PHASE I
CONCEPTUAL COST ESTIMATES

TECHNICAL MEMORANDUM

Marietta-Lawrenceville
Transportation Study

PREPARED FOR:

Atlanta Regional Commission

September 2000

URS

PHASE 1
TRAVEL DEMAND AND MOBILITY EVALUATION

TECHNICAL MEMORANDUM

MARIETTA-LAWRENCEVILLE TRANSPORTATION STUDY

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MARIETTA
LAWRENCEVILLE
A BETTER WAY AROUND

1. INTRODUCTION

The Marietta-Lawrenceville Study was initiated by the Atlanta Regional Commission (ARC) to identify and assess sound transportation strategies and opportunities for improving east-west mobility throughout the northern Atlanta metropolitan area. The overriding mission of the study is to develop a comprehensive and integrated approach to addressing transportation infrastructure and programmatic solutions to travel in the northern portion of the metropolitan area.

The Marietta-Lawrenceville Transportation Study is taking a phased approach to development and analysis of alternatives. The first analysis phase, termed the Pre-Screening Phase, was completed in June, 2000. This Pre-Screening Phase evaluated a broad universe of alternatives that ran a full gamut of locations and technology options. Nearly 100 alternatives were evaluated as part of this analysis. The Pre-Screening Analysis eliminated a host of alternatives consistent with the Evaluation Framework document approved by ARC. After completion of the Pre-Screening Phase, three corridor alternatives, each with several technology options, were considered viable for further analysis.

Phase 1 analysis will further evaluate the alternatives coming forth from the Pre-Screening Analysis. The Phase 1 analysis will provide more detail than was possible at the Pre-Screen phase. However, the Phase 1 analysis is still considered to be a systems level analysis conducted on the several alternative corridors. After completion of the Phase 1 analysis, more detailed analysis will be completed on a selected corridor. This additional analysis step will comprise the Phase 2 analysis.

In the Phase 2 analysis, further detailed analysis will be conducted on the final selected corridor. This phase will evaluate preliminary feasibility, and will identify land use, engineering, and environmental mitigation that may be required to support a final selected alternative corridor and technology. This phase will provide a regulatory framework for decision makers and stakeholders to use to determine the viability of the proposed selected alternative, and the corresponding programs and policies that would accompany and support it.

1.1 REPORT PURPOSE

The purpose of this report is to provide cost information to be used for comparative evaluation of the Phase 1 Alternatives. The alternatives were described in detail in the recently completed Definition of Phase 1 Alternatives Report, completed in August, 2000. The cost data contained herein is conceptual; that is, there are still many unknowns relative to the final design and alignment of the alternatives in each corridor. This level of uncertainty is common at this stage of analysis for a project of this type. Therefore, the costs developed for the alternatives described herein represent order-of-magnitude level of costs. As alternatives analysis progresses, and project alternatives are refined, then the cost estimates can also be refined with more specificity.

2. DESCRIPTION OF PHASE 1 ALTERNATIVES

As described previously, alternatives for Phase 1 analysis were developed as part of the Definition of Phase 1 Alternatives Report. Summaries of these alternatives are provided in the following sections, and are shown on Figures 1-3.

2.1 CORRIDOR A

Corridor A would link four major activity centers identified within the study area: Marietta, North Point, Gwinnett Place, and Lawrenceville.

The general corridor is described below, and includes optional alignments in several areas. The corridor could be used by either rail or rapid bus alternatives. This alternative would include 23 stations along its approximate 44 mile length.

- The corridor begins near the Marietta Square, then follows either SR120 or the north or south Marietta Loop to East Marietta. At Cobb Parkway the line would intersect the proposed Northwest Line that will connect Town Center, Cumberland, and Arts Center.
- The corridor then follows Roswell Road (SR120) through East Cobb to Roswell.
- The corridor continues northeast through Roswell to the North Point activity center along GA 400. Several alignment options are possible in this area, including use of portions of Alpharetta Street, Old Roswell Road, and Mansell Road. At North Point the line would intersect the proposed MARTA North Line extension.
- From North Point the line would run southeast to Gwinnett County along one of two options: SR120 (Abbots Bridge), or Old Milton Parkway and State Bridge Road.
- The SR120 option would continue to Sugarloaf Parkway, passing Discover Mills, then turn east on GA 316 to reach Lawrenceville. The State Bridge option would cross the Chattahoochee River, and continue along Pleasant Hill Road to the vicinity of Gwinnett Place, then turn east, generally along Satellite Blvd/I-85. From the I-85/GA 316 interchange the line could either follow I-85 to GA 120 and Discover Mills and continue as above, or it could stay along GA 316 to Lawrenceville.
- The corridor continues into downtown Lawrenceville, where it could intercept the Athens Commuter Rail Line in the vicinity of West Pike Street. Alternatively the corridor would continue along GA 316 to the proposed commuter rail station east of Lawrenceville near the airport, avoiding potential impacts in downtown Lawrenceville and serving the new college site at Collins Hill Road.

Specific features of the alignment would depend on the mode:

- If traditional light rail is used, much of the alignment could be at-grade. Elevated sections would be required to cross freeways and possibly other major highways. Signal pre-emption would be desirable at any at-grade intersections. A short section of subway is an alternative to at-grade service through the historic district of Roswell.

- If a fully grade-separated rail system is used (AGT or monorail), more of the alignment would have to be elevated or possibly depressed where streets or driveways cross the alignment. A tunnel is an option in Roswell.
- Bus rapid transit would use a combination of exclusive guideway and preferential treatment. Where right-of-way could be obtained, a mostly at-grade busway could be developed, with grade separations at major highways and signal pre-emption at other intersections, similar to the light rail alternative. In areas with significant restrictions, such as downtown Roswell, buses could operate along existing streets, with signal pre-emption at key intersections. Near the ends of the line and at major activity centers, bus lines serving multiple locations could feed into the line. The feeder lines would generally not require exclusive guideway, but could use various types of preferential treatment.

2.2 CORRIDOR B

Corridor B traverses primarily the central part of the study area. It is identical to Corridor A west of Johnson Ferry Road in East Cobb, and east of Gwinnett Place. In between, it generally follows Johnson Ferry Road, I-285, and I-85, and would serve six major activity centers: Marietta, Sandy Springs, Perimeter Center, Doraville, Gwinnett Place, and Lawrenceville. An alternative alignment could serve Peachtree Corners. The line would connect with four radial transit lines: the proposed Northwest Line; the North Line in the Perimeter Center area, the Northeast Line in Doraville, and the proposed Athens Commuter Rail Line in Lawrenceville.

The general corridor is described below, and includes optional alignments in several portions of the corridor. The corridor could be used by either rail or rapid bus alternatives. This alternative would include 24 stations along its approximate 43 mile length.

- The corridor begins near the Marietta Square and follows either SR120 or the north or south Marietta Loop to East Marietta. At Cobb Parkway the line intersects the proposed Northwest Line that will connect Town Center, Cumberland, and Arts Center.
- The corridor then follows Roswell Road (SR120) to Johnson Ferry Road, which it follows southeast to Sandy Springs.
- After entering Sandy Springs there are several alignment options for reaching the Perimeter Center area, including : Abernathy – Roswell – Hammond; Abernathy – Barfield/GA 400 – Hammond; Abernathy – Perimeter Center West.
- In the Perimeter Center area, a connection with the Sandy Springs and/or Dunwoody stations on MARTA's North Line is provided.
- The corridor proceeds east along I-285 to the Doraville area, where a connection to the Doraville Station on the Northeast Line would be also be provided.
- From Doraville the corridor runs northeast to Gwinnett Place. There are three primary corridor options: Peachtree Industrial Blvd.; Buford Highway; or I-285 and then I-85. Further variations could use a major electric transmission corridor between Peachtree Corners and Gwinnett Place to transition from one to another primary corridor.
- From Gwinnett Place the corridor runs east to Lawrenceville, with two major alignment options. The northern option would proceed along the I-85/Satellite Blvd. corridor to SR 120, then east to the Discover Mills area, then southeast along Sugarloaf Parkway, then

turn east on GA 316 to reach Lawrenceville. The southern option would follow I-85 and then GA 316 to Lawrenceville.

- In downtown Lawrenceville, it would intercept the Athens Commuter Rail Line at a station near West Pike Street. An alternative alignment would continue along GA 316 to the proposed commuter rail station east of near the airport, avoiding potential impacts in downtown Lawrenceville and serving the new college site at Collins Hill Road.

Specific features of the alignment would depend on the mode, as follows:

- If traditional light rail is used, much of the alignment could be at-grade. Elevated sections would be required to cross freeways and possibly other major highways. Signal pre-emption would be desirable at any at-grade intersections. A short section of subway would be an alternative to at-grade service through the historic district of Roswell.
- If a fully grade-separated rail system is used (AGT or monorail), most of the alternative would be elevated or possibly depressed, particularly where streets or driveways cross the alignment; a tunnel would be an option in Roswell.
- Bus rapid transit would use a combination of exclusive guideway and preferential treatment. Where right-of-way could be obtained, a mostly at-grade busway could be developed, with grade separations at major highways and signal pre-emption at other intersections, similar to the light rail alternative. Along GA 316, I-85, and I-285, bus rapid transit could take advantage of and operate in the HOV lanes. Additional special HOV ramps would be required to improve the speeds for this scenario. In addition, the HOV lane operation might have to be changed to 3+ occupancy to avoid the congestion that is currently forecast for some key segments with 2+ occupancy. Near the ends of the line and at major activity centers, bus lines serving multiple locations could feed on and off of the trunk line. The feeder lines would generally not require exclusive guideway, but could use various types of preferential treatment.

2.3 CORRIDOR C

Corridor C is identical to Corridor A west of Roswell and east of Gwinnett Place. In the intervening portion, it generally follows Holcomb Bridge Road instead of SR 120 or State Bridge Road to the I-85/Peachtree Industrial corridor. It would serve three of the same major activity centers as Corridor A: Marietta, Gwinnett Place, and Lawrenceville. It would also serve the Peachtree Corners activity center.

The general corridor is described below, and includes optional alignments in several portions of the corridor. The corridor could be used by either rail or rapid bus alternatives. This alternative would include 24 stations along its approximate 44 mile length.

- The corridor would begin near the Marietta Square; the line could follow either SR120 or the north or south Marietta Loop to East Marietta. At Cobb Parkway the line would intersect the proposed Northwest Line that will connect Town Center, Cumberland, and Arts Center.
- The corridor then follows Roswell Road (SR120) through East Cobb to Roswell.

- The corridor then turns southeast along Holcomb Bridge Road, allowing for a connection to the proposed North Line extension, and continues southeast to the Peachtree Corners area. There is a long-range possibility of a connection with an extension of MARTA's Northeast Line to the Peachtree Corners area.
- Several options are possible in the corridor between Peachtree Corners and Gwinnett Place: Peachtree Industrial Blvd.; Jimmy Carter Blvd. and then Buford Highway; or Jimmy Carter and then I-85. Further variations could use a major electric transmission corridor between Norcross and Gwinnett Place.
- From Gwinnett Place the corridor runs east to Lawrenceville, with two options: the northern option would proceed along the I-85/Satellite Blvd. corridor to SR 120, then east to the Discover Mills area, then southeast along Sugarloaf Parkway, then turn east on GA 316 to reach Lawrenceville; the southern option would follow I-85 and then GA 316 to Lawrenceville.
- In the Lawrenceville area, the corridor could run into downtown Lawrenceville, where it could intercept the Athens Commuter Rail Line at a new station at West Pike Street. An alternative alignment would continue along GA 316 to the proposed commuter rail station east of near the airport; this would avoid potential impacts in downtown Lawrenceville, and serve the new college site at Collins Hill Road.

Specific features of the alignment would depend on the mode:

- If traditional light rail is used, much of the alignment could be at-grade. Elevated sections would be required to cross freeways and possibly other major highways. Signal pre-emption would be desirable at any at-grade intersections. A short section of subway would be an alternative to at-grade service through the historic district of Roswell.
- If a fully grade-separated rail system is used (AGT or monorail), much of the alternative would be elevated or possibly depressed, particularly where streets or driveways cross the alignment; a tunnel would be an option in Roswell.
- Bus rapid transit would use a combination of exclusive guideway and preferential treatment. Where right-of-way could be obtained, a mostly at-grade busway could be developed, with grade separations at major highways and signal pre-emption at other intersections, similar to the light rail alternative. In areas with significant restrictions, such as downtown Roswell, buses could operate along existing streets, with signal pre-emption at key intersections. Near the ends of the line and at major activity centers, bus lines serving multiple locations could feed into the line. The feeder lines would generally not require exclusive guideway, but could use various types of preferential treatment.

2.4 CORRIDOR D

Corridor D is identical to Corridor B east of Perimeter Center. The western portion of the corridor generally follows I-75 and I-285 from Marietta to Cumberland to Perimeter Center. The portion of the corridor between Marietta and Cumberland would also be served by the proposed Northwest Line. This segment could be integrated into the Marietta-Lawrenceville corridor.

Corridor D would link seven major activity centers: Marietta, Cumberland, Sandy Springs, Perimeter Center, Doraville/I-85, Gwinnett Place, and Lawrenceville. An alignment option via Peachtree Industrial could also serve the Peachtree Corners activity center. The line would connect with four radial transit lines: the proposed Northwest Line; the North Line in the Perimeter Center area, the Northeast Line in Doraville, and the proposed Athens Commuter Rail Line in Lawrenceville.

The general corridor is described below, and includes optional alignments in several portions of the corridor. The corridor could be used by either rail or rapid bus alternatives. This corridor is the only one of the four proposed corridors where heavy rail is one of the candidate technologies, in addition to LRT, AGT, BRT, and bus. The general corridor and the specific test alignment are shown in Figure 4.

- Since the Northwest Line is proposed to run along US 41 from Cumberland to north of Marietta, it could also provide service as part of the Marietta Lawrenceville corridor. One option would be to have a passenger transfer junction in the Cumberland area. The other option would be to use the same technology for both lines, and have a track junction near Cumberland. Under this scenario, some trains from Town Center and Marietta could operate to Arts Center, and others to Perimeter Center and Gwinnett. A shuttle or spur from US 41 into downtown Marietta could be added.
- From Cumberland the corridor would follow I-285 to Sandy Springs and Perimeter Center. In Sandy Springs there are several alignment options on either side of I-285, including segments of I-285, Mt. Vernon, Hammond, and GA 400. The line could connect with the North Line at Dunwoody or Medical Center Station.
- The corridor proceeds east along I-285 to the Doraville area, where a connection to the Doraville Station on the Northeast Line could be provided.
- From Doraville the corridor runs northeast to Gwinnett Place. There are three primary alignment options: Peachtree Industrial Blvd.; Buford Highway; or I-285 and then I-85. Further variations could use a major electric transmission corridor between Peachtree Corners and Gwinnett Place to transition from one to another primary corridor.
- From Gwinnett Place the corridor runs east to Lawrenceville, with two major alignment options. The northern option would proceed along the I-85/Satellite Blvd. corridor to SR 120, then east to the Discover Mills area, then southeast along Sugarloaf Parkway, then turn east on GA 316 to reach Lawrenceville. The southern option would follow I-85 and then GA 316 to Lawrenceville.
- In the Lawrenceville area, the corridor could run into downtown Lawrenceville, where it could intercept the Athens Commuter Rail Line at a new station at West Pike Street. An alternative alignment would continue along GA 316 to the proposed commuter rail station east of near the airport, thus avoiding potential impacts in downtown Lawrenceville, and serving the new college site at Collins Hill Road.

Specific features of the alignment would depend on the mode:

- If traditional light rail is used, much of the alignment could be at-grade. Elevated sections would be required to cross freeways and possibly other major highways. Signal pre-emption would be desirable for crossing at-grade intersections.

- If a fully grade-separated rail system is used (AGT or monorail), most of the alignment would likely be elevated or possibly depressed where streets or driveways are crossed.
- The bus rapid transit alternative could make extensive use of the future HOV lanes along I-75, I-285, I-85, and GA 316. New construction would consist mainly of exclusive connecting ramps, on-line stations, park-ride lots, and preferential treatment for buses along approach roads and for distribution in major activity centers. The system could be used by multiple bus routes, serving different origins and destinations, to reduce the need for transfer activities.

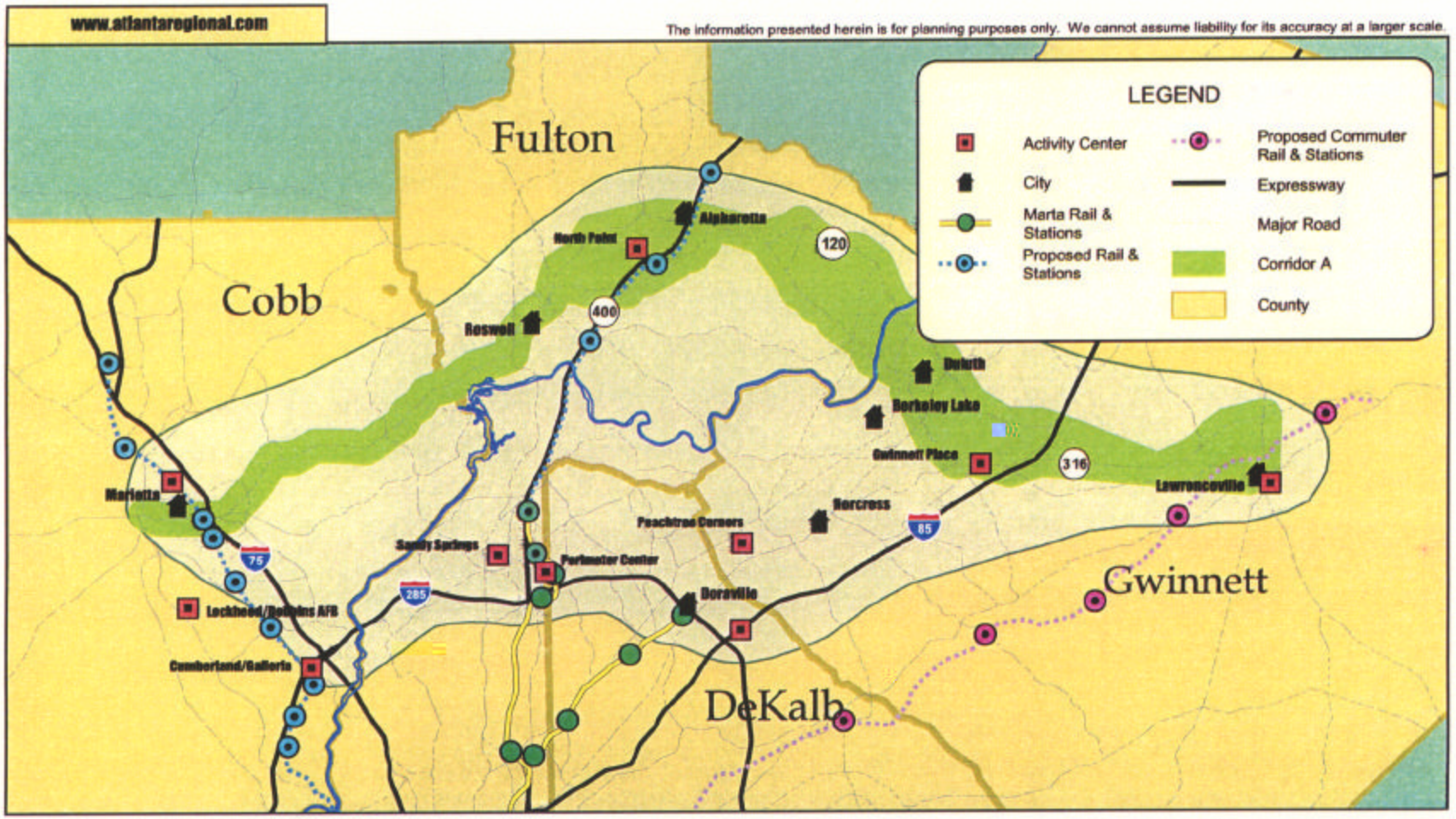

Figure 1: Alternative A

MARIETTA LAWRENCEVILLE
A BETTER WAY AROUND

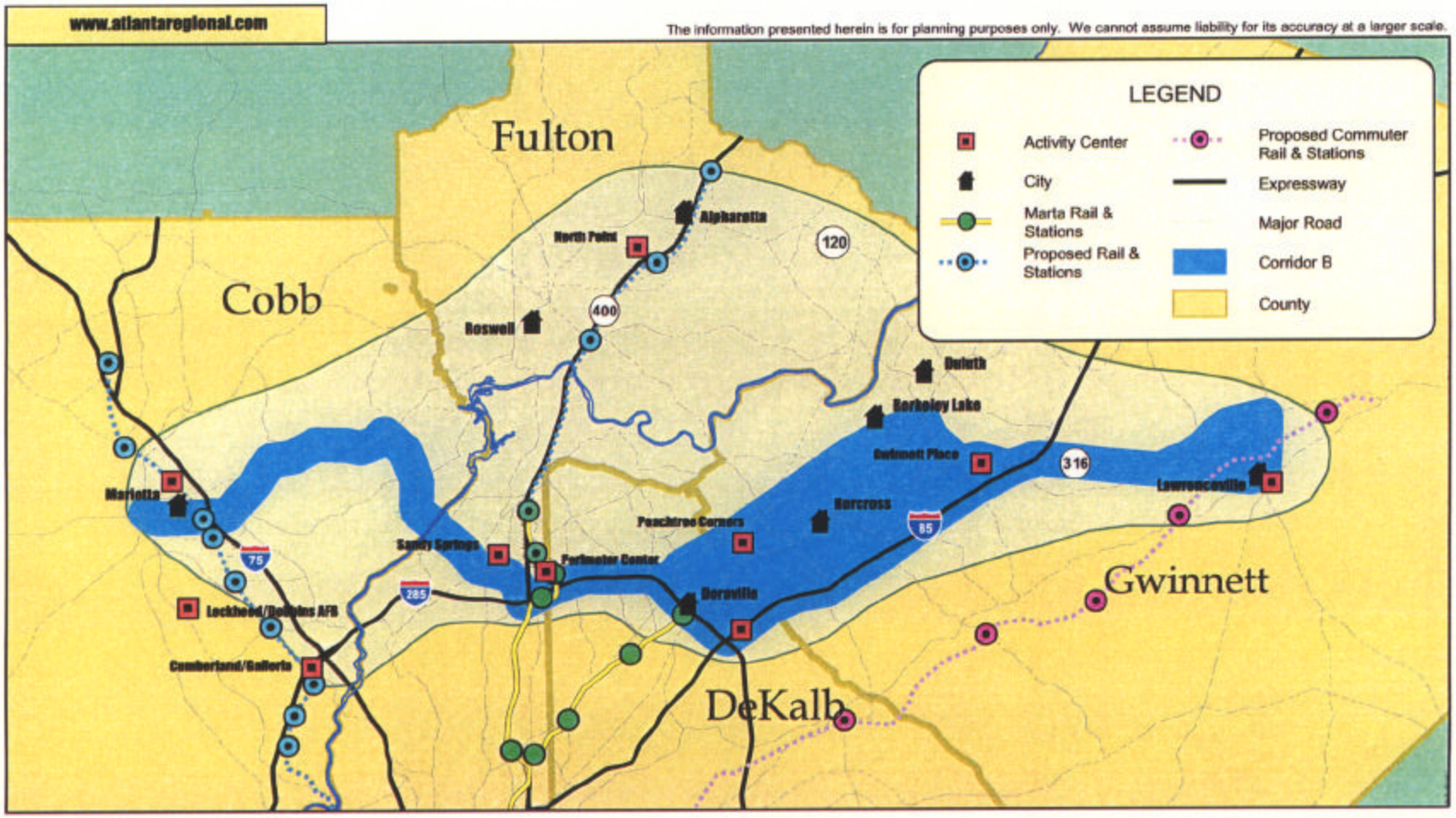

Figure 2: Alternative B

MARIETTA LAWRENCEVILLE
A BETTER WAY AROUND

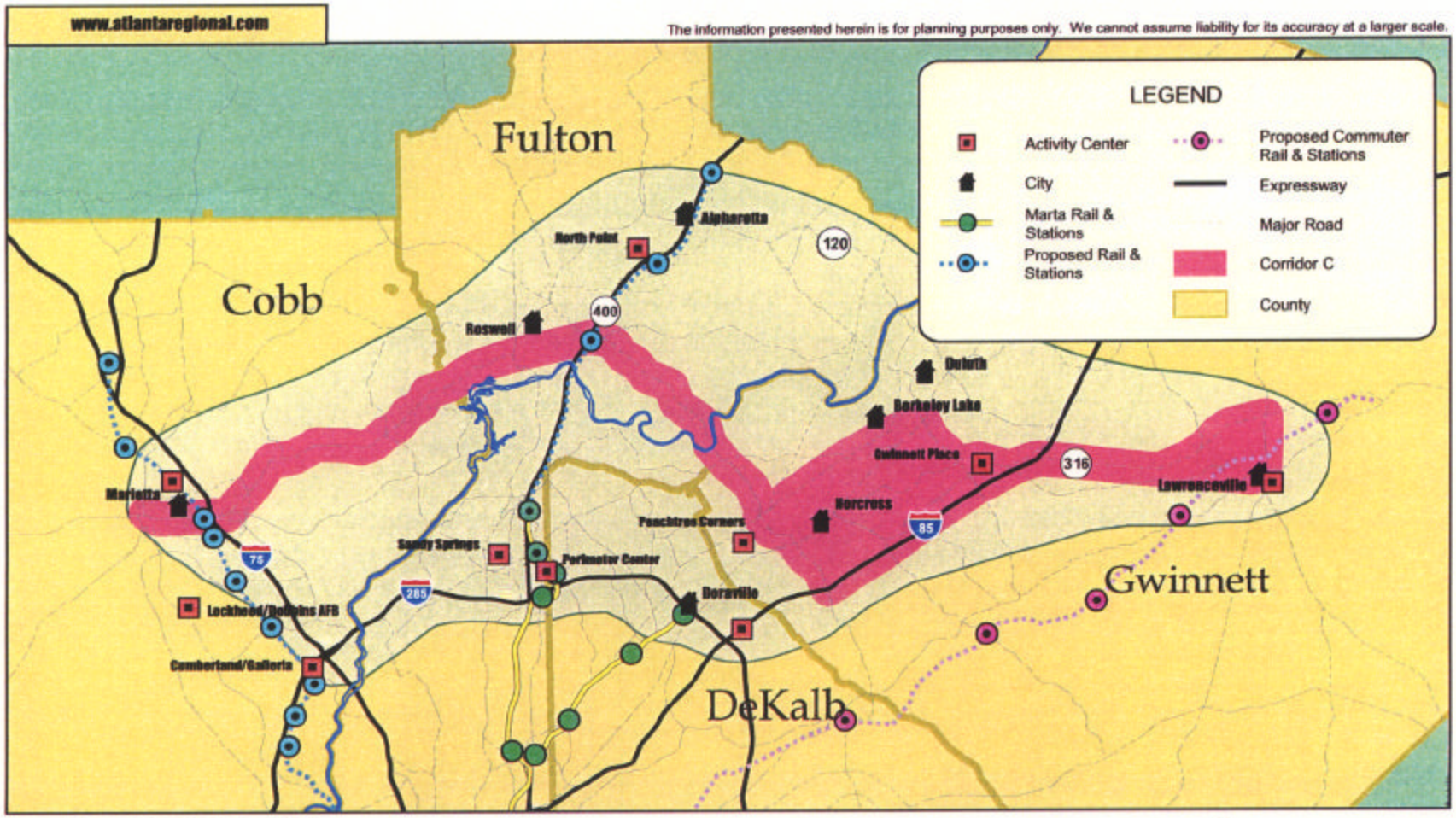

Figure 3: Alternative C

MARIETTA LAWRENCEVILLE
A BETTER WAY AROUND

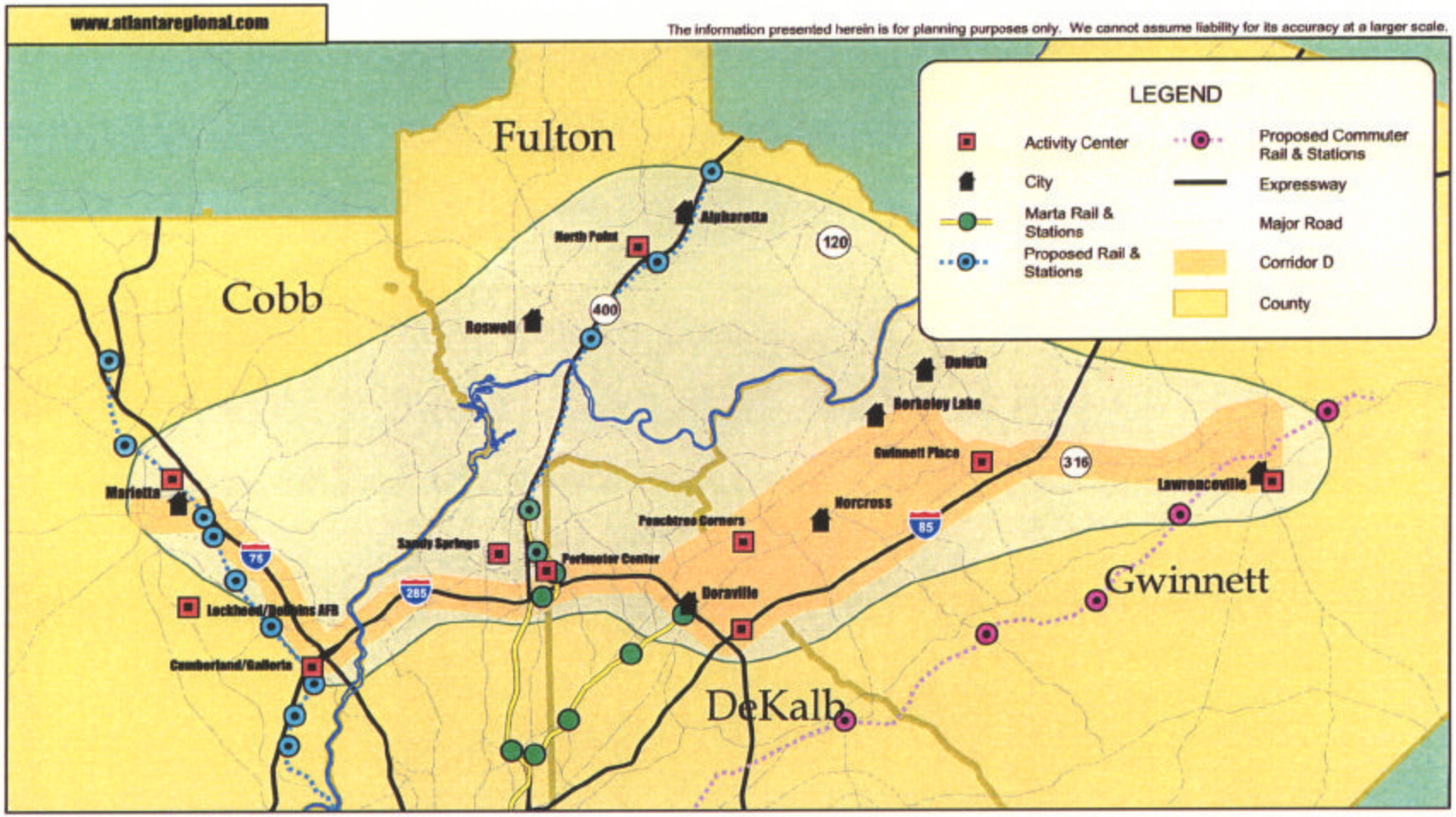

Figure 4: Alternative D

MARIETTA LAWRENCEVILLE
A BETTER WAY AROUND

3. MAJOR ASSUMPTIONS AND INFORMATION SOURCES

This section summarizes the type of assumptions and the sources used to develop the cost estimates for the Phase 1 Alternatives.

3.1 CONSTRUCTION COSTS

The construction base cost for the Phase 1 guideway alternatives includes the guideway costs, station costs, communication and control systems costs, vehicles and maintenance facilities. Unit costs were developed for structure, fixed track, open track, drainage, ballasted track, associated highway construction for typical track sections, and items unique to each alternative. Traction power and signaling requirements were also identified. Contingencies including utility relocation, noise abatement, traffic control, and drainage were priced as percentages of the typical section construction cost. The contingency percentages were based on historical construction costs.

Station costs include terminal and line stations, parking and transit centers. Station costs are on a typical section basis. The station platforms are open with shelter for basic protection from the elements. Passenger stations assume accommodation of trains up to three cars in length.

The station cost estimates were developed for each alternative within each segment given the type of station (neighborhood, intermediate, regional) and the profile (at-grade or elevated). Neighborhood stations were assumed to require 3 acres of land and would provide 50 parking spaces. Intermediate stations were estimated to require 8 acres of land and would provide 300 parking spaces. Regional stations were assumed at rail-to-rail crossings, and would require 15 acres of land and would provide 1,000 parking spaces.

Communication system costs include safety and security systems associated with wayside and stations. Included in the wayside are fiber optic cables and duct banks. Included in the stations are closed circuit television equipment, public address equipment, fire alarm equipment and telephones. It is assumed that the central control center, computer system, software controller consoles and overview display are included in the costs.

Vehicle costs were determined on a per vehicle basis, based upon recent purchase made across the country for the various vehicle types.

In the case of the Bus Rapid Transit alternative, an average cost to build a two-lane roadway was used. This average cost was developed by researching recently completed roadway construction projects in each jurisdiction within the study area. These costs were averaged over the study area, and the resulting average figure was used.

To determine the unit costs for each component, built systems costs were obtained from the Federal Transit Administration and from transit operators. Principal operator source data came

from the Dallas Area Rapid Transit Authority and from the Denver Regional Transportation District. These data were supplemented with additional information obtained from a research effort conducted in 1997 by the Colorado Department of Transportation and the Denver Regional Transportation District. In the case of monorail and automated guideway transit, available datasets are small as compared to other mode technologies. Therefore, these data were supplemented through the use of non-published information obtained from private operators of such systems. Where possible, local cost data were used.

3.2 RIGHT-OF-WAY

Right-of-way costs are based on an assumed taking of private property needed for construction of the guideway and its associated stations. For all alternatives, an assumed 50 foot take was required for the entire length of the corridor. As project alternatives are refined, it will be possible to more closely estimate the costs of right-of-way associated with alternatives.

A simplified methodology to estimate right-of-way cost was applied. This estimate is inclusive of all fees and costs associated with the public taking of private property. Recent taking estimates prepared by appraisers for specific takings along major roadways in the Metropolitan Atlanta area were obtained. Data were sampled for roadway projects in Cobb, Fulton, and Gwinnett counties. These estimates varied considerably by location, size of the taking and land use. Based on the information gathered, several land use categories were developed:

- Suburban mixed use, comprised of typical suburban arterial uses, such as small, free standing commercial uses, interspersed with single or multi-family uses;
- Residential land, consisting of residential frontage with takings that do not affect the structure on the property.
- Commercial land, consisting of commercial uses with takings that do not affect the improvements on the property;
- Commercial improved, comprised of commercial frontage which does affect the improvements on the property; and
- Commercial office park, where a parcel has been developed into Class A office space, with some impacts on developed improvements.

For all land categories, the amount of business or consequential damages, litigation costs, and land acquisition were factored into the per unit cost developed for use in the analysis. In this way, the values used herein represent an “acquired” land cost.

3.3 OPERATION AND MAINTENANCE COSTS

In order to develop operations and maintenance (O&M) costs for bus and premium transit, historical peer project O&M costs were researched. Average costs using cost per revenue mile rate were developed and multiplied by the calculated revenue miles to generate the applicable O&M cost figures.

Unit costs were developed from information provided by the National Transit Database (1998), using data from specific properties across the nation exhibiting operating parameters similar in

scope to that being considered in this phase of the project. In the case of monorail, this data was supplemented though private operator resources.

4.0 ORDER OF MAGNITUDE SYSTEM COST ESTIMATES

Based upon the corridor descriptions above, and reliant upon the station locations identified in the *Definition of Phase 1 Alternatives Report*, capital construction, right-of-way, and operating and maintenance costs were developed for each alternative.

4.1 CAPITAL AND RIGHT-OF-WAY COSTS

The capital costs were estimated for each alternative described above. Several assumptions were made in the development of the costs, as follows:

- For bus rapid transit and light rail alternatives, roughly 20% of the corridor would need to be elevated due to topography. For the heavy rail alternative, 60% of the corridor was assumed to be elevated. For automated guideway and monorail alternatives, the entire corridor was assumed to be grade separated.
- There were ten additional grade separations assumed to be required to overpass freeways and major arterials.
- For at-grade alternatives, a street crossing density of 5 crossings per mile was assumed.
- The right-of-way character of the North and Central corridors was assumed to be the same. The South corridor was estimated to have higher (more expensive) uses along the alternative.
- An entirely new right-of-way width of 50 feet was assumed to be required for each alternative. There was no reuse of existing or shared rights-of-way assumed.
- The number of vehicles required was calculated by applying MARTA's current cars per mile ratio to the length of the alternative under consideration.

The capital construction and right-of-way costs estimated for each alternative is summarized in Table 1. Review of Table 1 indicates the following:

- In all corridors, bus rapid transit is the least costly, with a total cost of about $1.2 billion in each corridor, and a per mile cost of approximately $26-27 million in each corridor.
- Light rail transit is the next least costly alternative, with a cost of about $2.2 billion in each corridor, and a resulting per mile cost of $50-51 million.
- The cost of monorail is close to the cost of light rail in each corridor, with a total of about $2.4 billion, and a per mile cost of $54-55 million.
- Automated guideway transit ranks fourth in terms of cost, with a total cost of approximately $2.9 billion in each corridor, with a per mile cost of $66-67 million.
- Heavy rail is the most expensive alternative, with a total cost of $3.8 billion in the South corridor, and a per mile cost of $88.5 million.

TABLE 1

SYSTEM ORDER OF MAGNITUDE CAPITAL COST ESTIMATES

TECHNOLOGY		North Corridor (A) (Millions)	South/ Johnson Ferry Corridor (B) (Millions)	Central Corridor (C) (Millions)	South/ I-285 Corridor (D) (Millions)	Cost Rank
Bus Rapid Transit	Construction	$816	$816	$816	$839	
	Right-of-way	$355	$360	$355	$393	
	Total	$1,171	$1,176	$1,171	$1,232	
	Total per Mile	$26.4	$27.3	$26.5	$29.1	1
Light Rail Transit	Construction	$1,876	$1,858	$1,871	$1851	
	Right-of-way	$342	$360	$342	$393	
	Total	$2,218	$2,218	$2,213	$2,244	
	Total per Mile	$50.0	$51.5	$50.1	$52.9	2
Automated Guideway transit	Construction	$2,579	$2,523	$2,577	$2,521	
	Right-of-way	$355	$360	$355	$393	
	Total	$2,934	$2,883	$2,932	$2,915	
	Total per Mile	$66.1	$66.9	$66.3	$68.8	4
Monorail	Construction	$2,061	$2,013	$2,053	$2,021	
	Right-of-way	$355	$360	$354	$393	
	Total	$2,416	$2,373	$2,407	$2,414	
	Total per Mile	$54.4	$55.1	$54.5	$56.7	3
Heavy Rail Transit	Construction	N/A	N/A	N/A	$3,382	
	Right-of-way	N/A	N/A	N/A	$393	
	Total	N/A	N/A	N/A	$3,775	
	Total per Mile	N/A	N/A	N/A	$89.1	5

4.2 OPERATIONS AND MAINTENANCE COSTS

The operations and maintenance costs associated with each alternative were also estimated. These costs were developed based upon on a vehicle-revenue mile basis. This is a factor developed based upon the total number of vehicles in revenue service, and the distance over which those vehicles perform in revenue service. It should be cautioned that, at this stage of the project, a detailed operations plan has not yet been developed. Therefore, the numbers presented herein are order of magnitude only, and can be used for comparative purposes.

It is likely that, as systems planning advances and other operational models are developed, these costs will change. Therefore, the costs presented herein begin to identify relative orders of magnitude for the operations and maintenance costs of the various technologies.

All costs presented herein were developed from data contained in the Federal Transit Administration's National Transit Database, and was supplemented as appropriate base dupon work completed to date for the Marietta-Lawrenceville study.

Table 2 presents the operations and maintenance cost estimates for the system.

Review of Table 2 indicates that bus rapid transit would have the lowest overall operating and maintenance cost of the technologies tested. Of the rail technologies, monorail have the lowest cost in all corridors excaoite bas e7d wd heed avyhe rait would hava slightkele lor (projented) Tj 0 -13.5 T

TABLE 2
SYSTEM ORDER OF MAGNITUDE
OPERATIONS AND MAINTENANCE COST ESTIMATES
(ANNUAL BASIS)

TECHNOLOGY		North Corridor (A)	South/ Johnson Ferry Corridor (B)	Central Corridor (C)	South/ I-285 Corridor (D)	Cost Rank
Bus Rapid Transit	VRM Est. (1,000's)	3.792	3.824	3.775	3.736	
	$/ VRM	$4.14	$4.14	$4.14	$4.14	
	Total O&M (1,000's)	$15.67	$15.83	$15.63	$15.47	1
Light Rail Transit	VRM Est. (1,000's)	3.792	3.824	3.775	3.736	
	$/ VRM	$12.16	$12.16	$12.16	$12.16	
	Total O&M (1,000's)	$46.11	$46.51	$45.91	$45.43	3
Automated Guideway Transit	VRM Est. (1,000's)	3.792	3.824	3.775	3.736	
	$/ VRM	$21.94	$21.94	$21.94	$21.94	
	Total O&M (1,000's)	$83.20	$83.91	$82.83	$81.98	4
Monorail	VRM Est. (1,000's)	3.792	3.824	3.775	3.736	
	$/ VRM	$9.89	$9.89	$9.89	$9.89	
	Total O&M (1,000's)	$37.50	$37.82	$37.33	$36.95	2
Heavy Rail Transit	VRM Est. (1,000's)	N/A	N/A	N/A	3.736	
	$/ VRM	N/A	N/A	N/A	$8.58	
	Total O&M (1,000's)	N/A	N/A	N/A	$32.06	2

Notes:
(1) VRM = Vehicle Revenue Miles
(2) Sample size for monorail and automated guideway transit is small
(3) Numbers in above table have been rounded