GEORGIA 400 CORRIDOR ALTERNATIVES ANALYSIS

Conceptual Design Technical Memorandum

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Metropolitan Atlanta Rapid Transit Authority

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EXECUTIVE SUMMARY

This memorandum provides an evaluation of the candidate alternative technologies using design criteria that will be used for design and implementation of the alternative analysis (AA) project along Georgia 400 (GA 400). The method of analysis includes layout of potential alignments for heavy rail transit (HRT), light rail transit (LRT), and bus rapid transit (BRT). Other methods of analysis include the development of conceptual cross sections and their corresponding limits of construction. Conceptual right-of-way (ROW) limits were established based on the limits of construction and the property data that was provided by the Georgia Department of Transportation (GDOT). All design criteria can be found in the appendices.

Results of this analysis show that a majority of the project can be constructed within the existing ROW and minimize impacts to adjacent properties. This analysis also showed that ample ROW is available to construct proposed managed lanes and exclusive guideway for the different alternatives in this corridor with minimal conflicts between the two. As part of the analysis, the location of potential transit stations was also evaluated. The study showed that although there is ample ROW in the corridor for exclusive guideways, accessibility to the proposed stations could be a challenge. A majority of the proposed station locations are “landlocked” and pose an accessibility issue at these locations.

The study finds that each of the transit alternatives is a viable option within the GA 400 corridor. There is ample ROW for exclusive guideways and minimal impacts to adjacent properties. Areas such as station locations and a possible LRT maintenance facility require further investigation.

It is recommended that each of the alternatives be further refined to:

- Review the magnitude of utility impacts.
- Identify the exact location of the proposed managed lanes in the corridor.
- Assess the environmental impacts in the area.
- Refine each alignment.
- Adjust trackwork associated with HRT and LRT relative to the station locations.
- Include BRT interchange configurations.

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1.0 INTRODUCTION

1.1 Background and Purpose

The Metropolitan Atlanta Rapid Transit Authority (MARTA) has initiated a GA 400 Corridor Alternatives Analysis (AA) study to evaluate potential transit improvements within the GA 400 Corridor. The AA will identify transit alternatives that address the transportation needs within the corridor. The study area is located in DeKalb and Fulton Counties and includes the cities of Sandy Springs, Roswell, Dunwoody, Alpharetta, and Milton.

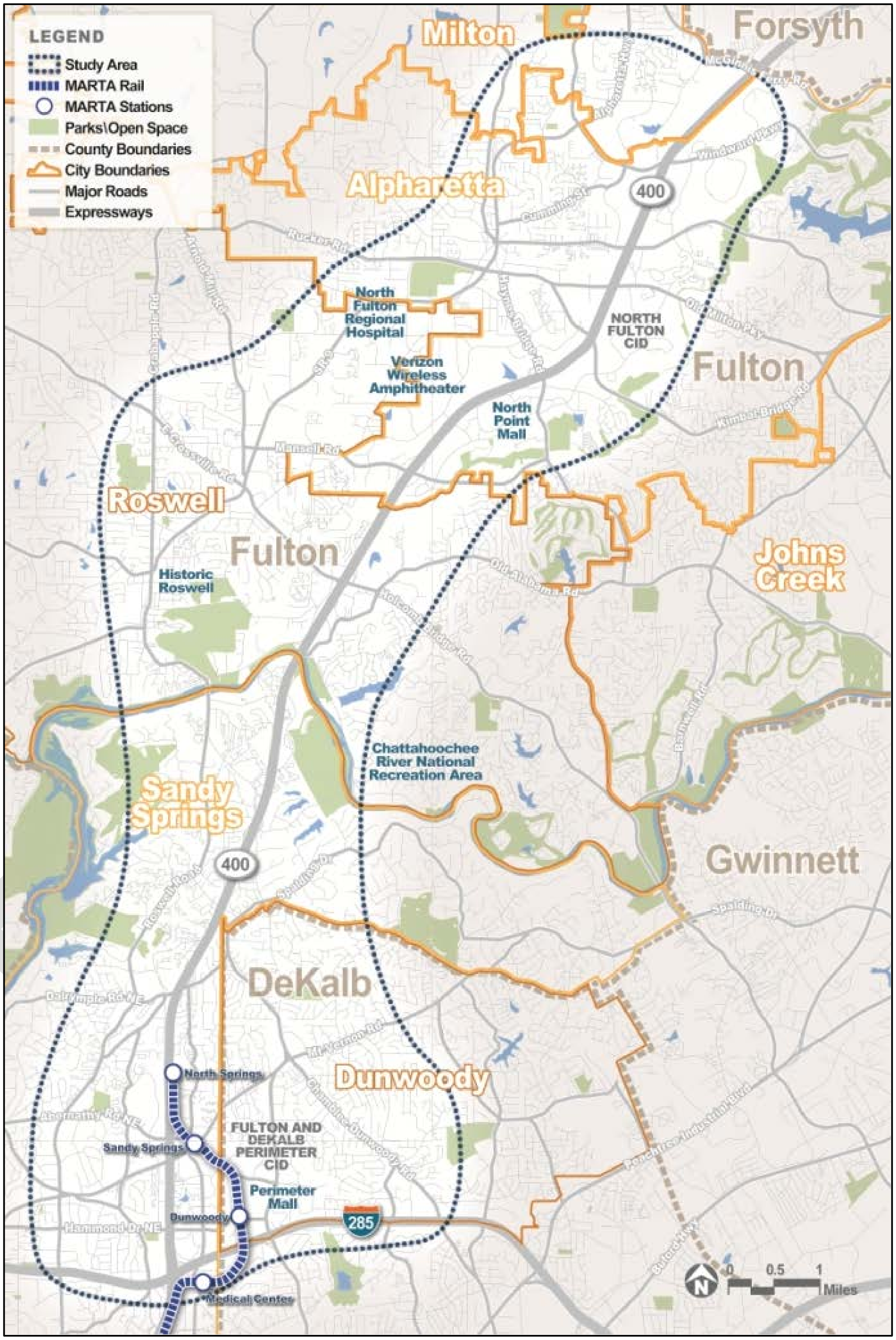
The purpose of this Conceptual Design Technical Memorandum is to evaluate the candidate alternatives using design criteria that will be required for design and implementation of the AA project. The study area being analyzed is within the GA 400 right-of-way. The Georgia Department of Transportation (GDOT) has provided proposed managed lane locations along GA 400. The proposed transit alignments along GA 400 have been laid out to minimize conflicts with the proposed managed lanes.

1.2 Project Description

The Georgia 400 Alternatives Analysis study is located in DeKalb and Fulton Counties. The study area begins north of Interstate I-285 (I-285) and extends 12.2 miles north along GA 400 to Windward Parkway. See Figure 1.1 This project will identify alternative transit modes within the GA 400 corridor that:

- Provide a feasible means of transit within the corridor.
- Improve mobility and accessibility to transit.
- Improve transit connectivity and coverage to communities within the study area.

Figure 1-1: GA 400 Corridor Study Area



2.0 DESCRIPTION OF ANALYSIS

2.1 Technical Data Collection

As part of the technical concept design available data was obtained from the Georgia Department of Transportation. Available data included:

- Traffic volume data
- Proposed managed lane data
- Property files with existing right-of-way

Traffic volume data for existing and future traffic was provided by GDOT. This data does not take into account the proposed transit alternatives. Data was also collected on current bus travel time in relation to general purpose traffic travel time. This data showed that current bus traffic in the corridor along GA 400 is five(5) to ten(10) percent slower than the general purpose traffic.

The managed lane data provided by GDOT features four alternatives for proposed managed lanes along GA 400. GDOT has not chosen a preferred alternative for the managed lanes. The concept design assumes proposed managed lanes will be located along the center of Georgia 400, with symmetrical widening on the east and west side of GA 400.

ROW data was provided by GDOT. The data included property files adjacent to the corridor. No other information was included such as property owner names and lot sizes.

2.2 Mapping

For this analysis aerial photography, property data, and existing ROW limits along GA 400 was provided by GDOT. In addition to the aerial photography provided by GDOT, Google was used to obtain missing aerial photography in the study area. The aerial photography was used as a background for plotting, reviewing alignments and identifying potential conflicts with general purpose traffic and impacts to adjacent property. This data was used for estimating the magnitude of impacts to properties adjacent to the ROW and to provide a conceptual level view of potential impacts in the corridor.

2.3 Alignments

The MARTA GA 400 North Line Alternative Analysis extends 12.2 miles from I-285 north to Windward Parkway, located south of the Forsyth County line. The conceptual technical analysis included a technical review of the proposed alternative alignments along GA 400. The alternatives have each been evaluated as exclusive guideways for the three alternative technologies: HRT, LRT, and BRT. Proposed managed lane drawings provided by GDOT were placed on the aerial photography in order to establish the alternative alignments and minimize conflicts with the proposed managed lane alignments. The alignments for the conceptual analysis have all been shown on the east side and parallel to GA 400.

2.3.1 Heavy Rail Transit (HRT) Alignment

The HRT alternative would operate on an exclusive guideway track infrastructure. The existing HRT alignment in the corridor would be extended 12.2 miles north along GA 400 to Windward Parkway. The HRT alternative has been evaluated and located to avoid conflict with proposed roadway improvements in the corridor.

The proposed alignment parallels GA 400 and has been offset 25 feet from the edge of the existing pavement to account for the construction of proposed managed lanes. The HRT typical section features a minimum distance of 15 feet between the double track centerlines. The design accommodates current MARTA and American Railway Engineering and Maintenance-of-Way Association (AREMA) design criteria. Typical sections for the HRT alternative can be viewed in Appendix B.

2.3.2 Light Rail Transit (LRT) Alignment

The LRT alignment would operate on an exclusive guideway rail infrastructure. The catenary poles which provide power for the LRT vehicles would be located between the two tracks with a minimum distance of 14 feet between the two tracks. The LRT alternative would require a new light railway infrastructure. The LRT alternative would tie to the existing MARTA rail located just north of I-285 via a new exclusive LRT guideway. The design criteria utilized for this analysis is from a similar system, the Charlotte Area Transit System 'LYNX' and Transit Cooperative Research Program (TCRP) Report 155, "Track Design Handbook for Light Rail Transit".

2.3.3 Bus Rapid Transit (BRT)

The BRT alternative would operate on an exclusive guideway that would include exclusive BRT interchanges. The BRT alternative typical section has two 12-foot lanes, one in each direction with 10-foot shoulders. The lanes are separated by painted stripes. The BRT alternative would have some interface with the proposed managed lanes. This interface could be the potential sharing of managed lane and BRT interchanges. Typical sections for the BRT alternative can be found in Appendix B.

2.4 Station Locations

Stations for this analysis have been located along the corridor to minimize impacts to adjacent properties and the environment while maximizing access. The HRT alternative would have five (5) stations and the LRT alternative would have six (6) stations each along their respective alignments. The stations have been analyzed as being center station platform stations at each location. In this technical analysis, the assumption is that the proposed alternatives will be either on the west or east side of GA 400 with no alignment traversing the centerline of GA 400.

The BRT alternative has six (6) stations located along the corridor. The BRT stations would be center island platform stations at all stops. Based on current available data and analysis the stations would be a combination of at-grade and aerial stations.

2.5 Typical Sections

Typical sections have been developed for each of the alternative technologies. The HRT and LRT alternative typical sections provide at-grade, aerial, sub-grade, retained cut/fill, and tunnel sections. The BRT typical sections have been shown the same sections as the HRT and LRT sections with the one exception being the BRT typical sections do not include a tunnel section.

2.6 Vehicle Storage and Maintenance

An integral part of this analysis was the need and location for maintenance facilities for each of the alternative technologies. The HRT and BRT alternatives would utilize existing maintenance facilities located south and east of the GA 400 corridor.

The LRT alternative is a new technology in the corridor and would require a new maintenance facility to support the LRT vehicles. The facility would accommodate daily turn around, inspections, preventive and corrective maintenance activities. A location for the maintenance facility will need to be identified along the LRT alternative alignment.

A potential alternative to a new maintenance facility would be the use of Armour Yard. Further studies and analysis of the Armour Yard facility would be required to determine if there is adequate space to accommodate a maintenance facility for LRT vehicles.

2.7 Right-of-Way (ROW)

The existing ROW width along the GA 400 corridor varies. The existing ROW has minimal utilities that would be impacted by an exclusive transit alignment. In previous technical studies, GDOT has provided a 40 feet section paralleling the existing roadway for exclusive guideway use. Conceptual typical sections require a minimum ROW width of 64 feet for an exclusive guideway, which is 24 feet wider than the 40 feet provided by GDOT.

3.0 CONCLUSION

This technical memorandum evaluates the design criteria required for extending transit in the GA 400 corridor. The conceptual analysis assumes exclusive HRT, LRT, and BRT guideways paralleling the roadway on either the east or west side of GA 400.

Available data was collected as part of the analysis which was used in identifying and mitigating potential conflicts in the corridor.

An analysis was done to determine the minimum construction limits required along the route It can be concluded from this analysis that a majority of the project can be constructed within the existing ROW and minimize impacts to properties adjacent to the existing ROW. It can also be concluded from this analysis that ample ROW is available to construct proposed managed lanes and exclusive guideway in this corridor with minimal conflicts between the two. It is recommended that each of the alternatives be further refined to include:

- Review the magnitude of utility impacts.
- Identify the exact location of the proposed managed lanes in the corridor.
- Assess the environmental impacts in the area.
- Refine each alignment.
- Adjust trackwork associated with HRT and LRT relative to the station locations.
- Include BRT interchange configurations.

Appendix A

Evaluation and Design Criteria

Appendix A – Evaluation and Design Criteria
HRT Design Criteria

Design Element	Recommended	References
Maximum Design Speed	70 mph	MARTA System Design Criteria, Vol. 1
Desired Minimum Horizontal Tangent Length	210’	MARTA System Design Criteria, Vol. 1
Absolute Minimum Tangent Length	3V pr 75’, whichever is greater	MARTA System Design Criteria, Vol. 1
Desired Minimum Horizontal Curve Radius	1000’	MARTA System Design Criteria, Vol. 1
Absolute Minimum Curve Radius	750’	MARTA System Design Criteria, Vol. 1
Minimum Vertical Tangent Length	3V or 75’, whichever is greater	MARTA System Design Criteria, Vol. 1
Maximum Vertical Gradient	4%	MARTA System Design Criteria, Vol. 1
Absolute Maximum Gradient	4%	MARTA System Design Criteria, Vol. 1
Minimum Gradient	0.3%	MARTA System Design Criteria, Vol. 1
Minimum Vertical Curve Length	$LVC=AV_d/30$ (crest) $LVC=AV_d/60$ (sag) $LVC=3V_d$ LVC=100 LVC=70A, whichever is greater	MARTA System Design Criteria, Vol. 1

Appendix A – Evaluation and Design Criteria
LRT Design Criteria

Design Element	Recommended	Reference
Maximum Design Speed	55 mph	TCRP Report 155 Track Design Handbook for LRT
Desired Minimum Tangent Length	3V	TCRP Report 155 Track Design Handbook for LRT
Desired Minimum Horizontal Curve Radius	500’	TCRP Report 155 Track Design Handbook for LRT
Absolute Minimum Curve Radius	300’ – aerial and tunnel mainlines 82’ – embedded street track	TCRP Report 155 Track Design Handbook for LRT
Desired Minimum Horizontal Curve Length	165’	TCRP Report 155 Track Design Handbook for LRT
Absolute Minimum Horizontal Curve Length	3V	TCRP Report 155 Track Design Handbook for LRT
Maximum Sustained Vertical Gradient	4%	TCRP Report 155 Track Design Handbook for LRT
Absolute Maximum Gradient for short grades <500, between PVI’s	7%	TCRP Report 155 Track Design Handbook for LRT
Minimum Gradient	0.2%	TCRP Report 155 Track Design Handbook for LRT
Desired Minimum Vertical Curve Length	$200(G_1-G_2)$	TCRP Report 155 Track Design Handbook for LRT
Absolute Minimum Vertical Curve Length	$LVC = (G_1-G_2)V^2/25$ (crest) $LVC = (G_1-G_2)V^2/25$ (sag)	TCRP Report 155 Track Design Handbook for LRT

Design Element	Recommended	Reference
Design Speed	40 mph	APTA Recommended Practice
Minimum Stopping Sight Distance	165’	A Policy on Geometric Design of Highways and Streets
Maximum superelevation	3%	APTA Recommended Practice
Maximum superelevation runout	1:400	A Policy of Geometric Design of Highways and Streets
Minimum horizontal curve radius	Based on minimum design speed	
Absolute minimum curve radius	265’	APTA Recommended Practice
Minimum tangent at station ends	65’	APTA Recommended Practice
Minimum grade	0.2%	APTA Recommended Practice
Maximum grade	5%	APTA Recommended Practice
Absolute maximum grade	8% (400’-500’)	APTA Recommended Practice

Appendix B

Typical Sections