

# Appendix E: Revenues and Cost Estimates

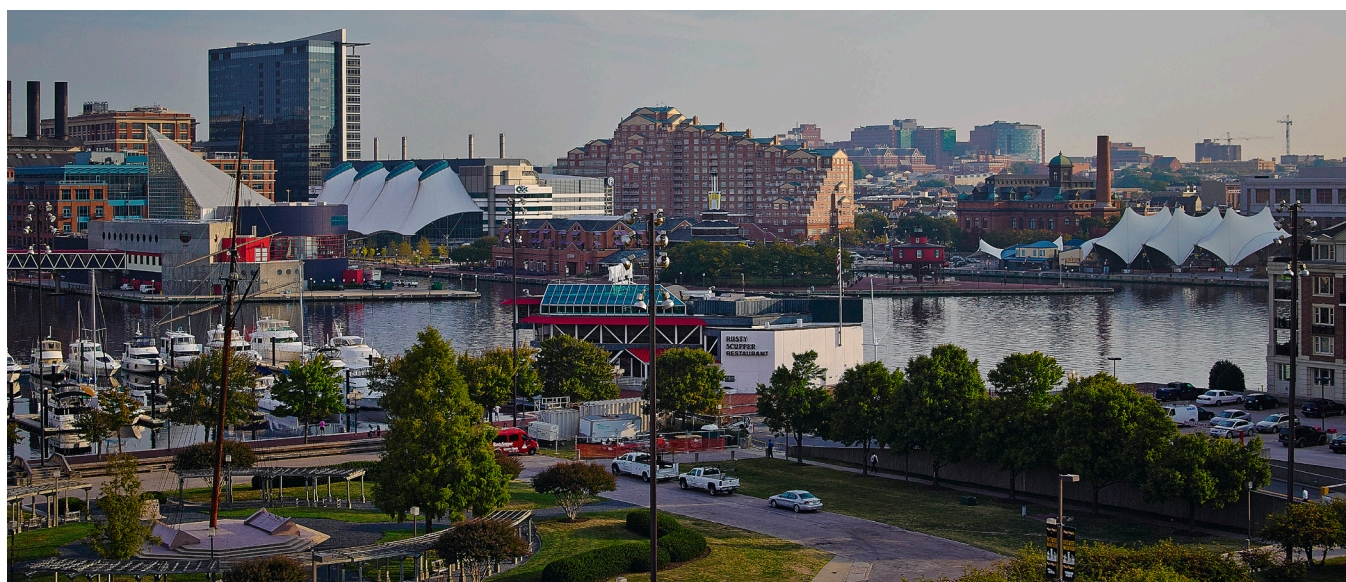


Photo Source: Mission Media

## Regional Financial Plan – 2020-2040

Each metropolitan transportation plan must include a financial plan. In this financial plan, the region demonstrates consistency between (1) reasonably available and projected sources of revenues and (2) the estimated costs of implementing proposed transportation system improvements. This consistency is referred to as “fiscal constraint.”

### Fiscal Constraint

MAP-21 requires regional transportation plans to be fiscally constrained. That is, the total estimated costs of projects and programs cannot exceed forecasted revenue levels.

For *Maximize2040*, the BRTB, in consultation with the Maryland Department of Transportation, has forecasted the amount of revenues from federal, state, local, and private sources the region reasonably anticipates will be available for 21-year period from 2020-2040.

### Available/Anticipated Revenues

Shown below are the revenues (from federal, state, local, and private sources) expected to be available for the 21-year period from 2020-2040, broken down by type of investment:

- System operations: \$29.954 billion
- System preservation: \$12.102 billion
- Major expansion projects: \$15.590 billion
- **Total revenues: \$57.646 billion**

The development of *Maximize2040* was an 18-month process. One of the early components was the financial forecast. The forecast included an increased state share of funding to cover the cost of a New Starts project (Red Line light rail project) that was in the last regional transportation plan. Late in the process of developing *Maximize2040*, the new administration decided to withdraw the project from the New Starts Program. The state funding set aside for this project will be reallocated to other projects within the state of Maryland but not necessarily within the BRTB’s region. The state as a member of the BRTB will continue to work and coordinate with the other BRTB members to address additional monies available to the Baltimore region.

## Definitions – Roadway Projects

*System operations* (roadways) – Covers the salaries and wages of personnel who maintain and operate highway systems and vehicles.

*System preservation* (roadways) – Covers capital costs for routine asset management and maintenance activities. These activities include: repaving roadways; repairing bridges; clearing snow and ice; and maintaining roadside lighting, guardrails, and signs.

## Definitions – Transit Projects

*System operations* (transit) – Covers routine maintenance, employee wages, spare parts, and consumables. Note that while routine maintenance is considered a function of system operations, maintenance activities may be paid for with federal capital funds.

*System preservation* (transit) – Covers planning, design, acquisition/construction, and major asset rehabilitation activities necessary to keep the existing transit system in a State of Good Repair.

## System Expansion Funding

The remaining \$15.59 billion will be available to fund *major expansion projects*. Examples of such projects include major new or widened roads, major roadway and bridge rehabilitations, and major new or expanded transit service.

## Forecasted Revenues by Year: Operations, Preservation, and Major Expansion

The table below shows projected revenues by year for system operations, system preservation, and major expansion projects in the region. Consistent with MDOT assumptions, the BRTB has assumed that 41.6% of statewide revenues (federal + state + private funds) will be available for the Baltimore region for the 2020-2040 period.

In addition to revenues expected from federal, state, and private funding sources, the table shows \$150 million from a local source. Anne Arundel County has indicated it will be able to commit this amount toward its major expansion projects. With this local commitment, total projected revenues for major capital projects are approximately \$15.59 billion.

### Maximize2040: Regional Revenue Forecasts – System Operations, System Preservation, and Major Expansion Projects

MDOT Statewide Revenue Projections			Baltimore Region Revenue Projections (41.6% of Statewide Totals for Operations and Preservation)					Totals
	Operations	Preservation		Operations	Preservation	Major Expansion	Cumulative Expansion	
2020	\$2,217,000,000	\$1,105,000,000	2020	\$922,000,000	\$460,000,000	\$538,000,000	\$538,000,000	
2021	\$2,307,000,000	\$1,129,000,000	2021	\$960,000,000	\$470,000,000	\$559,000,000	\$1,097,000,000	
2022	\$2,441,000,000	\$1,154,000,000	2022	\$1,015,000,000	\$480,000,000	\$565,000,000	\$1,662,000,000	
2023	\$2,539,000,000	\$1,179,000,000	2023	\$1,056,000,000	\$490,000,000	\$585,000,000	\$2,247,000,000	
2024	\$2,641,000,000	\$1,205,000,000	2024	\$1,099,000,000	\$501,000,000	\$537,000,000	\$2,784,000,000	
2025	\$2,745,000,000	\$1,232,000,000	2025	\$1,142,000,000	\$513,000,000	\$561,000,000	\$3,345,000,000	
2026	\$2,855,000,000	\$1,259,000,000	2026	\$1,188,000,000	\$524,000,000	\$587,000,000	\$3,932,000,000	
2027	\$2,968,000,000	\$1,287,000,000	2027	\$1,235,000,000	\$535,000,000	\$613,000,000	\$4,545,000,000	
2028	\$3,086,000,000	\$1,315,000,000	2028	\$1,284,000,000	\$547,000,000	\$640,000,000	\$5,185,000,000	
2029	\$3,207,000,000	\$1,344,000,000	2029	\$1,334,000,000	\$559,000,000	\$670,000,000	\$5,855,000,000	
2030	\$3,334,000,000	\$1,373,000,000	2030	\$1,387,000,000	\$571,000,000	\$699,000,000	\$6,554,000,000	
2031	\$3,465,000,000	\$1,404,000,000	2031	\$1,441,000,000	\$584,000,000	\$731,000,000	\$7,285,000,000	
2032	\$3,604,000,000	\$1,434,000,000	2032	\$1,499,000,000	\$597,000,000	\$763,000,000	\$8,048,000,000	
2033	\$3,748,000,000	\$1,466,000,000	2033	\$1,559,000,000	\$610,000,000	\$796,000,000	\$8,844,000,000	
2034	\$3,897,000,000	\$1,498,000,000	2034	\$1,621,000,000	\$623,000,000	\$831,000,000	\$9,675,000,000	
2035	\$4,061,000,000	\$1,531,000,000	2035	\$1,689,000,000	\$637,000,000	\$864,000,000	\$10,539,000,000	
2036	\$4,224,000,000	\$1,565,000,000	2036	\$1,757,000,000	\$651,000,000	\$901,000,000	\$11,440,000,000	
2037	\$4,394,000,000	\$1,599,000,000	2037	\$1,828,000,000	\$665,000,000	\$936,000,000	\$12,376,000,000	
2038	\$4,571,000,000	\$1,635,000,000	2038	\$1,902,000,000	\$680,000,000	\$979,000,000	\$13,355,000,000	
2039	\$4,755,000,000	\$1,670,000,000	2039	\$1,978,000,000	\$695,000,000	\$1,021,000,000	\$14,376,000,000	
2040	\$4,947,000,000	\$1,707,000,000	2040	\$2,058,000,000	\$710,000,000	\$1,064,000,000	\$15,440,000,000	
	<b>\$72,006,000,000</b>	<b>\$29,091,000,000</b>	Revenues (Fed+State)	<b>\$29,954,000,000</b>	<b>\$12,102,000,000</b>	<b>\$15,440,000,000</b>		<b>\$57,496,000,000</b>
			Revenues (Local)			\$150,000,000		<b>\$150,000,000</b>
			Total Revenues	<b>\$29,954,000,000</b>	<b>\$12,102,000,000</b>	<b>\$15,590,000,000</b>		<b>\$57,646,000,000</b>

# Appendix E: Revenues and Cost Estimates

The following table shows the breakdown of forecasted revenues for each mode by federal and state dollars. This table assumes that the current modal allocation for federal dollars (78 percent of federal dollars for highways and 22 percent of federal dollars for transit) will hold in future years.

**Maximize2040 Regional Revenue Forecasts – Federal/State Breakdown by Mode**

	Federal		State		Totals	
	Highways	Transit	Highways	Transit	Highways	Transit
2020	\$289,000,000	\$82,000,000	\$1,209,000,000	\$341,000,000	\$1,498,000,000	\$423,000,000
2021	\$298,000,000	\$84,000,000	\$1,254,000,000	\$354,000,000	\$1,552,000,000	\$438,000,000
2022	\$304,000,000	\$86,000,000	\$1,303,000,000	\$368,000,000	\$1,607,000,000	\$454,000,000
2023	\$311,000,000	\$88,000,000	\$1,351,000,000	\$381,000,000	\$1,662,000,000	\$469,000,000
2024	\$288,000,000	\$81,000,000	\$1,378,000,000	\$389,000,000	\$1,666,000,000	\$470,000,000
2025	\$297,000,000	\$84,000,000	\$1,431,000,000	\$404,000,000	\$1,728,000,000	\$488,000,000
2026	\$307,000,000	\$86,000,000	\$1,487,000,000	\$419,000,000	\$1,794,000,000	\$505,000,000
2027	\$315,000,000	\$89,000,000	\$1,544,000,000	\$435,000,000	\$1,859,000,000	\$524,000,000
2028	\$324,000,000	\$91,000,000	\$1,604,000,000	\$452,000,000	\$1,928,000,000	\$543,000,000
2029	\$334,000,000	\$94,000,000	\$1,665,000,000	\$470,000,000	\$1,999,000,000	\$564,000,000
2030	\$344,000,000	\$97,000,000	\$1,728,000,000	\$488,000,000	\$2,072,000,000	\$585,000,000
2031	\$355,000,000	\$100,000,000	\$1,795,000,000	\$506,000,000	\$2,150,000,000	\$606,000,000
2032	\$366,000,000	\$103,000,000	\$1,864,000,000	\$526,000,000	\$2,230,000,000	\$629,000,000
2033	\$377,000,000	\$106,000,000	\$1,936,000,000	\$546,000,000	\$2,313,000,000	\$652,000,000
2034	\$386,000,000	\$109,000,000	\$2,012,000,000	\$568,000,000	\$2,398,000,000	\$677,000,000
2035	\$403,000,000	\$114,000,000	\$2,085,000,000	\$588,000,000	\$2,488,000,000	\$702,000,000
2036	\$410,000,000	\$116,000,000	\$2,171,000,000	\$612,000,000	\$2,581,000,000	\$728,000,000
2037	\$423,000,000	\$119,000,000	\$2,252,000,000	\$635,000,000	\$2,675,000,000	\$754,000,000
2038	\$436,000,000	\$123,000,000	\$2,341,000,000	\$660,000,000	\$2,777,000,000	\$783,000,000
2039	\$449,000,000	\$127,000,000	\$2,432,000,000	\$686,000,000	\$2,881,000,000	\$813,000,000
2040	\$463,000,000	\$131,000,000	\$2,526,000,000	\$712,000,000	\$2,989,000,000	\$843,000,000
	<b>\$7,479,000,000</b>	<b>\$2,110,000,000</b>	<b>\$37,368,000,000</b>	<b>\$10,540,000,000</b>	<b>\$44,847,000,000</b>	<b>\$12,650,000,000</b>



### **Funding Breakdown: System Preservation Needs**

For this plan update, the federal agencies have requested that the BRTB show a breakdown of the funding projected for system preservation by project type. To comply with this request, SHA and MTA have provided the tables shown on the next page with the funding allocated for system preservation needs by project type.

### **Major Expansion Projects: Forecasted Revenues vs Estimated Costs**

Here is a breakdown of expected revenues versus total estimated costs for major expansion projects for the 2020-2029 and 2030-2040 periods. This breakdown demonstrates that the region expects to have sufficient funds to pay for the projects in *Maximize2040* in the time periods in which the region expects these projects to be implemented.

- Forecasted Revenues, 2020-2029: \$6,005,000,000
- Estimated Costs, 2020-2029: \$2,906,000,000
- Forecasted Revenues, 2030-2040: \$9,585,000,000
- Estimated Costs, 2030-2040: \$9,578,000,000

Shown on the pages following the system preservation tables are copies of the materials used to determine the funding anticipated to be available for implementing the programs and projects in *Maximize2040*:

- "Financially Constrained Long Range Plan, Year 2010 to 2040 Update for the Baltimore Metropolitan Area," prepared by the Maryland Department of Transportation
- Letter of commitment of funding from Anne Arundel County



# Appendix E: Revenues and Cost Estimates

Maximize2040: SHA Regional System Preservation Breakdown					
SHA System Preservation	2020	2021-2025	2026-2030	2031-2035	2036-2040
Pavement: Resurfacing / Rehabilitation		\$485,000,000	\$540,000,000	\$602,000,000	\$672,000,000
Congestion Management	\$91,000,000	\$57,000,000	\$64,000,000	\$71,000,000	\$79,000,000
Environmental	\$11,000,000	\$171,000,000	\$191,000,000	\$213,000,000	\$237,000,000
Safety and Spot Improvements	\$32,000,000	\$399,000,000	\$445,000,000	\$496,000,000	\$553,000,000
Urban Reconstruction	\$75,000,000	\$11,000,000	\$64,000,000	\$71,000,000	\$79,000,000
Bridges: Replacement / Rehabilitation	\$11,000,000	\$314,000,000	\$350,000,000	\$390,000,000	\$435,000,000
Enhancements / Alternative Transportation	\$59,000,000	\$29,000,000	\$32,000,000	\$35,000,000	\$40,000,000
<b>Totals</b>	<b>\$284,000,000</b>	<b>\$1,512,000,000</b>	<b>\$1,686,000,000</b>	<b>\$1,878,000,000</b>	<b>\$2,095,000,000</b>
					<b>\$7,455,000,000</b>

Maximize2040: MTA Regional System Preservation Breakdown					
Base Category	System Preservation Sub-Category	Sum of Percent of Total	2020	2021-2025	2026-2030
Admin/Maint Facilities	Agencywide Admin/Maint Facilities	1.18%	\$ 2,076,800	\$ 11,127,400	\$ 12,413,600
	Bus Admin/Maint Facilities	7.95%	\$ 13,992,000	\$ 74,968,500	\$ 83,634,000
	Light Rail Admin/Maint Facilities	0.11%	\$ 193,600	\$ 1,037,300	\$ 1,157,200
	MARC Admin/Maint Facilities	0.85%	\$ 1,496,000	\$ 8,015,500	\$ 8,945,000
	Mobility Admin/Maint Facilities	0.44%	\$ 774,400	\$ 4,149,200	\$ 4,628,800
<b>Admin/Maint Facilities Total</b>			<b>\$ 18,532,800</b>	<b>\$ 99,297,900</b>	<b>\$ 110,775,600</b>
Environmental	Agencywide Environmental	2.40%	\$ 4,224,000	\$ 22,632,000	\$ 25,248,000
	Infrastructure	11.30%	\$ 19,888,000	\$ 106,559,000	\$ 118,876,000
	Light Rail Infrastructure	4.21%	\$ 7,409,600	\$ 39,700,300	\$ 44,289,200
	MARC Infrastructure	10.56%	\$ 18,585,600	\$ 99,380,800	\$ 111,091,200
	Metro Infrastructure	8.28%	\$ 14,572,800	\$ 78,080,400	\$ 87,105,600
<b>Infrastructure Total</b>			<b>\$ 60,456,000</b>	<b>\$ 323,920,500</b>	<b>\$ 361,362,000</b>
IT Systems	Agencywide IT Systems	2.19%	\$ 3,854,400	\$ 20,651,700	\$ 23,038,800
	TP IT Systems	0.53%	\$ 1,108,800	\$ 5,940,900	\$ 6,627,600
	Agencywide Passenger Amenities	3.84%	\$ 6,758,400	\$ 36,211,200	\$ 40,396,800
	MARC Passenger Amenities	2.17%	\$ 3,819,200	\$ 20,463,100	\$ 22,828,400
	Metro Passenger Amenities	0.23%	\$ 404,800	\$ 2,168,900	\$ 2,419,600
<b>Passenger Amenities Total</b>			<b>\$ 10,982,400</b>	<b>\$ 58,843,200</b>	<b>\$ 65,644,800</b>
Rolling Stock	Agencywide Rolling Stock	0.32%	\$ 563,200	\$ 3,017,600	\$ 3,365,400
	Bus Rolling Stock	15.63%	\$ 27,508,800	\$ 147,290,900	\$ 164,427,600
	Light Rail Rolling Stock	8.17%	\$ 14,379,200	\$ 77,043,100	\$ 85,948,400
	MARC Rolling Stock	7.25%	\$ 12,760,000	\$ 68,367,500	\$ 76,270,000
	Metro Rolling Stock	10.52%	\$ 18,515,200	\$ 99,203,600	\$ 110,670,400
<b>Rolling Stock Total</b>			<b>\$ 76,859,200</b>	<b>\$ 411,808,100</b>	<b>\$ 459,408,400</b>
<b>Total</b>			<b>\$ 176,000,000</b>	<b>\$ 943,000,000</b>	<b>\$ 1,052,000,000</b>
<b>Grand Total</b>			<b>\$ 100.00%</b>		

Financially Constrained Long Range Plan  
Year 2010 to 2040 Update  
For The  
Baltimore Metropolitan Area

Prepared by  
Maryland Department of Transportation

August 2013  
(Extended to 2040 July 2014)

# Appendix E: Revenues and Cost Estimates

## DOCUMENTATION OF ASSUMPTIONS

**Date:** August 2013 (Extended to 2040 July 2014)

**Subject:** Methodology and Assumptions used to derive the  
2013 - 2040 Constrained Long-range Transportation Plan.

### Total Program Revenues/Expenditures (Operating and Capital):

- FY 1981 to FY 2012 figures are actual expenditures from historical records. FY 2013 to FY 2018 figures are from the FY 2013 Trust Fund Forecast and Consolidated Transportation Plan (CTP).
- The federal funds received directly by WMATA are **not** included in this exercise.
- FY 2019 to FY 2040 projections of state funds use a historical annual average growth rate of 3.89%. A regression model was used to determine the appropriate starting point in FY 2019. Federal fund projections for the same period are based on an average growth rate of 2.75% for Highway and 4.7% for Transit program funds, but also assume an O. A. of 90%.

### Operating Expenditures:

- FY 1981 to FY 2012 are actual expenditures from historical records. Expenditures for FY 2013 to FY 2018 are operating budget projections contained in the FY 2013 Trust Fund Forecast.
- FY 2019 to FY 2040 projections are derived by inflating the previous year with an estimate for the percentage change in CPI-U plus 2%. The Consumer Price Index is a generally accepted measure of inflation. The projected annual change in index figures is based on information received from two econometric firms, Global Insight and Moody's Analytics. A blended average of the forecasts received from the two firms is used. Two percent (2%) is added to the forecasted rate to account for the additional operating costs associated with new capital expansions. The size of this additional factor is decided based on testing to determine what amount, when added to CPI, best approximates the historical trend in operating expenditures.

### Capital - Systems Preservation:

- Department records were used to determine the split between systems preservation and expansion for FY 1981 to FY 2012. FY 2013 to FY 2018

represents the current version of the capital program adjusted for the revenue increase passed during the 2013 legislative session.

- An annual growth rate of 2.2% is assumed for systems preservation for the FY 2019 – FY 2040 period. This growth rate is based on a regression analysis of historical system preservation expenditures.

#### Capital - Expansion:

- Expenditures for capital expansion were derived by subtracting both operating and systems preservation expenditures from the total program expenditures for each year.

#### Baltimore Area - Percentage of Capital Expansion:

- Total capital figures from FY 1981 to Present were split into surface and non-surface. Surface included highway (SHA) and transit (MTA, MARC, & WMAT) costs. Non-surface included port, aviation, and motor vehicle administrations plus the Secretary's Office expenses.
- The surface / non-surface data and the system preservation / expansion data were combined, analyzed, and evaluated to produce estimates of the percentage of Maryland expansion associated with surface transportation for the various time periods.
- Surface capital in the Baltimore Region was derived by adding the expenditures for all of MTA (excluding LOTS and non-Baltimore region Park and Ride expenditures), one-half of MARC and that portion of SHA that pertained to the region (Anne Arundel, Baltimore, Carroll, Harford, and Howard counties).
- These Baltimore specific figures were used to derive estimates of Baltimore surface expansion. These figures, when used with the above-mentioned projections, produce the estimates shown for Baltimore as a percent of Total Surface Expansion.



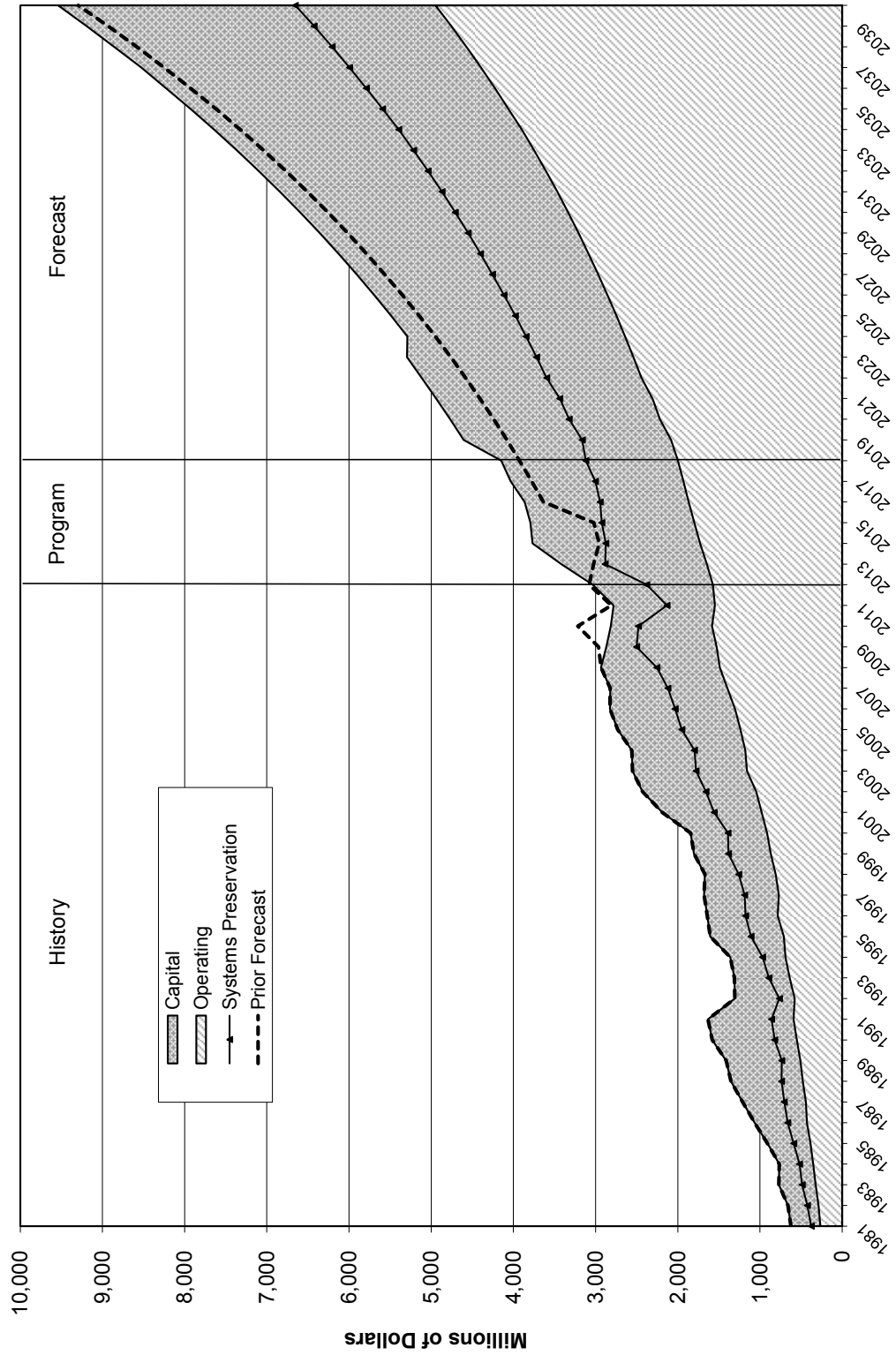
# Appendix E: Revenues and Cost Estimates

**MDOT Operating & Capital Expenditures - Statewide**  
History, Program & Forecast  
( Millions of Dollars )

Fiscal Year	Operating	Systems Preservation	Operating & Systems Pres.	Expansion	Statewide Total
1981	265	111	376	247	623
1982	287	136	423	236	659
1983	322	164	486	284	770
1984	352	167	519	246	765
1985	385	204	589	319	908
1986	428	234	662	403	1,065
1987	441	264	705	506	1,211
1988	478	260	738	615	1,353
1989	508	227	735	677	1,412
1990	551	270	821	760	1,581
1991	591	268	859	773	1,632
1992	577	187	764	542	1,306
1993	638	254	892	418	1,310
1994	689	279	968	393	1,361
1995	709	400	1,109	497	1,606
1996	784	391	1,175	465	1,640
1997	770	417	1,187	493	1,680
1998	808	451	1,259	411	1,670
1999	868	515	1,383	420	1,803
2000	913	476	1,389	455	1,844
2001	979	578	1,557	632	2,189
2002	1,045	612	1,657	772	2,429
2003	1,158	620	1,778	772	2,550
2004	1,178	619	1,797	762	2,559
2005	1,237	714	1,951	780	2,731
2006	1,303	729	2,032	793	2,825
2007	1,396	724	2,120	701	2,821
2008	1,488	766	2,254	680	2,934
2009	1,527	974	2,501	368	2,869
2010	1,583	896	2,479	336	2,815
2011	1,548	583	2,131	650	2,781
2012	1,572	806	2,378	656	3,034
2013	1,646	1,238	2,884	534	3,418
2014	1,728	1,148	2,876	891	3,767
2015	1,798	1,126	2,924	869	3,793
2016	1,867	1,078	2,945	918	3,863
2017	1,931	1,071	3,002	1,031	4,033
2018	1,998	1,121	3,119	1,029	4,148
2019	2,081	1,081	3,162	1,443	4,605
2020	2,217	1,105	3,322	1,447	4,769
2021	2,307	1,129	3,436	1,504	4,940
2022	2,441	1,154	3,595	1,521	5,116
2023	2,539	1,179	3,718	1,576	5,294
2024	2,641	1,205	3,846	1,444	5,290
2025	2,745	1,232	3,977	1,510	5,487
2026	2,855	1,259	4,114	1,579	5,693
2027	2,968	1,287	4,255	1,651	5,906
2028	3,086	1,315	4,401	1,726	6,127
2029	3,207	1,344	4,551	1,805	6,356
2030	3,334	1,373	4,707	1,887	6,594
2031	3,465	1,404	4,869	1,973	6,842
2032	3,604	1,434	5,038	2,061	7,099
2033	3,748	1,466	5,214	2,151	7,365
2034	3,897	1,498	5,395	2,246	7,641
2035	4,061	1,531	5,592	2,336	7,928
2036	4,224	1,565	5,789	2,438	8,227
2037	4,394	1,599	5,993	2,534	8,527
2038	4,571	1,635	6,206	2,652	8,858
2039	4,755	1,670	6,425	2,767	9,192
2040	4,947	1,707	6,654	2,884	9,538

MDOT - Office of Finance  
29-Jul-14

# MDOT Operating & Capital Expenditures - Statewide History, Program & Forecast



# Appendix E: Revenues and Cost Estimates

\* Original MDOT Page

## BALTIMORE METROPOLITAN AREA Percentage of Capital Expansion

Surface Enhancement % of Maryland Enhancement:	
1981 - 2012	87.7%

Baltimore Enhancement % of Surface Enhancement:	
1981 - 2012	41.6%



Fiscal Year	Statewide Expansion Funds	Surface Percentage	Private Funds	Total Surface Available	Baltimore Percentage	Baltimore New Starts	Total Balto. Expansion Funds
2010	336						192
2011	650						173
2012	656						229
2013	534						231
2014	891						426
2015	869						250
2016	918						231
2017	1,031						284
2018	1,029						576
2019	1,433	1,257	23	1,280	533	100	633
2020	1,447	1,269	23	1,292	538	100	638
2021	1,504	1,319	23	1,342	559	100	659
2022	1,521	1,334	23	1,357	565	100	665
2023	1,576	1,382	23	1,405	585	97	682
2024	1,444	1,266	24	1,290	537	0	537
2025	1,510	1,324	24	1,348	561	0	561
2026	1,579	1,385	24	1,409	587	0	587
2027	1,651	1,448	24	1,472	613	0	613
2028	1,726	1,514	24	1,538	640	0	640
2029	1,805	1,583	25	1,608	670	0	670
2030	1,887	1,654	25	1,679	699	0	699
2031	1,973	1,730	25	1,755	731	0	731
2032	2,061	1,807	25	1,832	763	0	763
2033	2,151	1,886	25	1,911	796	0	796
2034	2,246	1,969	26	1,995	831	0	831
2035	2,336	2,048	26	2,074	864	0	864
2036	2,438	2,138	26	2,164	901	0	901
2037	2,534	2,222	26	2,248	936	0	936
2038	2,652	2,326	26	2,352	979	0	979
2039	2,767	2,426	27	2,453	1,021	0	1,021
2040	2,884	2,529	27	2,556	1,064	0	1,064
Total 19-40	29,850	26,175	412	26,587	11,072	497	16,470
Total 10-40	36,764						19,062

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\* Revised Page – New Starts Funding Removed

## BALTIMORE METROPOLITAN AREA Percentage of Capital Expansion

Surface Enhancement % of Maryland Enhancement:	
1981 - 2012	87.7%

Baltimore Enhancement % of Surface Enhancement:	
1981 - 2012	41.6%



Fiscal Year	Statewide Expansion Funds	Surface Percentage	Private Funds	Total Surface Available	Baltimore Percentage	Baltimore New Starts	Total Balto. Expansion Funds
2010	336						192
2011	650						173
2012	656						229
2013	534						231
2014	891						426
2015	869						250
2016	918						231
2017	1,031						284
2018	1,029						576
2019	1,433	1,257	23	1,280	533	0	533
2020	1,447	1,269	23	1,292	538	0	538
2021	1,504	1,319	23	1,342	559	0	559
2022	1,521	1,334	23	1,357	565	0	565
2023	1,576	1,382	23	1,405	585	0	585
2024	1,444	1,266	24	1,290	537	0	537
2025	1,510	1,324	24	1,348	561	0	561
2026	1,579	1,385	24	1,409	587	0	587
2027	1,651	1,448	24	1,472	613	0	613
2028	1,726	1,514	24	1,538	640	0	640
2029	1,805	1,583	25	1,608	670	0	670
2030	1,887	1,654	25	1,679	699	0	699
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2038	2,652	2,326	26	2,352	979	0	979
2039	2,767	2,426	27	2,453	1,021	0	1,021
2040	2,884	2,529	27	2,556	1,064	0	1,064
Total '19-'40	29,850	26,175	412	26,587	11,072	0	15,973
Total '10-'40	36,764						18,565

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# Appendix E: Revenues and Cost Estimates



2664 RIVA ROAD, P.O. BOX 6675  
ANNAPOLIS, MARYLAND 21401  
OFFICE OF PLANNING AND ZONING

August 14, 2014

Mr. Todd Lang  
Transportation Planning Director  
Baltimore Metropolitan Council  
Offices @ McHenry Row  
15900 Whetsone Way, Suite 300  
Baltimore, Maryland 21230

SUBJECT: PROJECTED AVAILABILITY OF LOCAL FUNDING FOR  
TRANSPORTATION FOR PROJECTS PROPOSED FOR THE REGIONAL LONG RANGE  
PLAN

Dear Mr. Lang:

Based on development forecasts and assuming use of impact fees for transportation per County code, it is estimated that Anne Arundel County will have approximately \$ 150 million available for projects that have been recommended for inclusion in the Baltimore Region's Long Range Transportation Plan from projected revenues from impact fees assessed by the County. This estimate covers the period from 2015 until 2040.

Use of impact fees for specific projects is subject to availability approval of the County Executive and appropriation by the County Council.

Please contact me at (410) 222-7440 if you have any questions.

Sincerely,

Harvey Gold  
BRTB Representative

*cc: for GGC*  
Cc: G Cardwell  
J: BRTB/ LRP Local Funding 8-15-14

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## Cost Estimating Methodology

Estimating project costs for *Maximize2040* was a joint effort that included the assistance of staff from state agencies, local jurisdictions, transportation consultants, and BMC. The Maryland State Highway Administration (SHA) provided cost estimates for state highway facilities. Sponsoring jurisdictions supplied cost estimates for local facilities. The Maryland Transit Administration (MTA) developed capital cost estimates for transit projects.

In practical terms, there are at least two rounds of cost development. The first estimate, expressed in year of expenditure dollars, is less intensive. This first-round estimate is developed for use in documents such as *Maximize2040*. The second, more detailed, estimate is developed as the project moves to project planning and is reviewed at least once a year to reflect updates to fields in the cost estimating program. When developing cost estimates, however, there are some basic principles and factors that can and should be identified early in the process to minimize errors throughout the design process. Some of these considerations are:

- Identify all potential impacts before a project gets initial funding and provide reasonable costs with contingencies to cover those impacts.
- Make sure that all specifications clearly define the scope of work.
- Use standard pay items from the category code book whenever possible.

## Estimating Highway Project Costs

The cost estimates for *Maximize2040* highway projects were guided by SHA's *2014 Highway Construction Cost Estimating Manual*. The manual is intended to provide uniform and consistent guidelines for the preparation of engineering cost estimates on highway construction projects.

Documented below is the methodology that SHA used to develop cost estimates for highway projects for consideration in *Maximize2040*. Details on individual projects vary depending on the level of project development (e.g., whether the project is in the preliminary or final engineering phase, whether the project sponsor has completed the required environmental documentation, whether right of way has been acquired, etc.).



Projects that have progressed into some stage of SHA project planning utilize the latest Consolidated Transportation program (CTP) estimates. These estimates document detailed Project Planning (PP), Preliminary Engineering (PE), Right-of-way (RW), and Construction (CO) phases of a project and are updated on an annual basis. When a selected alternative has not yet been chosen, the CTP assumes the highest cost of the most reasonable alternative. Right-of-way costs are provided by the SHA District office.

# Appendix E: Revenues and Cost Estimates

For projects not included in the CTP, staff developed a cost-per-mile estimate by applying information provided in the 2014 SHA Highway Construction Cost Estimating Manual. SHA personnel have reviewed each project's characteristics individually and have utilized the following cost assumptions:

- Roadway length and lane miles: Project costs include new lane miles and additional full-depth shoulder where applicable. New construction is estimated at \$1.6 million per lane mile, including grading (Category 2), paving (Category 5), and shoulders (Category 6).
- Drainage Items: determined by calculating both the hydraulic structure costs for drainage spillways and earthwork costs (\$32/mile Class I Excavation) necessary to construct the adjacent stormwater management facilities.
- Small Structures: Estimated using SHA's asset management system. Costs are: retaining walls (\$150/sf), box culverts (\$250/sf), and bridge removal (\$35/sf).
- Bridges: Estimated using SHA's asset management system and aerial mapping. Costs are: bridge over water, span < 55 feet (\$225/sf); bridge over water, span > 55 feet (\$215/sf); bridge over roadway (\$175/sf); bridge deck replacement (\$100/sf); and bridge superstructure replacement (\$200/sf).
- Sidewalks: Estimated using aerial mapping. Costs are: \$9/sf.
- Curb and Gutter: Estimated using aerial mapping. Costs are: \$35/lf.
- Signal Modification: Estimated using aerial mapping. Costs are: \$65,000/each, one structure per affected leg.
- Pavement Markings: Estimated using aerial mapping. Costs are: 5" epoxy markings (\$2.10/LF), 5-inch preformed thermoplastic markings (\$3.90/LF), 5-inch lead-free reflective thermoplastic (\$0.85/LF), and 5-inch permanent preformed patterned marking tape (\$3.50/LF).
- Resurfacing: Estimated using aerial mapping. Costs are: \$100,000/sf of existing pavement to remain.



The following percentages from SHA's Cost Manual have been applied to: small structures, bridges, sidewalks, signal modifications, curb and gutter, and resurfacing:

- 40% – Category 1 – Preliminary items
- 0-30% – Category 7 – Landscaping
- 15-45% – Utilities
- 40% – Contingencies (Page F3)

## Assumptions:

- Administrative/Overhead: A 15.3% contingency is applied to the combined construction cost estimated for administrative/overhead items.
- Preliminary Engineering – a 15% contingency is applied to the construction cost estimate combined with the environmental/administrative/overhead contingencies for preliminary engineering.

### **Estimating Transit Project Costs**

MTA developed rail transit cost estimates utilizing the cost estimating methodology developed for a recent light rail project. Net construction costs (includes overhead) were estimated for mainline, vehicle, and station costs, including those for tunnels and elevated or at-grade guideways. A contingency of 40% was added to these costs due to the lack of detailed design. "Soft costs" were estimated at 32% for design fees and other associated items. Right of way costs were then included in estimates.

Bus Rapid Transit (BRT) cost estimates were developed using an average industry standard of \$20 million per mile.



### **Year of Expenditure Cost Estimates**

In all cases, BMC staff applied a 2.2% annual inflation rate to account for capital cost escalation and to determine year of expenditure cost estimates as required by MAP-21. This rate is consistent with the rate that MDOT uses to determine system preservation funding needs through FY 2040.