toll plaza would be required, because there is at present no automated technology to accurately establish vehicle occupancy.

Under these assumptions, a HOT lane that opened at the 25,000 level and closed at 40,000 would continue in operation for about 30-35 years. This 'lifetime' depends on the underlying demand growth rate, ranging from 1.4 percent as estimated by Cambridge Systematics in the 2001 draft *Statewide Transportation Plan*, to 1.6 percent as is typical for the links included in the interstate system according to the ARC's regional model.

Over those 30-35 years, one mile of HOT lanes could generate up to a net present value of $1.35-1.45 million (year 2000 dollars), assuming a 7 percent discount rate. This represents only 4.4-4.7 percent of the average system construction cost of $ 30.6 million per route-mile for Tiers 1 through 4. In effect, then, the maximum share of funding that could likely be borne by HOT tolls under the assumptions made is less than 5 percent.

In practical terms, however, the potential is far less than this, chiefly because most of the segments in the planned HOV system would already be operating at or above 40,000 ADT per mainline lane when the HOV lanes are planned to open. Virtually all[18] of the other lanes would encounter unacceptable congestion in the HOT lanes well before 30 years of operation; in effect, the best time for implementing HOT (with HOV-2s traveling free) has already passed for most of the segments in the plan. Realistically, the contribution of net HOT revenues towards construction funding would likely be on the order of 1-2 percent.

Within the set of assumptions made above (HOV-2, no tolls for HOVs, and HOT priced to be a viable alternative for the general public), system-wide HOT lanes are unlikely to be able to contribute more than 1 percent of the estimated funding shortfall of the regional HOV system. Even this level cannot be assured; corridor-specific analysis would be required to realistically assess the potential for each. Issues of fairness would also emerge if HOT lanes were implemented only in corridors where it would generate the most revenue.

Changes in the assumptions made for the analysis might result in a more significant contribution to funding, though each would need to be subjected to further analysis. These possible directions, and some brief observations on them, are as follow:

[18] The one notable exception is the 7.5-mile segment of SR 316 included in Tier 1. It is possible that HOT operation could fund as much as 20-25% of the cost of this one segment.

- A general strategy of transforming the HOV-2 system requirement to HOV-3 when congestion in the HOV lanes reaches unacceptable levels. At this point, tolled use by SOVs and HOV-2s could be introduced, similar to California's SR 91. The need to consider HOV-3 will generally occur when demand reaches levels now being experienced on greater Los Angeles freeways. This appears to be contrary to GDOT's vision of HOV-2 as a regional standard.
- Imposing tolls for HOV use of HOT lanes. This would dilute the incentive for lane use by HOVs, and would make the HOT lanes resemble a general-purpose toll highway.
- Increasing per-minute-saved tolls to serve only the SOV travel market segments that place the highest value on travel time-savings. Criticism of these HOT lanes as 'Lexus lanes' would be more valid at these price levels than for the California HOT lanes implemented to date.
- Advancing the construction of the HOV system to capture more years in which uncongested HOT operation could be offered to toll-paying HOVs. It is unlikely that the upper limit of 5 percent of system funding could be approached by this method, because most of the HOV plan's segments are already above 25,000 ADT per directional mainline freeway lane.

In light of these considerations, it seems reasonable to exclude HOT lanes as a funding source for the HOV system.

One other potential source of user charge would be fees assessed to commercial passenger vehicles (buses) making use of the HOV lanes. As demonstrated in Dallas-Fort Worth and other metropolitan areas, bus operations on uncongested HOV lanes can result in considerable operating cost savings for the bus operator. In practice, this potential source has not been used for at least one of the following reasons:

- The volume of bus traffic would not generate a significant enough income stream to be worth collecting;
- Most buses using the lanes are operated by the metropolitan area's public transportation provider(s), and the payment of use fees would represent only a transfer of funds from one public 'pocket' to another;
- Similar to tolling HOVs, imposing costs on travelers who are choosing a more environmentally-friendly form of transportation runs counter to the intention of many HOV projects.

In Atlanta's case, all three reasons are likely to apply. Assuming that all buses using the HOV lanes could be assessed (and would pay) a charge of 12.5 year 2000 cents[19] per vehicle-mile, the total value of these revenues over the period 2003-2030 would likely be no more than 0.1 percent of the HOV system construction costs. Because MARTA or the transit systems of neighboring counties would operate the vast majority of the buses on the HOV lanes, the 'funds transfer' issue would apply. If the additional costs were passed through to the passengers, they would amount to one-half to one cent per passenger-mile, enough to have a very small negative impact on transit ridership.

7.4.2 Area-Specific Motor Fuel Taxes

Motor fuel taxes have a number of features that make them attractive from an administrative and policy perspective:

- The collection method is already in place;
- The user costs are proportional to travel, providing an incentive to reduce trip-making and/or trip length;
- The user costs are inversely proportional to vehicle fuel economy, encouraging use of more fuel-efficient vehicles.

The only effective way to focus this source on the HOV system is geographically, i.e. by creating an overlay district in which an additional tax would be imposed. Although Georgia does not presently have a provision to vary fuel taxes within the state, at least nine states (Alabama, California, Florida, Hawaii, Illinois, Mississippi, Nevada, New York, and Virginia) did so as of January 2003[20]. These additional taxes are usually set within predetermined limits by county, or are imposed on larger sections of the state for specific purposes.

Intra-state variations in fuel taxes can create 'boundary issues' similar to those that occur near Georgia's borders with other states: motorists from one jurisdiction may buy their gasoline in another because of the tax differential. When differences in total fuel price reach significant levels (*e.g.* the 15-cent-per gallon differential that recently existed between Minnesota and Wisconsin), changes in fueling behavior can become pronounced enough to affect the viability of businesses in the higher-priced jurisdiction. Under

[19] The approximate value of the roadway use in Table 6. Total operating cost savings to the operator would likely be between 2 and 3 times this amount.

[20] American Petroleum Institute website.

such extreme circumstances, spatial graduation[21] of these taxes might be considered. However, the differentials that might be necessary to fund the HOV system are unlikely to require such an adjustment.

Excise taxes are a more stable source of funds than motor fuel sales taxes, which are influenced by the volatile price of fuel. The extent of excise tax increase required to make up the HOV funding shortfall will depend on the geographic area over which it would apply. The most logical candidates are either the 13-county current non-attainment area or the proposed 21-county non-attainment area.

Estimated Motor Fuel Excise Tax Increases by Area

The expected revenues (in year 2000 dollars) from a 1-cent excise tax increase over the years 2003-2030 on a statewide, 21-county, and 13-county basis is estimated as follows:

- Statewide 1-cent excise tax would yield $1,442,747,000
- 21 County 1-cent excise tax would yield $ 579,417,000
- 13 County 1-cent excise tax would yield $ 479,318,000

The per-gallon excise tax estimated to be able to yield the unfunded balance of the HOV System's Tiers 1 through 4 over the same time period is estimated to be about:

- 1.5 cents per gallon increase Statewide;
- 3.8 cents per gallon increase over the 21-county area; or
- 4.6 cents per gallon increase over the 13-county area.

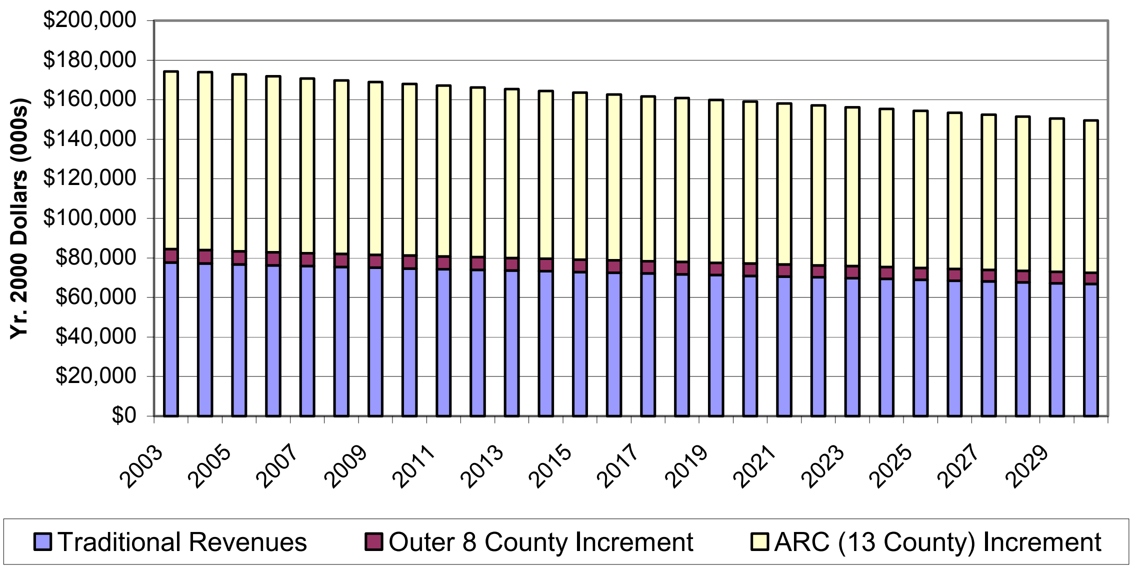
Another way to structure this increase would be to 'layer' it so that the 8 outermost non-attainment counties would pay only half the rate of the inner 13. This would have two advantages: 1) it would raise more funds for the more expensive inner portions of the HOV system from those areas; and 2) it would provide a more gradual transition, decreasing the temptation for motorists to cross county lines to buy gasoline. Such a layered tax over the 21 County Non-Attainment Area is estimated to be:

[21] Rietveld, Piet. et. al.," Spatial Graduation of Fuel Taxes", Department of Spatial Economics, Free University, Amsterdam, June 1999.

- a 2.1 cent per gallon Increase in the 8 Non-Attainment/Non-ARC Counties, plus a
- further 2.1 cent per gallon Increase (for a total increase of 4.2 cents per gallon) in the 13 ARC Counties

Figure 7.8 shows the estimated new revenues by year from a $0.021 increase over the 8 non-attainment counties not included in the ARC, and from a $0.042 increase in the 13-county ARC area plus the estimated traditional-source revenues for the HOV system.

Figure 7.8 Estimated Annual HOV Funding with Dedicated Increase in Motor Fuel Taxes



7.4.3 Area-Specific Increase in Vehicle Registration Fees

As annual fixed fees, vehicle registration revenues do not encourage either reduced travel or fuel efficiency. However, the ability to set fees by class or type of vehicle permits some degree of focus, by allowing vehicle types that would not be permitted to use the HOV lanes (such as heavy trucks) to be exempted.

These fees can also be focused geographically. Several states allow counties or municipalities to impose registration fees over and above state fees. For personal motor vehicles in Georgia, these fees are uniform statewide, but are collected by counties based on the residential address of the vehicle's owner. The county vehicle registration process also includes the payment of the *ad valorem* taxes on the vehicle; as discussed in Section 7.3.2, these do vary by county.

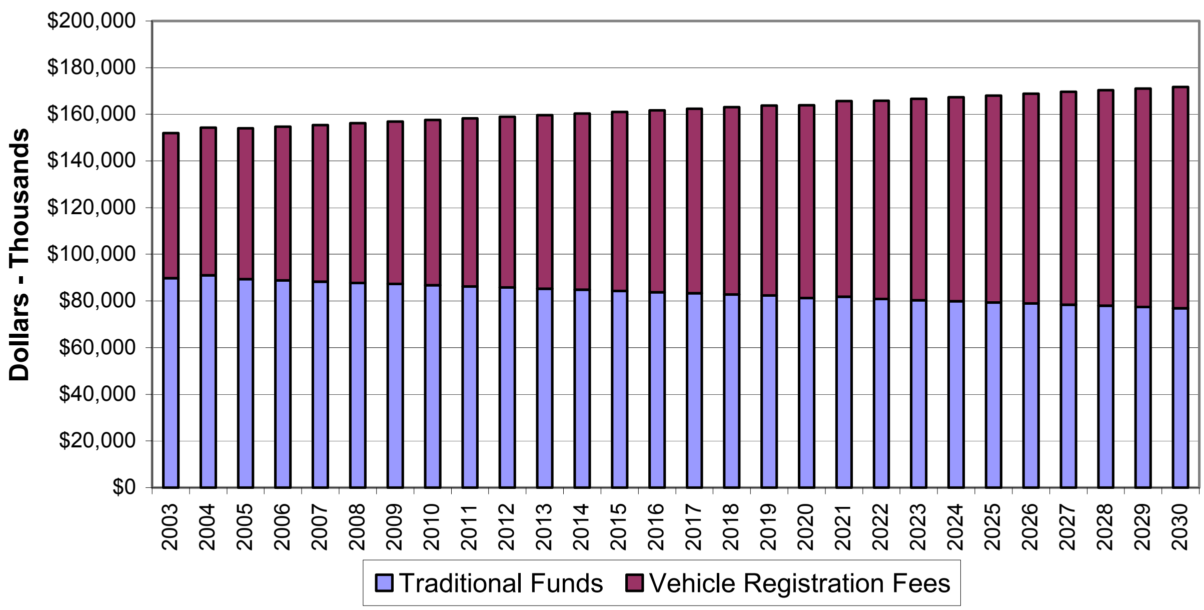
Estimates of the additional revenue were based on the estimates of future personal motor vehicle registrations shown in Table 7.7. Based on these projections, an increase of $26.90 per year in the registration fee for personal motor vehicles would generate the required funds over the 13-county area, and an increase of $22.28 annually would accomplish this over the 21-county area. Figure 7.9 shows the estimated revenues by year for the $22.28 increase over the 21-county area, in addition to the estimated traditional-source revenues for the HOV system.

Table 7.7 – Projected Vehicle Registrations

County	Year 2000	Year 2010	Year 2020	Year 2030
Fulton	415,044	425,688	485,816	544,782
Dekalb	376,667	396,630	457,071	513,394
Cobb	388,934	419,348	446,242	470,788
Gwinnett	397,845	456,178	511,517	562,996
Clayton	187,959	210,959	231,313	249,569
Hall	91,058	145,228	163,421	184,953
Cherokee	93,344	143,945	160,798	179,914
Carroll	51,732	103,086	120,404	139,460
Douglas	54,256	75,860	92,975	111,567
Fayette	64,449	85,819	110,188	136,383
Henry	74,156	81,670	91,709	104,072
Bartow	49,189	88,940	102,373	116,599
Spalding	35,748	51,326	76,724	106,368
Rockdale	42,137	119,094	155,116	190,817
Coweta	53,317	72,793	94,657	119,893

County	Year 2000	Year 2010	Year 2020	Year 2030
Forsyth	71,593	76,739	98,826	124,633
Newton	42,372	71,449	105,495	143,780
Paulding	44,556	52,669	73,518	98,197
Walton	39,671	42,323	46,361	50,529
Barrow	32,228	46,383	62,483	81,296
Dawson	12,175	16,216	21,223	26,789
Totals	2,618,430	3,182,343	3,708,230	4,256,779

Figure 7.9 Estimated Vehicle Registration Fee Revenue From 21 County Area



7.5 Recommendations

Based on the analyses described in this chapter, it is recommended that:

- Tiers 1-4 of the HOV Plan are placed in the ARC 2030 Aspirations Plan. Those that are selected to be placed on the Fiscally Constrained 2030 Plan would be listed for implementation over the period 2004-2030 based on a continuation of traditional financing methods to cover most of its costs (*i.e.* using the share of projected traditional revenues established in the draft *Statewide Transportation Plan*). This is estimated to result in a shortfall in funding of almost $2.2 billion year 2000 dollars over this timeframe.

- The shortfall may be made up by an increase in area-specific motor fuel taxes 'layered' $0.021 per gallon tax increase over the 8 non-attainment counties not included in the ARC, and a $0.042 per gallon tax increase in the 13-county ARC area. Alternatively, this amount could be made up by an increase of $26.90 per year in the registration fee for personal motor vehicles registered in the 13-county area, or by an increase of $22.28 annually over the 21-county area.

The projected financial results of these recommendations are summarized in Table 7.8. By extending the construction period of Tiers 1-4 to 2030, the 'HOV share' of traditional funding would provide $390 million, leaving $2.2 billion to be financed by new sources.

Table 7.8 - Funding Schedule for Tier 1-4 HOV System included in the ARC 2030 Aspirations Plan (2003-2030) (Year 2000 Dollars)

HOV System Tiers	**Totals** (Dollars- Thousands)
Tier 1	$648,000
Tier 2	$392,000
Tier 3	$1,896,000
Tier 4	$1,603,000
Total of Tier 1 – 4	**$4,539,000**
Planned Traditional Sources 2003-2025	$1,951,459
Extension of Traditional Sources 2026-2030	$389,627
New Sources from Non-Attainment Area	$2,197,914

Table 7.9 summarizes the financial alternatives discussed in this chapter, and for those that were not recommended, notes the principal factors underlying the recommendation.

Table 7.9 - Summary of Financial Alternatives Considered

Financial Alternative	Linked to HOV or transportation	Likely to yield sufficient revenue	Encourages HOV or transit use	Encourages fuel economy	Unpopular or politically unacceptable	Recommended
Use of expected federal transportation funds from 2026-2030	Yes	No	Neutral	Neutral	No	Yes
Increased federal funding	Yes	No	Yes (if through federal motor fuel tax)	Yes (if through federal motor fuel tax)	Yes	No
Leverage federal funds with GARVEE or TIFIA	Yes	No (funding is evenly spread out)	No	No	No	No
Increased statewide motor fuel taxes	Yes	Yes	Yes	Yes	Yes	No
Increased local taxes (SPLOST)	No	Yes	No	No	Yes	No
Increased local taxes (*ad valorem* on motor vehicles)	Yes	Yes	Slightly	Slightly	Yes	No
Public/private partnerships	No	No (need revenue stream)	No	No	No	No
Roadway use fees (general tolls or congestion pricing)	Yes	Yes	Yes	No	Yes	No
Roadway use fees (HOT lanes)	Yes	No	Neutral (under assumptions made)	Neutral (under assumptions made)	No	No
Roadway use fees (for buses)	Yes	No	No	No	No	No
Area-specific motor fuel tax	Yes	Yes	Yes	Yes	Somewhat	Yes
Area-specific registration fees	Yes	Yes	Yes	No	Somewhat	Yes (as alternative to fuel tax)

8.0 Air Quality Analysis

8.1 Overview

An air quality analysis based on vehicle miles traveled (VMT) was completed for Phase II to determine the impacts of new HOV facilities on regional air quality conditions. The analysis included the identification of any improved vehicle miles traveled (VMT) by speed range for impacts to air quality. Once identified the data were reviewed for potential improvements to air quality as reflected in reduced VMT by speed range.

An air quality analysis was not completed per se, but an initial examination of impacts created by the HOV system, (nitrogen oxides, NOx, and volatile organic compounds, VOC, are the problem "smog" pollutants for the Atlanta region). More detailed air quality analysis will be conducted as HOV projects are entered into the 2030 RTP update. For this task VMT was examined as a facsimile for mobile-source emissions, insofar as more VMT equates to more emissions and potentially higher levels of air pollution. The relationship with speed is not so clear-cut, however. In the Environmental Protection Agency's (EPA) "MOBILE5" air quality model, as speeds increase, the NOx emission rate increases at speeds exceeding around 27 mph. As speeds increase, the VOC emission rate however decreases with speeds in excess of around 27 mph. The "ideal" speed under MOBILE5 to hold down overall smog production is where the NOx and VOC curves cross, namely at around 27 mph.

But under EPA's newly released "MOBILE6" model, which is replacing MOBILE5, in the "out" years – namely 15 or 20 years from today – not speed, not even VMT will much affect vehicular emissions of NOx and VOC. This is because the programmed improvements to engines and exhaust systems are such that the engines are becoming so efficient in burning off residues before they are emitted (given the engines run increasingly hot), that in the longer term, relatively little NOx/VOC will be forecast by MOBILE6 to be emitted from mobile sources.

8.2 Year 2025 Alternatives Modeled

Two Year 2025 system alternatives were modeled with Atlanta Regional Commission's (ARC) transportation system planning/travel demand analysis suite. One was the "Build" alternative, which incorporated the full, proposed High Occupancy Vehicle (HOV) regional system; this system alternative also included the proposed GRTA express bus enhancements. The other alternative modeled for 2025 was the ARC "Base" alternative, based upon the Long Range Plan; this system alternative did not include the proposed GRTA express bus enhancements. Outputs of the modeling for each system alternative included, among many other parameters, VMT by speed range and ARC facility type (VMT were categorized by facility type, not just by speed as called for by the Work Scope).

8.3 Forecasts of VMT for Year 2025

The VMT forecasts from the system model runs were categorized by speed range and facility type. One facility type is a modeling convention, namely that labeled a "centroid connector". Centroid connectors are synthesized, abstract representations of local/neighborhood roads that motorists use to get to and from the main network of collectors, arterials, expressways and freeways. Centroid connectors are abstracted links for moving between this network of streets and highways, and the actual points of trip origin or destination within traffic analysis "zones". Although presented for completeness in the accompanying charts, discussion of results will exclude the forecast VMT associated with centroid connectors. The key is how vehicle miles are registered on the main roadway network.

8.4 Comparison of VMT by Year 2025 System Alternative

Year 2025 model-output VMT are presented in Table 8.1 for the HOV System Build alternative, and in Table 8.2 for the Atlanta Regional Commission (ARC) Base alternative. Data are displayed by speed range and facility type, for the weekday AM peak period, the weekday PM peak period, the weekday off-peak period, and the weekday summed daily period. The weekday summed daily period, equivalent to the average annual weekday forecast, is the most important in the present context.

Viewing the "without centroid connectors" *relative shares* of weekday summed VMT by facility type, there is little difference between the HOV System Build (Table 8.1) and the ARC Base (Table 8.2) alternatives. On a daily basis, the HOV projects have had little affect on the *distribution* of VMT by type of facility. And viewing the "without centroid connectors" *relative shares* of weekday VMT by speed range, there is little difference between the HOV System Build (Table 8.1) and the ARC Base (Table 8.2) alternatives. Here again, on a daily basis, the HOV projects have had little affect on the *distribution* of VMT by speed category.

Table 8.3 shows the VMT differentials by speed category and facility type. A minus value signifies a decrease in going from ARC Base to HOV System Build alternative; conversely, a positive value signifies an increase in going from ARC Base to HOV System Build alternative. Viewing speed distribution impacts of the HOV projects for weekday "without centroid connectors", there has been a decrease in VMT at lower speeds (1 – 29 mph), a "wash" effect at middling speeds (30 – 49 mph), and an increase in VMT at higher speeds (50 mph or more), with an overall reduction of about a half million vehicle miles traveled daily. This overall reduction equates to a VMT savings of about 1/3 of a percent for the average weekday. This may seem insignificant, but really it is not: over the course of a year, assuming an annualization factor of 300, 150 million vehicle miles would be saved regionwide. This would equate to an annual savings (reduction) in mobile-source emissions, as well.

Table 8.1 - Year 2025 ARC Model Output: VMT by Speed Range and Facility Type for HOV System Build Alternative*

Weekday AM Peak Period

					Vehicle-Miles Traveled (VMT)									
Speed Range	Centroid Connector	Freeway	Expressway	Parkway	High Speed Ramps	Low Speed Ramps	Class I Arterials	Class II Arterials	Class III Arterials	Class I Collectors	With Centroid Connector Total VMT	%	W/out Centroid Connector Total VMT	%
0 mph	0	0	0	0	0	0	0	10,415	0	0	10,415	0.0%	10,415	0.0%
1-19 mph	3,961,459	518,261	5,409	0	38,382	224,142	423,728	628,066	774,566	857,581	7,431,593	22.0%	3,470,134	11.6%
20-29 mph	0	1,611,655	18,935	0	126,456	104,256	1,540,060	2,290,212	2,893,848	2,222,705	10,808,125	32.0%	10,808,125	36.2%
30-39 mph	0	3,618,481	89,983	0	57,633	21,896	1,006,372	546,597	1,373,266	1,275,555	7,989,782	23.7%	7,989,782	26.8%
40-49 mph	0	3,663,527	245,682	0	38,229	0	236,195	0	0	0	4,183,633	12.4%	4,183,633	14.0%
50-59 mph	0	2,130,493	544,684	45,025	4,802	0	60,562	0	0	0	2,785,567	8.2%	2,785,567	9.3%
60-69 mph	0	414,029	137,636	16,605	0	0	0	0	0	0	568,270	1.7%	568,270	1.9%
70+ mph	0	198	0	0	0	0	0	0	0	0	198	0.0%	198	0.0%
Total VMT	3,961,459	11,956,643	1,042,329	61,631	265,502	350,294	3,266,918	3,475,289	5,041,679	4,355,841	33,777,584	100.0%	29,816,125	100.0%
Share	11.7%	35.4%	3.1%	0.2%	0.8%	1.0%	9.7%	10.3%	14.9%	12.9%	100.0%			
Without Centroid Connectors														
Share		40.1%	3.5%	0.2%	0.9%	1.2%	11.0%	11.7%	16.9%	14.6%				100.0%

Weekday PM Peak Period

					Vehicle-Miles Traveled (VMT)									
Speed Range	Centroid Connector	Freeway	Expressway	Parkway	High Speed Ramps	Low Speed Ramps	Class I Arterials	Class II Arterials	Class III Arterials	Class I Collectors	With Centroid Connector Total VMT	%	W/out Centroid Connector Total VMT	%
0 mph	0	0	0	0	0	0	0	14,355	0	0	14,355	0.0%	14,355	0.0%
1-19 mph	5,888,734	1,574,286	113,424	0	92,651	303,976	1,143,575	1,498,824	2,061,076	2,040,284	14,716,830	33.6%	8,828,095	23.3%
20-29 mph	0	2,779,271	153,737	0	119,771	115,435	1,878,051	2,833,124	3,708,510	2,939,677	14,527,576	33.1%	14,527,576	38.3%
30-39 mph	0	4,562,047	275,621	0	73,135	14,782	832,160	341,184	1,136,664	1,229,268	8,464,862	19.3%	8,464,862	22.3%
40-49 mph	0	2,582,035	377,546	29,480	34,162	0	225,975	0	0	0	3,249,198	7.4%	3,249,198	8.6%
50-59 mph	0	1,685,761	616,021	34,391	4,405	0	58,868	0	0	0	2,399,445	5.5%	2,399,445	6.3%
60-69 mph	0	294,356	146,527	19,599	0	0	0	0	0	0	460,482	1.1%	460,482	1.2%
70+ mph	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	0.0%
Total VMT	5,888,734	13,477,756	1,682,875	83,470	324,125	434,192	4,138,629	4,687,487	6,906,249	6,209,230	43,832,748	100.0%	37,944,013	100.0%
Share	13.4%	30.7%	3.8%	0.2%	0.7%	1.0%	9.4%	10.7%	15.8%	14.2%	100.0%			
Without Centroid Connectors														
Share		35.5%	4.4%	0.2%	0.9%	1.1%	10.9%	12.4%	18.2%	16.4%				100.0%

Weekday Off Peak Period

					Vehicle-Miles Traveled (VMT)									
Speed Range	Centroid Connector	Freeway	Expressway	Parkway	High Speed Ramps	Low Speed Ramps	Class I Arterials	Class II Arterials	Class III Arterials	Class I Collectors	With Centroid Connector Total VMT	%	W/out Centroid Connector Total VMT	%
0 mph	0	0	0	0	0	0	0	33,115	0	0	33,115	0.0%	33,115	0.0%
1-19 mph	10,769,963	9,112	0	0	50,984	471,527	38,268	176,811	140,435	402,644	12,059,744	13.5%	1,289,781	1.6%
20-29 mph	0	66,995	0	0	348,721	549,328	1,672,343	4,217,599	4,663,837	4,575,163	16,093,986	18.1%	16,093,986	20.6%
30-39 mph	0	1,323,167	0	0	180,885	135,238	4,891,135	3,010,474	6,194,679	4,713,590	20,449,168	23.0%	20,449,168	26.1%
40-49 mph	0	10,358,305	190,065	0	92,612	0	550,815	0	0	0	11,191,796	12.6%	11,191,796	14.3%
50-59 mph	0	22,438,507	1,110,700	8,000	66,774	0	535,044	0	0	0	24,159,024	27.1%	24,159,024	30.9%
60-69 mph	0	4,343,342	574,072	117,079	0	0	0	0	0	0	5,034,492	5.7%	5,034,492	6.4%
70+ mph	0	6,224	0	0	0	0	0	0	0	0	6,224	0.0%	6,224	0.0%
Total VMT	10,769,963	38,545,651	1,874,836	125,079	739,976	1,156,093	7,687,604	7,437,999	10,998,951	9,691,396	89,027,549	100.0%	78,257,586	100.0%
Share	12.1%	43.3%	2.1%	0.1%	0.8%	1.3%	8.6%	8.4%	12.4%	10.9%	100.0%			
Without Centroid Connectors														
Share		49.3%	2.4%	0.2%	0.9%	1.5%	9.8%	9.5%	14.1%	12.4%				100.0%

Weekday Summed Daily Period

					Vehicle-Miles Traveled (VMT)									
Speed Range	Centroid Connector	Freeway	Expressway	Parkway	High Speed Ramps	Low Speed Ramps	Class I Arterials	Class II Arterials	Class III Arterials	Class I Collectors	With Centroid Connector Total VMT	%	W/out Centroid Connector Total VMT	%
0 mph	0	0	0	0	0	0	0	57,885	0	0	57,885	0.0%	57,885	0.0%
1-19 mph	20,620,156	2,101,659	118,833	0	182,018	999,645	1,605,571	2,303,701	2,976,077	3,300,509	34,208,166	20.5%	13,588,011	9.3%
20-29 mph	0	4,457,921	172,671	0	594,949	769,019	5,090,454	9,340,935	11,266,194	9,737,545	41,429,687	24.9%	41,429,687	28.4%
30-39 mph	0	9,503,695	365,604	0	311,653	171,917	6,729,668	3,898,254	8,704,609	7,218,413	36,903,812	22.1%	36,903,812	25.3%
40-49 mph	0	16,603,866	813,293	29,480	165,003	0	1,012,985	0	0	0	18,624,627	11.2%	18,624,627	12.8%
50-59 mph	0	26,254,761	2,271,405	87,416	75,981	0	654,474	0	0	0	29,344,037	17.6%	29,344,037	20.1%
60-69 mph	0	5,051,727	858,234	153,283	0	0	0	0	0	0	6,063,244	3.6%	6,063,244	4.2%
70+ mph	0	6,422	0	0	0	0	0	0	0	0	6,422	0.0%	6,422	0.0%
Total VMT	20,620,156	63,980,050	4,600,040	270,180	1,329,603	1,940,580	15,093,150	15,600,776	22,946,880	20,256,467	166,637,880	100.0%	146,017,724	100.0%
Share	12.4%	38.4%	2.8%	0.2%	0.8%	1.2%	9.1%	9.4%	13.8%	12.2%	100.0%			
Without Centroid Connectors														
Share		43.8%	3.2%	0.2%	0.9%	1.3%	10.3%	10.7%	15.7%	13.9%				100.0%

*alternative includes GRTA express bus enhancements

Table 8.2 - Year 2025 ARC Model Output: VMT by Speed Range and Facility Type for ARC Base Alternative*

Weekday AM Peak Period

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Speed Range	Centroid Connector	Freeway	Expressway	Parkway	High Speed Ramps	Low Speed Ramps	Class I Arterials	Class II Arterials	Class III Arterials	Class I Collectors	With Centroid Connector Total VMT	%	W/out Centroid Connector Total VMT	%
0 mph	0	0	0	0	0	0	0	10,373	0	0	10,373	0.0%	10,373	0.0%
1-19 mph	3,983,352	605,047	4,341	0	43,877	227,194	443,298	648,518	793,078	900,935	7,649,638	22.5%	3,666,286	12.2%
20-29 mph	0	1,566,606	44,190	0	126,543	105,751	1,551,965	2,321,384	2,913,468	2,250,280	10,880,188	32.0%	10,880,188	36.3%
30-39 mph	0	3,664,294	64,189	0	55,606	20,775	1,018,488	534,708	1,387,535	1,262,768	8,008,362	23.6%	8,008,362	26.7%
40-49 mph	0	3,677,789	252,856	0	37,679	0	220,100	0	0	0	4,188,424	12.3%	4,188,424	14.0%
50-59 mph	0	2,131,491	477,197	44,927	4,741	0	59,820	0	0	0	2,718,176	8.0%	2,718,176	9.1%
60-69 mph	0	390,977	95,736	16,484	0	0	0	0	0	0	503,196	1.5%	503,196	1.7%
70+ mph	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	0.0%
Total VMT	3,983,352	12,036,204	938,508	61,411	268,445	353,720	3,293,670	3,514,983	5,094,082	4,413,983	33,958,356	100.0%	29,975,004	100.0%
Share	11.7%	35.4%	2.8%	0.2%	0.8%	1.0%	9.7%	10.4%	15.0%	13.0%	100.0%			
Without Centroid Connectors														
Share		40.2%	3.1%	0.2%	0.9%	1.2%	11.0%	11.7%	17.0%	14.7%				100.0%

Weekday PM Peak Period

Speed Range	Centroid Connector	Freeway	Expressway	Parkway	Vehicle-Miles Traveled (VMT) High Speed Ramps	Low Speed Ramps	Class I Arterials	Class II Arterials	Class III Arterials	Class I Collectors	With Centroid Connector Total VMT	%	W/out Centroid Connector Total VMT	%
0 mph	0	0	0	0	0	0	0	14,301	0	0	14,301	0.0%	14,301	0.0%
1-19 mph	5,915,473	1,734,019	130,316	0	103,775	309,167	1,203,526	1,572,441	2,113,886	2,094,612	15,177,213	34.5%	9,261,740	24.3%
20-29 mph	0	2,849,879	146,554	0	121,426	115,222	1,852,500	2,807,503	3,743,526	2,961,150	14,597,759	33.1%	14,597,759	38.3%
30-39 mph	0	4,455,274	276,663	0	73,363	15,787	837,647	343,001	1,126,026	1,235,197	8,362,956	19.0%	8,362,956	21.9%
40-49 mph	0	2,695,751	401,810	29,410	28,607	0	225,696	0	0	0	3,381,273	7.7%	3,381,273	8.9%
50-59 mph	0	1,573,096	442,120	43,570	3,633	0	56,346	0	0	0	2,118,766	4.8%	2,118,766	5.6%
60-69 mph	0	283,560	90,141	10,919	0	0	0	0	0	0	384,620	0.9%	384,620	1.0%
70+ mph	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	0.0%
Total VMT	5,915,473	13,591,578	1,487,603	83,899	330,803	440,176	4,175,715	4,737,244	6,983,437	6,290,959	44,036,888	100.0%	38,121,415	100.0%
Share	13.4%	30.9%	3.4%	0.2%	0.8%	1.0%	9.5%	10.8%	15.9%	14.3%	100.0%			
Without Centroid Connectors														
Share		35.7%	3.9%	0.2%	0.9%	1.2%	11.0%	12.4%	18.3%	16.5%				100.0%

Weekday Off Peak Period

Speed Range	Centroid Connector	Freeway	Expressway	Parkway	Vehicle-Miles Traveled (VMT) High Speed Ramps	Low Speed Ramps	Class I Arterials	Class II Arterials	Class III Arterials	Class I Collectors	With Centroid Connector Total VMT	%	W/out Centroid Connector Total VMT	%
0 mph	0	0	0	0	0	0	0	33,324	0	0	33,324	0.0%	33,324	0.0%
1-19 mph	10,801,848	9,186	0	0	60,352	490,367	34,906	165,009	157,388	398,606	12,117,662	13.6%	1,315,814	1.7%
20-29 mph	0	96,899	0	0	348,916	532,216	1,697,187	4,212,336	4,689,961	4,604,050	16,181,564	18.1%	16,181,564	20.6%
30-39 mph	0	1,282,047	0	0	174,932	133,854	4,917,705	3,051,184	6,182,693	4,729,016	20,471,430	22.9%	20,471,430	26.1%
40-49 mph	0	10,540,383	167,462	0	77,738	0	570,153	0	0	0	11,355,735	12.7%	11,355,735	14.5%
50-59 mph	0	22,399,947	1,099,798	7,404	73,009	0	522,488	0	0	0	24,102,646	27.0%	24,102,646	30.7%
60-69 mph	0	4,327,954	509,812	118,139	0	0	0	0	0	0	4,955,905	5.6%	4,955,905	6.3%
70+ mph	0	6,269	0	0	0	0	0	0	0	0	6,269	0.0%	6,269	0.0%
Total VMT	10,801,848	38,662,685	1,777,071	125,544	734,947	1,156,437	7,742,438	7,461,853	11,030,042	9,731,672	89,224,536	100.0%	78,422,688	100.0%
Share	12.1%	43.3%	2.0%	0.1%	0.8%	1.3%	8.7%	8.4%	12.4%	10.9%	100.0%			
Without Centroid Connectors														
Share		49.3%	2.3%	0.2%	0.9%	1.5%	9.9%	9.5%	14.1%	12.4%				100.0%

Weekday Summed Daily Period

Speed Range	Centroid Connector	Freeway	Expressway	Parkway	Vehicle-Miles Traveled (VMT) High Speed Ramps	Low Speed Ramps	Class I Arterials	Class II Arterials	Class III Arterials	Class I Collectors	With Centroid Connector Total VMT	%	W/out Centroid Connector Total VMT	%
0 mph	0	0	0	0	0	0	0	57,997	0	0	57,997	0.0%	57,997	0.0%
1-19 mph	20,700,673	2,348,252	134,656	0	208,003	1,026,728	1,681,730	2,385,968	3,064,352	3,394,152	34,944,513	20.9%	14,243,840	9.7%
20-29 mph	0	4,513,384	190,744	0	596,885	753,190	5,101,652	9,341,222	11,346,955	9,815,480	41,659,511	24.9%	41,659,511	28.4%
30-39 mph	0	9,401,615	340,852	0	303,900	170,416	6,773,839	3,928,892	8,696,254	7,226,981	36,842,749	22.0%	36,842,749	25.1%
40-49 mph	0	16,913,923	822,127	29,410	144,024	0	1,015,949	0	0	0	18,925,432	11.3%	18,925,432	12.9%
50-59 mph	0	26,104,535	2,019,115	95,902	81,383	0	638,653	0	0	0	28,939,588	17.3%	28,939,588	19.8%
60-69 mph	0	5,002,491	695,688	145,542	0	0	0	0	0	0	5,843,720	3.5%	5,843,720	4.0%
70+ mph	0	6,269	0	0	0	0	0	0	0	0	6,269	0.0%	6,269	0.0%
Total VMT	20,700,673	64,290,467	4,203,182	270,854	1,334,195	1,950,334	15,211,823	15,714,079	23,107,561	20,436,613	167,219,780	100.0%	146,519,107	100.0%
Share	12.4%	38.4%	2.5%	0.2%	0.8%	1.2%	9.1%	9.4%	13.8%	12.2%	100.0%			
Without Centroid Connectors														
Share		43.9%	2.9%	0.2%	0.9%	1.3%	10.4%	10.7%	15.8%	13.9%				100.0%

*alternative excludes GRTA express bus enhancements

Table 8.3 - Year 2025 ARC Model Output: VMT Differentials Comparing HOV System Build with Base Alternative*

Weekday AM Peak Period

Difference in Vehicle-Miles Traveled (VMT)

Speed Range	Centroid Connector	Freeway	Expressway	Parkway	High Speed Ramps	Low Speed Ramps	Class I Arterials	Class II Arterials	Class III Arterials	Class I Collectors	With Centroid Connector Total VMT	%	W/out Centroid Connector Total VMT	%
0 mph	0	0	0	0	0	0	0	43	0	0	43	0.0%	43	0.0%
1-19 mph	-21,893	-86,786	1,068	0	-5,494	-3,052	-19,570	-20,452	-18,512	-43,354	-218,045	120.6%	-196,152	123.5%
20-29 mph	0	45,049	-25,255	0	-88	-1,495	-11,905	-31,172	-19,621	-27,575	-72,063	39.9%	-72,063	45.4%
30-39 mph	0	-45,813	25,794	0	2,027	1,122	-12,115	11,889	-14,270	12,787	-18,580	10.3%	-18,580	11.7%
40-49 mph	0	-14,262	-7,173	0	550	0	16,095	0	0	0	-4,790	2.7%	-4,790	3.0%
50-59 mph	0	-998	67,487	98	62	0	743	0	0	0	67,392	-37.3%	67,392	-42.4%
60-69 mph	0	23,053	41,900	122	0	0	0	0	0	0	65,074	-36.0%	65,074	-41.0%
70+ mph	0	198	0	0	0	0	0	0	0	0	198	-0.1%	198	-0.1%
Total VMT	-21,893	-79,561	103,821	220	-2,943	-3,426	-26,753	-39,693	-52,402	-58,142	-180,772	100.0%	-158,879	100.0%
Share	12.1%	44.0%	-57.4%	-0.1%	1.6%	1.9%	14.8%	22.0%	29.0%	32.2%	100.0%			
Without Centroid Connectors														
Share		50.1%	-65.3%	-0.1%	1.9%	2.2%	16.8%	25.0%	33.0%	36.6%				100.0%

Weekday PM Peak Period

Difference in Vehicle-Miles Traveled (VMT)

Speed Range	Centroid Connector	Freeway	Expressway	Parkway	High Speed Ramps	Low Speed Ramps	Class I Arterials	Class II Arterials	Class III Arterials	Class I Collectors	With Centroid Connector Total VMT	%	W/out Centroid Connector Total VMT	%
0 mph	0	0	0	0	0	0	0	55	0	0	55	0.0%	55	0.0%
1-19 mph	-26,739	-159,733	-16,892	0	-11,123	-5,191	-59,951	-73,617	-52,810	-54,327	-460,384	225.5%	-433,645	244.4%
20-29 mph	0	-70,608	7,183	0	-1,655	212	25,551	25,622	-35,017	-21,473	-70,183	34.4%	-70,183	39.6%
30-39 mph	0	106,774	-1,041	0	-227	-1,005	-5,487	-1,817	10,639	-5,929	101,906	-49.9%	101,906	-57.4%
40-49 mph	0	-113,716	-24,264	70	5,555	0	279	0	0	0	-132,075	64.7%	-132,075	74.4%
50-59 mph	0	112,665	173,901	-9,179	772	0	2,522	0	0	0	280,679	-137.5%	280,679	-158.2%
60-69 mph	0	10,796	56,386	8,680	0	0	0	0	0	0	75,862	-37.2%	75,862	-42.8%
70+ mph	0	0	0	0	0	0	0	0	0	0	0	0.0%	0	0.0%
Total VMT	-26,739	-113,823	195,272	-429	-6,678	-5,984	-37,086	-49,757	-77,188	-81,729	-204,141	100.0%	-177,402	100.0%
Share	13.1%	55.8%	-95.7%	0.2%	3.3%	2.9%	18.2%	24.4%	37.8%	40.0%	100.0%			
Without Centroid Connectors														
Share		64.2%	-110.1%	0.2%	3.8%	3.4%	20.9%	28.0%	43.5%	46.1%				100.0%

Weekday Off Peak Period

Difference in Vehicle-Miles Traveled (VMT)

Speed Range	Centroid Connector	Freeway	Expressway	Parkway	High Speed Ramps	Low Speed Ramps	Class I Arterials	Class II Arterials	Class III Arterials	Class I Collectors	With Centroid Connector Total VMT	%	W/out Centroid Connector Total VMT	%
0 mph	0	0	0	0	0	0	0	-209	0	0	-209	0.1%	-209	0.1%
1-19 mph	-31,885	-74	0	0	-9,368	-18,840	3,362	11,802	-16,953	4,038	-57,918	29.4%	-26,033	15.8%
20-29 mph	0	-29,904	0	0	-195	17,112	-24,844	5,264	-26,124	-28,887	-87,579	44.5%	-87,579	53.0%
30-39 mph	0	41,120	0	0	5,953	1,384	-26,570	-40,710	11,987	-15,427	-22,262	11.3%	-22,262	13.5%
40-49 mph	0	-182,079	22,603	0	14,874	0	-19,338	0	0	0	-163,939	83.2%	-163,939	99.3%
50-59 mph	0	38,560	10,902	596	-6,236	0	12,556	0	0	0	56,378	-28.6%	56,378	-34.1%
60-69 mph	0	15,388	64,260	-1,060	0	0	0	0	0	0	78,588	-39.9%	78,588	-47.6%
70+ mph	0	-45	0	0	0	0	0	0	0	0	-45	0.0%	-45	0.0%
Total VMT	-31,885	-117,034	97,765	-465	5,029	-344	-54,833	-23,854	-31,091	-40,276	-196,987	100.0%	-165,102	100.0%
Share	16.2%	59.4%	-49.6%	0.2%	-2.6%	0.2%	27.8%	12.1%	15.8%	20.4%	100.0%			
Without Centroid Connectors														
Share		70.9%	-59.2%	0.3%	-3.0%	0.2%	33.2%	14.4%	18.8%	24.4%				100.0%

Weekday Summed Daily Period

Difference in Vehicle-Miles Traveled (VMT)

Speed Range	Centroid Connector	Freeway	Expressway	Parkway	High Speed Ramps	Low Speed Ramps	Class I Arterials	Class II Arterials	Class III Arterials	Class I Collectors	With Centroid Connector Total VMT	%	W/out Centroid Connector Total VMT	%
0 mph	0	0	0	0	0	0	0	-112	0	0	-112	0.0%	-112	0.0%
1-19 mph	-80,517	-246,593	-15,824	0	-25,985	-27,083	-76,159	-82,267	-88,275	-93,644	-736,347	126.5%	-655,830	130.8%
20-29 mph	0	-55,463	-18,073	0	-1,937	15,829	-11,198	-287	-80,761	-77,935	-229,825	39.5%	-229,825	45.8%
30-39 mph	0	102,080	24,752	0	7,753	1,501	-44,172	-30,638	8,355	-8,568	61,064	-10.5%	61,064	-12.2%
40-49 mph	0	-310,057	-8,834	70	20,979	0	-2,964	0	0	0	-300,805	51.7%	-300,805	60.0%
50-59 mph	0	150,226	252,290	-8,486	-5,402	0	15,820	0	0	0	404,448	-69.5%	404,448	-80.7%
60-69 mph	0	49,237	162,546	7,741	0	0	0	0	0	0	219,524	-37.7%	219,524	-43.8%
70+ mph	0	153	0	0	0	0	0	0	0	0	153	0.0%	153	0.0%
Total VMT	-80,517	-310,417	396,858	-674	-4,592	-9,754	-118,673	-113,304	-160,681	-180,146	-581,900	100.0%	-501,383	100.0%
Share	13.8%	53.3%	-68.2%	0.1%	0.8%	1.7%	20.4%	19.5%	27.6%	31.0%	100.0%			
Without Centroid Connectors														
Share		61.9%	-79.2%	0.1%	0.9%	1.9%	23.7%	22.6%	32.0%	35.9%				100.0%

*HOV System Build alternative includes, but ARC Base alternative excludes GRTA express bus enhancements

9.0 Next Steps

9.1 Establishing a Sustainable HOV System Process

The nationwide HOV experience suggests public acceptance of HOV systems is necessary for their success. It is necessary to provide both public policy makers and the public at large with information supporting the value of the HOV system to the community. The lack of this support has resulted in the failure of some HOV systems. In locations where HOV facilities have appeared underutilized, there has been public debate about the effectiveness of HOV lanes in the transportation system. A recent example of the public's concern about HOV effectiveness occurred in Minnesota. The Minnesota state legislature and the public called for converting an existing HOV lane to a general-purpose lane due to underutilization. The Minnesota Department of Transportation did not have an ongoing data collection and feedback loop in place to demonstrate whether the HOV lanes were achieving stated goals. Consequently, Minnesota DOT commissioned a special study to test whether it was more beneficial to covert the HOV lanes to general-purpose lanes or leave them as HOV lanes.

As the State of Georgia expands its HOV system, an opportunity exists to initiate a system to test measures of effectiveness (MOEs). Implementation of formal data collection and reporting can provide feedback to effectively counteract negative publicity about perceived under-performing HOV lanes. Dallas Area Rapid Transit (DART) in Texas and CalTrans District 7: Los Angeles and Ventura Counties are two examples of organizations that regularly monitor HOV operations and track historical trends of carpool and people movement volumes. Both organizations are able to demonstrate comparisons of HOV versus general-purpose lane usage.

To test HOV program policies, measures of effectiveness should be developed that help answer to what extent HOV facilities are achieving established goals. The two primary MOEs adopted for the Atlanta area HOV lanes are achieving greater person throughput and reliable, consistent travel time savings. As with any monitoring program, establishing clear and identifiable goals, objectives, and strategies to measure the program's success is vital. The main concern is how to conduct the measurement in a meaningful manner. The Texas Transportation Institute (TTI) has had considerable experience in collecting and analyzing HOV data for DART and other agencies. Generally, TTI employs two basic approaches. The first is to perform pre- and post- trend-line data comparisons for each facility where HOV was developed. The second is to collect the same data in non-HOV facilities and HOV facilities and perform comparative analysis. An example of this locally is the pre- and post- analysis of the I-85 HOV extension beyond I-285. This general process is detailed below.

9.1.1 Pre- and Post- Testing of HOV Facilities

In order to find out how an HOV facility performs over time, it is necessary to compare the before and after impacts of an HOV lane on a freeway facility. After identifying relevant objectives and measurements for HOV, one can collect base-line data on the facility before it is under construction for HOV. This will establish the everyday general-purpose lane conditions on the freeway. Then, once the HOV lane is in operation, data on high-occupancy vehicle use and single occupancy vehicle use as well as travel times in HOV versus non-HOV lanes are collected. In the first few years of operation, it is useful to collect data frequently to measure the HOV effectiveness and then decrease the frequency of data collection and reporting over time. For example, after a new HOV lane is in operation, the necessary data could be collected monthly for the first six months, quarterly for the next two years, and then annually thereafter. TTI has observed in Texas that it takes a few years to reach a consistent level of HOV use on a facility.

9.1.2 Data Collection

Only a small portion of the raw data used to perform HOV measurements of effectiveness analyses can be generated electronically. The primary collection tool is an observation survey. This requires employing people to observe and tally auto occupancy, traffic volumes, HOV violations, and monitor travel time. Usually, data is collected only during the peak periods, not daily. Overall, the manual data collection process is cost-intensive. However, technology needs to be monitored for the potential use in data collection to simplify the process. Some data, such as HOV violations, may be easier to collect as databases for regional enforcement are put in place. Table 9.1 summaries HOV objectives, measures of effectiveness, and data collection techniques utilized by the Texas Transportation Institute.

Table 9.1 – Measures of Effectiveness Matrix

Objective	Measure of Effectiveness	Data Collection
Increase person movement Ridership of 10,000 or more Greater percent of persons in HOV lane vs. SOV lane during peak hour	Person movement Vehicle movement	Visual Survey – count vehicles, persons Automatic vehicle identification (AVI) readers located in HOV and general-purpose lanes
Increase vehicle occupancy	Vehicle occupancy	Visual occupancy count survey – count persons
Maintain reliability and integrity of HOV lane	Accident rate Violation rate Vehicle breakdown rate	Accident data – state records Visual survey – state records
Demonstrate travel time savings of HOV over SOV lanes	Average operating speed/travel time	Manual travel time surveys using floating car method
Increase number of carpools	Carpool formation	Visual survey – count carpools
Enhance bus operations	Average bus operating speeds during peak hour	Manual travel time surveys using floating car method
Increase bus ridership	Bus vehicle and passenger trips	Visual survey – count bus occupancy
Increase Park and Ride Utilization	Average daily number and percent of spaces utilized	Visual survey – count spaces
Increase and maintain public support	Person satisfaction	Random survey
No adverse impact on general-purpose lanes Change in general-purpose lane speed Change in accident rate	Average operating speed/travel time Accident rate	Manual travel time surveys using floating car method Accident data – state
Cost effective increase of person-movement capacity Value of benefit outweigh costs Greater B/C ratio than SOV lane alternative	Average cost HOV construction Average cost of HOV support facilities Average cost of daily operation and enforcement	TTI has used the MicroBENCOST economic planning tool to analyze cost-effectiveness. It has other data input such as traffic, accident rate and geometric configuration in addition to cost inputs.
Improve air quality	Tons of pollutants emitted	Air quality monitoring station and model estimates
Reduce fuel consumption	Gallons of fuel consumed	Model estimates

9.2 Planning Toolkit for Implementation

The planning toolkit for HOV implementation briefly covers additional analysis required as HOV projects proceed to design and environmental review. The HOV Strategic Implementation Plan for the Atlanta Region primarily focused on how to sequence development of HOV throughout the region. The planning analysis was conducted at a screening level. The results of the effort provide a guide for future development, but in most cases, additional, more detailed analyses are necessary in order to successfully implement HOV and complementary facilities. The following outlines specific areas for a detailed planning HOV lane evaluation.

The HOV Strategic Implementation Plan used existing and projected mainline traffic volumes along sections between existing interchanges. Some additional counts were collected during the study, but additional traffic information will be needed such as:

- 24-hour vehicle counts along freeway mainline and/or at interchange ramps and along the current interchanging arterial roadways as well as non-interchanging, roadway crossings that could provide potential HOV interchange opportunities

- AM and PM peak period traffic turning movement counts at all current interchange intersections along the project corridor, at intersections in close proximity to the existing interchange intersections, and at intersections that may be heavily impacted due to the diversion of HOV traffic to exclusive HOV interchanges
- Baseline auto occupancy and vehicle classification counts on corridor and arterial roadways
- Directional splits (derived from peak period and daily traffic counts)

Some current and future land use data were reviewed for the implementation plan, but this review was at a macroscopic level. More detailed data may be available from local and regional agencies to meet these needs, GDOT should work closely with these agencies to minimize redundancy in data collection. To establish a better understanding of potential land use compatibility and impacts, the following should be performed:

- Evaluate land uses adjacent in the project corridor in order to ultimately determine the feasibility and impacts of alternative design concepts
- Evaluate existing and future land uses by major land use type as well as private versus public ownership
- Identify and inventory land uses on a parcel by parcel basis up to one-quarter mile radius of the corridor right-of-way at current and potential new interchange locations particularly where existing and potential park and ride facilities are integrated in the HOV system

Though modeling the proposed HOV system was one part of the HOV plan, this model output performed at a gross level on the mainline. For a corridor-specific examination, the planning evaluation will require:

- Developing daily (ADT) traffic volumes for the existing condition and future year conditions
- Establishing growth rates by segments along the corridor roadway. This will allow the application of the rates to existing traffic data or supplemented traffic counts to establish the existing condition for the traffic operations analysis

However, the ARC model is currently being redeveloped, and the new model will more precisely output data on HOV. This new model will need to be monitored for new output that may more accurately define HOV related data.

Additional considerations are:

- Performing a traffic operations analysis for the existing and future background (No-Build) condition to establish a basis of comparing operations associated with the concept alternatives
- Examining heavily impacted intersections associated with the HOV interchanges
- Conducting highway operational analyses for weaving, ramp junction and basis freeway segment operations
- Developing a traffic simulation model to assess potential network modifications associated with the alternative concepts as well as operational modifications
- Finally, it will be necessary to continue coordination with the transit agencies, local jurisdictions and other agencies.

9.3 Design Toolkit for Implementation

As HOV projects move into the concept development stage, there are several issues that should be noted for the benefit of those responsible for the development of the concepts. While many detailed issues were analyzed during this study, concept level layouts, typical sections and final cost estimates were not prepared. However, the analysis and recommendations of this study are a good starting point and should be reviewed before proceeding with concept development. Based on the work performed to develop the HOV Strategic Implementation Plan, the following are recommended for consideration by the engineers responsible for concept development.

- Database
  - A GIS level database was used for this study.
  - Aerial photography was flown at altitudes that are too high for use in preparing design level mapping.
  - New photography and mapping should be obtained for concept and design.
- Typical Sections
  - Barrier separation is desirable and should be used wherever practical. Moveable barriers, with provisions for drainage, should be placed in a full-depth pavement buffer between the HOV lane and general use lanes.
  - Buffer separation should be used to avoid unnecessary bridge replacements, excessive property impacts, or undesirable environmental impacts. When buffer separation must be used, they should desirably be 4' wide with vertical delineator posts.

- Alternative typical sections, layouts and cost estimates should be analyzed during concept development.
- While a consistent typical section is desirable, the final design may be a mixture of barrier and buffer separation.
- Where possible, the design should provide flexibility to allow for change in operation as conditions warrant. This should include the ability to convert the typical section to two HOV lanes or to relocate direct merge or slip ramps.

- Access
  - The locations and types of HOV access recommended in this study are a good starting point. However, alternative locations and types should be studied during concept development.
  - Direct access locations should be established first.
  - Intermediate slip ramps should be located in areas not well covered by direct access points to capture HOV traffic that enter the freeway by general use interchanges.
  - Direct merge access should only be used on buffer separated facilities and in areas where slip ramps and direct access are not practical.
  - Slip ramps or direct merge access locations should be a sufficient distance from general use interchanges to allow safe weaves across the general use lanes. Where general use interchanges are spaced closely, the slip ramp or direct merge access should cover two or more interchanges.
- Enforcement Areas
  - Provide safe enforcement areas where practical.
  - For barrier separated systems, enforcement areas should be placed at all access points, especially the exits.
  - Long gaps without an enforcement area should be avoided. The opportunity for vehicles to enter and exit the HOV system in areas without enforcement provisions should be avoided.
  - Enforcement areas should be located so as not to give the violator an opportunity to exit the HOV system after seeing an enforcement vehicle.
- Other Issues
  - All design should be in accordance with all AASHTO and GDOT guidelines and policies.
  - Guide sign placement must be considered during concept development.

HOV System Plan

October 2003