# APFO Reform Part 2: Tests for Transportation Adequacy



Wheaton Metro Station Area

### INTRODUCTION

This report provides recommendations for the transportation adequacy testing portions of the Growth Policy Review. This report is organized into four sections:

- Recommendations for the Planning Board to consider.
- The proposed Policy Area Mobility Review (PAMR).
- Changes considered to Local Area Transportation Review (LATR), and
- Responses to other questions from the County Council.

### **RECOMMENDATION SUMMARY**

Staff has separated recommendations into those for a Policy Area Review system and those for the Local Area Transportation Review system:

### **Policy Area Review**

- 1) A second test, in addition to Local Area Transportation Review (LATR), is desirable to stage growth in concert with the implementation of adequate public facilities.
- 2) Based on the level of concerns regarding the importance, coherence, and reliability of the Policy Area Transportation Review (PATR), staff recommends against reinstating the PATR system as previously defined.
- Staff recommends that the Planning Board support continued development of a new policy area test, tentatively called Policy Area Mobility Review (PAMR), that we find builds upon the many positive characteristics of PATR while improving:

- Coherence, as the adequacy standards are based on forecasted traveler delays rather than the forecasted Average Congestion Index
- Reliability, as the equivalency between transportation system capacity and vehicle trips for areas that "fail" the PAMR test is defined in a lookup table, rather than through an iterative process of travel demand model runs
- Applicability, as the lookup table allows both the public and private sector opportunities to address areas that fail the PAMR test through a wider range of actions in the form of non-auto amenities such as transit and pedestrian facilities in addition to providing roadway capacity.
- 4) The Policy Area Mobility Review (PAMR) system should have the following characteristics:
  - Uses the existing Policy Area geographies.
  - Considers a horizon year that includes current jobs and households, all the approved development in the pipeline, and the transportation system of current plus future projects fully-funded in the six year CIP and CTP.
  - Uses the travel demand forecasting model to determine the relative mobility for both transit vehicles and autos and compares these relationships against a standard for groups of policy areas.
  - Makes a single finding for each Policy Area; either the policy area is adequate or not adequate in terms of PAMR.
  - For Policy Areas that are found inadequate, development applicants (other than those with *de minimis* impacts) can do any one or some combination of the following:
    - Conduct a trip reduction program with an agreement signed with MNCPPC to reduce or eliminate peak hour trips.
    - Provide non-auto amenities such as sidewalks, handicap ramps, or bike lockers to gain vehicle trip credits as specified in the LATR guidelines (up to a maximum of 120 trips).
    - Construct additional roadway capacity with the amount based on a table that will be provided in the Growth Policy that will be related to the type of development, its size, and the type of roadway to be widened or added to – major highway, arterial/business district street, or master planned primary. All improvements must be in the master plan, and be a logical continuous segment, from one intersection to another. The Planning Board would have the approval authority over the segment to be constructed.

- Provide transit capital improvements in terms of adding to the fleet of transit vehicles.
- Apply for a fee-in-lieu of provision of capital improvements, but only after demonstration to the Planning Board of a good-faith effort to pursue capital improvement implementation.
- The PAMR process outlined by staff does not yet contain proposals on some of the more specific procedures that were part of PATR in the past, although we have given them attention. These include procedures for special treatment of affordable housing, strategic economic development projects, and other land uses. Staff can bring these recommendations forward fairly quickly once there is consensus on major points.

### Local Area Transportation Review

- 5) Retain the LATR congestion standards currently in effect
- 6) Require an LATR study for the Alternative Review Procedure in Metro Station Policy Areas.
- 7) Revise the practice for already approved development sites being expanded to provide for:
  - Allowing an increase of five peak hour trips to avoid a traffic study altogether based on "de minimis" logic.
  - Basing the number of signalized intersections in the study on the increased number of peak hour trips rather than the total number of peak hour trips, in cases where use and occupancy permits for at least 75% of the originally approved development were issued more than twelve years prior to the LATR study scope request for the expansion.
- Allowing payment in lieu of implementation for non-automobile transportation amenities with the agreement of the DPWT, WMATA, SHA, or Maryland Transit Administration.
- 9) Requiring documentation that traffic mitigation or trip reduction measures were considered in all cases.
- 10)Requiring studies be submitted by certified professionals (Professional Engineer, Professional Transportation Planner, or Professional Transportation Operations Engineer).
- 11)Continue the Highway Mobility Report on a two year cycle, and incorporate an expanded data collection program within the Department to allow for improved reporting of intersection conditions and travel time

analysis in the report and verification of developer-submitted traffic studies.

Additional procedural clarifications to the Planning Board's LATR Guidelines are described in the Appendix to this report. These clarifications are for the Board's information and will be considered when an update to the LATR Guidelines is prepared.

### POLICY AREA TRANSPORTATION REVIEW

The Council directed the Board to provide recommendations on the renewed use of a Policy Area Transportation Review (PATR) test. Staff recommends a new test, called Policy Area Mobility Review (PAMR), that would be a second, policy area level, test to supplement the Local Area Transportation Review test.

The following paragraphs describe:

- A summary of the philosophy and rationale behind each of the staff recommendations
- A description of potential approaches that were considered, with a table summarizing the relative strengths and weaknesses of the approaches
- Responses to particular questions raised by Council members during the interim status reports

### **Rationale for Conclusions and Recommendations**

The Policy Area Mobility Review (PAMR) test considers the transportation system adequacy of each of the County's policy areas. The Policy Areas are shown in Exhibit 2-1. This section of the report describes the details of the PAMR process and describes responses to several "frequently asked questions" that we have asked ourselves during the system development.

### PAMR Details

The Policy Area Mobility Review consists of the following elements:

- Establishment of Transit LOS and Arterial LOS standards to be applied within each policy area
- Evaluation of the forecasted conditions for each policy area
- Finding of PAMR "adequacy" or "inadequacy" for each policy area
- Development of alternative approaches to mitigate transportation impacts of development in areas found inadequate.

In establishing transit and arterial level of service standards, the PAMR assesses areawide adequacy on two scales:

- Transit LOS is established by considering **relative transit mobility**, defined as the relative speed by which journey to work trips can be made by transit, as opposed to by auto
- Arterial LOS is established by considering **relative arterial mobility**, defined as the relative speed by which auto trips move during the PM peak hour as compared to the free flow speed.

The **relative transit mobility** is based on the Transit/Auto Travel Time LOS concept in the 1999 Transit Capacity and Quality of Service Manual published by the Transportation Research Board. This concept suggests that LOS A conditions exist for transit when a trip can be made more quickly by transit (including walk-access/drive-access and wait times) than by the single-occupant auto. This LOS A condition is true in the Washington region for certain rail transit trips with short walk times at both ends of the trip and some bus trips in HOV corridors. LOS F conditions exist when a trip takes more than an hour longer to make via transit than via the single-occupant auto.

This ratio between auto and transit travel times can also be expressed in an inverse relationship, defined by modal speed. If a trip can be made in less time via transit than via the auto, the effective transit speed is greater than the effective auto speed. Based on the typical roadway network speed during the AM peak period, staff has established the following relationship between auto and transit trips as described in the following table:

If the effective transit speed is	PAMR Transit LOS is
100% or more (e.g., faster) than the highway speed	A
At least 75% of the highway speed	В
At least 60% of the highway speed	С
At least 50% of the highway speed	D
At least 42.5% of the highway speed	E
Less than 42.5% of the highway speed	F

### **Relative Transit Mobility and Transit LOS**

The **relative arterial mobility** is based on the urban street delay level of service in the 2000 Highway Capacity Manual, published by the Transportation Research Board. This concept suggests that for a trip along an urban street that has a free-flow speed (generally akin to posted speed) of 40 MPH, LOS A conditions exist when the actual travel speed is at least 34 MPH, including delays experienced at traffic signals. At the other end of the spectrum, LOS F conditions exist when the actual travel speed is below 10 MPH.

The PAMR only evaluates conditions on the arterial roadway network. As was the case with PATR, there is a philosophical tenet for excluding freeway level of service from a policy area test. The County has limited influence over either the design or the operations of the freeway system, and we have historically decided

not to link local development directly to the performance of the freeway system. Additionally, with the PAMR system, the arterial LOS is exclusively an urban street network measure.

If the actual urban street travel speed is	PAMR Arterial LOS is
At least 85% of the free-flow speed	A
At least 70% of the highway speed	В
At least 55% of the highway speed	С
At least 40% of the highway speed	D
At least 25% of the highway speed	E
Less than 25% of the highway speed	F

### **Relative Arterial Mobility and Arterial LOS**

The PAMR Transit LOS and the PAMR Arterial LOS standards are inversely related, reflecting the County's long-standing policy that greater levels of roadway congestion should be tolerated in areas where high-quality transit options are available. The PAMR uses the following equivalency:

If the forecasted PAMR Transit LOS is	The PAMR Arterial LOS standard is
A	F
В	E
С	D
D	С
E	В
F	А

### Equivalency Between Transit LOS and Arterial LOS

Exhibits 2-2 through 2-4 show this information graphically using a graph on which the **relative transit mobility** is expressed along the X-axis and the **relative arterial mobility** is expressed along the Y-axis. In each case, a higher number along the axis reflects a better level of service, so that the best conditions would be found in the upper-right corner of the graph (excellent transit and highway mobility) and the poorest conditions would be found in the lower left corner of the graph.

- Exhibit 2-2 shows the application of the Transit LOS standards, shown as vertical bars,
- Exhibit 2-3 shows the application of the Arterial LOS standards, shown as horizontal bars, and
- Exhibit 2-4 shows the intersection of the two sets of standards using the equivalency described above. The colored line across the center of the chart shows the division between "adequate" areas to the upper right and "inadequate"" areas to the lower left. On Exhibit 2-4 this line is shown in

several different colors to demonstrate how the Transit LOS and the Arterial LOS boundaries from Exhibits 2-2 and 2-3 are applied.

### PAMR Results

The results of the PAMR test for three different land use and transportation network scenarios are shown in Exhibits 2-5 through 2-8.

- Exhibit 2-5 shows the policy area conditions for the forecasted "year 2013" conditions, reflecting current PAMR test results.
- Exhibit 2-6 provides the same year 2013 information shown in Exhibit 2-5, but in tabular form. In Exhibit 2-6, the columns are organized from left to right in the order in which the PAMR finding is made.
- Exhibit 2-7 shows the policy area conditions for year 2005 conditions, and
- Exhibit 2-8 shows the policy area conditions forecasted for the year 2030 Constrained Long Range Plan (CLRP), a long range forecast scenario similar to one that would be used in the analysis of master plans.

In each of the graphic exhibits the results for each of the 21 Policy Areas are indicated by a point on the graph. In addition, the average results for all arterial roadways countywide is shown by a labeled point on the graph.

This PAMR test indicates that two Policy Areas are found to be inadequate for the year 2013:

- The Germantown East Policy Area
- The Gaithersburg Policy Area

This finding is indicated in Exhibit 2-5 by the fact that these two areas are to the lower left of the line dividing adequate and inadequate policy areas. This finding is indicated in Exhibit 2-6 by the fact that the Relative Arterial Mobility is lower than the Arterial Mobility Standard.

The North Bethesda Policy Area and Fairland/White Oak Policy Areas are also close to being inadequate, but are on the "adequate" side of the dividing line.

Comparison of the trends from 2005, 2013, and 2030 provides the following conclusions:

 As the County both matures and anticipates limited transportation infrastructure financing resources, vehicle congestion experienced by individual system users will increase. This finding is demonstrated by the fact that the point measuring countywide average conditions "moves" toward to the bottom of the graphic in successive horizon years. This finding is not surprising and matches the findings in other recent long range planning studies.

- Over time, the relative attractiveness of transit for County residents will increase. This finding is demonstrated by the fact that the point measuring countywide average conditions "moves" toward the right of the graphic in successive horizon years. This finding reflects the fact that significant new transit services such as the Corridor Cities Transitway and the Georgetown Branch portion of the Purple Line are assumed to be in place by 2030. However, the finding also reflects the fact that as vehicle speeds decrease, speeds for transit systems on exclusive alignments, such as Metrorail and MARC, while not becoming faster in an absolute sense are yet becoming faster relative to the auto.
- In each horizon year, most policy areas are found to have adequate transportation system performance while two or three Policy Areas are found to have inadequate performance. In general, the 2013 conditions tend to be relatively poor in the I-270 corridor but to improve by 2030, as significant investments are assumed in the form of the Corridor Cities Transitway, I-270 widening, and Midcounty Highway.

As indicated by comparing Exhibits 2-5, 2-7, and 2-8, the PAMR is suitable for considering areawide conditions for multiple horizon years and alternative land use and transportation scenarios. Staff finds that this test is desirable as both a regulatory tool as well as for long-range planning needs such as assessing the long range balance between land use and transportation in master plans.

### Mitigation for Applications in Policy Areas with Inadequate PAMR

For Policy Areas which are found to be adequate, an applicant must still comply with the Local Area Transportation Review procedures and any other applicable development requirements, but no additional actions are required under PAMR. Applications in Policy Areas with a PAMR finding of inadequacy have several options by which they can mitigate the finding of inadequacy and move forward to LATR. (Staff proposes to retain the prior definition of a *de minimis* impact being an application that generates five or fewer peak hour vehicle trips and should not be subject to PAMR).

**Trip Mitigation**. As was the case in PATR, an applicant can choose to enter into a binding Trip Mitigation Agreement (TMAg) under which up to 100% of the projected peak hour vehicle trips would be removed from the roadway by implementing Transportation Demand Management (TDM) techniques applied to the applicants trips, or potentially to a combination of properties (so that an applicant could still generate some trips if the mitigation program removed an equal number of trips from other sites in the same Policy Area).

**Trip Reduction Through Provision of Non-Auto Amenities**. The LATR Guidelines allow applicants to mitigate roadway congestion impacts to some extent by the provision of non-auto transportation amenities that will enhance

pedestrian safety or increase the attractiveness of alternative modes of travel. The table of allowable amenities and their corresponding vehicle trip credits is excerpted from the LATR in Exhibit 2-9 (and the CLV standards referenced in Exhibit 2-9 are presented later in Exhibit 2-13). Such amenities include sidewalks, bike paths, curb extensions, countdown pedestrian signals, bus shelters and benches, bike lockers, and static or real time transit information signs. These amenities can be provided in exchange for vehicle trip "credits", with both the credit value and maximum potential trip reduction credit (from 60 to 120 peak hour vehicle trips) dependent upon the LATR congestion standard. Staff recommends that these provisions be accepted in their entirety as a PAMR mitigation tool.

**Implementation of Roadway Capacity**. The applicant can mitigate trips above the limits included in the LATR Guidelines for non-auto amenities by constructing link-based roadway network capacity. The conversion rate between vehicle trips and lane miles of roadway is provided in Exhibit 2-10. The values in Exhibit 2-10 are derived from regional estimates of vehicle trip length by trip purposes and uniform per-lane capacities for roadway functional classes that should be applied countywide. Several conditions apply, as noted in Exhibit 2-10:

- The number of lane miles in Exhibit 2-10 reflects total capacity provided (so if an applicant were to widen a roadway by one lane in each direction, the total minimum project length would be half the length listed in the table)
- The roadway construction or widening must have logical termini (for instance, connecting two intersections)
- The roadway construction must occur in the same Policy Area as the proposed development
- The roadway construction must be recommended in a master plan

**Implementation of Transit Capacity**. Staff estimates that on average, the typical Ride-On bus serves approximately 30 peak hour passenger trips. Staff recommends that an applicant be allowed to mitigate inadequate PAMR conditions by purchasing 40-foot long hybrid electric fleet vehicles for the Ride-On system, including 12 years of operations funding, at the rate of 30 peak hour vehicle-trips per fleet vehicle.

**Provision for payment in-lieu of construction**. Staff has found that, due to changing conditions, good implementation policies may quickly become outdated. For instance, the LATR Guidelines encourage the provision of "super shelters", but as a result of the Clear Channel Communications agreement, this option is no longer acceptable to DPWT as a mitigation option. Payment of a fee in lieu of facility implementation is often criticized as ineffective because implementation by the public sector may not be as prompt or because the funds may be spent on a program or in a geographic area without a strong nexus to the development providing the funding. However, payment of a fee in lieu of

construction should be accepted for both PAMR and LATR in cases where a good faith effort to implement the facility can be publicly demonstrated and the Planning Board finds that a desirable improvement cannot feasibly be implemented by the private sector but that the same improvement or an equivalent alternative can be implemented by a public agency at a later time.

### PAMR "Frequently Asked Questions"

**1. How and when might the PAMR system be modified?** One concern with any new regulatory system is that as the system is applied, the results may be counterintuitive or actually create irreconcilable conflicts with other policies. Staff recognizes that many readers might feel that the proposal described in this report does not yield intuitive results regarding transportation system adequacy. Yet one advantage of this system is its relative transparency. Staff suggests two ways that the system could be adjusted by policy makers by working simply with Exhibit 2-5 and without affecting the underlying methodology:

- The line dividing "adequate" from "inadequate" in Exhibit 2-5 could be defined differently. One way would be to draw a generally diagonal line connecting the midpoints of each LOS threshold rather than the minimums reflected in the stair-step shape. Staff recommends that use of the LOS minimum standards is generally more defensible in a regulatory process.
- The equivalency between Transit LOS performance and Arterial LOS standards could be adjusted to be more stringent, so that for a Transit LOS of B, the Arterial LOS standard would be set at LOS D rather than at LOS E. Staff recommends the equivalency proposed (where A matches to F, B to E, and C to D) based on the symmetry inherent in the application of a six-stage quality of service scale.

The current growth policy review is a deliberative process, appropriate for considering changes to the County's regulatory structure. The implementation of the PATR system in 1986 included several months of public deliberation. To date, the discussions of PAMR have taken place primarily at the agency staff level.

The PAMR uses many of the concepts established in the PATR, so the PAMR may be somewhat more familiar, and acceptable, to stakeholders and require less discussion than the adoption of the PATR in 1986. The Planning Board's outreach efforts proposed during the first two weeks of May will provide a useful opportunity to collect comment on the PAMR proposal. The feasibility of transmitting a fully-developed second-tier test from the Planning Board to the County Council by May 21 should be assessed after considering public comment.

Should the County Council adopt the PAMR system, or one like it, staff proposes to reassess policy area adequacy on an annual basis and consider changes to

the measure tools and processes on a biannual basis. The annual changes would include extending the horizon year to maintain a six-year forecast horizon, updating pipeline development, regional demographic assumptions, and CIP/CTP assumptions accordingly, and reassessing the relative transit mobility and relative highway mobility for each policy area. The biannual review would allow the Council to consider procedural changes. The MWCOG model structure is a state-of-the-art forecasting tool, which by definition means it is in a nearly continual state of evolution. Staff expects that every two to three years we will update our travel demand model to keep pace with the MWCOG process.

Any of these annual changes (procedural or assumptions regarding land use and transportation systems) might cause policy areas to shift between adequate and inadequate over time. Certainly one intent of the system would be to pursue land use and transportation decisions through both the development review and capital programming processes that would enable policy areas with poor transportation system performance to be improved to reach adequacy. As was the case with PATR, the key to minimizing uncertainty associated with annual changes is to establish clear timeframes for both policy area changes and their effective dates as applied to development applications.

2. Why retain the current Policy Area geographies? In the 2003 and 2005 reviews of growth policy procedures, the Planning Board staff assessed some transportation measures according to the five subareas used in the Transportation Policy Report (TPR). The Appendix to this report includes an update on the "Proportional Staging" alternative test using those five subareas. Some County Council members expressed interest in 2005 in pursuing a new geographic definition that would result in a geographic unit that would fall somewhere between the five TPR subareas and the 21 Policy Areas (not including MSPAs and TCPAs).

Staff uses a concept called a "superdistrict" for providing trip distribution guidance to preparers of LATR studies. There are 11 superdistricts defined in the LATR Guidelines, as indicated in Exhibit 2-11. For some geographic areas, the superdistricts might make sense in a regulatory arena. For instance, the superdistricts essentially mirror the two Policy Areas inside the Beltway. The superdistricts also combine three other sets of Policy Areas. Combining Cloverly with Fairland/White Oak and Aspen Hill with Olney may make sense in the regulatory arena.

However, in and around the I-270 corridor the superdistricts don't make sense from a regulatory perspective for several reasons:

• The independent municipalities of Gaithersburg and Rockville are logical independent Policy Areas; the superdistricts don't make that distinction.

- The Policy Areas adjacent to the municipalities, including Derwood, Montgomery Village/Airpark, and the R&D Village, have no independent identity in the superdistrict model.
- Potomac, North Potomac, and Darnestown/Travilah are logically combined into one superdistrict but have very different land use and transportation policies
- Damascus is not differentiated from the rest of the rural area; another solution that is pragmatic for trip distribution but not for implementing transportation policy.

As far as the TRAVEL/3 travel demand forecasting model is concerned, these alternative reporting geographies such as planning areas, policy areas, or superdistricts are merely reporting tools. They are not used for modeling travel behavior; they are used to report results and to regulate development activity. There has been some interest in modifying policy area geographies to match transportation corridors, for example, in the belief that it will better capture actual travel behavior. However, the TRAVEL/3 model forecasts travel demand throughout the entire MWCOG region, regardless of the geographic unit for which the results are reported. So while the consideration of the reporting purpose is important in considering the selection of the reporting tool, the selection of the reporting tool does not change the underlying travel demand model results.

There is a benefit to having policy area boundaries as small as possible while allowing results to be reported with validity. Smaller policy areas mean less averaging of congestion conditions. There is also some benefit to having policy area boundaries that are generally consistent with master plan and sector plan boundaries (with some exceptions) so that ongoing travel monitoring can be tied back to master plan objectives.

**3. Why not have staging ceilings in PAMR?** One significant difference in the philosophy behind PAMR as opposed to PATR is that once a finding is made regarding Policy Area adequacy, no further analysis is required to track jobs and housing totals. Staff recommends this binary approach for three reasons:

- Approaching mitigation from a vehicle-trip basis as opposed to a jobs/housing basis is a more straightforward calculation of impacts
- The tracking of pipeline development against staging ceilings need not be concerned with the tracking of public sector development (such as the number of jobs at NIH)
- The concept of adequacy can be thought of as similar to a positive or negative remaining staging ceiling. A policy area determined to be inadequate can be though of as having a negative staging ceiling for both jobs and housing.

Finally, staff notes that the staging ceiling concept, while familiar to proponents of PATR, was unique to the transportation arena. By removing staging ceilings in favor of a pass-fail system, the policy area test for transportation would be made consistent with the policy area test for schools.

**4. Why aren't more Policy Areas given a failing grade?** The PAMR results for 2005, 2013, and 2030 each show that most areas have acceptable levels of mobility as currently defined. The primary reason for this finding is the use of the 2000 Highway Capacity Manual urban street level of service criteria, which reflects a an acceptance of rolling delays on urban streets that may be less stringent than some would expect but that staff finds appropriate for link-level analysis.

Rockville Pike in North Bethesda is often cited as both a key segment of Montgomery County's "main street" and an emblem of undesirable roadway congestion. Staff conducted a series of travel time runs for the MD 355/I-270 study last fall, measuring travel time in either direction between Strathmore Hall in North Bethesda and the Woodmont Country Club in Rockville. This 2.7 mile segment of MD 355 has a posted speed limit of 40 MPH, so that the travel time at free-flow speeds would be about four minutes. The typical observed travel time was eight or nine minutes. A nine-minute trip includes five minutes of delay, which would be unacceptable if it were accrued at a single intersection, but averaged over a 2.7 mile trip, results in an average speed of 18 MPH, or 45% of the free flow speed. Per the Highway Capacity Manual, the urban street LOS for this segment is LOS D; perhaps not great, but certainly consistent with staff expectations for highway mobility in an urbanizing area with high quality transit options.

**5.** If we have new PAMR standards for arterial congestion, should we also change the LATR standards? Staff recommends that the LATR congestion standards (expressed in terms of Critical Lane Volume, or CLV) should be retained as they currently exist, ranging from an 1800 CLV in MSPAs and a 1400 CLV in rural policy areas. Two arguments could be logically made for changing the LATR standards in response to implementing PAMR.

First, some might argue that the LATR standards should be adjusted to reflect the PAMR Arterial LOS standards. This adjustment would result in LOS C or D congestion standards for nearly all Policy Areas in the County, far more stringent than today's standards. However, the LOS industry standards for roadway links (per the PAMR) and roadway intersections (per the LATR) are not directly linked; they are apples and oranges.

Second, some might argue that if the Council reinstates a second-tier test, then the LATR standards regarding CLV and the 30-trip threshold requiring a traffic study should be "reset" to their values prior to the FY 03 Growth Policy. Staff recommends that both the tighter LATR congestion standards (except in MSPAs) and the more stringent requirement to conduct LATR studies for applications with more than 30 vehicle trips remain appropriate. Both the current congestion standards and vehicle trip thresholds provide greater opportunity to implement improvements (which may be non-auto amenities in addition to intersection widening) concurrent with new development.

### 6. Should Metro Station Policy Areas be exempted from the PAMR test?

From an accounting perspective, the inputs and outputs for Metro Station Policy Areas (MSPAs) and Town Center Policy Areas (TCPAs) have been incorporated into the reports for their "parent" policy areas. For example, the values listed in this report for the North Bethesda Policy Area include the Twinbrook, White Flint, and Grosvenor MSPAs as well as the remainder of the North Bethesda Policy Area outside the MSPAs.

Staff recommends that the PAMR also incorporate the MSPAs within their "parent" policy areas. In other words, if the North Bethesda Policy Area were to be found inadequate, this finding would by definition extend to Twinbrook, White Flint, and Grosvenor MSPAs. This recommendation may appear to be inconsistent with current policies that progressively encourage growth in MSPAs. Staff makes this recommendation to apply PAMR to MSPAs and TCPAs for several reasons:

- Traffic generated by development within MSPAs does have an impact outside the MSPA and frequently this impact extends outside the bounds of the LATR study area. The PAMR test is more appropriate than the LATR test for addressing this impact.
- As we encourage increasing proportions of development into MSPAs, we also allow an increasing proportion of development to bypass the second-tier test; more than one-third of our forecast residential growth is within MSPAs.
- Our transportation needs are severe enough and funding sources scarce enough that exemptions to any potential source for implementing transportation improvements should be minimized.
- Our MSPAs have matured as developable land has become more scarce so that financial incentives to encourage redevelopment in MSPAs are of decreasing value to the County
- Because the PAMR mitigation tables are based on vehicle-trips (rather than the measure of jobs or dwelling units applied in PATR), transitoriented development in MSPAs already gets a "discount" by virtue of higher transit mode shares and therefore lower vehicle trip generation rates as compared to development outside MSPAs.

Staff suggests that if the Planning Board or County Council find that, based on current County policies promoting smart growth, MSPA developments should not

be fully subjected to the PAMR requirements, staff suggests three potential alternatives to the full PAMR test. Developments in MSPAs could be:

- Allowed to apply for the Alternative Review Procedure (with double the transportation impact tax and a formal Trip Mitigation Agreement) in lieu of passing the PAMR test. This policy was in effect during the final years that Policy Area Transportation Review was in effect;
- Subject to a discount (perhaps 50%, per the transportation impact tax discount) in trip mitigation or capacity requirements; or
- Be exempted from the PAMR test but subject to a different test, such as a cordon capacity analysis; or
- Fully exempted from the PAMR test.

### **Other Potential Policy Area Level Tests**

In responding to the Council's request to reconsider PATR, staff considered six other approaches to a second, policy area level, transportation test to supplement LATR. These approaches are summarized below:

- PATR 2003 Using Total Transportation Level of Service and an Average Congestion Index (ACI): This approach is similar to what was used previously in the PATR with some refinements in accounting for the quality of available transit service.
- **Proportional Staging**: Allow development based on the proportion of the transportation system as a percentage of the master planned development potential (proportional facility staging)
- **Cordon Line Capacity:** The capacities of roadways and transit entering and leaving an area is used in setting the development levels within the area (Such an approach was used at prior times for both the Silver Spring and Bethesda CBD's for setting the overall development capacity of those areas).
- **Corridor Analysis**: The capacities of parallel roads and transit are taken together to determine the overall system capacity serving specified subareas of the County (Such an approach is used in parts of Florida).
- Jobs/ Housing Accessibility: This approach would measure opportunities to match available housing locations with available employment locations within a given generally acceptable travel time budget.
- **Travel Time Variability**: This approach would consider the consistency of expected travel times from one day to the next with a particular concern for "Travel Time Reliability", which is a measure that is of increasing importance to many transportation service providers, particularly for transit service and goods movement, as well as for most travelers in private vehicles.

Each of the potential alternative procedures was rated according to how well it satisfies several characteristics that we judge to be relevant to the Board, Executive, and Council as well as to the broader stakeholder community. These characteristics include the following:

- **Importance** are the factors measured of interest to constituents (residents, business interests, and decision-makers)?
- **Relevance** are the factors measured appropriate to considering the transportation effects of growth?
- **Coherence** are the test results understandable to the constituents and are the results from different scenarios intuitive to the decision makers and stakeholders?
- **Reliability** does the test measure what it says it does, and can the results be replicated?
- Availability is the data observable and available today for current conditions and can that measure reasonably be forecast to represent future conditions?

Exhibit 2-12 shows how the staff recommended Policy Area Mobility Review (PAMR) compares to the alternative approaches considered.

Alternative	Characteristics of Desirable Alternative Approaches					
Approaches	Importance	Relevance	Coherence	Reliability	Availa	bility
					Current	Future
Policy Area Mobility Review	Good	Excellent	Fair	Excellent	Good	Good
Policy Area Transportation Review	Fair	Excellent	Poor	Fair	Good	Good
Proportional Staging	Fair	Poor	Excellent	Poor	Good	Good
Cordon Line Capacity	Fair	Poor	Fair	Excellent	Excellent	Good
Corridor Analysis	Good	Poor	Fair	Good	Fair	Poor
Jobs/Housing Accessibility	Fair	Excellent	Poor	Good	Good	Good
Travel Time Variability	Good	Poor	Excellent	Good	Fair	Poor

Exhibit 2-12. Characteristics of Alternative Tests to Supplement LATR

As shown in the table, most of the potential approaches meet several of the indicators in a good or excellent manner, but are fair or poor at one or more of the criteria. The recommended Policy Area Mobility Review is good or excellent at more characteristics than any other alternative. Staff finds the coherence of the process remains its weakest point, but that the PAMR coherence is an improvement over the PATR coherence. Descriptions and the staff review of each of the potential approaches are summarized below.

**Policy Area Transportation Review (PATR) using Total Transportation Level of Service and an Average Congestion Index (ACI)**: This approach is what was used previously in the PATR. The general strengths and weaknesses of PATR were previously described in the description of PAMR.

Staff also considered more minor adjustments to PATR to better account for the quality of available transit service without reliance on a quantitative measure. Such modifications would generally follow the Five-Group Framework identified in the *Staff Draft Policy Element* of the 2003 – 2005 Annual Growth Policy Report that identified five basic types of transit service areas.

The intent would be to have a Policy Area Group System that would be more sensitive to transit availability and have each group be associated with a range of standards of average roadway congestion – the ACI standards. Thus an investment in a sufficient amount of improved transit service could more likely result in an increase in the staging ceiling for an area because the policy area "moved-up" within it's group, rather than needing to move from one group to another in its entirety. The limitation to this system, however, is that the minor changes desired to allow an area to "move up" incrementally within its group require a quantitative analysis tool to ensure that judgments are not arbitrary. Staff therefore does not recommend pursuing this approach further for regulatory purposes.

**Proportional Staging:** This was an option that staff has analyzed in depth in both 2003 and 2005, and the Council has expressed continuing interest in. Proportional staging is attractive because its basic premise – providing planned transportation capacity at the same time as planned development – most closely meets the definition of APF. However, the proportional staging process has a fatal flaw in that there is truly no "end-state" condition for either development or transportation service in Montgomery County. Adding new projects to plans increases the overall potential system capacity, but immediately reduces the amount of system that is "complete" since the overall is then larger.

The most compelling example of this fatal flaw is that the addition of a new transportation service in the master plan, such as the adoption of a Purple Line alignment east of Silver Spring, would have exactly the opposite effect of that desired. Because the Purple Line would increase the master planned transportation capacity, the current and programmed transportation would

immediately be a lower proportion of master planned capacity. Therefore, the adoption of a Purple Line amendment would immediately reduce the current status of any policy areas it affects. The headline might read, "Council adopts Purple Line amendment; places Silver Spring in moratorium". However due to the interest in this procedure in the past, details of the latest analysis are available in the Appendix to this report. While this tool is inappropriate for regulatory work, it might be useful as an indicator of progress in capital programming.

**Cordon Line Capacity** measures traffic entering and leaving a policy area compared to the roadway capacity at the policy area boundary, or cordon. Cordon line capacity is a concept that has been applied several times during master plan reviews. In the case of the Silver Spring CBD, the cordon line capacity is already a Growth Policy measure. The availability and use of transit is taken into account in an overall manner by the use of mode share and trip generation estimates.

Policy area boundaries often follow natural or manmade features, such as stream valleys or railroad lines, which create transportation capacity constraints. Thus in such cases, the remainder of the traffic volumes crossing into and/or out of these areas may appropriately reflect roadway capacity constraints. In many other cases, however, cordon lines do not reflect roadway capacity constraints and planned congestion relief is not associated entirely with improving capacity at the cordon lines. For instance, in the Fairland/White Oak Policy Area, the ICC will increase cordon line capacity. However, in Eastern Montgomery County traffic congestion is most greatly associated with travel along and across US 29. Even without the ICC, significant improvements in east-west travel within the Fairland/White Oak Policy area are being implemented by building grade-separated interchanges, an improvement that would not be reflected in a cordon line capacity mechanism.

**Corridor Analysis** is similar to our previous policy area review procedures in that it looks at the average volume to capacity ratio for several combined facilities against a standard. The corridor analysis process has been used in some locations in Florida as part of their "concurrency analysis" of development. The procedure defines the higher classification roadways, the freeways and arterials, in a parallel direction and combines their capacity and demand. This process is similar to **screenline analysis**, a tool commonly used to examine facilities crossing a defined point, such as a stream valley. In some applications the capacity of nearby transitways are also counted. We used this tool extensively during the Transportation Policy Report analysis and are using it again in the MD 355/I-270 Corridor study. However, the corridor analysis has the same limitations as PATR and PAMR but is further limited as its application is only for selected parallel facilities.

**Jobs/Housing Accessibility** measures how many opportunities for matching housing with jobs exist within a given travel time budget (such as a 45 minute trip from any given starting point). From a planning agency perspective, this may be the purest measure of the balance between transportation and land use. Jobs/housing accessibility can be improved by either providing additional transportation system capacity (achieving greater accessibility by increasing the geographic coverage area within the travel time budget) or by reallocating land uses (achieving greater accessibility by increasing the number of destination points within a smaller geographic coverage area).

A primary concern with the accessibility measure, however, is that it is not important to constituents, as not all jobs are created equal. While we can reallocate theoretical jobs/housing totals, the jobs that may locate in a housingheavy area such as Olney may not have the same value to Olney residents as jobs that locate in a jobs-heavy area such as Bethesda. A secondary concern is that the measure is not easily understood. For instance, a typical Montgomery County resident may today reach many thousands of potential jobs within a 45 minute trip. But most residents only want to reach one job, and the job is defined by the type of work it entails, and many other issues not related to transportation. The value, therefore, of increasing the number of potential jobs 20,000 or 40,000 with a new transportation link is of limited importance.

**Travel Time Variability** considers the consistency of expected travel times from one day to the next. Transportation system travel time reliability is a measure that is of increasing importance to many transportation service providers (particularly for transit service and goods movement) and for all travelers. Travel time varies based on many external factors. Non-recurring delay is the term often used, where vehicle crashes and other incidents are perhaps the most notable, but other factors of equal importance in determining variability include weather conditions, special events, and system maintenance activities. The transportation service industry continues to improve data collection, analysis, and forecasting tools to assess travel time reliability. However, the information systems in place needed to make decisions based on reliability are still several years away. Further, while travel time variability is of importance to the County, it relationship to growth policy is not very strong. This characteristic is currently reported as part of the Department's Highway Mobility Report, and can be a useful indicator of system performance without being the basis for growth policy decisions.

### LOCAL AREA TRANSPORTATION REVIEW

The current Local Area Transportation Review (LATR) process applied to all new subdivisions is consistent with the Institute of Transportation Engineers (ITE) Recommended Practice on Traffic Access and Impact Studies for Site Development (TAAISD), the national document that guides studies for new development reviews. The Montgomery County procedures have been, and continue to be, among the most closely documented and, in some respects, most stringent in the country. For example, the threshold for requiring a traffic study on new or amended development is 30 peak hour trips in Montgomery County, while the TAAISD suggests that a 100-trip threshold is appropriate. The use of congestion standards based on different parts of the County, related to the amounts of transit available, with the most congested locations being the Metrorail station areas, is also very progressive in relation to other locations.

### **Summary of Information Influencing Recommendations**

No significant changes to the LATR philosophy or standards are recommended by staff, but we recommend some amendments to the Council's Growth Policy. The rationale for each of these is described below.

1. Requiring an LATR study for the Alternative Review Procedure in Metro Station Policy Areas. Section TA1 of the current growth policy states that an applicant following the Alternative Review Procedure "need not submit any application or take any action under TL Local Area Transportation Review". However, the LATR Guidelines page 9 states that the applicant must conduct "a traffic study to identify intersection improvements and/or trip mitigation measures that would have been required." This was adopted by the Board based on their acknowledgement that knowing the potential impacts was valuable to staff in determining potential capital facility projects and roadway modifications. Staff supports the LATR position and recommends the Growth Policy statement be amended to say that the applicant "need not take any action to implement measures identified in the study submitted per TL Local Area Transportation Review."

**2. Revising the practice for sites being expanded**. The "30 trip" threshold for requiring a traffic study applies to both existing and future trips generated by the development site. This is a necessary provision required to discourage property development in a piecemeal fashion that would avoid the LATR study altogether. One, perhaps unintended, consequence is that if a large property (say, the Life Sciences Center) applies for a minor amendment that changes the number of peak hour trips generated from 1,750 to 1,751 trips, that property should, under the guidelines, perform a traffic study with "five rings" of intersections to document the effects of the single increased trip. Staff recommends that the guidelines be amended as follows:

- A) Allowing an increase of five peak hour trips to avoid a traffic study altogether based on "de minimis" logic.
- Basing the number of signalized intersections in the study on the increased number of peak hour trips rather than the total number of peak hour trips, in cases where use and occupancy permits for at least 75% of the originally approved development were issued more than twelve years prior to the LATR study scope request.

3. Allowing payment in lieu of implementation for non-automobile transportation amenities in hardship cases. The LATR Guidelines allow applicants to take vehicle trip credits for implementing amenities such as offsite sidewalks, bike paths, bus shelters, bike lockers, and Intelligent Transportation System (ITS) components. Staff finds that this is an excellent tool to guide smart growth, wherein turn lanes can essentially be converted to pedestrian amenities. The implementation of these features is a challenge, however, due to evolving and sometimes competing interests among reviewing and implementing agencies. The most pervasive example of this challenge relates to the DPWT agreement with Clear Channel Communications regarding bus shelter implementation. Based on agreements with Clear Channel Communications, DPWT has not been able to support developer-installed bus shelters, even in locations where there may be concurrence on need. Payment in lieu of implementation has been suggested, but the accounting required to track payments to individual segments of sidewalks or shelters is not practical and payment into a general countywide fund is often not satisfying to local constituents. However, where needs exist and developer implementation is not feasible, the payment to a general fund, followed by a good-faith effort on the part of County government to address site-specific concerns, appears most pragmatic. Staff recommends that the guidelines be amended to indicate that in cases where DPWT, DPS, an MDOT agency, or WMATA, concurs in writing with the need for a proposed offsite improvement, but that any other of the same agencies states in writing that the offsite improvement should not be constructed by the applicant, the applicant be allowed to contribute payment to the County in lieu of constructing the improvement. Staff understands that a new, more flexible project or program may need to be established in the CIP to support this approach.

4. Requiring documentation that traffic mitigation or trip reduction

**measures were considered in all cases**. Based on previous Council Growth Policy Actions, "the Planning Board has the authority to select either trip mitigation agreements, non-automobile transportation amenities, or physical road improvements (or a combination thereof) as the required means to relieve local congestion. Priority will be given to non-physical improvements in Metro Station and CBD Policy Areas." Throughout the County, staff has noted community interest in pursuing trip reduction measures in lieu of physical improvements. Staff therefore recommends that in all LATR studies where a physical improvement is recommended, the study document the consideration of mitigation or non-auto amenity improvement alternatives and the reasons why physical improvements were selected.

**5. Requiring studies to be submitted by certified professionals**. Staff recommends that the LATR studies be submitted by a registered Professional Engineer (P.E.), Professional Traffic Operations Engineer (P.T.O.E), or Professional Transportation Planner (PTP).

6. Intersection Data Base and Data Collection. With the elimination of Policy Area Transportation Review, the Council directed the Planning Board to prepare an annual report documenting traffic congestion trends in the County. Called the Highway Mobility Report, the most recent edition of this study was prepared in the summer of 2006. This report is possible due to the development over time of a GIS-based intersection data repository at the Planning Department. All the counts of intersections made by DPWT and the Maryland State Highway Administration, as well as counts made as part of the development review process for LATR, are entered into the Department data base for use in analysis of the system conditions. The database includes information from traffic counts for different years; more up-to-date data for a greater number of intersections would significantly improve the value of the analysis. Expanding this database over time with a more robust intersection count will make monitoring of current (and therefore future since this is the starting point) conditions more comprehensive, as well as allowing for verification of developerprovided counts. This would require higher levels of funding for this activity.

**7. Intersection Critical Lane Volume (CLV) Standards**. The Council requested the Board to consider the changes that were proposed to the LATR standards in 2005. The most significant consideration in 2005 was to revise downward a number of the CLV standards. Staff does not support this recommendation. The current standards and those used in 2003 and for several years before are shown in Exhibit 2-13, with the change made in the 2003-2005 Growth Policy. All CLV standards except those in Metrorail Station Policy Areas were lowered by 50. The recommendations for use of the Policy Area Mobility Review procedures are intended to address in part the concerns about the necessity to further reduce intersection CLV standards due to congestion since it creates an additional areawide test.

### **Background Information on the LATR Recommendations**

Some changes to the LATR process have been suggested during prior critiques. These changes are discussed below in terms of their strengths and weaknesses. Staff does not recommend any significant changes to the LATR process. We do recommend one amendment to the LATR sections in the Council's Growth Policy, as reflected in the recommendations. Should the County use a delay based intersection analysis process, such as the procedures from the Highway Capacity Manual (HCM) of the Transportation Research Board? This has been raised a number of times, and several detailed work sessions have been held with the Planning Board and Council over the past years. Interestingly, the "planning" procedures in the HCM have been evolving over time, beginning as variations on the complex delay based process used for current signalized intersection analysis, to the current process that is more like our Critical Lane Volume procedure. However, in our review we have consistently found the shortcomings of the HCM procedures too great to warrant a change to our current process. These shortcomings include:

- The need to use software to conduct the analysis, making the calculations less transparent. A full use has desirable information such as signal timing and other information on the vehicle mix, such as truck volumes, that is not available in the future conditions we are dealing with in LATR tests.
- The results are generally unreliable at and above the "capacity" of the standard intersection, our 1,600 CLV levels, making it not usable in situations such as the Metrorail stations, where we have found that acceptable congestion can be maintained well above this level.
- There is a lack of a real world connection between the calculated delay and the actual observed delay. So using this process would not provide information about the expected actual delay, but would just be another calculated outcome.

On the positive side for our CLV procedures, it is ideal for the planning applications we apply it to, where often the only known information is the volumes and number and type of lanes. We have enough experience with it now that we know what levels of congestion are associated with the different CLV levels, and can fine tune these to reflect different public policies.

**Should there be an LATR test in the Metrorail Station Policy Areas?** The issue of appropriate standards for intersections in urban areas such as the County Metrorail stations and CBDs is a complex one. Density of development brings with it significant levels of auto use, even with high transit use. The challenge is to accommodate the vehicles at some acceptable level, and yet retain a transit supportive environment that encourages walking and bicycling. Montgomery County has been successful up to now in this with a variety of policies that have provided the needed roadway capacity primarily via public infrastructure improvements. Staff recommends that this system be maintained, with strong incentives for each development in these areas to maximize non-auto use, create good walking environments, and pay appropriate fees for improvements to be provided at the most effective locations by the County and State.

**Should the LATR test be more multimodal?** One emerging national trend in traffic impact studies is to include non-auto modes in the tests. Montgomery County has addressed this in several ways already:

- A pedestrian impact statement is part of every LATR study, stating how the development will impact pedestrians. Staff can use this to assure that problems identified are mitigated in the process.
- The congestion standards vary according to the availability of transit options, with greater congestion levels tolerated where transit options are robust.
- A wide variety of off-site non-auto alternatives are available to the applicant, to get trip credits in lieu of making intersection modifications.
- The Board has the ability to require demand management rather than intersection improvements in a situation where it felt the community or environmental impacts of the improvements would be detrimental.

One issue to be addressed is the **need for checking pedestrian crossing times at urban area intersections**. This has some value, but is an operational traffic control tool controlled by DPWT and can change between the time of the LATR study and when the development is open. One approach might be for the Council to set a single County policy on acceptable crossing times for which DPWT would be responsible for implementation.

The applicant has the ability to propose demand management/ trip reduction actions that could mitigate some, or even all, the site trips, and this can be accomplished in a wide variety of methods identified by them an agreed upon by the Board and DPWT. Our staff recommendation on having each applicant show that non-roadway improvements were considered is our approach to this valid issue.

### **OTHER ISSUES RAISED BY COUNCIL**

The first two issues below were included in the Council Resolution for comment by the Board. These are also discussed from a slightly different perspective in the Infrastructure Financing section of this report. The third topic was requested at the first Interim Report, and is one that has come up often concerning transportation analysis.

### Accounting for Federal Facilities in Montgomery County

The topic of how to account for possible future Federal employees at large employment centers in the County has been extensively discussed over the years in relation to Growth Policy. Since the Federal Government is not subject to the Growth Policy, the main issue is how and when to count the traffic generated by Federal facilities as background traffic. Department staff suggests that a somewhat more proactive approach be taken than in the past, which did not monitor Federal employment closely and waited to count traffic generated by new Federal facilities, such as the relocation of the Food and Drug Administration, until the project was fully-funded in the Federal budget. *Staff recommends monitoring federal employment at federal installations on an annual basis and counting the traffic from new or expanded federal installations as soon as the increases are forecast with reasonable certainty.* 

A short summary of the issues follows. This discussion centers on a limited number of large federal facilities where jobs are congregated, including: National Institutes of Health, Food and Drug Administration at White Oak, the Walter Reed Annex, the National Naval Medical Center in Bethesda, and to a lesser extent federal agencies in privately owned buildings such as National Oceanographic and Atmospheric Administration in Silver Spring, and the Nuclear Regulatory Commission in North Bethesda.

How to best treat large Federal agencies within the County growth policies requires considering the consequences of different approaches. One basic assumption is that all the employees at the site are already being accounted for in any intersection counts or other data collection. Thus, it is only future growth that is at issue. There are several perspectives on this.

- If the Federal employees who may come to the site are counted as pipeline or otherwise given the status of approved development, then desired local growth could be denied due to lack of transportation system capacity, or facilities oversized if the growth does not take place.
- Alternatively, if the future employees are not accounted for and they do come to the site, congestion over the standards may occur.
- Determining with precision the timing and amount of future growth is difficult since these activities are often dependent upon funding each year

by Congress, and changes that occur in agency missions and staffing. The agencies are not under any legal obligation to meet local transportation requirements or to adjust their facility plans to conform to local land use and public facility goals. Much of our commentary to federal agencies is via the National Capital Planning Commission, which does have some authority over the master plans and facility plans of the agencies. Agencies also do not have an obligation to report employee levels, but they have been cooperating with Planning staff and providing updated estimates and forecasts of installation employment for the annual Economic Forces study.

The County's most effective approach has been one involving an agreement by the agencies to emphasize reduced peak hour trip making through strong demand management programs, often accompanied by a written agreement with the Planning Board. The most effective of these programs has been with the Nuclear Regulatory Commission, but National Institutes of Health has also been a good partner, as has Walter Reed Annex. Food and Drug Administration growth is accompanied by a significant roadway modification program, and efforts to assure adequate local bus service to the site are on-going. The Base Realignment And Closure (BRAC) mandated growth at National Navy Medical Center Bethesda will have potential roadway effects, and studies to identify these are underway with good cooperation from the Navy and others involved on the Federal side. A continuation of these policies is recommended by staff.

### Considering "through traffic" in the development review process

Some percent of the trips on the roadway network at any time of the day are going through the County, meaning neither a beginning nor end in a County location. Most of these are on the Interstates (I-270 and I-495) but some are on the major arterials such as US 29. The County approach to these type of trips has been to limit the number of lanes available at the entry points into the County on the northern side through caps in the master plans. Consequently, the master plan for Clarksburg and Vicinity has a maximum of six lanes for I-270 where it goes into Frederick County. The US 29 bridge over the Patuxent River at the Howard County line is a maximum of four lanes total.

Any forecasting done with the transportation model takes into account all these trips, since it uses the land use from the surrounding jurisdictions and the full regional roadway and transitway network. Thus, the forecasts used for transportation facility planning and master plans, which always have a future year horizon and use a travel forecasting model, account fully for through trips.

Another issue is whether some accounting for through trip growth is desirable for Local Area Transportation Review. The LATR process requires the applicant to take all the approved development in the study area as background to the analysis. This assumes that all the approved development will develop to the full extent of the approval. An analysis done several years ago of projected intersection congestion from traffic studies versus the actual congestion found that for at least the first six years after the study, the projections were well above the actual traffic levels. Only after about eight years did the actual volumes reach and exceed the projections. By that time the effect of additional development beyond that in the study is probably at work. So there has not been data that would show that growth in through traffic is making the LATR analysis incorrect, and staff recommends no change to the LATR process to account for growth in through trips.

### **Responses to LATR issues discussed in 2005**

In the Growth Policy Resolution No. 16-17, Council directed the Board to provide analysis and recommendations on "...the current LATR test and alternatives to it, *including those considered during the 2005 review of the Growth Policy*" (emphasis added). The following is staff response to the LATR issues found in the November 14, 2005 memorandum to Council on the Growth Policy from Deputy Staff Director Glenn Orlin.

**Tighten the number of intersections to be studied by different sized development**. Planning staff finds the current guidelines are conservative from a public policy perspective, and we do not recommend changes to the current requirements in the Growth Policy. As distance from the site increases it becomes less pragmatic to allocate smaller and smaller proportions of the site traffic to individual intersection turning movements. Staff is very aware of the Council's concern for this topic, and we have been rigorous in the application of the study area definition. Current guidelines are now resulting in larger developments studying 20 or more intersections, sometimes including ones miles from the site. We see the current requirements as sufficient to insure the impacts are effectively analyzed.

Concerning whether intersections outside the County would be analyzed, staff would recommend against this requirement unless it is for information purposes only. Other jurisdictions have their own procedures and objectives for the intersections within their control.

**Require a link capacity analysis**. This analysis is now incorporated in the PAMR recommendations, which are based on part on the capacity and demands on the roadway links of the transportation network. A specific link analysis is not needed in the LATR procedures.

**Tighten the LATR standards**. This is discussed in detail in the LATR section of this report.

Address queuing in the LATR standards. There is now a queuing analysis procedure in the LATR Guidelines, which is applicable in Metrorail Station Policy Areas where an intersection exceeds 1800 CLV under total traffic conditions. This comes from the objective of insuring that traffic in our most congested areas can operate effectively, without "gridlock" which is caused when one intersection backs up through another upstream, blocking cross-movement. The current procedure is one of calculating marginal change from the current operations, and can work well in a closely spaced intersection network such as found in the Silver Spring and Bethesda CBD's.

However, queuing in many situations is a function of the signal timing and phasing, which can be changed, and of larger traffic movements such as onramps to the Beltway. Staff finds that outside of the current procedures for the MSPAs, addressing queuing would require applicants to use a simulation program. These are expensive and complex and the results are very sensitive to variables such as signal timing and percent of trucks and buses in the traffic stream. If the Board and Council wish staff to investigate this aspect further we can do so. However, a review of queuing may best be done and reported as part of the annual Highway Mobility Report, and not associated with specific development approvals.

### Using Transit to Reduce Roadway Congestion

The question of how to use transit or other non-roadway capacity actions to reduce congestion is one that the Council and others have raised on the context of the Growth Policy. This is a very complex topic that has generated many professional articles and books, with approaches and findings evolving over time. Staff expects that the rewards and risks of relying on demand reduction as an alternative to roadway capital facilities will be a topic of significant discussion during the Growth Policy process. We would offer the following as starting points, based on our review of recent literature.

- Congestion mitigation from other than increasing roadway capacity is best accomplished with a combination of methods – parking pricing and supply, corridor specific high quality transit enhancements so that transit trips are competitive with the auto trip, transit and pedestrian oriented land uses, and other Travel Demand Management strategies are ones that have proven effective.
- The addition of bus service in an attempt to capture choice riders for a trip that is not competitive with the automobile travel time and comfort will likely have little impact on overall delays attributable to congestion. Research on actions that cause choice riders to shift from auto to transit has found that a variety of attributes are important including: trip time relative to auto, reliability, headways (wait times), safety, and comfort. Having a congested roadway system with buses in the traffic stream will

not in itself therefore cause a mode shift if these other attributes are not found in the transit services available to the auto users. This problem can be mitigated to varying degrees by with a variety of approaches to give travel preference to transit vehicles, or to separate auto and transit travel lanes.

- New research on pedestrian access to rail services has indicated that accepted walking distances may be greater than has previously been found. The potential effects of these findings may vary with the actual kinds of trips that were surveyed (walk from home to station as opposed to walk from station to work), and more details on this research should accompany further discussion on this aspect.
- When auto users are attracted to transit services, they create space on the roadway that can reduce congestion. As with other capacity increases, over time this can induce other auto users to shift routes, or travel further, somewhat reducing or moving the positive effects from the most desirable routes to lower category, less desirable ones.

### Recent use of PATR for assessing master plan balance

Even after the PATR test was eliminated from the Growth Policy in 2003, staff continued to apply the Total Transportation Level of Service and Average Congestion Index tools to assess the "balance" between master planned land use and transportation. The Planning Board and County Council also used the results from this tool in their deliberations, with master plan policies customized to reflect the needs of each plan area. The consideration of land use and transportation balance for the four most recently adopted master plans are described below; the PATR test featured prominently in three of them:

- The 2005 Olney Master Plan includes a staging element that limits the first stage of development to a total of 15,235 dwelling units, based on the PATR standard and concerns regarding potential development densities, particularly in the mixed-use Town Center.
- The 2006 Shady Grove Sector Plan includes an aggressive transportation staging plan that includes a requirement that developments generating more than 100 vehicle trips enter into formal Trip Mitigation Agreements and includes construction of the MD 355/Gude Drive interchange, or comparable capacity improvement, as a prerequisite for the second stage of development. These staging elements were developed in part due to the fact that the Average Congestion Index for the Derwood Policy Area was forecast to be substandard in 2025 regardless of the range of actions included in the Shady Grove Sector Plan (which includes a small geographic subset of the Derwood Policy Area).
- The transportation analysis for the 2006 Woodmont Triangle Sector Plan built upon the Bethesda Stage II analysis completed in 2004. The overall

land use/transportation balance was not discussed in great detail primarily because the 2004 staging analysis confirmed that the forecasted 2025 ACI was well below the PATR congestion standard.

 The 2006 Damascus Master Plan included carefully crafted land use recommendations to retain the recommendation that roadways outside the Town Center remain at two lanes, based on Average Congestion Index. The fact that the Plan was in balance for the forecast 2025 conditions was a key consideration in the recommendation not to reserve right-of-way for a future Damascus Bypass.

Staff recommends that the PAMR system proposed for regulatory review in this report should also be adopted for considering the adequacy of master plan transportation / land use balance.

2003	2007	Differer	nce Policy Area	Policy Areas		
1450	1400	-50	Rural Areas			
1500	1450	-50	Clarksburg Damascus Gaithersburg City Germantown Town Cente	Germantown West Germantown East Montgomery Village/ r Airpark		
1525	1475	-50	Cloverly Derwood North Potomac	Olney Potomac R & D Village		
1550	1500	-50	Aspen Hill Fairland/ White Oak	Rockville City		
1600	1550	-50	North Bethesda			
1650	1600	-50	Bethesda/ Chevy Chase Kensington/ Wheaton	Silver Spring/ Takoma Park		
1800	1800	0	Bethesda CBD Friendship Heights CBD Glenmont Grosvenor Shady Grove	Silver Spring CBD Twinbrook Wheaton CBD White Flint		

## Exhibit 2-13 LATR Intersection Congestion Standards





Exhibit 2-2. PAMR Transit Level of Service Standard



# Exhibit 2-3. PAMR Arterial Level of Service Standard



# Exhibit 2-4. PAMR Adequacy Standard

100% Year 2013 %06 Relative Transit Mobility: (Transit Speed / Congested Auto Speed ) Adequate County-wide Average 80% Exhibit 2-5. Year 2013 PAMR Chart Relative Arterial Mobility: (Congested Auto Speed / Free Flow Auto Speed) 100% BCC Derkw 70% Olney CLV Rural W NB AH MV VP Rural E FWO Pot Rkv GTW 60% RDV ĠBG▲ U V V GTE Damascus 50% Inadequate ◀ 40% 30% 20% 20% %06 80% 70% 60% 50% 40% 30%
		Forecasted			Relative	Forecasted	Difference	
		Relative			Arterial	Relative	Between	
	Exhibit 2-5	Transit	Transit LOS	Arterial LOS	Mobility	Arterial	Forecast and	Adequacy
Policy Area	Key	Mobility	Standard	Standard	Standard	Mobility	Standard	Finding
Aspen Hill	HA	%99	ပ	D	40%	49%	%6	Adequate
Bethesda Chewy Chase	BCC	72%	U	۵	40%	45%	5%	Adequate
Clarksburg	CLK	54%	۵	U	55%	65%	10%	Adequate
Clovery	CLV	62%	U	۵	40%	73%	33%	Adequate
Damascus	Damascus	47%	ш	В	20%	73%	3%	Adequate
Derwood	Der	20%	U	۵	40%	49%	6%	Adequate
Fairland/White Oak	FWO	61%	U	۵	40%	42%	2%	Adequate
Gaithersburg	GBG	57%	۵	U	55%	44%	-11%	Inadequate
Germantown East	GTE	55%	۵	U	55%	47%	-8%	Inadequate
Germantown West	GTW	60%	۵	U	55%	61%	6%	Adequate
Kensington/Wheaton	КW	72%	U	۵	40%	48%	8%	Adequate
Montgomery Village/Airpark	MVA	60%	U	۵	40%	50%	10%	Adequate
North Bethesda	ß	67%	U	۵	40%	42%	2%	Adequate
North Potomac	ЧN	62%	U	۵	40%	51%	11%	Adequate
Olney	Olney	67%	U	۵	40%	54%	14%	Adequate
Potomac	Pot	62%	U	۵	40%	42%	2%	Adequate
R&D Village	RDV	56%	۵	U	55%	59%	4%	Adequate
Rockville	Rkv	62%	U	۵	40%	47%	7%	Adequate
Silver Spring/Takoma Park	SSTP	72%	U	۵	40%	47%	7%	Adequate
Rural Area East	Rural E	65%	U	۵	40%	54%	14%	Adequate
Rural Area West	Rural W	64%	С	D	40%	20%	30%	Adequate
Montgomery County Total		<u>%69</u>				49%		

# Exhibit 2-6. Year 2013 PAMR Tabulation

Exhibit 2-7. Year 2005 PAMR Chart

Relative Arterial Mobility: (Congested Auto Speed / Free Flow Auto Speed)





Relative Arterial Mobility: (Congested Auto Speed / Free Flow Auto Speed)



# Exhibit 2-9. LATR Mitigation Options for Non-Auto Amenities

Mons A reference. There are a second of the second s	Trip Credit	vs Congestion S	tandard
	1400-1500	1550-1600	1800
100 linear feet of five-foot sidewalk	0.5	0.75	1.0
100 linear feet of eight-foot bike path	0.5	0.75	1.0
Curb Extension/Pedestrian Refuge Island/Handicap Ramp	2.0	3.0	4.0
LED Traffic Signals/ Intersection	4.5	6.75	0.6
Accessible or Countdown Pedestrian Signals/ Intersection	1.0	2.0	3.0
Bus Shelter	5.0	7.5	10.0
"Super" Bus Shelter	10.0	15.0	20.0
Bus Bench with Pad	0.5	0.75	1.0
Information Kiosk	1.5	3.0	4.5
Bike Locker (set of eight)	2.0	3.0	4.0
Real-Time Transit Information Sign	10.0	15.0	20.0
Static Transit Information Sign	0.25	0.4	0.5
Maximum Trip Credits	60	90	120

Exhibit 2-10. PAMR Mitigation Options for Providing Roadway Capacity

Minimum Length of Roadway Construction

(Lane-miles of widening or new construction per 100 vehicle trips generated)

		Facility t	iype	
Land Use Type	Freeway	Major Highway	Arterial	Primary Residential
Office Retail Other Commercial Residential	0.38 0.24 0.31 0.31	0.51 0.31 0.41 0.41	0.77 0.47 0.62 0.62	1.54 0.94 1.23 1.24

Notes:

Arterial class also includes industrial and business streets Construction must be recommended in a master plan and have logical termini Exhibit 2-11. LATR Superdistricts



# **APPENDICES FOR APFO REFORM PART 2: TRANSPORTATION**

The Sections below provide additional information on topics related to the recommendations and findings in the report. These include:

- 1. Review of current transportation forecasting model process
- 2. Details of proportional staging analysis
- 3. Staff recommendations on LATR Guidelines
- 4. Report to Council on appropriate standards and CLV procedures, 1999

# **1. Review of the Current Transportation Modeling Process**

M-NCPPC has historically been at the forefront in developing and applying travel demand forecasting procedures. For many years Montgomery County maintained a travel forecasting model, called Travel/2, that was separate from the regional MWCOG travel model. Travel/2 was used for a variety of planning applications, including area master plan studies, countywide planning studies and PATR growth policy analyses. M-NCPPC developed this separate modeling tool, in part, because of perceived weaknesses in the Metropolitan Washington Council of Governments (MWCOG) model that staff was able to address by developing Travel/2. In 2002, staff determined that the MWCOG transportation model had evolved to the point where the previous weaknesses no longer existed. Staff also determined that there were many benefits if the Department adopted the MWCOG process. In the final analysis, it was clear that a transition to the MWCOG model would allow staff to focus the Department's forecasting resources on applications, while benefiting from the huge investment by the region and USDOT in the MWCOG model development and maintenance.

Staff has now developed a Montgomery County-focused version of the MWCOG transportation model, called **Travel/3.** This model has replaced Travel/2 as the Department's regional transportation analysis tool.

# What components of the MWCOG modeling process have been adopted?

It should be noted that what is often referred to as "The Model" is really an analytical **process** that includes many components such as:

- Software to run the model Travel/2 used a software package called EMME/2, along with other GIS and database software for post-processing and analysis. MWCOG uses a software package called TP+/Viper, the same software used by the Baltimore Metropolitan Council.
- Mathematical parameters and equations (these are the "real" models).

- Inputs to the model. Montgomery County land use and socio-economic data come from the Department's Research and Technology Center staff. Montgomery County transportation network data come from the Department's Transportation Planning staff. Regional land use, socio-economic data and transportation network data come from MWCOG.
- **Analysts** (real people) to develop, maintain, and apply the model, and to analyze the results to answer difficult planning questions.

Travel/3 has adopted the TP+/Viper software and the MWCOG model's mathematical parameters and equations, while recognizing the critical role that our own staff have in developing population and job forecasts as inputs to the model, and applying the model for numerous transportation studies that the Department conducts.

# 2. Proportional Staging Method Analysis

# Methodology and Alternatives Tested

The proportional staging method compares the percentage of planned development that has been built to the percentage of existing/programmed<sup>1</sup> transportation infrastructure for the various study areas<sup>2</sup> of the County. The calculation process involves a number of process assumptions for existing and planned capacity for roads, interchanges, and transit. The calculated percentages are then used to determine whether or not there is remaining development capacity to allow for additional planned development to be approved.

For example, if **75%** of planned development in an area has been built, and **95%** of planned transportation infrastructure is on the ground, then the result would be a remaining capacity of **20%** for additional planned development to be approved.

In this application "planned development" is defined as the jobs and households from the County Adopted Forecasts. Built development will come from our Planning Department totals of current development plus the pipeline of approvals.

The remaining capacity figures vary significantly depending on the method selected for estimating the percent-built for transportation infrastructure. This is arrived at by taking the total of (existing network + programmed additions), and dividing by the total master-planned network

<sup>&</sup>lt;sup>1</sup> New infrastructure/additional capacity that is funded for construction within the first six years of the Consolidated Transportation Program (CTP) and the Capital Improvement Program (CIP)

<sup>&</sup>lt;sup>2</sup> Geographies used for the 2002 Transportation Policy Report (TPR) II

The analysis for this report used 3 scenarios for estimating the transportation infrastructure percent-built figure. The percent-built calculations considered each of the following scenarios:

- Inclusion of the arterial system interchanges (scenario A)
- Exclusion of the arterial system interchanges (scenario B)
- Inclusion of the arterial system interchanges, excluding the US 29 interchanges (scenario C)

# Summary of Findings

After initial development of this procedure, staff has looked more closely and finds that it has a logic "fatal flaw" that make its application problematic for regulatory process. Defining the "total build out" of jobs, housing or the transportation system is trying to hit a moving target, with zoning, redevelopment and other changes occurring often that change the total amount of future development in an area. Similarly, the transportation network is constantly undergoing refinement, and can be expanded in many ways, even within master planned constraints. However the biggest concern is that the findings of remaining development capacity run counter to the normal public policy directions. In this process, adding transportation capacity to a master planned network will actually decrease the ability to approve more development until it is fully funded, even thought the actual capacity of the programmed network could possibly accommodate more development. Similarly, taking pieces out of the future network would add to the ability to approve development, since the percent of the (smaller) future total would be larger.

# It may be that this procedure can be a useful tool in looking at the need for capital programming among areas of the County, so we have developed the findings described below.

Scenario B of the methodology, which excludes the arterial system interchanges from the analysis, would result in the most capacity (3.5% countywide) for new development to be approved. Scenario A, the most stringent of the staging concept, would result in the least amount of capacity (-0.5% countywide) for new development to approved. In its current state, the proportional staging method favors the approval of new jobs over housing, for several areas of the County. All three scenarios of this staging concept would allow for the approval of new jobs in the Georgia Ave Corridor, and Eastern Montgomery County. All three scenarios would allow for the approval of new housing Inside the Beltway. Furthermore, the application of all three scenarios of the methodology results in capacity deficits in either jobs or housing in three of the five study areas (Georgia Ave, Eastern Montgomery County, and Rural).

Under scenario A of this staging concept, Eastern Montgomery County would have a net remaining capacity for new jobs of 15.7%. Conversely, this area

would have the greatest capacity deficit for new housing at –15.2%. The Georgia Ave Corridor and Inside the Beltway study areas would have remaining capacity for housing (6.5%) and jobs (6.6%) respectively. The I-270 Corridor would have a capacity deficit for both housing and jobs at -0.7% and -1.0% respectively.

	Capacity	Surplus	Capaci	ty Deficit	
	Housing	Jobs	Housing	Jobs	
Inside The Beltway	*			*	
Georgia Ave		*	*		
Eastern Mont. Co.		*	*		
I-270 Corridor			*	*	
Rural			*	*	

Scenario A - Capacity Surplus/Deficit by Study Area

Scenario B of the proportional staging method results in more capacity for the approval of new development, particularly jobs, more so than that of scenario A. Eastern Montgomery County would have a net remaining capacity of 22.8%, which is 7.1% higher than what the remaining capacity would be under scenario A. In contrast, this area would have the greatest capacity deficit for new housing at -8.8%. This scenario would yield a capacity surplus for new housing in the I-270 Corridor and Inside the Beltway at 1.6% and 7.3% respectively. In addition, the scenario results would yield a net remaining capacity for new jobs in the Georgia Ave Corridor (8.8%) and the I-270 Corridor (1.2%). The Rural study area would have a capacity deficit for both housing (-1.0%) and jobs (-6.5%).

	Capacity	Surplus	Capacit	y Deficit
	Housing	Jobs	Housing	Jobs
Inside The Beltway	*			*
Georgia Ave		*	*	
Eastern Mont. Co.		*	*	
I-270 Corridor	*	*		
Rural			*	*

Scenario B - Capacity Surplus/Deficit by Study Area

Scenario C of the analysis involves a slight modification of scenario A, in that the planned and programmed interchanges in Eastern Montgomery County are removed from the capacity assumptions, since these are dependant upon Council approval for the "later phases of the interchanges". Therefore, the remaining capacity totals are very similar to those seen in scenario A. Moreover, the area Inside the Beltway would have a capacity surplus of 6.5% for new housing. The Georgia Ave Corridor and Eastern Montgomery County would have a net remaining capacity of 5.5% and 21.4% respectively for new jobs. Similar to the results seen with scenarios A and B, Eastern Montgomery County would have the greatest capacity deficit for housing (-9.5%). Under this scenario,

both the I-270 Corridor and the Rural areas would have a capacity deficit for both housing and jobs.

	Capacity	Surplus	Capacity	y Deficit
	Housing	Jobs	Housing	Jobs
Inside The Beltway	*			*
Georgia Ave		*	*	
Eastern Mont. Co.		*	*	
I-270 Corridor			*	*
Rural			*	*

Scenario C - Capacity Surplus/Deficit by Study Area

# Additional refinements

Currently, the study areas used in this analysis are aggregates of the County's growth policy areas. Ideally, the study areas used in this analysis should more closely resemble the growth policy area boundaries. However, staff feels that performing this type of analysis for all 34 of the County's policy areas may produce misleading results since many larger projects span several area, and cannot be built in small pieces.

The staging methodology involves a number of calculations, process and capacity assumptions that may require some additional refinement in order to obtain the most relevant and accurate results possible. For instance, a weighting<sup>3</sup> component could be introduced to the calculation process to alter the way in which the percent-built figures for jobs, housing, and transportation infrastructure are calculated taking into account the travel expected on each part of the network. In addition, the process and capacity assumptions may need to be modified as new transit policy initiatives are introduced, and/or as the region's travel demand model capacities are refined.

# Additional Staff Recommendations for the LATR Guidelines

Transportation Planning staff and consultants who work with the Planning Board LATR Guidelines on a daily basis are often confronted with situations that are not covered or where the Guidelines no longer reflect the best procedures. The following are changes staff expects to be proposing in the Guidelines when they are updated next, probably in the context of reflecting any changes made by the Council in the overall Growth Policy. These are not felt to be of a nature that the Council would need to adopt them, as with the ones identified in the LATR Recommendations section of this report. These are included to inform the Board

<sup>&</sup>lt;sup>3</sup> Adjustment of a calculated figure(s) based on the relevance/importance of an equation's inputs.

Annual Growth Policy Study (AGP) - March 2007 Proportional Staging Method - Illustrative Example

#### Scenario A. Includes Arterial System Interchanges

	3		
	Housing*	Jobs	Transportation
Inside The Beltway			
Percent Built	81.1%	89.6%	87.6%
2030 Forecast	93,108	160,821	
Gross Capacity	81,570	140,892	
Existing Development	75,528	144,076	
Pipeline	4,795	7,427	
Net Remaining Capacity	1,247	-10,611	
Old Growth Policy	4,835	11,783	
Georgia Avenue			
Percent Built	92.2%	82.4%	87.9%
2030 Forecast	80,668	42,312	
Gross Capacity	70,944	37,211	
Existing Development	74,376	34,883	
Pipeline	1,575	636	
Net Remaining Capacity	-5,007	1,692	
Old Growth Policy	4,924	3,929	
Eastern Montgomery County	96.9%	65.9%	81 7%
2030 Ecroport	35 590	42 212	01.7%
Gross Capacity	20,009	34 551	
Existing Development	34 476	27 002	
Pipeline	1 464	6.461	
Net Remaining Canacity	-6.879	188	
Old Growth Policy	1 0 20	1 245	
	1,303	1,243	
Percent Built	74.3%	74 7%	73 7%
2030 Forecast	147,240	244 072	
Gross Capacity	108 448	179 768	
Existing Development	109 428	182 204	
Pipeline	14,906	56.621	
Net Remaining Capacity	-15,886	-59.057	
Old Growth Policy	14,270	11,281	
Rural			
Percent Built	86.9%	92.4%	85.9%
2030 Forecast	25,197	12,990	

00.976	92.4 /0
25,197	12,990
21,639	11,156
21,903	12,001
712	891
-976	-1,736
4,539	3,950
	25,197 21,639 21,903 712 -976 4,539

#### Countywide

Percent Built	82.7%	79.8%	80.9%
2030 Forecast	381,802	502,507	
Gross Capacity	311,661	403,578	
Existing Development	315,711	401,066	
Pipeline	23,452	72,037	
Net Remaining Capacity	-3,490	-21,079	
Old Growth Policy	28,715	28,588	

\*Total Housing Units

Annual Growth Policy Study (AGP) - March 2007 Proportional Staging Method - Illustrative Example

#### Scenario B. Excludes Arterial System Interchanges

	Housing*	Jobs	Transportation
Inside The Beltway			-
Percent Built	81.1%	89.6%	88.5%
2030 Forecast	93,108	160,821	
Gross Capacity	82,360	142,257	
Existing Development	75,528	144,076	
Pipeline	4,795	7,427	
Net Remaining Capacity	2,037	-9,246	
Old Growth Policy	4,835	11,783	

#### Georgia Avenue

ocorgia Arcitae			
Percent Built	92.2%	82.4%	91.2%
2030 Forecast	80,668	42,312	
Gross Capacity	73,598	38,604	
Existing Development	74,376	34,883	
Pipeline	1,575	636	
Net Remaining Capacity	-2,353	3,085	
Old Growth Policy	4,924	3,929	

#### Eastern Montgomery County

Percent Built	96.9%	65.9%	88.1%
2030 Forecast	35,589	42,312	
Gross Capacity	31,352	37,275	
Existing Development	34,476	27,902	
Pipeline	1,464	6,461	
Net Remaining Capacity	-4,588	2,912	
Old Growth Policy	1,939	1,245	

#### I-270 Corridor

Percent Built	74.3%	74.7%	<u>75.9%</u>
2030 Forecast	147,240	244,072	
Gross Capacity	111,714	185,183	
Existing Development	109,428	182,204	
Pipeline	14,906	56,621	
Net Remaining Capacity	-12,620	-53,643	
Old Growth Policy	14,270	11,281	

#### Rural

Nulai			
Percent Built	86.9%	92.4%	85.9%
2030 Forecast	25,197	12,990	
Gross Capacity	21,639	11,156	
Existing Development	21,903	12,001	
Pipeline	712	891	
Net Remaining Capacity	-976	-1,736	
Old Growth Policy	4,539	3.950	

#### Countywide

Percent Built	82.7%	79.8%	83.0%
2030 Forecast	381,802	502,507	
Gross Capacity	320,664	414,474	
Existing Development	315,711	401,066	
Pipeline	23,452	72,037	
Net Remaining Capacity	746	-14,232	
Old Growth Policy	28,715	28, 588	

\*Total Housing Units

Annual Growth Policy Study (AGP) - March 2007 Proportional Staging Method - Illustrative Example

#### Scenario C. Includes Arterial System Interchanges, Excluding the US 29 Interchanges

	Housing*	Jobs	Transportation
Inside The Beltway			
Percent Built	81.1%	89.6%	87.6%
2030 Forecast	93,108	160,821	
Gross Capacity	81,570	140,892	
Existing Development	75,528	144,076	
Pipeline	4,795	7,427	
Net Remaining Capacity	1,247	-10,611	
Old Growth Policy	4,835	11,783	

#### Georgia Avenue

ocorgia Arenac			
Percent Built	92.2%	82.4%	87.9%
2030 Forecast	80,668	42,312	
Gross Capacity	70,944	37,211	
Existing Development	74,376	34,883	
Pipeline	1,575	636	
Net Remaining Capacity	-5,007	1,692	
Old Growth Policy	4,924	3,929	

#### Eastern Montgomery County

Percent Built	96.9%	65.9%	87.4%
2030 Forecast	35,589	42,312	
Gross Capacity	31,100	36,975	
Existing Development	34,476	27,902	
Pipeline	1,464	6,461	
Net Remaining Capacity	-4,840	2,612	
Old Growth Policy	1,939	1,245	

#### I-270 Corridor

74.3%	74.7%	73.7%
147,240	244,072	
108,448	179,768	
109,428	182,204	
14,906	56,621	
-15,886	-59,057	
14,270	11,281	
	74.3% 147,240 108,448 109,428 14,906 -15,886 14,270	74.3% 74.7%   147,240 244,072   108,448 179,768   109,428 182,204   14,906 56,621   -15,886 -59,057   14,270 11,281

#### Rural

(\u)ai			
Percent Built	86.9%	92.4%	85.9%
2030 Forecast	25,197	12,990	
Gross Capacity	21,639	11,156	
Existing Development	21,903	12,001	
Pipeline	712	891	
Net Remaining Capacity	-976	-1,736	
Old Growth Policy	4,539	3,950	

#### Countywide

Percent Built	82.7%	79.8%	81.4%
2030 Forecast	381,802	502,507	
Gross Capacity	313,700	406,002	
Existing Development	315,711	401,066	
Pipeline	23,452	72,037	
Net Remaining Capacity	-3,490	-18,655	
Old Growth Policy	28,715	28,588	

\*Total Housing Units

and others on these potential changes, and to show the evolving state of the LATR analysis. (Page numbers refer to the 2004 Adopted LATR Guidelines).

- Inclusion of pass-by trips in defining significantly sized project (p. 5&7). Pass-by trips are to be included in establishing the 30-vehicle trip threshold requiring a traffic study. The page 5 definition is correct and the page 7 definition should be amended.
- 2. Citation that LATR may apply building permit review (p. 5) for cases not requiring an APF finding without subdivision, and that in limited cases (less than 12 months vacancy, no increase in square footage, and fewer than 30 peak-hour trips) the APF test may be approved administratively by staff
- **3.** Clarification of submittal and review processes (p. 5, 11, 12, 17, 37). Clarify timelines, including:
  - a. Transportation Planning staff have 15 working days to develop a study scope after receipt of a written request
  - b. Transportation Planning staff have 15 working days to review a submitted study for completeness (retain p. 11 text, revise p. 5
  - c. SHA and DPWT have 30 calendar days to review an approved study and comment on the feasibility of the recommendations, however
  - d. The applicant must obtain comments from SHA and DPWT and transmit them to Transportation Planning staff four weeks prior to a scheduled Planning Board hearing.
- 4. Clarifying the definition of "all land at one location" (p. 7). The LATR Guidelines require consideration of all land at one location in considering the size of total (existing plus proposed) development in traffic study scoping. The LATR guidelines allow professional judgment. Staff judgment in the past has generally, but not always, been that parcels separated by unbuilt roadways or local subdivision streets remain "land at one location" but that parcels separated by business district streets, arterial roadways, major highways, or freeways cease to be "land at one location" even if still in common ownership.
- 5. Clarifying the definition of "mitigating 50% of their total weekday morning and evening peak-hour trips" (p. 9). The LATR Guidelines should define how both the "non-mitigated" and "mitigated" trips should be calculated. In both cases the applicant must explicitly document the conversion between person-trips and vehicle-trips to account for transit use, vehicle occupancy, walk/bike use, internal site trip capture, and telecommute options. The estimates should document the effect of home-based work trips separately from all other trips. Special trip rates, such as for office uses within 1,000 feet of Metrorail stations outside the Beltway (p. 48), or rates for any uses within the Bethesda, Silver Spring, and Friendship Heights CBDs (p. 54) should not be used in either "non-mitigated" or "mitigated" trip rate calculations.

- 6. Clarifying the LATR study area (p. 13). There are several clarifications required to this study scope parameter:
  - a. The number of signalized intersections in each direction should be described as a "minimum" rather than a "maximum".
  - b. The Guidelines should indicate that the term "each direction" applies at every study intersection. For instance, in a hypothetical perfect rectangular grid, the first "ring" would include four intersections. The second "ring" would include not only the next four intersections along the streets serving the site, but also the four intersections among the cross streets encountered in the first "ring". In this manner, as the number of intersections in each direction grows linearly from one to five, the number of total study area intersections grows exponentially.
  - c. The site access driveways are not included in the "first ring" of intersections.
  - d. Intersections in jurisdictions for which the Planning Board does not have subdivision authority will not be included in the traffic study.
  - e. Unsignalized intersections may be included in the definition of "rings" if they are between two master-planned roadways.
  - f. Intersections distant enough so that fewer than 5 peak hour vehicle trips from the site will travel through the intersection need not be included in the traffic study, even if they would otherwise be identified as candidate locations.
  - g. The statement that the background development to be considered will be in "the same geographic area as the intersections to be studied" should be clarified to indicate that generally a polygon should be drawn connecting the intersections furthest from the site and the background development should be included in that area.
  - h. Individual background developments that generate less than five peak hour trips (i.e., subdivisions of four or fewer single family detached dwelling units) should not be included, as tracking those trips is not pragmatic.
- 7. Addressing the effects of the ICC (p. 14). The applicant and staff must agree upon the impact of transportation projects fully funded for construction within the first four years of the CIP or CTP. The FY 2007-2012 CTP identifies the ICC as a single project that will be 99% complete in FY 2012. Staff recommends that the ICC continue to be considered as a single project, even though it will be constructed in stages, and that once the entire project is fully funded within four years its effects be considered by application of a proportional volume change (either reductions or increases) to background traffic conditions on intersection approaches based on the impacts identified in the ICC EIS.

- 8. Clarification of pedestrian and bicycle impact statement requirements (p. 15). The Guidelines should require that the pedestrian and bicycle impact statement cover an area within a ¼ mile radius of the site, regardless of the LATR study area size. Information on bus route numbers and service frequency should be included. An inventory map of sidewalks and off-road shared-use paths within the ¼ mile radius should be included.
- **9.** Clarification of queue length analysis (p. 21). The generally accepted practice for evaluating queue lengths in CBDs and MSPAs is to observe the existing maximum queue during the peak hour and add background and site-generated traffic, assuming LATR lane distribution factors, a 25' average vehicle length, and a division of hourly approach volumes equally among the number of signal cycles in the hour. These factors should be identified in the Guidelines, as well as a statement that alternatives methods, such as simulation using Synchro or CORSIM, may be accepted if all simulation parameters are agreed to by staff.
- **10.** Guidance regarding pass-by trips and internal capture rates (p. 31) should be included directing the user to the current ITE Trip Generation Handbook.
- **11. Clarification of unusual CLV processes.** The discussion regarding CLV calculation should address:
  - a. Right turn overlaps can be assumed where an exclusive right turn lane exists.
  - Five leg intersections: The CLV for these intersections should be assessed according to the individual signal phases identified in the field
  - c. Pedestrian crossing time: In MSPA cases where pedestrian crossing time criteria are not met (per p. 22), the applicant must inform DPST of the condition and request them to revise the signal timing.
  - d. Identifying a CLV process for roundabouts. The LATR Guidelines should state that a CLV for a roundabout calculation should be performed by calculating the sum of the approach flow and circulating flows, as defined by the Highway Capacity Manual, for each approach and comparing the highest sum to the LATR standards.
- 12. Addressing effects of nearby traffic constraints. A continuing community concern relates to the degree to which observed traffic volumes may be reduced by either upstream or downstream congestion. Staff notes that the purpose of the LATR is not to establish delay-free conditions, but rather to assess the appropriate degree of responsibility applicable to private sector applicants. Staff recommends that the studies require a qualitative statement regarding observed traffic conditions if during the time period that the counts were obtained any queueing from downstream locations or other operational issues were observed. The

Guidelines should also clarify that traffic counts affected by adverse weather or nearby traffic incidents will not be accepted.

13. Clarification of impacts assessment for special exception cases where the current operations exceed the permitted parameters. In some cases, a special exception modification may be submitted wherein the observed traffic reflects a level of activity greater than that already permitted. In such cases, the petitioner must estimate the reduction in traffic activity that would be caused by reducing the operations to the permitted level, and use those conditions for establishing adequate public facility impacts.

# 4. MARCH 2, 1999 LETTER TO THE COUNCIL FROM THE PLANNING BOARD ON LATR GUIDELINES

This presents the detailed review that the Board and a citizen panel did on the LATR procedures, including Critical Lane Volume analysis, in the late 1990's. The Board, and subsequently the Council, endorsed the standards and procedures after an in-depth review. Staff finds the basic validity of the process remains sound.



Montgomery County Planning Board Office of the Chairman

March 2, 1999

The Honorable Isiah Leggett, President Montgomery County Council 100 Maryland Avenue Rockville, MD 20850

Dear Mr. Leggett:

We are writing in response to Council's concern regarding the Planning Board's decision in April 1998 to adopt revisions to the *Local Area Transportation Review (LATR) Guidelines*, including specifically the adoption of revised lane-use factors used in the Critical Lane Volume (CLV) methodology for calculating intersection congestion. We have completed an in-depth staff review and Board discussion of this topic, and are pleased to report to you on our process and decisions.

Concerns about the effect of the revised lane-use factors on the Annual Growth Policy (AGP) congestion standards adopted by the Council in 1994 were raised by citizens, including two who were members of the Intersection Congestion Working Group (ICWG) that had confirmed the appropriateness of those standards in a report to the Council in April 1997. Their concern was that the current lane-use factors might suggest a revision to the congestion standards.

In response, our staff has undertaken an in-depth review of the current lane-use factors and their relationship to the congestion standards. In doing so, staff considered whether other factors, such as a peak-hour factor, should be included in our CLV methodology for planning level analysis of the traffic impacts of proposed development. A working group that included John Viner, Dan Wilhelm, representatives of academia and the County Executive, our staff and other transportation professionals reviewed this issue in great detail.

Staff presented a report and recommendations to the Planning Board at public sessions held on January 7 and February 18, 1999. Testimony from interested citizens, including Mr. Viner and Mr. Wilhelm, was received at both sessions. There was consistent testimony from staff, citizens, and transportation professionals at the January 7 public hearing that the current lane-use factors are the "correct" factors, as substantiated by field data and as recommended in the *Highway Capacity Manual*. The question of including a peak-hour factor in our CLV methodology was raised at the January 7 public hearing; the Planning Board requested staff to consider that option.

At the February 18 public hearing, staff recommended that the lane-use factors adopted by the Planning Board in April 1998 should be retained and that a peak-hour factor should not be added to the planning level of analysis in the LATR Guidelines. The Planning Board concurred with those recommendations.

The Honorable Isiah Leggett March 2, 1999 Page Two\_\_\_\_\_

------

Further, and perhaps more importantly from the Council's perspective, the Planning Board unanimously supported staff's recommendation that the congestion standards adopted by the County Council in 1994 are valid and conservative standards upon which to base decisions regarding the approval of development in Montgomery County and should not be changed. Those standards continue to reflect our understanding of the intent of the Council to permit different levels of traffic congestion in policy area groups. Those standards are not affected by the change in lane-use factors. One effect of adopting the new and correct lane-use factors is that the Planning Board has provided intersection capacity for a very small increment of additional development at a few intersections before reaching the congestion standard. The total level of development in an area continues to be governed by both zoning limits and staging ceiling.

There is no increased risk of excessive delay in using the current lane-use factors. In fact, local data strongly suggests that signalized intersections in Montgomery County are handling traffic better today than they were in 1994. This can be attributed in part to the efficiencies gained from the County's Advanced Transportation Management System (ATMS).

On a very practical level, the Planning Board was convinced that using the new lane-use factors would have only a marginal effect on the decisions made at subdivision approval. The typical impact on CLV calculations is 50 to 90. Even so, only about 20 intersections are close to the standard where some minimal additional development would be permitted.

A copy of our staff's report is enclosed for your information and reference. We consider this report to be a very comprehensive and understandable discussion of a very complex subject. You may wish to contact Ron Welke in our Transportation Division at (301)495-4525 for further clarification of the recommendations and our decision.

Sincerely,

arthur Holmen/

Arthur Holmes Vice Chairman

WHH:RCW:cmd Enclosure

Itr to leggett re LATR wpd



MONTGOMERY COUNTY DEPARTMENT OF PARK AND PLANNING

THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION

Item No. // 02-18-1999

MCPB

8787 Georgia Avenue Silver Spring, Maryland 20910-3760

February 12, 1999

# MEMORANDUM

- TO: The Montgomery County Planning Board
- VIA: Jeffrey Zyontz, Acting Chief<sup>3</sup> County-Wide Planning Division

FROM: Richard C. Hawthorne, P. E., Chief RCH

Ronald C. Welke, Coordinator<sup>1</sup> Transportation Planning

SUBJECT: Review of the Local Area Transportation Review (LATR) Guidelines Adopted by the Planning Board in April 1998 and Their Relation to the Congestion Standards Adopted by the County Council in 1994

In January, after a staff presentation, citizen comment, and considerable discussion on the issue of lane use factors, the Planning Board decided the following:

- 1. The revisions to the lane use factors are appropriate and their use in the planning level of analysis using the Critical Lane Volume (CLV) methodology should continue,
- 2. Staff will analyze whether a "peak hour factor" is appropriate to use in the CLV calculation, and
- 3. If staff recommends that a "peak hour factor" is not appropriate, should there be changes in the congestion standards adopted by the County Council?

In order to respond to these issues, staff has reviewed thoroughly the origin of the LATR Guidelines and the CLV methodology, and their relationship to both the congestion standards and the *Highway Capacity Manual* (HCM). Staff requests that you, as decision makers, follow closely the discussion that follows, as it is the basis upon which you make decisions each week as to the transportation conditions tied to your approval of subdivision development.

# CONCLUSIONS AND RECOMMENDATIONS

- 1. The lane use factors adopted by the Board in April 1998 are the correct factors, as substantiated by local field data, are consistent with those in the HCM, and should be retained.
- 2. A "peak hour factor" should not be added to the planning level of analysis, i.e. the CLV methodology, in the LATR Guidelines. This is based on at least three considerations.
  - a. A peak hour factor does not improve the accuracy of the CLV calculations.
  - b. The difficulty of determining a peak hour factor for a future condition (consider forecasting the peak 15 minutes in a peak hour five to 20 years in the future).
  - c. It adds complexity to the CLV procedure, and opens up the process to other "adjustment" factors. These have not proven to be useful in previous attempts by others to add such adjustments.
- 3. The congestion standards recommended by the Planning Board and adopted by the County Council in 1994 should not be changed.

# POLICY IMPLICATIONS OF CONCLUSIONS AND RECOMMENDATIONS

The congestion standards adopted by the County Council in 1994 have not changed. By adopting the new and correct lane use factors, the Board has allowed a very small increment of development to be approved before reaching the congestion standard in a given policy area.

To assist you in visualizing CLVs relative to the congestion standards and relating them to conditions as they exist today, a listing of intersections where the existing CLVs (using the new lane use factors) are close to the congestion standard follows. In some cases, they are slightly over the standard which would suggest that mitigation is needed at this time. In other cases, they are slightly under the standard and would suggest that mitigation is not needed at this time. Staff believes that this list will assist you in judging the validity of staff's conclusions and recommendations.

Intersection	Policy Area	Standard CLV		Comment	
Aspen Hill Rd & Veirs Mill Rd	Aspen Hill	1550	1591(PM)	Needs improvement	
Bauer Dr. & Norbeck Rd	Aspen Hill	1550	1640(PM)	Needs improvement	
Beach Dr & Connecticut Av	Beth/ChChase	1650	1677(AM)	Needsimprovement	
Frederick Rd & Redland Rd	Derwood	1525	1523(AM)	OK but close	
Elton Rd & New Hampshire Av	Fair/WO	1550	1526(AM)	Metered flow	
Columbia Pk & Fairland Rd	Fair/WO	1550	1526(AM)	OK	
-			1509(PM)		
Briggs Chaney Rd & Columbia Pk	Fair/WO	1550	1609(AM)	Improve	
			1567(PM)	-	

New Hampshire Av & Pdr Mill Rd	Fair/WO	1550	1634(PM)	Improve
Georgia Av & Plyers Mill Rd	Ken/Wh	1650	1577(AM)	OK
Dennis Av & Georgia Av	Ken/Wh	1650	1579(AM)	OK
			1528(PM)	
Fieldcrest Rd & Woodfield Rd	MV/Airpark	1500	1525(PM)	Improve
Democracy Bl & Fernwood Rd	N.Beth	1600	1603(PM)	Improve
Twinbrook Pk & Rockville Pk	N.Beth	1600	1621(AM)	Improve
Old Grgin Rd & Tuckerman Ln	N.Beth	1600	1651(PM)	Improve
Executive Bl & Old Grgtn Rd	N. Beth	1600	1681(AM)	Improve
Georgia Av & MD 108	Olney	1525	1551(PM)	Improve
Emory Ln & Georgia Av	Olney	1525	1497(AM)	OK
Democracy Bl & Seven Locks Rd	Potomac	1525	1618(PM)	Improve
Colesville Rd & Sligo Creek Pk	SS/TakPk	1650	1698(PM)	Improve

#### DISCUSSION

There are five basic questions to be asked, answered and understood relative to this issue:

- 1. What is "capacity" and how does capacity relate to the CLV analysis in the LATR Guidelines? How is "capacity" measured? Has it changed over time?
- 2. What "volume" of traffic is "acceptable" within Montgomery County? Is it different in different policy areas? What is the relationship of "volume" to the congestion standards adopted by Council?
- 3. What is the relationship between "capacity" (c) and "volume (v)? What is the "v/c ratio" and how does this ratio relate to the congestion standards, HCM method of planning analysis and the CLV methodology used in Montgomery County?
- 4. Does the change in lane use factors permit more development than was permitted with the old lane use factors? Should the congestion standards be changed or another factor, the "peak hour factor," be added to our methodology to "offset" the effect of the new lane use factors?
- 5. Has adoption of the new lane use factors increased the risk of excessive delay at signalized intersections in Montgomery County?

In order to understand the relationship of capacity, volume and the congestion standards, a discussion of these critical elements of the LATR process will precede discussion of the "peak hour factor" and its relevance to the planning level of analysis used in the CLV methodology.

### What is "Capacity?"

"Capacity" is the number of vehicles that can pass a given point in a given time. It is expressed in "vehicles (or passenger cars) per lane per hour." This is a value that has been measured at locations throughout the United States and can be measured here in Montgomery County. In contrast, the factors used in our CLV analysis procedure, i.e. lane use factors, that initiated these questions have no bearing on "capacity," but rather are related to the calculation of "volume" as discussed later in this memorandum.

The recognized source for defining "capacity" is the *Highway Capacity Manual* (HCM) published by the Transportation Research Board (TRB). The HCM defines capacity for intersections using the "saturation flow" of a lane.

In the 1960s, the saturation flow for a lane at a signalized intersection was considered to be 1,400-1,500 vehicles per lane per hour. That value has increased steadily since that time, as vehicles have become more efficient and traffic engineering knowledge, understanding and application has improved.

In 1985, the HCM recognized a saturation flow rate for a lane at a signalized intersection of 1,800 passenger cars per hour of green. In 1994, the HCM value for saturation flow increased to 1,900. There is consideration to increasing the saturation flow to 2,000 or higher in the Year 2000 edition of the HCM.

#### What Is Theoretical "Capacity" at a Traffic Signal?

What is the relationship of "capacity" of a lane with 3600 seconds of green time to "capacity" of a lane when a traffic signal is installed? At a traffic signal, there is something called "lost time" which is the time when the indications change from green to yellow to red on each approach to the intersection. Generally, three to four seconds per signal phase or about 10% of the time available to move traffic is assumed to be "lost" at a traffic signal. For example, if saturation flow is 1,900 vehicles per lane per hour, then the capacity of a lane at a traffic signal would be about 1,700 vehicles per hour (90% of 1,900.)

#### What Is the Real World "Capacity" of a Traffic Signal in Montgomery County?

The capacity of a lane at a traffic signal in Montgomery County is assumed to be 1,700 vehicles per hour. However, actual calculations of critical lane volumes at over 25 intersections in the County using the adopted lane use factors indicate that the saturation flow may be approaching 2,000 vehicles per hour, suggesting that the "capacity" of a lane at a signalized intersection in Montgomery County may be closer to 1,800 vehicles per hour (90% of 2,000) rather than 1,700 (See Appendix A). The measured CLVs at these intersections all are above 1,800 and range from 1,800 to over 2,200 vehicles per lane per hour. Deployment of new technologies associated with the County's Advanced Transportation Management System (ATMS), as well as more aggressive drivers, account for these increased flow rates.

Research studies have verified that the deployment of state-of-the-art technology can increase the efficiency or "capacity" of an arterial road network by about 10%. Montgomery County began installing their computer-controlled traffic signal system in the early 1980s. That system is now fully deployed but is not running "real time," (i.e. signal timing is not yet being adjusted cycle-by-cycle as data is received from detectors.) Also, the County is installing cameras at intersections and providing traveler information to motorists. It is estimated that their system as it exists today has achieved about one-half of the efficiency possible with today's technology. It is important that we recognize and understand the increased "capacity" that has and will be achieved.

Staff is not suggesting that the congestion standards be reevaluated at this time. However, as there is increasing factual evidence that the capacity of our signalized intersections has increased, and as the County continues to deploy more transportation management and traveler information technology, it may be appropriate to consider raising the congestion standards in the future to reflect the levels of congestion desired by policy makers in different areas of the county.

#### How Is "Volume" Measured at a Signalized Intersection?

- ---- -----

Traffic volume at a signalized intersection is measured by manually counting the traffic approaching the intersection from all directions for a period of time, usually four, six or 12 hours, and how much of the total traffic goes through, turns right or turns left. The calculation that is made has become identified in Montgomery County as the "critical lane volume technique." It is a procedure that calculates the "critical lane volume" on each approach to the intersection.

In April 1998, the Board adopted revised LATR Guidelines that included a change in the "lane use factors," i.e. the percent of traffic in the most-used lane of each approach. Specifically, for a twolane approach, the lane use factor was changed from 0.55 to 0.53, and for a three-lane approach, the lane use factor was changed from 0.40 to 0.37. The change reflected measurements from local video data and is consistent with changes made in the 1994 edition of the HCM.

The new lane use factors resulted in a 1-6% reduction in calculated CLVs compared to use of the old lane use factors, or about 20-100 CLVs. To put this change in perspective, a change of 50 CLVs is equivalent to about 30,000 to 100,000 square feet of office, 7,000 to 20,000 square feet of retail, or 50 to 150 single family residences, depending on whether it is spread over one, two or three lanes. Whereas theoretical changes in CLVs of up to 120 are possible, in practice this magnitude of change is rare since such a change would require that each "critical lane" be a three-lane approach. As an example, the decrease in CLVs using the current lane use factors at ten intersections studied for the Hecht's site in Friendship heights ranged from 0 to 72 and averaged 41 less than they would have been with the previous lane use factors.

The lane use factors originally adopted by the Board (0.55 and 0.40) were the product of work done in the early 1970s. My observations during the 1980s and 1990s suggested that we were doing a better job of moving traffic with the advent of the computer. Particularly at congested intersections, we were making more efficient use of green time and queues were more evenly distributed over the approach lanes. This was confirmed in mid-1998 by actual field data from video cameras that are part of the County's ATMS (Advanced Transportation Management System).

A comparison of CLV calculations to the HCM planning method of analysis indicates that use of the adopted lane use factors, i.e. 0.53 and 0.37, more closely matches the HCM planning method results and can be considered to produce comparable results. Use of flat lane use factors, i.e. 0.50 and 0.333, in the CLV methodology as recommended for intersections at or near capacity in the HCM, produces results that are too optimistic, whereas use of the previous lane use factors, i.e. 0.55 and 0.40, produces results that are too conservative. (See table below)

Procedure	Alternative	Morning Peak Hour		Evening Peak Hour	
	Result (v)	vic	Result (v)	vic	
НСМ	*Standard*	1654	0.97	1212	0.71
Critical	LUF - 50/33	1592	0.94	1170	0.69
Lane	LUF - 53/37	1644	0.97	1204	0.71
Technique	LUF - 55/40	1678	0.99	1226	0.72

#### What Is the Relationship Between "Capacity" and "Volume"?

The relationship between capacity and volume, as described in the HCM, is defined as the "volume to capacity ratio," or v/c ratio. Simply stated, as it relates to the LATR Guidelines, it is the relationship between a desired maximum volume for a given policy area and the "capacity" of a signalized intersection as defined by the HCM and measured in the field, and is reflected by the congestion standards adopted by Council.

The adopted Congestion Standards for Montgomery County are as follows:

1450	Rural Areas
1500	Clarksburg, Damascus, Gaithersburg, Germantown East and West, Germantown town center, Montgomery Village/Airpark
1525	Cloverly, Derwood, North Potomac, Olney, Potomac, R&D Village
1550	Aspen Hill, Fairland/White Oak, Rockville
1600	North Bethesda
1650	Bethesda/Chevy Chase, Kensington/Wheaton, Silver Spring/Takoma Park

Bethesda CBD, Friendship Heights CBD, Grosvenor, Shady Grove, Silver Spring CBD, Twinbrook, Wheaton CBD, White Flint

V/C Ratio	Relationship to Capacity
= or < 0.85	Under
0.85 to = or < 0.95	Near
0.95 to = or < 1.00	At
> 1.00	Over

The HCM relates v/c values to capacity as follows:

1800

When the County Council adopted the congestion standards in 1994, it was understood that policy areas with a 1,600-1,650 CLV standard were near but not at capacity and that policy areas with a CLV standard of 1,800 were at or slightly above capacity. Assuming a saturation flow of 1,900 vehicles per lane per hour, as the 1994 HCM stated, the "capacity" of a lane at a traffic signal would have been 1,700 vehicles per hour, and the v/c ratios would have been between 0.94 and 0.97 for CLVs between 1,600 and 1,650 and between 1.00 and 1.06 for CLVs between 1,700 and 1,800. These comparisons of the congestion standards to expected acceptable volumes in different policy areas confirm that the adopted congestion standards conform to national norms, are valid and should not be adjusted.

If, in fact, the capacity of a lane at a signalized intersection has increased to 2,000 vehicles per hour, as discussed above, then the current congestion standards are conservative and have an inherent safety factor built into them. For example, assuming that saturation flow has increased from 1,900 to 2,000 vehicles per lane per hour, the "capacity" of a lane at a traffic signal has increased from 1,700 to 1,800 vehicles per hour. The v/c ratios would then be between 0.89 and 0.92 for CLVs between 1,600 and 1,650 and between 0.94 and 1.00 for CLVs between 1,700 and 1,800. This would suggest that the congestion standards are more conservative than originally intended when adopted by Council. Based on this evaluation, staff concludes that a "peak hour factor" should not and does not need to be added to the planning level of analysis used in the LATR Guidelines.

#### What Is the Impact of Use of the New (Correct) Lane Use Factors?

I suggest that you visualize the adopted congestion standards as the height of a bridge under which a truck must pass. The height of the truck is the CLV for a development that includes existing, background and site traffic. With the new lane use factors, the height of the truck is slightly lower than it had been with the old lane use factors. As discussed above, the new lane use factors resulted in a 1-5% reduction in calculated CLVs compared to use of the old lane use factors, or about 20-90 CLVs. As a result, Developer A may now get under the bridge if total traffic is close to the congestion standard, whereas Developer A would not have cleared the bridge before. However, Developer B who comes along after Developer A will not get under the bridge and will have to mitigate his trips. So it is not a question of allowing more development but rather a question of which developer gets caught under the bridge. What has happened is that a small increment of additional development has been permitted before reaching the congestion standard. Most of the major intersections in the county are already above the applicable congestion standards and are not affected by the change in lane use factors (See Appendix B). Only a very few intersections, as discussed above under "Policy Implications," may be affected by the change.

#### Should A "Peak Hour Factor" Be Added to the CLV Methodology?

Staff recommends that a "peak hour factor" not be included in the planning level of analysis in the CLV methodology. There is consensus among members of the Traffic Growth Working Group (TGWG) with this recommendation. This is based on at least three concerns.

- A peak hour factor does not improve the accuracy of the CLV calculations.
- The difficulty of determining a peak hour factor for a future condition (consider forecasting the peak 15 minutes in a peak hour five to 20 years in the future).
- It adds complexity to the CLV procedure, and opens up the process to other "adjustment" factors. These have not proven to be useful in previous attempts by others to add such adjustments.

What is the "peak hour factor?" The "peak hour factor" converts peak hourly traffic volumes to flow rates for the peak 15-minute period within that peak hour. This is done by dividing the hourly volume by the peak 15-minute volume multiplied by four. The conversion of hourly volumes to peak flow rates assumes that all movements peak during the same 15-minute period, and is, therefore, a conservative approach. Essentially, it is a "safety factor" to account for peaking of traffic within the peak hour.

If a peak hour factor were used in our process, it would basically increase all CLV's by the amount of the factor. So a 0.95 factor would take the current 1,500 CLV to 1,575. This would "undo" the accuracy gained from the new lane use factors.

An "additional finding" from the Intersection Congestion Working Group (ICWG) report prepared in April 1997 was that "some fine-tuning of the CLV procedures could be tested based on adjustment factors found in the 1994 *Highway Capacity Manual*. These factors could include calculating a peak hour factor accounting for the peaking within the peak hour, and modifying the lane use factors on multiple lane roadways to account for spreading of vehicles more uniformly in congested situations."

In developing the recommendations for the LATR Guidelines in April 1998, staff did consider this issue in recommending the adjustment to lane use factors that were adopted by the Board. The Highway Capacity Manual (HCM) planning method for calculating delay or congestion at signalized intersections indicates that as the volume approaches the capacity of the intersection, lane use becomes uniform. Staff could have recommended uniform lane use factors and a peak hour factor at that time. This was not considered appropriate.

The HCM recognizes default lane use values when average conditions exist or traffic distribution on a lane group is not known. The default values for two and three lane approaches are 0.525 and 0.367, respectively. Staff believed that it was reasonable and conservative to adopt lane use factors that were consistent with the HCM's default values, i.e. 0.53 and 0.37, even though the HCM would suggest flat lane use factors, i.e. 0.500 and 0.333. Lane use data collected from video cameras at several signalized intersections in Montgomery County confirm that the adopted lane use factors are representative of existing conditions.

In the late 1970's, a national research publication (TRB Circular 212) proposed a CLV procedure with a number of adjustment factors. Applications in real world situations showed the forecast CLV's to be much higher than observations of congestion reflected. These adjustment factors were not well received, and the more complex procedure faded from the technical scene.

Staff believes, and, after some detailed review, most members of the TGWG concur, that there is no technical basis to modify the current planning level of analysis in the CLV methodology to include a peak hour factor. It does not improve the accuracy of the calculations, exceeds the ability of the procedure to be accurate, and makes the procedure more complex. Peak hour factors will move toward 1.0 as volumes increase, so even knowing the current number, there is no practical way to estimate what they will be in the future. The CLV methodology was adopted in Montgomery County in the early 1970s because it was relatively simple and easy to understand, and only needed data always available for a planning-type analysis, i.e. volumes and lane configurations. These are important characteristics to retain.

#### Has the Risk of Excessive Delay Increased?

The answer simply is NO. A small increment of development can now be approved before reaching a congestion standard, but the standards have not changed. In fact, the standards adopted by the Council in 1994 have a safety factor built into them if we assume that the "capacity" of a signalized intersection has increased.

#### CONCLUSION

In conclusion, a) the lane use factors adopted by the Board in April 1998 are correct, b) it is not appropriate to include a "peak hour factor" in the LATR Guidelines planning level of analysis using the CLV methodology, and c) the congestion standards adopted by Council in 1994 are valid and indeed conservative standards upon which to base decisions regarding the approval of development in Montgomery County.

#### RW:RCH:cmd

LATR Guidelines Adopted by PB - memo3.wpd

# Appendix A

.

-----

# EXISTING CRITICAL LANE VOLUMES ABOVE 1800 (WITH ADOPTED LANE USE FACTORS)

Intersection	<u>Critical Lan</u> <u>AM Peak</u>	e Volume PM Peak	Congestion <u>Standard</u>
Twinbrook Pkwy & Veirs Mill Rd	1815		1550
Arcola Ave & Georgia Ave		1820	1650
Lost Knife Rd & Montgomery Village Ave	1821	1828	1500
New Hampshire Ave & Powder Mill Rd	1832		1550
Democracy Blvd & Old Georgetown Rd		1833	1600
Montrose/Randolph Rds & Rockville Pike		1834	1800
Colesville Rd & Sligo Creek Pkwy	1840		1650
Wisconsin Ave & Jones Bridge Rd		1847	1650
Twinbrook Pkwy & Rockville Pike		1851	1800
East Jefferson St & Montrose Rd		1852	1600
Midcounty Hwy & Shady Grove Rd	1853		1800
Georgia Ave & Norbeck Rd	1876		1550
Cedar Ln & Rockville Pike		1875	1650
Ednor/Layhill Rds & Norwood Rd	1910	1816	1525
Executive Blvd & Old Georgetown Rd		1923	1800
Aspen Hill Rd & Connecticut Ave		1955	1550
Columbia Pike & Spencerville Rd	1973	1961	1550
Lockwood Dr & New Hampshire Ave	1912	2003	1550

-

Democracy Blvd & Seven Locks Rd	2007		1525
Connecticut Ave & East West Hwy		2053	1650
East West Hwy & 16th St		2083	1650
Midcounty Hwy & Woodfield Rd		2089	1525
Georgia Ave & Randolph Rd	2101	1935	1650
Piney Branch Rd & University Blvd	2213	2154	1650
East Jefferson St & Montrose Rd		2268	1600
Connecticut Ave & Jones Bridge Rd		2013	1650

# Appendix B

,

.

# EXISTING CRITICAL LANE VOLUMES BY POLICY AREA (WITH ADOPTED LANE USE FACTORS)

Intersection	Critical Lane	<u>Volume</u> P <u>M Peak</u>
POLICY AREA - ASPEN HILL		
Congestion Standard - 1550		
Aspen Hill Rd & Veirs Mill Rd		1591
Bauer Dr & Norbeck Rd		1640
Georgia Ave & Norbeck Rd	1876	
Aspen Hill Rd & Connecticut Ave		1955
POLICY AREA - BETHESDA/CHEVY CH	ASE	
Congestion Standard - 1650		
Beach Dr & Connecticut Ave	1677	
Wisconsin Ave & Jones Bridge Rd		1847
Cedar Ln & Rockville Pike		1875
Connecticut Ave & East West Hwy		2053
Connecticut Ave & Jones Bridge Rd		2013

# POLICY AREA - BETHESDA CBD

Congestion Standard - 1800		
Bradley Blvd & Wisconsin Ave	1644	1690

2

# POLICY AREA - CLOVERLY

------

Congestion Standard - 1525		
Ednor/Layhill Rds & Norwood Rd	1910	1816
POLICY AREA - DERWOOD		
Congestion Standard - 1525		
Needwood Rd & Redland Rd	1691	1663
Midcounty Hwy & Shady Grove Rd	1853	
Midcounty Hwy & Woodfield Rd		2089

.

.

•

# POLICY AREA - FAIRLAND/WHITE OAK

Co	ngestion Standard - 1550			
Brig	ggs Chaney Rd & Columbia Pike		1567	
Elto	on Rd & New Hampshire Ave	1526		
Col	umbia Pike & Fairland Rd	1526	1509	
Brig	ggs Chaney Rd & Columbia Pike	1609		
Nev	v Hampshire Ave & Powder Mill Rd	1832	1634	
DE	Hampshire Ave & Powder Mill Rd	$\sim$	1634	_
Loc	kwood Dr & New Hampshire Ave	1912	2003	

# POLICY AREA - KENSINGTON/WHEATON

	-	-
Congestion	Standard-	1650

,

Georgia Ave & Plyers Mill Rd	1577
------------------------------	------

Dennis Ave & Georgia Ave	1579	1528
Connecticut Ave & Randolph Rd	1551	1514
Georgia Ave & Plyers Mill Rd	1689	
Arcola Ave & Georgia Ave		1820
Georgia Ave & Randolph Rd	2101	1935

# POLICY AREA - MONTGOMERY VILLAGE/AIRPARK

Congestion Standard - 1500

Fieldcrest Rd & Woodfield Rd	1682	1525
Centerway Rd & Snouffer School Rd	1662	
Lost Knife Rd & Montgomery Village Ave	1821	1828

# POLICY AREA - NORTH BETHESDA

Congestion Standard - 1600

Democracy Blvd & Old Georgetown Rd	1502	1833
Democracy Blvd & Fernwood Rd		1603
Twinbrook Pkwy & Rockville Pike	1621	1851
Old Georgetown Rd & Tuckerman Ln		1651
Executive Blvd & Old Georgetown Rd	1681	1923
Twinbrook Pkwy & Veirs Mill Rd	1815	
Montrose/Randolph Rds & Rockville Pike		1834

Fast Jefferson St & Montrose Rd	1852
East Jetterson Star Montrose Ka	1852

# POLICY AREA - OLNEY

--

Congestion Standard - 1525

7

# Georgia Ave & MD 108

# POLICY AREA - POTOMAC

Congestion Standard - 1525		
River Rd & Seven Locks Rd	1641	
Democracy Blvd & Seven Locks Rd	2007	1618
POLICY AREA - SHADY GROVE		
Congestion Standard - 1800		
Frederick Rd & Shady Grove Rd	1590	1575
Frederick Rd & Redland Rd	1523	
POLICY AREA - SILVER SPRING CBD		
Congestion Standard - 1800		
Colesville Rd & Georgia Ave	1676	1631
Colesville Rd & East West Highway		1684
Colesville Rd & 16th St		1664
East West Hwy & 16th St		2083

# POLICY AREA - SILVER SPRING/TAKOMA PARK

Congestion Standard - 1650		
Colesville Rd & Dale Dr		1509
Colesville Rd & Sligo Creek Pkwy	1840	1 <b>698</b>
Piney Branch Rd & University Blvd	2213	2154

# POLICY AREA - WHEATON CBD

1551

.

.

Congestion Strandard - 1800		
University Blvd & Veirs Mill Rd		1583
Georgia Ave & University Blvd	1506	
POLICY AREA - WHITE FLINT		
Congestion Standard - 1800		
Nicholson Ln & Rockville Pike		1592

•

.

.

.

.

---
-18

To: Planning Board VIA FAX 301 495 1320

From: John G. Viner, P.E.

February 5, 1999 THE CHAIRMAN TIONAL CAPITA of

Subject: February 18th Agenda Item 'Lane Use Factors in LATR Guidelines'

I think it would be helpful for the Planning Board to review the July 14, 1998 gater from the County Council President to Mr. Hussman on this topic. A copy is enclosed for your convenience. Note the concern of the Council on the question has the new Lane Use Factor (LUF) caused a significant de-facto change in congestion standards?

We now know the answer. The new LUF lowers calculated CLV by 70-120, for multi-lane intersections where congestion is a concern. County congestion standards have been degraded by 50% to 80% of an entire Level of Service (LOS) as LOS levels cover a 150CLV band. This is obviously a significant degradation in standards requiring corrective measures as outlined in the last paragraph of Mr. Leggett's letter.



## MONTGOMERY COUNTY COUNCIL

ROCKVILLE, MARYLAND

OFFICE OF THE COUNCIL PRESIDENT

Mr. William H. Hussmann, Chairman Montgomery County Planning Board 8787 Georgia Avenue Silver Spring, Maryland 20910-3760 July 14, 1998 THE MARYLAND NATIONAL CAPITAL PARK AND PLANNING COMMISSION FEB 8 1999 Silver SPRING

Dear Mr. Hussmann:

We received a copy of your response to John Viner's letter raising concerns about the Planning Board's having revised the lane-use factors utilized in the calculation of intersection capacity under the Local Area Transportation Review (LATR) Guidelines. We have received similar letters from the Montgomery County Civic Federation and the Greater Colesville Citizens Association (attached).

We appreciate your willingness to review this matter again. While it is clear to us that the Board has full authority to adjust the lane-use factors or any of factors or rates used to calculate the critical lane volume at intersections, we need to understand how the calculated CLV relates to the LATR standards, which we have the responsibility to adopt. In particular, the Intersection Congestion Working Group attempted to draw a mathematical relationship between the calculated CLV and actual travel delay in order to determine whether the LATR standards we had adopted (1800 CLV in Metro Station policy areas, ranging from 1650 to 1450 CLV elsewhere) were appropriate. In the review of the ICWG's work as part of the Policy Element of the FY 98 Annual Growth Policy, the Council decided to confirm the current standards. However, adjusting the lane-use factor in some instances would change the calculated CLV, and in those instances the relationship to actual travel delay would be altered.

Therefore, in your review we request that the Board pay particular attention to the relationship between the calculated CLV and actual delay. If the Board finds that relationship is sufficiently changed to the point where the LATR standards should be adjusted, then we would entertain a proposed amendment to the Policy Element that would allow us to effect such an adjustment. Alternatively the Board may wish to consider other factors in the LATR Guidelines, such as the inclusion of a peak-hour factor suggested by GCCA.

Sincere

Isiah Leggett Council President

IL go f\orin\icggmail\agp\lancusc.doc

Atlachenenus

STELLA B. WERNER COUNCIL OFFICE BUILDING, 100 MARYLAND AVENUE, ROCKVILLE, MARYLAND 20850 301/217-7900 TTY 301/217-7914 Printed on Recycled Paper