Highlights of the TPB Travel Forecasting Subcommittee Meeting
Held on Friday, May 20, 2005

Item 1: Approval of the March 18, 2005 Meeting Highlights

The highlights were approved as written.

Item 2: Update on Regional HOV Monitoring

Mr. Zilliacus distributed a handout entitled "2004 Performance of Regional High-Occupancy Vehicle Facilities on Freeways in the Washington Region." He explained that the objective of the HOV monitoring program is to evaluate regional HOV facility use and performance. The HOV facility data is classified by facility segment, mode and half hour periods. Previous HOV monitoring reports were published in 1997, 1998 and 1999. Three different monitoring methodologies were used:

- Vehicle classification and occupancy counts;
- Transit patronage counts, and
- Travel time runs via 'floating car' method.

The 2004 HOV Facility Summary included:

- I-95/I-495 (Shirley Highway) – 28 miles total length;
- I-66 – 28 miles total length;
- I-270 – 9 miles southbound, 18 miles northbound;
- VA 267 (Dulles Toll Road) – 23 miles total length; and
- US 50 – 9 miles total length.

He explained that John Hanson Highway (US 50) is a new monitoring location with concurrent flow HOV lanes. Previous HOV monitoring surveys were conducted in the fall; however the 2004 data was collected in the spring.

Mr. Zilliacus also discussed various HOV monitoring statistics which included:

- 'Floating car' travel time runs by facility and time period,
- A.M. and P.M./Peak direction travel time summary for HOV and non-HOV lanes,
- Mean A.M. and P.M. Peak period/peak direction travel times over time by facility,
- Observed average auto occupancies in the A.M. and P.M. peak direction during HOV-restricted periods,
- Observed average HOV auto occupancies in the A.M. and P.M. peak direction over time,
- Observed person movements in the A.M and P.M. peak direction during HOV-restricted periods, and

- A.M. and P.M. peak hour person movements during HOV-restricted periods.

In conclusion, barrier-separated and exclusive HOV facilities like Shirley Highway continue to provide substantial savings in travel time. HOV lanes out perform adjacent non-HOV lanes on a persons per lane per hour basis. Travel time benefits from some concurrent-flow HOV lanes are increasingly marginalized due to enforcement challenges and increasing congestion in adjacent non-HOV lanes.

The next steps will be to complete the report which will be forthcoming in July. The HOV monitoring data will inform ongoing models development and the next round of monitoring could possibly include the newly reconstructed Woodrow Wilson Bridge HOV lanes.

Questions and Comments

Mr. Jamei asked if data was collected on hybrid vehicles on Northern Virginia HOV facilities. Mr. Zilliacus replied yes, data was collected, however; there are challenges in doing so. At some counting locations it is possible to closely observe auto occupancy. In other places it is difficult to accurately distinguish hybrid vehicles.

Mr. Replogle asked if hybrid vehicle exemptions apply to high fuel economy hybrid vehicles (i.e. the Prius and the Insight) only. He stated that it is illegal for hybrid vehicles to have access to the HOV facilities in Northern Virginia. Mr. Zilliacus responded that hybrid vehicle counts were quantified just as the Virginia State Police quantify them.

Mr. Mann commented that the hybrid vehicles are grabbing all the capacity. If this continues, there will be serious problems on HOV facilities in Northern Virginia. Mr. Zilliacus agreed. He stated that this issue is attracting attention at a very high level within the Commonwealth. The enormous number of hybrids sold in Prince William, Stafford, Spotsylvania Counties and the City of Fredericksburg was discussed at the HOV task force meeting. Mr. Mann suggested that this information be reflected in the report.

Mr. Replogle referenced the 2004 observed average HOV auto occupancies in the A.M and P.M. Peak direction over time from the handout. He commented that the majority of the AM and PM peak auto occupancy observations are below 2.0. Some of that is violation and some are hybrid vehicles. He questioned whether there are estimates of the number of hybrid vehicles and the number of violation rates on these facilities. Mr. Zilliacus replied that the auto occupancy rate is a good indicator of compliance, however there are difficulties associated with these counts. There will always be a bit of under reporting of auto occupancy because there is no classification technology that can accurately do so.

Mr. Replogle commented that the amount of induced carpooling that is created by the HOV lanes is actually pretty modest. It would be useful to find some better ways to measure where HOV enforcement is working. He questioned whether this is something that can be teased out of the travel surveys to help make the data more meaningful for policy making and is there a better way to manage limited capacity or will these lanes turn into general purpose lanes. Mr. Zilliacus commented that there is at least one Public Private Transportation Act (PPTA) proposal to implement high-occupancy/toll (HOT) lanes along the Shirley Highway corridor as well as the FLUOR PPTA proposal for HOT lanes on a section of Virginia's portion of the Beltway which has gotten a lot of media attention.

Mr. Kirby asked VDOT staff if there were any discussions about the "sunset" of hybrid vehicles at the latest legislative session. Mr. Mann replied that he is unaware of such discussions. Mr. Zilliacus added that the "sunset" of hybrids will occur on June 30, 2006 (according to current Virginia law in effect as of the date of the meeting).

Mr. Replogle stated that the auto occupancy HOV rates spoke to an appalling lack of enforcement. Much of the low auto occupancy rates (below 2.0) occur in Maryland where there is not a hybrid exemption. He suggested that the "cheating rate" is forty to fifty percent and that there is no HOV enforcement. Mr. Zilliacus disagreed. Ms. Sutton reiterated that the low occupancy on the I-270 Spur could be due to on-going construction in the vicinity of the Democracy Boulevard interchange.

Mr. Jamei commented on the travel times for HOV and non-HOV traffic on I-66 for years 1999 and 2004. He questioned if this made sense. Mr. Zilliacus explained that unlike one-day traffic counts, a series of travel time runs were done and the times reported are reasonable.

Mr. Replogle asked if any statistical analysis was done on this data and what is the confidence level associated with it. Mr. Zilliacus replied that standard deviation is used to analyze travel time data and a summary table will be in the report.

Item 3: Variations in Average Annual Weekday vs. Average Annual Traffic, and Seasonal Traffic: Recommendations for Travel Demand Model and Air Quality Post- Processor.

Mr. Sivasailam distributed a memorandum entitled "Variations in Average Annual Weekday vs. Average Annual Traffic, and Seasonal Traffic: Recommendations for Travel Demand Model and Air Quality Post- Processor". He explained that the COG/TPB travel demand model produces estimates of average weekday travel. These model estimates are validated against observed traffic in the District of Columbia, Maryland, and Virginia. The observed data produced by these jurisdictions include average annual weekday traffic (AAWDT) in DC and average annual daily traffic (AADT) in Maryland. Virginia now reports both average annual daily and average annual weekday traffic. In the air quality analysis, ozone is modeled during the summer season, carbon monoxide is modeled during the winter season, and particulate matter is a year-round pollutant. He further explained that the purpose of the memorandum is to examine current observed traffic data to identify the relationships between AADT and AAWDT, as well as seasonal variations in traffic and to present recommendations regarding factors for the development of weekday and seasonally adjusted traffic estimates for the travel demand model and air quality post-processor, respectively.

Since the travel demand model addresses annual average weekday conditions (a 5 day average) and observed travel is often reported on an average daily basis (a 7 day average), some conversion from AADT to AAWDT has been required in order to validate the model, i.e., to compare how well the model simulates observed travel. In the past a factor of 1.11 has been used in order to accomplish this conversion. In recent air quality studies which required the use of seasonal adjustments, this factor was reviewed and endorsed as being appropriate for representing weekday travel during ozone season.

Mr. Sivasailam explained that staff recently analyzed traffic data throughout the region to determine a weekday adjustment for the travel demand model, i.e., a factor to convert AADT to AAWDT, and another set of adjustments to be employed in the air quality 'post-processor', i.e.,

factors to produce spring, summer, fall and winter travel estimates. TPB staff looked into available traffic count data and trend reports from Virginia, Maryland and the District of Columbia. The Maryland State Highway Administration (MD SHA) and the Virginia Department of Transportation (VDOT) collect traffic data from permanent count stations for various locations and facilities. MD SHA and VDOT also publish traffic trend reports; these reports are available in user friendly format on MD SHA and VDOT websites. The District of Columbia data included only 7-day counts.

A review of available data from the above sources indicated that the Maryland data files were the most comprehensive. Because of this, and since only Maryland travel estimates required both weekday and seasonal adjustments, the Maryland files provided the best resource for this analysis. While Virginia and the District of Columbia data were also analyzed and provided corroboration of results, for simplicity only the Maryland statistics are included in this report.

Staff identified eight permanent count stations within the MSA in Maryland with 364 days of data (2 in Montgomery County, 3 in Frederick County, 3 in Prince George's County) which provided a basis for the analysis. In order to come up with a regional adjustment factor based on data from all of the locations, staff estimated the average daily traffic at all sites by day of the week (weighted by the AAWDT volume at each location), prepared 5 day and 7 day averages, and then computed the weekly to weekday adjustment factor for the dataset as a whole. On average weekday traffic (AAWDT) for all locations is 1.05 of the AADT.

In order to come up with estimates of seasonal variation, staff analyzed the same Maryland ATR station locations, organized the counts by date and computed averages for the four discrete seasons: spring, summer, fall and winter. Staff then computed adjustment factors which, when applied to the travel demand model output volumes, would yield traffic estimates for each season.

Mr. Sivasailam explained that based on this analysis staff proposes the following weekday and seasonal adjustments:

A. Travel Demand Model Validation

   Since the District of Columbia and Virginia report traffic volumes as AAWDT, there is no need to adjust the observed traffic volumes in those two jurisdictions. However, in Maryland, since the data are still reported as AADT, staff proposes to apply a factor of 1.05 to all links to get AAWDT.

B. Post-processor (Air Quality) Application – Seasonal Variation

   Regional factors for all four seasons are used in preparation of seasonal and annual traffic and emissions estimates.

   - Ozone season – apply a regional factor of 1.05 to all links, AM, PM and Off-peak periods in the District of Columbia, Maryland and Virginia to convert AAWDT to ozone season average weekday traffic.

   - Winter season – apply a regional factor of 0.97 to all links to convert AAWDT to winter average weekday traffic.

   - Spring season – apply a factor of 1.02 to all links to convert AAWDT to produce spring average weekday traffic.

- Fall season – no factor is necessary as fall traffic equals AAWDT.

Questions and Comments

Mr. Replogle asked if there were any variations in the seasonal adjustment rates for different classes of roadway for different parts of the region. The sample of places that were looked at is predominantly outside the beltway. These places are very high class facilities with limited access roads which tend to have a much higher proportion of long distance traffic. Because this region is huge on tourism, it may have very different temporal variations during the course of the year. The commuter flow data should have significant differences between the core part of the region and the outer parts of the region given the variations in land use density and the makeup of drivers in the traffic stream by functional class. He questioned if that was examined in this sample data set. Mr. Sivasailam replied that the data sets were too limited to permit such an examination.

Mr. Jenkins commented that the rates for Maryland are pretty good and are right on target with what is seen in Prince George's County.

Mr. Mann asked when you code ground counts do you take the counts from Maryland, Virginia and the District of Columbia and factor them by 5%. Mr. Sivasailam replied that the 5% is only applied to counts in Maryland since Virginia and the District of Columbia produce AAWDT counts.

Mr. Replogle asked what factors are reflected in the Virginia and District of Columbia counts. Mr. Sivasailam replied that the factors vary in 2002 and 2003 from 4% to 6%. Mr. Replogle asked if this information will be presented to the committee and why it wasn't reflected in the memorandum. Mr. Kirby responded that the factors were used only for corroboration purposes.

Item 4. Update of the CTPP

Mr. Griffiths reported on the TRB "Census Data for Transportation Planning" Conference he recently attended in Irvine, California. He stated that because of confidentiality and disclosure avoidance restrictions placed on the data collected in the 2000 Census, many of the special data tabulations that transportation planners and researchers had been anxiously waiting to analyze were not as useful as originally hoped. He noted that as much as two-thirds of the data in some of the more interesting special tabulations had been suppressed for confidentiality reasons.

Mr. Griffiths also reported that the Census Bureau had recently begun a continuing household sample survey, the American Community Survey (ACS), that would provide annual tabulations of the population, household, and worker data collected. The ACS tabulations would also include some limited worker commuting statistics. He noted that the Census Bureau intended to use the ACS as a replacement for the decennial Census long-form questionnaire previously used to collect such data and that no long-form questionnaire was planned for the 2010 Census. He also noted that because of the smaller number of samples collected annually in the ACS, data for smaller geographical

areas would also be an issue for users of the ACS because of sample size and confidentiality issues.

Mr. Griffiths further reported that the processing of the CTPP – Part 3 worker flow data for the TPB modeled region was now nearing completion. He stated that adjustment factors for worker absenteeism, occasional transit and carpool commuting, and trip chaining were currently being calculated and finalized. The one remaining issue was whether or not a FRATAR procedure should be applied to the adjusted worker flow data so that it would more closely match year 2000 Cooperative Forecasting base year estimates of the jobs and households by transportation analysis zone (TAZ).

Mr. Moran asked what is driving the Census from the long form survey. Mr. Griffiths replied that it is a couple of things. Part of it is the budget process. It is very hard to come in once a decade and say we need this lump sum of money. So you spread it out over a longer period of time. In addition to spreading out the money you also keep a trained staff, rather than going out and hiring a lot of people for a single survey. Here they just keep a trained staff doing the same thing each month, so that helps and they obtain good information on both sampling error and response rates. So the quality is much better and the follow up is much better, but for a much smaller sample. In addition to the rack up of the money and doing it all at once, the peoples' complaints are spread over time. That is a real issue because with the Census, everybody calls their Congressman complaining. It may be a small percentage, but it seems like a real, real big number because all of a sudden Congressmen are getting all these constituents who are unhappy about this intrusive survey. If you have one or two complaints at a time, you can have a standard response as to why it is important for them to do the survey.

Mr. Replogle commented that there was a political outcry saying that the Constitution requires a once in ten year enumeration, which means you simply count how many heads and collect no additional data. So this was a move away from the big survey to something lower under the radar screen. He also noted that some MPOs are doing synthetic population approaches to get around some of these data problems and invited interested parties to attend a workshop on this topic being offered by Environmental Defense and the Baltimore Regional Partnership at Morgan State University Department of Civil Engineering and School of Public Health at Morgan State University on May 26th.

Item 5. Development of a Pedestrian Flow Model

Mr. Allen distributed a hardcopy of his slide presentation entitled "Pedestrian Flow Modeling for Prototypical Maryland Cities". He explained that the goal of the pedestrian model was to establish a method for estimating pedestrian crash exposure rates as a function of pedestrian flow volumes; develop a standardized travel modeling protocol for pedestrian flows on streets and sidewalks; and provide flexibility to support other planning investigations, i.e., vehicle and pedestrian interaction and implications of urban form and accessibility on pedestrian trip making. Two case studies were presented: downtown Baltimore and Langley Park.

The need and ability to model pedestrian movement is a recent development. There is increased interest in public health, environmental, and social benefits of walking. The fundamental differences from traditional vehicle modeling include less homogeneous journey purposes, route choices subject to high variability, pedestrian trips are often smaller parts of larger journeys or tours, and pedestrian networks are harder to define and quantify.

The pedestrian flow model is an origin-destination based demand model. Fourteen trip purposes were used to differentiate among activities. Block-face detail was used for land use, networks and trip making. Accessibility to activities influenced the number of walking trips and accessibility and distribution was influenced by barrier effects of streets, i.e., width, volume, speed, signals, etc. Stochastic path finding was used to define a distribution of walking routes from origins to destinations. The pedestrian flow model was built upon readily available but highly detailed input data which included:

- Census TIGER line files for streets
- Census Block Group population and housing characteristics
- Census Journey to Work
- Parcel-level property data and land uses
- Ortho-photography (1ft. resolution)
- Limited manual interpretation and adjustments

The source of the travel behavior characteristics (trip generation) was taken from the NYMTC Household Survey that was conducted in 1996. The survey included:

- 11,000 households
- 89,605 trip records, 59.3 million daily trips
- Walk: 12274 records, 9 million daily trips
- Very diverse region: 28 counties, Manhattan to rural.

The average pedestrian trip length was closely paralleled by the 2002 National Survey of Pedestrian and Bicyclist Attitudes and Behaviors. The production model was driven by land use and accessibility to activities.

The trip distribution model used a standard gravity formulation. Distribution was calibrated to New York trip lengths which was similar to national walk time distributions. There were network impedances based on perceived walk time in the trip assignment model which included sidewalk walk time, street crossing and wait times, street crossing risk factors, and perceived time penalties due to sidewalk quality.

Mr. Allen explained that the pedestrian flow model construct is viable. Detailed data can be assembled from available sources with reasonable effort. The model is sensitive to real-world factors that affect pedestrian travel such as land use, physical sidewalk network connectivity and quality, and barrier effects of street crossings. The output from the model can be used to evaluate pedestrian crash exposure and safety priorities.

Lastly, Mr. Allen discussed pedestrian crash data. Pedestrian crash data was obtained from the Maryland Department of Transportation Division of Highway Safety programs. Data was obtained for years 2000, 2001 and 2002 for Baltimore City, Montgomery and Prince George's Counties. Crashes were geo-coded to intersection locations for each case study. From 2000 to 2002 there were 876 pedestrian crashes at 430 distinct locations in Baltimore, as well as 161 pedestrian crashes at 90 distinct locations in Langley Park. Mr. Allen stated that calculating crash exposure rates on the basis of pedestrian volume does produce a unique list of priority locations.

Ranking on the basis of severity weighted counts produce essentially the same list but with minor differences in the order of rankings, and pedestrian volumes estimated by the model near the edges of the study area are suspect – generally low – so high crash rates at the edges should be used with caution.

Questions and Comments

Mr. Milone commented that there are different factors that explain pedestrian crashes, i.e. poorly built infrastructures, poor visibility at intersections, random human behavior. He questioned how this can be explained with the pedestrian model. Mr. Allen responded that that is one level of analysis beyond what has been done thus far. We are not trying to explain why crashes occur, we measured where they occurred. This information is given to safety researchers in Maryland and they take it to the next level.

Ms. Sutton asked if a model is really needed to tell where crashes occur. Mr. Allen explained that the focus was not on where the crashes occurred but where crash severity was the worst.

Ms. Erickson questioned the validity of pedestrian counts. Mr. Allen replied that pedestrian counts were used to calibrate the model. Staff compared estimates and actual counts on a link by link basis. Results were within 4% of the total on any given link. Some of the pedestrian counts looked suspect in quality, and refined pedestrian totals will be generated when better pedestrian data becomes available.

Ms. Sutton suggested requesting pedestrian counts in conjunction with traffic counts. Mr. Allen agreed that it would be useful.

Mr. Replogle commented on trip generation and questioned if income, city and/or age of population was considered. Mr. Allen replied that trip generation equations were based on trip rates, trips per household, and trips per job, and those are influenced by accessibility and income.

Mr. Replogle commented that research suggests that people are willing to walk farther or spend more time walking along more attractive routes, i.e., street-faced retail stores. There is a difference in urban design between street-face retail and retail surrounded by a sea of parked cars. People are not willing to walk as far if the environment is not attractive. This gets to the travel time penalties based on area effects. He asked if any urban design variables were used in this study. Mr. Allen replied that he looked at the block face in downtown Baltimore which has street retail on the block face versus Langley Park where you have some retail but in between the sidewalk and retail you have some heavy walking. We were not able to get to that level of detail in this analysis to incorporate that.

Mr. Replogle commented on his presentation from the end of the previous meeting on the estimation of transit mode shares in the TPB model. Mr. Replogle noted that the March 18 meeting highlights contained the following comments in response to his presentation: "Mr. Griffiths responded that the Census data Mr. Replogle was using had not been adjusted for several factors, such as discarding out-of-town workers, and cautioned against making such a conclusion until these adjustments had been made. TPB Staff is in the process of making these adjustments prior to checking the performance of the TPB mode choice model." He asked when this will be available. Mr. Griffiths replied it will be available at the next TFS meeting.

The next TFS meeting is scheduled for July 22, 2005.