



UNIVERSITY DRIVE MOBILITY IMPROVEMENTS PLANNING STUDY

FINAL OPERATING AND MAINTENANCE (O&M) COST REPORT

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Prepared for:



Prepared by:



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1.0 INTRODUCTION

This Operating and Maintenance (O&M) Cost Report documents enhanced bus and bus rapid transit (BRT) operating and maintenance (O&M) cost estimates for the University Drive Mobility Improvements Planning Study. University Drive is an approximately 27-mile, 6-lane corridor that runs from south of the Miami-Dade/Broward County line at NW 215th Street to Westview Drive in northern Broward County. O&M costs were estimated for the following Viable Alternatives under consideration

- Silver Alternative (No-Build)
- Orange Alternative
- Yellow Alternative
- Green Alternative (Future Baseline Transit)
- Blue Alternative (Enhanced Bus Operating in Mixed Traffic)
- Red Alternative (Enhanced Bus Operating in Outside Curb Lane as BAT Lane - *From Oakland Park Boulevard to Griffin Road*)
- Indigo Alternative (Bus Rapid Transit (BRT) Operating in Mixed Traffic)
- Magenta Alternative (Bus Rapid Transit (BRT) Operating in Outside Curb Lane as BAT Lane - *From Westview Drive to Griffin Road*)
- Violet Alternative (Bus Rapid Transit (BRT) Operating in Outside Curb Lane as BAT Lane - *From Westview to Griffin Road*)

The O&M cost estimates are based on the proposed operating plans for the study and include all administration, operations and maintenance costs necessary for daily operations of a transit system.

2.0 OPERATING REQUIREMENTS

Operating statistics were projected based on general operating assumptions for each alternative and include calculations of peak vehicles, annual vehicle-hours, and annual vehicle-miles which were used as inputs into the O&M cost models. Total fleet vehicle requirements were calculated for use in the capital costs estimates. The following assumptions were included in estimating operating requirements:

- **Days of Operation** – Annual operating requirements were calculated assuming typical current annual days of operation for weekdays (254 days), Saturday (52 days) and Sundays & Holidays (59 days).
- **Cycle Time and Layover Time** – The cycle time consists of round-trip run time and layover / schedule recovery time for each route. Operations plans include time for end-of-line layovers (15% of estimated run time as a minimum standard) to provide sufficient time for operators to

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switch between tracks and vehicle cabs (LRT only), take breaks as required by union agreement, as well as provide for schedule recovery (i.e., a late bus or train can “catch up” to its schedule).

- **Maintenance Spare Ratio** – The maintenance spare ratio (MSR) is the percentage of extra vehicles in a fleet, over and above the number actually required to provide scheduled peak period service. Bus and rail transit systems typically maintain a MSR of 10% to 30%, depending on the age and condition of the vehicles, the vehicle fleet size, and the effectiveness of the maintenance program. A 20% MSR is assumed for the BRT and LRT vehicle fleet, which is a commonly accepted standard in the transit industry.
- **Peak and Fleet Vehicle Requirements** – The peak vehicle requirement will be calculated for each premium transit service incorporating operating requirements based on service frequency and cycle times. The MSR will be applied to the peak vehicle requirement to determine the total fleet requirement.

Operating statistics for the Silver, Yellow, Orange, Green and Blue Alternatives were reviewed and provided by Broward County Transit (BCT). Tables 1 through 4 present the detailed operating requirements calculated for the Red, Indigo, Magenta and Violet Alternatives.

Table 1 Red Alternative Operating Requirements

Route 2: NW 207th St. to West Regional Terminal

From	To	Run Time (min)	Distance (miles)	---Headway---			----Annual Revenue----		Lay Over	Cycle Time	---Buses---	
				Day	Peak	Off-Peak	Bus-Miles	Bus-Hours			Peak	Off-Pk
NW 207th St.	West Regional Ter.	53.0	13.23	Weekdays	20.0		383,100	28,960	7.0	120.0	6.0	
		53.0	13.23	Saturdays	20.0		78,400	5,930	7.0	120.0	6.0	
		53.0	13.23	Sundays	20.0		60,900	4,600	7.0	120.0	6.0	
via University Dr.												

Route 2: West Regional Terminal to Westview Dr.

From	To	Run Time (min)	Distance (miles)	---Headway---			----Annual Revenue----		Lay Over	Cycle Time	---Buses---	
				Day	Peak	Off-Peak	Bus-Miles	Bus-Hours			Peak	Off-Pk
West Regional Ter.	Westview Dr.	51.0	12.21	Weekdays	20.0		353,600	28,960	9.0	120.0	6.0	
		51.0	12.21	Saturdays	20.0		72,400	5,930	9.0	120.0	6.0	
		51.0	12.21	Sundays	20.0		56,200	4,600	9.0	120.0	6.0	
via University Dr.												

Route 102: Golden Glades Interchange to Westview Dr.

From	To	Run Time (min)	Distance (miles)	---Headway---			----Annual Revenue----		Lay Over	Cycle Time	---Buses---	
				Day	Peak	Off-Peak	Bus-Miles	Bus-Hours			Peak	Off-Pk
Golden Glades Interchange	Westview Dr.	73.0	31.78	Weekdays	20.0		799,100	33,530	7.0	160.0	8.0	
		73.0	31.78	Saturdays	20.0		143,800	6,030	7.0	160.0	8.0	
		73.0	31.78	Sundays	20.0		157,500	6,610	7.0	160.0	8.0	
via University Dr.												

ESTIMATED TOTALS: 125,150 annual revenue bus-hours
 2,105,000 annual revenue bus-miles
 PEAK BUS REQUIREMENT: 20 buses
 FLEET BUS REQUIREMENT: 24 buses

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Table 2 Indigo Alternative Operating Requirements

Route 2: NW 207th St. to West Regional Terminal

From	To	Run Time (min)	Distance (miles)	---Headway---			----Annual Revenue----		Lay Over	Cycle Time	---Buses---	
				Day	Peak	Off-Peak	Bus-Miles	Bus-Hours			Peak	Off-Pk
NW 207th St.	West Regional Ter.	56.0	13.23	Weekdays	30.0		255,400	24,130	19.0	150.0	5.0	
		56.0	13.23	Saturdays	30.0		41,300	3,900	19.0	150.0	5.0	
		56.0	13.23	Sundays	30.0		43,700	4,130	19.0	150.0	5.0	
via University Dr.												

Route 2: West Regional Terminal to Westview Dr.

From	To	Run Time (min)	Distance (miles)	---Headway---			----Annual Revenue----		Lay Over	Cycle Time	---Buses---	
				Day	Peak	Off-Peak	Bus-Miles	Bus-Hours			Peak	Off-Pk
West Regional Ter.	Westview Dr.	54.0	12.21	Weekdays	30.0		235,700	24,130	21.0	150.0	5.0	
		54.0	12.21	Saturdays	30.0		38,100	3,900	21.0	150.0	5.0	
		54.0	12.21	Sundays	30.0		40,300	4,130	21.0	150.0	5.0	
via University Dr.												

BRT Route: Golden Glades Interchange to Westview Dr.

From	To	Run Time (min)	Distance (miles)	---Headway---			----Annual Revenue----		Lay Over	Cycle Time	---Buses---	
				Day	Peak	Off-Peak	Bus-Miles	Bus-Hours			Peak	Off-Pk
Golden Glades Interchange	Westview Dr.	77.0	31.78	Weekdays	15.0		1,065,500	50,290	13.0	180.0	12.0	
		77.0	31.78	Saturdays	15.0		185,100	8,740	13.0	180.0	12.0	
		77.0	31.78	Sundays	15.0		210,000	9,910	13.0	180.0	12.0	
via University Dr.												

ESTIMATED TOTALS: 133,260 annual revenue bus-hours
 2,115,100 annual revenue bus-miles
 PEAK BUS REQUIREMENT: 22 buses
 FLEET BUS REQUIREMENT: 26 buses

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Table 3 Magenta Alternative Operating Requirements

Route 2: NW 207th St. to Westview Dr.

From	To	Run Time (min)	Distance (miles)	---Headway---			----Annual Revenue----		Lay Over	Cycle Time	---Buses---	
				Day	Peak	Off-Peak	Bus-Miles	Bus-Hours			Peak	Off-Pk
NW 207th St.	West Regional Ter.	50.0	13.23	Weekdays	30.0		255,400	19,300	10.0	120.0	4.0	
		50.0	13.23	Saturdays	30.0		41,300	3,120	10.0	120.0	4.0	
		50.0	13.23	Sundays	30.0		43,700	3,300	10.0	120.0	4.0	
via University Dr.												

Route 2: NW 207th St. to Westview Dr.

From	To	Run Time (min)	Distance (miles)	---Headway---			----Annual Revenue----		Lay Over	Cycle Time	---Buses---	
				Day	Peak	Off-Peak	Bus-Miles	Bus-Hours			Peak	Off-Pk
West Regional Ter.	Westview Dr.	48.0	12.21	Weekdays	30.0		235,700	19,300	12.0	120.0	4.0	
		48.0	12.21	Saturdays	30.0		38,100	3,120	12.0	120.0	4.0	
		48.0	12.21	Sundays	30.0		40,300	3,300	12.0	120.0	4.0	
via University Dr.												

BRT Route: Golden Glades Interchange to Westview Dr.

From	To	Run Time (min)	Distance (miles)	---Headway---			----Annual Revenue----		Lay Over	Cycle Time	---Buses---	
				Day	Peak	Off-Peak	Bus-Miles	Bus-Hours			Peak	Off-Pk
Golden Glades Interchange	Westview Dr.	69.0	31.78	Weekdays	15.0		1,065,500	46,100	13.5	165.0	11.0	
		69.0	31.78	Saturdays	15.0		185,100	8,010	13.5	165.0	11.0	
		69.0	31.78	Sundays	15.0		210,000	9,090	13.5	165.0	11.0	
via University Dr.												

ESTIMATED TOTALS: 114,640 annual revenue bus-hours
2,115,100 annual revenue bus-miles

PEAK BUS REQUIREMENT: 19 buses
FLEET BUS REQUIREMENT: 23 buses

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Table 4 Violet Alternative Operating Requirements

Route 2: NW 207th St. to Westview Dr.

From	To	Run Time (min)	Distance (miles)	---Headway---			---Annual Revenue---		Lay Over	Cycle Time	---Buses---	
				Day	Peak	Off-Peak	Bus-Miles	Bus-Hours			Peak	Off-Pk
NW 207th St.	West Regional Ter.	50.0	13.23	Weekdays	30.0		255,400	19,300	10.0	120.0	4.0	
		50.0	13.23	Saturdays	30.0		41,300	3,120	10.0	120.0	4.0	
		50.0	13.23	Sundays	30.0		43,700	3,300	10.0	120.0	4.0	
via University Dr.												

Route 2: NW 207th St. to Westview Dr.

From	To	Run Time (min)	Distance (miles)	---Headway---			---Annual Revenue---		Lay Over	Cycle Time	---Buses---	
				Day	Peak	Off-Peak	Bus-Miles	Bus-Hours			Peak	Off-Pk
West Regional Ter.	Westview Dr.	48.0	12.21	Weekdays	30.0		235,700	19,300	12.0	120.0	4.0	
		48.0	12.21	Saturdays	30.0		38,100	3,120	12.0	120.0	4.0	
		48.0	12.21	Sundays	30.0		40,300	3,300	12.0	120.0	4.0	
via University Dr.												

BRT Route: Golden Glades Interchange to Westview Dr.

From	To	Run Time (min)	Distance (miles)	---Headway---			---Annual Revenue---		Lay Over	Cycle Time	---Buses---	
				Day	Peak	Off-Peak	Bus-Miles	Bus-Hours			Peak	Off-Pk
Golden Glades Interchange	Westview Dr.	69.0	31.78	Weekdays	15.0		1,065,500	46,100	13.5	165.0	11.0	
		69.0	31.78	Saturdays	15.0		185,100	8,010	13.5	165.0	11.0	
		69.0	31.78	Sundays	15.0		210,000	9,090	13.5	165.0	11.0	
via University Dr.												

ESTIMATED TOTALS: 114,640 annual revenue bus-hours
 2,115,100 annual revenue bus-miles
 PEAK BUS REQUIREMENT: 19 buses
 FLEET BUS REQUIREMENT: 23 buses

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Table 5 presents the summary of operating requirements for each of the individual alternatives.

Table 5 Summary of Operating Requirements

	SILVER*	ORANGE*	YELLOW*	GREEN*	BLUE*	RED	INDIGO	MAGENTA	VIOLET
Peak <i>Bus</i> Requirement	20	21	21	16	19	20	10	8	8
Fleet <i>Bus</i> Requirement	24	25	25	19	23	24	12	10	10
Peak <i>BRT</i> Requirement	-	-	-	-	-	-	12	11	11
Fleet <i>BRT</i> Requirement	-	-	-	-	-	-	14	13	13
Annual Bus-Hours	62,812	82,007	82,007	83,386	96,117	125,150	133,260	114,640	114,640
Annual Bus-Miles	n/a	n/a	n/a	n/a	n/a	2,105,000	2,115,100	2,115,100	2,115,100

*Source: Broward County Transit

3.0 O&M Cost Estimates

Based on the operating plans and level of service for the enhanced bus and BRT operations developed for the project, annual O&M costs were calculated by applying a FY 2012 Broward County Transit (BCT) fully allocated bus unit cost of \$94.26. The multi-variable unit costs derived from the fully allocated model described in the *Operating and Maintenance (O&M) Methodology Report*, were applied to capture additional costs to operate and maintain enhanced bus and bus rapid transit (BRT). Costs were estimated and summarized using 2012 dollars.

Table 6 Summary of Annual O&M Cost Estimates (2012 dollars)

	Stations	Garages	Bus-Hrs	Bus-Miles	Peak Buses	Fully Allocated Model	BCT Cost Per Hour
FY 2012 BRT Unit Costs	\$9,787	\$1,224,711	\$46.68	\$2.39	\$57,599		
Silver Alternative			62,812				
FY 2008 Cost by Variable	\$ -	\$ -	\$ -	\$ -	\$ -		\$ 5,920,000
						<i>Increment Over No Build</i>	\$ -
Orange Alternative			82,007				
FY 2008 Cost by Variable	\$ -	\$ -	\$ -	\$ -	\$ -		\$ 7,730,000
						<i>Increment Over No Build</i>	\$ 1,810,000
Yellow Alternative			82,007				
FY 2008 Cost by Variable	\$ -	\$ -	\$ -	\$ -	\$ -		\$ 7,730,000
						<i>Increment Over No Build</i>	\$ 1,810,000
Blue Alternative			83,386				
FY 2008 Cost by Variable	\$ -	\$ -	\$ -	\$ -	\$ -		\$ 7,860,000
						<i>Increment Over No Build</i>	\$ 1,940,000
Red Alternative	20	-	125,150	2,105,000	20		
FY 2008 Cost by Variable	\$ 195,740	\$ -	\$ 5,841,847	\$ 5,040,288	\$ 1,151,973	\$ 12,229,847	\$11,800,000
						<i>Increment Over No Build</i>	\$ 5,880,000
Indigo Alternative	20	-	133,260	2,115,100	22		
FY 2008 Cost by Variable	\$ 195,740	\$ -	\$ 6,220,412	\$ 5,064,472	\$ 1,267,170	\$ 12,747,793	\$12,560,000
						<i>Increment Over No Build</i>	\$ 6,640,000
Magenta Alternative	20	-	114,640	2,115,100	19		
FY 2008 Cost by Variable	\$ 195,740	\$ -	\$ 5,351,253	\$ 5,064,472	\$ 1,094,374	\$ 11,705,839	\$10,810,000
						<i>Increment Over No Build</i>	\$ 4,890,000
Violet Alternative	20	-	114,640	2,115,100	19		
FY 2008 Cost by Variable	\$ 195,740	\$ -	\$ 5,351,253	\$ 5,064,472	\$ 1,094,374	\$ 11,705,839	\$10,810,000
						<i>Increment Over No Build</i>	\$ 4,890,000

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