Guide to Interpretation of Traffic Signal Timing Reports Produced by the Miami-Dade County (MDC) Advanced Traffic Management System (ATMS)

Miami-Dade county's Traffic Signals and Signs Division started the migration from the Urban Transportation Control System (UTCS) to the new Advanced Traffic Management system in 2005. For several years traffic engineers and planners have interpreted the traffic signal timing reports obtained from the UTCS; however, several intersections have already been migrated to the ATMS and their signal timing report may not be easily understood. This document describes how to determine the traffic patterns, green time, yellow and red intervals used at an intersection. Note that the following paragraphs pertain to the sample timing data shown in the attached tables.

1. How to Determine Time-Of-Day (TOD) Plan in Effect

The TOD plan can be determined from the *Local Time-of-Day Schedule* table. The TOD plan is determined by identifying both the time at which a timing plan will start and the Day of the Week when the timing plan is implemented. In some instances intersections operate according to timing parameters entered into the traffic controller but that neither include a predetermined cycle length nor provide coordination along the major street, which is described in the Plan column as "Free". Please note that the *Local Time–of-Day Schedule* does not necessarily display the TOD plan for each hour of the day. For example, timing plan 1 starts at 6:30 AM and ends at 9:00 AM on Saturdays and Sundays.

2. How to determine Theoretical Green Time for Each Phase in a Given Timing Pattern

The theoretical green time for each of the phases used at an intersection is displayed on the *Green Time* table. The *Green Time* table provides the pattern cycle length, green time allotted for each of the phases, and pattern offset for each of the timing plans included in the existing database (i.e., non-TOD plans are also included).

It is important to highlight that the offset is referenced to the beginning of yellow of the coordinated phases (i.e., Φ2 and Φ6) for all the signalized intersections controlled by the ATMS. Most of the time, left-turning movements on the major street are concurrent and the offset reference point will coincide for both Φ2 and Φ6. However, when one of the left-turning movements on the major street lag, the offset will be referenced to the beginning of yellow of the opposing through traffic phase. For example, when Φ5 lags the offset reference point is the beginning of Φ6's yellow. On the other hand, if Φ1 lags the offset reference point is Φ2's beginning of yellow.

The theoretical green time obtained from the report may be different from the actual green allotted to the phase. A phase will terminate if the phase "gaps out", "maxes out" or enters in conflict flash. In order to increase the efficiency of traffic flow at an intersection, the signal will "max out" during the heavy traffic volume periods and will "gap-out" when traffic is not as heavy as that of the peak hour. The theoretical green time will be different from the actual green time when the phase "gaps-out" because the unused green time of a phase is usually transferred to the next phase. In contrast, if the phase "maxes out" the theoretical green time is equal to the actual green time.

If the signalized intersection is operating free, both Maximum Green values of each phase must be considered. Please refer to **Section 4** below for a more detailed explanation.

3. How to Determine Yellow and Red Clearance Time for Each Phase

The yellow and red clearance time for each of the phases used at an intersection is displayed on the *Phase Bank* table provided on Page 1. The *Phase Bank* table provides other important information in addition to the clearance values and will be described in more detail in **Section 4** below.

4. How to Determine the Maximum Green Time for Each Phase

Timing phase data; such as green, yellow and red time are stored in three Phase Banks. The Maximum Green Time for each of the phases used at an intersection is displayed on the *Phase Bank* table. Phase Banks may have different values for the minimum green, maximum green and the maximum green 2. *Phase Banks* include the following timing parameters: Walk, Don't Walk, Min Initial, Veh Ext, Max Limit, Max 2, Yellow and Red. The maximum green time of a phase will be obtained from the parameters Max Limit (Max 1) or Max 2.

The first step for determining the maximum green time consists of identifying the Phase Bank and maximum green time used (i.e., Max 1 or Max 2) for a particular pattern. The Phase Bank and maximum green time are used according to the setting code of the traffic controller's internal logic, as described in the *Settings* table. Please note that the setting code may vary throughout the day according to the day of the week and time presented in the *Local Time of Day Function* table. In the example presented below, Phase Bank 1 Max 2 is used from 6:00 AM to midnight Monday through Friday, and from 6:30 AM to 1:30 AM on Saturday and Sunday. It is important to highlight that when the settings are blank and the intersection is running a particular pattern the timing data is read from Phase Bank 1, Max 1, and when the settings are blank and the intersection is running free the data is read from Phase Bank 1, Max 2.

Local Time of Day Function

Time	Function	Settings *	Day of Week
0000	TOD OUTPUTS	-------1	M T W Th F
0130	TOD OUTPUTS	-------1	Su S
0600	TOD OUTPUTS	--------	M T W Th F
0630	TOD OUTPUTS	--------	Su S

*** Settings**

Blank - Plan - Phase Bank 1, Max 1
Blank - FREE - Phase Bank 1, Max 2
1 - Phase Bank 2, Max 1
2 - Phase Bank 2, Max 2
3 - Phase Bank 3, Max 1
4 - Phase Bank 3, Max 2
5 - EXTERNAL PERMIT 1
6 - EXTERNAL PERMIT 2
7 - X-PED OMIT
8 - TBA

The second step consists of obtaining either the Max 1 or Max 2 values from the *Phase Bank* table. In the example presented in 4, Φ1 and Φ8 could be provided with a Maximum of 25 and 15 seconds on a weekday from 6:00 AM to 6:30 AM (please refer to Phase Bank 1 Max 2), respectively.

5. External Permits

External Permit 0, 1 and 2 are used to omit/skip the display of a particular phase when the pattern indicates it. The *Permitted Phases* table describes the phases utilized at the intersection and the phases used when the External Permit command is actuated. External Permits are actuated by including either setting code 5 or 6 in the *Local Time of Day Function* table. In the example presented in this document, the movements at an

Permitted Phases

	12345678
Default	12--5678
External Permit 0	--------
External Permit 1	-2---678
External Permit 2	-2---678

intersection are served with phases 1,2,5,6,7 and 8, but Φ1 is omitted when the External Permit 1 command is activated.

Please note that omitting phases could also be accomplished by not providing a Force-Off value in a particular time.

Phase Bank

Phase		Walk Phase Bank 1 2 3	Don't Walk 1 2 3	Min Initial 1 2 3	Veh Ext 1 2 3	Max Limit 1 2 3	Max 2 1 2 3	Yellow	Red
1	EBL	0 - 0 - 0	0 - 0 - 0	5 - 5 - 5	2 - 2 - 2	7 - 5 - 7	25 - 15 - 15	3.7	0
2	WBT	0 - 0 - 0	0 - 0 - 0	16 - 16 - 16	1 - 1 - 1	35 - 36 - 35	0 - 0 - 0	4	0.5
3		0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 16 - 0	0 - 0 - 0	0	0
4		0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 7 - 0	0 - 0 - 0	0	0
5	WBL	0 - 0 - 0	0 - 0 - 0	5 - 5 - 5	2 - 2 - 2	7 - 5 - 7	18 - 15 - 15	3	0
6	EBT	0 - 0 - 0	0 - 0 - 0	16 - 16 - 16	1 - 1 - 1	35 - 36 - 35	0 - 0 - 0	4	0.5
7	NBT	5 - 5 - 5	19 - 19 - 19	7 - 7 - 7	2.5 -2.5 - 2.5	16 - 16 - 16	45 - 25 - 25	4	1.2
8	SBT	0 - 0 - 0	0 - 0 - 0	7 - 7 - 7	2.5 -2.5 - 2.5	8 - 7 - 8	15 - 18 - 18	4	1.2

		Green Time									
		1	2	3	4	5	6	7	8		
Timing Plan	Cycle	EBL	WBT			WBL	EBT	NBT	SBT	Ring Offset	Offset
1	90	7	42	0	0	7	43	16	7	0	63
3	85	9	28	0	0	9	29	22	8	0	14
4	100	7	51	0	0	7	52	17	7	0	51
5	110	14	49	0	0	14	50	22	7	0	91
6	110	14	49	0	0	14	50	22	7	0	57
7	110	10	54	0	0	10	55	21	7	0	7
8	110	7	55	0	0	7	56	21	9	0	52
9	110	7	56	0	0	7	57	22	7	0	80
10	130	7	61	0	0	7	62	17	7	0	5
11	130	14	51	0	0	14	52	40	7	0	126
12	80	7	23	0	0	7	24	22	10	0	3
13	130	14	51	0	0	14	52	40	7	0	126
14	90	15	27	0	0	15	28	22	8	0	32
15	115	15	46	0	0	15	47	28	8	0	113
16	120	20	40	0	0	20	41	30	12	0	93
17	80	5	33	0	0	5	34	17	7	0	38
18	90	7	37	0	0	7	38	21	7	0	1
22	75	8	24	0	0	8	25	17	8	0	5
25	130	10	75	0	0	10	76	17	10	0	49
26	120	20	46	0	0	13	54	26	10	0	44
27	130	20	41	0	0	13	49	41	10	0	127

Miami-Dade County Traffic Signals

Time Of Day Schedule Report for 3997 : Dadeland Blvd&Kendall Dr

28	110	14	44	0	0	12	47	24	10	0	61

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Local Time of Day Function

Time	Function	Settings *	Day of Week
0000	TOD OUTPUTS	-------1	M T W Th F
0130	TOD OUTPUTS	-------1	Su S
0600	TOD OUTPUTS	--------	M T W Th F
0630	TOD OUTPUTS	--------	Su S

Permitted Phases 5

	12345678
Default	12--5678
External Permit 0	--------
External Permit 1	-2---678
External Permit 2	-2---678

Local Time of Day Schedule 1

Time	Plan	Day of Week
0000	22	Su S
0000	Free	M T W Th F
0130	Free	Su S
0600	1	M T W Th F
0630	1	Su S
0630	10	M T W Th F
0900	4	Su S
0930	8	M T W Th F
1030	8	Su S
1100	5	M T W Th F
1130	5	Su S
1530	6	M T W Th F
1600	7	Su S
1600	13	M T W Th F
1700	11	M T W Th F
1730	13	M T W Th F
1830	6	S
1830	9	Su
1930	8	M T W Th F
2030	18	Su
2130	17	M T W Th F
2230	22	S
2300	22	Su

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* Settings
Blank - Plan - Phase Bank 1, Max 1
Blank - FREE - Phase Bank 1, Max 2
1 - Phase Bank 2, Max 1
2 - Phase Bank 2, Max 2
3 - Phase Bank 3, Max 1
4 - Phase Bank 3, Max 2
5 - EXTERNAL PERMIT 1
6 - EXTERNAL PERMIT 2
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