Baltimore Red Line Cancellation: The Implications for Black Households

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Prepared for:

NAACP Legal Defense Fund

ECONorthwest
ECONOMICS • FINANCE • PLANNING

KOIN Center
222 SW Columbia Street
Suite 1600
Portland, OR 97201
503.222.6060

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ABOUT ECONORTHWEST

ECONorthwest was founded in 1974 and maintains offices in Portland and Eugene, Oregon, Seattle, Washington, and Boise, Idaho. ECONorthwest has completed over 3,400 project engagements, including over 100 that involved expert testimony. ECONorthwest is the largest independent economics and finance consultancy in the western states and serves national and international markets. Its staff includes experts in economics, finance, planning, mathematics, programming, and statistics.

Transportation economics and finance is one of the largest practice areas in the firm. This practice specializes in developing mathematical, statistical, and empirical models for analyzing and forecasting transportation activity, and for evaluating transportation projects and policy. Over half of the PhD economists at ECONorthwest work in this practice area. In addition, a large planning and development practice adds land use and transportation planning skills. ECONorthwest has participated in several important studies for the US DOT, including SHRP2 research efforts, and is on several teams for task-order contracts for Policy, Planning, and Operations studies from the FHWA. We also have participated in studies for the National Science Foundation's National Cooperative Highway Research Program and Transit Cooperative Research Program.

The analytical tools developed at ECONorthwest are unique and powerful, and are recognized and used widely. These include:

- Authorship of three editions of the *User and Non-User Benefit Analysis for Highways* manual for and associated computer tools for the American Association of State Highway and Transportation Officials. AASHTO vends these tools to every state in the nation.
- Authorship of a Transit Benefit-Cost Manual, for the Transit Cooperative Research Program of the National Academy of Sciences.
- Authorship of the American Planning Association (APA) manual on transportation and land-use interactions.
- Development of the Toll Optimization Model (TOM) suite of computer models to determine how to set tolls in a fair and efficient way on high-occupancy toll (HOT) lanes and new roadways. To date, TOM tools have been applied by ECONorthwest in more than 60 settings throughout the nation.
- Participation in Oregon's Transportation and Land Use Modeling Improvement Program since 1996 and development of integrated economic and travel models.
- Participation in Regional Transportation Planning efforts for several MPOs, which have included Environmental Justice components and analysis of disparate impacts.

More information about ECONorthwest can be found at *www.econw.com*.

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INTRODUCTION

The NAACP Legal Defense Fund (LDF) retained ECONorthwest and its associates to examine the implications of certain decisions regarding transportation improvement alternatives in the Baltimore, Maryland, region. Specifically, LDF is interested in the implications for Black residents of Maryland of the State's decision to not provide required State funding for the so-called Red Line, a planned east-west light rail line for Baltimore, Maryland, and instead to transfer that funding to a package of highway improvements. ECONorthwest was retained to determine the extent of racial disparity in the realization of benefits from the highway improvements versus the Red Line improvements.

Background on the Alternatives Considered

The Red Line light rail alternative had emerged as the locally preferred alternative (LPA) out of 11 service configurations under consideration in the Baltimore region in recent years. It is a variant of so-called Alternative 4C, embraced by the state's previous governor in 2009. The Federal Transit Administration approved the initiation of preliminary engineering in June 2011. The FTA estimated the Red Line to cost $2.2 billion and attract 57,000 daily riders. Subject to funding approval, Red Line construction was anticipated to begin in 2016, with completion in late 2021 or 2022.

The 14.1-mile Red Line route proposal travels East-West from Baltimore County through Baltimore City. The selected route connects important jobs centers, such as the Social Security Administration and the Center for Medicare and Medicaid, with existing mass transit corridors and Baltimore's central business district. Baltimore City currently has one subway line running North-South and it was anticipated that the proposed Red Line would significantly expand access to transit infrastructure for currently underserved communities of African-American populations in Baltimore City.

On June 25, 2015, the current Maryland Governor indicated that the State would not provide state funds for the project. It is our understanding that the cancellation of the Red Line freed up state funds that the Governor has directed primarily towards highway improvements. Shortly after the Red Line cancellation, the State announced a $2 billion highway-spending program, with $1.35 billion from new sources. We refer to this as the "Highway Alternative" to the Red Line.

The Highway Alternative is the only detailed alternative presented. The State has presented a conceptualized transit improvement plan that contemplates providing enhanced bus as well as bus rapid transit (BRT) service called Link. However, at this time, detailed characterization of the line configurations, service frequency, speeds, and fares does not exist. Moreover, it is not clear to what extent Link and the Red Line alternative were complements or substitutes, since it is our understanding that Link planning was occurring contemporaneously with Red Line planning. Therefore, there is inadequate specificity and certainty

regarding the Link proposal for ECONorthwest to evaluate its potential service consequences at this time.

As a consequence, the analysis herein considers the Red Line light rail facility and the Highway Alternative portfolio the relevant, alternative transportation innovations relevant to the concerns of the LDF. Additional detail on these two alternatives can be found in Appendix A.

Goals of the Analysis

The goal of this analysis is to determine whether the policy to de-fund of the Red Line, which would serve predominantly black neighborhoods in Baltimore, and to spend the money instead on highway improvements to serve predominantly white suburbs and rural areas, would have racially disparate impacts, taking benefits from black households and giving them to white households, in violation of Title VI of the Civil Rights Act of 1964.

In the parlance of transportation economists, and in adopted federal transportation improvement evaluation methodologies, our goal is to measure impacts via *user benefit* calculations. User benefits in the transportation context flow from savings in travel time (in various forms), fares, tolls, and operating costs.

There are now widely adopted, theoretically sound methods for calculating monetized benefits to users from changes in transportation infrastructure. These methods allow us to speak not only in terms of individual elements of user costs, such as travel times and fares, experienced by individuals, but also the impact of changes in the so-called *generalized cost* of all of these elements combined on travel behavior and user benefits.

It should be noted that in this analysis, we do not consider the capital or operating costs associated with the alternatives as those are irrelevant to assessing whether the change in policy has a disparate impact.

The user benefits analysis proceeds by comparing the flow of user benefits under alternative future scenarios. Then, the changes in user benefits are examined respectively for black, white, and other users by examining how the generalized cost of travel for those users changes under the Red Line versus Highway Alternative. We have designed our effort to provide, as needed, differential information about travel by times of day, trip purpose, and mode (auto, bus, rail, etc.) of travel.

While most states do not possess statewide travel models as detailed as Maryland's, and therefore can't conduct this kind of analysis on a statewide level, metropolitan planning organizations (MPOs) throughout the nation regularly apply regional travel models to estimate impacts on different neighborhoods and protected classes as a part of their regional transportation planning activities.

In the Methodology section, we describe the analytical methods ECONorthwest and its associates have employed to simulate the effects of the Red Line and Highway Alternative proposals, measure their respective user-benefit

consequences, and attribute race characteristics to the distribution of those user benefits.

METHODOLOGY

The methodology employs three primary modules to perform the required analysis:

1. A regional travel model
2. A race attribution model
3. A user benefit computation model

This method of applying these models is presented here.

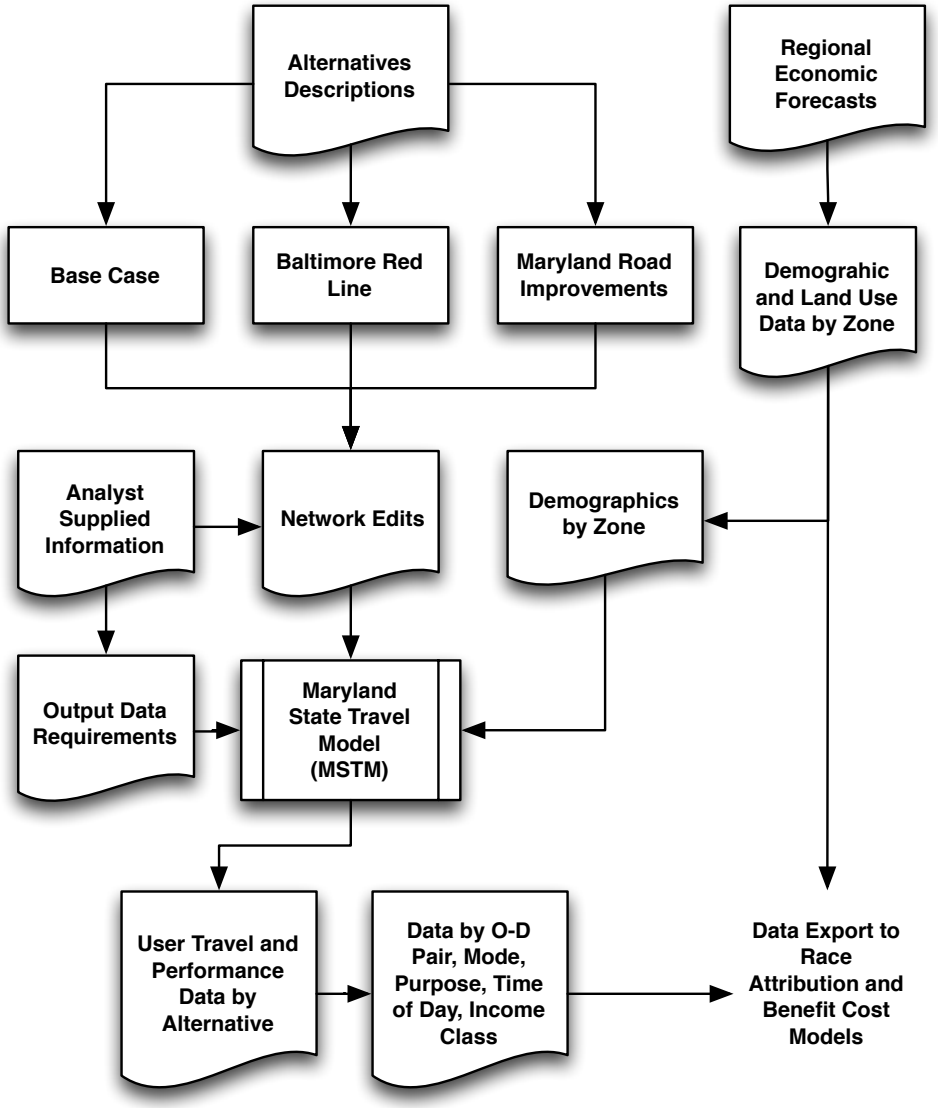
Regional Travel Model

The regional travel model is a computer-based modeling program that links demographics and network characteristics to user travel behavior and system performance. For the Baltimore region, the analytical tools available for emulating regional travel behavior are excellent. Specifically, there exists a sophisticated model of travel in the state of Maryland, called the Maryland State Travel Model (MSTM). The MSTM is an advanced trip-based model that incorporates highway and transit networks throughout the State of Maryland. It models trip generation, trip distribution, mode choice, time of day, and assignment of vehicles to network paths. A subset of this model represents the greater Baltimore region.

The Maryland State Highway Administration (MSHA) developed the MSTM with the assistance of the National Center for Smart Growth (NCSG) at the University of Maryland and Parsons Brinckerhoff to facilitate statewide transportation planning. ECONorthwest and its associates worked with the MSTM to conduct the analysis in this case. It is the primary transportation analysis tool available in the state and the only model that includes both the areas served by the Red Line and all of the proposed highway improvements.

The MSTM provides travel times, costs and numbers of trips on an origin-destination (OD) zone-pair basis. There are 1,179 model zones in the state, and over one million combinations of origin and destination zones. Within each zone, the transportation network is represented by a series of nodes, corresponding to connections in the transportation infrastructure. For instance, the intersection of two state highways would be represented by a node. Nodes are linked to form a transportation network with a representation of speed limits, link congestability, transit interconnects and wait times, etc. Figure 1 displays a highly conceptualized representation of how the MSTM was used in the analysis for LDF.

Figure 1: Data Flow to and From the Maryland State Travel Model



The MSTM permits modelers to simulate household travel demand across multiple modes of travel including:

- Automobile (drive alone and car pool)
- Bus transit (local and express; walk access and auto access)
- Rail transit (urban rail and intercity commercial rail; walk access and auto access)

As Figure 1 reveals, data representing Maryland's transportation network and zonal demographics determine the flow of traffic and ridership between zones by identifying routes that minimize travelers' cost of travel. The regional model in

Figure 1 assigns trips originating in origin zones to travel modes and routes that represent the lowest-path cost. Travel cost entails both monetary costs, such as the cost of gasoline, and various non-monetary costs, such as time spent driving in the car. Household travel demand varies with household income and household size, which are characterized by data gathered at the Census tract level.

The regional model may be operated over multiple time periods by incorporating information about demographic and population changes for Maryland communities. For instance, one model run may use 2007 demographic attributes and networks, while another uses anticipated demographics and network changes for 2030.

As Figure 1 indicates, the model produces estimates of user travel activity (trips) between every pair of origin and destination zones. The characteristics of the road network (capacity, tolls, and connectivity), transit network (frequency, fares, and connectivity), and the zones (numbers of households by size and income and employees by sector) vary by link and zone, respectively. Thus, these characteristics of the modeled transportation network and residential and employment zones are the primary determinants of the results of the MSTM simulations.

The primary outputs of the MSTM, in turn, are the numbers of trips between each pair of zones by income class, trip purpose, time of day, and mode (drive-alone, shared ride, walk-access bus, auto-access bus, walk-access rail, auto-access rail) and the amount of time each type of trip is expected to take, as well as tolls, fares, and distances traveled. There are four times of day represented in the model: AM Peak, Midday, PM Peak and Night, with different travel times for each zone pair at different times of day. There are also various trip purposes represented, with the primary ones being Home-to-Work, Work-to-Home, and Shopping.

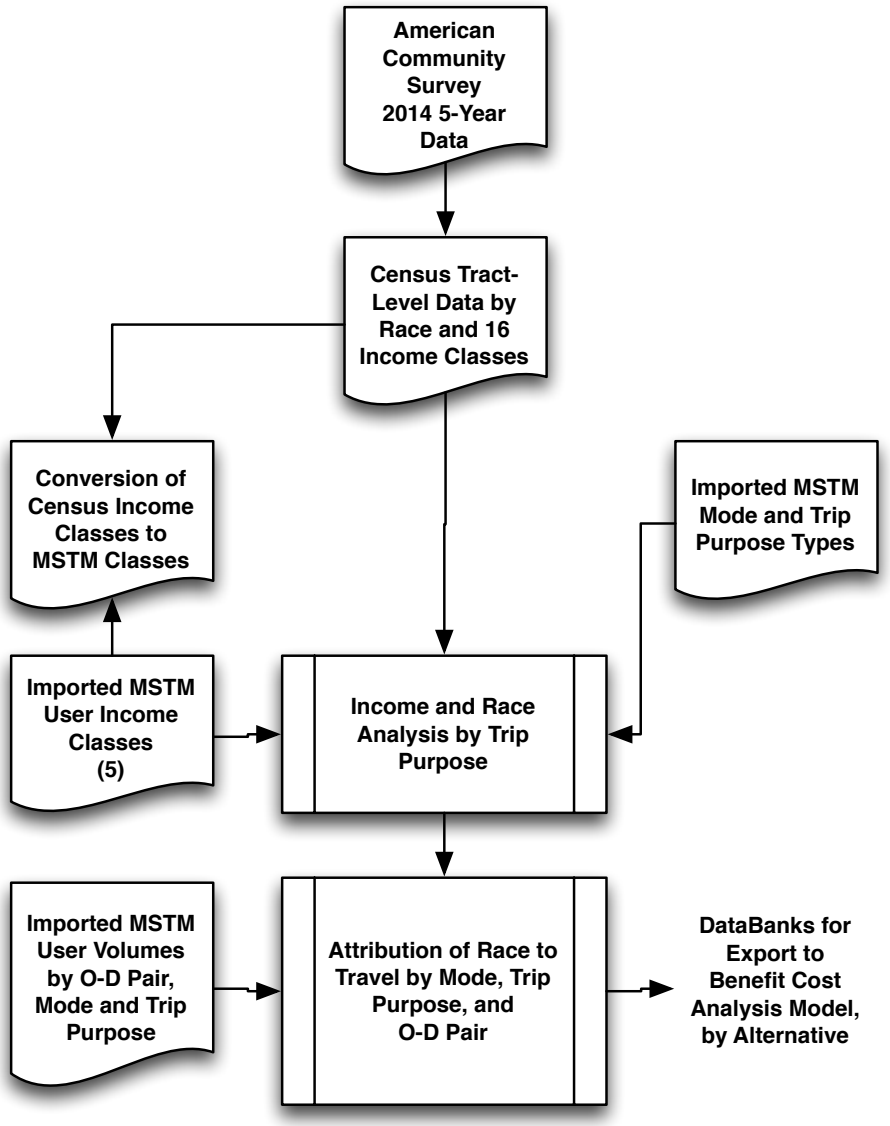
The 2030 zonal demographic information adopted by the State of Maryland are used in both the Red Line and Highway Alternative cases. The adopted 2030 model scenario included the Red Line and was used as-is in this analysis. The Highway Alternative scenario was built by editing the transit network to not include the Red Line and associated changes to bus service and editing the highway network to include the proposed highway improvements.

Because the model reports various travel times and costs for each scenario for over one million zone pairs, and there are multiple trip purposes, modes of travel, times of day, and other dimensions, the scale of the model out put that must be processed is very large, with over 400 million data elements produced. This high resolution data is used in the next modeling step.

Race Attribution Model

The MSTM does not contain information about race in the zonal demography. Consequently, an additional model was built by ECONorthwest to attribute race to users based on their home zone and income class. The race attribution model was developed from Census American Community Survey (ACS) data, the most accurate and current information available about the racial characteristics of Maryland residents. The statistical association of race by income class by model zone can then be applied to travel model output, which does contain information on user travel activity by income class and zone. This method is the most accurate available for attributing race to travelers. The Race Attribution Model is represented conceptually in Figure 2.

Figure 2: Data Flows in the Race Attribution Model



As

Figure 2 indicates, the Race Allocation Model is informed by two major types of information:

1. Statistical relationships between income and race discovered through analysis of tract-level Census data mapped to model zones through GIS.

2. Information produced by the Regional Travel Model. This is zone-pair activity (user trips) characterized by user income class, mode and trip purpose, and time of day of travel.

The analysis performed in the Race Attribution Model thus permits the attribution of travelers' race to all of the information on user trip volumes and activity. This permits subsequent computations of user impacts to also be parsed by race.

User Benefit Analysis

To consistently and properly interpret the respective impacts of the Red Line Case and the Highway Alternative Case on black and white users, the race-augmented data is processed in a User Benefit Analysis Model (UBAM). To understand how the economic literature (and federal transportation analysis policy) measure user benefits, it is helpful to review the theoretical and arithmetic calculations behind the computation of user benefits.

First, economic theory suggests that users have a *demand* or *willingness to pay* for a good or service like transportation. This demand or willingness to pay is a *derived demand* in that it is getting from one place to another that is valued, rather than the travel itself. In fact, the time spent traveling is perceived by travelers as a part of the price for traveling, along with the cash price for tolls, fares, and operating costs. In the transportation setting, the *generalized cost* is considered the relevant measure of price because it incorporates factors like travel time as well as out-of-pocket expenditures. Many studies have demonstrated that we all behave as if the value of time (per hour) has a dollar representation. Not surprisingly, this value of time, in turn, is related to the value of wage or leisure alternatives, since the alternatives to travel are to work or enjoy leisure.

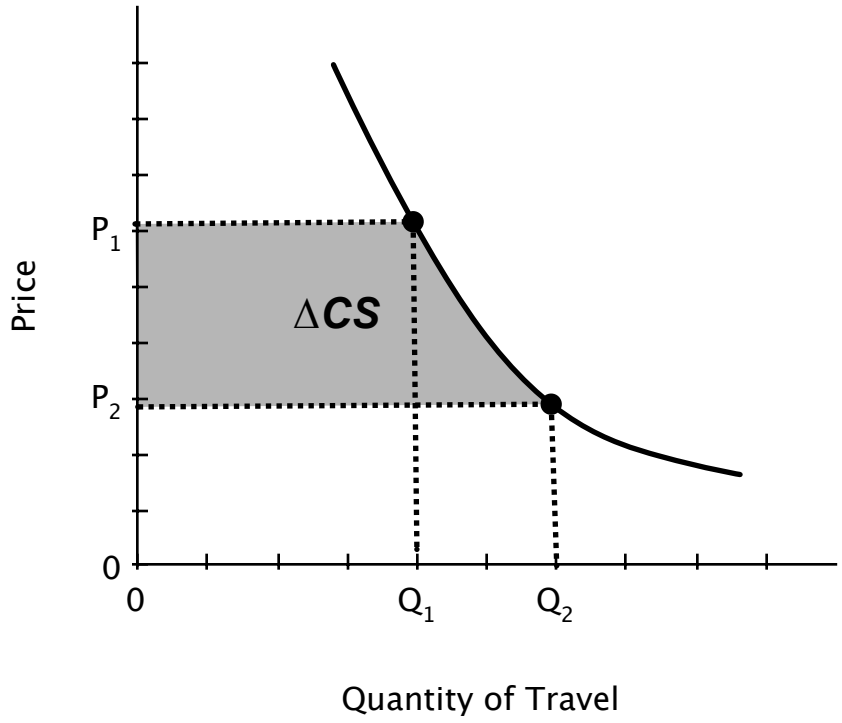
Second, economic theory recognizes that we often can obtain goods or services for much less than we would have been willing to pay for them. In economics parlance, we walk away from such transactions with a *surplus* of willingness to pay. Consequently, this phenomenon is called *consumer surplus*. Extending this logic, if something changes in the marketplace so that a service becomes available at a lower price than previously, we enjoy an increase in consumer surplus. Conversely, if something becomes more costly, we suffer a decrease in consumer surplus. User benefit analysis is linked intimately to this concept of changes in consumer surplus. In fact, user benefits from transportation improvements are equal to the value of the associated changes in consumer surplus.

Third, it is important to recognize that for user benefits to occur, there must be a change in the generalized cost of travel from what it has previously been. In a

transportation setting, this occurs typically because there is an improvement in the network that has reduced generalized cost—such as a new service that provides faster travel and/or lower fares or other cash costs. Of course, if a service becomes more costly, the change in consumer surplus will be negative, as will user benefits.

The computation of user benefits is conceptually simple, as the simple example in Figure 3 illustrates. In this example, the behavior of consumers in the Base Case (denoted by the subscript 1) was to use (consume) the quantity of service Q_1 when the price or generalized cost was P_1. When the generalized cost fell to P_2, the consumers, naturally, consumed the larger quantity Q_2 (i.e., they used the transportation service more often). This is because the consumers' demand curve (the heavy, curved line) is downward sloping (i.e., people choose to consume less of a service when it costs more).

Figure 3: Measuring User Benefits as a Change in Consumer Surplus



This change in price and corresponding change in the quantity demanded causes a change in consumer surplus equal to the shaded area denoted by ΔCS. This change is positive, meaning consumers are better off, because price fell. Arithmetically, the value of ΔCS and, hence, the user benefit that has been created, can be approximated using some simple algebra. Namely:

User Benefit = $\Delta CS = (P_1 - P_2) \times (Q_1 + Q_2)/2$

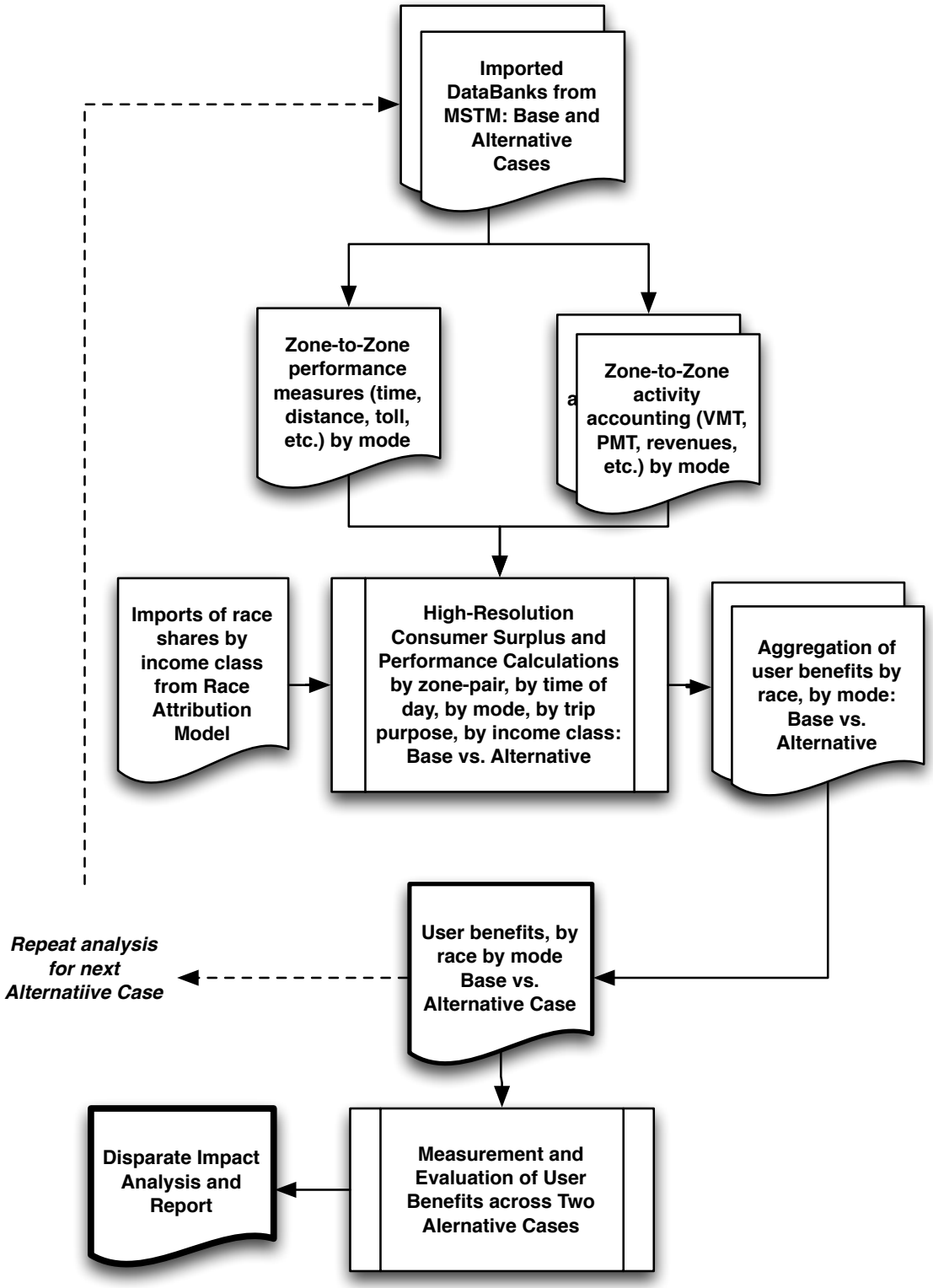
Although this is a very simple example, it illustrates that if prices change from a Base Case to an Alternative Case, user benefits can be computed if we have information on numbers of trips and generalized costs under base case and alternative scenarios. Of course, in a complex network, with millions of users and millions of changes (positive and negative) in generalized cost and trips made, the arithmetic gets more complex. Consequently, it is necessary to employ a computerized model to calculate user benefits.

This requires that large amounts of information be brought together from the Regional Travel Model as augmented by the Race Attribution Model. We are interested in comparing the user benefits of the Red Line Scenario, which is what would have happened absent the change in policy, and the Highway Alternative Scenario, which represents the effects of cancelling the Red Line and making a set of highway improvements instead.

Since both the Red Line and the Highway Alternative are future innovations, it is necessary to model them both at a common point in time. The anticipated completion data for the Red Line was 2022. The nearest year subsequent to that for which zone-level demographic information is available is 2030; that is the analysis year used to evaluate the alternatives.

Figure 4 summarizes in a conceptualized representation, the computations made to calculate the user benefits of each alternative to the common Base Case, and the comparisons of the resulting user benefits to each alternative. In order to perform these calculations properly, the various user benefit elements have to be measured at the finest resolution possible. That is, the user benefits mathematics described simplistically earlier, can only be aggregated after performing that calculation on many individual changes in consumer behavior on many network links, by time of day, mode, trip purpose, etc.

Figure 4: Data Flow of the User Benefit Analysis Model



FINDINGS

Comparing the results of the user benefit analysis for the Red Line with those for the Highway Improvements Alternative, we find that canceling the Red Line and instead building the specified highway improvements would take away user benefits from blacks and other racial minorities, primarily in the Baltimore area, and would increase user benefits to white residents, primarily in other parts of Maryland.

The measure of disparate impact specified in the *Castaneda* case may also be applied here. Given that 26.18 percent of trips made by Maryland residents are made by black residents, one would expect that if a policy change harmed travelers in a race-neutral manner, approximately 26.18 percent of trips harmed from the policy change would be by black travelers. 26.100 million daily person trips would be harmed by the policy change and 26.18 percent of those, or 6.833 million, would be expected to be by black travelers. **But 7.926 million of the trips that would be harmed by the policy change were by black travelers, a difference of 1.093 million, or 487 standard deviations, from the expected number.** The *Castaneda* decision suggests that a difference of more than two or three standard deviations is unlikely to be the result of random chance. The probability of the observed difference in this case being the result of random chance in this case is essentially zero (zero to more than 14 decimal places).

Another measurement of disparate impact is the proportion of trips by black travelers that would be negatively affected by the policy change compared to the proportion of trips by white travelers that would be negatively affected. 7.9 million daily person trips by black travelers, 16.0 million by white travelers, and 2.2 million by other travelers would be negatively affected, out of 11.2 million total daily trips by black travelers, 27.8 million by white travelers, and 3.9 million by other travelers. **70.5 percent of trips by black travelers, 57.4 percent of trips by white travelers, and 56.9 percent of trips by other travelers would be negatively affected.**

Additionally, model results show that blacks would be made worse off by more than $19 million per year, other minorities would be made worse off by more than $600 thousand, and whites would be made better off by almost $35 million. These amounts are annualized weekday benefits, in year 2010 dollars, for modeled travel in the year 2030. These impacts derive primarily from the value of additional time black travelers would spend traveling. Black travelers would need to spend an additional 2.6 million hours per year. Of those, 1.6 million would be spent by black residents of Baltimore City.

These results clearly show a disparate impact on blacks and other racial minorities. Because the direction of the impacts is negative for blacks and other minorities while it is positive for whites, more than 100 percent of net benefits flow to whites and less than zero percent flow to blacks and other minorities. Whites receive 228 percent of net benefits from the policy change, blacks receive -124 percent and other minorities receive -4 percent.

The Red Line would produce benefits to black residents who travel by auto as well as those who use transit. Of the $19 million per year by which black residents would be better off with the Red Line, over $7.5 million is derived from reduced congestion on highways parallel to the route of the Red Line.

Appendix B lists the differences in benefits resulting from canceling the Red Line and building the specified highway improvements instead, by county by benefit source by race.

APPENDICES

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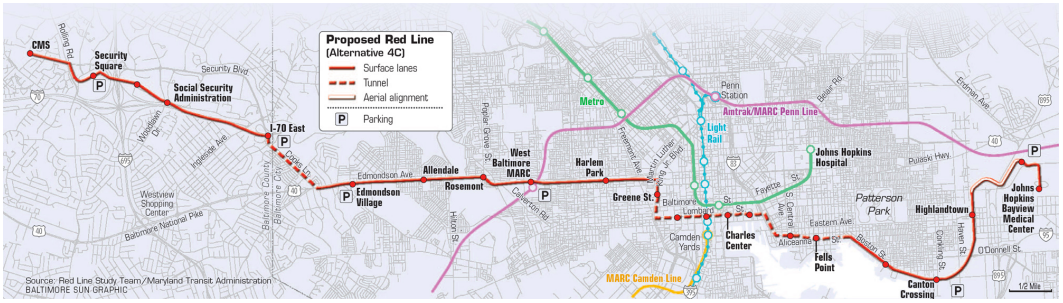
Appendix A: Alternatives Considered

Baltimore Red Line

Figure 1: Maryland Transit Administration Proposed Red Line Route



The 14.1-mile Red Line route proposal travels East-West from Baltimore County through Baltimore City. The selected route connects important jobs centers, such as the Social Security Administration and the Center for Medicare and Medicaid, with existing mass transit corridors. Baltimore City is also currently has one subway line running North-South and the proposed Red Line would significantly expand access to transit infrastructure for currently underserved communities of low-income and Black populations in Baltimore City. The Red Line was originally slated for completion by 2022.

The Red Line project had been in planning stages since at least 2001 and the estimated cost of construction was approximately $2.9 billion. However, the Red Line is one of only six nationwide transportation projects nationwide to qualify for federal aid and had secured federal financing of $900 million. In addition, the local governments of Baltimore City and Baltimore County had promised at least $280 million to the project. After cancelation, Maryland will forgo federal financing along with the estimated $288 million that had been spent by the state on preliminary engineering and route design.

The primary reason for cancelation of the Red Line given by Governor Hogan was cost. Of particular concern was the estimated 4.2 miles of tunnel required for the project, including a $1 billion tunnel under downtown Baltimore City.

Maryland Road Expansion

Figure 2: Governor Hogan's Map of Highway and Bridge Improvements

The cancelation of the Red Line freed up substantial sources of state funds which Governor Hogan has directed primarily towards the expansion highway spending. Shortly after the Red Line cancelation, Governor Hogan announced a $2 billion highway-spending program, with $1.35 billion from new sources.

The increased transportation spending has been directed to improve or build approximately 80 major state infrastructure projects. These projects all impact major arterials such as interstates and state highways around the State of Maryland. Figure 2 displays an image produced by Governor Hogan's office detailing the new transportation projects and appropriations by county. Baltimore City is absent from this image.[1]

[1] http://www.baltimoresun.com/news/maryland/politics/blog/bal-hogan-transportation-map-cuts-baltimore-out-of-maryland-20150625-story.html

Appendix B: Benefits by County and Race

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County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Allegany County	black	highway_distance	0
Allegany County	black	highway_time	(28)
Allegany County	black	highway_tolls	0
Allegany County	black	transit_drive_access	0
Allegany County	black	transit_fares	0
Allegany County	black	transit_ivt	0
Allegany County	black	transit_wait	0
Allegany County	black	transit_walk_access	0
Allegany County	other	highway_distance	0
Allegany County	other	highway_time	(27)
Allegany County	other	highway_tolls	0
Allegany County	other	transit_drive_access	0
Allegany County	other	transit_fares	0
Allegany County	other	transit_ivt	0
Allegany County	other	transit_wait	0
Allegany County	other	transit_walk_access	0
Allegany County	white	highway_distance	22
Allegany County	white	highway_time	(5,301)
Allegany County	white	highway_tolls	0
Allegany County	white	transit_drive_access	0
Allegany County	white	transit_fares	0
Allegany County	white	transit_ivt	0
Allegany County	white	transit_wait	0
Allegany County	white	transit_walk_access	0
Anne Arundel County	black	highway_distance	417,132
Anne Arundel County	black	highway_time	4,063,469
Anne Arundel County	black	highway_tolls	5,787
Anne Arundel County	black	transit_drive_access	(370,217)
Anne Arundel County	black	transit_fares	0
Anne Arundel County	black	transit_ivt	161,051
Anne Arundel County	black	transit_wait	25,327
Anne Arundel County	black	transit_walk_access	85,961
Anne Arundel County	other	highway_distance	135,621
Anne Arundel County	other	highway_time	1,383,710
Anne Arundel County	other	highway_tolls	1,128
Anne Arundel County	other	transit_drive_access	(174,440)
Anne Arundel County	other	transit_fares	0
Anne Arundel County	other	transit_ivt	92,840
Anne Arundel County	other	transit_wait	24,074
Anne Arundel County	other	transit_walk_access	34,778

County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Anne Arundel County	white	highway_distance	180,168
Anne Arundel County	white	highway_time	10,697,879
Anne Arundel County	white	highway_tolls	9,367
Anne Arundel County	white	transit_drive_access	(1,576,967)
Anne Arundel County	white	transit_fares	0
Anne Arundel County	white	transit_ivt	451,568
Anne Arundel County	white	transit_wait	289,527
Anne Arundel County	white	transit_walk_access	346,534
Baltimore City	black	highway_distance	91,991
Baltimore City	black	highway_time	(4,735,908)
Baltimore City	black	highway_tolls	(13,283)
Baltimore City	black	transit_drive_access	(804,058)
Baltimore City	black	transit_fares	0
Baltimore City	black	transit_ivt	(8,797,485)
Baltimore City	black	transit_wait	(332,895)
Baltimore City	black	transit_walk_access	2,384,524
Baltimore City	other	highway_distance	11,385
Baltimore City	other	highway_time	(428,524)
Baltimore City	other	highway_tolls	(3,827)
Baltimore City	other	transit_drive_access	(14,128)
Baltimore City	other	transit_fares	0
Baltimore City	other	transit_ivt	(1,279,893)
Baltimore City	other	transit_wait	(130,475)
Baltimore City	other	transit_walk_access	396,149
Baltimore City	white	highway_distance	58,066
Baltimore City	white	highway_time	(3,306,650)
Baltimore City	white	highway_tolls	(39,390)
Baltimore City	white	transit_drive_access	(21,759)
Baltimore City	white	transit_fares	0
Baltimore City	white	transit_ivt	(10,119,686)
Baltimore City	white	transit_wait	(1,825,571)
Baltimore City	white	transit_walk_access	3,482,347
Baltimore County	black	highway_distance	64,717
Baltimore County	black	highway_time	(3,041,252)
Baltimore County	black	highway_tolls	(20,483)
Baltimore County	black	transit_drive_access	112,900
Baltimore County	black	transit_fares	0
Baltimore County	black	transit_ivt	(4,473,495)
Baltimore County	black	transit_wait	694,262
Baltimore County	black	transit_walk_access	235,565

County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Baltimore County	other	highway_distance	15,080
Baltimore County	other	highway_time	(912,244)
Baltimore County	other	highway_tolls	(7,846)
Baltimore County	other	transit_drive_access	(46,760)
Baltimore County	other	transit_fares	0
Baltimore County	other	transit_ivt	(1,007,630)
Baltimore County	other	transit_wait	154,543
Baltimore County	other	transit_walk_access	73,331
Baltimore County	white	highway_distance	(526,045)
Baltimore County	white	highway_time	(8,823,880)
Baltimore County	white	highway_tolls	(125,170)
Baltimore County	white	transit_drive_access	(207,521)
Baltimore County	white	transit_fares	0
Baltimore County	white	transit_ivt	(8,562,140)
Baltimore County	white	transit_wait	1,666,583
Baltimore County	white	transit_walk_access	229,629
Calvert County	black	highway_distance	(28,367)
Calvert County	black	highway_time	4,890
Calvert County	black	highway_tolls	0
Calvert County	black	transit_drive_access	0
Calvert County	black	transit_fares	0
Calvert County	black	transit_ivt	(263)
Calvert County	black	transit_wait	112
Calvert County	black	transit_walk_access	(115)
Calvert County	other	highway_distance	(10,144)
Calvert County	other	highway_time	(10,016)
Calvert County	other	highway_tolls	0
Calvert County	other	transit_drive_access	0
Calvert County	other	transit_fares	0
Calvert County	other	transit_ivt	(30)
Calvert County	other	transit_wait	13
Calvert County	other	transit_walk_access	(7)
Calvert County	white	highway_distance	(313,233)
Calvert County	white	highway_time	(529,645)
Calvert County	white	highway_tolls	0
Calvert County	white	transit_drive_access	0
Calvert County	white	transit_fares	0
Calvert County	white	transit_ivt	(3,030)
Calvert County	white	transit_wait	1,289
Calvert County	white	transit_walk_access	(1,340)

County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Caroline County	black	highway_distance	70,126
Caroline County	black	highway_time	149,504
Caroline County	black	highway_tolls	0
Caroline County	black	transit_drive_access	0
Caroline County	black	transit_fares	0
Caroline County	black	transit_ivt	0
Caroline County	black	transit_wait	0
Caroline County	black	transit_walk_access	0
Caroline County	other	highway_distance	17,803
Caroline County	other	highway_time	72,054
Caroline County	other	highway_tolls	0
Caroline County	other	transit_drive_access	0
Caroline County	other	transit_fares	0
Caroline County	other	transit_ivt	0
Caroline County	other	transit_wait	0
Caroline County	other	transit_walk_access	0
Caroline County	white	highway_distance	511,604
Caroline County	white	highway_time	1,445,533
Caroline County	white	highway_tolls	0
Caroline County	white	transit_drive_access	0
Caroline County	white	transit_fares	0
Caroline County	white	transit_ivt	0
Caroline County	white	transit_wait	0
Caroline County	white	transit_walk_access	0
Carroll County	black	highway_distance	30,699
Carroll County	black	highway_time	(91,437)
Carroll County	black	highway_tolls	30
Carroll County	black	transit_drive_access	21
Carroll County	black	transit_fares	0
Carroll County	black	transit_ivt	(238)
Carroll County	black	transit_wait	(85)
Carroll County	black	transit_walk_access	221
Carroll County	other	highway_distance	24,885
Carroll County	other	highway_time	15,671
Carroll County	other	highway_tolls	28
Carroll County	other	transit_drive_access	108
Carroll County	other	transit_fares	0
Carroll County	other	transit_ivt	(822)
Carroll County	other	transit_wait	(277)
Carroll County	other	transit_walk_access	731

County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Carroll County	white	highway_distance	957,106
Carroll County	white	highway_time	(1,362,211)
Carroll County	white	highway_tolls	1,138
Carroll County	white	transit_drive_access	3,069
Carroll County	white	transit_fares	0
Carroll County	white	transit_ivt	(22,740)
Carroll County	white	transit_wait	(8,811)
Carroll County	white	transit_walk_access	21,608
Cecil County	black	highway_distance	(16,618)
Cecil County	black	highway_time	(74,231)
Cecil County	black	highway_tolls	0
Cecil County	black	transit_drive_access	0
Cecil County	black	transit_fares	0
Cecil County	black	transit_ivt	(3,613)
Cecil County	black	transit_wait	(341)
Cecil County	black	transit_walk_access	(206)
Cecil County	other	highway_distance	10,278
Cecil County	other	highway_time	(38,201)
Cecil County	other	highway_tolls	0
Cecil County	other	transit_drive_access	0
Cecil County	other	transit_fares	0
Cecil County	other	transit_ivt	(2,506)
Cecil County	other	transit_wait	(264)
Cecil County	other	transit_walk_access	(95)
Cecil County	white	highway_distance	495,501
Cecil County	white	highway_time	(510,531)
Cecil County	white	highway_tolls	0
Cecil County	white	transit_drive_access	0
Cecil County	white	transit_fares	0
Cecil County	white	transit_ivt	(22,231)
Cecil County	white	transit_wait	(1,949)
Cecil County	white	transit_walk_access	(938)
Charles County	black	highway_distance	(667,264)
Charles County	black	highway_time	712,718
Charles County	black	highway_tolls	0
Charles County	black	transit_drive_access	0
Charles County	black	transit_fares	0
Charles County	black	transit_ivt	0
Charles County	black	transit_wait	0
Charles County	black	transit_walk_access	0

County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Charles County	other	highway_distance	(73,774)
Charles County	other	highway_time	33,379
Charles County	other	highway_tolls	0
Charles County	other	transit_drive_access	0
Charles County	other	transit_fares	0
Charles County	other	transit_ivt	0
Charles County	other	transit_wait	0
Charles County	other	transit_walk_access	0
Charles County	white	highway_distance	(548,628)
Charles County	white	highway_time	(380,729)
Charles County	white	highway_tolls	0
Charles County	white	transit_drive_access	0
Charles County	white	transit_fares	0
Charles County	white	transit_ivt	0
Charles County	white	transit_wait	0
Charles County	white	transit_walk_access	0
Dorchester County	black	highway_distance	(3,758)
Dorchester County	black	highway_time	(138,982)
Dorchester County	black	highway_tolls	0
Dorchester County	black	transit_drive_access	0
Dorchester County	black	transit_fares	0
Dorchester County	black	transit_ivt	0
Dorchester County	black	transit_wait	0
Dorchester County	black	transit_walk_access	0
Dorchester County	other	highway_distance	(759)
Dorchester County	other	highway_time	(42,591)
Dorchester County	other	highway_tolls	0
Dorchester County	other	transit_drive_access	0
Dorchester County	other	transit_fares	0
Dorchester County	other	transit_ivt	0
Dorchester County	other	transit_wait	0
Dorchester County	other	transit_walk_access	0
Dorchester County	white	highway_distance	(7,771)
Dorchester County	white	highway_time	(947,438)
Dorchester County	white	highway_tolls	0
Dorchester County	white	transit_drive_access	0
Dorchester County	white	transit_fares	0
Dorchester County	white	transit_ivt	0
Dorchester County	white	transit_wait	0
Dorchester County	white	transit_walk_access	0

County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Frederick County	black	highway_distance	(5,737,875)
Frederick County	black	highway_time	7,801,320
Frederick County	black	highway_tolls	2,662
Frederick County	black	transit_drive_access	0
Frederick County	black	transit_fares	0
Frederick County	black	transit_ivt	31
Frederick County	black	transit_wait	31
Frederick County	black	transit_walk_access	(85)
Frederick County	other	highway_distance	(3,748,664)
Frederick County	other	highway_time	5,557,431
Frederick County	other	highway_tolls	1,707
Frederick County	other	transit_drive_access	0
Frederick County	other	transit_fares	0
Frederick County	other	transit_ivt	67
Frederick County	other	transit_wait	67
Frederick County	other	transit_walk_access	(185)
Frederick County	white	highway_distance	(42,740,124)
Frederick County	white	highway_time	102,872,821
Frederick County	white	highway_tolls	18,214
Frederick County	white	transit_drive_access	0
Frederick County	white	transit_fares	0
Frederick County	white	transit_ivt	298
Frederick County	white	transit_wait	298
Frederick County	white	transit_walk_access	(821)
Garrett County	black	highway_distance	0
Garrett County	black	highway_time	(0)
Garrett County	black	highway_tolls	0
Garrett County	black	transit_drive_access	0
Garrett County	black	transit_fares	0
Garrett County	black	transit_ivt	0
Garrett County	black	transit_wait	0
Garrett County	black	transit_walk_access	0
Garrett County	other	highway_distance	0
Garrett County	other	highway_time	(17)
Garrett County	other	highway_tolls	0
Garrett County	other	transit_drive_access	0
Garrett County	other	transit_fares	0
Garrett County	other	transit_ivt	0
Garrett County	other	transit_wait	0
Garrett County	other	transit_walk_access	0

County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Garrett County	white	highway_distance	0
Garrett County	white	highway_time	(1,204)
Garrett County	white	highway_tolls	0
Garrett County	white	transit_drive_access	0
Garrett County	white	transit_fares	0
Garrett County	white	transit_ivt	0
Garrett County	white	transit_wait	0
Garrett County	white	transit_walk_access	0
Harford County	black	highway_distance	(54,456)
Harford County	black	highway_time	(599,400)
Harford County	black	highway_tolls	(285)
Harford County	black	transit_drive_access	(3,626)
Harford County	black	transit_fares	0
Harford County	black	transit_ivt	(54,555)
Harford County	black	transit_wait	7,988
Harford County	black	transit_walk_access	1,781
Harford County	other	highway_distance	(23,501)
Harford County	other	highway_time	(239,293)
Harford County	other	highway_tolls	(61)
Harford County	other	transit_drive_access	496
Harford County	other	transit_fares	0
Harford County	other	transit_ivt	(20,677)
Harford County	other	transit_wait	3,270
Harford County	other	transit_walk_access	885
Harford County	white	highway_distance	(227,145)
Harford County	white	highway_time	(2,904,330)
Harford County	white	highway_tolls	(654)
Harford County	white	transit_drive_access	21,677
Harford County	white	transit_fares	0
Harford County	white	transit_ivt	(272,347)
Harford County	white	transit_wait	47,424
Harford County	white	transit_walk_access	6,234
Howard County	black	highway_distance	(25,313)
Howard County	black	highway_time	1,310,642
Howard County	black	highway_tolls	(1,665)
Howard County	black	transit_drive_access	(13,035)
Howard County	black	transit_fares	0
Howard County	black	transit_ivt	(173,484)
Howard County	black	transit_wait	36,686
Howard County	black	transit_walk_access	31,846

County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Howard County	other	highway_distance	1,779
Howard County	other	highway_time	985,910
Howard County	other	highway_tolls	(3,671)
Howard County	other	transit_drive_access	30,556
Howard County	other	transit_fares	0
Howard County	other	transit_ivt	(347,233)
Howard County	other	transit_wait	47,689
Howard County	other	transit_walk_access	49,299
Howard County	white	highway_distance	(104,442)
Howard County	white	highway_time	5,929,441
Howard County	white	highway_tolls	(9,177)
Howard County	white	transit_drive_access	172,249
Howard County	white	transit_fares	0
Howard County	white	transit_ivt	(1,000,252)
Howard County	white	transit_wait	198,448
Howard County	white	transit_walk_access	121,428
Kent County	black	highway_distance	5,878
Kent County	black	highway_time	(1,733)
Kent County	black	highway_tolls	0
Kent County	black	transit_drive_access	0
Kent County	black	transit_fares	0
Kent County	black	transit_ivt	0
Kent County	black	transit_wait	0
Kent County	black	transit_walk_access	0
Kent County	other	highway_distance	918
Kent County	other	highway_time	(929)
Kent County	other	highway_tolls	0
Kent County	other	transit_drive_access	0
Kent County	other	transit_fares	0
Kent County	other	transit_ivt	0
Kent County	other	transit_wait	0
Kent County	other	transit_walk_access	0
Kent County	white	highway_distance	42,944
Kent County	white	highway_time	(21,577)
Kent County	white	highway_tolls	0
Kent County	white	transit_drive_access	0
Kent County	white	transit_fares	0
Kent County	white	transit_ivt	0
Kent County	white	transit_wait	0
Kent County	white	transit_walk_access	0

County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Montgomery County	black	highway_distance	2,078,703
Montgomery County	black	highway_time	192,909
Montgomery County	black	highway_tolls	43,833
Montgomery County	black	transit_drive_access	(612)
Montgomery County	black	transit_fares	0
Montgomery County	black	transit_ivt	(3,655)
Montgomery County	black	transit_wait	7,880
Montgomery County	black	transit_walk_access	(9,662)
Montgomery County	other	highway_distance	1,975,421
Montgomery County	other	highway_time	(1,483,364)
Montgomery County	other	highway_tolls	52,215
Montgomery County	other	transit_drive_access	1,605
Montgomery County	other	transit_fares	0
Montgomery County	other	transit_ivt	(121)
Montgomery County	other	transit_wait	9,618
Montgomery County	other	transit_walk_access	(9,908)
Montgomery County	white	highway_distance	6,768,053
Montgomery County	white	highway_time	(4,171,928)
Montgomery County	white	highway_tolls	144,755
Montgomery County	white	transit_drive_access	(2,582)
Montgomery County	white	transit_fares	0
Montgomery County	white	transit_ivt	(4,591)
Montgomery County	white	transit_wait	27,177
Montgomery County	white	transit_walk_access	(28,972)
Prince Georges County	black	highway_distance	(729,085)
Prince Georges County	black	highway_time	(1,664,901)
Prince Georges County	black	highway_tolls	(3,220)
Prince Georges County	black	transit_drive_access	(66,516)
Prince Georges County	black	transit_fares	0
Prince Georges County	black	transit_ivt	(179,388)
Prince Georges County	black	transit_wait	35,585
Prince Georges County	black	transit_walk_access	37,790
Prince Georges County	other	highway_distance	(97,229)
Prince Georges County	other	highway_time	(288,952)
Prince Georges County	other	highway_tolls	(433)
Prince Georges County	other	transit_drive_access	(13,650)
Prince Georges County	other	transit_fares	0
Prince Georges County	other	transit_ivt	(30,145)
Prince Georges County	other	transit_wait	7,476
Prince Georges County	other	transit_walk_access	9,693

County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Prince Georges County	white	highway_distance	(265,910)
Prince Georges County	white	highway_time	(840,755)
Prince Georges County	white	highway_tolls	(955)
Prince Georges County	white	transit_drive_access	(44,066)
Prince Georges County	white	transit_fares	0
Prince Georges County	white	transit_ivt	(129,134)
Prince Georges County	white	transit_wait	22,463
Prince Georges County	white	transit_walk_access	25,305
Queen Annes County	black	highway_distance	(676)
Queen Annes County	black	highway_time	227,893
Queen Annes County	black	highway_tolls	0
Queen Annes County	black	transit_drive_access	0
Queen Annes County	black	transit_fares	0
Queen Annes County	black	transit_ivt	0
Queen Annes County	black	transit_wait	0
Queen Annes County	black	transit_walk_access	0
Queen Annes County	other	highway_distance	(23,051)
Queen Annes County	other	highway_time	129,706
Queen Annes County	other	highway_tolls	0
Queen Annes County	other	transit_drive_access	0
Queen Annes County	other	transit_fares	0
Queen Annes County	other	transit_ivt	0
Queen Annes County	other	transit_wait	0
Queen Annes County	other	transit_walk_access	0
Queen Annes County	white	highway_distance	(647,239)
Queen Annes County	white	highway_time	6,458,059
Queen Annes County	white	highway_tolls	0
Queen Annes County	white	transit_drive_access	0
Queen Annes County	white	transit_fares	0
Queen Annes County	white	transit_ivt	0
Queen Annes County	white	transit_wait	0
Queen Annes County	white	transit_walk_access	0
Somerset County	black	highway_distance	(197,535)
Somerset County	black	highway_time	(1,261,285)
Somerset County	black	highway_tolls	0
Somerset County	black	transit_drive_access	0
Somerset County	black	transit_fares	0
Somerset County	black	transit_ivt	0
Somerset County	black	transit_wait	0
Somerset County	black	transit_walk_access	0

County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Somerset County	other	highway_distance	(11,582)
Somerset County	other	highway_time	(70,310)
Somerset County	other	highway_tolls	0
Somerset County	other	transit_drive_access	0
Somerset County	other	transit_fares	0
Somerset County	other	transit_ivt	0
Somerset County	other	transit_wait	0
Somerset County	other	transit_walk_access	0
Somerset County	white	highway_distance	(304,367)
Somerset County	white	highway_time	(3,208,958)
Somerset County	white	highway_tolls	0
Somerset County	white	transit_drive_access	0
Somerset County	white	transit_fares	0
Somerset County	white	transit_ivt	0
Somerset County	white	transit_wait	0
Somerset County	white	transit_walk_access	0
St. Marys County	black	highway_distance	(13,098)
St. Marys County	black	highway_time	39,858
St. Marys County	black	highway_tolls	0
St. Marys County	black	transit_drive_access	0
St. Marys County	black	transit_fares	0
St. Marys County	black	transit_ivt	0
St. Marys County	black	transit_wait	0
St. Marys County	black	transit_walk_access	0
St. Marys County	other	highway_distance	(11,541)
St. Marys County	other	highway_time	58,882
St. Marys County	other	highway_tolls	0
St. Marys County	other	transit_drive_access	0
St. Marys County	other	transit_fares	0
St. Marys County	other	transit_ivt	0
St. Marys County	other	transit_wait	0
St. Marys County	other	transit_walk_access	0
St. Marys County	white	highway_distance	(89,900)
St. Marys County	white	highway_time	(709,318)
St. Marys County	white	highway_tolls	0
St. Marys County	white	transit_drive_access	0
St. Marys County	white	transit_fares	0
St. Marys County	white	transit_ivt	0
St. Marys County	white	transit_wait	0
St. Marys County	white	transit_walk_access	0

County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Talbot County	black	highway_distance	216,318
Talbot County	black	highway_time	(1,329,580)
Talbot County	black	highway_tolls	0
Talbot County	black	transit_drive_access	0
Talbot County	black	transit_fares	0
Talbot County	black	transit_ivt	0
Talbot County	black	transit_wait	0
Talbot County	black	transit_walk_access	0
Talbot County	other	highway_distance	42,455
Talbot County	other	highway_time	(367,311)
Talbot County	other	highway_tolls	0
Talbot County	other	transit_drive_access	0
Talbot County	other	transit_fares	0
Talbot County	other	transit_ivt	0
Talbot County	other	transit_wait	0
Talbot County	other	transit_walk_access	0
Talbot County	white	highway_distance	1,691,816
Talbot County	white	highway_time	(9,758,034)
Talbot County	white	highway_tolls	0
Talbot County	white	transit_drive_access	0
Talbot County	white	transit_fares	0
Talbot County	white	transit_ivt	0
Talbot County	white	transit_wait	0
Talbot County	white	transit_walk_access	0
Washington County	black	highway_distance	31,699
Washington County	black	highway_time	100,647
Washington County	black	highway_tolls	0
Washington County	black	transit_drive_access	0
Washington County	black	transit_fares	0
Washington County	black	transit_ivt	0
Washington County	black	transit_wait	0
Washington County	black	transit_walk_access	0
Washington County	other	highway_distance	(5,679)
Washington County	other	highway_time	108,218
Washington County	other	highway_tolls	0
Washington County	other	transit_drive_access	0
Washington County	other	transit_fares	0
Washington County	other	transit_ivt	0
Washington County	other	transit_wait	0
Washington County	other	transit_walk_access	0

County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Washington County	white	highway_distance	(582,931)
Washington County	white	highway_time	4,416,070
Washington County	white	highway_tolls	0
Washington County	white	transit_drive_access	0
Washington County	white	transit_fares	0
Washington County	white	transit_ivt	0
Washington County	white	transit_wait	0
Washington County	white	transit_walk_access	0
Wicomico County	black	highway_distance	3,221,947
Wicomico County	black	highway_time	(8,671,017)
Wicomico County	black	highway_tolls	0
Wicomico County	black	transit_drive_access	0
Wicomico County	black	transit_fares	0
Wicomico County	black	transit_ivt	0
Wicomico County	black	transit_wait	0
Wicomico County	black	transit_walk_access	0
Wicomico County	other	highway_distance	475,735
Wicomico County	other	highway_time	(1,802,995)
Wicomico County	other	highway_tolls	0
Wicomico County	other	transit_drive_access	0
Wicomico County	other	transit_fares	0
Wicomico County	other	transit_ivt	0
Wicomico County	other	transit_wait	0
Wicomico County	other	transit_walk_access	0
Wicomico County	white	highway_distance	17,623,405
Wicomico County	white	highway_time	(26,909,804)
Wicomico County	white	highway_tolls	0
Wicomico County	white	transit_drive_access	0
Wicomico County	white	transit_fares	0
Wicomico County	white	transit_ivt	0
Wicomico County	white	transit_wait	0
Wicomico County	white	transit_walk_access	0
Worcester County	black	highway_distance	893,828
Worcester County	black	highway_time	(250,806)
Worcester County	black	highway_tolls	0
Worcester County	black	transit_drive_access	0
Worcester County	black	transit_fares	0
Worcester County	black	transit_ivt	0
Worcester County	black	transit_wait	0
Worcester County	black	transit_walk_access	0

County	Race	Benefit Source	Benefit / (Harm) in 2010 Dollars
Worcester County	other	highway_distance	143,996
Worcester County	other	highway_time	(36,216)
Worcester County	other	highway_tolls	0
Worcester County	other	transit_drive_access	0
Worcester County	other	transit_fares	0
Worcester County	other	transit_ivt	0
Worcester County	other	transit_wait	0
Worcester County	other	transit_walk_access	0
Worcester County	white	highway_distance	4,072,016
Worcester County	white	highway_time	(1,782,110)
Worcester County	white	highway_tolls	0
Worcester County	white	transit_drive_access	0
Worcester County	white	transit_fares	0
Worcester County	white	transit_ivt	0
Worcester County	white	transit_wait	0
Worcester County	white	transit_walk_access	0