

**MEMORANDUM**

September 18, 2012

TO: Transportation, Infrastructure, Energy and Environment Committee

FROM:  Glenn Orlin, Deputy Council Staff Director

SUBJECT: **Discussion**—I-270 high-occupancy-vehicle (HOV) lanes

During this worksession the Committee will explore the potential of re-purposing the southbound inside lane of I-270 from Clarksburg Road (MD 121) to I-370 from general use to sole use by high-occupancy vehicles—carpools, vanpools, and buses—during weekday morning rush hours. Currently the I-270 HOV system consists of:

- during the morning peak, a southbound lane from I-370 to the lane divide, and one lane southbound on each of the two spurs; and
- during the evening peak, a northbound lane on each of the two spurs and one lane on the mainline from the lane divide to MD 121.

This configuration was not what had been initially planned. In the early 1990s the State Highway Administration (SHA) developed a project and received Federal approvals to add an HOV lane in each direction I-270 from Germantown to MD 121 in Clarksburg. Four successive Consolidated Transportation Programs (CTPs) so described the project, with construction starting in FY 1995 and finishing in FY 1997 (see ©1-4). The project had the full support of the County.

However, in FY 1997, during the last year of construction, opposition to HOV lanes was raised by the members of the House of Delegates from District 39—the newly created district representing Germantown, Laytonsville, and Damascus—who had philosophical objections to HOV lanes. They believed that anyone who paid the gas tax should use any part of a public road, and so drivers travelling alone should not be prohibited from using any lane. Consequently, despite the County's objections, SHA decided to implement a compromise: the new northbound lane would be reserved for HOVs in the evening peak as planned, but the new southbound lane would be open for general use. SHA's main technical argument was that the additional southbound capacity would be needed while the widening of MD 355 in Germantown was underway. SHA secured approval from the Federal Highway

Administration for this change, and in 1997 the new lanes opened to traffic. The widened MD 355 was opened to traffic two years later, but the new southbound lane on I-270 was never re-purposed as an HOV lane.

In the 15 years since this decision, much has changed in the corridor. Germantown's population has increased from 58,000 to 86,000 (+48%), Clarksburg's population rose from 2,000 to 17,000 (+750%), and Frederick County's population has gone up from 183,000 to about 240,000 (+31%). As these areas have developed, there is an increasing demand for a high quality transit connection to workplaces in the I-270 Corridor, Bethesda, and downtown Washington. Since 1997 the MARC's commuter rail service has a new branch to the City of Frederick, but its route to the I-270 Corridor and downtown Washington is circuitous (southwest to Point of Rocks before heading southeast to Silver Spring and Union Station), its frequency is limited, and there is no midday service. Express bus service on I-270 from Germantown to Shady Grove Metro has been implemented, but in the morning peak period it is caught in the congestion on the general use lanes.

There is no relief to this commute in the foreseeable future. While the Corridor Cities Transitway (CCT) is in the late planning stage and will soon enter the preliminary design stage, it is largely acknowledged that only the first stage—from Shady Grove to Metropolitan Grove—may be built during the next several years. Furthermore, the primary use of the CCT will be for commuters to the employment center in the Great Seneca Science Corridor; most commuters to Shady Grove Metro and points south will continue onto I-270, which is a much more direct route with no stops. Therefore, the best opportunity for improving travel time for transit and ridesharing commuters in the I-270 Corridor is to re-purpose the inside southbound lane of I-270 between MD 121 and I-370 as an HOV 2+ lane, as originally intended in the early 1990s.

**Analysis.** At Council staff's request, SHA staff performed a cursory queuing analysis of this proposal. The results of this analysis are on ©5. The first scenario, entitled "Existing," shows the current southbound weekday morning peak hour vehicles in each link of I-270 from north of MD 121 to I-370. It shows free-flow conditions from just north of MD 121—where the number of lanes expands from 2 to 3—until Middlebrook Road in Germantown. From Middlebrook Road south to I-270, however, the average speed slows considerably: into the Level of Service E and F ranges.

The second scenario, entitled "Converting Left-Most Lane to HOV (Existing HOV Usage)," assumes that the inside lane is reserved solely for HOVs, and that HOVs comprise 20% of the traffic flow in each link. (The 20% ratio is based on the average use of the HOV lane south of I-370 in the morning peak.) Note that in this scenario there is no additional HOVs assumed to be created as a result of the travel time advantage afforded to them; it merely separates the "Existing" scenario's HOVs from the SOVs. Under this second scenario the traffic in the remaining general purpose lanes between MD 121 and Middlebrook Road slows to 20-36 mph: into Level of Service E and F range. However, because of the metering effect north of Middlebrook Road, the traffic flow from Middlebrook Road and Clopper Road (MD 117) would improve to Level of Service D.

The third scenario, entitled "Converting Left-Most Lane to HOV (Increased HOV Usage)," is the same as the second scenario, except that it assumes a modest inducement in the creation of HOVs due to the travel time advantage afforded to them. As might be expected the results from this scenario are

slightly better than the second scenario in most respects, except that the travel time advantage for HOVs is reduced.

SHA estimates that implementing either the second or third scenario would cost in the range of \$20-25 million. The cost includes fabricating and erecting signs, adjusting the location of some existing signs and light poles, and milling and re-marking the inside lane. This change cannot occur without Federal Highway Administration (FHWA) approval; it will require much more detailed traffic and operational analyses and a demonstration that the extended HOV lane would operate safely. The approval process itself could take at least many months, and possibly as much as a year or more.

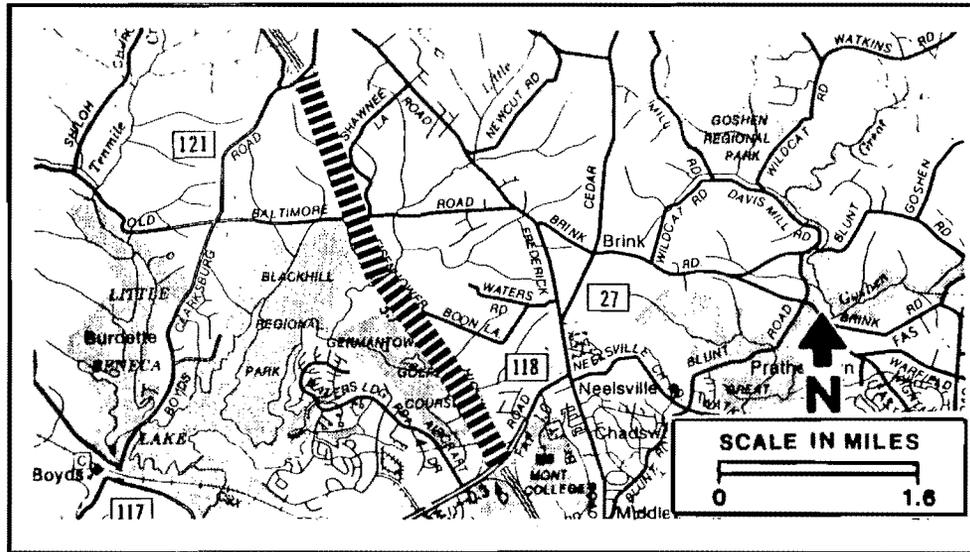
***Further analysis needed.*** Council staff appreciates the quick turnaround from SHA in performing this first cut at analyzing an extended HOV lane. However, since the results are inconclusive one way or the other, and since FHWA would require a more extensive analysis anyway, Council staff believes that SHA should undertake a much more comprehensive analysis during the next several months. For example:

- In the present queuing analysis the demand shown for the HOV lane is based on an assumed percentage of total volume. Instead, a more detailed analysis would calculate the demand with a traffic forecasting model, taking into account the travel times on I-270 and nearby parallel routes, and would perform this analysis 5 or 10 years in the future.
- Under the third scenario the present analysis assumes that the capacity freed up in the general purpose lane (because some drivers would shift to ridesharing or transit) would fill up again due to the phenomenon of latent demand. This latent demand would consist of both drivers from parallel routes and drivers on I-270 from earlier or later in the peak period. These benefits should be captured in a more detailed analysis.
- The effects on traffic south of I-370 and in the two-lane section north of MD 121 should be estimated.
- If the extended HOV lane would result in that lane reaching capacity south of I-370—to the point where it no longer would provide a travel-time advantage over the general purpose lanes—then other options should be examined, including: (1) re-designating the HOV restriction to vehicles with at least 3 persons on board; and (2) re-purposing the inside *two* lanes on I-270 south of I-370 as HOT lanes.

Most commuters decide whether or not to carpool, vanpool, or take transit based on the travel time and reliability of the morning commute, since generally there is more pressure to reach work on time than to get home on time. The existence of the northbound HOV to Clarksburg in the evening has probably made very little difference in commuters' decisions to rideshare. Therefore, to a certain degree the potential use of the extended HOV lane is probably underestimated, and the congestion in the general use lanes is likely overestimated; the positive effects of an extended HOV lane would also show up in more use of the existing HOV lane south of I-370 in the morning and in the northbound HOV lane in the evening.

**Council staff recommendation: Formally request SHA to perform a more comprehensive analysis of re-purposing the inside southbound lane of I-270 between MD 121 and I-370 as an HOV 2+ lane, and to examine other HOV or HOT options (such as those noted above) if this first option is clearly not advantageous in maximizing people movement.** If SHA can secure FHWA approval, such an option should be implemented as soon as possible. If FHWA approval is secured the Division of Transit Services should then prepare changes to the Ride On route structure in Clarksburg and Germantown to best take advantage of the extended HOV lane.

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**PROJECT:** I-270

**DESCRIPTION:** Upgrade existing I-270 from MD 118 to MD 121 to 6 lanes with the addition of an HOV lane in each direction (4.26 miles).

**JUSTIFICATION:** I-270 is the backbone of one of the most rapidly developing corridors in the state. Traffic volumes currently cause congestion and are increasing with development. Forecasted volumes indicate deficiencies at interchanges and the need for widening the mainline.

**PLAN CONSISTENCY:** Comprehensive Amendment to Germantown Master Plan, 1989; Master Plan for Clarksburg and Vicinity, 1968

**ASSOCIATED IMPROVEMENTS:**

- I-270, MD 124 to I-70 to north of Biggs Ford Road (D&E Program)
- I-270, at Father Hurley Boulevard (Montgomery County)
- MD 355, MD 124 to Middlebrook Road
- MD 118, south of MD 117 to Wisteria Drive and I-270 to MD 355
- MD 124/MD 27 Corridor Study (D&E Program)

**STATUS:**

Final Engineering and Right-of-way underway. Construction to begin during budget fiscal year.

**SIGNIFICANT CHANGE FROM FY 93-98 CTP:**

Construction delayed one year to FY95 based on availability of Federal funds.

Federal Funding By Year of Obligation

PHASE	FFY 94	FFY 95	FFY 96	FFY 97	FFY 98-99	FEDERAL CATEGORY
PP	0	0	0	0	0	-----
PE	0	0	0	0	0	-----
RW	0	0	0	0	0	-----
CO	36000	0	0	0	0	IS

**POTENTIAL FUNDING SOURCES:**

SPECIAL     FEDERAL     GENERAL     OTHER

**PROJECT CASH FLOW**

Phase	Total Estimated Cost (\$000)	Expended Thru 1993	for Planning Purposes Only					Six Year Total	Balance to Complete
			Current Year 1994	Budget Year 1995	1996	1997	1998		
Planning	0	0	0	0	0	0	0	0	
Engineering	3856	3090	766	0	0	0	0	766	
Right-of-way	488	366	122	0	0	0	0	122	
Construction	39789	0	0	14710	21100	3979	0	39789	
Total	44133	3456	888	14710	21100	3979	0	40677	
Inflated Total	45724	3456	888	15298	21944	4138	0	42268	

**FUNCTION:**

STATE - Principal Arterial

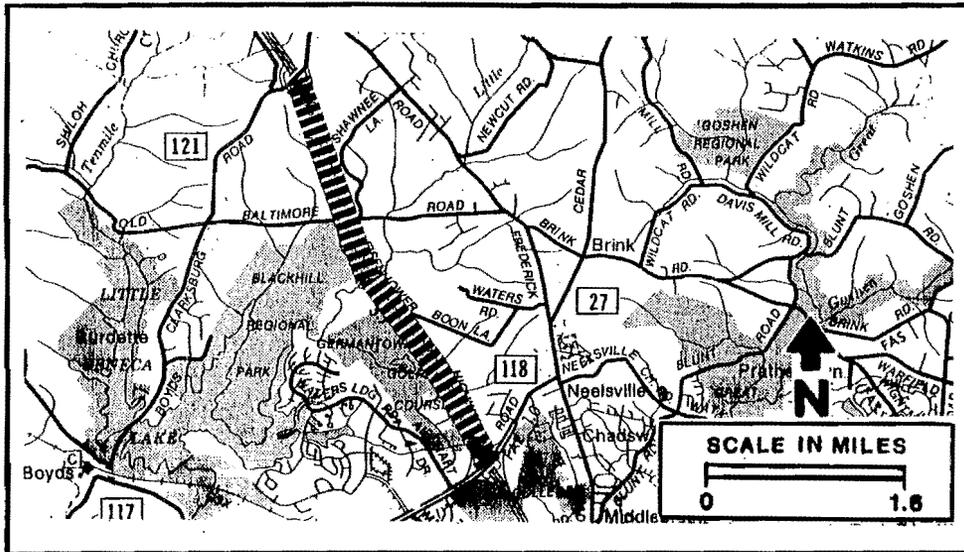
FEDERAL - Interstate

STATE SYSTEM: Primary

**DAILY TRAFFIC:**

CURRENT(1992) - 64,400

PROJECTED(2015) - 128,400



**PROJECT:** I-270, Eisenhower Memorial Highway

**DESCRIPTION:** Upgrade existing I-270 from Middlebrook Road to MD 121 to 6 lanes with the addition of an HOV lane in each direction (4.26 miles).

**JUSTIFICATION:** I-270 is the backbone of one of the most rapidly developing corridors in the state. Traffic volumes currently cause congestion and are increasing with development. Forecasted volumes indicate deficiencies at interchanges and the need for widening the mainline.

**PLAN CONSISTENCY:** Germantown Master Plan, 1989; Clarksburg and Vicinity Master Plan, 1994

**ASSOCIATED IMPROVEMENTS:**

- I-270, I-495 to MD 121 install Advanced Traffic Management System
- I-270/US 15, Shady Grove Metro to north of Briggs Ford Road (D&E Program)
- I-270, at Father Hurley Boulevard (Montgomery County)
- MD 355, MD 124 to Middlebrook Road; MD 355, Middlebrook Road to MD 27
- MD 118, south of MD 117 to Wisteria Drive and I-270 to MD 355
- MD 124/MD 27 Corridor Study (D&E Program)

**STATUS:** Right-of-Way and Construction underway.

**SIGNIFICANT CHANGE FROM FY 94-99 CTP:**

Cost increased \$4.7 million based on inclusion of 7th and 8th lanes between Middlebrook Road and Father Hurley Boulevard and reconstruction of interchange at MD 118.

**Federal Funding By Year of Obligation**

PHASE	FFY 95	FFY 96	FFY 97	FFY 98	FFY 99-00	FEDERAL CATEGORY
PP	0	0	0	0	0	-----
PE	0	0	0	0	0	-----
RW	0	0	0	0	0	-----
CO	0	0	0	0	0	-----

**POTENTIAL FUNDING SOURCES:**

SPECIAL     FEDERAL     GENERAL     OTHER

Phase	Total Estimated Cost(\$000)	Expended Thru 1994	PROJECT CASH FLOW				Six Year Total	Balance to Complete
			Current Year 1995	Budget Year 1996	for Planning Purposes Only			
			1995	1996	1997	1998	1999	2000
Planning	0	0	0	0	0	0	0	0
Engineering	4775	4775	0	0	0	0	0	0
Right-of-way	559	384	175	0	0	0	0	0
Construction	44381	0	13356	26707	4318	0	0	0
<b>Total</b>	<b>49715</b>	<b>5159</b>	<b>13531</b>	<b>26707</b>	<b>4318</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Inflated Total</b>	<b>49715</b>	<b>5159</b>	<b>13531</b>	<b>26707</b>	<b>4318</b>	<b>0</b>	<b>0</b>	<b>0</b>

**FUNCTION:**

STATE - Principal Arterial

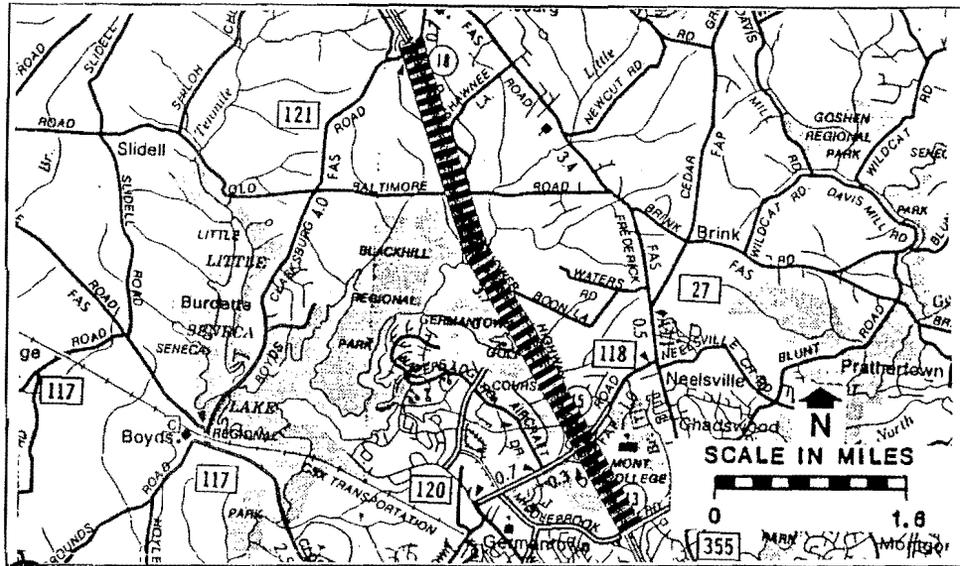
FEDERAL - Interstate

**STATE SYSTEM:** Primary

**DAILY TRAFFIC:**

CURRENT(1993) - 66,700

PROJECTED(2015) - 201,500



**PROJECT:** I-270, Eisenhower Memorial Highway

**DESCRIPTION:** Upgrade existing I-270 from Middlebrook Road to MD 121 to 6 lanes with the addition of an HOV lane in each direction (5.11 miles).

**JUSTIFICATION:** I-270 is the backbone of one of the most rapidly developing corridors in the state. Traffic volumes currently cause congestion and are increasing with development. Forecasted volumes indicate deficiencies at interchanges and the need for widening the mainline.

**PLAN CONSISTENCY:** Germantown Master Plan, 1989; Clarksburg and Vicinity Master Plan, 1994.

**ASSOCIATED IMPROVEMENTS:**

- I-270, I-495 to MD 121, Advanced Traffic Management System (SPP)
- I-270/US 15, Shady Grove Metro to north of Biggs Ford Road (D&E Program)
- I-270, at Father Hurley Boulevard (Montgomery County)
- MD 355, MD 124 to Middlebrook Road; MD 355, Middlebrook Road to MD 27 (Const.)
- MD 118, south of MD 117 to Wisteria Drive and I-270 to MD 355 (Const. Program)
- MD 124/MD 27 Corridor Study (D&E Program)

**STATUS:** Construction underway.

**SIGNIFICANT CHANGE FROM FY 95-00 CTP:** None.

**Federal Funding By Year of Obligation**

PHASE	FFY 96	FFY 97	FFY 98	FFY 99	FFY 00-01	FEDERAL CATEGORY
PP	0	0	0	0	0	----
PE	0	0	0	0	0	----
RW	0	0	0	0	0	----
CO	0	0	0	0	0	----

**POTENTIAL FUNDING SOURCES:**

SPECIAL     FEDERAL    GENERAL    OTHER

**PROJECT CASH FLOW**

Phase	Total Estimated Cost(\$000)	Expended Thru 1995	Current Year 1996	Budget Year 1997	for Planning Purposes Only				Six Year Total	Balance to Complete
					1998	1999	2000	2001		
Planning	0	0	0	0	0	0	0	0	0	
Engineering	5214	5214	0	0	0	0	0	0	0	
Right-of-way	582	407	175	0	0	0	0	175	0	
Construction	43389	10204	27528	5657	0	0	0	33185	0	
Total	49185	15825	27703	5657	0	0	0	33360	0	
Inflated Total	49185	15825	27703	5657	0	0	0	33360	0	

**FUNCTION:**

STATE - Principal Arterial

FEDERAL - Interstate

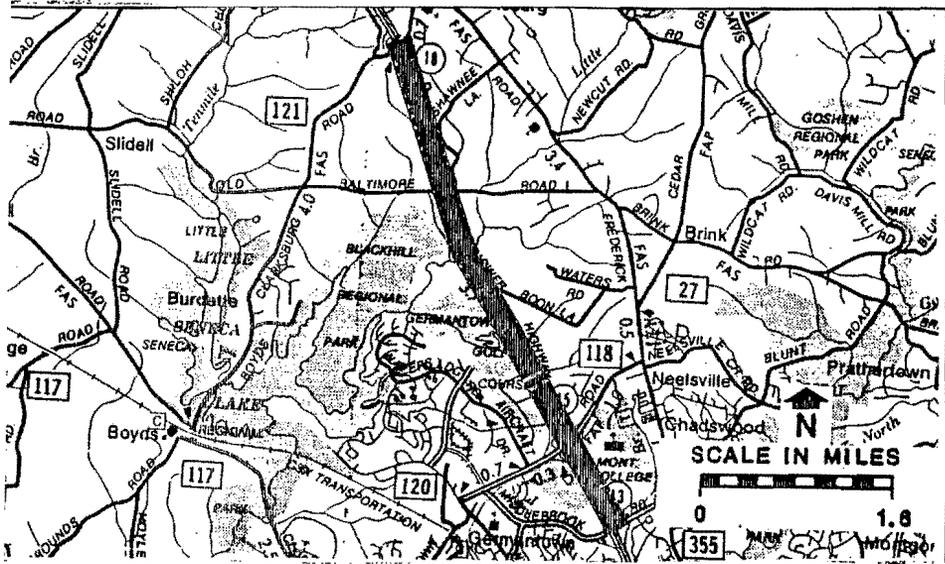
STATE SYSTEM: Primary

**DAILY TRAFFIC: (USAGE IMPACTS)**

CURRENT(1994) - 68,500

PROJECTED(2020) - 201,500

OPERATING IMPACTS : \$43,200 per year



**PROJECT:** I-270, Eisenhower Memorial Highway

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 I-270/US 15, Shady Grove Metro to north of Biggs Ford Road (D&E Program)  
 I-270, at Father Hurley Boulevard (Montgomery County)  
 MD 355, MD 124 to Middlebrook Road; MD 355, Middlebrook Road to MD 27 (Const.)  
 MD 118, south of MD 117 to Wisteria Drive and I-270 to MD 355 (Const. Program)  
 MD 124/MD 27 Corridor Study (D&E Program)

**STATUS:** Open to service.

**SIGNIFICANT CHANGE FROM FY 96-01 CTP:** None.

Federal Funding By Year of Obligation

PHASE	FFY 97	FFY 98	FFY 99	FFY 00	FFY 01-02	FEDERAL CATEGORY
PP	0	0	0	0	0	---
PE	0	0	0	0	0	---
RW	0	0	0	0	0	---
CO	0	0	0	0	0	---

POTENTIAL FUNDING SOURCES:

SPECIAL     FEDERAL    GENERAL    OTHER

PROJECT CASH FLOW

Phase	Total Estimated Cost(\$000)	Expended Thru 1996	Current Year 1997	Budget Year 1998	for Planning Purposes Only				Six Year Total	Balance to Complete
					1999	2000	2001	2002		
Planning	0	0	0	0	0	0	0	0	0	
Engineering	5,275	5,275	0	0	0	0	0	0	0	
Right-of-way	410	410	0	0	0	0	0	0	0	
Construction	43,896	29,883	14,013	0	0	0	0	14,013	0	
<b>Total</b>	<b>49,581</b>	<b>35,568</b>	<b>14,013</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14,013</b>	<b>0</b>	
Federal Aid	41,260	29,209	12,051	0	0	0	0	12,051	0	

FUNCTION:

STATE - Principal Arterial

FEDERAL - Interstate

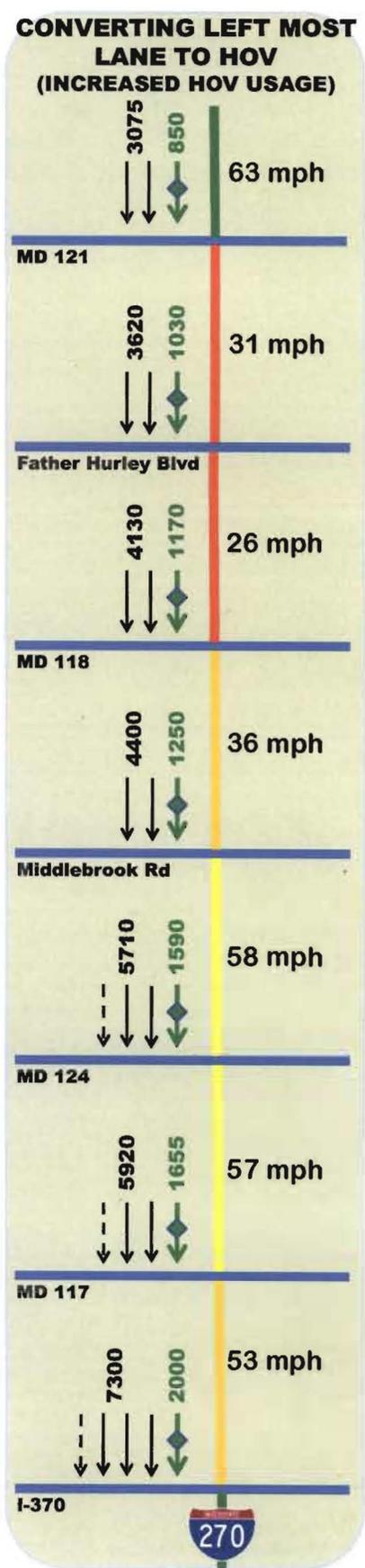
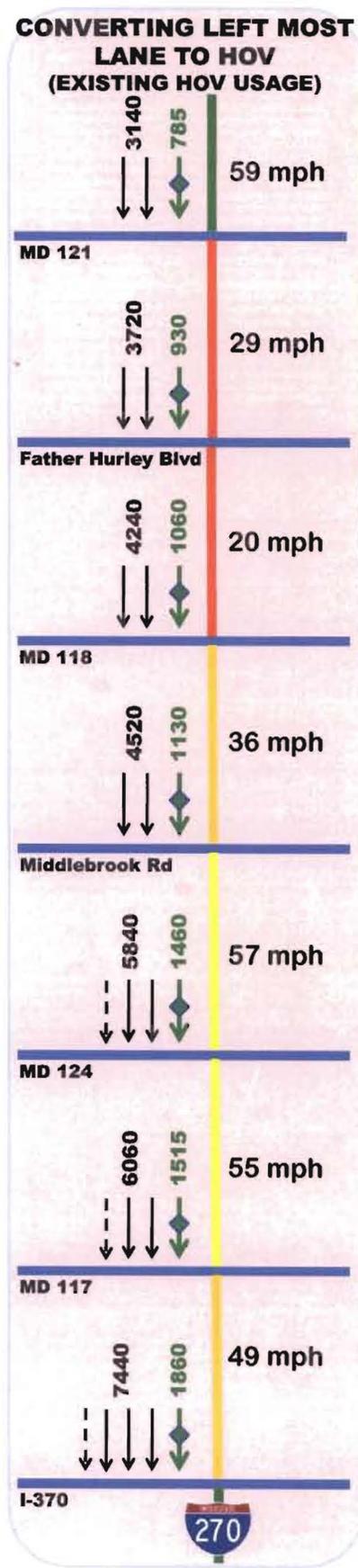
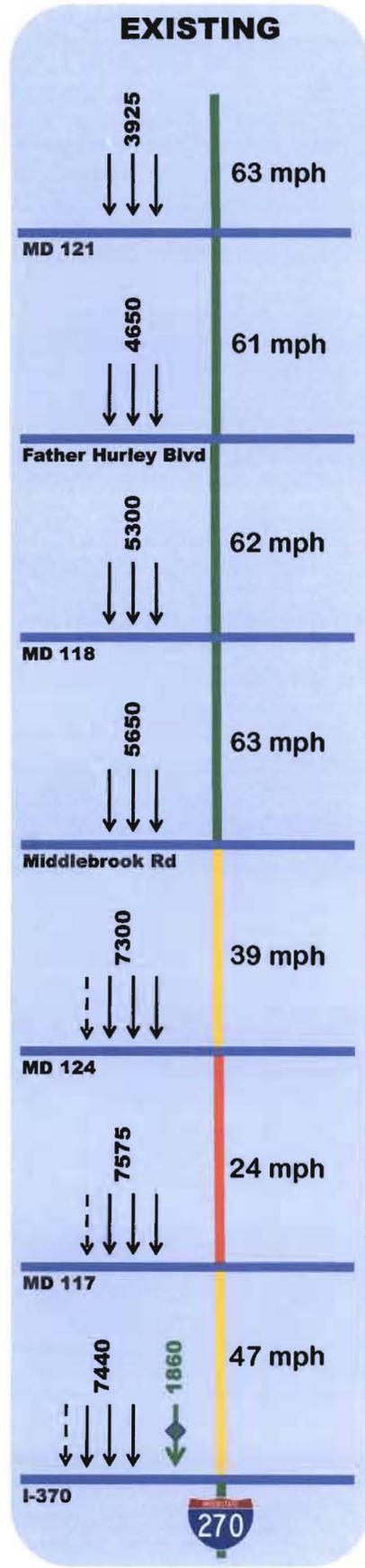
STATE SYSTEM: Primary

DAILY TRAFFIC: (USAGE IMPACTS)

CURRENT(1995) - 68,500

PROJECTED(2020) - 201,500

OPERATING IMPACTS: \$43,200 per year



Travel Time (MD 121 to I-370): GP - 12 min  
 Delay per vehicle:  
 Person Thruput:

GP - 15 min; HOV - 9 min  
 GP +4 min (vs Existing)  
 Decreases 3% (vs Existing)

GP - 13.5 min; HOV - 11 min  
 GP +2.5 min (vs Existing)  
 Decreases 1% (vs Existing)

**DRAFT**

XX - GP AM Peak Volumes XX - HOV AM Peak Volumes  
 XX mph - Average Speed → Traffic Flow -→ Auxiliary Lane  
 — LOS F — LOS E — LOS D — LOS A, B, C

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