TRANSPORTATION POLICY IN MARYLAND

Focus on Economic Performance

BY WENDELL COX

INTRODUCTION

THIS PAPER EXAMINES HIGHWAY AND TRANSIT POLICY in Maryland based upon the proposition that its principal purpose should be to maximize economic growth, which would also minimize poverty. Such a focus would improve the state's competitiveness by the most effective use of public expenditures.

The analysis is limited to highways and transit because these two modes of transport are subject to day-to-day political considerations, including decisions about the use of scarce funding raised through taxation and user fees. Ports and airports are also crucial to the economy of Maryland. However, these facilities are managed as government enterprises and are operated subject to commercial disciplines. As a result, they are less susceptible to day-to-day political considerations and control, which would dilute their contribution to the economy of the state.

The paper will describe Maryland's highway and transit situation. It will then examine the relationship between better mobility, economic growth, and lower levels of poverty. There then follows a review of transportation policy, concluding with recommendations to refocus policies to maximize economic growth and minimize poverty.

'METROPOLITAN' MARYLAND

Maryland is one of the nation's most urban and most densely populated states. According to the United States Bureau of the Census, more than 85 percent of the

TABLE 1 POPULATION AND DOMESTIC MIGRATION: 2000-2009

	POPULATION	DOMESTIC MIGRATION	INTERNATIONAL MIGRATION
INNER CITY: CITY OF BALTIMORE	-1.7%	-11.5%	1.7%
INNER SUBURBAN COUNTIES	7.6%	-4.2%	5.1%
OUTER SUBURBAN COUNTIES	15.6%	8.6%	0.8%
EX-URBAN COUNTIES	13.8%	8.6%	0.7%
OTHER COUNTIES	4.2%	4.2%	0.9%
MARYLAND	**7.3%**	**-1.8%**	**3.5%**

NOTE: Inner Suburban Counties are adjacent to the cities of Baltimore or Washington. Outer Suburban Counties are all other counties. Ex-urban Counties are adjacent to Baltimore or Washington metropolitan areas.

population lived in urban areas in 2000, which comprised 18 percent of Maryland's land area.

The intensity of Maryland's urbanization is illustrated by the fact that nearly 90 percent of Maryland's population is in three of the largest metropolitan areas[1] in the nation.[2]

- All of the Baltimore metropolitan area (20th largest in the nation) is in Maryland. In addition, strong commuting patterns have developed to the Baltimore metropolitan area from south-central Pennsylvania.
- Maryland counties form the northern tier of the Washington metropolitan area (8th largest in the nation). During the past decade, the Washington metropolitan area has been growing more strongly than the nation.
- Cecil County is in the Philadelphia metropolitan area (5th largest in the nation). However, there are strong commuting patterns from Cecil County to the Baltimore metropolitan area, which is likely to increase with the expansion of federal employment in the Aberdeen Proving Grounds area (Harford County).

The Baltimore and Washington metropolitan areas comprise a Bureau of the Census-defined "combined statistical area," in recognition of the significant economic interplay between the new areas.[3]

In Maryland, as throughout the United States and the developed world, virtually all population growth has been in suburban areas in recent decades, illustrating a pervasive trend of decentralization.[4] Nearly all central cities that retain their 1950 boundaries (like Baltimore) have lost population. At the same time, suburban growth has been principally the result of the migration from smaller urban areas and rural areas to suburban areas. In the case of Baltimore, for example, the population growth in the suburbs has been four times the city population loss since 1950.

Decentralization has continued in the present decade, as is illustrated in Table 1. The strongest population growth is in the outer suburban counties of the

major metropolitan areas and the adjacent exurban counties. Overall, the state is losing domestic migrants, with the largest losses occurring from the city of Baltimore and the inner suburban counties. The outer suburban and ex-urban counties have strong domestic in-migration. Virtually all of the state is receiving international in-migration, though by far the strongest trend is toward the inner suburban counties.

At the same time, there is strong movement out of Maryland to Pennsylvania and West Virginia, which Maryland attributes to the lower-cost housing in the counties adjacent to the border. Washington, D.C. provides the largest source of domestic migration into Maryland.[5] Typically, job creation has followed the movement of people to suburban and exurban areas, with some lag time. As Pennsylvania and West Virginia continue to attract people from Maryland, jobs could be created there that otherwise would have been created in Maryland. This would mean that some of Maryland's potential job creation and economic growth would be exported to neighboring states, because of its higher housing costs and, as is suggested below, its greater traffic congestion.

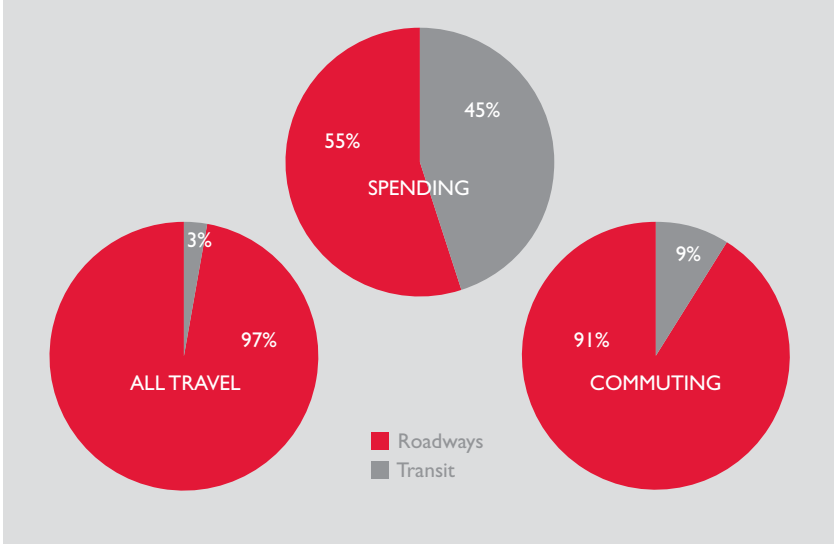
Finally, employment is likely to grow strongly in the state, in part as a result of the new employment that will result from the Base Relocation and Closing Act (BRAC). Between 40,000 and 60,000 new jobs are likely to be added in Maryland as a result.[6]

HIGHWAYS AND TRANSIT IN MARYLAND

With this large urban population and strong growth, highway traffic volumes have been rising in Maryland. From 1998 to 2008, traffic volumes increased 17.2 percent statewide. At the same time roadway capacity increased by less than one-half that figure, at 7.0 percent.[7] As a result, traffic congestion has become more intense. This is illustrated by the peak period congestion delay trends in both the Washington and Baltimore areas.

- In the Baltimore area, there was an average congestion delay was 31 percent during peak periods compared to non-peak periods in 2007. This means that the average trip that would take 30 minutes in non-congested periods would take close to 40 minutes during peak periods. Traffic congestion has worsened considerably. In 1998, the average congestion delay was 20 percent. In 1982, the average congestion delay was 7 percent.
- In the Washington area, the average congestion delay was 39 percent during peak periods compared to non-peak periods in 2007. Only Los Angeles, Chicago and San Francisco had more intense traffic congestion. This means that the average trip that would take 30 minutes in non-congested periods would take nearly 42 minutes during peak periods. In 1998, the average congestion delay was 32 percent. In 1982, the average congestion delay was 11 percent.[8]

FIGURE 1 SPENDING AND TRAVEL SHARES: STATE OF MARYLAND



The overwhelming share of travel in Maryland is by road. In 2008, 84.0 percent of all work trips were by car, with 8.5 percent by transit. Working at home (such as telecommuting) accounted for 3.8 percent of employment, while all other modes (bicycle, walking, motorcycle, and taxicab) accounted for 3.6 percent of commuting. Automobiles carried 90.8 percent of commuters[9] who traveled by car or by transit, while 9.2 percent traveled by transit.

This is an improvement from 8.5 percent for transit in 1990. However, transit's increase of 52,000 daily commuters has been more than offset by a 62,000 loss in car pool commuters (Figure 1). Driving alone became substantially more popular, comprising 73 percent of all commutes in the state in 2008. Between 1990 and 2008, 93 percent (400,000) of all new commutes between 1990 and 2008 were by single-occupant automobiles. This is despite the huge transit investments that have been made in the Baltimore and Washington metropolitan areas (below). At the same time, working at home, which requires virtually no government expenditure, increased 47,000 between 1990 and 2008.[10]

Cars, however, tend to carry an even larger share of overall travel than commuter travel. It is estimated that cars account for approximately 97 percent of all travel by car and transit, with transit carrying approximately 3 percent.[11]

- In the Baltimore urban area, transit carries an estimated 2.5 percent of car and transit travel (2008). This is slightly higher than the estimated 2.3 percent in 1983.
- In the Washington urban area, transit carries an estimated 4.2 percent of car and transit travel. This is up from 3.8 percent in 1983.[12]

These improvements have been related to large transit investments, especially Washington's Metro (principally commuting from Prince George's and Montgomery counties to Washington) and expansion of MARC commuter rail service (to both downtown Baltimore and Washington's Union Station).

The Maryland Department of Transportation funds much of the roadway and transit systems in the state. Since 2005, it is estimated that transit has received approximately 45 percent of the transit and highway spending. This share is considerably above transit's share of travel in the state. As noted above, it is estimated that only 9 percent of commuting travel and 3 percent of overall travel is by transit. Thus, transit receives up to 15 times the share of funding that it represents of travel (Figure 1).

Where Transit Works and Why. In light of the preference that public policy has established for transit investments, it is appropriate to review what transit's strengths and weaknesses.

Transit's Strength #1: Work Trip Access to Large Downtown Areas. Transit's principal strength is moving commuters to the largest downtown areas, where transit services and employment are concentrated. In 2000, nearly 40 percent of the nation's transit commuters traveled to the 13 largest downtown areas.[13] These transit commuters represented barely two percent of the nation's commuters. Their geographic concentration is illustrated by the fact that the land area of these downtown areas, combined, is less than 1.5 times that of the city of Frederick.

Based upon work location:

Baltimore Metropolitan Area. In the Baltimore metropolitan area 5.5 percent of commuters used transit for the work trip in 2008. The highest transit share was in the city of Baltimore, at 13.0 percent. In Baltimore County, 4.2 percent of commuters used transit for the work trip. In the rest of the Baltimore metropolitan area 1.4 percent of commuters used transit (Figure 2).[14] In 2000, approximately 20 percent of commuters to downtown Baltimore used transit for the work trip.[15]

Approximately 68 percent of transit commuters in the metropolitan area work in Baltimore City. The core geographical strength of transit is illustrated by the fact that the city represents only 29 percent of the employment in the metropolitan area. Baltimore County accounts for 21 percent of transit commuter destinations, while accounting for 28 percent of metropolitan employment. The balance of the metropolitan area accounts for 11 percent of the destination transit commuters, however has the largest share of employment at 43 percent (Figure 3).[16]

The tallest office towers in the metropolitan area are in downtown Baltimore, which like other downtown areas, tends to be perceived as having most of the employment. However, downtown employment in Baltimore and elsewhere tends

FIGURE 2[17] TRANSIT MARKET SHARE BY WORK LOCATION
Baltimore Metropolitan Area: 2008

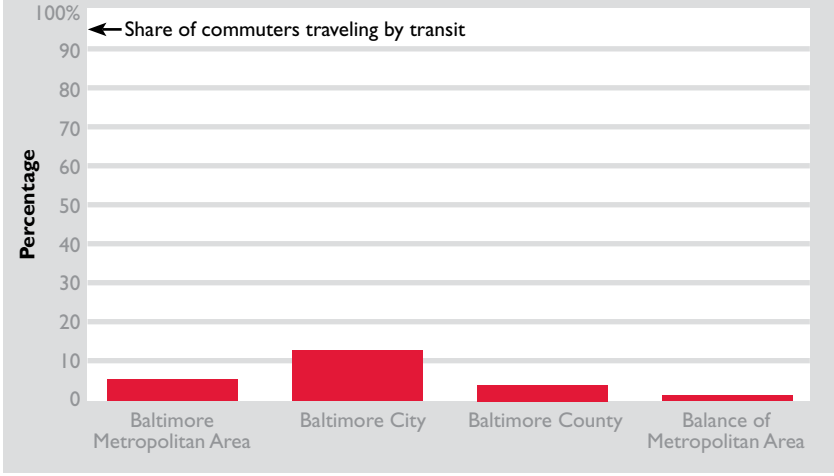
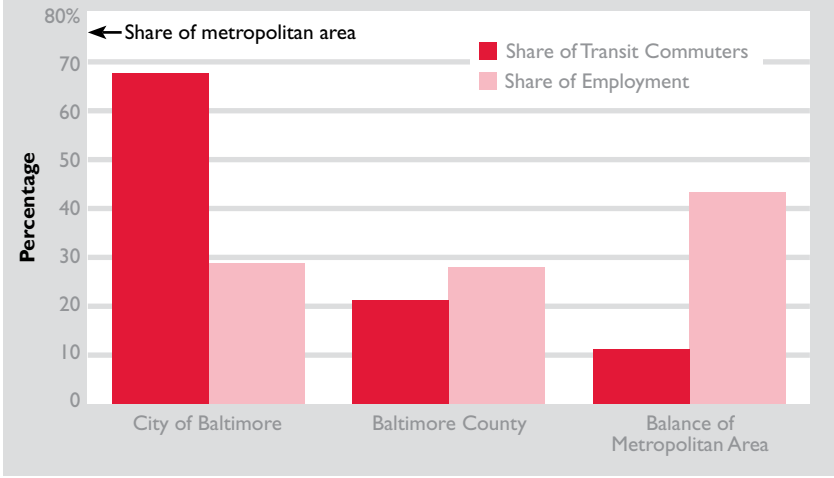


FIGURE 3[18] EMPLOYMENT AND TRANSIT COMMUTING
Baltimore Metropolitan Area: 2008



to be far smaller than is often perceived. For example, in 2000, the Manhattan business district (the second largest in the world) account for only one-fifth of the employment in the New York urban area.[19]

In 2000, downtown Baltimore had approximately 100,000 jobs in approximately one square mile, for a job density of approximately 100,000 per square mile. However, this represented only 10 percent of the jobs in the urban area. There

were nearly 900,000 jobs in the urban area outside of downtown, in an area of 680 square miles. The employment density outside downtown was approximately 1,300 jobs per square mile, or about 80 times less than the density of downtown.

Washington Metropolitan Area. In the Maryland portion of the Washington metropolitan area more than 15 percent of commuters used transit for the work trip in 2008, with the largest share traveling to the District of Columbia. Transit's share of commuting to jobs in Montgomery County was 9.7 percent, and 6.2 percent in Prince George's County. In the balance of the Maryland portion of the metropolitan area, 1.4 percent of commuters used transit.[20] By comparison, transit carried 35.5 percent of commuters to jobs in Washington, illustrating transit's association with the large downtown employment center (the third largest downtown in the nation[21]) there.

Transit's Strength #2: Mobility for Low-Income Households. Transit's other vital service to the community is in providing mobility for lower-income citizens within central city communities and to employment.

Transit's Principal Weakness: Limited Access. There are, however, serious limitations to transit's ability to provide service to the great majority of jobs outside downtown areas, both because transit service tends to be slower than driving and because many jobs cannot be reached by transit. Transit commuters to suburban locations tend to have lower than average incomes. For example, transit commuters to Baltimore County locations have incomes less than one-half that of average for the Baltimore metropolitan area. Transit commuters to Montgomery County employment locations have incomes one-third below the Washington metropolitan area average, while transit commuters to Prince George's County work locations have average incomes little more than one-third that of the Washington metropolitan area average. Further, transit commuters, even to downtown locations, tend to not have cars to a far greater degree than people who commute by other means, further illustrating the connection between lower-income and transit commuting (Figure 4).

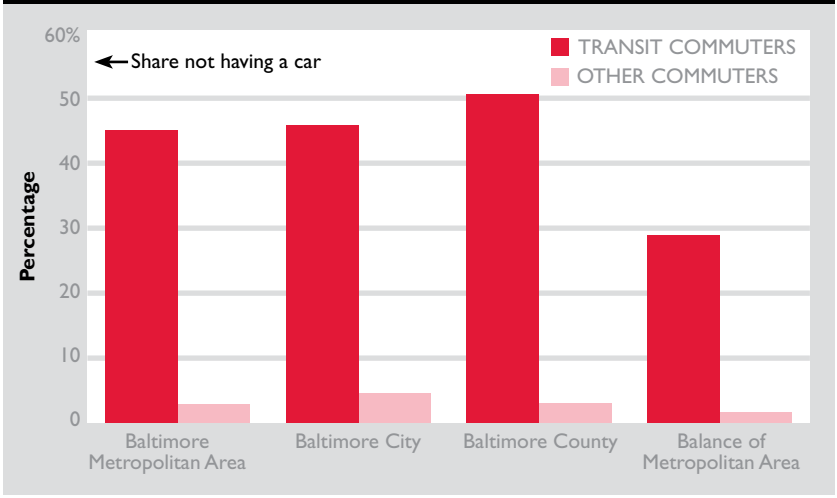
The Baltimore and Washington situations illustrate the fact that transit has little potential to provide mobility to job locations outside the largest downtown areas.

MOBILITY, COMPETITIVENESS, AND POVERTY MINIMIZATION

Mobility, the ability to efficiently move within an area, is crucial for economic growth, job creation and the reduction of poverty. Efficient mobility is important, not only for people but also for freight movement. This is illustrated by the research summarized below.

Urban areas in which more people can reach an area's jobs in a certain amount of time (such as 30 minutes) tend to be more productive. Research at the University

FIGURE 4[22] COMMUTERS AND ACCESS TO CARS
Share with No Car by Mode of Travel: 2008



of Paris indicates that each 10 percent increase in employment accessibility (the number of jobs that can be reached by employees in a fixed time) increases metropolitan productivity by 1.3 percent.[23]

A Reason Foundation study by David Hartgen and M. Gregory Fields looked at job accessibility in eight U.S. urban areas: Atlanta, Charlotte, Dallas, Denver, Detroit, Salt Lake City, San Francisco, and Seattle.[24] Hartgen and Fields chose a 25-minute commute period (the approximate national average one-way work trip) to evaluate accessibility and found, generally, that each 10 percent increase in the number of jobs made accessible within a 25-minute one-way commute resulted in a 1 percent increase in productivity as measured by the gross domestic product (GDP) of the urban area. They also found that if free-flow traffic conditions could be established, considerable improvements in urban productivity would be achieved because employees could reach more jobs in less time. At the same time, they showed that traffic congestion will worsen considerably by 2030 under present plans as adopted by metropolitan planning organizations. Hartgen and Lee also noted that areas outside downtowns are becoming more important in regional economies:

> *Contrary to conventional planning wisdom, the research suggests that regional economies might be more dependent on access to major suburbs, malls and universities than on access to downtowns or airports. Not only are models of productivity somewhat stronger for these sites than for CBD [central business district] accessibility, but access to them has a stronger effect on regional productivity.*[25]

Our own international econometric research of approximately 100 international urban areas yielded parallel findings, associating daily personal vehicle travel

with higher economic productivity. Among the factors considered, only "rule of law" exhibited a stronger association.[26]

Alleviating Poverty. The loss of productivity from relying on transit can be even greater than longer travel times for the employed. Drivers can commute by car from their homes in literally any location in a metropolitan area to jobs in any other location. Transit service, however, is much more limited. Large numbers of jobs may simply not be reached by transit or may require long travel times that are impractical.

For example, a Federal Transit Administration study found that few low-income central-city residents in Boston could reach high-growth suburban employment areas within one hour by transit, a fact that reduces regional productivity.[27] University of California research indicates far smaller unemployment rates among African-American households where there is an automobile available.[28] This is because cars shorten commute times and broaden access to jobs throughout the metropolitan area, not just to the limited areas with adequate transit service.

Other research by the Progressive Policy Institute has shown that access to cars improves minority and low-income employment and productivity, noting that "in most cases, the shortest distance between a poor person and a job is along a line driven in a car." Additionally, a Brookings Institution report concluded that, "[g]iven the strong connection between cars and employment outcomes, auto ownership programs may be one of the more promising options and one worthy of expansion."[29] This research demonstrates that in the modern urban area, transit cannot substitute for cars for a large share of trips.

This connection between employment and automobile ownership led the Clinton Administration to ease welfare-program restrictions to make it easier for recipients to own a car. In announcing the new policy, the White House stated that:

> *Even in metropolitan areas with extensive transit systems, studies have shown that less than half the entry level jobs are accessible by transit. One national study found that twice as many welfare recipients with cares were working than those without cars, and 25 percent more low-income families with cars were working than those without cars.*[30]

Transit could only replicate the mobility of the automobile in the modern American urban area with annual expenditures that exceed the gross income of a metropolitan area.[31] By comparison, the highway system and the automobile provide ubiquitous mobility throughout metropolitan areas.

Freight Movement. There is more to mobility than moving people. Freight and commercial traffic are integral to the operation of the economy and any constraints that interfere with the movement of people are likely to also slow freight traffic. In Maryland, nearly all freight movement and commercial within and between metropolitan areas is by roads.

The failure to provide sufficient road capacity for the efficient movement of freight led to a report in Portland, Oregon indicating a loss of regional competitiveness and the fact that businesses are being driven away by the traffic congestion.[32] Vancouver's similar anti-highway policies have led to serious concerns about future competitiveness and a prestigious business alliance has called for significant highway expansion to alleviate the extensive traffic congestion.[33]

RESOURCE ALLOCATION CASE STUDY: BALTIMORE

The Baltimore area regional transportation plan (*Transportation Outlook: 2035: Creating a Blueprint for the Baltimore Region's Future*)[34] is used as a case study for a more detailed examination of capital expenditures. The plan outlines proposed projects and expenditures through 2035. The plan provides detailed financial and travel projections for two 2035 alternatives, a baseline that would make no improvements beyond those already committed and a preferred alternative, which would spend more than $8.0 billion for highway and transit improvements (2007$). The incremental analysis below compares the higher expenditure and improved travel benefits in the preferred alternative to the baseline level.

Transportation Outlook: 2035 projects a nearly 40 percent increase in highway use by 2035 and a 20 percent increase in transit ridership. Road conditions are projected to worsen materially, with daily hours of delay rising 450 percent under the baseline and more than 250 percent under the preferred alternative, while average peak hour travel speeds are projected to fall three miles per hour from the present.

- *Transit:* Under the preferred alternative, an additional $2.25 billion would be spent. The transit expansions would increase daily ridership by 0.9 percent under the preferred alternative compared to the baseline. Over the period, the capital expenditures per new transit ride would be more than $225. The annual incremental capital expenditure would be over $100,000 for new commuter using transit for the work trip.[35]
- *Highways:* Under the preferred alternative, an additional $5.93 billion would be spent. The highway expansions would reduce daily hours of delay nearly 35 percent under the preferred alternative in 2035 compared to the baseline. Over the period, the capital expenditures per reduced hour of delay would be approximately $8. On an annual basis, this would calculate to incremental capital expenditures of less than $50 per annual commuter.[36]
- *Freight and commercial traffic:* The slower traffic and delays that is projected in *Transportation Outlook: 2035* will impose economic costs and are likely to make the metropolitan area less competitive.

Transportation Outlook: 2035 would allocate more than 25 percent of its capital funding to transit, which is approximately 10 times its proportional share of use (2.7% of trips). The incremental cost for each new transit passenger under *Trans-*

portation Outlook: 2035. This is 2,000 times that of each additional person commuting by car ($100,000 divided by $50). Given the relationship between mobility and access and the scarcity of public funding relative to potential uses, this represents a less than optimal policy trade-off.

Thus, Baltimore's regional planning agency, the Baltimore Regional Council, forecasts a continuing deterioration of personal and commercial transportation over the next quarter-century. Such forecasts are typical of large metropolitan area plans around the nation. Further, Baltimore's disproportional spending on transit is not unusual.[37]

Yet, despite this transit emphasis, virtually no progress has been made in reducing the demand for personal mobility, with generally declining transit market shares over the past quarter-century.[38] The future bodes little better, even in Portland, Oregon, which is often held up as a model of a metropolitan area that invests heavily in transit. Yet, despite this emphasis, Portland's 2004 regional transportation anticipates a 12 percent *decline* in overall job and residential access by 2020.[39] Finally, more recent national research indicates scant potential for transferring the demand for personal mobility to transit, even with large investments.[40]

Further, the incremental cost analysis, above, indicates a significant variation in capital expenditures between transit and highways. This failure to maximize the value of capital expenditures forecloses opportunities to improve Maryland's economic performance and competitiveness in the future.

REFOCUSING TRANSPORTATION DECISION-MAKING IN MARYLAND

With the continuing deterioration in traffic congestion and related productivity in Maryland, the present policy approaches might be characterized as geared toward "managing decline." There is an assumption in some quarters that progress is impossible. At the same time, statewide figures indicate that the huge investments in transit have not been accompanied by any material diversion of travel away from single-occupant automobiles.

Texas research, however, demonstrates that decline is not inevitable. The Texas Governor's Business Council (GBC) estimated that traffic congestion (measured the hours of peak period delay in urban areas)[41] would double over the next 25 years under current plans. By focusing the attention of policy on traffic congestion minimization, GBC showed that traffic congestion in the Texas urban areas could be reduced by more than one-quarter, even with the much higher than average population growth that is expected in the state.[42]

At the same time, Maryland's policy commitment to "smart growth" (compact urban development) increases the challenges of providing for improved mobility. Compact urban development concentrates traffic, which necessitates larger roadway expansions to maintain or improve travel times.

Further, the continuing growth of single-occupant automobile use guarantees that traffic volumes and traffic congestion will continue to increase strongly. The

unfortunate but indisputable fact is that large transit investments can make little or no difference in this equation, as projections in Baltimore's *Transportation Outlook: 2035* clearly indicate.

Moreover, there are strong objections to policies that provide sufficient road capacity to meet rising demand on environmental grounds. The reality is, however, that despite policies that have provided insufficient capacity improvement, the demand for automobile use, especially by single-occupant commuters, has increased. There is no reason to believe that this will change.[43]

This means that traffic congestion will continue to worsen, travel speeds will decline and there will be more "stop and go" traffic. These kinds of traffic conditions materially retard fuel efficiency and, as a result, increase emissions of greenhouse gas emissions (because fuel efficiency declines as traffic congestion increases).

There is an imperative to provide sufficient roadway capacity so that the higher automobile demand forecast in regional transportation plans can be accommodated, while minimizing environmental impacts. Finally, there are substantial improvements on the horizon in automobile technology that are projected to reduce greenhouse gas emissions at the same time that automobile demand continues its expected increases.[44]

Nonetheless, Maryland should adopt a policy focus that seeks to maximize mobility, while minimizing travel times. The starting point would be to develop urban access indicators[45] to assist in better informing future decisions. Given the strong association between mobility, economic growth and poverty alleviation, access-based performance indicators should be developed for use at the state and regional planning levels. These indicators would gage the performance of the transportation system based upon the quality of access from residences and to employment.

- *Residential Access Index:* The Residential Access Index would measure the percentage of jobs[46] in a metropolitan area that can be reached in a particular period of time during peak travel periods from residences in transportation analysis zones[47] (such as 30 minutes[48]).
- *Employment Access Index:* The Employment Access Index would measure the number and share of residences in a metropolitan area that can be reached in the same period (30 minutes) from jobs in transportation analysis zones (such as 30 minutes).

These access indicators would also make it possible to quantify freight and commercial traffic access and overall access in metropolitan areas.[49]

- *Freight Access Index:* Because road freight and commercial uses the same infrastructure as commuters and serves the same origin and destination zones, the Residential Access Index and Employment Access Index would also serve as freight access indictors.

- *Metropolitan Access Index and Sub-regional Access Index:* The Residential Access Index and the Employment Access Index would be averaged at the metropolitan and sub-regional level to produce metropolitan access indexes.

Present planning models are generally capable of producing the access indictors using their built-in (coded) transportation networks. Metropolitan and sub-regional indexes would be developed using population weighted data from the transportation analysis zone indexes. The access indictors should be published on an annual basis by the Maryland Department of Transportation and the regional planning agencies.

These urban access indicators would provide transportation and planning agencies with data that could be used to improve economic performance and reduce poverty by targeting future expenditures toward investments that maximize mobility.

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1 This report refers to metropolitan areas and urban areas. While the two terms are similar, there are important differences. An urban area is an urban footprint, the area of continuous urbanization. It is not constrained by any political boundaries. A metropolitan area is always larger than an urban area and represents the labor market of any urban area, including rural areas. In the United States outside New England, metropolitan areas are defined by counties or county equivalent jurisdictions. For example, the Baltimore metropolitan area includes Anne Arundel County, Baltimore City, Baltimore County, Carroll County, Harford County, Howard County and Queen Anne's County. For most urban analysis purpose, urban area is the preferred geography. However, urban area data is not available for some issues and years, which necessitates the use of metropolitan area data in some cases.

2 All data from or derived from the United States Bureau of the Census (2009).

3 They are not, however, considered a combined urban area.

4 "High Income World Metropolitan Areas: Core and Suburban Population Trends," 2004, Demographia, http://demographia.com/db-highmetro.htm.

5 "Maryland's Net Outmigration Slows in 2008," Maryland State Data Center, http://www.mdp.state.md.us/msdc/IRSMigr/st_to_st_07_08.pdf

6 "Planning for BRAC: Status, Background and Next Steps," Maryland Department of Planning, 2007, http://www.mdp.state.md.us/PDF/OurWork/BRAC/Planning_for_BRAC.pdf

7 Calculated from data in "Highway Statistics," Federal Highway Administration, http://www.fhwa.dot.gov/policy/ohpi/hss/hsspubs.cfm.

8 Urban area data from Texas Transportation Institute's *Annual Mobility Reports*.

9 The term "commuter" refers to a person traveling to or from work.

10 All work trip data from the Bureau of the Census.

11 This is based upon the assumption that the overall travel share (in passenger miles) is approximately 30 percent of the commute market share. This figure is the approximate national ratio and is slightly above the Baltimore ratio (29 percent).

12 Measured by passenger miles. Estimated from US Department of Transportation Federal Highway Administration and Federal Transit Administration data. MARC commuter rail ridership allocated to the Washington metropolitan area. See: "Roadway and Transit Market Share: 2008: Largest Urban Areas in the United States with 25 Year (1983) Comparison, The Public Purpose, http://www.publicpurpose.com/ut-tr83-2008.pdf.

13 Latest data available. "United States Central Business Districts (Downtowns): 50 Largest Urban Areas: 2000 Data on Employment and Transit Work Trips," 2006, Demographia, http://demographia.com/db-cbd2000.pdf.

14 All data calculated from American Community Survey, 2008 (United States Bureau of the Census)

15 http://demographia.com/db-cbd2000.pdf, above.

16 Calculated from American Community Survey, 2008.

17 Calculated from U.S. Bureau of the Census data.

18 Calculated from US Bureau of the Census data.

19 http://demographia.com/db-cbd2000.pdf, above.

20 Calculated from American Community Survey, 2008.

21 http://demographia.com/db-cbd2000.pdf, above.

22 Calculated from U.S. Bureau of the Census data.

23 Rémy Prud'homme and Chang-Woon Lee, "Size, Sprawl, Speed and the Efficiency of Cities," Observatoire de l'Économie et des Institutions Locals, July 1998, revised November 1998, at http://www.rprudhomme.com/resources/Prud$27homme+$26+Lee+1999.pdf.

24 David T. Hartgen and M. Gregory Fields, "Gridlock and Growth: The Effect of Traffic Congestion on Regional Economic Performance," Reason Foundation *Policy Study* No. 371, August 2009, at http://reason.org/news/show/gridlock-and-growth-the-effect.

25 Ibid., p. 6.

26 Wendell Cox, "Public Transport Performance Indicators: Implications for Emerging Urban Areas," presentation to the CODATU X Congress, Bucharest, Romania, http://www.publicpurpose.com/c11-icators.pdf.

27 Annalynn Lacombe, *Welfare Reform and Access to Jobs in Boston*, prepared for the U.S. Department of Transportation, Bureau of Transportation Statistics, January 1998, at http://www.bts.gov/publications/welfare_reform_and_access_to_jobs_in_boston/pdf/entire.pdf .

28 Steven Raphael and Michael Stoll, "Can Boosting Minority Car-Ownership Rates Narrow Inter-Racial Employment Gaps?" National Science Foundation, June 2000, at http://www.russellsage.org/publications/workingpapers/Can%20Boosting%20Minority%20Car-Ownership%20Rates%20Narrow%20Inter-Racial%20Employment%20Gaps/document .

29 Evelyn Blumenberg and Margy Waller, "The Long Journey to Work: A Federal Transportation Policy for Working Families," Brookings Institution, Center for Urban and Metropolitan Policy, July 2003, p. 2.

30 Press release, "President Clinton Announces Transportation Grants to Help Low-Income Families," The White House, October 16, 2000, at http://clinton5.nara.gov/WH/new/html/Mon_Oct_16_130120_2000.html.

31 Wendell Cox, "The Illusion of Transit Choice," Veritas, http://www.publicpurpose.com/illusion.pdf.

32 *Economic Impact Analysis of Investment in a Major Commercial Transportation System for the Greater Vancouver Region*, Delcan and Economic Development Research Group, July 2003, http://www.gvgc.org/pdfs/SW1040_FinalReport_Revised2.pdf.

33 Economic Development Research Group, *The Cost of Congestion to the Economy of the Portland Region,* December 5, 2005: http://www.metro-region.org/library_docs/trans/coc_exec_summary_final_4pg.pdf.

34 *Transportation Outlook: 2035: Creating a Blueprint for the Baltimore Region's Future*, 2007, Baltimore Metropolitan Council, http://www.baltometro.org/downloadables/Outlook2035/TO2035_Final_All.pdf.

35 Assumes transit ridership growth at a constant rate over the period. Assumes 450 one-way commute trips annually.

36 Assumes the hours of delay are reduced at a constant rate over the period. Total highway capital expenditures are divided by the total hours of delay reduced. Commuter estimate assumes that 60 percent of peak period delays are experienced by people traveling to and from work.

37 See, for example, "Regional Plan Spending Compared to Transit and Highway Market Shares," 2007, The Public Purpose, http://www.publicpurpose.com/ut-rplantransit.pdf.

38 http://www.publicpurpose.com/ut-tr83-2008.pdf, above.

39 Calculated from data in Metro, 2004 RTP, http://library.oregonmetro.gov/files/2004rtp_chapter2.pdf.

40 Summarized in The Lieberman–Kerry Cap and Trade Bill: Making Housing Less Affordable, by Wendell Cox and Ronald Utt, Ph.D., Backgrounder #2470, October 4, 2010

41 As measured by the Travel Time Index (Texas Transportation Institute), which estimates the total delay time relative to peak hour travel times that would occur if there were no traffic congestion.

42 David Ellis, Tim Lomax, Alan E. Pisarski, Wendell Cox and Jennifer McEwan, *Shaping the Competitive Advantages of Texas Metropolitan Areas: The Role of Transportation, Housing and Aesthetics*, Governor's Business Council, 2006, http://www.texasgbc.org/Trans%20Report%20Docs/Shaping%20the%20Competitive%20Advantage.pdf.

43 Sometimes the view is expressed that if traffic congestion becomes bad enough, people will transfer to transit, bicycles or walking. The reality, however, is that traffic can become far worse than it is now, a situation that can be observed in large urban areas around the world. People do not switch to other modes of travel simply because it is not possible to reach their destinations as quickly and reaching them may not be possible at all by transit.

44 Wendell Cox, *Washington's War on Cars and the Suburbs: Secretary LaHood's False Claims on Roads and Transit*, Table 3, Heritage Foundation, 2010, http://www.heritage.org/Research/Reports/2010/06/Washingtons-War-on-Cars-and-the-Suburbs-Secretary-LaHoods-False-Claims-on-Roads-and-Transit.

45 Described in greater detail at http://www.publicpurpose.com/ut-accessindicators.pdf (above).

46 The focus on peak period commuting (employment trips) is appropriate because the concentration of such trips during peak travel hours raises travel demand to levels well above non-peak periods. As a result, commuting trips are the proximate cause of most traffic congestion in metropolitan areas. This is despite the fact that in many corridors, commuting trips may not be a majority of travel. Based on the present distribution of trips and traffic congestion, the focus on commuting trips would improve mobility for all other trip purposes.

47 A metropolitan area may have more than 1,000 transportation analysis zones.

48 The suggested standard travel time is 30 minutes, slightly more than the current average national work trip travel time of 25 minutes.

49 It would be necessary to develop access indicators for the Maryland counties in the Washington metropolitan area with respect to all transportation analysis zones in the metropolitan area.