

**Memorandum***District of Columbia**Bowie**College Park**Frederick County**Gaithersburg**Greenbelt**Montgomery County**Prince George's County**Rockville**Takoma Park**Alexandria**Arlington County**Fairfax**Fairfax County**Falls Church**Loudoun County**Manassas**Manassas Park**Prince William County*

Date: October 19, 2010

To: MOVES Taskforce Meeting

From: Yu Gao
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Subject: MOVES Vehicle Hours of Travel (VHT) Distribution for Transit Buses

Background

MOVES model require VHT distribution for all vehicle types on freeway and arterial facilities. On arterial facilities, the transit buses would be traveling at speeds that are different from the traffic stream due to their need to make frequent stops; therefore we would need different VHT distributions for transit buses on arterial roads both in urban and rural setting. Staff requested speed data of transit buses from WMATA in order to develop local data in place of the MOVES default data. A GIS database which has the bus speed and distance information of AM peak, PM peak and off peak hours needed for our analysis was provided by WMATA.

Analysis and Final Result

As a first step staff excluded freeway, expressway and other high speed bus travel data from the data base since our analysis is for arterial facilities only. The database was then summarized and Table 1 shows the distances traveled by the transit buses under different MOVES speed bins for the three periods of the day. AM peak is from 6 AM to 9 AM; PM peak is from 3 PM to 6 PM; and off-peak is the rest of the day. Since MOVES model requires time-based average speed distribution instead of distance-based one, staff divided the distances by the average bin speeds to get the time spent by the buses under each speed bin, as shown in table 2.

The input data requires weekday and weekend distribution for 24 hours. The final VHT distribution (weekday) for transit buses is shown in table 3. The off-peak distribution is used to represent the weekend distribution.

Table 1. Transit Bus Distance(feet) by Speed Bins(Arterial Facility)

Speed	Daily_Distance	AM Peak_Distance	PM Peak_Distance
speed < 2.5mph	145,279	161,438	160,573
2.5mph <= speed < 7.5mph	531,874	447,930	668,832
7.5mph <= speed < 12.5mph	2,301,780	2,213,862	2,673,341
12.5mph <= speed < 17.5mph	3,211,083	2,779,916	2,538,148
17.5mph <= speed < 22.5mph	1,581,574	1,302,661	835,989
22.5mph <= speed < 27.5mph	716,737	305,632	324,090
27.5mph <= speed < 32.5mph	229,866	179,914	180,221
32.5mph <= speed < 37.5mph	185,456	78,229	147,299
37.5mph <= speed < 42.5mph	103,076	37,170	140,122
42.5mph <= speed < 47.5mph	48,482	15,526	48,145
47.5mph <= speed < 52.5mph	23,071	101,102	98,282
52.5mph <= speed < 57.5mph	23,306	0	0
57.5mph <= speed < 62.5mph	0	0	0
62.5mph <= speed < 67.5mph	0	0	0
67.5mph <= speed < 72.5mph	0	0	0
72.5mph <= speed	0	0	0

Table 2. Transit Bus Time Traveled by Speed Bins (Arterial Facility)

avgSpeedBinDesc	Daily_Time	6-9 AM_Time	3-6 PM_Time
speed < 2.5mph	58,112	64,575	64,229
2.5mph <= speed < 7.5mph	106,375	89,586	133,766
7.5mph <= speed < 12.5mph	230,178	221,386	267,334
12.5mph <= speed < 17.5mph	214,072	185,328	169,210
17.5mph <= speed < 22.5mph	79,079	65,133	41,799
22.5mph <= speed < 27.5mph	28,669	12,225	12,964
27.5mph <= speed < 32.5mph	7,662	5,997	6,007
32.5mph <= speed < 37.5mph	5,299	2,235	4,209
37.5mph <= speed < 42.5mph	2,577	929	3,503
42.5mph <= speed < 47.5mph	1,077	345	1,070
47.5mph <= speed < 52.5mph	461	2,022	1,966
52.5mph <= speed < 57.5mph	424	0	0
57.5mph <= speed < 62.5mph	0	0	0
62.5mph <= speed < 67.5mph	0	0	0
67.5mph <= speed < 72.5mph	0	0	0
72.5mph <= speed	0	0	0

Table 3. VHT Distribution for Transit Bus by Time of Day(Arterial Facility)

avgSpeedBinID	avgBinSpeed	avgSpeedBinDesc	9AM-3PM/6PM-6AM	6AM-9 AM	3PM-6 PM
1	2.5	speed < 2.5mph	7.92%	9.94%	9.10%
2	5	2.5mph <= speed < 7.5mph	14.49%	13.79%	18.95%
3	10	7.5mph <= speed < 12.5mph	31.36%	34.07%	37.86%
4	15	12.5mph <= speed < 17.5mph	29.17%	28.52%	23.97%
5	20	17.5mph <= speed < 22.5mph	10.77%	10.02%	5.92%
6	25	22.5mph <= speed < 27.5mph	3.91%	1.88%	1.84%
7	30	27.5mph <= speed < 32.5mph	1.04%	0.92%	0.85%
8	35	32.5mph <= speed < 37.5mph	0.72%	0.34%	0.60%
9	40	37.5mph <= speed < 42.5mph	0.35%	0.14%	0.50%
10	45	42.5mph <= speed < 47.5mph	0.15%	0.05%	0.15%
11	50	47.5mph <= speed < 52.5mph	0.06%	0.31%	0.28%
12	55	52.5mph <= speed < 57.5mph	0.06%	0.00%	0.00%
13	60	57.5mph <= speed < 62.5mph	0.00%	0.00%	0.00%
14	65	62.5mph <= speed < 67.5mph	0.00%	0.00%	0.00%
15	70	67.5mph <= speed < 72.5mph	0.00%	0.00%	0.00%
16	75	72.5mph <= speed	0.00%	0.00%	0.00%