



# Chapter 6:

## Financial Plan







# FINANCIAL PLAN

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



## Definitions – Roadway Funding

### 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 Funding

### 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.

## Major Capital Projects

The remaining \$12.162 billion will be available to fund major capital projects. Examples of such projects include major new or widened roads, major roadway and bridge rehabilitations, and major new or expanded transit service.

## Revenues Reasonably Expected to Be Available

The FAST Act and its predecessors have required regional transportation plans to be fiscally constrained. That is, the total estimated costs of projects and programs cannot exceed forecasted revenue levels.

For *Maximize2045*, 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 expects will be available for the 22-year period from 2024-2045.

### Forecasted Revenues

Shown below are forecasted revenues (from federal, state, local, and private sources) for *Maximize2045*, broken down by investment category:

#### *Maximize2045 (covering 22 years: 2024-2045):*

System operations:	\$36.749 billion	56.4%
System preservation:	\$16.270 billion	25.0%
Major capital projects:	<u>\$12.162 billion</u>	18.7%
Total revenues:	<b>\$65.181 billion</b>	

Here are revenue breakdowns from the two preceding plans, showing how the relative portions for these categories have shifted over time:

#### *2015 plan (covering 21 years: 2020-2040):*

System operations:	\$29.954 billion	52.0%
System preservation:	\$12.102 billion	21.0%
Major capital projects:	<u>\$15.590 billion</u>	27.0%
Total revenues:	<b>\$57.646 billion</b>	

#### *2011 plan (covering 20 years: 2016-2035):*

System operations:	\$24.048 billion	53.1%
System preservation:	\$ 9.392 billion	20.8%
Major capital projects:	<u>\$11.819 billion</u>	26.1%
Total revenues:	<b>\$45.260 billion</b>	

### Forecasted Revenues by Year: 2024-2045

The table below shows forecasted revenues by year for system operations, system preservation, and major capital projects in the region. Consistent with MDOT assumptions, the BRTB has assumed that 40.3% of statewide revenues (federal + state + private funds) will be available for the Baltimore region for the 2024-2045 period.

### Maximize2045: Regional Revenue Forecasts – System Operations, System Preservation, and Major Capital Projects

#### MDOT Statewide Revenue Projections

	Operations	Preservation
2024	\$2,592,000,000	\$1,259,000,000
2025	\$2,696,000,000	\$1,332,000,000
2026	\$2,811,000,000	\$1,408,000,000
2027	\$2,924,000,000	\$1,490,000,000
2028	\$3,043,000,000	\$1,575,000,000
2029	\$3,176,000,000	\$1,661,000,000
2030	\$3,313,000,000	\$1,698,000,000
2031	\$3,451,000,000	\$1,732,000,000
2032	\$3,597,000,000	\$1,766,000,000
2033	\$3,754,000,000	\$1,802,000,000
2034	\$3,911,000,000	\$1,838,000,000
2035	\$4,079,000,000	\$1,874,000,000
2036	\$4,257,000,000	\$1,912,000,000
2037	\$4,433,000,000	\$1,950,000,000
2038	\$4,633,000,000	\$1,989,000,000
2039	\$4,837,000,000	\$2,029,000,000
2040	\$5,042,000,000	\$2,070,000,000
2041	\$5,258,000,000	\$2,111,000,000
2042	\$5,475,000,000	\$2,153,000,000
2043	\$5,717,000,000	\$2,196,000,000
2044	\$5,963,000,000	\$2,240,000,000
2045	\$6,228,000,000	\$2,285,000,000
<b>Total</b>	<b>\$91,190,000,000</b>	<b>\$40,370,000,000</b>

#### Baltimore Region Revenue Projections (40.3% of Statewide Totals for Operations and Preservation)

	Operations	Preservation	Major Capital	Cumulative Major Capital	Totals
2024	\$1,045,000,000	\$507,000,000	\$197,000,000	\$197,000,000	\$1,749,000,000
2025	\$1,086,000,000	\$537,000,000	\$208,000,000	\$405,000,000	\$1,831,000,000
2026	\$1,133,000,000	\$567,000,000	\$219,000,000	\$624,000,000	\$1,919,000,000
2027	\$1,178,000,000	\$600,000,000	\$232,000,000	\$856,000,000	\$2,010,000,000
2028	\$1,226,000,000	\$635,000,000	\$245,000,000	\$1,101,000,000	\$2,106,000,000
2029	\$1,280,000,000	\$669,000,000	\$258,000,000	\$1,359,000,000	\$2,207,000,000
2030	\$1,335,000,000	\$684,000,000	\$290,000,000	\$1,649,000,000	\$2,309,000,000
2031	\$1,391,000,000	\$698,000,000	\$328,000,000	\$1,977,000,000	\$2,417,000,000
2032	\$1,450,000,000	\$712,000,000	\$368,000,000	\$2,345,000,000	\$2,530,000,000
2033	\$1,513,000,000	\$726,000,000	\$409,000,000	\$2,754,000,000	\$2,648,000,000
2034	\$1,576,000,000	\$741,000,000	\$455,000,000	\$3,209,000,000	\$2,772,000,000
2035	\$1,644,000,000	\$755,000,000	\$503,000,000	\$3,712,000,000	\$2,902,000,000
2036	\$1,716,000,000	\$771,000,000	\$553,000,000	\$4,265,000,000	\$3,040,000,000
2037	\$1,786,000,000	\$786,000,000	\$609,000,000	\$4,874,000,000	\$3,181,000,000
2038	\$1,867,000,000	\$802,000,000	\$665,000,000	\$5,539,000,000	\$3,334,000,000
2039	\$1,949,000,000	\$818,000,000	\$725,000,000	\$6,264,000,000	\$3,492,000,000
2040	\$2,032,000,000	\$834,000,000	\$791,000,000	\$7,055,000,000	\$3,657,000,000
2041	\$2,119,000,000	\$851,000,000	\$861,000,000	\$7,916,000,000	\$3,831,000,000
2042	\$2,206,000,000	\$868,000,000	\$939,000,000	\$8,855,000,000	\$4,013,000,000
2043	\$2,304,000,000	\$885,000,000	\$1,017,000,000	\$9,872,000,000	\$4,206,000,000
2044	\$2,403,000,000	\$903,000,000	\$1,101,000,000	\$10,973,000,000	\$4,407,000,000
2045	\$2,510,000,000	\$921,000,000	\$1,189,000,000	\$12,162,000,000	\$4,620,000,000
Revenues (Fed+State)	<b>\$36,749,000,000</b>	<b>\$16,270,000,000</b>	<b>\$12,162,000,000</b>		<b>\$65,181,000,000</b>
Revenues (Local)			\$0		\$0
Total Revenues	<b>\$36,749,000,000</b>	<b>\$16,270,000,000</b>	<b>\$12,162,000,000</b>		<b>\$65,181,000,000</b>
Total Costs	<b>\$36,749,000,000</b>	<b>\$16,270,000,000</b>	<b>\$12,057,000,000</b>		<b>\$65,181,000,000</b>
Potential Set-Aside Amount			<b>\$105,000,000</b>		
% of Total Costs	<b>56.4%</b>	<b>25.0%</b>	<b>18.5%</b>		

### Forecasted Federal Revenues by Funding Program: 2024-2045

During the most recent federal certification review, conducted in 2016 by a team of FHWA and FTA staff members, the review team recommended that the next long-range regional transportation plan include a breakdown of forecasted federal revenues by funding program. BMC staff has applied the percentages accounted for by the major federal funding programs in the FY 2019 federal apportionment to MDOT as a means to estimate how these federal revenues might break down in the period from 2024-2045. The following table shows that breakdown. There is no guarantee that these funding programs will be available in their present forms throughout the next 25 years. There also is no guarantee that these same percentages will apply in the future, or that MDOT will continue to provide the same level of state funding for projects. However, this approach seems to be the best way to address the recommendation from the 2016 certification process review team and to provide a possible scenario for how federal funding might be apportioned in the region in the future.

### Maximize2045 Regional Revenue Forecasts – by Federal Funding Program

	FHWA				FTA			Totals		Total Revenues
	NHP	STBG	HSIP	CMAQ	S5307	S5337	S5339	Highways	Transit	
2024	\$307,000,000	\$155,000,000	\$32,000,000	\$50,000,000	\$230,000,000	\$96,000,000	\$14,000,000	\$544,000,000	\$340,000,000	\$1,749,000,000
2025	\$322,000,000	\$162,000,000	\$33,000,000	\$52,000,000	\$241,000,000	\$100,000,000	\$14,000,000	\$569,000,000	\$355,000,000	\$1,831,000,000
2026	\$337,000,000	\$170,000,000	\$35,000,000	\$55,000,000	\$252,000,000	\$105,000,000	\$15,000,000	\$597,000,000	\$372,000,000	\$1,919,000,000
2027	\$353,000,000	\$178,000,000	\$36,000,000	\$57,000,000	\$264,000,000	\$110,000,000	\$16,000,000	\$624,000,000	\$390,000,000	\$2,010,000,000
2028	\$370,000,000	\$186,000,000	\$38,000,000	\$60,000,000	\$277,000,000	\$115,000,000	\$17,000,000	\$654,000,000	\$409,000,000	\$2,106,000,000
2029	\$388,000,000	\$195,000,000	\$40,000,000	\$63,000,000	\$290,000,000	\$121,000,000	\$17,000,000	\$686,000,000	\$428,000,000	\$2,207,000,000
2030	\$406,000,000	\$204,000,000	\$42,000,000	\$66,000,000	\$304,000,000	\$127,000,000	\$18,000,000	\$718,000,000	\$449,000,000	\$2,309,000,000
2031	\$425,000,000	\$214,000,000	\$44,000,000	\$69,000,000	\$318,000,000	\$132,000,000	\$19,000,000	\$752,000,000	\$469,000,000	\$2,417,000,000
2032	\$445,000,000	\$224,000,000	\$46,000,000	\$72,000,000	\$333,000,000	\$139,000,000	\$20,000,000	\$787,000,000	\$492,000,000	\$2,530,000,000
2033	\$465,000,000	\$234,000,000	\$48,000,000	\$75,000,000	\$348,000,000	\$145,000,000	\$21,000,000	\$822,000,000	\$514,000,000	\$2,648,000,000
2034	\$487,000,000	\$245,000,000	\$50,000,000	\$79,000,000	\$364,000,000	\$152,000,000	\$22,000,000	\$861,000,000	\$538,000,000	\$2,772,000,000
2035	\$510,000,000	\$257,000,000	\$52,000,000	\$83,000,000	\$382,000,000	\$159,000,000	\$23,000,000	\$902,000,000	\$564,000,000	\$2,902,000,000
2036	\$534,000,000	\$269,000,000	\$55,000,000	\$87,000,000	\$400,000,000	\$167,000,000	\$24,000,000	\$945,000,000	\$591,000,000	\$3,040,000,000
2037	\$559,000,000	\$281,000,000	\$57,000,000	\$91,000,000	\$418,000,000	\$174,000,000	\$25,000,000	\$988,000,000	\$617,000,000	\$3,181,000,000
2038	\$586,000,000	\$295,000,000	\$60,000,000	\$95,000,000	\$438,000,000	\$183,000,000	\$26,000,000	\$1,036,000,000	\$647,000,000	\$3,334,000,000
2039	\$614,000,000	\$309,000,000	\$63,000,000	\$99,000,000	\$459,000,000	\$191,000,000	\$28,000,000	\$1,085,000,000	\$678,000,000	\$3,492,000,000
2040	\$643,000,000	\$323,000,000	\$66,000,000	\$104,000,000	\$481,000,000	\$200,000,000	\$29,000,000	\$1,136,000,000	\$710,000,000	\$3,657,000,000
2041	\$673,000,000	\$339,000,000	\$69,000,000	\$109,000,000	\$504,000,000	\$210,000,000	\$30,000,000	\$1,190,000,000	\$744,000,000	\$3,831,000,000
2042	\$705,000,000	\$355,000,000	\$72,000,000	\$114,000,000	\$528,000,000	\$220,000,000	\$32,000,000	\$1,246,000,000	\$780,000,000	\$4,013,000,000
2043	\$739,000,000	\$372,000,000	\$76,000,000	\$120,000,000	\$553,000,000	\$230,000,000	\$33,000,000	\$1,307,000,000	\$816,000,000	\$4,206,000,000
2044	\$774,000,000	\$390,000,000	\$79,000,000	\$126,000,000	\$579,000,000	\$241,000,000	\$35,000,000	\$1,369,000,000	\$855,000,000	\$4,407,000,000
2045	\$812,000,000	\$408,000,000	\$83,000,000	\$132,000,000	\$607,000,000	\$253,000,000	\$37,000,000	\$1,435,000,000	\$897,000,000	\$4,620,000,000
	<b>\$11,454,000,000</b>	<b>\$5,765,000,000</b>	<b>\$1,176,000,000</b>	<b>\$1,858,000,000</b>	<b>\$8,570,000,000</b>	<b>\$3,570,000,000</b>	<b>\$515,000,000</b>	<b>\$20,253,000,000</b>	<b>\$12,655,000,000</b>	<b>\$65,181,000,000</b>

FY 2024-2045  
 Total Estimated  
 Federal  
 Revenues **\$32,908,000,000**





### Fiscal Constraint: Forecasted Revenues vs. Major Capital Project Costs

Here is a breakdown of forecasted revenues versus total estimated year of expenditure costs for major capital projects for the 2024-2034 and 2035-2045 periods. This breakdown demonstrates that the region expects to have sufficient funds to pay for the projects in *Maximize2045* in the time periods in which the region expects these projects to be implemented.

Forecasted Revenues, 2024-2034:	\$3,209,000,000
Estimated YOE Costs, 2024-2034:	<u>\$3,196,000,000</u>
	\$13,000,000

Forecasted Revenues, 2035-2045:	\$8,953,000,000
Estimated YOE Costs, 2035-2045:	<u>\$8,861,000,000</u>
	\$92,000,000

The main resource used to determine the funding anticipated to be available for implementing the projects in *Maximize2045* is the document titled *Financially Constrained Long Range Plan, Year 2017 to 2045 Update for the Baltimore Metropolitan Area*, prepared by the Maryland Department of Transportation. This document is included on the following pages.

Material on the cost estimating methodologies that MDOT SHA and MDT MTA used to develop roadway and transit projects appears following the MDOT Financially Constrained Long Range Plan document.



The region expects to have sufficient funds to pay for the projects in *Maximize2045* in the time periods in which the region expects these projects to be implemented.

Financially Constrained Long Range Plan

Year 2017 to 2045 Update

For The

Baltimore Metropolitan Area

Prepared by

Maryland Department of Transportation

August 2017



DOCUMENTATION OF ASSUMPTIONS

**Date:** August 2017

**Subject:** Methodology and Assumptions used to derive the 2017 – 2045 Constrained Long-range Transportation Plan

Total Program Revenues/Expenditures (operating and capital):

- FY 1981 to FY 2016 figures are actual expenditures from historical records. FY 2017 to FY 2022 are from the FY 2017 Transportation Trust Fund Financial Plan and Consolidated Transportation Plan (CTP).
- The federal funds received directly by WMATA are not included in this exercise.
- FY 2023 to FY 2045 projections of state funds use a historical annual average growth rate of 5.3%. Federal fund projections for the same period are based on an average growth rate of 3.0% for Highway and Transit program funds.

Operating Expenditures:

- FY 1981 to FY 2016 figures are actual expenditures from historical records. Expenditures for FY 2017 to FY 2022 are the operating budget projections contained in the current Trust Fund Forecast.
- FY 2023 to FY 2045 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 economic forecasting firms. Two percent (2%) is added to the forecasted rate to account for the additional operating costs associated with new capital expansions.

Capital - Systems Preservation:

- Department records were used to determine the split between systems preservation and expansion for FY 1981 to FY 2016. Amounts for FY 2017 to FY 2022 represent the current version of the capital program.
- For the period FY 2023 – FY 2045, an annual growth rate of 2.0% is assumed for systems preservation projects, not to exceed 70% of the total program.

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, and WMATA) costs. Non-surface included the Maryland Port, Aviation, and Motor Vehicle Administrations and 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 and as a percent of Total Maryland Expansion.

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	187	519	246	765
1985	385	204	589	319	908
1986	428	234	662	403	1,065
1987	441	264	705	508	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	642	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	478	1,399	455	1,844
2001	979	578	1,557	632	2,189
2002	1,045	612	1,657	772	2,429
2003	1,156	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	1,366	724	2,120	701	2,821
2008	1,488	765	2,254	680	2,934
2009	1,527	974	2,501	368	2,869
2010	1,563	957	2,540	275	2,815
2011	1,548	908	2,456	325	2,781
2012	1,672	1,066	2,668	366	3,034
2013	1,638	1,164	2,792	416	3,208
2014	1,843	1,324	3,167	477	3,644
2015	1,859	1,438	3,297	603	3,900
2016	1,917	1,389	3,306	606	4,112
2017	1,947	1,560	3,507	1,123	4,630
2018	2,030	1,580	3,610	1,071	4,681
2019	2,080	1,557	3,637	1,005	4,642
2020	2,131	1,475	3,606	687	4,293
2021	2,181	1,391	3,572	483	4,055
2022	2,264	1,449	3,713	400	4,113
2023	2,454	1,284	3,738	550	4,288
2024	2,592	1,259	3,851	540	4,391
2025	2,696	1,332	4,028	571	4,599
2026	2,811	1,408	4,219	603	4,822
2027	2,924	1,490	4,414	639	5,053
2028	3,043	1,576	4,619	676	5,295
2029	3,176	1,661	4,837	712	5,548
2030	3,313	1,688	5,011	805	5,816
2031	3,451	1,732	5,183	914	6,097
2032	3,597	1,766	5,363	1,030	6,393
2033	3,754	1,802	5,556	1,146	6,702
2034	3,911	1,838	5,749	1,279	7,028
2035	4,079	1,874	5,953	1,416	7,369
2036	4,257	1,912	6,169	1,559	7,728
2037	4,433	1,950	6,383	1,721	8,104
2038	4,633	1,989	6,622	1,879	8,501
2039	4,837	2,029	6,866	2,052	8,918
2040	5,042	2,070	7,112	2,242	9,354
2041	5,258	2,111	7,369	2,444	9,813
2042	5,475	2,153	7,628	2,667	10,295
2043	5,717	2,196	7,913	2,889	10,802
2044	5,963	2,240	8,203	3,131	11,334
2045	6,228	2,285	8,513	3,383	11,896



## BALTIMORE METROPOLITAN AREA Percentage of Capital Expansion

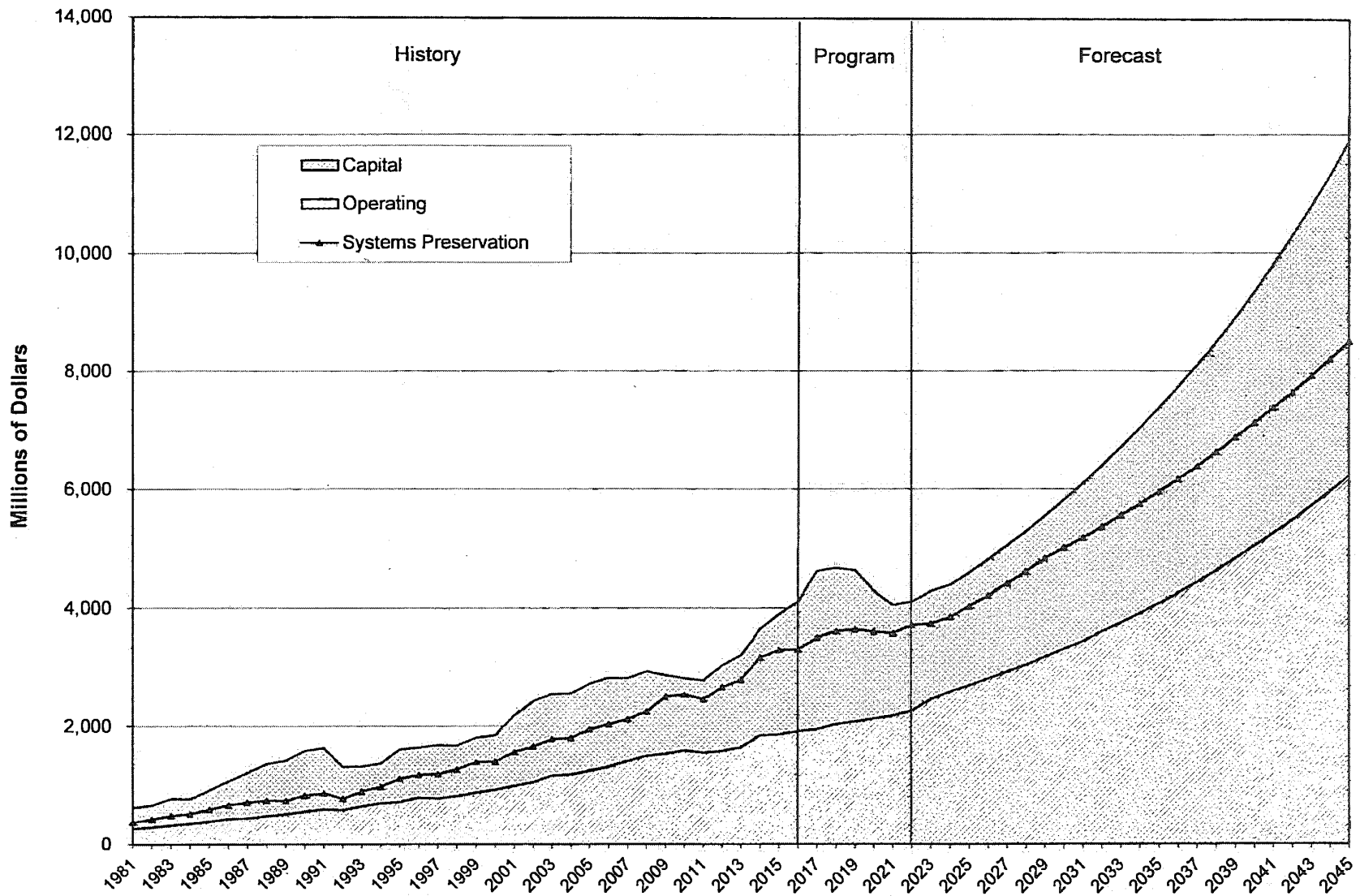
Surface Enhancement % of Maryland Enhancement:	
1981 - 2016	86.4%

Baltimore Enhancement % of Surface Enhancement:	
1981 - 2016	40.3%



Fiscal Year	Statewide Expansion Funds	Surface Percentage	Private Funds	Total Surface Available	Baltimore Percentage	Total Balto. Expansion Funds
2014	477					155
2015	603					192
2016	806					282
2017	1,123					90
2018	1,071					90
2019	1,005					107
2020	687					80
2021	483					83
2022	400					69
2023	550	475	23	498	201	201
2024	540	467	23	490	197	197
2025	571	493	23	516	208	208
2026	603	521	23	544	219	219
2027	639	552	23	575	232	232
2028	676	584	24	608	245	245
2029	712	615	24	639	258	258
2030	805	696	24	720	290	290
2031	914	790	24	814	328	328
2032	1,030	890	24	914	368	368
2033	1,146	990	25	1,015	409	409
2034	1,279	1,105	25	1,130	455	455
2035	1,416	1,224	25	1,249	503	503
2036	1,559	1,347	25	1,372	553	553
2037	1,721	1,487	25	1,512	609	609
2038	1,879	1,624	26	1,650	665	665
2039	2,052	1,773	26	1,799	725	725
2040	2,242	1,938	26	1,964	791	791
2041	2,444	2,112	26	2,138	861	861
2042	2,667	2,305	26	2,331	939	939
2043	2,889	2,497	27	2,524	1,017	1,017
2044	3,131	2,706	27	2,733	1,101	1,101
2045	3,383	2,924	27	2,951	1,189	1,189
<b>Total '23-'45</b>	<b>34,848</b>	<b>30,116</b>	<b>571</b>	<b>30,687</b>	<b>12,363</b>	<b>12,363</b>
<b>Total '14-'45</b>	<b>41,503</b>					<b>13,511</b>

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



## Cost Estimating Methodologies

Estimating project costs for *Maximize2045* was a joint effort that included the assistance of staff from state agencies, local jurisdictions, transportation consultants, and BMC. MDOT SHA provided cost estimates for state highway facilities. Sponsoring jurisdictions supplied cost estimates for local facilities, with assistance from MDOT SHA. MDOT MTA developed capital cost estimates for the transit projects it would operate. Sponsoring jurisdictions developed cost estimates for non-MTA-operated facilities and services.

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 *Maximize2045*. 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

For projects not included in the CTP, MDOT SHA staff utilized the all-inclusive (cost categories 1-8) cost per mile (CPM) from the *2017 MDOT SHA Cost Estimating Manual*. The MDOT SHA staff have reviewed each project's characteristics and have utilized the following methodology and estimation assumptions:

- Cost of new lanes are estimated assuming the project can add new lanes without the need of reconstructing existing lanes. The cost of resurfacing, at a rate of \$0.2 million / lane-mile, is included for all existing lanes.
- If no lanes are being added to an existing roadway, reconstruction of all existing lanes are still assumed. If only a segment of a roadway needs a lane addition, the engineer would review the project and determine the length of additional lane-mile needed.
- The lead engineer is provided flexibility to determine which CPM rate to apply for new lane-miles: low, median, or high. Given the existing project areas, the low CPM rate of \$3.7 million / lane-mile was used for all estimations.
- All interchanges within the project limit were reviewed to determine if the proposed improvements would require interchange reconstruction. The guide provides two interchange costs, dependent on the roadway classification of both roadways: \$110 million / full interchange for freeway-to-freeway interchanges or \$45 million / full interchange otherwise. The total interchange cost is determined by the cost per full interchange and the number of interchange quarters potentially impacted by the roadway improvement.
- The cost of Project Planning (PP) varies by project size as follows: for a construction cost under \$50 million, PP is calculated at 6.0%; for a construction cost between \$50 and \$99.9 million, PP is calculated at 2.5%; and for a construction cost greater than \$100 million, PP is calculated at 1.5%.
- The cost of Preliminary Engineering (PE) varies by project size as follows: for a construction cost under \$50 million, PE is calculated at 15%; for a construction cost of \$50 and \$99.9 million, PE is calculated at 10%; and for a construction cost greater than \$100 million, PE is calculated at 8.5%.
- A contingency rate of 40% of the construction cost is added to calculate the net construction cost.



- An overhead cost, an estimate of related administrative and incidental costs, is added to the cost of each project phase.
- The Right-of-Way (ROW) area needs were based on three factors: the existing MDOT SHA ROW area, the anticipated typical section width of the new roadway, and the length of the project. The anticipated typical section width is determined by the functional classification of the roadway, the project area terrain, and the speed limit of the roadway. Each project was reviewed to ensure these assumptions were appropriate and changes to the typical section width were made to reflect what could be feasibly done within the confines of the project area.
- The per acre ROW cost is based on annual average County cost, as provided by the MDOT SHA Office of Real Estate, taking into account roadway functional classification.

### Estimating Transit Project Costs

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

### Year of Expenditure Cost Estimates

In all cases, BMC staff applied a 2.0% annual inflation rate to account for capital cost escalation and to determine year of expenditure cost estimates as required by the FAST Act. This rate is consistent with the rate that MDOT uses to determine system preservation funding needs through FY 2045.

