VIII. PROJECTED EFFECTS OF THE 2001 BRTP

Support of Regional Transportation Goals

Regional Process Goal

The full spectrum of projects in the 2001 BRTP investment package were derived and developed through a coordinated regional process. This process involved cooperative transportation planning programs and coordinated modeling activities among the region's jurisdictions and State agencies.

Physical Form/Land Use Goal

The current land use and demographic makeup of the region makes it imperative that a major share of available resources be directed to maximizing the effectiveness of current highway and fixed-guideway transit alignments. As the majority of development required for the Preferred Alternative projects takes place in existing transportation corridors, the projects meet the criteria established in the 2001 BRTP's land use and accessibility goals.

An additional benefit of directing the majority of construction projects to designated growth and redevelopment areas is the preservation of open space. In the recent past, large amounts of new development have reduced the region's stock of forest and agricultural land. The preservation of existing community identity is also enhanced by directing projects to currently-developed corridors.

Accessibility Goal

The Preferred Alternative projects will maintain and enhance access to freight movement and major retail areas throughout the region. As there are many instances where increased system connectivity results from these projects, the overall accessibility of the system is improved for commuter, recreational and business trips.

Economic Development Goal

Many businesses, and some entire industries, stake their futures on efficient, reliable movement of raw materials and finished products. Many companies have found that being competitive in the highly volatile markets of the 1990s, means carrying low stocks of material, and relying on "just-in-time" delivery. In this situation, the efficiency of the transportation system can be the key to success or failure.

Average trip times remain essentially the same as in 1996, no small feat when considering the additional Vehicle Miles of Travel (VMT) the transportation system will see in 2025.

Enhancing access to the region's major tourist attractions and recreational destinations will have positive effects on the region's economy, as well.

Environmental Quality Goal

The projects in the Preferred Alternative have been designed with the purpose of attaining National Ambient Air Quality Standards (NAAQS). The improved air quality figures should keep further government sanctions from being applied to the region.

The 2001 BRTP also promotes the preservation of natural resources, and is dedicated to complying with the provisions of existing environmental protection mandates.

System Performance

PERFORMANCE MEASURES

Travel Model Results

The Preferred Alternative includes previously identified projects and programs for which reasonably available funding has been determined. Table VIII-1 shows the A.M. peak performance measures and Table VIII-2 shows the 24-hour weekday performance measures for the 2025 Preferred Alternative with comparisons to 1996 and the 2025 Existing & Committed (E&C), or programmed networks.

In comparing the 2025 E&C with the 2025 Preferred Alternative, the following are assumed:

- Both alternatives use Round 5-C socio-economic forecasts for the year 2025.
- The additional capacity expansion projects and other associated improvements, covered under surface funding to create the Preferred Alternative, cost $5.5 billion.

The performance measures used to evaluate the Preferred Alternative were developed using travel demand model output. Those highways where congestion existed for more than one hour have been mapped and displayed in Figure VIII-1.

Referring to Tables VIII-1 & VIII-2, some observations about the preferred alternative can be concluded.

- The Preferred Alternative keeps total vehicle miles traveled (VMT) for all roadways about the same as the E&C alternative while decreasing VMT occurring under congested conditions by 12 percent for the A.M. peak and 11 percent for the day.
- For freeways, total VMT increases slightly while VMT occurring under congested conditions decreases by seven percent for both the A.M. peak and for the entire day.
- Transit ridership increases 47 percent for the day, while transit's mode share of work trips increases by 50 percent.
- Vehicle and person hours of delay both decrease by about five percent due to shorter trip lengths and less congested VMT.
- Average trip length for both vehicles and persons decreases slightly.
- Average speed increased by about four percent due to less traffic congestion.
- Nitrogen oxide (NOx) emissions and volatile organic compound (VOC) emissions increase slightly because of the increase in average speeds.

Multi-modal Implications

The Preferred Alternative provides for a wide range of modal selections. It is important to provide

Figure VIII-1

and all figures/maps in this document are available on the BMC webpage, http://www.baltometro.org/mambo/content/view/399/322/.

multi-modal connectivity throughout the region. The following are observations addressing multi-modal integration within the Preferred Alternative:

- Traditional radial transit routes will be augmented with suburb-to-suburb transit routes between major activity centers that reflect current and projected travel patterns.
- "Access to Jobs" initiatives are supported with improvements to MARC service from Baltimore City to Harford County.
- Improvements at the Port of Baltimore and the addition of several interchanges, as well as major road improvements, serve to improve freight movement in the region.
- Bicycle and pedestrian projects are now serving both commuting and utility trip purposes rather than simply recreational trips.
- Several of the bicycle and pedestrian projects create linkages between facilities and across jurisdictional boundaries, creating connectivity for these trips. Some of these projects link to transit facilities providing intermodal connections as well.
- Improvements to the Central Light Rail line such as double-tracking will increase safety and improve travel time in the north-south corridor.
- Proposed extensions of the light rail will provide improved access to downtown Baltimore and access to City residents to employment sites.
- Highway improvements and improved transit service when combined, serve to reduce travel time and increase speeds for autos and trucks.
- The further integration of ITS technologies and the start-up of an Advanced Traveler Information System allows more efficient use of the transportation system and provides travelers with better information to enable them to make informed decisions about mode choice and route selection.

Inter-regional Implications

The 2025 forecast indicates that more Baltimore region Home Based Work (HBW) trips are designated to Washington region jobs and more labor force is being imported from regions other than Washington to fill jobs in Baltimore. Identification of mobility problems is a first step toward improving the region's transportation system to accommodate travel needs today and in the future. The following are observations are observations on the mobile nature of commuters.

- Person HBW trips from 1990 to 2025 traveling from the Baltimore region to the Washington region show an increase from 168,000 to 195,000 trips.
- In 2025, 107,000 or 64 percent, of the HBW trips from the Baltimore region to the Washington region originate in Howard or Anne Arundel counties.
- There is a 63 percent increase in the number of HBW commuters traveling from Washington to Baltimore. By 2025, this number increases from 87,000 to 141,000, an increase of 54,000 trips.
- Trips to the Baltimore region from external areas other than the Washington region increase by 14,000 HBW trips, to a 2025 total of 29,000. While numbers are not large, this does represent over a doubling in the number of trips.

Table VIII-1 Regional A.M. Peak Measures

Indicator of Transportation Demand	1996	2025 Existing & Committed	2025 Preferred Alternative
Vehicle Miles of Travel (VMT)			
Freeways	10,534,000	13,200,000	14,001,000
Arterials	6,755,000	8,632,000	8,218,000
Collector and Local Roads	1,571,000	2,345,000	2,161,000
All Roads	18,860,000	24,177,000	24,380,000
Congested VMT (LOS E&F)			
Freeways	4,653,000	7,922,000	7,355,000
Arterials	749,000	2,066,000	1,501,000
Collector and Local Roads	125,000	396,000	273,000
All Roads	5,527,000	10,384,000	9,129,000
Percentage of Congested VMT (LOS E&F)			
Freeways	44.2%	60.0%	52.5%
Arterials	11.1%	23.9%	18.3%
Collector and Local Roads	8.0%	16.9%	12.6%
All Roads	29.3%	42.9%	37.4%
Travel Characteristics			
Average Vehicle Person Trip Length (in minutes)			
Work (HBW)	27.0	27.8	26.7
Non-Work (Non-HBW)	12.4	13.3	13.1
SOV	18.8	19.9	19.2
HOV	15.4	15.9	15.4
All Trips	18.0	19.0	18.4
Performance			
Vehicle Hours of Delay	54,600	111,200	100,800
Annual Cost of Person Hours of Delay (1996 $)	238,820,000	486,389,000	440,899,000
Congested Speed (mph)			
Freeways	43.2	39.3	40.7
Arterials	34.0	32.9	33.7
Collector and Local Roads	30.7	26.9	27.4
All Roads	38.2	35.3	36.6
Fiscal Reasonableness			
Projected Capital Cost (in billions of 2001 dollars)	-	-	5.4

Table VIII-2 Regional 24-Hour Measures

Indicator of Transportation Demand	1996	2025 Existing & Committed	2025 Preferred Alternative
Vehicle Miles of Travel (VMT)			
Freeways	35,456,000	46,585,000	48,856,000
Arterials	22,110,000	27,653,000	26,737,000
Collector and Local Roads	5,274,000	7,664,000	7,215,000
All Roads	62,840,000	81,902,000	82,808,000
Congested VMT (LOS E&F)			
Freeways	8,618,000	16,082,000	14,961,000
Arterials	1,253,000	3,384,000	2,451,000
Collector and Local Roads	245,000	661,000	533,000
All Roads	10,116,000	20,127,000	17,945,000
Percentage of Congested VMT (LOS E&F)			
Freeways	19.3%	34.5%	28.2%
Arterials	5.1%	12.1%	9.1%
Collector and Local Roads	0.0%	0.1%	0.1%
All Roads	12.8%	24.6%	20.2%
Total Transit Ridership	206,200	223,600	329,800
Travel Characteristics			
Automobile Occupancy			
Work Trips	1.11	1.09	1.10
Non-Work Trips	1.41	1.39	1.39
All Trips	1.33	1.31	1.31
Transit Mode Share	2.8%	2.6%	3.9%
Performance			
Vehicle Hours of Delay	91,400	192,200	182,200
Annual Cost of Person Hours of Delay (1996 $)	399,784,000	840,683,000	796,943,000
Air Quality Conformity			
NOx (tons/day)	112.60	58.32	61.05
VOC (tons/day)	54.00	39.11	39.34
NOx Budget (tons/day)	-	96.9	96.9
VOC Budget (tons/day)	-	45.5	45.5
Fiscal Reasonableness			
Projected Capital Cost (in billions of 2001 dollars)	-	-	5.4

ENVIRONMENTAL JUSTICE

Environmental justice (EJ) includes consideration of whether low-income and minority populations bear disproportionate impacts resulting from governmental decisions. Historically, EJ was borne out of civil rights and environmental complaints from low-income and minority communities. Concerns were raised, claiming that these communities suffered disproportionately from exposure to toxic chemicals and the siting of industrial plants and waste facilities.

In 1994, Presidential Executive Order 12898 directed federal agencies to make EJ part of their mission by identifying and addressing the effects of all programs, policies, and activities on "minority populations and low-income populations." In 1997, the U.S. Department of Transportation (DOT) issued, "Order to Address Environmental Justice in Minority Populations and Low-income Populations."

The Order directs consideration of the following two groups: A person whose household income is at or below the U.S. Department of Health and Human Services poverty guidelines is considered low-income. A person belonging to the following groups are part of minority populations:

- Person of origin in any of the black racial groups of Africa
- Person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin
- Person of origin in the Far East, Southeast Asia, Indian subcontinent, or Pacific Islands
- Person of origin of the original people of North America (American Indian, Alaskan Native)

The DOT Order applies to all policies, programs and other activities undertaken, funded or approved by the DOT, including metropolitan planning. The three fundamental DOT environmental justice principles are as follows.

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations

Metropolitan Planning Organizations (MPOs) are responsible for assessing the benefits and burdens of transportation system investments for different socio-economic groups. This includes a data collection effort, and developing a process to engage minority, low-income, and disability populations in public involvement activities.

Baltimore Regional Transportation Board Process

In response to these guidelines, the Baltimore Regional Transportation Board (BRTB) hired a consultant to prepare background and state-of-the-practice information. The consultant report, prepared in September 1999, provided background information on the broad topic of equity and specific recommendations on how the BRTB could approach matters of equity in the metropolitan Baltimore transportation planning process.

The consultant concluded that the BRTB "…should explicitly address issues of equity. EJ issues have so far been addressed in transportation planning primarily in the context of individual projects, such as new highways and major highway and transit improvements. Practitioners are coming to recognize, however, that the issue of equity in specific projects are rooted in the plans and programs that give rise to these projects. The ability of agencies and community groups to gather and analyze data using geographic information systems (GIS) and new approaches to transportation demand models enables them to pay attention to equity issues at the planning and policy levels." The consultant acknowledged that equity analysis will encompass the more specific issues of EJ and enhance public involvement.

The BRTB subsequently created an Equity Subcommittee in January 2000. Subcommittee members were invited from community-based groups, including the Baltimore Urban League, Baltimoreans United In Leadership Development (BUILD), Centro de la Comunidad, Citizens Advisory Committee, Citizens Planning and Housing Association, Conference of Minority Transportation Officials, Empower Baltimore Management Corporation, and Environmental Defense. Two BRTB members actively represented the MPO. MDOT, SHA, and MTA were also invited to participate.

In light of the issues of improved public involvement and new data collection and analyses, the Subcommittee formed two workgroups on public involvement and data which meet regularly. The full Equity Subcommittee met monthly.

The Subcommittee's recommendations were presented to the BRTB in February 2001 and fall under three categories: continued Subcommittee involvement, improved education and outreach, and new data activities. The Subcommittee recognized the evolutionary nature of improving public involvement and data analyses and that changes will not happen overnight.

Data Analysis for the 2001 BRTP

A regional accessibility analysis has been undertaken to measure the region's ability to improve access to jobs and other locations. When a project is ready to move into the planning phase and then onto construction, specific project-level EJ analyses are conducted by the appropriate state agency at the beginning of the project planning phase. This phase also includes public participation.

This regional analysis considers race and income when comparing projects included in the 2001 BRTP against the current programmed transportation system. The BRTB concludes that the package of projects in the 2001 BRTP do not serve disproportionately negatively impact low-income and minority populations. However, there are still many low-wage jobs inaccessible by transit within one hour.

Demographics — Based on 1990 Census data, Figures VIII-2 through VIII-5 show the distribution of racial and ethnic persons in the region while Figure VIII-6 shows the income demographic in the region.

Figure VIII-2

and all figures/maps in this document are available on the BMC webpage, http://www.baltometro.org/mambo/content/view/399/322/.

Figure VIII-3

and all figures/maps in this document are available on the BMC webpage, http://www.baltometro.org/mambo/content/view/399/322/.

Figure VIII-4

and all figures/maps in this document are available on the BMC webpage, http://www.baltometro.org/mambo/content/view/399/322/.

Figure VIII-5

and all figures/maps in this document are available on the BMC webpage, http://www.baltometro.org/mambo/content/view/399/322/.

Figure VIII-6

and all figures/maps in this document are available on the BMC webpage, http://www.baltometro.org/mambo/content/view/399/322/.

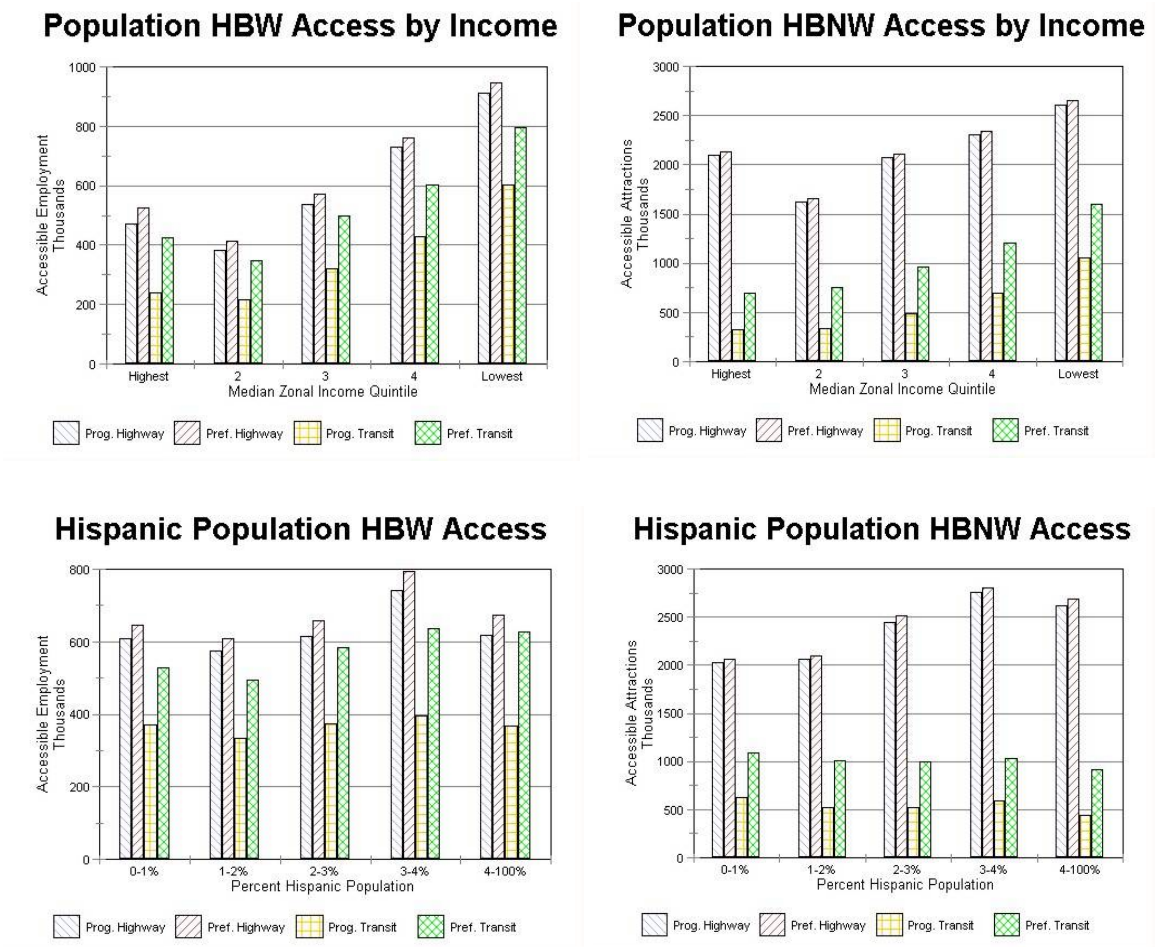
Accessibility Analysis Charts

Figure VIII-7 below displays various characteristics of the accessibility analysis conducted. Auto trips were reviewed for their accessibility/reach within 30 minutes of travel time. Transit trips were reviewed for their accessibility/reach within 60 minutes of travel time.

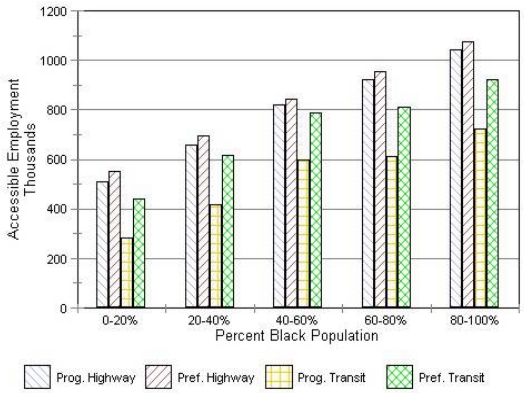
The analysis compared projects already programmed through 2006 to proposed projects in the 2001 BRTP (Preferred Alternative). Accessibility to jobs is shown as home-based work trips (HBW). Accessibility to other locations, such as schools and hospitals, is shown as home-based non-work trips (HBNW).

The 2001 BRTP has few new roads, but a number of roadway widenings. Therefore, there is little increase in accessibility between the programmed and Preferred Alternative highway network. The 2001 BRTP does include new transit lines and new and more frequent bus service. Therefore, there are greater changes from the programmed to the Preferred Alternative transit network. With the Preferred Alternative, transit HBW access comes much closer to highway access.

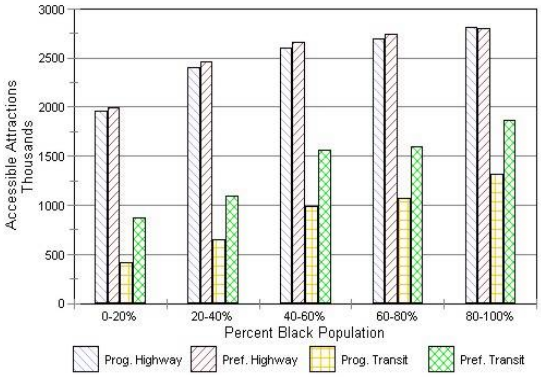
Figure VIII-7 Accessibility Analysis Charts



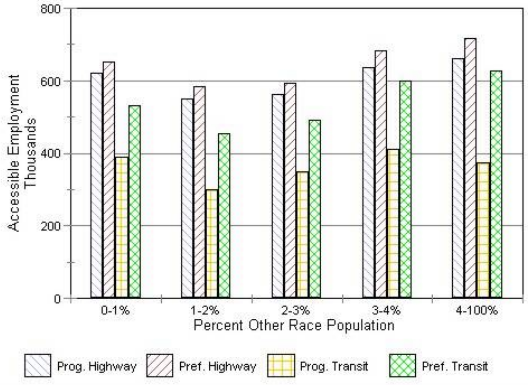
Black Population HBW Access



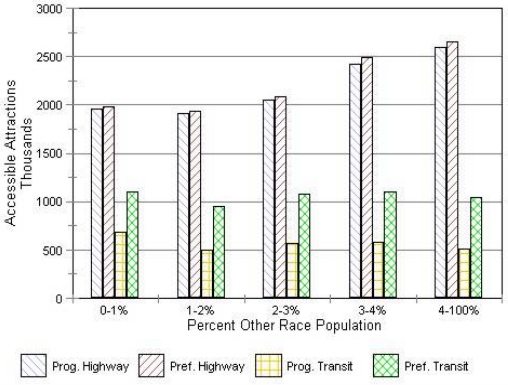
Black Population HBNW Access



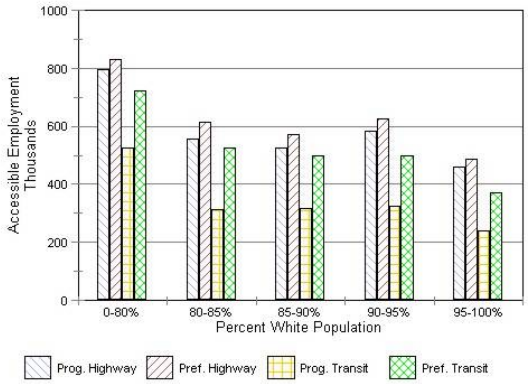
Other Race Population HBW Access



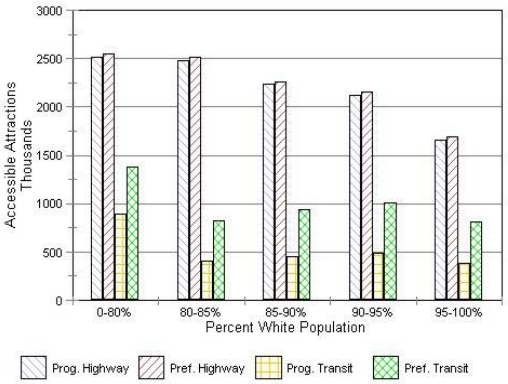
Other Race Population HBNW Access



White Population HBW Access



White Population HBNW Access



Examples of the Accessibility Analysis — Figures VIII-8 through VIII-13 highlight three locations in the region as examples of how the overall accessibility analysis works. Two maps are shown for each of the three locations. The first map illustrates the distance a person can travel by transit based on the programmed projects in increments of 60, 90, and 90+ minutes of travel time. The second map illustrates the same analysis based on the projects in the Preferred Alternative. Highway access is not included, because it does not change appreciably between the programmed and Preferred Alternative scenarios. In the case of transit travel, however, the Preferred Alternative does have measurable effects in decreasing a person's travel time.

The three locations include: Zone 100 in Northwest Baltimore City, Zone 310 in Western Anne Arundel County, and Zone 691 in Eastern Baltimore County. Table VIII-3 below shows the demographics of the selected locations.

Table VIII-3 Demographics of Selected Zones

Zone	% Black	% Hispanic	% Other	% White	Median Household Income (1993 $)
100	98.2	0.0	0.9	1.1	11,344
310	13.7	12.3	4.9	81.4	53,818
691	17.6	0.0	2.0	80.4	12,589
Regionwide	26.0	1.0	2.0	72.0	36,809 (1990)

Figure VIII-8

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Figure VIII-9

and all figures/maps in this document are available on the BMC webpage, http://www.baltometro.org/mambo/content/view/399/322/.

Figure VIII-10

and all figures/maps in this document are available on the BMC webpage, http://www.baltometro.org/mambo/content/view/399/322/.

Figure VIII-11

and all figures/maps in this document are available on the BMC webpage, http://www.baltometro.org/mambo/content/view/399/322/.

Figure VIII-12

and all figures/maps in this document are available on the BMC webpage, http://www.baltometro.org/mambo/content/view/399/322/.

Figure VIII-13

and all figures/maps in this document are available on the BMC webpage, http://www.baltometro.org/mambo/content/view/399/322/.

WATER QUALITY

Water quality has become a significant factor in land development and transportation planning. Regional and interstate compacts such as the Baltimore Reservoir Watershed Management Agreement and the Chesapeake Bay Agreement 2000 are shaping policies on how and where growth will take place. Water quality issues, policies and programs are generally defined by natural drainage patterns or watersheds.

A watershed is all of the land area that drains to any body of water such as a stream, lake, river or the Chesapeake Bay. Since the arrival of the first settlers in America, land has been cleared and built upon which has affected the shape, movement, and ability of streams to support life. The most significant changes have occurred in the last 50 years with the post World War II building boom. Homes, roads, industry, and commercial areas have replaced forests and farms with surfaces that do not allow water to seep back into the ground. The result is an increase in water running off of the land into streams and carrying a variety of pollutants. Generally, the more hard surfaces, or impervious cover, in a watershed, the more degraded the streams in the watershed become. Transportation planning takes into account the proximity to sensitive aquatic systems and other natural resources. Figure VIII-14 shows the major watersheds, or basins, in the Baltimore region. These basins can be divided into smaller watersheds to evaluate impacts on local streams or reservoirs. The map has highlighted the drinking water reservoir watersheds in the region as a part of the larger basins draining to the Chesapeake Bay.

Highways and fixed guideway transit can affect water quality and aquatic habitat in a number of ways. The construction of roads and rail tracks, road maintenance practices, wear and tear on vehicles, and deposition of exhaust materials all contribute to the degradation of water quality. The following table summarizes the pollutant constituents (i.e., components) found in highway runoff and their sources.

Table VIII-4 Highway Runoff Constituents and Their Primary Sources (US EPA, 1993)

Constituent	Primary Sources
Particulates	Pavement wear, vehicles, atmosphere
Nitrogen, Phosphorous	Atmosphere, roadside fertilizer application
Lead	Tire wear, automobile exhaust
Zinc	Tire wear, motor oil, grease
Iron	Auto body rust, steel highway structures, moving engine parts
Copper	Metal plating, moving engine parts, fungicides and insecticides
Cadmium	Tire wear, roadside insecticide application
Chromium	Metal plating, moving engine parts, break lining wear
Nickel	Diesel fuel and gasoline, lubricating oil, metal plating, break lining wear, asphalt paving
Manganese	Moving engine parts
Cyanide	Anticake compound used to keep deicing salt granular
Sodium, Calcium, Chloride	Deicing salts
Sulphate	Roadway beds, fuel, deicing salts
Petroleum	Spills and leaks of motor lubricants, antifreeze and hydraulic fluids, asphalt surface leachate

Figure VIII-14

and all figures/maps in this document are available on the BMC webpage, http://www.baltometro.org/mambo/content/view/399/322/.

Some of these pollutants can come from other sources; however, highway runoff provides limited opportunities to filter pollutants before they are washed into waterways. Curbs and gutter systems can be very efficient at trapping and retaining fine particles that are deposited on road surfaces and carried away in stormwater runoff. In particular, studies conducted in California and Wisconsin have shown that cars provide a significant source of metals, especially copper and cadmium. These pollutants were not generally found in roof and lawn runoff.

Stormwater quantity can pose a threat to aquatic systems. The increase in impervious cover in a watershed decreases the amount of water that soaks into the ground and increases the amount of water that runs off the surface. Groundwater normally seeps into streams slowly through springs and wetlands to provide a consistent flow. Increased flows in streams from storms result in the widening and deepening of streams. This causes stream banks to erode more quickly. Increased sediment from the accelerated erosion deposits on the stream bottoms, which smothers aquatic insect and fish habitat. In addition, sediment and stormwater runoff carry nutrients and other pollutants to reservoirs and estuaries. These nutrient-heavy waters feed algal growth, which reduces oxygen that fish need to breathe. In addition, toxic materials are introduced to the ecosystem.

The design and placement of road crossings can inhibit fish migration by making the water too shallow for fish to swim and/or by creating barriers through which fish cannot navigate. The removal of trees for the construction of roads and crossings can eliminate shade cover, which increases water temperatures above tolerable levels for sensitive aquatic species.

Methods for Minimizing Impacts

Techniques have been developed to minimize water quality impacts that have been documented from all levels of urbanization, including highways. Assessments are conducted during different phases of highway planning, design, and maintenance. Minimizing impacts to water quality and other natural resources primarily involves the avoidance of identified resources of concern.

Road and bridge maintenance programs can be developed to minimize the level of pollutants generated during these activities. Options can range from selecting different materials to altering the timing of the maintenance activities. These options can be critical when working in and around sensitive habitats or public drinking water supply resources. For example, the selection of materials, timing and application rates for the application of deicing materials need to be carefully considered and adjusted for sensitive natural resource areas.

In addition to local planning and restoration efforts, key state and interstate programs have and are establishing habitat restoration goals and strategies affecting transportation planning and design. Three of those key programs are the Chesapeake Bay 2000 Agreement, the State Highway Administration National Pollution Discharge Elimination System (NPDES) Municipal Stormwater permit system, and Total Maximum Daily Load (TMDL) allocations.

Chesapeake Bay 2000 Agreement: This agreement, first signed in 1983, is a multi-state and federal agency cooperative effort to improve the water quality and living resources of the Chesapeake Bay. Most recently, commitments to reduce impacts to the Chesapeake Bay from transportation related sources were included in the Chesapeake Bay Agreement signed in June 2000. These commitments are as follows:

- *4.3.1: By 2002, the signatory jurisdictions will promote coordination of transportation and land use planning to encourage compact, mixed use development patterns,*

revitalization in existing communities and transportation strategies that minimize adverse effects on the Bay and its tributaries.

- *4.3.2: By 2002, each state will coordinate its transportation policies and programs to reduce the dependence on automobiles by incorporating travel alternatives such as telework, pedestrian, bicycle and transit options, as appropriate, in the design of projects so as to increase the availability of alternative modes of travel as measured by increased use of those alternatives.*
- *4.3.3 Consider the provisions of the federal transportation statutes for opportunities to purchase easements to preserve resource lands adjacent to rights of way and special efforts for stormwater management on both new and rehabilitation projects.*
- *4.3.4 Establish policies and incentives which encourage the use of clean vehicle and other transportation technologies that* reduce emissions.

Strategies to address these commitments are being developed by a recently formed Transportation Workgroup of the Chesapeake Bay Program's Land Growth and Stewardship Subcommittee (LGSS).

State Highway Administration National Pollution Discharge Elimination System (NPDES) Municipal Stormwater Permit System: The 1987 Amendments to the Clean Water Act adopted a phased approach to controlling pollutants from stormwater discharges. The Amendments established a permitting process, and developed a characterization and management program for monitoring and controlling different categories of stormwater runoff. The permitting process is administered by the US Environmental Protection Agency (EPA) through MDE. The permit governing state highway construction and maintenance activities is issued to and managed by the SHA. To comply with permit requirements, SHA must conduct public outreach, identify pollution sources and document or establish stormwater management programs.

In addition, SHA has developed a Best Management Practice (BMP) inspection and remediation program and established a monitoring program to compare local characterization results with national water quality values. SHA is required in the near term to conduct 20 structural and non-structural retrofits, which can include improving the function of stormwater management pond and restoring stream stability and habitat. They are also partnering with local governments to support restoration and retrofit projects, conduct pilot studies, and develop watershed improvement plans. The permit also requires SHA to develop better approaches to apply deicing materials to reduce contamination. The NPDES permit has provided a new focus in addressing water quality concerns from highway runoff and has provided an opportunity to partner with local governments, non-profits, and other interested groups in addressing issues of mutual concern. Stormwater NPDES permits have also been issued individually to all of the jurisdictions in the Baltimore region to address local stormwater quality concerns.

Total Maximum Daily Load Allocations: TMDL allocations is another process established in the Clean Water Act. A TMDL establishes the maximum amount of an impairing substance or stressor that a waterbody can assimilate and still meet water quality standards and allocates that load among pollution contributors. TMDLs are a tool for implementing Maryland water quality standards which have been established through State regulation for all streams in the State. They are based on the relationship between pollution sources and in-stream

A TMDL establishes the maximum amount of an impairing substance that a waterbody can assimilate and still meet water quality standards.

water quality conditions. A TMDL addresses a single pollutant or stressor for each waterbody. Non-point source controls may be established by implementing BMPs through voluntary or mandatory programs for enforcement, technical assistance, financial assistance, education, training, technology transfer, and demonstration projects.

Highway projects may be affected by TMDL's where the sources of the identified pollutant or stressor is a nonpoint source and highway construction or stormwater runoff is considered a controllable source within the watershed. The nature of any additional requirements regarding TMDL's and highway construction has yet to be determined. Maryland is in the process of establishing the TMDL's for the designated impaired water bodies. A list of those water bodies, impairing substance and the timetable for TMDL development can be found on MDE's web site www.mde.state.md.us.

Recommended Projects and Reservoir Watersheds

Figure VIII-15 shows the projects recommended in the 2001 BRTP in relation to the watersheds in the Baltimore region. The highlighted watersheds are those areas draining to drinking water reservoirs. Loch Raven, Liberty and Prettyboy Reservoirs provide water to approximately 1.8 million people in the Baltimore region. Brighton Dam and Rocky Gorge Dam are part of the Washington Metropolitan water supply system. Atkisson Reservoir supplies water to Bel Air. The recommended projects in the 2001 BRTP present a balance between water supply protection and meeting the transportation needs of the Baltimore region.

Specific methods to minimize water quality and other natural resource impacts will be addressed as alignments are set and during the design and permitting phases of the projects.

AIR QUALITY

Emissions are the chemical compounds produced by everyday human (anthropogenic) activities and nature that lead to the formation of a pollutant. For the Baltimore metropolitan area, the pollutant of concern is ground-level ozone. Ground-level ozone is formed when volatile organic compounds (VOCs) and nitrogen oxides (NOx) "bake" in hot sunlight. VOCs and NOx are described as precursor emissions because they combine in the atmosphere to form a pollutant, as opposed to being directly emitted. VOCs and NOx sources include automobiles, small gasoline powered engines, power plants and consumer products such as paints and household cleaners.

Natural (biogenic) emissions emanate from the life processes of plants and animals. Anthropogenic VOC and NOx emissions are usually classified in one of three categories: stationary, area or mobile. Stationary sources are relatively large, fixed sources of emissions such as power plants, chemical industries, and petroleum refineries. Area sources include small, stationary and non-transportation sources that may collectively contribute to air pollution. Such types include dry cleaners and bakeries. The third category is mobile sources, which include both on-road, and off-road sources. The on-road group includes cars, trucks and buses, while off-road encompasses trains, ships, boats, airplanes, lawnmowers and construction equipment.

The region's air quality on unhealthy days is a result of emissions generated in the Baltimore region from mobile, stationary, and area sources, as well as from areas down wind. Prevailing southwesterly summer time winds have a tendency to bring ozone precursors from urban areas from the south and coal generating plants in the mid-west. Regional and national organizations have been formed to address transport issues. Unabated levels of transport emissions will result in regionally funded measures to reduce the Baltimore region's emissions to acceptable ozone concentrations.

Figure VIII-15

and all figures/maps in this document are available on the BMC webpage, http://www.baltometro.org/mambo/content/view/399/322/.

An important concern in the operation of the region's transportation system is the contribution of automobiles, buses and trucks to urban air pollution. Surface transportation is a major contributor to the air pollution problem in the Baltimore region. Motor vehicles account for approximately 38 percent of daily emissions of VOCs (or hydrocarbons) and 34 percent of daily emissions are from NOx.

The 1990 CAAA and TEA-21 bring transportation and air quality planning efforts together to ensure clean and healthy air. Since the Baltimore region fails to meet the current National Ambient Air Quality Standard (NAAQS) for ground-level ozone, Maryland is required to develop a State Implementation Plan (SIP). The SIP describes how Maryland intends to meet the NAAQSs.

Within the SIP, an emissions budget is established by the MDE for each emission source. Emissions budgets are the component of the SIP that identifies the allowable emissions levels for VOCs and NOx emitted from mobile, stationary and area sources. Carbon monoxide (CO) emissions associated with the implementation scenario must also be equal to or less than the CO emissions budget established in the 1995 Maintenance Plan. The emissions levels are used for meeting emission reduction milestones, attainment or maintenance demonstrations. These budgets are used to track the contribution of each source to the overall level of emissions.

The Conformity Process - Overview

Conformity is the analytical process used to ensure that transportation activities do not interfere with meeting air quality goals. ISTEA links compliance with the conformity requirements to ensure continued Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) funding for transportation plans and programs. The SIP assigns emissions targets for each source category (i.e. stationary, area and mobile). The mobile source category emissions target is further refined into a regulatory limit on emissions. This limit is defined as the mobile sources budget. As long as emissions generated from projects in transportation plans and programs remain within the mobile source emissions budget, transportation plans conform to the SIP. Conformity between the SIP and transportation plans ensures progress towards clean air while allowing the functioning of an efficient transportation system. In essence, plans and programs conform when they stay within the SIP-adopted mobile sources budget.

Many methods are used to achieve emissions reduction targets. A few of the strategies used in Maryland include the following.

- Addressing vehicle emissions, such as instituting the use of reformulated gasoline and implementing an Inspection and Maintenance (I & M) programs, also known as the Vehicle Emissions Inspection Program (VEIP) in Maryland
- Changing travel behavior through ridesharing or transit use
- Reducing congestion through transportation investments such as signal systemization efforts

Technical Conformity Analyses

A sophisticated transportation planning computer model is applied to assess the highway travel and system speed impacts of implementing the region's transportation plan and program. Upon completion of the travel forecasting information, MDE utilized the MOBILE5b emissions computer model to estimate the emission effects of the projected transportation system usage and performance characteristics. The transportation plan and air quality analysis contain only projects that were

within the expected financial resources of the Baltimore region. Projects were staged considering the financial implications and coordinated with need due to projected changes in socio-economic data. All projects contained in the 2001 BRTP were sufficiently defined to allow for precise coding of the travel model. Analysis of the 2002 and 2005 networks were based on program projects contain in the 2002-2006 TIP. The other horizon years (2015 and 2025) contain both TIP and 2001 BRTP projects.

The 2001 BRTP's goals, objectives and projects were reviewed to ensure that the 2001 BRTP had no adverse impact on the SIP. The conformity analysis incorporated the current demographic and travel estimates and measured the transportation plan impact on VOC, NOx, and CO (carbon monoxides).

Analyses were conducted representing both wintertime and summer time conditions through modifications in MOBILE emission model assumptions and changes in the VMT seasonal adjustment. Horizon years of 2002, 2005, 2015, and 2025 representing EPA required milestone years and last year of the 2001 BRTP scenario were analyzed. The Phase II SIP (as revised in February 2000 and July 2001) contains budgets for milestone years 2002 and 2005. Conformity determination of horizon years with established budgets in the SIP is required.

Mobile source emissions for all horizon years of analysis associated with the 2001 BRTP and program implementation can be found in Table VIII-5. Across the top of the table are the milestone or horizon years. The next row lists the mobile source emission budgets for VOC, NOx, and CO for each milestone year. Under that row, the mobile source budgets that include emissions credits associated with Tier 2 standards are shown. The next row lists the network based analysis of mobile source emissions for each year associated with the implementation of the 2001 BRTP. Under that row, the Tier 2 credits are shown. Initial analysis of the network results indicates that projected mobile source emissions are below the established budgets for years 2002, 2015, and 2025.

Needed reductions in mobile source emissions from the 2001 BRTP horizon year of 2005 is expected to be mitigated with the implementation of Emission Reduction Strategies (ERS). The analysis of ERS is performed outside the traditional 4-step travel model due to the fact that the improvements are minor or cannot properly be reflected in the model. BMC staff used professionally accepted sketch planning methods to test and evaluate these projects. Projects are separated into three general categories: implemented, programmed (CMAQ/NON-CMAQ), and planned. These projects and changes in mobile emissions are added to the estimates from the network-based analysis. The estimated mobile source emissions from the implementation of implemented, programmed, and planned projects are listed on the second to the last row (Implementation Total). The final row contains a comparison of the mobile source emissions from implementation to the established budgets.

The analysis indicates that mobile source emissions associated with each horizon year are below established emission budgets in the approved attainment SIP. Based on the methodology and analysis tools, it could be reasonably expected that mobile source emissions associated with the implementation of plans and programs in the Baltimore region conform to the CAAA of 1990 and State of Maryland regulations. The 2001 BRTP does not worsen the region's air quality problem or delay the region in attaining the standard.

CLEAN AIR PARTNERS™

Voluntary Episodic Control Efforts — Clean Air Partners

Table VIII-5

and all figures/maps in this document are available on the BMC webpage, http://www.baltometro.org/mambo/content/view/399/322/.

Clean Air Partners (CAP) is a semi-independent public-private partnership working to improve air quality in the Baltimore and Washington areas. The original effort began in 1994 through a cooperative project of BMC and the Metropolitan Washington Council of Governments (MWCOG) in conjunction with the states of Maryland and Virginia and the District of Columbia.

The primary goals of CAP are to educate all sectors of the community about the health effects of ground-level ozone and to motivate individuals and organizations to take voluntary actions to reduce ozone precursor emissions. The cornerstone program has been Ozone Action Days. This program recruits local employers which, with CAP assistance, develop Ozone Action Days plans. These plans include components to educate employees and customers about ground-level ozone and alter operational activities on days when air quality is expected to be poor. In 1999 there were 11 Ozone Action Days called and in 2000 the cooler weather led to only eight Ozone Action Day alerts. Each year since 1996, over 100 companies in the Baltimore region have received Ozone Action Day alerts and notified their employees and customers about "Doing Their Share For Cleaner Air".

To complement the Ozone Action Days program and to increase overall awareness of the air pollution problem, CAP has conducted media campaigns. Over the past few summers CAP has distributed Public Service Announcements, purchased paid advertising and partnered with local radio and television stations. Campaign highlights included a $36,000 public and private sponsorship of a television campaign on WJZ-TV. Spots aired throughout the month of July. Each spot, hosted by Baltimore's own Bob Turk, talked about the problem of air pollution and the actions individuals can do to improve the air. CAP also had booths at local radio events such as at the Ravens home football games in August and the Country Fair sponsored by Radio Station WPOC in July 1998.

From the CAP effort also came the animated ozone video map. Through the tireless efforts of MDE and the American Lung Association of Maryland an animated ozone video map was aired on television Channel 13 in Baltimore and Channel 4 in Washington. This unique concept, which