

APPENDIX O.1

SURFACE TRANSPORTATION METHODOLOGY

O.1.1 INTRODUCTION

A traffic analysis was completed in support of the Draft Environmental Impact Statement for airfield improvements at Fort Lauderdale-Hollywood International Airport (FLL). Five (5) intersections were identified as study intersections:

1. SE 30th Street / U.S. Highway 1
2. SE Griffin Road / U.S. Highway 1
3. SE Griffin Road / Interstate-95 Northbound Ramps
4. SE Griffin Road / Interstate-95 Southbound Ramps
5. SE 42nd Street / Ravenswood Road

The following sections discuss the assumptions, process, analysis and findings from the traffic analysis.

O.1.2 GENERAL APPROACH AND METHODOLOGY

Existing (2006) traffic counts were collected at the study intersections for both the morning and the evening peak hours. Daily 24-hour counts were also collected to establish “k” and “d” factors for peak hours. The “k” factor is the ratio of a peak hour (different for the morning and the evening peak hour) two-way link volumes to the daily two-way link volumes, and “d” is the directional distribution for that link for that particular peak hour. These factors are used to convert future daily volumes from the Broward County travel demand model volumes to directional peak hour volumes. Highway Capacity Manual (HCM) 2000 methodology was used to analyze Level of Service (LOS) at the study intersections utilizing SYNCHRO version 6 software. **Table O.1-1, *Level of Service***, below summarizes the general HCM criteria.

A “Link” is defined as the segment of a roadway which forms a “leg” at an approach of an intersection. So a typical four-legged intersection will have four legs or links at each approach. Each link has traffic entering (approaching) and also exiting the intersection, or in other words has two-way volumes. The “d” factor, or directional distribution, defines the ratio of the higher volume (whether entering or exiting) to the lesser volume of a link.

**Table O.1-1
LEVEL OF SERVICE (LOS)**

The Highway Capacity Manual 2000 (HCM 2000, Transportation Research Board) also serves as a technical guide for the evaluation of “free-flow” and intersection traffic operations. The HCM defines Level of Service (LOS) as a qualitative measure which describes operational conditions within a traffic stream—generally in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. The criteria used to evaluate LOS conditions vary, based on the type of roadway and whether the traffic flow is considered interrupted or uninterrupted.

The LOS is typically dependent on the quality of traffic flow at the intersections along a roadway. The HCM methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. The HCM uses different procedures depending on the type of intersection control. The LOS determined in this study are determined using the HCM methodology.

It should be noted that typically LOS-A to D are considered acceptable as a measure of driver comfort. LOS-E and F are considered unacceptable in terms of driver comfort and delay, LOS-E considered at capacity and LOS-F considered beyond capacity.

However, sometimes LOS-E is also considered acceptable for existing facilities by some jurisdictions when the level of improvements required to achieve LOS-D are excessive. This situation can arise, for example, in the case of an intersection where approach volumes are at or near the maximum threshold of a four-legged intersection. At this level grade-separation may be typically considered, as the level of at-grade improvements required to achieve LOS-D may be too excessive (such as four-lane left or right turn lanes). Typically these are less-costly stop-gap at-grade measures for the interim while grade-separation may be the long-term solution.

While LOS-D, and in rare cases LOS-E, is typically considered acceptable for existing facilities, for new facilities, typically LOS-C is the desired LOS for the design year.

For signalized intersections, average total control delay per vehicle for the overall intersection is used to determine LOS.

Level of Service (LOS) Standards

LEVEL OF SERVICE	AVERAGE TOTAL DELAY PER VEHICLE (SECONDS)	
	SIGNALIZED	UNSIGNALIZED
<i>A</i>	<i>0 to 10.00</i>	<i>0 to 10.00</i>
<i>B</i>	<i>10.01 to 20.00</i>	<i>10.01 to 15.00</i>
<i>C</i>	<i>20.01 to 35.00</i>	<i>15.01 to 25.00</i>
<i>D</i>	<i>35.01 to 55.00</i>	<i>25.01 to 35.00</i>
<i>E</i>	<i>55.01 to 80.00</i>	<i>35.01 to 50.00</i>
<i>F</i>	<i>80.01 and up</i>	<i>50.01 and up</i>

A Select-Zone analysis was completed to determine the approximate share (percentage) of traffic originating from and destined to the airport terminal complex. A separate analysis was performed to quantify the share of traffic generated by other airport-related services/businesses.

It was found that the main terminal contributes a maximum of one percent at the U.S. Highway 1 study intersections of SE 30th Street and Griffin Road. The percentage share of traffic from the main airport terminal is insignificant (less than one percent) on the Interstate-95 ramp terminals and the Ravenswood Road / SE 42nd Street intersection.

Traffic from airport-related services/businesses has a significant proportion going through the study intersections. The average percentage share of traffic to and from other airport-related services/businesses (minus traffic from the main terminal complex) at the study intersections are summarized in **Table O.1-2, Percentage Share of Traffic from Other Airport-Related Services/Businesses**, below.

**Table O.1-2
PERCENTAGE SHARE OF TRAFFIC FROM OTHER AIRPORT-RELATED
SERVICES/BUSINESSES**

Intersection	Leg	Percentage Share
U.S. Highway 1 / Griffin Road	West	60%
	East	54%
	North	36%
	South	21%
U.S. Highway 1 / SE 30 th Street	West	15%
	North	16%
	South	27%
Southbound Interstate-95 / Griffin Road	West	28%
	East	32%
	Southbound Off-Ramp	3%
	Southbound On-Ramp	21%
Northbound Interstate-95 / Griffin Road	West	32%
	East	41%
	Northbound Off-Ramp	16%
	Northbound On-Ramp	35%
Ravenswood Road / SE 42 nd Street	West	96%
	East	88%
	North	48%
	South	77%

O.1.3 FUTURE PROJECTIONS

Broward County's travel demand model was used to obtain daily volumes for all future alternatives. The current Broward model has year 2000 validation and a planning horizon year of 2030. Subsequently, land use data was interpolated to obtain daily traffic volumes for years 2012 and 2020. The 2012 and 2020 two-way daily volumes for the No-Action conditions are graphically depicted in **Exhibits O.1-1, 2012 Daily Volumes No-Action**, and **O.1-2, 2020 Daily Volumes No-Action**, respectively.

Daily volumes from the model were converted to directional morning and evening peak hour link volumes by applying "k" and "d" factors. The "k" and "d" factors were developed from existing 2006 counts for each peak hour. The directional peak hour link volumes were then used to develop peak hour turning movements for each study intersection for each alternative utilizing NCHRP guidelines.

Land use assumptions included in the Broward County model were found to be understated for the north side development area of the airport. Therefore, a sensitivity analysis was performed to gauge the difference with increased land use to the north of the airport. The sensitivity analysis, as summarized in **Table O.1-3, Sensitivity Analysis, Comparison with Increased Landuse to the North of the Airport**, indicates that roadway and intersection volumes will not change significantly to warrant changes to the current recommendations.

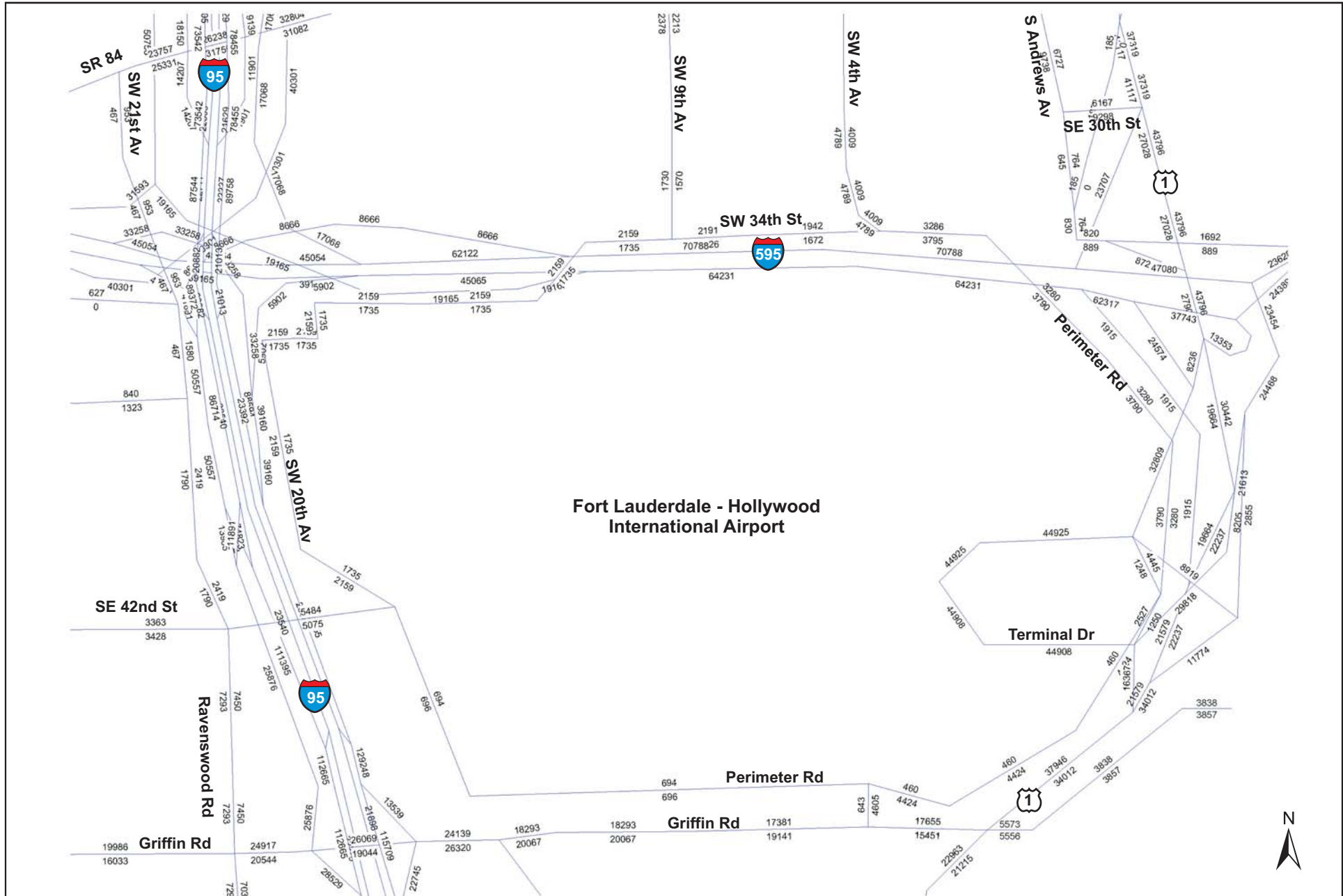
All the changes pertaining to these alternatives (i.e. network changes and/or land use changes) were modeled in the Broward County model and daily traffic volumes were obtained. No network or land use changes were made for the No Action Alternative and for Alternatives A, B4, and B5 as no changes were warranted from a traffic standpoint as compared to the No Action Alternative. Alternatives A, B4, and B5 will have the same traffic volumes as the No Action Alternative for the same year.

**Table O-3
SENSITIVITY ANALYSIS COMPARISON WITH INCREASED
LANDUSE TO THE NORTH OF THE AIRPORT**

Roadway	Segment	Proportion of Traffic from Airport Services (excluding Main Terminal)	Years ==> 2012 (with added Landuse in TAZ 640, north of FLL)				2020 (with added Landuse in TAZ 640, north of FLL)				
			Alternatives ==>				Alternatives ==>				
			No-Build (Do Nothing)	Alt B1, B1b & B1c	Alt C1 & D2	Alt D1	No-Build (Do Nothing)	Alt B1, B1b & B1c	Alt C1 & D2	Alt D1	
Griffin Road	just West of I-95 Ramps	28%	Two-way Lanes	6	6	6	6	6	6	6	6
			One-way Per Lane Capacity	9,667	9,667	9,667	9,667	9,667	9,667	9,667	9,667
			One-way Daily Total Capacity	29,000	29,000	29,000	29,000	29,000	29,000	29,000	29,000
			Two-way Daily Total Capacity	58,000	58,000	58,000	58,000	58,000	58,000	58,000	58,000
			Two-way Daily Volume	45,044	46,499	46,135	46,125	51,751	52,495	50,928	50,899
			FLL Services Share	12,612	13,020	12,918	12,915	14,490	14,699	14,260	14,252
			Volume / Capacity (V/C) Ratio	0.78	0.80	0.80	0.80	0.89	0.91	0.88	0.88
			Volume / Capacity (V/C) Ratio	0.85	0.88	0.89	0.88	0.97	0.99	1.00	0.98
Griffin Road	just East of I-95 Ramps	41%	Two-way Lanes	6	6	6	6	6	6	6	6
			One-way Per Lane Capacity	9,667	9,667	9,667	9,667	9,667	9,667	9,667	9,667
			One-way Daily Total Capacity	29,000	29,000	29,000	29,000	29,000	29,000	29,000	29,000
			Two-way Daily Total Capacity	58,000	58,000	58,000	58,000	58,000	58,000	58,000	58,000
			Two-way Daily Volume	49,575	51,293	51,715	50,911	56,193	57,404	57,924	56,658
			FLL Services Share	20,326	21,030	21,203	20,874	23,039	23,636	23,749	23,230
			Volume / Capacity (V/C) Ratio	0.85	0.88	0.89	0.88	0.97	0.99	1.00	0.98
			Volume / Capacity (V/C) Ratio	0.92	0.95	0.96	0.95	1.05	1.07	1.08	1.06
Griffin Road	just West of US-1	60%	Two-way Lanes	6	6	6	6	6	6	6	6
			One-way Per Lane Capacity	9,943	9,943	9,943	9,943	9,943	9,943	9,943	9,943
			One-way Daily Total Capacity	29,828	29,828	29,828	29,828	29,828	29,828	29,828	29,828
			Two-way Daily Total Capacity	59,656	59,656	59,656	59,656	59,656	59,656	59,656	59,656
			Two-way Daily Volume	32,390	32,852	34,976	34,295	36,825	36,958	38,577	38,762
			FLL Services Share	19,434	19,711	20,886	20,577	22,095	22,175	23,146	23,257
			Volume / Capacity (V/C) Ratio	0.54	0.55	0.58	0.57	0.62	0.62	0.65	0.65
			Volume / Capacity (V/C) Ratio	0.54	0.55	0.58	0.57	0.62	0.62	0.65	0.65
Griffin Road	just East of US-1	54%	Two-way Lanes	2	2	2	2	2	2	2	2
			One-way Per Lane Capacity	5,989	5,989	5,989	5,989	5,989	5,989	5,989	5,989
			One-way Daily Total Capacity	5,989	5,989	5,989	5,989	5,989	5,989	5,989	5,989
			Two-way Daily Total Capacity	11,978	11,978	11,978	11,978	11,978	11,978	11,978	11,978
			Two-way Daily Volume	11,036	10,958	14,993	12,983	15,472	15,473	19,366	17,458
			FLL Services Share	5,989	5,917	8,096	7,011	8,355	8,355	10,458	9,427
			Volume / Capacity (V/C) Ratio	0.92	0.91	1.25	1.08	1.29	1.29	1.62	1.46
			Volume / Capacity (V/C) Ratio	0.92	0.91	1.25	1.08	1.29	1.29	1.62	1.46
SE 30th Street	just West of US-1	15%	Two-way Lanes	2	2	2	2	2	2	2	2
			One-way Per Lane Capacity	5,989	5,989	5,989	5,989	5,989	5,989	5,989	5,989
			One-way Daily Total Capacity	5,989	5,989	5,989	5,989	5,989	5,989	5,989	5,989
			Two-way Daily Total Capacity	11,978	11,978	11,978	11,978	11,978	11,978	11,978	11,978
			Two-way Daily Volume	15,451	15,553	15,246	15,491	17,682	17,564	17,364	16,886
			FLL Services Share	2,318	2,333	2,287	2,324	2,652	2,605	2,605	2,533
			Volume / Capacity (V/C) Ratio	1.29	1.30	1.27	1.29	1.48	1.47	1.45	1.41
			Volume / Capacity (V/C) Ratio	1.29	1.30	1.27	1.29	1.48	1.47	1.45	1.41
US-1	just North of SE 30th Street	16%	Two-way Lanes	6	6	6	6	6	6	6	6
			One-way Per Lane Capacity	9,943	9,943	9,943	9,943	9,943	9,943	9,943	9,943
			One-way Daily Total Capacity	29,828	29,828	29,828	29,828	29,828	29,828	29,828	29,828
			Two-way Daily Total Capacity	59,656	59,656	59,656	59,656	59,656	59,656	59,656	59,656
			Two-way Daily Volume	77,834	78,362	78,210	78,656	80,070	79,620	79,122	78,122
			FLL Services Share	12,453	12,538	12,514	12,585	12,811	12,591	12,739	12,660
			Volume / Capacity (V/C) Ratio	1.30	1.31	1.31	1.32	1.34	1.32	1.33	1.33
			Volume / Capacity (V/C) Ratio	1.30	1.31	1.31	1.32	1.34	1.32	1.33	1.33
US-1	just South of SE 30th Street	27%	Two-way Lanes	8	8	8	8	8	8	8	8
			One-way Per Lane Capacity	9,543	9,543	9,543	9,543	9,543	9,543	9,543	9,543
			One-way Daily Total Capacity	38,172	38,172	38,172	38,172	38,172	38,172	38,172	38,172
			Two-way Daily Total Capacity	76,344	76,344	76,344	76,344	76,344	76,344	76,344	76,344
			Two-way Daily Volume	69,896	70,546	70,417	70,813	73,578	73,342	73,212	72,363
			FLL Services Share	18,872	19,047	19,013	19,120	19,866	19,802	19,767	19,538
			Volume / Capacity (V/C) Ratio	0.92	0.92	0.92	0.93	0.96	0.96	0.96	0.95
			Volume / Capacity (V/C) Ratio	0.92	0.92	0.92	0.93	0.96	0.96	0.96	0.95
US-1	just North of Griffin Road	36%	Two-way Lanes	6	6	6	6	6	6	6	6
			One-way Per Lane Capacity	10,391	10,391	10,391	10,391	10,391	10,391	10,391	10,391
			One-way Daily Total Capacity	31,172	31,172	31,172	31,172	31,172	31,172	31,172	31,172
			Two-way Daily Total Capacity	62,344	62,344	62,344	62,344	62,344	62,344	62,344	62,344
			Two-way Daily Volume	71,490	72,484	72,484	72,068	77,775	78,109	78,426	79,363
			FLL Services Share	25,736	26,094	26,094	25,944	27,999	28,119	28,233	28,571
			Volume / Capacity (V/C) Ratio	1.15	1.16	1.16	1.16	1.25	1.25	1.26	1.27
			Volume / Capacity (V/C) Ratio	1.15	1.16	1.16	1.16	1.25	1.25	1.26	1.27
US-1	just South of Griffin Road	21%	Two-way Lanes	4	4	4	4	4	4	4	4
			One-way Per Lane Capacity	9,581	9,581	9,581	9,581	9,581	9,581	9,581	9,581
			One-way Daily Total Capacity	19,161	19,161	19,161	19,161	19,161	19,161	19,161	19,161
			Two-way Daily Total Capacity	38,322	38,322	38,322	38,322	38,322	38,322	38,322	38,322
			Two-way Daily Volume	44,235	43,959	44,160	44,237	47,872	47,451	47,993	47,951
			FLL Services Share	9,289	9,231	9,274	9,290	10,053	9,965	10,079	10,070
			Volume / Capacity (V/C) Ratio	1.15	1.15	1.15	1.15	1.25	1.24	1.25	1.25
			Volume / Capacity (V/C) Ratio	1.15	1.15	1.15	1.15	1.25	1.24	1.25	1.25
Lee Wagener Boulevard / SW 42nd Street	just West of Anglers Avenue / Ravenswood Road	96%	Two-way Lanes	2	2	2	2	2	2	2	2
			One-way Per Lane Capacity	5,989	5,989	5,989	5,989	5,989	5,989	5,989	5,989
			One-way Daily Total Capacity	5,989	5,989	5,989	5,989	5,989	5,989	5,989	5,989
			Two-way Daily Total Capacity	11,978	11,978	11,978	11,978	11,978	11,978	11,978	11,978
			Two-way Daily Volume	6,795	6,793	6,834	7,413	7,487	7,513	7,537	8,117
			FLL Services Share	6,523	6,521	6,561	7,116	7,188	7,212	7,236	7,792
			Volume / Capacity (V/C) Ratio	0.57	0.57	0.57	0.62	0.63	0.63	0.63	0.68
			Volume / Capacity (V/C) Ratio	0.57	0.57	0.57	0.62	0.63	0.63	0.63	0.68
Lee Wagener Boulevard / SW 42nd Street	just East of Anglers Avenue / Ravenswood Road	88%	Two-way Lanes	2	2	2	2	2	2	2	2
			One-way Per Lane Capacity	5,989	5,989	5,989	5,989	5,989	5,989	5,989	5,989
			One-way Daily Total Capacity	5,989	5,989	5,989	5,989	5,989	5,989	5,989	5,989
			Two-way Daily Total Capacity	11,978	11,978	11,978	11,978	11,978	11,978	11,978	11,978
			Two-way Daily Volume	11,714	11,405	12,388	12,669	18,840	12,379	13,684	13,615
			FLL Services Share	10,308	10,036	10,901	11,149	16,587	10,994	12,042	11,981
			Volume / Capacity (V/C) Ratio	0.93	0.95	1.03	1.06	1.57	1.03	1.14	1.14
			Volume / Capacity (V/C) Ratio	0.93	0.95	1.03	1.06	1.57	1.03	1.14	1.14
Anglers Avenue / Ravenswood Road	just North of Lee Wagener Boulevard / SW 42nd Street	48%	Two-way Lanes	4	4	4	4	4	4	4	4
			One-way Per Lane Capacity	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468
			One-way Daily Total Capacity	12,935	12,935	12,935	12,935	12,935	12,935	12,935	12,935
			Two-way Daily Total Capacity	25,870	25,870	25,870	25,870	25,870	25,870	25,870	25,870
			Two-way Daily Volume	4,194	4,116	4,974	4,919	5,117	5,190	6,213	6,253
			FLL Services Share	2,013	1,976	2,388	2,361	2,456	2,491	2,982	3,001
			Volume / Capacity (V/C) Ratio	0.16	0.16	0.19	0.19	0.20	0.20	0.24	0.24
			Volume / Capacity (V/C) Ratio	0.16	0.16	0.19	0.19	0.20	0.20	0.24	0.24
Anglers Avenue / Ravenswood Road	just South of Lee Wagener Boulevard / SW 42nd Street	77%	Two-way Lanes	4	4	4	4	4	4	4	4
			One-way Per Lane Capacity	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468
			One-way Daily Total Capacity	12,935	12,935	12,935	12,935	12,935	12,935	12,935	12,935
			Two-way Daily Total Capacity	25,870	25,870	25,870	25,870	25,870	25,870	25,870	25,870
			Two-way Daily Volume	15,889	16,976	15,566	16,361	17,664	18,979	17,873	18,222
			FLL Services Share	12,235	13,072	11,986	12,598	13,601	14,614	13,762	14,031
			Volume / Capacity (V/C) Ratio	0.61	0.66	0.60	0.63	0.68	0.73	0.69	0.70
			Volume / Capacity (V/C) Ratio	0.61	0.66	0.60	0.63	0.68	0.73	0.69	0.70

TAZs	Years ==> 2012				2020			
	Alternatives ==>				Alternatives ==>			
	No-Build (Do Nothing)	Alt B1, B1b & B1c	Alt C1 & D2	Alt D1	No-Build (Do Nothing)	Alt B1, B1b & B1c	Alt C1 & D2	Alt D1
TAZ 642 (West of FLL)	8,337	8,386	11,534	11,543	8,446	8,472	11,587	11,604
TAZ 640 (North of FLL)	7,301	7,326	-	-	7,227	7,243	-	-
TAZ 632 & 633 (Southeast of FLL)	6,159	6,115	10,156	8,152	9,254	9,242	13,295	11,295

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