I-20 East Transit Initiative

STATION COST ESTIMATING METHODOLOGY

Technical Memorandum

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1.0 INTRODUCTION

The I-20 East AA/DEIS has identified various fixed-guideway alignment alternatives that include heavy rail transit (HRT), light rail transit (LRT), and bus rapid transit (BRT) that would operate east-west along the Interstate 20 (I-20) corridor between southern Downtown Atlanta and the Mall at Stonecrest.

There are a minimum of 9 and a maximum of 11 stations included in the alternatives evaluated. The majority of the stations will be in aerial configuration, fixed atop an elevated guideway, but there is at least one at-grade station and one retained-cut station included with HRT and LRT alternatives, and a number of at-grade stations included in one BRT alternative.

To support the AA/EIS documentation associated with the project, high-level conceptual cost estimates have been prepared for the stations included in the alternatives (Appendix A). The methodology for preparing these estimates is based on comparisons with other fixed-guideway projects in various stages of planning, relative cost based on station locations, and relative cost based on station type. These are explained herein.

Basic differences between the stations due to their proposed locations are noted in the cost estimates, but detailed unit costs have not been applied at this point in the planning process.

2.0 STATION DESCRIPTIONS

Currently, stations have not been developed to the point where detailed unit cost estimates can be completed. As shown on station plan maps associated with the study, only the approximate locations of platforms and pedestrian vertical access elements (stairs, elevators, escalators, etc.) are depicted. However, basic layout parameters have been established as follows:

- **HRT Stations** - HRT stations have center platforms that range from 24 to 32 feet wide by 400 to 600 feet long. Entrance points, as required depending on the location of the station, have direct access to the station platform with no mezzanine required. Escalators may be included at some station locations where lengthy vertical pedestrian circulation elements are required.
- **LRT Stations** - LRT stations have center platforms that range from 16 to 24 feet wide by 300 to 400 feet long. Entrance points, as required depending on the location of the station, have direct access to the station platform with no mezzanine required.
- **BRT Stations** - BRT stations have side platforms, ranging from 8 to 12 feet wide each, and 4 bus bays for each direction for a total of 8. Entrance points, as noted on the plans, access one side to the other with at-grade (guideway level) passenger crossings.

All stations are to have basic amenities including canopies, benches, etc., with platform heights that allow level boarding (no ADA lifts or separate ramps required). However, it is expected HRT stations may include greater canopy coverage and more amenities due to greater size, while BRT stations are expected to have more modest amenities.

Station Component Variables

All stations have at least one vertical circulation component for passenger access to the station platforms, usually there are two. If only one primary access point is identified, it is assumed there will be emergency stairway(s) included; however, these are not shown. At-grade station access points will require well-marked guideway crossing points at either end of the station platforms. The exception to this will be in locations where there is a street crossing above the guideway or other topographical difference that will provide an opportunity for an entrance using a vertical circulation component to access the station area.

3.0 COST ESTIMATING METHODOLOGY

The conceptual cost estimates have been prepared based on a methodology that includes three factors: comparison with similar projects, relative cost based on station type, and relative cost based on station location. In addition, exclusions are listed that add further clarity with regard to the wide ranging potential variables that exist between the projects compared. Overall cost estimates by alternative and station types are included in **Table 1** at the end of this document.

3.1 Comparison with Similar Projects

Inherent differences in overall project complexity, scale, and cost exist between the transit modes and station types, especially between HRT and BRT, with LRT falling somewhere between. Differences are also predictable between projects located in cities or regions where various project elements are considered to be more or less desired. Finally, differences in local materials and overall construction costs, and project complexity due to local logistical considerations, are likely.

The documents (along with the transit types and cost estimates [average cost in $ millions including 3.5 percent annual inflation to 2011 dollars]) for comparable projects are:

- Downtown Natomas Airport – Green Line to the Airport Transitional Analysis Report – Sacramento Regional Transit Authority, Sacramento, CA. 2010
    - LRT at-grade ($1.9) and aerial ($5.3)
- Durham-Orange County Corridor Alternatives Analysis - Triangle Transit, Durham, NC. 2011
    - LRT at-grade ($2.0) and aerial ($12.5)
    - BRT at-grade ($1.0) and aerial ($10.0)
- Southwest LRT Capital Cost Evaluation - Hennepin County Regional Railroad Authority, Minneapolis, MN. 2009
    - LRT at-grade ($3.75) and aerial ($7.5)
- Westline Alternatives Analysis/Draft Environmental Impact Statement – Metropolitan Atlanta Regional Transit Authority, Atlanta, GA. 2004
    - HRT at-grade ($20.5) and aerial ($40.1)
    - BRT at-grade ($.76) and aerial ($2.3)

- DRAFT Final Plan for Entry into Final Design. City and County of Honolulu, Honolulu, HI. 2011.
    - LRT at-grade ($6.2) and aerial ($15.2)

It should be noted that most costs were listed in SCC Main Build Worksheets found in the documentation associated with each project and it is assumed costs were derived from more detailed unit cost estimates.

The range of costs based on the comparables is as follows:

- HRT at-grade ($20.5) and aerial ($40.1)
- LRT at-grade ($1.0 – $3.75) and aerial ($5.3 - $12.5)
- BRT at-grade ($0.75 - 1.0) and aerial ($2.3 - $10.0)

Using the costs of similar projects as comparables at least provides a range in which predicted costs for the LRT stations included in the I-20 East AA/DEIS study may fall. The challenge is finding data from other projects to use as comparables for HRT and BRT. More information on LRT projects with elevated guideways/aerial stations can be found than for HRT or BRT.

To address this challenge, it was decided only LRT costs would be considered, with the estimated cost for LRT stations used as a base cost and then HRT and BRT costs adjusted based on relative differences between the station types and locations.

It should be noted that, although at least one example HRT aerial station cost(s) was found (and actually prepared for a MARTA project), it is assumed these costs are more consistent with existing MARTA HRT station types which contain elaborate head houses, concourses, and extensive canopy coverage, more consistent with ‘landmark’ architecture. The I-20 East “philosophy” is to build smaller, simpler HRT stations (400’ platforms instead of 600’ platforms) that will cost less than traditional MARTA HRT stations.

3.2 Relative Cost Based on Station Type

A stated objective for the I-20 East AA/DEIS study is to maintain similar station characteristics and overall parity for each of the station types, i.e., HRT, LRT and BRT. This is advised in order to maintain fairness in how the various transit types are evaluated. The merits of the potential overall transit service and ridership are emphasized rather than the appearance of project elements or quantity of amenities provided.

As mentioned in Methodology section above, LRT station cost estimates were used as a base reference and then HRT and BRT costs were derived based on adjustments to the LRT estimate. Considerations for making the adjustments, as compared to LRT stations, included more or less overall platform area required; greater or fewer amenities such as furnishings, lighting, and other features and fixtures provided; more or less canopy coverage; and more or less overall project complexity.

HRT station costs were estimated to cost approximately 155 percent more than LRT stations, mainly based on greater platform size which in turn increases scale and number of features required. For BRT, a 95 percent decrease is utilized from the base LRT cost. BRT stations have smaller platforms but typically include two side platforms instead of

one center platform. The overall area is slightly smaller than the total area of the LRT center platform, but other amenities and features will be comparable to LRT.

3.3 Relative Cost Based on Station Location

Based on the above descriptions and component differences identified, there is sufficient information available to document expected relative station costs that will change depending on location and alternative. For example, the HRT 1 Turner Field station concept plan indicates three station access components as compared to Glenwood Avenue (West), which shows only one. Given the suggested cost for vertical circulation components at $1.75 million each, there is a difference of $ 3.5 million for the station cost estimate between the two locations.

3.4 Exclusions

The following features are excluded from the cost estimates:

- Aerial structures or retained cut structures associated with the main guideway alignment
- Variable message signs, CCTV and public address, ticket vending, and other system elements
- Pedestrian bridge connections, or other ramps and access-ways outside the immediate platform area
- Entry plazas, landscaping, etc.
- Drop-off (kiss and ride) areas, local circulator bus bays or temporary parking
- Surface or structured parking and other amenities associated with park and ride and/or long-term parking
- Elaborate head houses and other structural components that serve mainly as a……..
- Other on-site amenities, structures or buildings
- Soft costs such as design

These features are not included because they are listed separately on SCC Main Worksheets reviewed Category 20: Stations, stops, terminals, intermodal, which includes categories 20.01 for at-grade stations and 20.02 for aerial stations, and 20.07 for elevators, escalators, are the only categories considered. Other categories including 20.04, 20.05, 20.06 (intermodal transfer from ferries, trolleys, etc., and joint development, parking structures, etc.) are considered to contain too many variables that will not allow for accurate comparing from project to project. Other main categories such as Category 40: Site work and Special Considerations, and Category 50: Systems, are also considered too variable, and are not considered.

It should be noted that in the case of the Sacramento Green Line project, category 40.06: Pedestrian/bike access and accommodation is known to contain elements that could be considered part of Category 20.07, and are therefore included in the comparable estimate for the vertical circulation component(s). A unit cost estimate was completed for this project that allows for those elements to added with some assurance of accuracy.

4.0 REFERENCES

- City and County of Honolulu. 2011. DRAFT Final Plan for Entry into Final Design. Attachment C: SCC Workbook Tables.
- Federal Transit Administration (FTA). (2011). SCC Workbook. Inflation Worksheet. Appendix A – Cost Estimates.
- Hennepin County Regional Railroad Authority. 2009. Southwest LRT Capital Cost Evaluation. Technical Memorandum No. 7A. Pages 4-20.
- MARTA. 2004. Westline Alternatives Analysis/Draft Environmental Impact Statement. Chapter 7: Evaluation Methodology for Cost and Cost Effectiveness Measures. Pages 2-9.
- Sacramento Regional Transit District. 2010. Downtown Natomas Airport – Green Line to the Airport Transitional Analysis Report. Appendix C – Capital Costs.
- Triangle Transit. 2011. Durham-Orange County Corridor Alternative Analysis. Volume 3, Section A – Capital Cost Estimates. Pages 3-62.

Table 1: Station Cost Estimates

DRAFT I-20 East AA/DEIS Station Cost Estimates 9/28/11

Alt.	Station	Station Config.	Base Cost	addition/ deduct.	Total	Notes
HRT 1	Turner Field	Aerial	13,500	1,750	15,250	(1) extra set elevators/stairs for improved area pedestrian access and capacity
	Glenwood Park/Beltline	Aerial	13,500		13,500	
	Glenwood Ave West	Aerial	13,500	(1,750)	11,750	(1) Station entrance only (emergency stairway provided other end of platform)
	Gresham Rd/Flat Shoals	Aerial	13,500		13,500	
	Candler Rd	At-grade	13,500	(1,750)	11,750	Only (1) set elevators/stairs required for ped access from Candler road intersection (above station)
	Wesley Chapel Rd	Aerial	13,500		13,500	
	Panola Rd	Aerial	13,500		13,500	
	Evans Mill/Lithonia	Aerial	13,500		13,500	
	Mall at Stonecrest	Aerial	13,500	1,750	15,250	(1) extra set elevators/stairs for improved area pedestrian access and capacity
				Total	**121,500**	
HRT 2	Glenwood Ave East	Ret. Cut[2]	13,500	(1,750)	11,750	(1) Station entrance only (emergency stairway provided other end of platform)
	Gresham Rd/Flat Shoals	Aerial	13,500		13,500	
	Candler Rd	At-grade	13,500	(1,750)	11,750	Only (1) set elevators/stairs required for ped access from Candler road intersection (above station)
	Wesley Chapel Rd	Aerial	13,500		13,500	
	Panola Rd	Aerial	13,500		13,500	
	Evans Mill/Lithonia	Aerial	13,500		13,500	
	Mall at Stonecrest	Aerial	13,500	1,750	15,250	(1) extra set elevators/stairs for improved area pedestrian access and capacity
				Total	**92,750**	
HRT 3	Indian Creek	Ret. Cut	13,500		13,500	
	Covington Highway	Aerial	13,500		13,500	
	Wesley Chapel Rd	Aerial	13,500		13,500	
	Panola Rd	Aerial	13,500		13,500	
	Evans Mill/Lithonia	Aerial	13,500		13,500	
	Mall at Stonecrest	Aerial	13,500	1,750	15,250	(1) extra set elevators/stairs for improved area pedestrian access and capacity
BRT						
	Moreland Ave	At-grade	5,700		5,700	
	Glenwood Ave West	At-grade	5,700		5,700	
	Gresham Rd/Flat Shoals	At-grade	5,700		5,700	
	Candler Rd	At-grade	5,700	1,250	6,950	(1) set elevators/stairs required for ped access from Candler road intersection (above station)
	Wesley Chapel Rd	At-grade	5,700		5,700	Transfer station - elevators/stairs assumed in Aerial HRT costs
				Total	**112,500**	
LRT 1	Turner Field	Aerial	8,700	4,250	12,950	(1) extra platform and set of elevators/stairs for improved area pedestrian access and capacity
	Glenwood Park/Beltline (south)	Aerial	8,700		8,700	
	Glenwood Ave West	Aerial	8,700	(1,250)	7,450	(1) Station entrance only (emergency stairway provided other end of platform)
	Gresham Rd/Flat Shoals	Aerial	8,700		8,700	
	Candler Rd	At-grade	8,700	(1,250)	7,450	Only (1) set elevators/stairs required for ped access from Candler road intersection (above station)
	Wesley Chapel Rd	Aerial	8,700		8,700	
	Panola Rd	Aerial	8,700		8,700	
	Evans Mill/Lithonia	Aerial	8,700		8,700	
	Mall at Stonecrest	Aerial	8,700	1,250	9,950	(1) One extra set elevators/stairs for improved area pedestrian access
				Total	**81,300**	
LRT 2	Glenwood Park/Beltline (north)	Aerial	8,700		8,700	
	Glenwood Ave West	Aerial	8,700	(1,250)	7,450	(1) Station entrance only (emergency stairway provided other end of platform)
	Gresham Rd/Flat Shoals	Aerial	8,700		8,700	
	Candler Rd	At-grade	8,700	(1,250)	7,450	Only (1) set elevators/stairs required for ped access from Candler road intersection (above station)
	Wesley Chapel Rd	Aerial	8,700		8,700	
	Panola Rd	Aerial	8,700		8,700	
	Evans Mill/Lithonia	Aerial	8,700		8,700	
	Mall at Stonecrest	Aerial	8,700		8,700	(1) One extra set elevators/stairs for improved area pedestrian access
				Total	**67,100**	
BRT 1	Turner Field	Aerial	8,200	3,250	11,450	Longer platform and (1) extra set elevators/stairs for improved area pedestrian access and capacity
	Glenwood Park/Beltline (south)	Aerial	8,200		8,200	
	Glenwood Ave West	Aerial	8,200	(1,250)	6,950	(1) Station entrance only (emergency stairway provided other end of platform)
	Gresham Rd/Flat Shoals	Aerial	8,200		8,200	
	Candler Rd	At-grade	8,200	(1,250)	6,950	Only (1) set elevators/stairs required for ped access from Candler road intersection (above station)
	Wesley Chapel Rd	Aerial	8,200		8,200	
	Panola Rd	Aerial	8,200		8,200	
	Evans Mill/Lithonia	Aerial	8,200		8,200	
	Mall at Stonecrest	Aerial	8,200	1,250	9,450	(1) One extra set elevators/stairs for improved area pedestrian access
				Total	**75,800**	

NOTES

1 The basic unit cost for the station includes platform, canopy(s), station furniture, lighting and static signs. Cost of aerial structure or retained cut structures not included. Costs for variable message signs, CCTV and public address, ticket vending, and other systems costs not included and will be associated with communications and central control. Also not included are pedestrian bridge connections, or other ramps and accessways not incorporated within the immediate station platform area or guideway; entry plazas, landscaping, etc., and ground-level improvements such as drop-off areas, bus bays, parking (surface or structure) or other on-site amenities, structures or buildings. Vertical circulation elements are assumed either center platform access or directly attached to the side of the aerial structure with at-grade crossing on structure. Unit cost for all stations to include (2) vertical circulation elements containing (1) elevator and (1) stairway each. HRT to include (1) escalator per station in addition to elevator/stair sets. At-grade BRT stations have no elevators/stairs unless indicated. Cost for additional or subtracted vertical circulation elements indicated on table.

2 HRT retained cut stations assumed approximately same cost as aerial guideway stations as elevators/stairs and other amenties are necessary.