SOUTH FLORIDA REGIONAL TRANSPORTATION AUTHORITY

Strategic Regional Transit Plan

December 2008

Chapter 6:

Run Time Analysis

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RUN TIME ANALYSIS
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1.0 INTRODUCTION

The purpose of this working paper is to document the analysis of run time estimation for the various corridor alternatives. Corridor alternatives developed for the Strategic Regional Transit Plan (SRTP) have gone through an evaluation process (Screen One and Screen Two) to determine the highest opportunity corridors. Part of the evaluation process criteria includes performance measures related to alternative ridership. Alternative ridership is estimated through travel demand model runs. To establish a model run, run time estimates must be developed for each of the alternative alignments and modes of transit (e.g., bus rapid transit, light rail transit, etc). Alternative alignment run times (model based run times) where developed for these travel demand model runs using standard alternative development practices for systems level planning (i.e., general assumptions versus specific detailed assumptions).

Secondary to the run times developed for the travel demand model runs, run time estimates have been developed for bus mode alternatives using a more detailed set of assumptions. These run time estimates, called "assumption specific run times" attempt to estimate run times using a bit more detailed level of assumptions. These run times have been developed to gain a better comfort level of the model run times in relation to overall capital and operating cost estimates. The difference in methodology for developing run time estimates between the model based run times and the assumption specific run times only applies to the bus mode alternatives (e.g., rapid bus alternative). Rail mode alternative run times where developed for the travel demand model with more specific assumptions, specifically because they generally operate in exclusive right-of-way.

As corridor projects advance, an increased level of knowledge and detail becomes available regarding the nature in which the transit service would operate within a given corridor. This advanced knowledge produces improved assumptions related to alignment, station locations, traffic signal systems, and physical improvements impacting vehicle travel times. This increased knowledge supports the use of assumption specific run time estimation. Assumption specific run time estimates are generally used on corridor projects as they advance through corridor level development, such as Alternatives Analysis, Environmental Impact Statement (EIS) and Preliminary Engineering (PE). Although the corridors under study are not advanced through a higher level of corridor development (e.g., AA or EIS), some more specific assumptions where applied regarding signal delays, dwell times and travel speeds for each of the bus transit corridors. Further detailed assumptions would be required as individual corridors advance into Alternatives Analysis (AA).

A brief description of how the two run time estimates were developed is described below.

> *Travel Demand Model based run time estimates:* Run time estimates for the travel demand model where developed for multiple modes. For rail modes, run times where estimated using vehicle performance characteristics, assuming exclusive right-of-way, consistent with modes currently operated in the region (Metrorail – heavy rail and Tri-Rail –

traditional push/pull commuter rail operation). DMU and LRT run times where also developed using typical vehicle performance characteristics. Bus mode or rapid bus alternative run time estimates where developed using a relationship between existing bus run times (e.g., Dade MAX and Broward State Road 7 service) and existing roadway level of service (LOS). This relationship is transferred to future year conditions to determine bus run times for the alternatives.

Assumption Specific run time estimates: These run time estimates are based on assumptions related to 1) vehicle performance (e.g., acceleration/deceleration, maximum speed, doorway configuration and passenger boarding and alighting times), 2) corridor characteristics (e.g., highway, major arterial, local collector roadway, speed limits, traffic signal spacing) and 3) alignment assumptions (e.g., station locations and spacing, exclusive versus non-exclusive right-of-way, signal systems and delays, physical improvements like queue jumper lanes).

2.0 SCREEN TWO ALTERNATIVES

Travel Demand Model based run times were developed for each alternative (based on proposed mode of transit). As noted above, run time estimates for rail mode alternatives utilize characteristics consistent with "assumption specific" based run time estimates, therefore these run times were not estimated again using an "assumption specific" methodology. Additionally, some of the corridor alternatives are projects that have advanced through a more detailed level of analysis (e.g., Alternatives Analysis) which has resulted in a more refined level of run time estimates and thus have been used in the travel demand model runs. Following is a list of Screen Two Alternatives for which assumption specific run time estimates were developed.

- 31A – North-South Premium Bus
- 31K – Wellington Rapid Bus
- 31L – Military Trail Rapid Bus
- 31N – Pines Rapid Bus
- 31O – Oakland Park Rapid Bus
- 31Q – Kendall Drive Rapid Bus
- 31R – 137th Avenue Rapid Bus to Palmetto and the MIC
- 31S – Douglas Road Rapid Bus

A comparison of travel demand model based run times estimates and assumptions specific based run times in detailed below in section 4.

3.0 RUN TIME ESTIMATION ASSUMPTIONS

Assumption Specific run time estimates for bus alternatives are based on assumptions related to:

- Vehicle performance,
- Corridor characteristics, and
- Alignment assumptions.

With regards to transit travel times, important vehicle performance factors include vehicle acceleration and deceleration; door cycle time and width; and low floor versus standard transit coach. Vehicle performance is typically constant (with minimal influence on travel times) and is dependent on the vehicle type used, such as the vehicle manufacturer and the size of the vehicle. Vehicle manufacturers produce vehicles with similar or identical performance criteria to one another, resulting in little or no impact in corridor travel times related to vehicle performance differences.

Corridor characteristics include the type of roadway (e.g., highway / interstate, major arterial, local collector road, etc.), posted travel speed limits, signal spacing and signal timing. Corridor characteristics can vary significant from one corridor to another as well as within a given corridor. Therefore, corridor characteristics are considered variable in nature with significant influence on overall corridor travel times.

Alignment assumptions include factors such as station location and spacing, type of right-of-way used by the transit service (exclusive versus non-exclusive), signal systems and delays, and physical improvements such as queue jumper lanes or fly over ramps. Alignments assumptions have a significant impact on overall corridor travel times. The use of exclusive versus non-exclusive right-of-way can result in half the travel time. Signal systems also impact travel times. Signals that are timed to produce consistent flows along the corridor assist in speeding the travel times whereas signals with priority timing to cross streets increase the overall travel times along a corridor. Lastly, physical improvements like queue jumper lanes, bus only lanes or fly over ramps can speed travel times significantly by allowing the bus rapid transit service to bypass typically traffic congested areas or intersections along a corridor.

4.0 COMPARISON OF RUN TIMES

Many of the bus rapid transit corridors identified under this study are conceptually defined. At this level of definition, run time estimates were developed using a relationship between existing bus run times and roadway level of service transferred to 2030 roadway network level of service. These travel times provide consistency between the corridor alternatives and are appropriate for this level of study.

More detailed travel times where also developed with specific assumptions (assumption specific). These run times have been developed to gain a better comfort level of the model run times in relation to overall capital and operating cost estimates. These run

times provide insight into potential differences in operating and capital costs as these corridor projects advance. Consideration should be given to developing more detailed run time estimates as each project is advanced through project development. Much like capital and O&M cost estimates, as the project is developed further along, refinements to the run times will help provide improved accuracy in ridership estimates, operating costs and capital costs.

Corridor run time comparisons made below are done for the purpose of comparison and do not suggest inaccuracy of either method of run time estimation. Assumption specific run times make assumptions regarding signal timing and dwell times that would require further refinement as projects advance.

4.1 ALTERNATIVE DESCRIPTIONS AND RUN TIME COMPARISONS

31A North-South Premium Bus

This project consists of the following four service patterns:

- A - Dadeland South to the Miami Intermodal Center
- B - Palmetto Area to the HEFT
- C – Palmetto Area to Sawgrass Mills Area
- D – Sawgrass Mills Area to I-95, Boca Town Center and Mizner Park

	Service Pattern	Assumption Specific Method Off Peak Only	Travel Demand Model Based Peak / Off Peak
One-Way Travel Time (minutes)	A	15.28	**21.20 / 21.20**
	B	79.57	**88.15 / 69.60**
	C	10.22	**16.04 / 12.01**
	D	19.90	**23.81 / 15.7**
Average Speed (miles per hour)	**A**	**16.3**	**14.2 / 14.2**
	B	**17.4**	**16.3 / 17.1**
	C	**17.3**	**13.1 / 16.2**
	D	**16.2**	**19.6 / 29.6**

31K Wellington Rapid Bus

This project provides service along Okeechobee Boulevard from Wellington in the vicinity of U.S. 441 and Forest Hill Boulevard to Downtown West Palm Beach.

	Assumption Specific Method Off Peak Only	Travel Demand Model Based Peak / Off Peak
One-Way Travel Time (minutes)	48.08	**56.55 / 48.90**
Average Speed (miles per hour)	**17.8**	**14.8 / 17.1**

31L Military Trail Rapid Bus

This project provides service along Military Trail from downtown Boca Raton to north of Downtown West Palm Beach.

	Assumption Specific Method Off Peak Only	Travel Demand Model Based Peak / Off Peak
One-Way Travel Time (minutes)	96.97	**134.9 / 118.2**
Average Speed (miles per hour)	**20.4**	**14.3 / 16.4**

31N Pines Rapid Bus

This project provides service along Pines / Hollywood Boulevard with two service patterns:

- A – SW 160th Avenue (Pembroke Pines West) to Downtown Hollywood / FEC
- B – SW 160th Avenue (Pembroke Pines West) to NW 215th Street (Metrorail North Corridor)

	Service Pattern	Assumption Specific Method Off Peak Only	Travel Demand Model Based Peak / Off Peak
One-Way Travel Time (minutes)	A	46.07	**48.05 / 41.90**
	B	31.17	**37.30 / 32.40**
Average Speed (miles per hour)	**A**	**17.3**	**16.7 / 19.2**
	B	**18.4**	**15.9 / 18.3**

31O Oakland Park Rapid Bus

This project provides service along Oakland Park Boulevard with two service patterns:

- A – Sawgrass Mills to FEC
- B – Sawgrass Mills to Cypress Creek Tri-Rail Station

	Service Pattern	Assumption Specific Method Off Peak Only	Travel Demand Model Based Peak / Off Peak
One-Way Travel Time (minutes)	A	49.90	**57.45 / 43.00**
	B	49.58	**61.80 / 45.70**
Average Speed (miles per hour)	**A**	**16.2**	**14.5 / 19.4**
	B	**17.3**	**13.9 / 18.8**

31Q Kendall Drive Rapid Bus

This project provides service along Kendall Drive from the proposed Sunset KAT Metrorail Extension to Dadeland South.

	Assumption Specific Method Off Peak Only	**Travel Demand Model Based Peak / Off Peak**
One-Way Travel Time (minutes)	34.15	**43.00 / 31.90**
Average Speed (miles per hour)	**14.1**	**11.2 / 15.0**

31R 137th Avenue Rapid Bus to Palmetto and the MIC

This project provides service along SW 137th Avenue and 8th Street from Kendall to Palmetto and the MIC.

	Assumption Specific Method Off Peak Only	**Travel Demand Model Based Peak / Off Peak**
One-Way Travel Time (minutes)	120.00	**133.55 / 95.7**
Average Speed (miles per hour)	**17.4**	**10.6 / 14.8**

31S Douglas Road Rapid Bus

This project provides service along Douglas Road between the MIC and the Douglas Road Metrorail Station

	Assumption Specific Method Off Peak Only	**Travel Demand Model Based Peak / Off Peak**
One-Way Travel Time (minutes)	17.57	**25.5 / 18.1**
Average Speed (miles per hour)	**15.4**	**10.6 / 14.9**