

## CHAPTER 5

# FINANCIALLY CONSTRAINED ELEMENT

The financially constrained element of Visualize 2045 identifies all the regionally significant capital improvements to the region's highway and transit systems that transportation agencies expect to make and to be able to afford through 2045. It also outlines all anticipated spending on the current and future transportation system's operations and maintenance over the same timeframe. Any project that might affect future air quality by adding or removing highway or transit capacity is included in this portion of the plan.

The financially constrained element includes regionally significant projects and programs that seek to efficiently move people and goods using a variety of transportation modes. The investments spelled out in this element aim to meet the region's current mobility and accessibility needs, as well as those that will arise in the future.

There are three major types of projects and programs included in the financially constrained element. They are:

- 1. System Expansion.** Projects that add new capacity by increasing the number of lane-miles of roadway or by building new transit lines or adding service to existing lines.
- 2. State of Good Repair.** Major rehabilitation or complete replacement of aging infrastructure, including bridges, transit vehicles, and technology and communications systems, as they near the end of their useful lifespan.
- 3. Operations and Maintenance.** Day-to-day activities like repaving roadways, inspecting and maintaining bridges, clearing snow and debris, servicing transit vehicles, maintaining and operating traffic signals, and paying train and bus operators.



System expansion investments are detailed as specific projects in the plan. Anticipated investments in state of good repair and operations and maintenance are discussed more generally. These investment details are included as part of the financial analysis of the plan ([Appendix A](#)).

This chapter includes lists and maps of the projects as well as an analysis of how they will help bring the region closer to fulfilling the concepts called for in the seven endorsed aspirational initiatives. This chapter includes summaries of the financial plan and the Air Quality Conformity analysis. It also includes an analysis which demonstrates the projected future performance of the transportation system in 2045.

## FEDERAL REQUIREMENTS

Federal regulations require the TPB to develop a long-range transportation plan identifying the projects expected to be funded within a minimum planning horizon of 20 years. The TPB must demonstrate that there is funding available for those projects. The total expenditures cannot exceed the total anticipated funding. The TPB must also analyze the plan for its effect on the region's air quality.

## Projects in the Financially Constrained Element

The following lists and maps highlight more than 100 of the major and regionally significant projects that provide for system expansion and changes in highway or transit capacity. To view an interactive version of the maps in this chapter and to access the project database (including full technical descriptions), please visit [visualize2045.org/financially-constrained-element](https://visualize2045.org/financially-constrained-element).

In all, the plan includes 1,388 new lane-miles of roadway and 124 new miles of high-capacity transit. [Appendix B: Summary of Projects in the Financially Constrained Element](#) includes a comprehensive listing of all projects in the financially constrained element beyond those highlighted in this chapter (numbering over 600) along with their costs, completion dates, and links to further project information.

**Figure 5.1 Projects in the Financially Constrained Element**

*\*Tolled Lanes are a subset of Freeways/Expressways*

	System	Existing	Added by Visualize 2045	Total 2045
Roadway (lane miles)	Freeways / Expressways	3,589	+975	4,564
	Arterials	13,459	+413	13,872
	<b>Total</b>	<b>17,048</b>	<b>+1,388</b>	<b>18,436</b>
Tolled Lanes* (lane miles)		<b>436</b>	<b>+461</b>	<b>897</b>
High-Capacity Transit (miles)	Metrorail	119	+12	131
	Light Rail / Streetcar	2	+21	23
	Bus Rapid Transit	4	+91	95
	Commuter Rail	167	0	167
	<b>Total</b>	<b>292</b>	<b>+124</b>	<b>416</b>



## Major Highway Projects

### DISTRICT OF COLUMBIA

#### MAJOR HIGHWAYS

1. I-295 - reconstruct interchange at Malcolm X Blvd, 2020 (\$200M)
2. I-395 - remove 3rd St SB exit ramp, reconfigure 3rd St SB entrance and 2nd St NB exit ramps, reconnect F St between 2nd and 3rd St, 2019 (\$27M)

#### LOCAL ROADS

3. South Capitol St - convert to 6 lane urban blvd, incl. Frederick Douglass Bridge Reconstruction, 2021 (\$822M)
4. **Lane Reductions/Reconfigurations for Bicycle Lanes, 2018, 2019, 2020, 2024 (not mapped)**

### MARYLAND

#### MAJOR HIGHWAYS

5. I-70 - widen to 6 lanes with interchange at Meadow Rd, 2025, 2035 (\$143M)
6. I-95/I-495 - interchange at Greenbelt Metro Sta, 2030 (\$196M)
7. **I-95/I-495 Traffic Relief Plan, construct 4 managed lanes, 2025 (\$4.2B)**
8. **I-270 Traffic Relief Plan, construct 4 managed lanes, 2025 (\$3.4B)**
9. **I-270 - "Innovative Congestion Management" project to includes auxiliary lanes & add'l improvements, 2019 (\$114M)**
10. I-270 - interchange at Watkins Mill Rd Ext, 2021 (\$120M)
11. Baltimore Washington Parkway (MD-295) at MD-193 (Greenbelt Rd) - intersection improvement, 2020 (\$8.5M)
12. Suitland Pkwy - interchange at Rena/Forestville Rd, 2025 (\$2.8M)
13. US-1 (Baltimore Ave) - reconstruct 4 lanes, 2030 (\$116M)
14. US-15 (Catoctin Mtn Hwy) - reconstruct intersection at Monocacy Blvd, 2018 (\$61M)
15. **US-15 (Frederick Fwy and Catoctin Mtn Hwy) - widen to 6 lanes with interchange at Biggs Ford Rd, 2030, 2040, 2045 (\$220M)**
16. **US-29 (Columbia Pke) - improve interchanges at Stewart Ln, Tech Rd/Industrial Pkwy, Musgrove Rd/Fairland Rd, Greencastle Rd, and Blackburn Rd, 2045 (\$646M)**
17. US-50 (John Hanson Hwy) - westbound ramp to Columbia Park Rd, 2025 (\$64M)
18. **US-301 (Crain Hwy) - widen to 6 lanes, 2045 (\$4.6B)**

19. US-301 - widen Governor Harry Nice Memorial Bridge, 2023 (\$768M)

#### STATE ROUTES

20. MD-3 (Robert Crain Hwy) - widen to 6 lanes, 2035 (\$1.8B)
21. MD-4 (Pennsylvania Ave) - widen to 6 lanes with interchanges at Dowerhouse Rd, Westphalia Rd, and Suitland Pkwy, 2040 (\$533M)
22. MD-5 (Branch Ave) - upgrade, widen to 6 lanes including interchanges, 2035 (\$790M)
23. MD-28 (Norbeck Rd) / MD-198 (Spencerville Rd) - widen to 4, 6 lanes, 2045 (\$413M)
24. MD-85 (Buckeystown Pke) - widen to 4, 6 lanes, 2021, 2035 (\$220)
25. **MD-97 (Georgia Ave) - widen to 7, 8 lanes, 2025 (\$52M)**
26. MD-97 (Brookeville Bypass) - construct 2 lane bypass, 2021 (\$52M)
27. MD-117 (Clopper Rd) - widen to 4 lanes, 2030 (\$69M)
28. MD-118 (Germantown Rd) - widen to 4 lanes, 2020 (\$4.0M)
29. MD-124 (Woodfield Rd) - widen to 6 lanes, 2035 (\$129M)
30. MD-197 (Collington Rd) - widen to 4/5 lanes, 2025 (\$94M)
31. MD-202 (Landover Rd) - Largo Town Center Metro Access Improvement, reconstruct 6 lanes, 2045 (\$24M)
32. MD-210 (Indian Head Hwy) - upgrade to 6 lanes and interchange improvement, 2040 (\$754M)
33. MD-223 (Woodyard Rd) - widen to 4 lanes, 2020 (\$2.8M)
34. MD-450 (Annapolis Rd) - widen to 4 lanes, 2030 (\$67M)

#### LOCAL ROADS

35. Mid county Hwy Extension (M-83) - construct 4, 6 lanes, 2025 (\$202M)
36. Middlebrook Rd Extended - widen to 4 lanes, 2025 (\$16M)
37. Montrose Pkwy East - construct 4 lanes, 2025 (\$140M)

### VIRGINIA

#### MAJOR HIGHWAYS

38. I-66 HOT (Inside Beltway), revise operations from HOV 2+ to HOT during peak hours and bus service, 2017, 2021, 2040 (\$375M)
39. I-66 HOT (Outside Beltway) - widen to 6 lanes (3 general purpose, 2 HOT, and 1 auxiliary) and bus service, 2021, 2040 (\$4.4B)

40. I-66 - Extend existing westbound acceleration/deceleration lane, 2020, 2022 (\$59M)
41. I-95/Fairfax County Parkway - enhanced interchanges for BRAC, 2025 (\$57M)
42. **I-95 - add southbound auxiliary lane, 2028 (\$27M)**
43. I-95/I-495 - reconstruct interchange at Van Dorn St, 2030 (\$40M)
44. I-395 HOT - additional lane and revise operation from HOV 3+ during peak to HOT 3+, 2019 (\$220M)
45. I-395 - construct new south bound lane, 2018, 2020 (\$58M)
46. **I-495 - construct 4 HOT lanes, 2025 (\$500M)**
47. I-495 Auxiliary Lanes - construct 2 auxiliary lanes in both directions, 2030
48. I-495 - interchange at VA 267, 2030 (\$70M)
49. Dulles Toll Rd (VA-267) - Collector-Distributor Road west-bound, 2037 (\$62M)
50. Dulles Toll Rd (VA-267) - Collector-Distributor Road east-bound, 2036 (\$124M)
51. Dulles Toll Rd (VA-267) - interchange at New Boone Blvd Extension, 2037 (\$79M)
52. Dulles Toll Rd (VA-267) - interchange at Greensboro Drive/Tyco Rd, 2036 (\$28M)
53. Dulles Access Rd (VA 267) - widen to 6 lanes including interchange reconstruct at I-495, 2030 (\$40M)
54. US-1 (Jefferson Davis Hwy) - widen to 6 lanes, 2040 (\$58M)
55. US-1 (Richmond Hwy) - widen to 6 lanes, 2025, 2035 (\$37M)
56. US-1 (Richmond Hwy) - widen to 6 lanes, 2024, 2030 (\$127M)
57. US-1 (Richmond Hwy) - widen to 6 lanes, 2035 (\$125M)
58. US-15 (James Madison Hwy) - widen to 4 lanes, 2024, 2030 (\$45M)
59. **US-15 (James Madison Hwy) - widen to 4 lanes, 2022, 2025 (\$33M)**
60. US-15 (James Madison Hwy) - widen to 4 lanes, 2030, 2040 (\$54M)
61. US-29 (Lee Hwy) - widen to 5 lanes and improve I-66 interchange, 2030 (\$255M)
62. US-29 (Lee Hwy) - widen to 3, 6 lanes, 2017, 2025 (\$130M)
63. US-50 (Lee Jackson Memorial Hwy) - widen to 6 lanes, 2025 (\$100M)
64. US-50 (Arlington Blvd) - widen/reconstruct 6 lanes including interchanges, 2020, 2025 (\$249M)

## STATE ROUTES

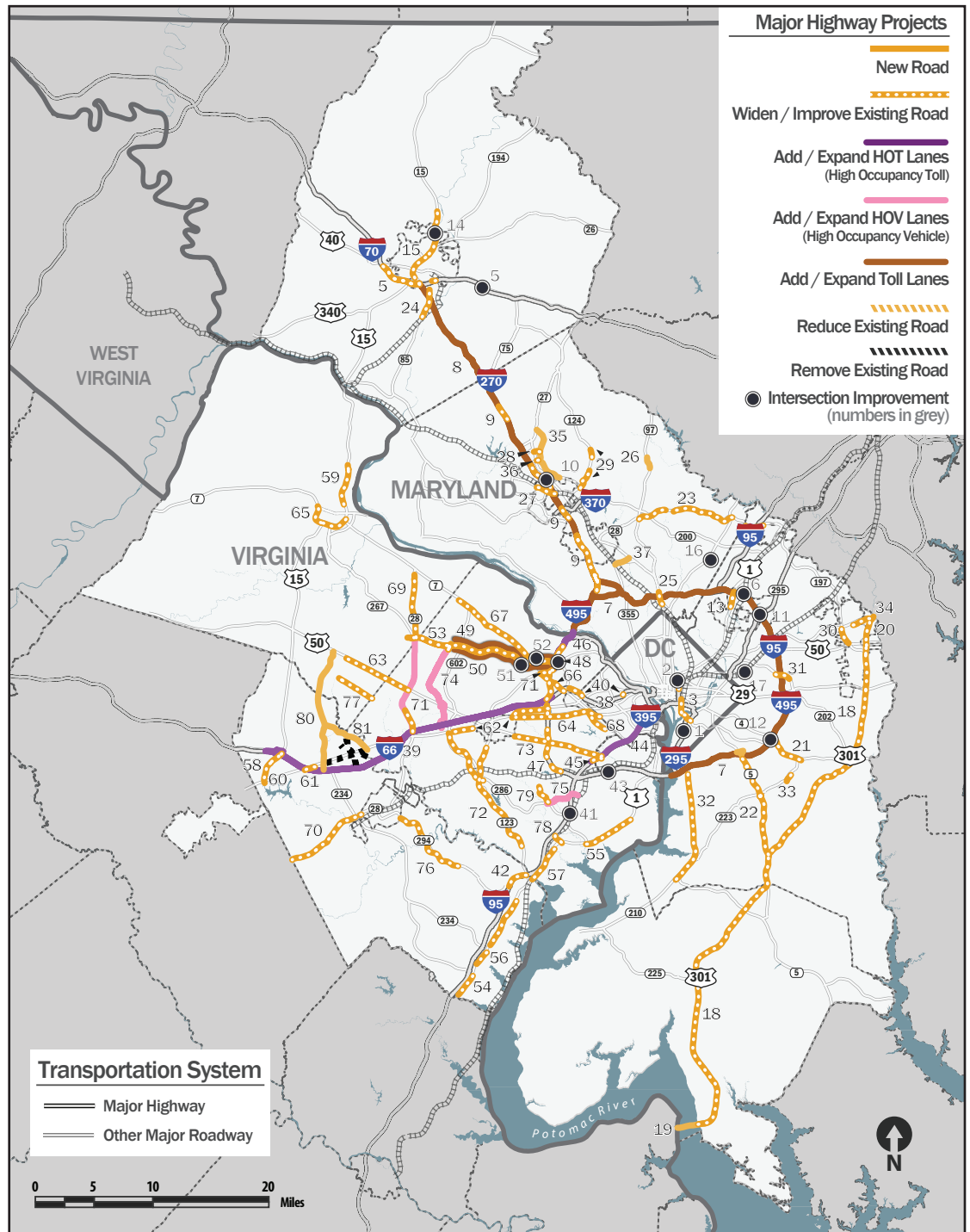
- 65. VA-7/US-15 Bypass (Harry Byrd Hwy) - widen to 6 lanes, 2035, 2040 (\$55M)
- 66. VA-7 (Leesburg Pke) - widen to 6 lanes, 2021 (\$71M)
- 67. VA-7 (Leesburg Pke) - widen to 6, 8 lanes, 2021, 2025, 2030 (\$49M)
- 68. VA-7 (Leesburg Pke) - widen to 6 lanes, 2020, 2025 (\$34M)
- 69. VA 28 (Sully Rd) HOV, widen to 8-10 lanes, HOV in additional lanes during peak, 2016, 2025, 2040 (\$100M)
- 70. VA-28 (Nokesville Rd) - widen to 4 or 6 lanes, 2019, 2025, 2022, 2040 (\$71M)
- 71. VA-123 (Chain Bridge Rd) - widen to 8 lanes, 2021 (\$22M)
- 72. VA-123 (Ox Road) - widen to 4, 6 lanes, 2020, 2025 (\$69.9M)
- 73. VA-236 (Little River Tpke) - widen to 6 lanes, 2030 (\$58M)
- 74. VA-286 (Fairfax County Pkwy) HOV - widen to 6 lanes, HOV in additional lanes during Peak, 2025, 2035 (\$295M)
- 75. VA-289 (Franconia/ Springfield Parkway), HOV lanes with interchange at Neuman St, 2025 (\$16M)
- 76. VA-294 (Prince William Pkwy) - widen to 6 lanes, 2040 (\$263M)
- 77. **VA-620 (Braddock Rd) - widen to 4 lanes, 2025, 2027 (\$165M)**
- 78. VA-638 (Pohick Rd) - widen to 4 lanes, 2020 (\$12M)
- 79. VA-638 (Rolling Rd) - widen to 4 Lanes, 2025 (\$31M)

## LOCAL ROADS

- 80. Manassas Bypass (VA-234 Bypass) - construct 4 lanes, 2040 (\$96M)
- 81. Manassas Battlefield Bypass - construct 4 lanes and close portions of US-29 (Lee Hwy) and VA-234 (Sudley Rd), 2035, 2040 (\$28M)

Note: New or significantly changed projects are identified with **bold text**. Costs identified include total project costs which may include additional elements presented in another list(s).

Figure 5.2 Major Highway Projects





## Major HOT, HOV, and Toll Lane Projects

### MARYLAND

#### MAJOR HIGHWAYS

1. I-95/I-495 Traffic Relief Plan, construct 4 managed lanes, 2025 (\$4.2B)
2. I-270 Traffic Relief Plan, construct 4 managed lanes, 2025 (\$3.4B)

### VIRGINIA

#### MAJOR HIGHWAYS

3. I-66 HOT (Inside Beltway), revise operations from HOV 2+ to HOT during peak hours and bus service, 2017, 2021, 2040 (\$375M)
4. I-66 HOT (Outside Beltway) - widen to 6 lanes (3 general purpose, 2 HOT, and 1 auxiliary) and bus service, 2021, 2040 (\$4.4B)
5. I-66 - construct HOV ramps to access Vienna Metro Sta, 2021 (\$41M)
6. **I-495 - construct 4 HOT lanes, 2025 (\$500M)**
7. I-395 HOT - additional lane and revise operation from HOV 3+ during peak to HOT 3+, 2019 (\$220M)
8. Dulles Toll Rd (VA-267) - Collector-Distributor Road west-bound, 2037 (\$62M)
9. Dulles Toll Rd (VA-267) - Collector-Distributor Road east-bound, 2036 (\$124M)
10. Dulles Toll Rd (VA-267) - interchange at New Boone Blvd Extension, 2037 (\$79M)
11. Dulles Toll Rd (VA-267) - interchange at Greensboro Drive/Tyco Rd, 2036 (\$28M)

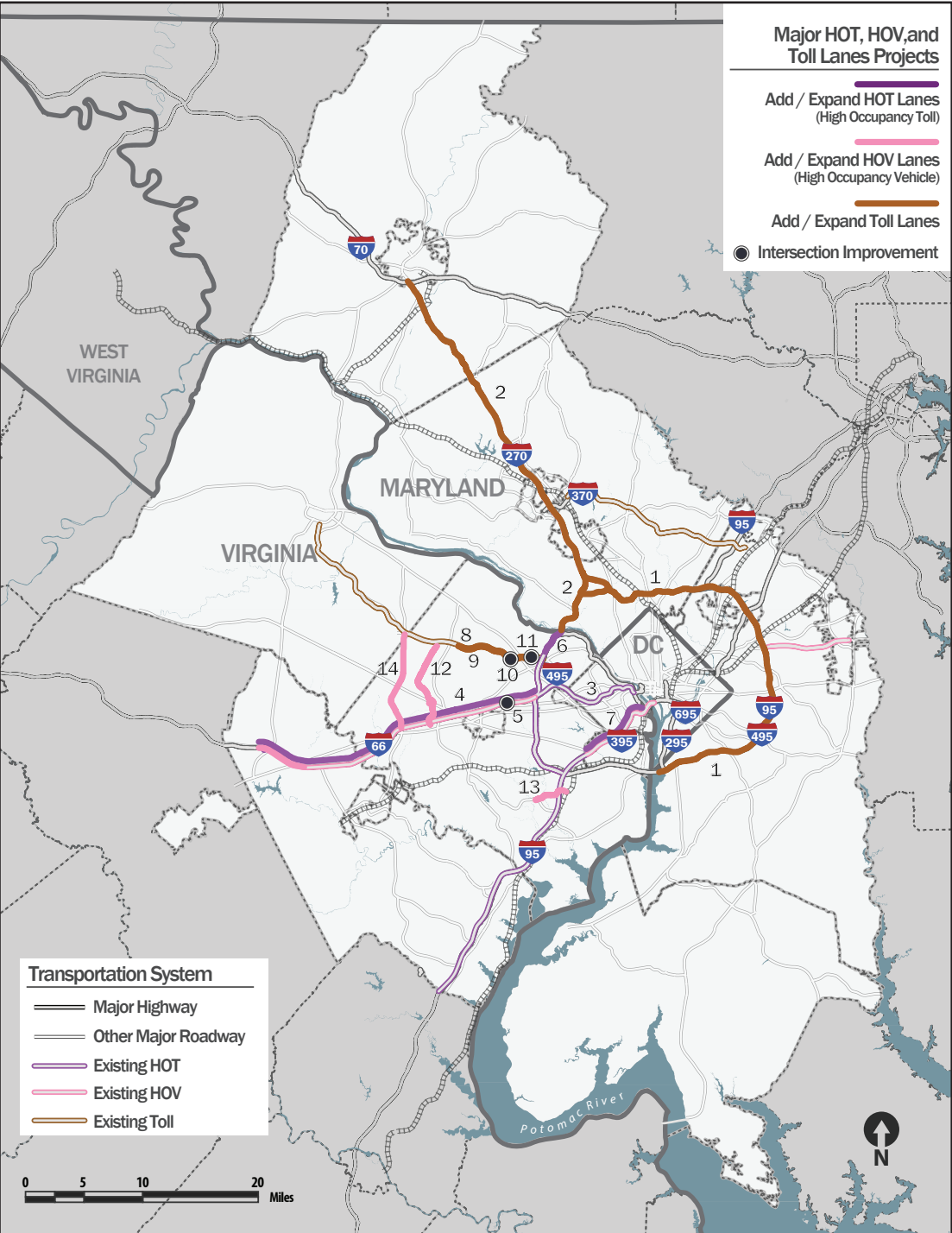
#### STATE ROUTES

12. VA-286 (Fairfax County Pkwy) HOV - widen to 6 lanes, HOV in additional lanes during peak, 2025, 2035 (\$296M)
13. VA-289 (Franconia/Springfield Parkway), HOV lanes with interchange at Neuman St, 2025 (\$16M)
14. VA-28 (Sully Rd) HOV, widen to 8-10 lanes, HOV in additional lanes during peak, 2016, 2025, 2040 (\$100M)

Note: New or significantly changed projects are identified with **bold text**. Costs identified include total project costs which may include additional elements presented in another list(s).

\*HOT = High-Occupancy Toll Lanes  
HOV = High-Occupancy Vehicle Lanes

Figure 5.3 Major HOT, HOV, and Toll Lane Projects



## Major Transit Projects

### DISTRICT OF COLUMBIA

1. DC Streetcar, 2023, 2026 (\$348M)
2. DC Dedicated Bicycle Lane Network, 2019, 2024 (not mapped) (\$800k)
3. 16th Street Bus Priority Improvements, 2021 (\$15M)

### MARYLAND

4. Corridor Cities Transitway BRT - from Shady Grove to COMSAT, 2020 (\$545M)
5. North Bethesda Transitway BRT - from Montgomery Mall to White Flint Metro, 2040 (\$115M)
6. Veirs Mill Rd BRT - from Wheaton Metro to Rockville Metro, 2030 (\$6M)
7. Randolph Rd BRT - from US-29 to MD-355, 2040 (\$102M)
8. New Hampshire Ave. BRT - from Takoma Metro to Colesville P&R, 2045 (\$285M)
9. US-29 BRT - from Silver Spring Metro to Burtonsville P&R, 2020 (\$39M)
10. MD-355 BRT - from Bethesda Metro to Clarksburg, 2040 (\$1B)
11. MARC - Increase trip capacity and frequency along all commuter rail lines, 2029 (\$1B)
12. Purple Line - Bethesda to New Carrollton, 2020 (\$2.4B)

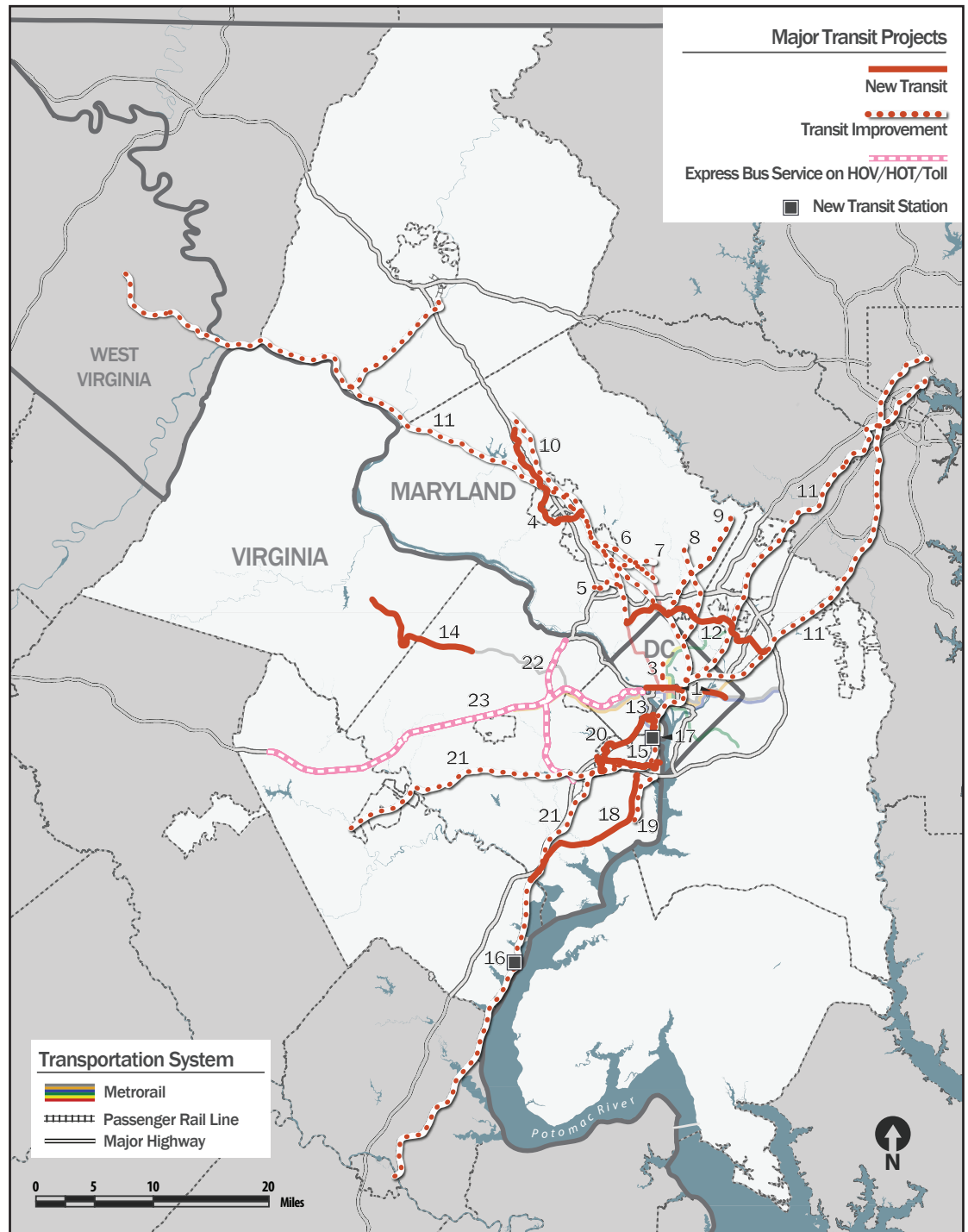
### VIRGINIA

13. Crystal City Transitway: Northern Extension BRT, 2023 (\$24M)
14. Metro Silver Line (Dulles Corridor Metrorail Project) - Phase 2, 2020 (\$2.9B)
15. Duke St Transitway - King St Metro to Fairfax County line, 2024 (\$19M)
16. Potomac Shores VRE Station, 2019 (\$26M)
17. Potomac Yard Metro Station, 2021 (\$268M)
18. US-1 BRT from Huntington Metro Station to Woodbridge, 2030 (\$504M)
19. US-1 bus lanes and improved intersections, 2035 (\$37M)

20. West End Transitway - Van Dorn St Metro to Pentagon Metro, 2024 (\$140M)
21. VRE - Reduce headways along the Manassas and Fredericksburg Lines, 2020 (\$105M)
22. I-495 HOT Lane Express Bus Service, 2030 (\$254M)
23. I-66 HOT Lane Enhanced Bus Service, 2025, 2040

Note: New or significantly changed projects are identified with **bold text**. Costs identified include total project costs which may include additional elements presented in another list(s).

Figure 5.4 Major Transit Projects





## Financially Constrained Element and Aspirational Initiatives

Visualize 2045 calls upon local jurisdictions and funding agencies to implement projects, programs, and policies in line with the seven aspirational initiatives described in [Chapter 4](#). These initiatives represent regionally agreed-upon concepts to pursue to help the region attain its goals for the transportation system in the future.

In some cases, TPB member jurisdictions are already planning and implementing parts of these initiatives. Others have yet to be planned and funded. This section summarizes how the financially constrained element includes projects that support the initiatives. The TPB believes that the anticipated growth in travel demand calls for increasing investment in projects, programs, and policies in line with the aspirational initiatives. In future long-range transportation plans, the TPB would like to see more projects, programs, and policies that support the seven endorsed initiatives incorporated into the financially constrained elements.

This high-level summary is not a fully exhaustive analysis of all the projects in the constrained element and their connection to the endorsed initiatives. Rather, it highlights some key examples to illustrate progress on the region's aspirations.

## Bring Jobs and Housing Closer Together

This initiative is focused on achieving a balanced distribution of jobs and housing throughout the region and adding more housing to the region to meet the forecast growth in jobs. Some projects in the financially constrained element do address future land-use assumptions, such as Embark Richmond Highway, which includes plans for complementary new development and rapid transit.

While projects in the constrained element do reflect current locally adopted land-use plans, they may not fully complement the balanced distribution of jobs and housing throughout the region envisioned under this initiative. COG's Cooperative Forecasts of Population, Households, and Employment projects that much of the new housing and jobs in the region will be located in regional Activity Centers. While the strategy of growing in Activity Centers has proven to be effective and holds promise for the future, this initiative calls for more to be done in terms of optimizing the distribution of jobs and housing across jurisdictions and to also bring more housing into the region.

TPB and COG leaders are working together to harness the expertise of COG's Planning Directors Technical Advisory Committee and COG's Housing Directors Advisory Committee for their advice on how to more fully implement this initiative.





## Expand Bus Rapid Transit and Transitways

The financially constrained element includes five new bus rapid transit (BRT) routes in Montgomery County. The endorsed initiative encourages BRT systems to operate fully in dedicated rights-of-way, which these four BRT routes do not entirely do. The constrained element also includes the Crystal City Transitway BRT expansion. This project expands upon the existing Metroway system and results in a route which will run partially on an exclusive right-of-way. Other BRT in the plan includes the Corridor Cities Transitway BRT in Maryland and the Richmond Highway BRT in Virginia, both of which will run in exclusive rights-of-way.

TPB's Regional Public Transportation Subcommittee will advise the TPB on how the region's BRT network can be further expanded in the years to come.



(BeyondDC/Flickr)

## Provide More Telecommuting and Other Options for Commuting

The financially constrained element of Visualize 2045 includes funding for travel demand management programs such as the TPB's Commuter Connections program. Such programs encourage and incentivize telework and transit use through employer-provided subsidies, among other actions. They help push our region to more rapidly adopt alternative transportation strategies to reduce vehicle miles traveled and relieve congestion.

The Commuter Connections Subcommittee will advise the TPB on how to further enhance and grow the transportation demand management programs and policies called for in this initiative.



(Aimee Custis/Flickr)

## Move More People on Metrorail

The financially constrained element includes plans for expanding capacity on Metrorail by running all 8-car trains during peak hours and making capacity improvements to stations in the system core. These improvements directly support the endorsed initiative. The initiative calls for other core capacity improvements to Metrorail including a new Rosslyn tunnel and station, which are not yet included in the financially constrained element of the plan.



(Lea Latumahina/Flickr)



## Expand Express Highway Network

Visualize 2045's financially constrained element includes one major project that fully supports this initiative: High-Occupancy Toll (HOT) lanes on the northern portion of I-495 in Virginia. This project includes express toll lanes with toll-free travel for high-occupancy vehicles. Express bus service will also run on the express lanes.

The financially constrained element also includes adding dynamically-priced toll lanes along I-495 in Maryland and I-270.

## Improve Walk and Bike Access to Transit

The financially constrained element includes expanding the network of dedicated bicycle lanes in the District of Columbia which will allow more people to bicycle for their daily trips and connect to Metro and other transit options. This project supports bicycle movement but does not explicitly address the pedestrian experience.

For the most part, bicycle and pedestrian improvements are not included in the financially constrained portion of the region's long-range transportation plan because they are typically not large enough to be considered "regionally significant" to impact Air Quality Conformity. Such improvements may also be incorporated into highway or transit projects but not explicitly mentioned in the constrained element. However, Visualize 2045 calls attention to other ways that the TPB promotes and supports improvement of walk and bike access to transit: see the Bicycle and Pedestrian Element in [Chapter 7](#) as well as more information about this endorsed initiative in [Chapter 4](#).

TPB's Bicycle and Pedestrian Subcommittee advises the TPB on ways to create more safe and efficient opportunities for walking and bicycling to transit stations.

## Complete the National Capital Trail

The National Capital Trail will circle the region's inner jurisdictions with a fully connected bicycle and pedestrian path separated from motor vehicle traffic. Most of the upgrades to existing trails and new trails that need to be built in order to complete the National Capital Trail will not fall within the purview of the constrained element of Visualize 2045 because the trails will typically not impact Air Quality Conformity. However, some pieces of the National Capital Trail are related to other projects in the financially constrained element of the plan – once the Purple Line is completed, the portion of the National Capital Trail between Bethesda and Silver Spring, which is currently closed for construction, will be reopened and vastly improved compared to the previous conditions of the trail.

Visualize 2045 calls attention to other ways that the TPB promotes and supports bicycle and pedestrian trails: see the Bicycle and Pedestrian Element in [Chapter 7](#) as well as more information about this endorsed initiative in [Chapter 4](#).

TPB's Bicycle and Pedestrian Subcommittee advises the TPB on the National Capital Trail and other bicycle and pedestrian trail improvements.





## Financial Plan Summary

The financial analysis is meant to demonstrate that the region has forecast revenues which are reasonably expected to be available to cover the estimated costs of adequately maintaining, operating, and expanding the highway and transit system. This analysis is a required element of the TPB's long-range transportation plan. [Appendix A: Financial Plan of Visualize 2045](#) contains the full financial analysis, while this section provides a summary.

The financially constrained element of Visualize 2045 is fiscally realistic, balancing all proposed new project investments and system maintenance and operating costs with reasonable revenue expectations, as agreed upon by TPB and its implementation agency partners in the metropolitan transportation planning process.

A total of \$291.1 billion<sup>1</sup> in transportation revenues and expenditures is projected for the National Capital Region for the 27-year period of 2019 to 2045. WMATA's expenditures will constitute 48%, local public transportation 18%, and highways 34% of the total through 2045.

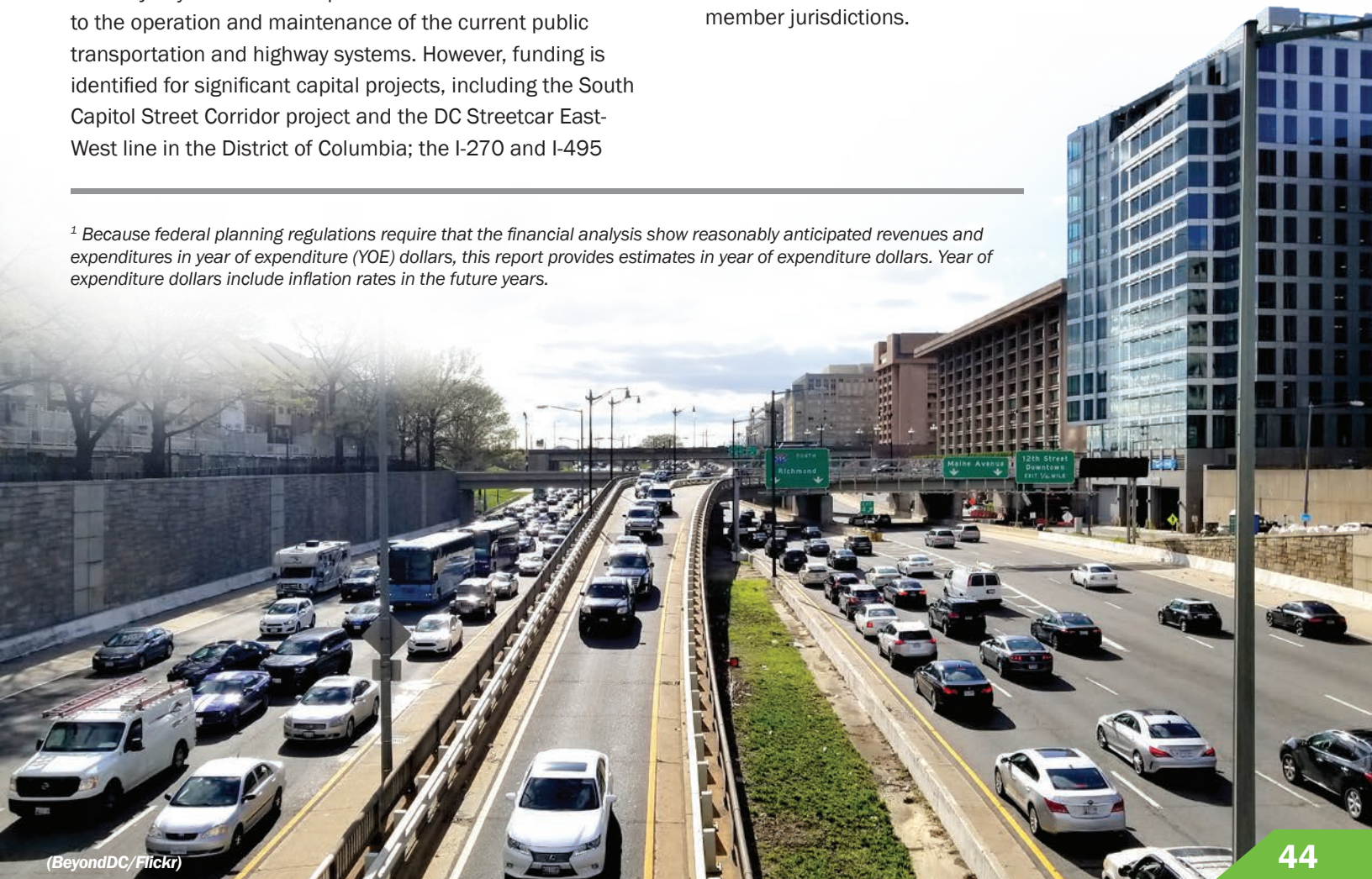
The majority of future transportation revenues will be devoted to the operation and maintenance of the current public transportation and highway systems. However, funding is identified for significant capital projects, including the South Capitol Street Corridor project and the DC Streetcar East-West line in the District of Columbia; the I-270 and I-495

Traffic Relief Plan, the replacement of the Nice Bridge and construction of the Purple Line, and the MARC Growth and Investment Plan for commuter rail in Maryland; and the I-66 HOT Lanes, completion of phase two of the Metrorail Silver Line, and the VRE System Expansion Plan in Virginia, among other projects.

Most importantly, the plan also demonstrates full funding for WMATA's forecast operational and state of good repair needs through 2045. The increasing need for state of good repair funding to renew and rehabilitate the 40-year old Metrorail system and to operate and maintain the region's largest bus and paratransit fleet requires considerable financial resources. Over the past few years, the need for additional funding for Metro has been a subject of agreement by the region's leaders, and the District, Maryland, and Virginia have all identified additional funding for Metro this year.

The inputs to the financial plan were prepared by the TPB member jurisdiction and agency staffs, working with the TPB staff. The forecasts and assumptions were reviewed by a working group and subsequently reported to and reviewed by the TPB's Technical Committee. The expenditure and revenue estimates for the WMATA transit system were developed, reviewed and agreed upon jointly between WMATA and its member jurisdictions.

<sup>1</sup> Because federal planning regulations require that the financial analysis show reasonably anticipated revenues and expenditures in year of expenditure (YOE) dollars, this report provides estimates in year of expenditure dollars. Year of expenditure dollars include inflation rates in the future years.





## Forecast Revenues

State DOTs, public transportation providers, other transportation agencies and jurisdictions, and the TPB cooperatively developed reasonable estimates of funds that will be available to support the implementation of the constrained element of Visualize 2045. More details can be found in [Appendix A](#) regarding the assumptions agencies made in developing the forecast revenues.

The financial analysis summarizes the revenues (Figure 5.5) for the constrained element of the long-range transportation plan for the period 2019 through 2045. There are five sources of revenue: federal, state, regional/local, private/other, and fares/tolls.

Overall, federal revenue as a proportion of total revenue is 13%, while state (including the District of Columbia) sources are the largest single source at 44%. Local funds, which include funds collected across Northern Virginia, represent 24% of revenue. User fees from fares and tolls are 16% of the total revenues, while bonds, private, or other sources account for 4% of total revenues.

## Forecast Expenditures

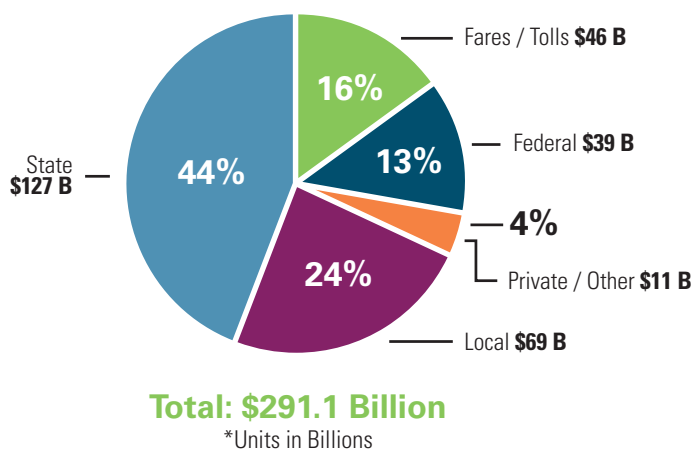
The financial analysis forecasts the costs of operating, maintaining and expanding the transportation system (Figure 5.6). Notably, only a fraction of the funds is for expansion of the region's highway and transit systems; most expenditures are to operate and maintain the system and fund state of good repair projects to repair or replace infrastructure including highway bridges, transit vehicles, and other assets. There are three categories of expenditure: operations & maintenance, capital - state of good repair, and capital - expansion.

The financial analysis demonstrates that the region has reasonably expected funds for the projects in the constrained element of Visualize 2045.

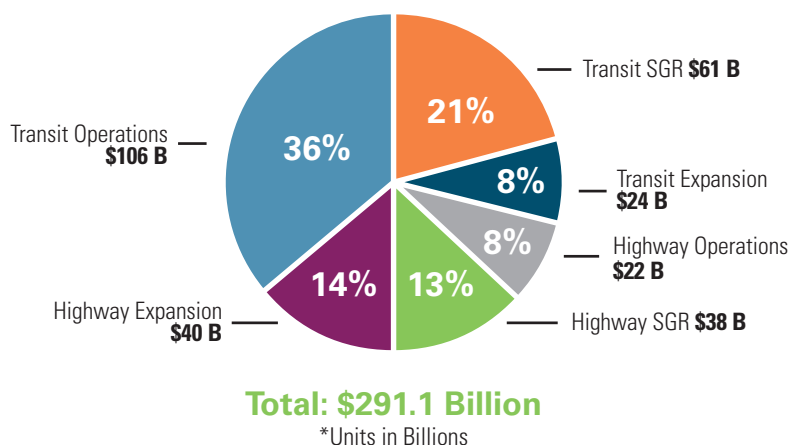
Sixty-six percent of expenditures are slated for public transportation and 34% is slated for highways. Within the expenditures, operating the transportation system is forecast to take up 44%, maintaining the system in a state-of-good-repair is forecasted to take up 34%, and expansion is the smallest portion, with 22%. While operating the system constitutes the largest portion of all transit expenditures it constitutes the smallest portion of all highway expenditures.

Together, balancing revenues and expenditures demonstrates fiscal constraint and the region's ability to pay for the long-range transportation plan.

**Figure 5.5 Revenues by Funding Source**



**Figure 5.6 Expenditures by Type and Mode**



## Performance Analysis Summary

The performance analysis of the financially constrained element of Visualize 2045 uses output from the TPB's travel demand model, which forecasts where, when, and how people will travel around the region in coming decades. To make its predictions, the model relies on the latest regional population and job growth forecasts from the Metropolitan Washington Council of Governments, information on existing travel patterns from the TPB's Household Travel Survey, and the future transportation system laid out in the constrained element of Visualize 2045.<sup>1</sup>

The performance analysis considers how well the anticipated transportation system will accommodate rising travel demand and address current mobility and accessibility challenges. It also examines how the future system will support or advance key strategies in regional transportation policy documents. The results of the analysis can help decision-makers and the public better understand what changes to current plans and funding might be needed to achieve different future outcomes.

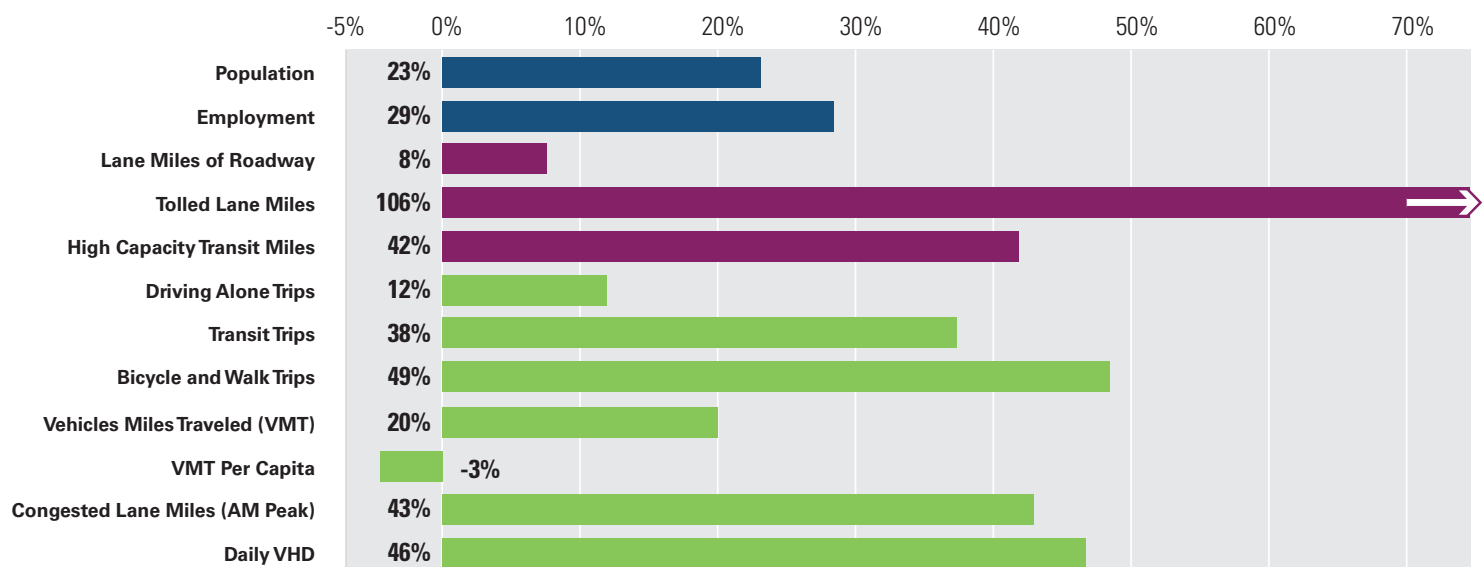
As with past forecasts, this analysis primarily compares conditions today with a future, labelled "2045 Build," that includes the transportation projects anticipated under the plan's financially constrained element. However, for the first time, the analysis also looks at a "2045 No-Build" scenario, which represents a future in which no new transportation projects would be constructed, but anticipated population and job growth would still occur.

The analysis shows that expected growth in the region will continue to place demand on the transportation network (see Figure 5.7). By 2045, the region is expected to welcome an additional 1.3 million people and nearly 1 million jobs, increases of 23% and 29%, respectively, over today. This growth will be seen throughout the region but will be especially focused in Activity Centers. Two-thirds of new residents and three quarters of new jobs will be located inside the centers.

The region is employing a variety of methods to meet future mobility and accessibility demands and make progress on regional transportation policy priorities and aspirations. Based on the more than 600 projects in the financially constrained element of the plan, by 2045 there will be approximately 1,400 new lane miles of roadways, of which approximately 460 miles will be managed lanes. There will also be numerous improvements in High Capacity Transit (HCT) throughout the region. Bus Rapid Transit, for example, will increase from four miles today to 95 miles by 2045. Enhancements are also planned in Metrorail, commuter rail and light rail systems. These additions will lead to greater use of transit and carpooling, as well as more walking and biking.

Forecasts are mixed regarding future road use. Twenty-five years from now, the average person is expected to drive less than today. But population and employment will grow faster than the highway and transit systems will expand, and the resulting pressure on the system will accelerate congestion and crowding. As a result, some areas of the region will experience a reduction in the average number of jobs accessible by auto within a 45-minute commute.

**Figure 5.7 Constrained Element Performance Analysis Summary (percent change between Today and 2045 Build)**



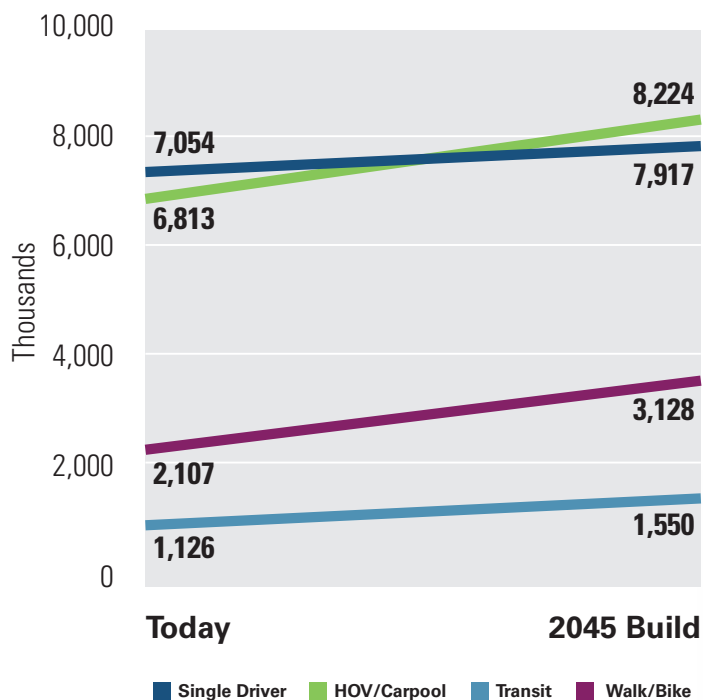
<sup>1</sup> The results of this analysis use the following input data: MWCOG's Round 9.1 Cooperative Land-Use Forecasts, TPB's Version 2.3.75 Travel Demand Model, 2016 Vehicle Registration Data, and EPA's MOVES 2014a Mobile Emissions Model. Results of this analysis are for the TPB Planning Area. These findings are based on regional model estimates that come with a degree of uncertainty.



## PROVIDING A COMPREHENSIVE RANGE OF TRANSPORTATION OPTIONS

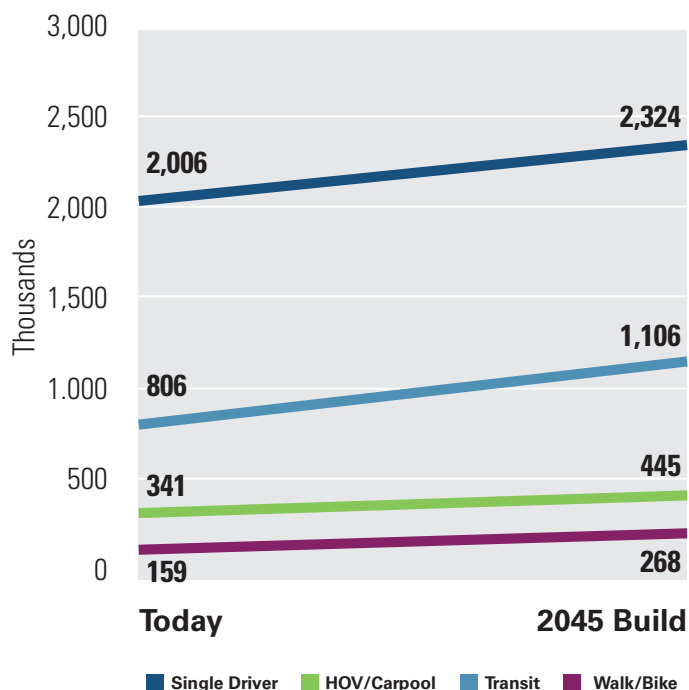
By 2045, the region's transportation system is expected to handle 3.7 million more trips, an increase of 22%. With greater demand placed on the transportation network, the region will seek to accommodate new trips on various modes (see Figure 5.8). Overall, in 2045, automobiles will continue to be the predominant way people travel in the region. However, while solo driving is the most common way that people make trips today, in 2045 HOV trips will be the most common. Transit trips and walk/bike trips will grow at rates faster than trips made by auto, including HOV and driving alone.

**Figure 5.8 All Trips by Mode**



For work trips, commuters are more likely to drive alone than to use any other mode, both today and in 2045 (see Figure 5.9). But transit is also very important for commuting, accounting for 27% of all work trips forecast for 2045. And the rate of growth will be faster for transit trips and walking and biking than for commute trips for solo driving and HOV.

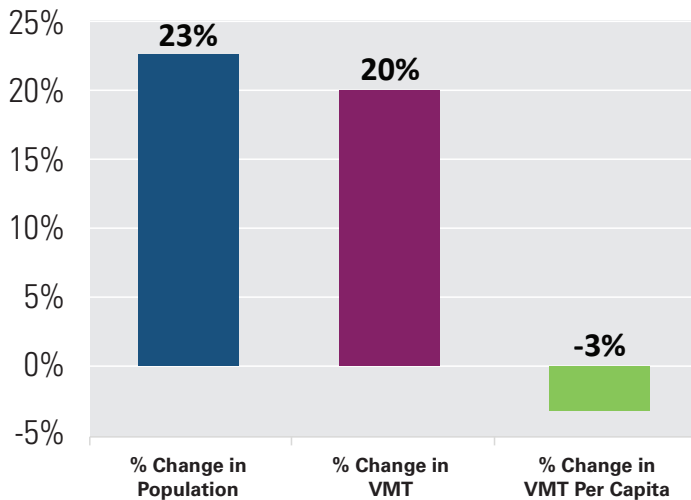
**Figure 5.9 Work Trips by Mode**



(RaksyBH/Shutterstock)

Growth in the region's population will exceed growth in vehicle miles travelled (VMT), which means that on average, a person is forecast to drive 3% fewer miles in 2045 (see Figure 5.9). This continues a decline in VMT per capita reported in the 2016 performance analysis of the TPB's long-range plan. Projected land-use patterns, travel patterns, and increased use of non-auto modes are likely behind this trend.

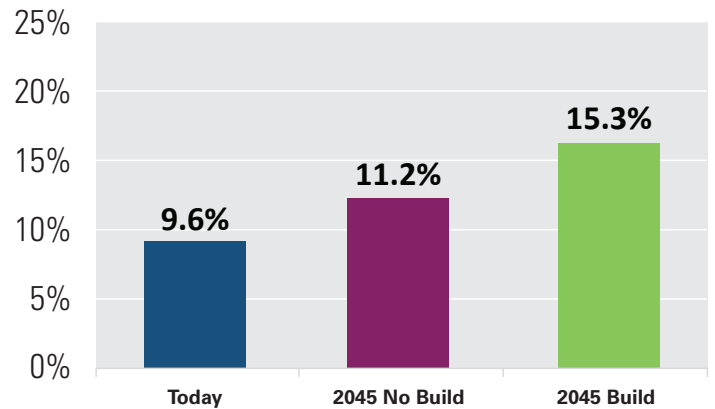
**Figure 5.10 Vehicle Miles Travelled Per Capita (Today - 2045 Build)**



For the first time, this analysis of the TPB's long-range plan looks at the forecast use of reliable modes (see Figure 5.10), which include managed lanes (HOV and priced lanes), fixed guideway rail and bus rapid transit service, and bike and pedestrian travel. The analysis found that travel will substantially increase on these modes, which are less susceptible to congestion and day-to-day travel time fluctuations. The 2045 No Build scenario forecasts an increase in the use of reliable modes at a much lower rate than the 2045 Build analysis, suggesting that anticipated transportation projects over the next 25 years will significantly contribute to system reliability.

Public outreach for Visualize 2045 found that "reliability" was a dominant factor influencing residents' daily decisions about how, when, and where to travel (see page 97).

**Figure 5.11 Percent of Daily Person Miles Traveled on Reliable Modes**



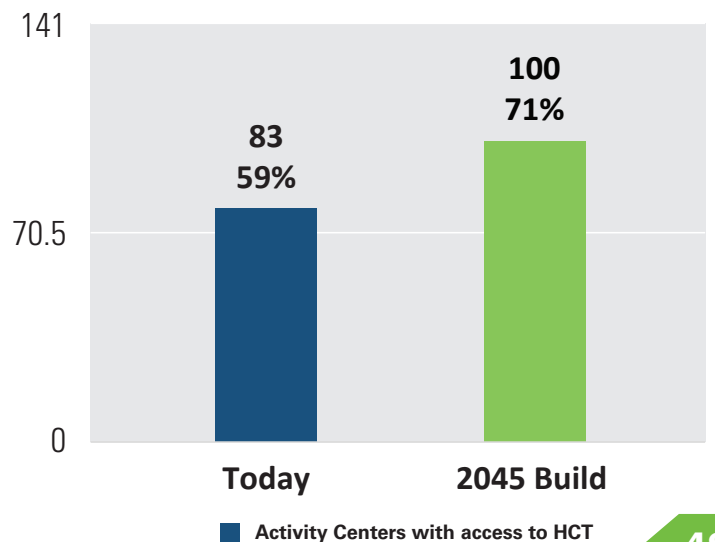
*Note: Reliable modes include managed lanes (HOV and priced lanes), fixed guideway rail and bus rapid transit service, and bike and pedestrian travel.*

## ACCESS AND CONNECTIVITY

Land-use forecasts presented in Chapter 2 show that the region is planning extensive new housing and employment within Activity Centers. Although more people currently live outside of Activity Centers than inside them – and that will continue to be the case in 2045 – population growth will be more than 50% faster within the centers. Activity Centers will also be a nexus for employment growth, with three out of four new jobs, between today and 2045, expected to be in Activity Centers.

The region's plans for growth in these areas will be complemented by new transportation connections, especially transit. By 2045, there will be significant increases in high-capacity transit links to Activity Centers (see Figure 5.12), which will improve region-wide access to transit. Currently, 59% of Activity Centers are connected to high-capacity transit. By 2045 that number will increase to 71%.

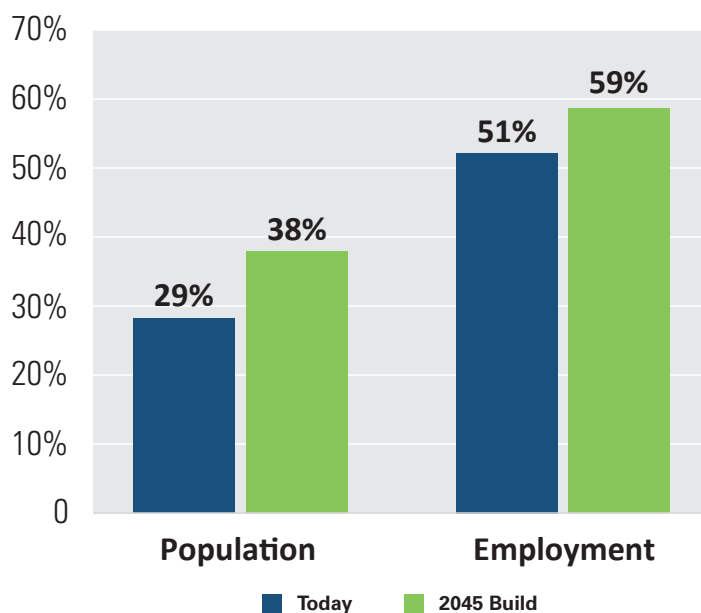
**Figure 5.12 Number of Activity Centers with Access to HCT**





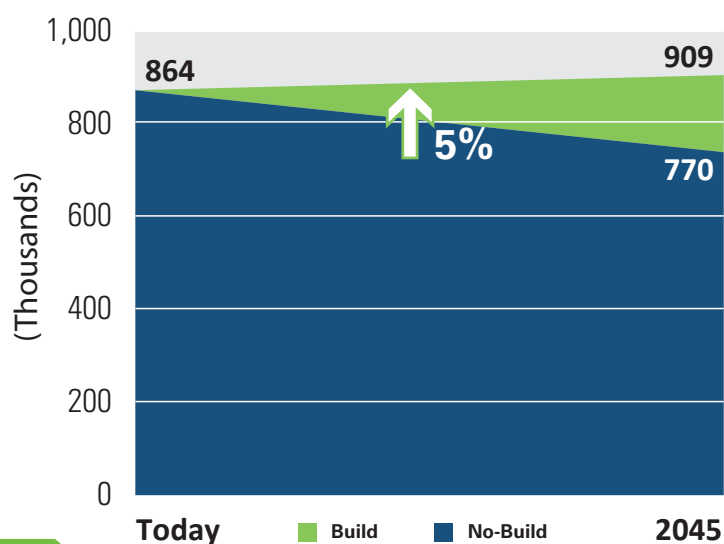
Many more people and jobs overall will have better access to high-capacity transit (see Figure 5.13). In 2045, 38% of the region's population is forecast to live within walking distance of such transit, compared to 29% today. Further, 59% of jobs will be accessible on foot to high-capacity transit, compared to 51% today.

**Figure 5.13 Percent of Population and Jobs in Proximity to HCT**



Today, on average, the region's residents can reach 864,000 jobs within a 45-minute drive from home. By 2045, with the addition of population, jobs, and transportation improvements, residents will be able to access 909,000 jobs within a 45-minute auto commute (see Figure 5.14). This represents a 5% increase, between today and 2045, in access to jobs by auto throughout the region. In contrast, if no new transportation projects are built in the coming decades (2045 No-Build), access to jobs will decrease significantly.

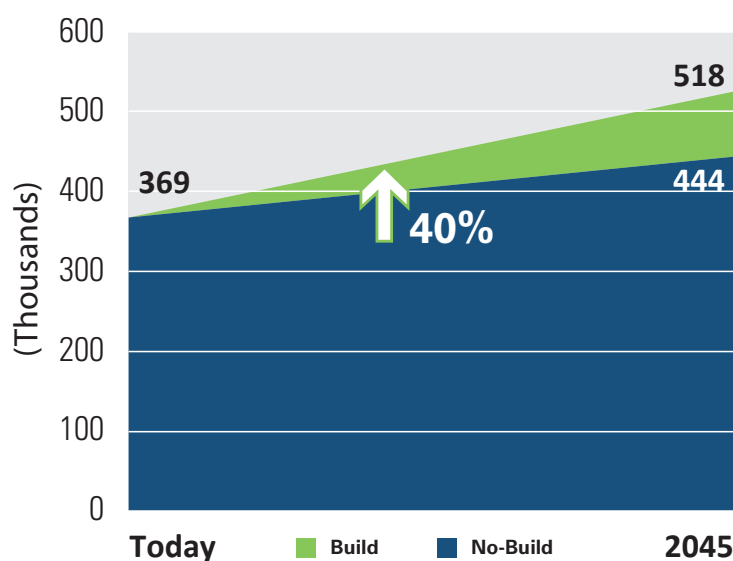
**Figure 5.14 Change in Access to Jobs by Auto**



The geographic distribution of the change in job access is not equally shared throughout the region, as shown in the detailed map of model output results (see Figure 5.16). The forecast shows declines in job accessibility by auto on the eastern side of the region and areas inside the Capital Beltway. This anticipated decline is likely the result of two important factors: anticipated increases in roadway congestion, which make it more difficult to reach other parts of the region by car within 45 minutes, and the location of most new jobs between now and 2045 which are expected to be in western jurisdictions beyond a 45-minute commute for those living in the east.

The analysis of job access by transit shows a more positive general trend. By 2045 the average number of jobs accessible within a 45-minute transit commute will increase substantially from 369,000 to 518,000, an increase of 40% (see Figure 5.15). This significant gain is likely linked to the forecast increase in jobs near existing transit stations and the expansion of higher quality transit service to more areas of the region, particularly Activity Centers.

**Figure 5.15 Change in Access to Jobs by Transit**



The No-Build analysis, which is depicted in Figure 5.15 as well, identifies a much smaller increase of 20% in access to jobs by transit, from 369,000 to 444,000. This smaller rate of growth suggests that the transportation projects in the constrained element of Visualize 2045 will make a major difference in providing people with more access to jobs by transit throughout the region.

An examination of the geographic distribution of these changes between today and 2045 shows that most places that currently have access to transit will experience increases in the number of jobs that are accessible within a 45-minute transit commute (see Figure 5.17). Furthermore, parts of the region where new transit projects are planned are also forecasted to gain access to additional jobs.

Figure 5.16 Change in Access to Jobs by Auto between Today and 2045 Build

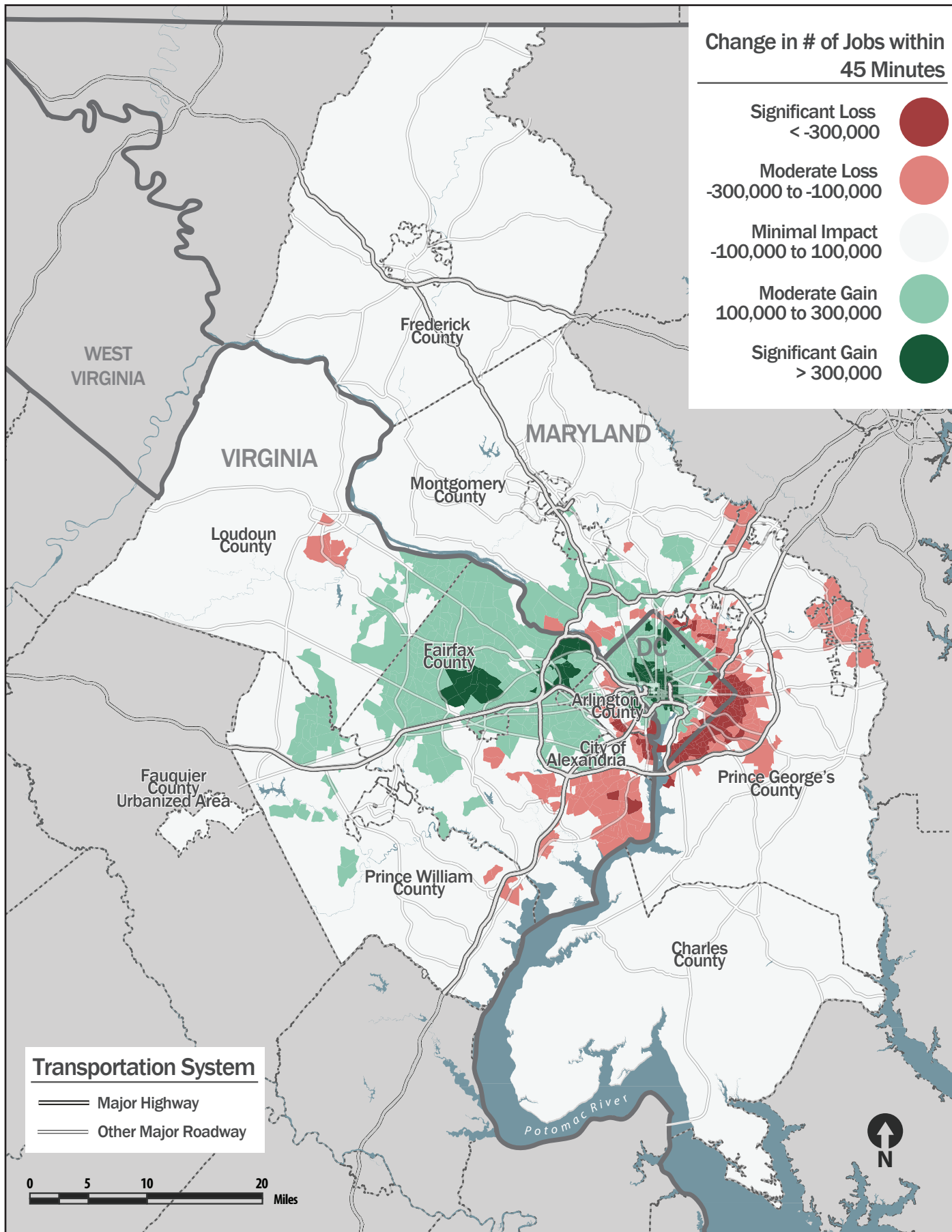
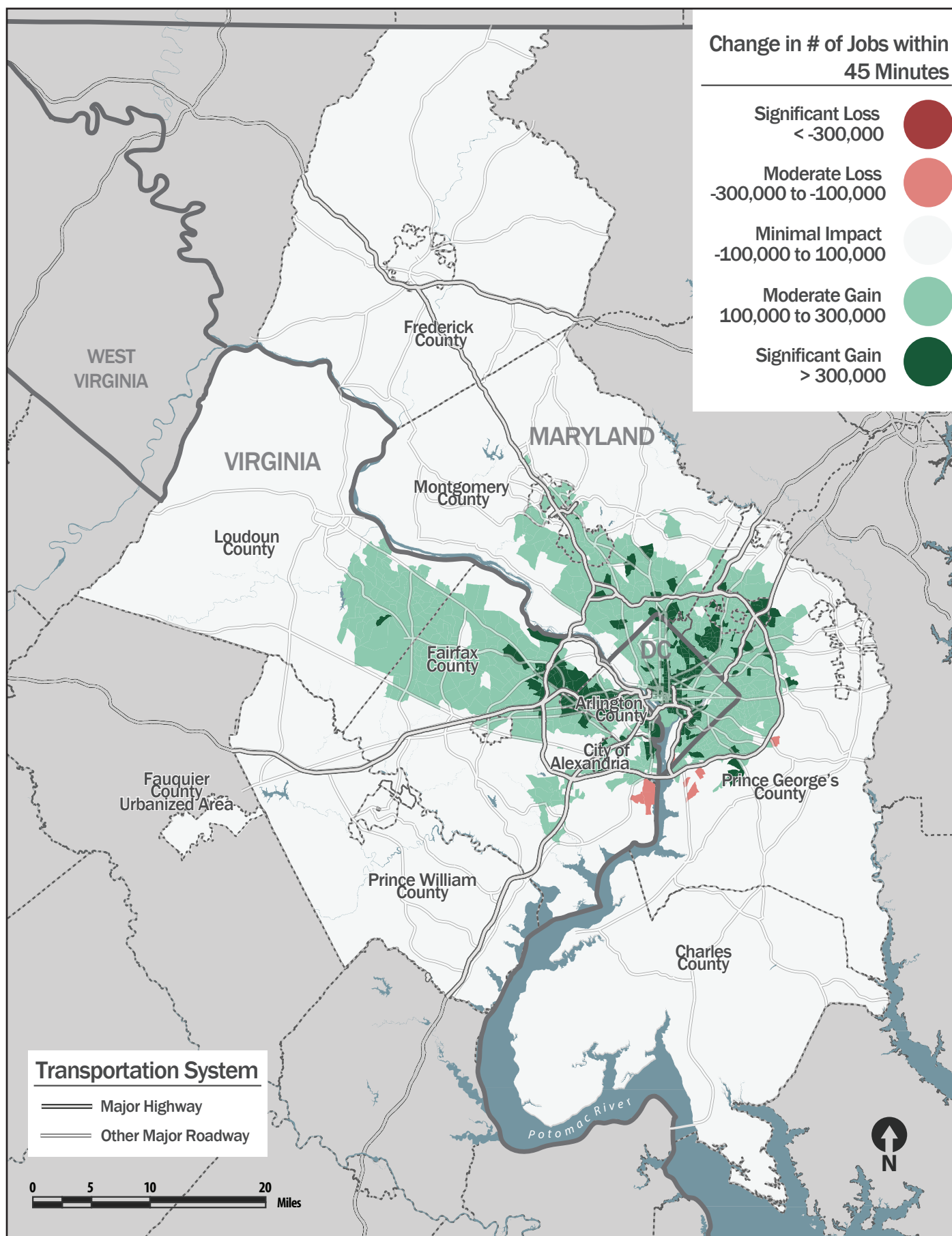




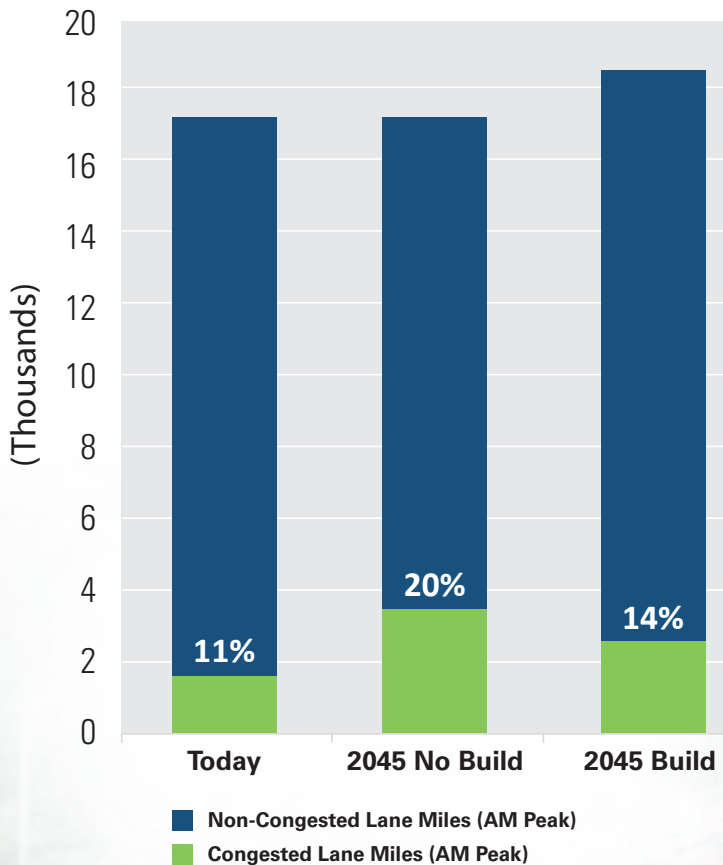
Figure 5.17 Change in Access to Jobs by Transit between Today and 2045 Build



## CONGESTION AND DELAY

Highway congestion is forecast to get worse in the coming decades, although the number of congested roads will remain a relatively small fraction of total lane miles. Today, during the morning peak hour, 11% of lane miles in the region are congested. In 2045, that number will grow to 14% under the financially constrained element (the “2045 Build”) of Visualize 2045 (see Figure 5.18). This means approximately 800 more lane miles will be congested in the morning—an increase of 43% between today and 2045.

**Figure 5.18 Share of Total Lane Miles Congested**



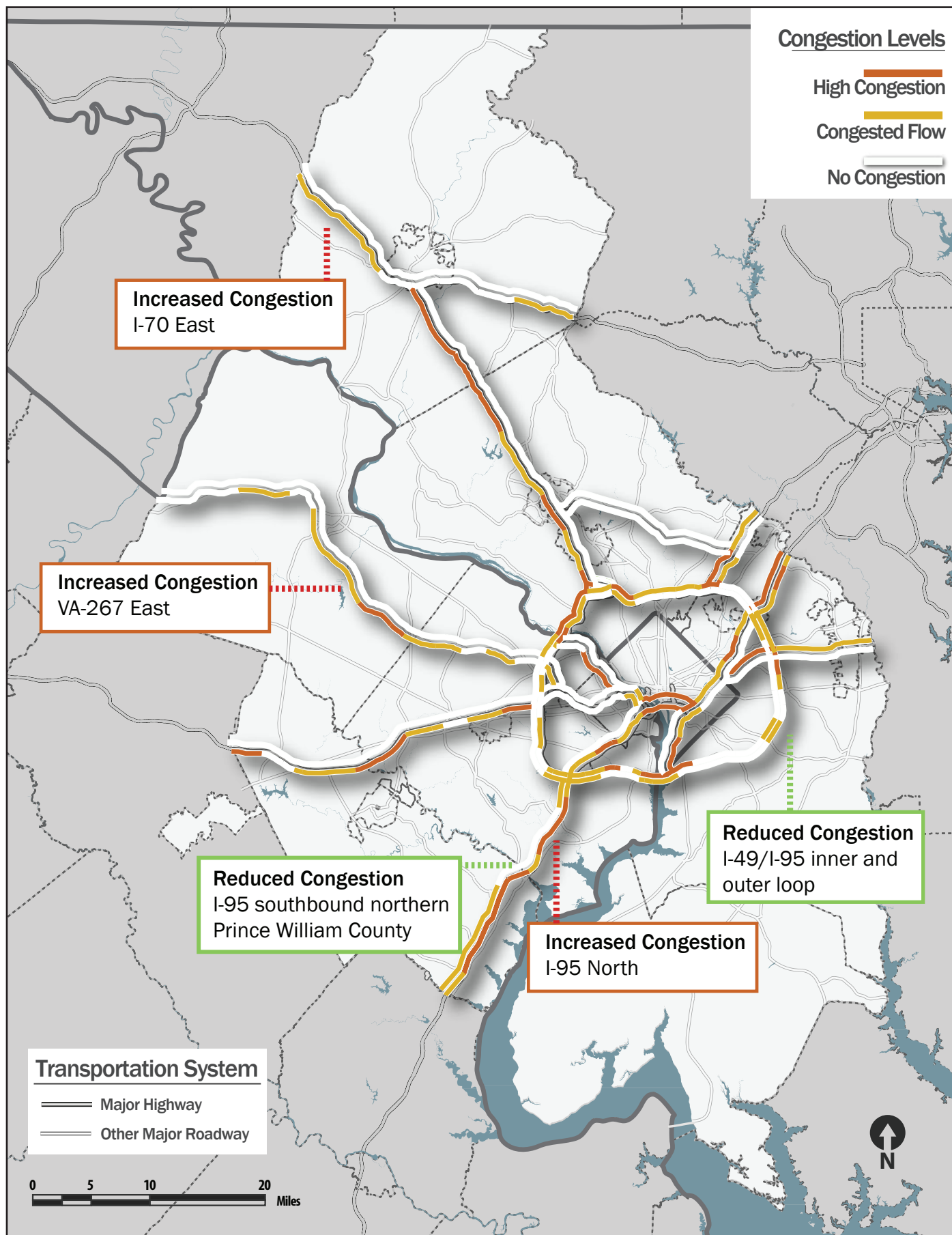
While congestion will remain a growing challenge, the projects in the constrained element of Visualize 2045 will moderate the anticipated increase in congestion. Analysis of the No Build scenario helps to illustrate this point. If we do not build the transportation improvements of the plan's constrained element (2045 No Build), forecasts show that 20% of the region's lane miles will be congested.

While congestion on many roads is expected to increase, some segments of highway will see a slight relief in congestion because of capacity expansions or changes in travel behavior (see Figure 5.19). Major highways where improvements in congestion are anticipated include portions of I-95 in northern Virginia and I-495 inner and outer loops in suburban Maryland. Also, even though the new plan shows increases in congestion on I-270 and parts of the Beltway relative to today, the congestion in these locations was more severe in the previous plan (2016 CLRP).





Figure 5.19 2045 Major Highway Congestion Map (AM Peak)

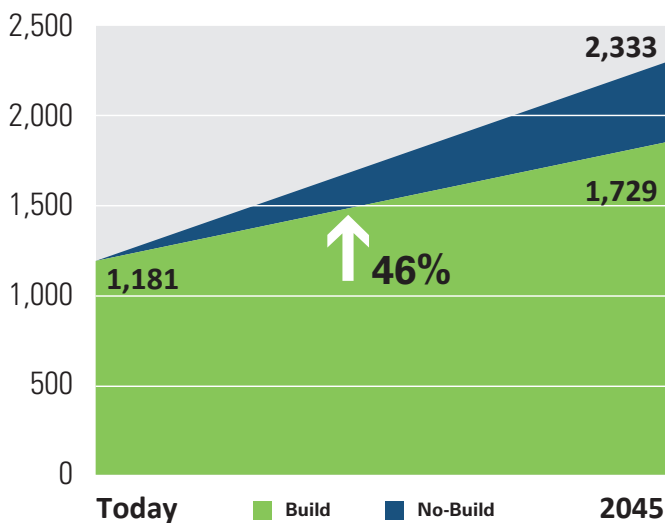


Total daily vehicle hours of delay, which represents time spent in traffic in congested conditions, are forecast to increase by 46% between today and 2045 (see Figure 5.20). A similar measure, average vehicle delay per trip shows an increase from 5.29 minutes today to 6.64 minutes in 2045 (see Figure 5.21), a change of 25%.

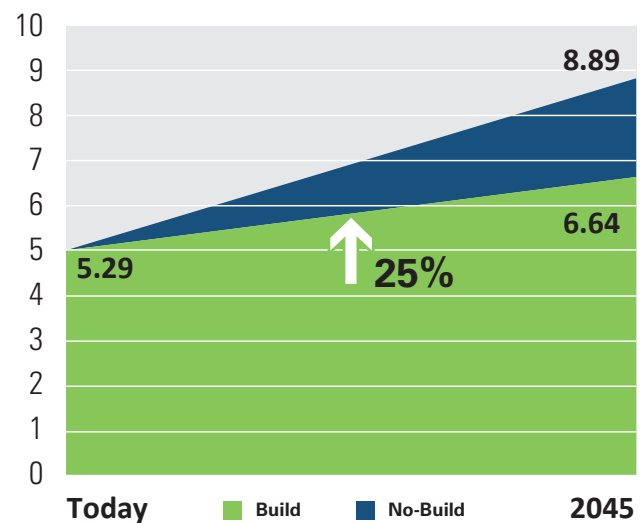
While congestion will continue to be a challenge for this region, it is worth noting that the forecast rate of growth in vehicle hours of delay for this plan (46%) is much lower than a comparable

prediction for the region's long-range transportation plan in 2016, which estimated an increase of 74%. Further, Visualize 2045's forecast increase of 46% in hours of delay is significantly lower than the No-Build forecasts, which showed this measure nearly doubling between now and 2045. Similarly, the increase in the average minutes of delay per trip would increase much more substantially — nearly 70% — under the No-Build future.

**Figure 5.20 Total Daily Vehicle Hours of Delay**



**Figure 5.21 Average Minutes of Delay per Trip**





## Air Quality Conformity Analysis Summary

The air quality analysis demonstrates how the region is working towards its environmental goals. One of these goals comes from the Regional Transportation Priorities Plan (RTPP), which states the TPB's work should "enhance environmental quality and protect natural and cultural resources."

The financially constrained element of Visualize 2045 must demonstrate that future emissions under the plan are consistent—"in conformity"—with emissions levels set forth in air quality plans adopted by the states. Federal law requires "conformity findings" in all metropolitan regions that are currently not in attainment of certain federal air quality standards. Since the Washington region does not currently meet federal standards for ground-level ozone, the TPB must demonstrate that future vehicle-related emissions of ozone-forming pollutants will, under the proposed constrained element plan, remain below the approved limits. This section summarizes the air quality conformity analysis, and the full document can be found in [Appendix C: Air Quality Conformity Report](#).

### Pollutants Analyzed

The Washington metropolitan area currently does not meet federal air quality standards for ground-level ozone, meaning that the amount of ozone present in the air exceeds the maximum allowed. Ozone pollution is harmful to people and the environment. Therefore, the region must show through a detailed technical analysis that future vehicle-related emissions of the two key ingredients in the formation of ozone—nitrogen oxides (NOx) and volatile organic compounds (VOCs)—are expected to remain below approved regional limits. The Metropolitan Washington Air Quality Committee (MWAQC) facilitates the establishment of the regional limits for on-road mobile emissions of VOCs and NOx, which combine in sunlight on hot summer days to form ground-level ozone. Motor vehicles are one of several sources responsible for VOC and NOx emissions in the region. A few examples of others include: power plants, residential heating and air conditioning, dry cleaners, gas stations, boats, airplanes, construction vehicles, and lawn equipment.

### FEDERAL REQUIREMENTS

The Clean Air Act requires that transportation and air quality planning be integrated in regions like this one that are designated by the U.S. Environmental Protection Agency (EPA) as air quality "nonattainment" areas. In such areas, as well as in areas designated as "maintenance", federal funding and approval for transportation projects is only available if transportation activities are consistent with the region's air quality goals.

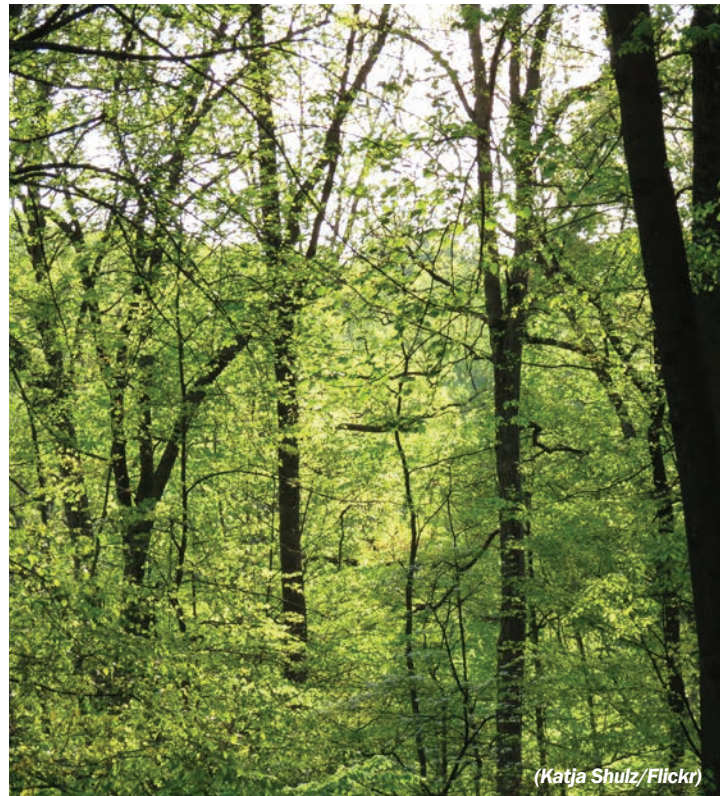
Before Visualize 2045 can be adopted, the TPB must approve a "conformity determination" showing that anticipated future vehicle-related emissions will remain below regional limits (known formally as "motor vehicle emissions budgets") that have been set by the region's air quality improvement plan (known as the "State Implementation Plan" or "SIP") and approved by the EPA. The Metropolitan Washington Air Quality Committee (MWAQC) is the body responsible for developing the regional air quality plan. The conformity determination will demonstrate that the constrained element of Visualize 2045 is consistent – "in conformity" – with the regional limits.



## Air Quality Conformity Analysis Results

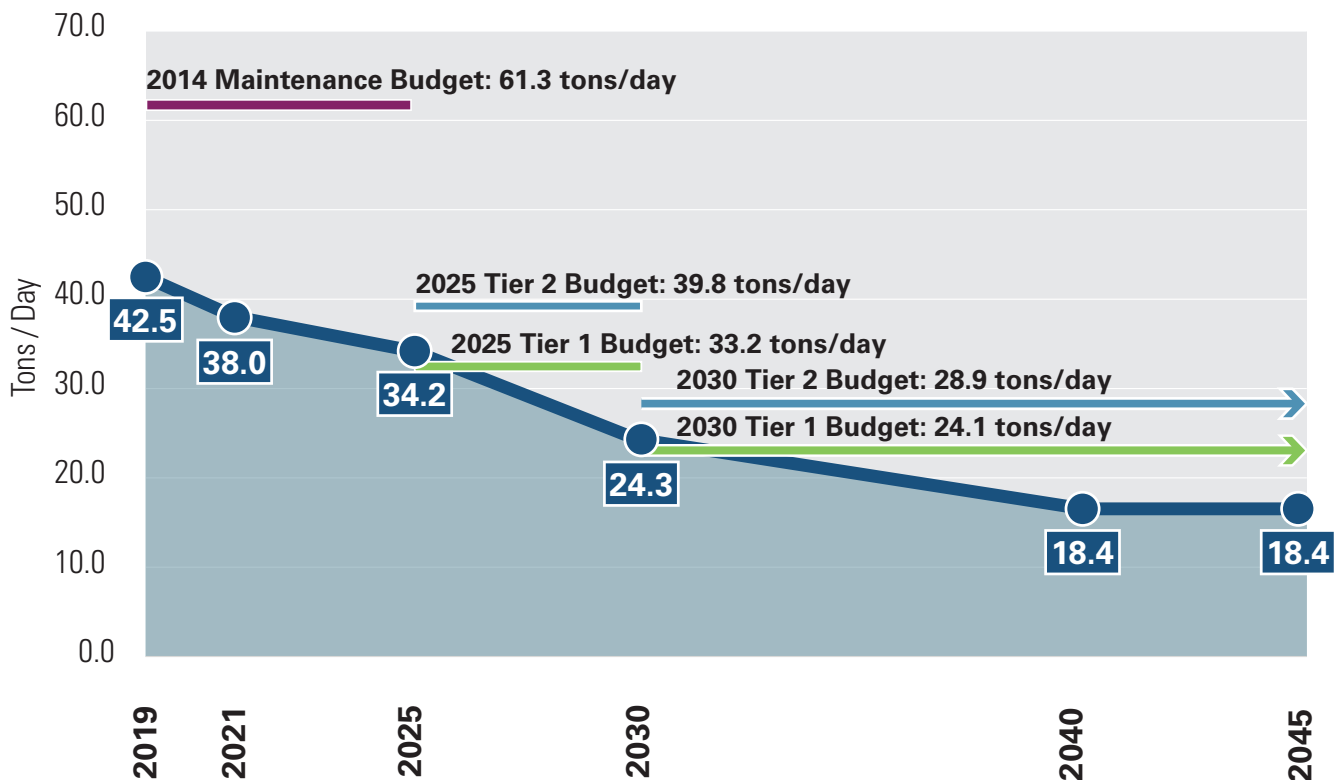
Under the constrained element of Visualize 2045, mobile emissions are expected to drop steadily (Figures 5.22 and 5.23) mainly due to tougher fuel and vehicle efficiency standards.<sup>2</sup> In spite of increased travel, mobile emissions are expected to steadily decrease through the 2045 horizon year of the plan, mainly as cars and trucks meeting tougher new federal fuel and vehicle efficiency standards enter the region's vehicle fleet and as changes are made to the formulation of vehicle fuel. Changes in development patterns, investments in transit and other travel options, and improved operational efficiency of area roadways will also contribute to reductions in vehicle-related emissions.

The plan's air quality conformity assessment included comparing forecasted mobile source emissions to the region's two tiers of mobile emissions budgets for volatile organic compounds (VOC) and nitrogen oxides (NOx). The conformity analysis found that forecasts of mobile emissions for VOC and NOx are within required budgets for all analysis years of the plan. Details related to the two tiers of mobile budgets can be found in [Appendix C](#).



(Katja Shulz/Flickr)

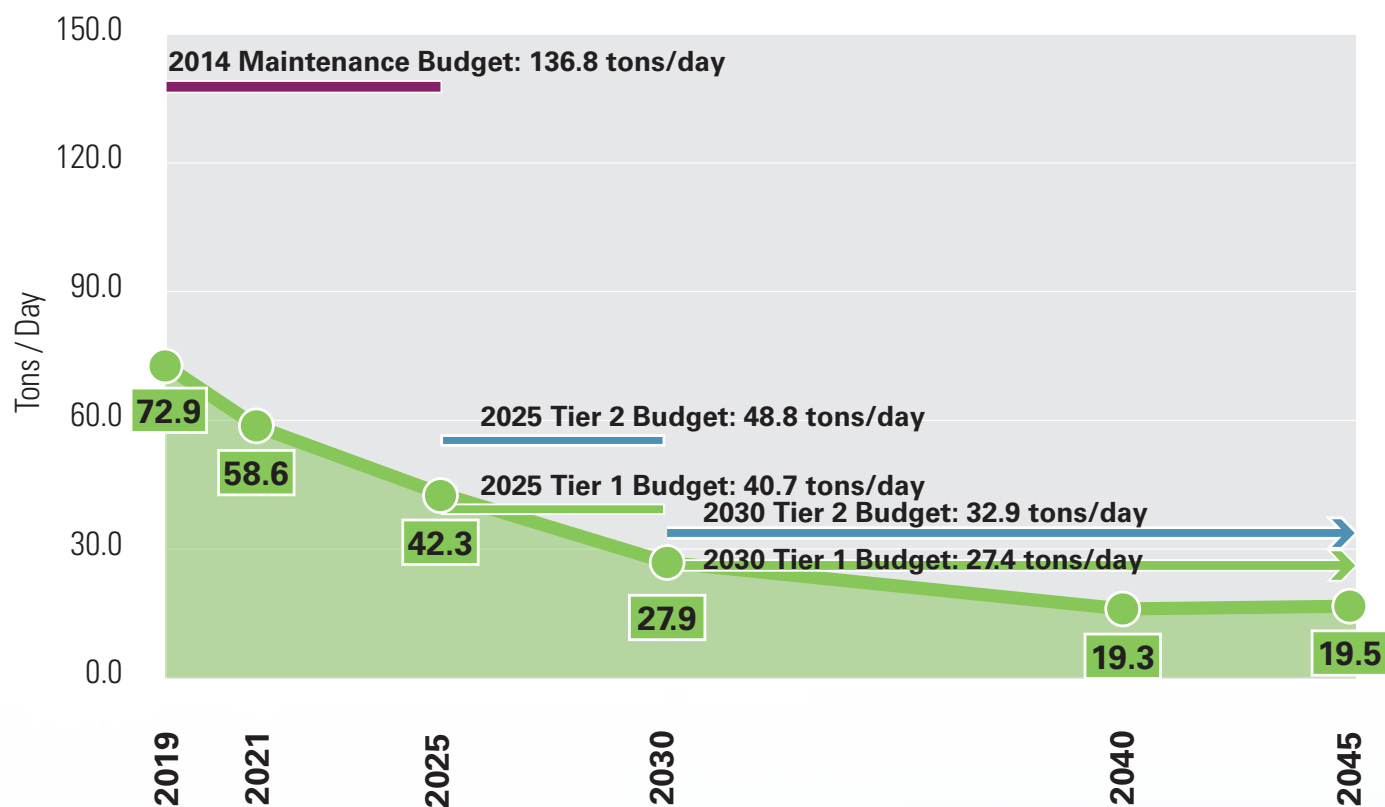
**Figure 5.22 Volatile Organic Compound (VOC) Mobile Source Emissions and Budgets**



<sup>2</sup> NOTE: The mobile budgets shown were developed as part of the 2008 Ozone Standard Maintenance Plan. EPA found the budgets adequate for use in conformity. The adequacy finding was published in the Federal Register on August 6, 2018 with an effective date of August 21, 2018.



Figure 5.23 Precursor Nitrogen Oxide (NOx) Mobile Source Emissions and Budgets





## Greenhouse Gases

Unlike the two specific pollutants regulated by federal law in this region, greenhouse gases, such as carbon dioxide, are not regulated by the federal government and are not included in the Air Quality Conformity analysis. In 2010, the TPB started proactively estimating and reporting future greenhouse gas mobile source emissions (as carbon dioxide equivalent or CO<sub>2</sub>e) in the long-range transportation plan.

Since 2005, the base year for the COG Climate Change Report, absolute greenhouse gas emissions have decreased by 7%. By 2045, the latest analysis shows that GHG emissions are forecasted to be 23% below 2005 emissions levels, or 16% below today's emissions levels, with a slight uptick between 2040 and 2045. Greenhouse gas emissions per capita are expected to decrease by 32% between today and 2045 (Figure 5.24). The emissions reductions are largely attributed to increased fuel efficiency standards, but the uptick between 2040 and 2045 occurs as cleaner vehicles have saturated the fleet, and the benefits from fuel efficiency standards can no longer keep pace with VMT increases.



**Figure 5.24 Greenhouse Gas Mobile Source Emissions (CO<sub>2</sub>e)**

