Commonwealth of Virginia
November 8, 2021

Report to the Governor and the General Assembly of Virginia

Transportation Infrastructure and Funding

2021

COMMISSION DRAFT

JLARC
JOINT LEGISLATIVE AUDIT
AND REVIEW COMMISSION

JLARC Report 556

jlarc.virginia.gov

Contents

Summary i

Recommendations and Policy Options vii

Glossary xi

Chapters

1. Overview of Surface Transportation in Virginia 1
2. Transportation Revenue 9
3. Road Condition and Funding for Maintenance 25
4. Planning for Improvements 39
5. Improvement Funding 53
6. Transit Condition and Funding 69

Appendixes

A: Study resolution 83

B: Research activities and methods 84

C: Transportation revenues and fund allocation 92

D: Tolling, public-private partnerships, and debt 99

E: Special structure condition and funding 105

F: Freight planning and freight rail grant programs 109

G: Interstate highway funding programs 114

H: Highway safety funding program 116

I: Passenger rail oversight and funding 117

J: Agency responses 122

Summary: Transportation Infrastructure and Funding

WHAT WE FOUND

Recent legislative changes increased revenues to address near- and long-term funding concerns

To address projected near- and long-term revenue constraints, the 2020 General Assembly substantially increased Virginia's transportation revenues. From FY19 to FY21, annual state revenues increased by $578 million (16 percent). Revenues increased through a combination of tax rate increases, new revenue sources, and general growth in retail and motor vehicle sales. The 2020 changes further diversified the state transportation revenue base—which receives dedicated revenue from motor fuel taxes, retail sales taxes, vehicle sales taxes, and a variety of fees—and indexed state fuel taxes to inflation. The legislature also added regional taxes, increasing revenues from regions by about $300 million. These changes followed legislation passed by the 2019 General Assembly, which raised truck fees and diesel taxes. Under the new structure, commercial trucks, which have a greater impact on roadways, pay substantially more into the system than passenger vehicles.

WHY WE DID THIS STUDY

In 2020, the Joint Legislative Audit and Review Commission (JLARC) directed its staff to review Virginia's surface transportation infrastructure and funding.

ABOUT VIRGINIA'S TRANSPORTATION SYSTEM

Multiple state, regional, local, and private entities are responsible for different parts of Virginia's multimodal surface transportation system. These entities plan for, operate, maintain, and improve system infrastructure and assets. Key parts of the system include roadways, public transit, passenger and freight rail, and bicycle and pedestrian networks. For FY22, the state plans to spend or allocate over $8 billion for surface transportation.

Revenue increases will help to strengthen the state transportation system by providing more funding to improve the condition of existing roads and bridges, and to make system improvements to address congestion, safety, and economic development needs.

The restructured revenue stream makes it less likely the state will experience revenue shortfalls as motor fuel consumption declines over time. Because fuel taxes were increased and indexed to inflation, and fuel consumption is projected to decline gradually, it could be more than 10 years before the state experiences any significant decline in fuel tax revenues.

In 2020, Virginia created a highway user fee for drivers of fuel-efficient, hybrid, and electric vehicles. The state is also establishing a voluntary mileage-based user fee program so owners of fuel-efficient and electric vehicles can choose to be taxed based on how much they drive. These new user fees could eventually replace the fuel tax as a main source of transportation revenue. However, the long-term success of the mileage-based user fee program depends on how well it gains public acceptance. One key challenge is determining how to best protect participant privacy and limit the use of data collected under the program.

State infrastructure condition has been improving, but bridges are aging and locally maintained roads need further improvement

Virginia's transportation infrastructure is in better condition than most other states. Virginia ranks 13th among states for pavement condition and 17th for bridge condition. Funding increases over the last decade and policy changes have resulted in substantial improvements in pavement condition and the condition of other assets, such as bridges.

Fewer of the state's bridges are rated as "structurally deficient" than in the past, but because bridges are aging, more than one-quarter of the bridges are very close (i.e., one rating point away on the 10-point scale) to being rated structurally deficient. Structurally deficient bridges typically need to be fully replaced, while bridges in slightly better condition can often be rehabilitated at a much lower cost. Current law, though, prohibits State of Good Repair funds from being used for preventative bridge repair or reconstruction projects and caps the amount of funding that can be allocated to districts with the highest need.

Roads maintained by localities are in poorer condition than state-maintained roads. About two-thirds of locally maintained primary pavements are in sufficient condition, compared with 83 percent of those maintained by the Virginia Department of Transportation (VDOT). Localities with primary roads in the worst condition are generally those that are more fiscally stressed. Localities in the Richmond district had primary roads in the worst condition, with only 56 percent of lane miles in sufficient condition. Similarly, bridges maintained by localities are in slightly worse condition than bridges maintained by VDOT. The difference in condition suggests that the state's maintenance payments to some localities may not be sufficient to keep pace with their road maintenance needs.

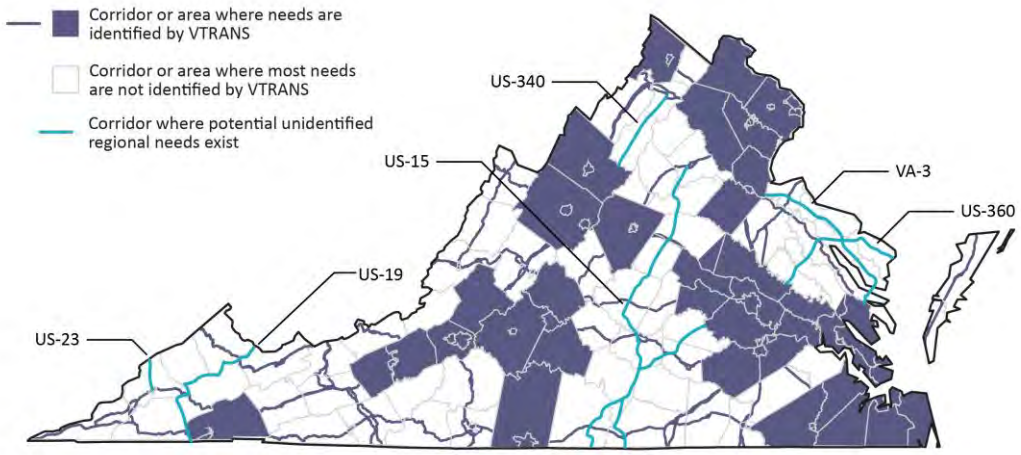
Transportation needs are identified through a data-driven process that engages key stakeholders, but a few regional corridors in rural areas may not be adequately included

Virginia uses an effective process to identify needed improvements to the transportation system. The state's primary needs identification process, VTrans, uses a data-driven process to identify where the transportation system needs to be improved. VTrans also proactively engages local and regional stakeholders and uses their input to modify and refine needs.

Though the needs identification process is effective, it could be more comprehensive because VTrans currently could be excluding some transportation needs of *regional* significance in rural areas. The Commonwealth Transportation Board (CTB) has already taken some steps to address this by expanding the VTrans scope to examine safety needs and needs related to economic development sites, but a few gaps remain. JLARC identified several potential corridors of regional significance in rural areas that are not included in VTrans needs assessments for congestion or travel time reliability

(see figure). These routes often carry as much or more traffic than nearby corridors of statewide significance. Given the relatively high volume of traffic, and their importance to the localities they serve, any unidentified needs along these routes could be regionally significant and would merit evaluation under VTrans.

VTrans does not evaluate some potential transportation needs on a few corridors of regional significance



SOURCE: VTrans webmaps and shapefile data.
[a] In these areas, VTrans identifies safety needs but not other types of needs (e.g., congestion, economic development, accessibility).

Virginia's main program for funding system improvements (Smart Scale) is appropriately based on objective benefit and cost data

The state's primary process to select projects to address transportation needs, Smart Scale, is an objective way to select transportation construction and other improvement projects. Smart Scale uses data to calculate the expected *benefits* relative to the state's *cost* to fund different projects. Projects are scored relative to each other, and projects with the highest scores are recommended for funding. Smart Scale scoring is generally viewed as being objective and transparent, and the approach is consistent with a 2010 JLARC recommendation. Transportation experts indicated that Virginia's Smart Scale project prioritization process is considered a model among states.

Despite local concerns, analysis of Smart Scale decisions over time concluded that selection decisions are generally equitable across regions and types of projects. The program has appropriately allocated funding across regions based on population, for example. The Office of Intermodal Planning and Investment (OIPI) has also analyzed Smart Scale decisions after each round of funding and refined the process to improve it over time. For example, OIPI changed Smart Scale safety scores to remove accidents attributable to driving under the influence because those accidents were not likely due to unsafe infrastructure.

Longer wait period for revenue sharing program grants, implemented in response to the pandemic, will no longer be necessary if revenue forecast improves as expected

In 2020, as part of a larger emergency response to the pandemic, the CTB took several actions to address revenue shortfalls in the state's transportation budget. Some of these actions affected the revenue sharing program, which provides smaller-scale grants to localities for transportation projects. No new grants were issued under the program for FY21–24, and the window between when grant applications are submitted and funds are received was extended from one-to-two years to five-to-six years. These actions, along with others authorized by the General Assembly and taken by the CTB, seem reasonable and necessary in hindsight to keep Virginia's transportation agencies functioning, continue maintenance activities, and avoid disrupting ongoing improvement projects.

Now that the temporary reduction in revenues due to the pandemic appears to have passed, the extended five-to-six year window between grant application and award no longer appears necessary. Delaying funding is contrary to the CTB's established policy for the revenue sharing program and can increase project costs because material and labor expenses increase over time. Additionally, the General Assembly could restore some or all funding for new projects in the FY23–24 grant cycle, if there is an FY22 revenue surplus or if new projections show FY23–24 revenues could be higher than previously predicted.

Virginia transit assets are generally in serviceable condition, but systems face potential capital and operating funding shortfalls

Most of Virginia's transit assets are in serviceable condition. More than 90 percent of facilities and fleet vehicles are in a state of good repair, as are 70 percent of non-fleet vehicles. All major rail asset types (vehicles, track, and facilities) in Virginia are, on average, in better condition than transit agencies nationally.

Transit agencies may face challenges in continuing to maintain these assets and improve their systems because state capital assistance is projected to lag behind needs. (This excludes Metro, which is funded separately from other transit agencies and appears to be receiving funds needed to carry out its capital improvement plan.) The Department of Rail and Public Transportation currently projects a $226 million gap in state capital assistance to transit agencies over the next five years, even though the state substantially increased transit capital funding in 2020. This gap could be substantially reduced if state transportation revenues continue to recover strongly from the pandemic and exceed the most recent revenue projections and if the federal transportation reauthorization and infrastructure bill is enacted.

Most of the state's transit agencies, including Metro, are also facing uncertainty in future operating revenues because of the pandemic. Agencies saw substantial reductions in ridership, and as a whole, experienced fare losses of 57 percent. Agencies are using

federal pandemic relief funds to cover gaps in their operating budgets, but many will have used these funds up within one to two years. Agencies may need to cut services unless ridership recovers or they receive additional state or federal funds.

WHAT WE RECOMMEND

Legislative action

- Amend the Code of Virginia to clarify and ensure data privacy for citizens choosing to participate in the mileage-based user fee program.
- Amend the Code of Virginia to reduce long-term costs and further improve bridge safety by allowing the State of Good Repair program to fund repair and reconstruction projects for bridges very close to being structurally deficient and by raising or eliminating the restriction on the amount of program funding a region can receive.

Executive action

- Update CTB policy to include corridors of regional significance in the VTrans needs identification process.
- Change the revenue sharing program policy implemented during pandemic to make grant awards available in the second biennium after grant applications are submitted (three-to-four years after application).
- Use the Commonwealth Transportation Board's authority to distribute a portion of the FY21 transportation revenue surplus to the transit capital funding program.

POLICY OPTIONS FOR CONSIDERATION

- Make minor changes to new highway user fee, to improve consistency and avoid future revenue gaps, by creating a regional surcharge and by applying user fees to electric vehicles weighing over 10,000 pounds.
- Amend the Code of Virginia to change how road maintenance payments are distributed to cities and towns to better align payments with maintenance needs.
- Appropriate additional funds to the revenue sharing program for FY23–24, contingent on a surplus or projected increase in transportation revenues.

The complete list of recommendations and policy options is available on page vii.

Policy options for consideration. Staff typically propose policy options rather than make recommendations when (i) the action is a policy judgment best made by elected officials—especially the General Assembly, (ii) evidence suggests action could potentially be beneficial, or (iii) a report finding could be addressed in multiple ways

Recommendations and Policy Options: Transportation Infrastructure and Funding

JLARC staff typically make recommendations to address findings during reviews. Staff also sometimes propose policy options rather than recommendations. The three most common reasons staff propose policy options rather than recommendations are: (1) the action proposed is a policy judgment best made by the General Assembly or other elected officials, (2) the evidence indicates that addressing a report finding is not necessarily required, but doing so could be beneficial, or (3) there are multiple ways in which a report finding could be addressed and there is insufficient evidence of a single best way to address the finding.

Recommendations

RECOMMENDATION 1

The General Assembly may wish to consider amending § 46.2-773 of the Code of Virginia to ensure privacy of Mileage-Based User Fee program participant data by: (i) guaranteeing participants the option to participate without location tracking, (ii) limiting data collection to what is needed for program administration, (iii) excluding individual-level participant data from disclosure, (iv) requiring the program to have a specific data retention period, and (v) limiting any research to using aggregated data subject to approval of an institutional review board. (Chapter 2)

RECOMMENDATION 2

The General Assembly may wish to consider amending § 46.2-773 of the Code of Virginia to clarify that program fees can be charged for all miles driven by participants or for only miles driven in Virginia, and that both options can be made available to participants. (Chapter 2)

RECOMMENDATION 3

The Department of Motor Vehicles should evaluate the Mileage-Based User Fee program, including (i) administrative and operational costs; (ii) program enrollment, total fees, and per-mile rates by vehicle attributes (e.g., fuel efficiency, fuel type, vehicle weight); (iii) user compliance and fraud; and (iv) all uses of program data by the vendor, researchers, and others. The evaluation results and recommended program changes should be reported to the House and Senate Transportation committees in December 2023, following the first full year of program implementation. (Chapter 2)

RECOMMENDATION 4

The General Assembly may wish to consider amending § 33.2-369 of the Code of Virginia to improve bridge safety and reduce long-term costs by allowing the State of Good Repair program to fund bridges that are in fair condition, specifically those that have a general condition rating less than or equal to 5.0. (Chapter 3)

RECOMMENDATION 5

The General Assembly may wish to consider amending § 33.2-369 of the Code of Virginia to allow the State of Good Repair (SGR) program to fund more of the estimated bridge and pavement repair needs in construction districts by (i) eliminating the 17.5 percent cap and 5.5 percent floor on the proportion of SGR funding that a district can be allocated or (ii) raising the cap on the proportion of SGR funding that a district can be allocated to 20 percent but maintaining the 5.5 percent floor. (Chapter 3)

RECOMMENDATION 6

The Commonwealth Transportation Board should designate corridors of regional significance to be included in the VTrans needs identification process. (Chapter 4)

RECOMMENDATION 7

The Commonwealth Transportation Board should change its Smart Scale policy to require applicants to rank their project submissions in order of applicant priority to provide the board with additional information to inform the board's funding decisions. (Chapter 5)

RECOMMENDATION 8

The Commonwealth Transportation Board should change its revenue sharing program policy to make grant awards available in the second biennium after grant applications are submitted (three to four years after application). (Chapter 5)

RECOMMENDATION 9

The General Assembly may wish to consider amending § 33.2-2600 of the Code of Virginia to require that projects considered for funding through the Hampton Roads Transportation Fund be evaluated and prioritized based on objective and quantifiable benefits and costs. (Chapter 5)

RECOMMENDATION 10

The Commonwealth Transportation Board should direct $39.8 million in FY21 transportation revenue surplus funds to the Commonwealth Mass Transit Fund to restore funding to pre-pandemic levels and direct these funds to be distributed to transit agencies under the MERIT capital assistance program. (Chapter 6)

RECOMMENDATION 11

The Department of Rail and Public Transportation should monitor COVID-19 pandemic ridership recovery at transit agencies and develop options for changing the MERIT operating assistance program formula to avoid harming agencies that continue to have lower ridership following the pandemic while not providing them a disproportionately large share of state assistance. Options should be presented to the Commonwealth Transportation Board before FY24 funding awards are made. (Chapter 6)

RECOMMENDATION 12

The Department of Rail and Public Transportation (DRPT) should review the performance metrics for the MERIT operating assistance program to determine if and how they could be changed to promote transit access to low-income areas and other areas of need. DRPT should present options to the Commonwealth Transportation Board for consideration by December 2022. (Chapter 6)

RECOMMENDATION 13

The Department of Rail and Public Transportation (DRPT) should review the criteria for scoring minor enhancements in the MERIT capital assistance program to determine how they could be changed to make passenger amenity projects, such as bus stops and shelters, more competitive. DRPT should present options for changes to the Commonwealth Transportation Board for consideration by December 2022. (Chapter 6)

Policy Options to Consider

POLICY OPTION 1

The General Assembly could establish regional surcharges in the Code of Virginia for the highway use fee and mileage-based user fee. (Chapter 2)

POLICY OPTION 2

The General Assembly could amend § 46.2-772 et seq. and § 58.1-2701 of the Code of Virginia to assess a highway use fee on (i) fuel efficient and electric vehicles weighing from 10,000 pounds to 26,000 pounds, and (ii) electric vehicles over 26,000 pounds. Fees could be scaled to vehicle weight. (Chapter 2)

POLICY OPTION 3

The General Assembly could consider amending § 33.2-319 of the Code of Virginia to modify how maintenance payment program funds are distributed to cities and towns by (i) eliminating the current funding formula and directing the CTB to develop and approve a new formula that better accounts for the different drivers of maintenance costs; (ii) eliminating the current funding formula and directing the CTB to award funds based on an assessment of pavement and bridge conditions in each locality; or (iii) directing the CTB to develop an approach for directing additional funding to localities that have a high proportion of pavements and bridges in poor condition and have relatively high indicators of fiscal stress. (Chapter 3)

POLICY OPTION 4

The Office of Intermodal Planning and Investment (OIPI) could develop a methodology for piloting monetized benefit-cost scores in round five of Smart Scale funding awards. OIPI could require project applicants to submit the data needed for OIPI to perform this analysis. The pilot effort should be for informational purposes and limited to the top 5 to 10 percent of the most costly Smart Scale applications. (Chapter 5)

POLICY OPTION 5

The General Assembly could appropriate an additional $100 million per year in revenue sharing program funds in the FY23–24 Appropriation Act. The appropriation for FY23 could be made contingent on a FY22 surplus. (Chapter 5)

POLICY OPTION 6

The Commonwealth Transportation Board, in cooperation with the secretary of transportation and the Virginia Department of Transportation, could determine which local projects qualify to receive any additional revenue sharing program funds for FY23–24 and could then approve new grant awards. (Chapter 5)

POLICY OPTION 7

The Commonwealth Transportation Board could direct a portion of any future FY22 transportation revenue surplus to the Commonwealth Mass Transit Fund, and direct these funds to be distributed to transit agencies under the MERIT capital assistance program to help address any remaining, unfunded transit asset needs. (Chapter 6)

Glossary: Transportation Infrastructure and Funding

American Rescue Plan Act of 2021 (ARPA) is a federal economic stimulus bill that, among other things, provided funding for public transit agencies.

Arterial Preservation is a VDOT planning program that aims to preserve and improve critical transportation highways in the state.

Coronavirus Aid, Relief, and Economic Security Act (CARES Act) is a federal economic stimulus bill that, among other things, provided funding for public transit agencies.

Central Virginia Transportation Authority (CVTA) is a public, regional authority in the Richmond region that receives regional transportation tax revenues and can allocate revenues to projects.

Construction entails building new infrastructure, such as adding a lane to an existing road, or replacing existing infrastructure, such as replacing an aging bridge with a new bridge.

Construction District Grant Program (CDGP) is one of two funds that make up Smart Scale. Smart Scale applicants compete for CDGP funds within VDOT construction districts.

Commonwealth Transportation Board (CTB) is the policy board that oversees transportation projects and initiatives for the state.

Commonwealth Transportation Fund (CTF) is Virginia's main transportation fund. Most state transportation revenues are deposited into the CTF.

Coronavirus Response and Relief Supplemental Appropriations Act (CRRSAA) is a federal economic stimulus bill that, among other things, provided funding for public transit agencies.

Department of Rail and Public Transportation (DRPT) is the state agency that oversees and supports public transit, freight rail, and commuter services in Virginia.

Federal Highway Administration (FHWA) is the federal agency that oversees state transportation agencies and federal highway and intermodal grant funding.

Federal Transit Administration (FTA) is the federal agency that oversees transit agencies and federal transit grant funding.

Federal Rail Administration (FRA) is the federal agency that oversees passenger and freight rail and federal rail grant funding.

Hampton Roads Transportation Accountability Commission (HRTAC) is a public, regional authority in Hampton Roads that receives regional transportation tax revenues and can allocate revenues to projects.

Hampton Roads Transportation Planning Organization (HRTPO) is the regional transportation planning body for the Hampton Roads area.

High Priority Projects (HPP) fund is one of two funds that make up Smart Scale. Smart Scale applicants compete for HPP funds statewide.

Highway Maintenance and Operations Program (HMOP) is VDOT's primary source of funding for maintenance and operations.

Highway Use Fee (HUF) is a state fee in Virginia charged to drivers of fuel-efficient and electric vehicles.

I-81 corridor improvement program is a state-administered program designed to fund improvements along Interstate 81. The program is funded through state and regional revenue sources.

Improvements to the transportation system include construction projects, such as adding lanes or redesigning an inter-change, as well as operational improvements and purchases of new fleet vehicles to expand transit services.

Infrastructure Investment and Jobs Act is a federal bill that, if passed, would provide federal funding for surface transportation.

Interstate Operations and Enhancement Program (IOEP) is a state-administered funding program that allocates funding to interstates based on freight traffic volume.

Maintenance generally includes all activities necessary to maintain the existing transportation system, including existing roads, bridges, and transit services.

Making Efficient and Responsible Investments in Transit (MERIT) is a state funding program administered by DRPT that provides operating and capital assistance grants to Virginia transit agencies.

Metropolitan Planning Organizations (MPOs) are federally required planning organizations for urban and suburban areas.

Mileage-based user fees (MBUF) charge drivers a fee for each mile they drive. MBUFs are also referred to as Road-Use Charges (RUCs) or Vehicle Miles Travelled (VMT) taxes.

Multimodal means that a transportation process or project considers all modes of surface transportation, including roads, rail, transit, pedestrian, and bicycle.

Northern Virginia Transportation Authority (NVTA) is a public, regional authority in Northern Virginia that receives regional transportation tax revenues and can allocate revenues to projects. NVTA also acts as the region's planning body.

Northern Virginia Transportation Commission (NVTC) is a multi-jurisdictional agency representing Fairfax, Arlington, and Loudoun counties and the cities of Alexandria, Fairfax, and Falls Church. NVTC helps to provide public transit and commuter rail services in the region.

Office of Intermodal Planning and Investment (OIPI) is an office within the transportation secretariat that supports and advises the secretary of transportation, and is involved in many aspects of surface transportation planning and programming.

Operations of the transportation system refers to the management of the existing system to make it function more efficiently, such as synchronization of traffic lights, interstate safety patrols, and routing of transit buses.

Paratransit is on-demand, often door-to-door transit services for individuals with disabilities who are unable to use other transit options.

Planning District Commissions (PDCs) are state statute-established organizations of local governments that facilitate regional planning and services.

Potomac and Rappahannock Transportation Commission (PRTC) is a multi-jurisdictional agency representing Prince William, Stafford, and Spotsylvania counties and the cities of Manassas, Manassas Park, and Fredericksburg. PRTC operates bus services and supports commuter rail service in the region.

Regional transportation authorities in Virginia are public entities that receive and allocate dedicated regional transportation revenues.

Revenue Sharing is a state funding program that helps to fund all types of local transportation projects. Localities provide a 50:50 match to receive state funds.

Ridership is the number of passengers using a public transit system.

Smart Scale is a state funding program for improvements across modes of transportation through which localities apply to the state for project funding.

State of Good Repair (SGR) is a state funding program that provides funding to improve deteriorated pavements and structurally deficient bridges.

Strategically Targeted Affordable Roadway Solutions (STARS) is a VDOT planning program that develops cost-effective solutions to improve congestion and safety in the state.

Structurally deficient is term used to describe bridge condition. Bridges that are structurally deficient often require rehabilitation, have weight restrictions, or have been closed to traffic. Bridges that have a general condition rating—which measures bridge condition on a scale from 0 to 9—of 4.0 or less are deemed structurally deficient.

Surface transportation refers to travel by roads, rail, transit, pedestrian, and bicycle, but not travel by air, sea, or waterways.

Surface Transportation Reauthorization Act of 2021 is a federal bill that, if passed, would provide funding for surface transportation.

Transit agencies are entities that operate and maintain transit systems. Transit agencies are either operated by a local government or regional agencies managed by multiple local governments. Larger transit agencies that operate more than 100 vehicles are "Tier I" agencies, while smaller agencies that operate 100 or fewer vehicles are "Tier II".

Transit Ridership Incentive Program (TRIP) is a statewide grant program administered by DRPT that aims to improve transit service in urbanized areas of the state with a population above 100,000, and to reduce barriers to transit use for low-income individuals.

Virginia Department of Transportation (VDOT) is a state transportation agency that is responsible for maintaining, operating, and improving the state's highway systems, which includes the majority of the state's roads, bridges, and other structures.

Virginia Highway Safety Improvement Program (VHSIP) is a state-administered funding program that aims to address safety concerns with road improvement projects.

Virginia Passenger Rail Authority (VPRA) is a state transportation authority that was created by the General Assembly in 2020 and is responsible for promoting, sustaining, and expanding Virginia's passenger rail services.

VTrans is Virginia's statewide transportation plan. VTrans's main purpose is to assess long-term trends, identify transportation needs, and prioritize them for study.

Washington Metropolitan Area Transit Authority (WMATA) is a tri-jurisdictional agency that operates heavy rail, fixed-route bus, and paratransit services in Northern Virginia and is commonly referred to as "Metro."

1 Overview of Surface Transportation in Virginia

In 2020, the Joint Legislative Audit and Review Commission (JLARC) directed its staff to review Virginia's surface transportation infrastructure and funding. Staff were directed to review infrastructure condition; funding sources for transportation; challenges facing the state's transportation system; trends affecting transportation and their expected impact, especially the shift to fuel efficient and alternative fuel vehicles; and the state's preparedness to adapt to changes in transportation needs. (See Appendix A for the study resolution.)

JLARC had not reviewed transportation in many years. JLARC last reviewed transportation funding in 2001 and 2002. JLARC also reviewed transportation planning and programming in 2010.

To address the study resolution, JLARC staff interviewed staff at state transportation agencies, including the Office of Intermodal Planning and Investment (OIPI), Virginia Department of Transportation (VDOT), Department of Rail and Public Transportation (DRPT), Virginia Passenger Rail Authority (VPRA), and the Department of Motor Vehicles (DMV). JLARC staff also interviewed key local and regional stakeholders, including staff with local public works departments; transit agencies; regional transportation authorities; local and regional planning bodies; as well as transportation experts and other stakeholders. JLARC staff analyzed asset condition data from VDOT, the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA); revenue and budget data from VDOT and DRPT; and revenue projection data from the Department of Taxation (TAX). JLARC staff also reviewed state transportation plans developed by OIPI and literature on topics related to transportation infrastructure and funding. (See Appendix B for a full description of research methods.)

Virginia has a multimodal surface transportation system

Virginia's multimodal surface transportation system includes roadways, public transit, passenger and freight rail, and bicycle and pedestrian networks. Virginia's roadway system includes more than 70,000 miles of roads throughout the state. These roads include major eight-lane roads such as interstates, as well as smaller roads such as two-lane county roads.

Virginia's commuter rail and bus systems are operated by 40 regional and local transit agencies. Transit services include fixed-route and on-demand bus services, commuter rail, and light rail. Some transit systems, like the Washington Metropolitan Area Transit Authority (WMATA) bus and rail system in Northern Virginia, are large, while others, such as "dial-a-ride" services in rural areas, are much smaller.

Virginia has more than 3,000 miles of rail lines throughout the state, which are used by both freight and passenger rail. All regions of the state are served by freight rail,

while passenger rail is available only in certain areas. Amtrak provides passenger rail services under contract with the state.

Funding for surface transportation will total more than $8 billion in FY22

Virginia funds the maintenance, operation, and improvement of its surface transportation system (sidebar). The state also funds transportation agency administration, planning, research, environmental compliance work, and debt service. Revenues that fund transportation in Virginia come from a variety of local, regional, state, and federal sources. The majority (80 percent) of state revenues come from taxes on most retail sales, motor fuels, and motor vehicle sales. Motor fuel and motor vehicle sales taxes are collected by DMV, while TAX receives sales and use tax revenues. Revenues are then deposited in the Commonwealth Transportation Fund.

For FY22, the state plans to spend or allocate over $8 billion for surface transportation. This includes $6.6 billion in planned state expenditures and $1.5 billion that regional entities allocate. However, this does not include local expenditures that do not flow through the state's transportation budget.

Maintenance, operations, and improvements account for the majority of transportation spending. About one-third of surface transportation funding supports maintaining and operating the state's roads (Figure 1-1).

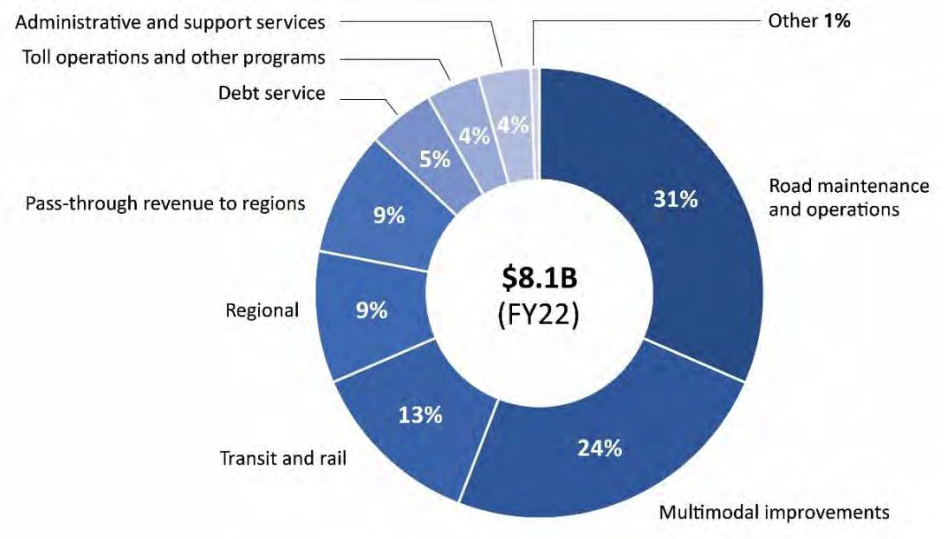
Maintenance is defined here to include all activities necessary to maintain the existing transportation system, including existing roads, bridges, and transit services. Maintenance can include routine activities, such as pothole repair, and construction projects to repair the existing system, such as replacement of an existing bridge.

Operation is the management of existing systems to make them function more efficiently, such as synchronization of traffic lights, interstate safety service patrols, and routing of transit buses.

Improvements include construction projects, such as adding lanes or redesigning an interchange, as well as operational improvements and purchases of new fleet vehicles to expand transit services.

This report contains a glossary of these and other terms.

FIGURE 1-1
Majority of spending is on road maintenance and operations and multimodal improvements

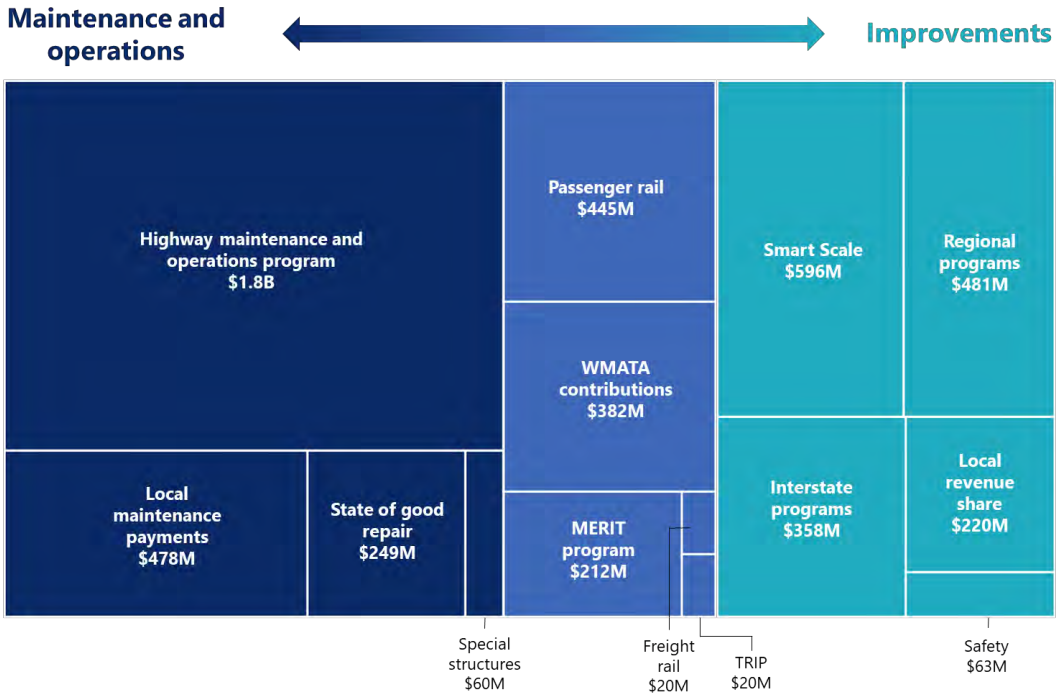


SOURCE: JLARC analysis of Commonwealth Transportation Fund budget, FY22.
NOTE: "Road maintenance and operations" includes State of Good Repair and Special Structure funding. "Transit and rail" includes dedicated capital funding for WMATA. "Regional funding for improvements" includes regional improvement project participation. "Other" includes support to other state agencies and transfers.

One-quarter of surface transportation funding is dedicated to improvements of the state's multimodal surface transportation system (mostly construction projects). Transit and rail funding is the next-largest category and accounts for 13 percent of spending, most of which is for transit. Regional and other categories, such as debt service, account for remaining spending.

Transportation funding is distributed through several maintenance, operation, and improvement "programs." These include large programs that fund highway maintenance and operation, as well as smaller programs that fund freight rail and safety (Figure 1-2). The Commonwealth Transportation Board (CTB) approves how available funding is allocated across the state's funding programs, subject to the requirements in the Code of Virginia. VDOT and DRPT administer the programs and distribute funding across VDOT districts, transit agencies, and/or localities as needed. (See Chapters 3, 5, and 6 for descriptions of these programs.)

FIGURE 1-2
Transportation funding is distributed through a number of programs

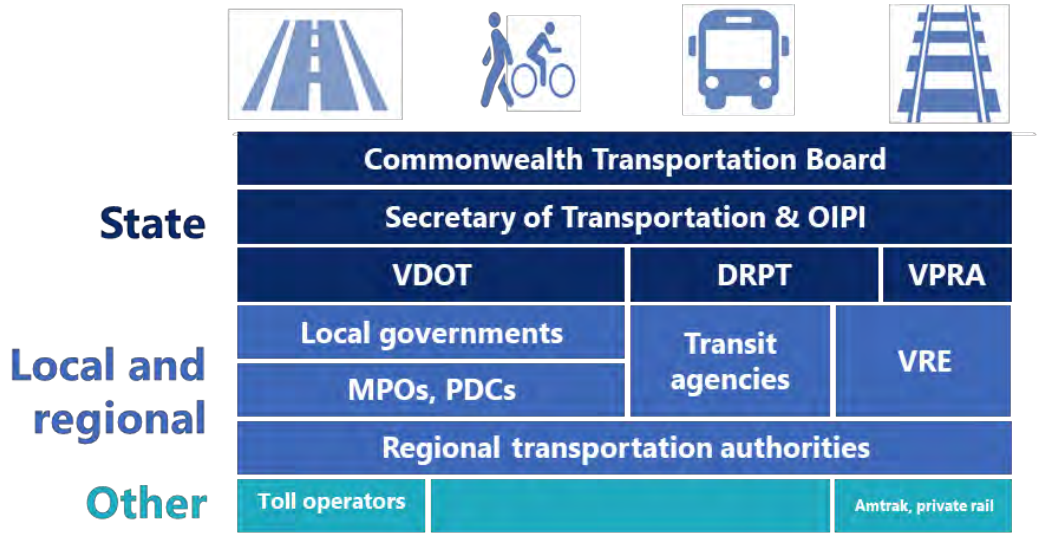


SOURCE: JLARC summary analysis, including FY22 CTB budget, FY22 VDOT budget, FY22-27 Six-Year Improvement Program, presentations to CTB.
NOTE: MERIT = Making Efficient and Responsible Investments in Transit program, TRIP = Transit Ridership Incentive Program. Figure not inclusive of all funding programs or allocations. Only major state and regional programs are shown. "Regional programs" represents funding that regional authorities are able to allocate and does not include pass-through funds that flow from regional entities to transit providers or localities.

Virginia's surface transportation system is supported by state, regional, local, and private entities

Multiple state, regional, local, and private entities are responsible for different parts of Virginia's surface transportation system (Figure 1-3). These entities plan for, operate, maintain, and improve the state's transportation infrastructure.

FIGURE 1-3
State, local, regional, and private entities are responsible for transportation



SOURCE: JLARC summary analysis.
NOTE: OIPI = Office of Intermodal Planning and Investment. VDOT = Virginia Department of Transportation. DRPT = Department of Rail and Public Transportation. VPRA = Virginia Passenger Rail Authority. MPO = Metropolitan Planning Organization. PDC = Planning District Commission. VRE = Virginia Railway Express.

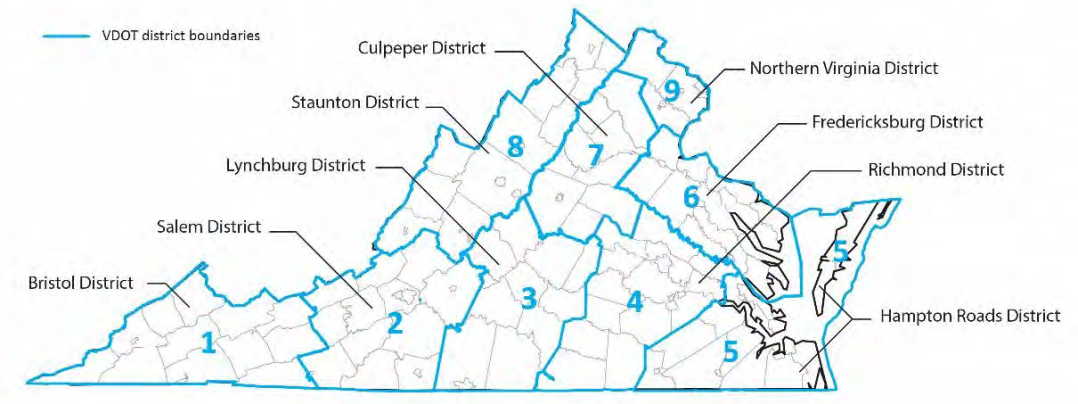
At the federal level, multiple divisions within the U.S. Department of Transportation oversee and fund surface transportation in Virginia. FHWA, FTA, and the Federal Railroad Administration distribute highway, transit, and rail funding, respectively, and support and assist transportation entities in the state. Various federal entities are also directly responsible for certain aspects of the state's surface transportation system, such as roads and bridges on military bases and in national parks.

VDOT, local governments, transit agencies, and private rail companies operate and maintain Virginia's surface transportation system

VDOT is responsible for the majority of the state's roads. VDOT maintains nearly 58,000 miles of roads throughout the state and more than 20,000 bridges and other structures. Maintenance includes repaving roads and rehabilitating bridges. VDOT also operates the state's tunnels and moveable bridges, three ferries, and many traffic

operations services such as traffic signal coordination and highway safety service patrol. VDOT uses nine districts to structure its activities (Figure 1-4). VDOT districts are also used as the geographic boundaries for multimodal state planning and some funding programs.

FIGURE 1-4
VDOT uses nine districts to structure its maintenance, operations, and improvement projects



SOURCE: VDOT.

Local governments are involved in multiple aspects of surface transportation. Cities, many towns, and Arlington and Henrico counties are responsible for maintaining the roads in their jurisdiction. These roads account for about 15 percent of the state's total road miles. All local governments, including those counties and towns whose roads are maintained by VDOT, can improve their road and bicycle and pedestrian networks, for example, by widening roads and repairing sidewalks.

Local and regional transit agencies operate and maintain transit systems with support from DRPT. These include fixed-route and on-demand bus services, commuter rail, and light rail. Transit agencies operate bus and train routes and make capital investments, such as replacing aging buses or rail cars, as needed. DRPT allocates funding to transit agencies for daily operations and capital investments. DRPT also oversees and collects data from transit agencies and coordinates several federal grant programs on behalf of the agencies.

Private rail companies own and maintain the railroad tracks that both freight and passenger rail use. Two Class I railroads—CSX and Norfolk Southern—and nine shortline railroads move goods throughout the state. The passenger and commuter rail operators that serve the state—Amtrak and Virginia Railway Express (VRE)—operate on rail owned by private freight companies and state and federal governments. DRPT has historically overseen and funded passenger and freight rail, but most of its passenger rail responsibilities were recently shifted to a new state entity: VPRA.

VPRA was created by the General Assembly in 2020 and is responsible for promoting, sustaining, and expanding Virginia's passenger rail services. VPRA has assumed most of DRPT's passenger rail responsibilities, including administering state-supported Amtrak services and grant programs to promote passenger rail infrastructure. VPRA is authorized to purchase and own rail property, including track and right-of-way, to promote passenger rail expansion. DRPT maintains responsibility for rail planning, such as developing Virginia's statewide rail plan, which includes both passenger and freight rail.

State, regional, and local entities plan for and make transportation system improvements

In addition to maintaining and operating the transportation system, state, regional, and local entities plan for and make transportation system improvements. Improvements include widening existing roads, building new bridges, adding bike lanes, and expanding transit services.

The CTB is the state's policy board that oversees surface transportation projects and initiatives for the state. The board conducts statewide transportation planning and allocates funding. The board has adopted five major statewide goals that guide planning:

- economic competitiveness and prosperity;
- accessible and connected places;
- safety for all users;
- proactive system management; and
- healthy communities and sustainable transportation communities.

Within the limits set by statute, the CTB approves how funding is allocated and the final allocations for many funding programs. The CTB also has the authority to approve VDOT and DRPT's policies and objectives. The secretary of transportation chairs the CTB.

OIPI, located within the transportation secretariat, is the state's main transportation improvement planning organization. OIPI is responsible for developing the state's transportation plan (VTrans), which identifies transportation needs, and overseeing the state's main process for allocating improvement funds (Smart Scale). VDOT and DRPT assist OIPI in these processes by studying needs and helping develop projects or other solutions to address them.

MPOs are federally required planning organizations for urban and suburban areas.

PDCs are state statute-established regional organizations of local governments.

Regional entities such as metropolitan planning organizations (MPOs) and planning district commissions (PDCs) are responsible for improvement planning at the regional level (sidebar). Local governments and transit agencies also identify improvements needed to the state's road and transit systems, respectively.

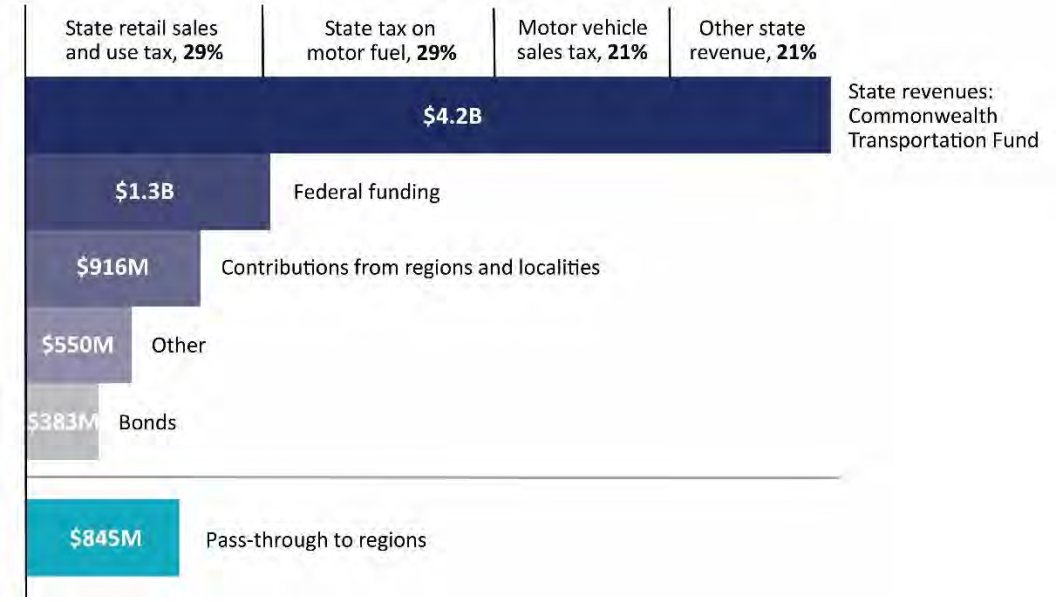
Three regional transportation authorities play a major role in planning for and funding transportation improvements in certain regions of the state. The Northern Virginia

Transportation Authority, Hampton Roads Transportation Accountability Commission, and Central Virginia Transportation Authority each fund transportation improvement projects in their respective regions. Regional taxes levied in these regions flow through the state to these authorities, and a portion of those funds are used to pay for additional improvement projects. Two other regional organizations, the Northern Virginia Transportation Commission (NVTC) and Potomac and Rappahannock Transportation Commission, coordinate funding across their respective regions. NVTC also conducts regional planning across Northern Virginia's many separate transit systems.

2 Transportation Revenue

Like most states, Virginia funds its transportation system primarily through dedicated taxes and fees from state, federal, regional, and local sources (Appendix C). Funds from each of these levels of government appear in Virginia's transportation budget. Most revenues are deposited into the Commonwealth Transportation Fund (CTF), Virginia's largest transportation fund (Figure 2-1). Nearly all state transportation revenues are non-general fund revenues dedicated to transportation. While most CTF funds support surface transportation, a portion of funds are directed to non-surface transportation modes such as aviation and ports.

FIGURE 2-1
Virginia's transportation revenues come from a variety of sources (FY22)



SOURCE: JLARC analysis of FY22 Commonwealth Transportation Fund budget, I-81 bond issuance.
NOTE: Pass-through revenues are regional taxes that are collected by the state and transferred to three regional authorities (NVTA, CVTA, and HRTAC) and WMATA. Support from regions and localities includes mostly HRTAC and NVTA contributions to construction projects, so often begin as regional "pass-through" revenues. "Other" includes mostly regional fuel taxes dedicated to Smart Scale, I-81 program funding, and a small amount of general funds.

State taxes and fees make up over half of the state's operating revenues for transportation. The three largest sources of state transportation revenue are (1) state taxes on motor fuels (the "gas tax"), (2) a state retail sales and use tax dedicated to transportation, and (3) a tax on the sale of motor vehicles. Other state revenues for transporta-

tion include car and truck registration fees, taxes on insurance premiums, and real estate taxes. (Virginia also uses tolling arrangements and public-private partnerships to help fund and finance specific areas or corridors of the state. See Appendix D).

Federal funding currently represents $1.3 billion of the state's transportation budget (17 percent of revenues in FY22). Historically, a separate *federal* motor fuels tax generated most of the funding that the federal government allocates to states. In recent years, though, the federal gas tax has not been sufficient to support federal highway and transit programs, and Congress has authorized the use of other federal funds to ensure consistent funding to states. Federal transportation funding has increased in the short term from COVID-19 relief funds.

Regional pass-through funds, which are generated through regional taxes, also make up a large part of transportation revenues in Virginia and are projected to generate more than $800 million annually. These revenues are distributed to regional transportation authorities, who use them to fund regional improvements or pass them on to localities and transit operators. Regional taxes in Northern Virginia, Hampton Roads, and in the Richmond region include fuel, retail sales, and other taxes. A regional fuels tax of 7.7 cents per gallon is assessed in all other areas of the state, raising over $200 million annually (sidebar).

Regional fuel taxes collected in areas other than Hampton Roads and the Richmond region are handled in one of four ways. For localities along the I-81 corridor, tax revenues flow to the I-81 corridor improvement program (~$60M/year). For localities in the Potomac and Rappahannock Transportation Commission (PRTC) and the Northern Virginia Transportation Commission (NVTC), regional fuel taxes flow to localities and transit operators (~$40M/year and ~$60M/year, respectively). For all other areas of the state, the regional fuel tax funds projects in the relevant VDOT district through the state's Smart Scale program (~$100M/year).

Recent legislative changes increased transportation revenues and help address funding concerns

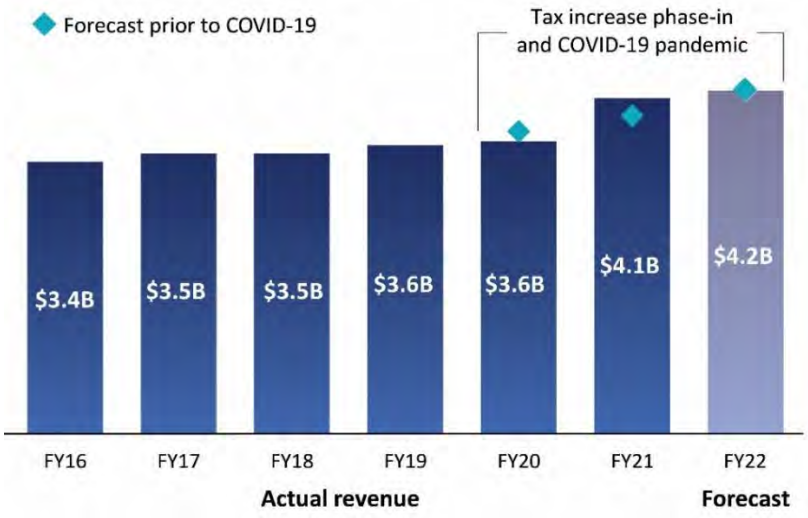
Prior to 2020, the cost of maintaining and improving Virginia's transportation system had begun to outpace available revenues. State funds awarded under Smart Scale, the state's main improvement program, fell by more than $150 million from 2017 to 2019. In addition, the Virginia Department of Transportation (VDOT) and the Department of Rail and Public Transportation (DRPT) reported maintenance fund shortfalls of more than $300 million per year. There was also concern that Virginians were driving more, but fuel tax revenues were flat or declining. Without additional revenue, the Commonwealth Transportation Board would likely have needed to shift more funds from the state's improvement budget to cover the maintenance and operation needs funded through the Highway Maintenance and Operating Fund.

To address these shortfalls, the 2020 General Assembly substantially increased transportation revenues. From FY19 to FY21, annual state revenues increased by $578 million (16 percent), in part because of tax increases. Revenue collections in FY20 were lower than initially forecasted because of the effects of the COVID-19 pandemic. However, revenues increased in FY21 and exceeded the pre-pandemic forecast because of higher-than-expected vehicle sales and retail sales tax collections. Revenues are expected to continue growing in FY22 because of higher gas tax rates and ongoing economic recovery (Figure 2-2).

The 2020 legislation also added new regional revenues. The main regional changes were the establishment of a regional tax in central Virginia along with the creation of

the Central Virginia Transportation Authority (CVTA) and a statewide "regional" fuels tax, which account for about $300 million per year in new revenue.

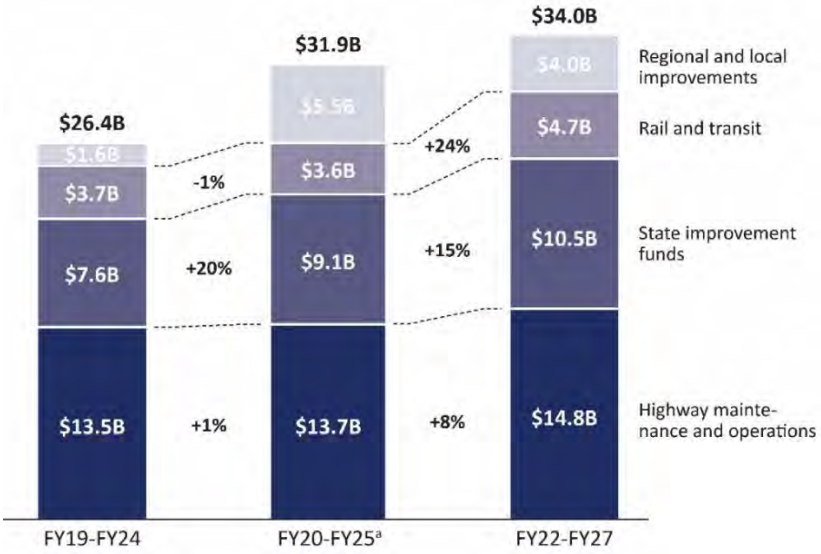
FIGURE 2-2
State transportation revenues did not meet expectations in FY20 because of the COVID-19 pandemic, but revenues have since recovered



SOURCE: JLARC calculations using revenue forecasts from Dept. of Taxation, actual revenues from office of the Secretary of Finance and Dept. of Accounts.
NOTE: Pre-COVID-19 forecasts are from November 2018 and 2019. The pre-COVID forecast for FY22 is used here given recent trends in revenues: Q1 FY22 revenues were 16 percent higher than Q1 FY21, and 19 percent higher than Q1 FY20, indicating that the state can reasonably expect to collect more transportation revenue in FY22 than in FY21. TAX will release official FY22 forecasts in November 2021, after the publication of this report. Excludes federal revenues, regional and local revenues, and financing proceeds.

Increased revenues will improve state funding for transportation system maintenance and improvements (Figure 2-3). Each year, Virginia estimates how much new funding will be available to allocate to transportation programs over a six-year period. The state's most recent six-year financial plan indicates that the state will have $3.6 billion more (16 percent) over the six-year period than before the 2020 tax changes, largely because of new revenue and debt issuance. This includes at least 8 percent more for highway maintenance and operations, 15 percent more for state-funded improvements, and 24 percent more for rail and transit. The plan shows a decline in regional and local funds, but this is because a significant portion of future regional revenues have already been committed to the Hampton Roads Bridge-Tunnel and other major regional projects within the six-year period.

FIGURE 2-3
New state revenue will enable more spending in key areas over next six years



SOURCE: JLARC calculations using Commonwealth Transportation Fund Six-Year Financial Plans (SYFPs).
NOTE: [a] There was no FY21–FY26 plan because of the COVID-19 pandemic.
VDOT administration, tolling, transfers to other agencies and funds, and some other programs not shown. FY22–27 amounts are based on December 2020 revenue forecast. Highway maintenance and operations includes special structures funding for the most recent SYFP. Rail and transit includes DRPT administration and VPRA funding. Regional and local improvement funds mostly reflect HRTAC and NVTA project participation. Some state improvement funding in FY19–24 and FY20–25 amounts may be related to public transit.

Over time, these new state revenues should help to address some of Virginia's transportation goals. Based on a comparison of projected FY24 revenues to FY20, there will be a $300 million (40 percent) increase for construction programs that fund multimodal system improvements and rehabilitation of existing roads and bridges. VDOT's highway maintenance funding will increase by $40 million a year, and $80 million in new funding will go toward maintaining the state's special structures (see Appendix E). Finally, over $30 million per year in new funding will flow to the state's transit agencies to bolster funding for transit operations and capital assets compared with projections before the 2020 changes, and at least $60 million more per year will be used for passenger rail by FY24.

The extent to which these new revenues will address transportation concerns varies by mode of transportation and funding program. New revenues should help to close reported budget gaps for state road, bridge, and special structure maintenance programs (Chapter 3). The state will also have substantially more funding for multimodal projects that improve the system, such as projects that address congestion or safety problems, but will not be able to pay for all potential improvement projects identified by the state, regions, and localities (Chapter 5). New revenues will improve support for transit, but may not fully cover the state's share of costs for replacing aging capital assets and improving transit systems (Chapter 6).

Federal funding could increase significantly for the next five years. Based on current estimates, the federal transportation reauthorization and infrastructure bill, if passed, would provide Virginia with roughly $7 billion in funding for highways and transit over the next five years. Much of that funding would be a reauthorization of current funding amounts, but Virginia would also see an average of at least $270 million annually in *new* funding for highways and bridges and at least $60 million annually in *new* funding for public transit in each of the next five years. The law would also include several new competitive grants (including significant increases in passenger rail grants).

State has taken key steps to ensure transportation revenues are sustainable over long term

Virginia has established a diverse transportation tax structure that helps ensure long-term revenue sustainability. Instead of relying heavily on a single revenue source, such as fuel taxes, Virginia has several transportation taxes, including motor fuel, retail sales, vehicle sales, and several others. Virginia's transportation revenue sources appear well diversified compared with other states. This diverse tax base makes it easier for Virginia to replace revenues lost from any one source. These taxes are also exclusively dedicated to transportation and not shared with other government functions, which provides additional long-term stability.

The biggest long-term revenue challenge for Virginia and other states is the viability of motor fuel taxes. Over time, motor fuel consumption is expected to decline as vehicles become more fuel efficient and more electric vehicles are adopted (sidebar).

Electric vehicles (EVs) in this report generally refer to battery electric vehicles (BEVs) and plug-in hybrids (PHEVs) but not hybrid electric vehicles (HEVs), which are always at least in part powered by gasoline.

EVs appear to be the most likely type of alternative fuel vehicles to come into widespread use. Other types of alternative fuels, such as hydrogen, have not been able to successfully penetrate the U.S. vehicle market, although several manufacturers are exploring this technology for heavy, long-haul trucks.

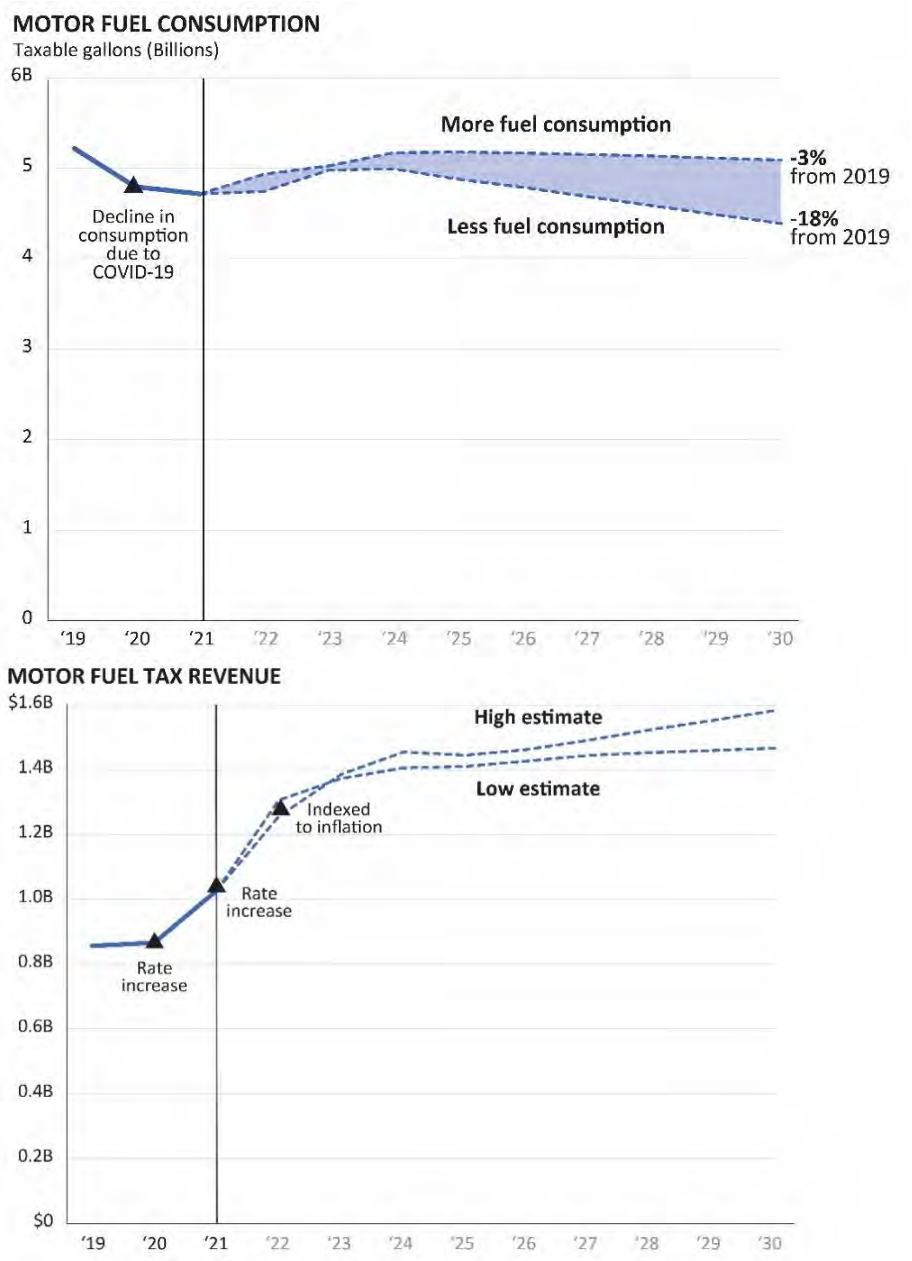
Recent changes to motor fuel taxes will likely offset revenue losses from declining fuel consumption

Even though Virginia has a diverse transportation tax base, motor fuel taxes are still an important component of revenues. State fuel taxes generated about $1 billion in revenues in FY21, or about a quarter of state-generated revenues. Reductions in motor fuel tax revenues have implications for Virginia's transportation funding. However, other state revenue sources, including the motor vehicle sales tax and retail sales and use tax, are not sensitive to declines in fuel consumption.

At least through 2030, the recent changes to motor fuel taxes will likely have a greater positive effect on revenue than the negative effect of declining consumption (Figure 2-4). The state has taken two key steps to ensure transportation funds do not substantially decline: (1) increased the motor fuel tax rate per gallon and (2) indexed the rate to inflation over time.

The 2020 General Assembly increased the gasoline fuel tax rate by 10 cents over two years (60 percent), and the 2019 General Assembly increased the diesel fuel tax rate by seven cents starting in July 2021 (35 percent). The legislature also indexed both taxes to inflation starting in July 2022. (The Consumer Price Index, which measures inflation, is projected to grow by about 20 percent from FY23 to FY30.)

FIGURE 2-4
Fuel tax rate increases will likely offset potential consumption declines



SOURCE: JLARC analysis using Dept. of Taxation forecast and collections of state motor fuels and road taxes, and gas and diesel consumption outlook for light duty vehicles, commercial light trucks, and heavy freight vehicles from the U.S. Energy Information Administration's 2020 and 2021 AEOs. Inflation forecast is from TAX and the CBO.
NOTE: The Department of Taxation (TAX) produces official mid-range forecasts of state transportation revenues. High and low outlooks reflect official TAX forecast for FY22–24 and JLARC analysis using national consumption outlook for FY25–30. The TAX forecast is from November 2020 and will be updated in November 2021. The 3% reduction scenario assumes current fuel economy standards and lower oil prices; 18% reduction scenario assumes fuel economy rules similar to the Obama-era standards are in place through the period and oil prices are high.

Without these motor fuels tax increases, revenue collections thus far and future revenue projections would be significantly lower. Prior to the 2020 legislative changes, motor fuels tax revenues were expected to be about $960 million in FY24. Because of the legislative changes, motor fuels tax revenues are now expected to be about $1.4 billion in FY24. Motor fuel tax revenues in the first quarter of FY22 were 23 percent higher than in the first quarter of FY20, indicating that tax rate increases have more than offset the decline in consumption caused by the COVID-19 pandemic.

Although fuel consumption is expected to decline over time, the projected decline is not enough to offset the positive effects of recent fuel tax increases. In the near term, fuel consumption is expected to increase, as travel returns closer to pre-pandemic levels in 2022 and 2023. However, by 2030, federal estimates indicate that fuel consumption could decline anywhere from 3 to 18 percent from pre-pandemic levels observed in 2019.

Most of this decline is expected to come from a shift to more fuel-efficient and hybrid passenger vehicles rather than widespread adoption of electric vehicles. Electric vehicles currently represent only 0.3 percent of light-duty vehicles in Virginia and less than 2 percent of all new vehicles sold nationally. This low current percentage and the fact that 5–10 percent of the total car stock in Virginia can "turn over" each year as people purchase new vehicles, means that it will take time for EVs to represent a meaningful percentage of all vehicles.

While legislative changes improve revenue through 2030, future revenue impacts are difficult to project with certainty. For example, fuel consumption (and tax revenue) could decline at a faster rate if electric vehicles are adopted more quickly than expected because of improvements in battery technology, expanded tax credits, and/or significant expansion of charging networks. Federal forecasts expect electric vehicles could make up to 4 percent of light-duty vehicles nationally by 2030, although aspirational state and federal targets are higher (sidebar). If new electric vehicle sales meet federal targets, electric vehicles could be about a fifth of light-duty vehicles in 2030, and consumption would likely decline significantly more than what is shown in Figure 2-4.

Various targets have been set for electric vehicle adoption. Under HB1965 (2021), Virginia may promulgate regulations that correspond to California's Zero-Emission Vehicle (ZEV) mandate, which requires 22% of model year 2025 car sales to be electric. The Biden administration set a goal that 50% of *new* car sales (not 50% of all vehicles) be electric vehicles by 2030.

If the current projected trends in fuel consumption hold, the state may not experience a decline in fuel tax revenue until several years after 2030. However, projections beyond the 10-year period are not reliable given the many factors that could influence consumption in the long term, such as federal policy and changes in fuel prices. Even so, the decline in fuel consumption is likely to remain gradual and the state should have enough time to identify and adapt to any corresponding decline in tax revenue. For example, if federal policies are enacted that promote faster adoption of electric vehicles, state transportation officials will be aware of those policies. Officials are monitoring trends in electric vehicle adoption and transportation revenues, as part of the state's planning process, and will have several years to observe changes in fuel consumption and tax revenues. The General Assembly could then take actions that it deems necessary, such as enacting further changes to other transportation taxes and fees, to replace declining revenue.

State has established new user fees that will supplement motor fuel taxes and, in the long term, could potentially replace them

Many experts and transportation stakeholders view user fees as a long-term solution to the eventual loss of fuel tax revenues. User fees help ensure owners of more fuel-efficient vehicles pay into the transportation system and further diversify the tax structure. User fees can be structured to closely match a driver's use of public highways to the fees that are owed.

In 2020, Virginia implemented a new highway use fee (HUF) and directed the creation of a voluntary Mileage-Based User Fee (MBUF) program (Table 2-1). Owners of more fuel efficient vehicles will soon have the option to either pay the HUF or participate in the MBUF program. Both user fees are administered by the Department of Motor Vehicles (DMV).

TABLE 2-1
New user fees will apply to millions of drivers

	Highway use fee (HUF)	Mileage-based user fee (MBUF)
Start date	July 2020	July 2022
Description	Drivers are charged a flat annual fee. The fee is equal to what is not paid in state gas tax relative to the average driver, with a 15 percent discount. [a]	Drivers are charged a fee for each mile they drive, up to the annual fee they would have paid if opting for the HUF.
Eligibility	Vehicles under 10,000 pounds with fuel efficiency at or above 25mpg	Same as HUF [b]
Optional?	No	Yes, as an alternative to the HUF
Maximum fee	$109 (FY22)	$109 [c]
Number eligible	2.6M *(estimated)*	2.6M (*estimated*) [b]
Annual revenue	$43M (FY21)	Not yet known

SOURCE: Code of Virginia § 46.2-770-4; Department of Motor Vehicles; Secretary of Finance; JLARC analysis.
NOTE: [a] The fee is calculated as follows: 26.2 cents per gallon*[(11,600 miles/23.7mpg) - (11,600 miles/driver mpg)]*0.85. [b] DMV may limit program participation during the first four years of implementation. [c] Maximum HUF and MBUF fees are indexed to inflation through their link to the gas tax and will be different in FY23 when the MBUF begins (though the typical fee is much lower than the maximum fee of $109). Mileage-based user fees are also referred to as "road use charges" or "vehicle miles traveled" taxes. HUF eligibility reflects JLARC estimate for the first years of the program and is subject to change.

User fees will initially account for modest revenue but could be an option for replacing fuel taxes in the future

Virginia's user fees generated $43 million in FY21 (1 percent of state transportation revenue). Based on JLARC staff estimates, at least 2.6 million Virginians (or 38 percent of vehicle owners) will be charged user fees in the next two years. The number of owners charged user fees will increase over time, assuming that vehicles continue to become more fuel efficient and the number of electric vehicles on state roads grows. However, because this change will be gradual, user fee revenues will remain relatively

small in the *near term* and will mostly serve as a supplemental source of transportation revenue.

Eventually, in the *long term*, Virginia's user fees could become a major revenue source and eventually replace motor fuel taxes. As currently structured, HUF revenues could grow to several times their current size. For example, in 20 years, if one-quarter of vehicles are electric, and another half are fuel-efficient, and the HUF grows at the rate of inflation, the HUF could theoretically generate over $700 million in revenues.

Although the HUF could hypothetically replace most fuel taxes, transportation experts indicate that an MBUF program is likely the best way to accomplish this. An MBUF program would be preferable because it can charge drivers based on actual use of the system, whereas the HUF is a flat fee based on vehicle fuel efficiency. Virginia is currently establishing a voluntary MBUF program, and a second or third generation of this program could one day be expanded to enroll all Virginia vehicle owners. For example, using reasonable assumptions about taxable miles, charging two cents per mile through an MBUF in the future could theoretically generate about $1.2 billion to $1.4 billion in annual revenue (approximately the same amount of state motor fuels tax Virginia collects).

It is uncertain if and when user fees could be expected to replace fuel taxes. JLARC's projections do not show a decline in fuel tax revenues in the next 10 years, so there is not an immediate need to replace these revenues. On the user fee side, future fee revenues cannot be reliably projected because the HUF is only in its second year and the MBUF program is still being developed. Consequently, there is no historical data that can be used to project future trends. Other factors add to this challenge, such as uncertainty in the rate of electric vehicle adoption, uncertainty about the future mix of fuel efficient gas-powered cars on the road, and uncertainty in the number of drivers who will enter the MBUF program instead of paying the HUF.

Virginia MBUF will need to foster public acceptance, address data privacy challenges, and exclude miles driven outside of the state

Virginia is establishing a voluntary MBUF program to give drivers of fuel efficient vehicles a potentially lower-cost alternative to the HUF. While several other states have participated in small-scale pilot studies, only Oregon and Utah have established permanent MBUF programs. Oregon has had a small MBUF since 2015 with about 2,000 participants. Utah's MBUF is newer and slightly larger, with 4,000 participants as of 2020 (and plans to significantly expand by 2031). Virginia's MBUF is being modeled on the Oregon and Utah programs but will likely begin as a much larger program.

DMV will oversee Virginia's MBUF program, but it will mostly be administered by a private company. Based on the initial request for proposals and state law, the program will: (1) be optional, (2) cover a subset of drivers, (3) provide drivers the option to use metering equipment that does or does not track driver location, (4) cap fees, and (5)

include protections for user data. DMV may limit the number of participants in the first years of the program.

The long-term success of Virginia's program will likely depend on overcoming key challenges other states faced. Most immediately, the state needs to foster public acceptance. One of the main ways the state can do this is by clearly addressing data privacy, which has been a chief concern in other states. The primary concern is about location tracking, which the program needs—at least at a high level—to charge drivers for miles driven within Virginia and to provide other features. Without some kind of location tracking, participants will have to pay for the miles they drive outside of the Commonwealth and will lose features such as the ability to view an inventory of their past trips.

Virginia should adopt robust privacy legislation for MBUF participants. The program should give users the option to report mileage without location tracking and restrict how participant data can be collected, used, disclosed, and retained. For example, legislation should limit the collection of participant data to only what is necessary for program administration, require that there be a reasonable period after which program data is destroyed, prevent disclosure of disaggregated data, and require any research uses of aggregated data to be approved by an institutional review board (IRB). Similar privacy protections have been adopted in other states, and transportation studies at research institutes, such as the Virginia Tech Transportation Institute, often require IRB approval.

RECOMMENDATION 1

The General Assembly may wish to consider amending § 46.2-773 of the Code of Virginia to ensure privacy of Mileage-Based User Fee program participant data by: (i) guaranteeing participants the option to participate without location tracking, (ii) limiting data collection to what is needed for program administration, (iii) excluding individual-level participant data from disclosure, (iv) requiring the program to have a specific data retention period, and (v) limiting any research to using aggregated data subject to approval of an institutional review board.

Virginia should eventually offer an option to MBUF participants that does not charge them for miles driven outside of Virginia. Under current state law, DMV plans to direct the MBUF program vendor to collect a fee for *all* miles that program participants drive, including miles driven outside of Virginia. Some other states, such as Oregon, only collect per-mile fees for miles participants drive within Oregon to ensure fees reflect road use *in* Oregon. While participants who do not report their location cannot be offered this deduction, charging for in-state miles is a fairer approach for those using location-tracking (GPS-enabled) devices.

DMV staff indicated that they do not believe the current law allows participants to be charged only for miles driven in Virginia. The General Assembly should clarify that the law allows DMV to provide this option to program participants.

RECOMMENDATION 2

The General Assembly may wish to consider amending § 46.2-773 of the Code of Virginia to clarify that program fees can be charged for all miles driven by participants or for only miles driven in Virginia, and that both options can be made available to participants.

If Virginia wishes to maintain and expand the MBUF to raise more revenue in the long term, it will need to evaluate the program's effectiveness and make necessary changes. For example, as more vehicles are eligible for the MBUF, Virginia may need to adjust eligibility rules, fee rates, and fee caps to ensure the program is fairly generating adequate revenue. Program administrative costs and interstate agreements—ongoing challenges in other states—will likely need to be evaluated. DMV should conduct the evaluation and then report to the General Assembly on program performance to ensure accountability and keep the legislature informed as it considers opportunities to strengthen the program.

RECOMMENDATION 3

The Department of Motor Vehicles should evaluate the Mileage-Based User Fee program, including (i) administrative and operational costs; (ii) program enrollment, total fees, and per-mile rates by vehicle attributes (e.g., fuel efficiency, fuel type, vehicle weight); (iii) user compliance and fraud; and (iv) all uses of program data by the vendor, researchers, and others. The evaluation results and recommended program changes should be reported to the House and Senate Transportation committees in December 2023, following the first full year of program implementation.

State could consider expanding user fees to include regional surcharges and heavy electric vehicles

Virginia could make two changes to user fees to ensure consistency in what drivers pay and to address potential long-term revenue gaps. Adding a *regional* surcharge on the state's highway use fee would ensure all drivers pay into regional funds, as they do state funds. Adding a fee on heavy vehicles that are fuel efficient or electric would ensure those vehicles pay into transportation funds to account for forgone gas tax revenue, as passenger cars currently do. Both changes would address revenue gaps in the new transportation tax structure that are currently small but could grow larger in the longer term.

The state recently created several regional fuel taxes to help pay for transportation improvements. The state is projected to collect and remit $390 million in regional fuels taxes in FY22. While these taxes are indexed to inflation, like the state tax, revenues could decline over the long term as fuel consumption declines. A new, regional user fee surcharge could someday replace these lost revenues.

The regional surcharge could be proportional to what vehicle owners currently pay in fuel taxes. For example, currently the state gas tax rate is 26.2 cents/gallon, and the

regional gas tax rate is 7.7 cents/gallon, a 7:2 ratio. Using that same ratio, a vehicle owner who is charged the maximum $109 HUF would pay about $32 in regional user fee surcharges. Revenues from this surcharge would be remitted to the region where the vehicle is registered. Like state user fees, regional surcharges would initially raise modest revenues (~$12 million annually).

POLICY OPTION 1

The General Assembly could establish regional surcharges in the Code of Virginia for the highway use fee and mileage-based user fee.

User fees do not currently apply to electric and fuel efficient vehicles that weigh over 10,000 pounds, such as commercial trucks and large delivery vans. For example, electric tractor trailers pay the same registration fees as diesel-powered trucks, but do not pay fuel taxes, the diesel tax surcharge, or a highway use fee. While heavy electric trucks currently make up less than 1 percent of global heavy truck sales, some forecasts show market share increasing over time.

Some other states charge heavy electric vehicles additional fees, though they reflect a fraction of what gas or diesel-powered heavy commercial vehicles pay in fuel taxes. For example, Michigan charges a $100 fee for electric vehicles below 8,000 pounds and a $200 fee on electric vehicles above 8,000 pounds. Colorado and Georgia also assess higher fees on heavier electric vehicles. Other states, such as Idaho, Illinois, and Utah, do not exempt heavy vehicles from standard electric vehicle fees. Pennsylvania assesses a fee per kilowatt hour of electricity used. Flat fees in these states range from $50 to $300 per year for heavy electric vehicles, which is likely a fraction of what commercial vehicles pay in state fuel taxes. For example, an 80,000-pound truck making a one-way trip on I-81 through Virginia will pay an estimated $22 in state fuel taxes and surcharges for the trip.

Virginia could assess a weight-based fee on electric and fuel efficient vehicles over 10,000 pounds. To ensure fairness, these vehicles could be required to pay in to the transportation system like other users. Because heavy vehicles have more significant impacts on roadways than lighter vehicles, it would be logical to charge a user fee that reflects that higher impact. Virginia's fee could initially be aligned with other states' fees and Virginia's HUF ($100–$300 per year) and be scaled up by vehicle weight to account for road impact. Fee structures could be revisited if heavy fuel efficient and electric vehicles begin to gain market share.

POLICY OPTION 2

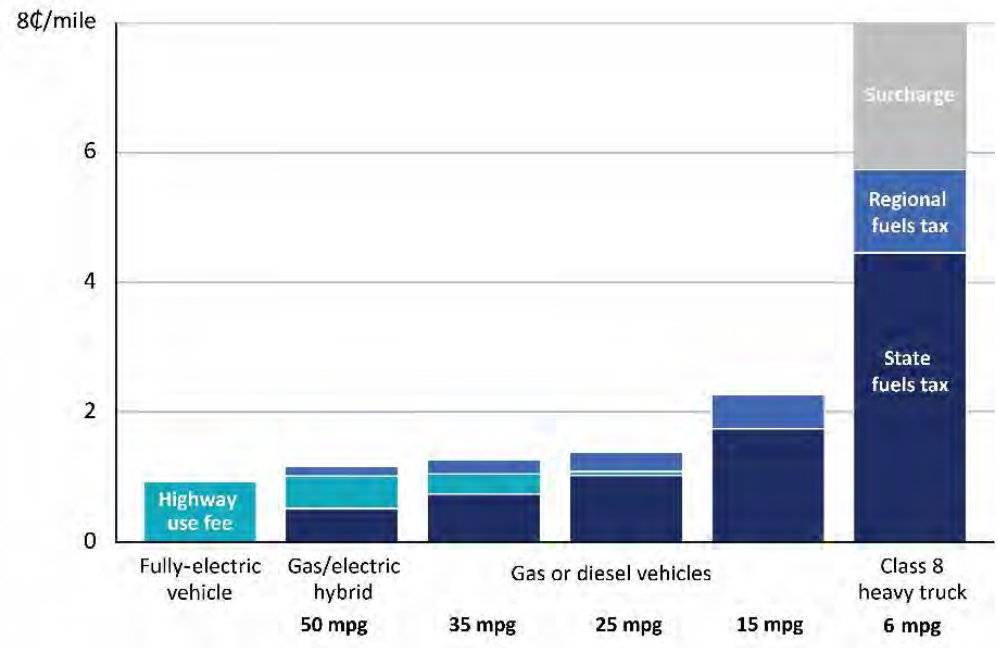
The General Assembly could amend § 46.2-772 et seq. and § 58.1-2701 of the Code of Virginia to assess a highway use fee on (i) fuel efficient and electric vehicles weighing from 10,000 pounds to 26,000 pounds, and (ii) electric vehicles over 26,000 pounds. Fees could be scaled to vehicle weight.

Vehicles with lower fuel efficiency and greater impact on roads pay more in taxes and fees

Like all other states, a significant portion of Virginia's transportation taxes and fees are levied on system users. This approach reflects the "benefits" principle: users who benefit more and impose more costs should also pay more. The state's primary taxes and fees on system users are taxes on motor vehicle fuels paid at the pump and fees paid at registration, including the new HUF.

Under Virginia's tax and fee structure, users whose vehicles have a greater impact on roadways generally pay more, most significantly heavy trucks. Different users pay a different mix of user fees. Gas-powered passenger vehicle users (including out-of-state drivers) pay fuel taxes that roughly correlate to the distance traveled on state roads, so that drivers who drive more generally pay more. Less fuel efficient vehicles, which tend to be larger and heavier, pay more in fuel tax. Because owners of fuel efficient vehicles and electric vehicles pay less (or no) fuel tax, Virginia's new user fee ensures these drivers pay into the system. Heavy trucks pay fuel taxes and a surcharge (Figure 2-5).

FIGURE 2-5
Trucks pay most, followed by less to more fuel efficient passenger vehicles



SOURCE: JLARC calculations; Code of Virginia; Department of Motor Vehicles.
NOTE: Assumes each vehicle travels the average number of miles in Virginia. Excludes registration fees. Based on tax and highway use fee rates for FY22. HUF is paid at registration but converted to per mile estimate for comparison purposes. Assumes gas and diesel tax rates are the same for comparison purposes. Drivers who use alternative fuels such as natural gas or hydrogen pay an equivalent tax (but represent just 0.1 percent of vehicles).

Heavy trucks have a significantly greater impact on roadways than passenger vehicles. The typical loaded weight of a heavy truck registered to drive in or through Virginia is 80,000 pounds. Based on federal studies, wear and tear on pavements increases exponentially with vehicle weight, so these vehicles can impose at least 100 times the cost on pavements as passenger vehicles, as well as additional societal costs related to congestion, crashes, air pollution, and noise.

Virginia charges heavy trucks higher taxes and fees to reflect their greater impact and ensure interstate commercial traffic pays into Virginia's system. The per-mile amount of fuels tax paid by heavy trucks in Virginia is about four to eight times higher than the amount paid in fuels taxes and highway use fees by most passenger cars. Trucks also pay significantly higher registration fees. Virginia also ensures that trucks traveling through the state pay for the miles they drive even if they do not purchase fuel at the pump in Virginia: through interstate taxing agreements, truck companies receive either a credit or a bill depending on how many miles they drive and how much fuel they purchase in each state. Heavy trucks also pay the same Virginia regional fuel taxes as passenger vehicles when they purchase fuel in the state.

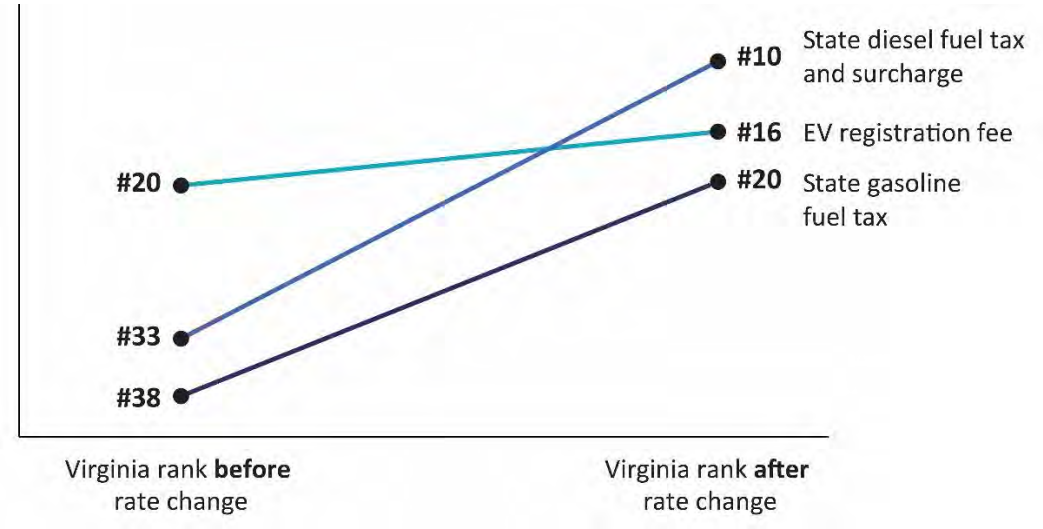
More efficient gas-powered vehicles and hybrids pay motor fuel taxes and the highway use fee. These vehicles pay regional and state motor fuel taxes depending on fuel efficiency and how much they drive. Vehicles that get 25 miles per gallon or better also pay a flat highway use fee at registration, scaled to fuel efficiency. While these vehicles pay smaller highway use fees than electric vehicles, they make up the vast majority of HUF revenue.

Virginia has considered tax credits for EVs. Acts of Assembly Chapter 493 (2021) establishes but does not fund a $2,500–$4,500 rebate for EV purchases. Studies have shown a $1,000 credit could boost new EV registrations 5-10%.

Electric-vehicles will pay about 15 percent less in state transportation taxes and fees than gas-powered vehicles on average, despite having the same impact on pavements, congestion, and safety. This is because of a legislative decision to maintain a small incentive to buy electric vehicles. Allowing electric vehicles to pay less has relatively little impact on current state revenues because they represent just 0.3 percent of all Virginia passenger vehicles, and the "discount" amounts to less than $20 per year for the average EV driver. The annual $109 fee is also likely to have limited impact on EV adoption relative to larger monetary incentives and other factors (sidebar). Electric vehicle owners who drive less may be paying slightly more than their share in some cases, but the new MBUF will allow them to pay a lower user fee consistent with road use.

All states tax motor fuels, and the majority of states assess additional fees on electric and/or hybrid vehicles. The 2019 General Assembly increased taxes and fees for heavy trucks, and the 2020 General Assembly increased fuel taxes for all drivers and user fees for electric and fuel efficient vehicles. Following these increases, Virginia's major taxes and fees are in the top half of states (Figure 2-6).

FIGURE 2-6
Virginia recently increased user fees relative to other states



SOURCE: JLARC rankings for changes between 2018 and 2021–22 based on Code of Virginia and data from the American Petroleum Institute, International Fuel Tax Association, and National Conference of State Legislatures.
NOTE: State gasoline tax ranking includes Virginia's regional motor fuels taxes that apply statewide. EV registration fee is the additional highway use fee paid by electric and fuel efficient vehicles and excludes the base registration fee paid by all vehicles. Diesel taxes and surcharges are the sum of state diesel taxes and the diesel tax surcharge applied to heavy trucks.

3 Road Condition and Maintenance Funding

The Virginia Department of Transportation (VDOT) and local governments maintain the state's road network. This includes roughly 70,000 miles of roads, 21,000 bridges and structures, 25 special structures (e.g., tunnels), and other facilities, such as rest areas and commuter parking lots. VDOT maintains the majority of the state's road network, including 85 percent of Virginia state road miles, 93 percent of the state's bridges, and all special structures. VDOT's road maintenance responsibilities include secondary roads, which is unusual among states (sidebar). The remaining 15 percent of roads and 7 percent of bridges are the responsibility of cities, towns with populations of more than 3,500 (or otherwise authorized), and two counties (Arlington and Henrico).

Virginia is one of five states in which the department of transportation maintains secondary roads. The others are Alaska, Delaware, North Carolina, and West Virginia. In all other states, local governments maintain secondary roads.

Virginia's road network is grouped into different system classifications based on jurisdiction and function. VDOT maintains three main highway systems: interstate, primary, and secondary (Figure 3-1). The Commonwealth Transportation Board (CTB) has the authority to designate whether a given road should be part of the interstate, primary, or secondary system. Locally maintained roads are classified in the urban road system.

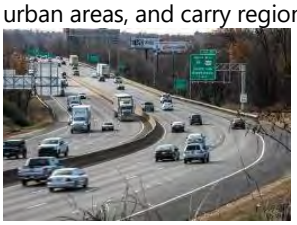
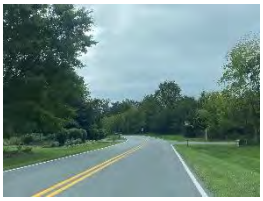
The condition of the road network affects the speed and safety with which people and goods can move throughout the state. Road condition is mainly measured by the condition of pavement surfaces and bridge structures. Pavements that are in poor condition, such as a section with significant cracking or potholes, can slow travel, damage vehicles, and contribute to accidents. If a bridge is in poor condition, use could be restricted or the bridge could be shut down, requiring drivers to use other, longer routes (sidebar). In extreme cases, a bridge in poor condition could be at risk of sudden failure.

VDOT bridge engineers monitor bridge safety and close all bridges they deem as unsafe.

Regular and timely maintenance keeps roads in good condition and ultimately reduces the cost of maintenance overall. Without regular maintenance, infrastructure can deteriorate because of the effects of traffic loads, weather, and aging. Keeping roads in good condition requires substantial commitment of state funds, in addition to federal and local funding.

Virginia's road infrastructure is in generally good condition compared with other states. Virginia ranks 13th among states for pavement condition and 17th for bridge condition. Virginia's pavements and bridges are also in good condition compared to nearby states in which the state department of transportation also maintains the majority of the roadways, such as North Carolina, South Carolina, and West Virginia.

FIGURE 3-1
Virginia classifies roads as interstates, primary, secondary, and urban

System	Description and examples
VDOT-maintained	
Interstates 	Interstates facilitate travel between Virginia and the rest of the country, connect major urban areas, and carry regional traffic.  I-95, Colonial Heights  I-81, Rockbridge County  I-64, Henrico County
Primary Roads 	Primary roads provide interstate access, connect cities and towns across the state, and carry regional traffic. High-volume primaries can carry significantly more traffic and look very different from low-volume primaries.  SR 288, Powhatan County  U.S. 460, Montgomery County  SR 42, Shenandoah County
Secondary Roads  	Secondary roads provide access to primary roads and interstates and carry local traffic. High-volume secondaries can carry significantly more traffic and look very different from low-volume secondary roads.  SR 620, Fairfax County  SR 612, Nelson County  SR 634, Nelson County
Locally maintained	
Urban Roads  	Urban roads carry local and regional traffic and provide access to the interstate and primary road systems. These can include high- and low-volume roads.  U.S. 60, Richmond  U.S. 250, Waynesboro  Floyd Avenue, Richmond

SOURCE: Title 33.2 of the Code of Virginia and JLARC analysis. Photos from JLARC staff and VDOT.

Interstates and primary roads in good condition, but VDOT's secondary roads and bridges need improvement

VDOT regularly assesses the condition of road pavement and bridges it is responsible for, and uses this information to determine maintenance needs. Pavement information is collected by a VDOT contractor using specialized data collection vans (sidebar). Pavement information on interstate, primary, and high-volume secondary roads is collected annually, and information on low-volume secondary roads is collected on a rolling five-year basis. Bridges are inspected biennially by VDOT's certified bridge safety inspectors using industry standard metrics. VDOT compares observed pavement and bridge conditions to condition targets set by the Commonwealth Transportation Board (CTB), and allocates maintenance funds across the nine VDOT districts as needed to meet those targets.

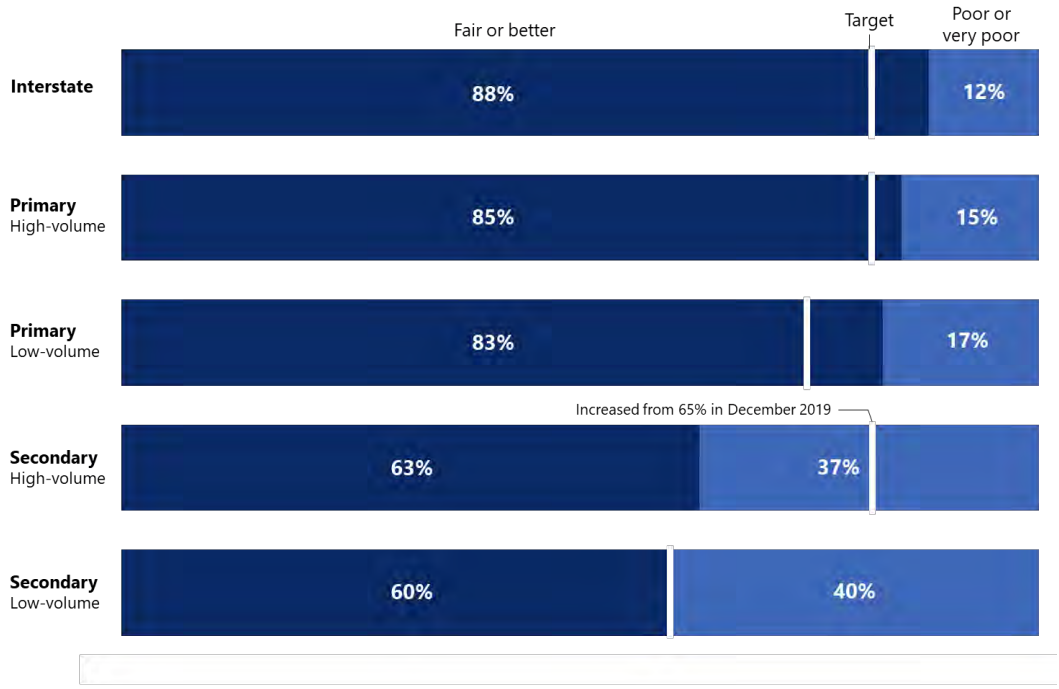
Automatic Road Analyzer (ARAN) vans take pictures and other measurements of road pavements using an array of cameras and laser surveillance equipment. This data is compiled to determine the condition of a given segment of pavement.

Pavements

VDOT-maintained interstate and primary road systems are meeting overall pavement condition targets, but secondary roads are not (Figure 3-2). About 40 percent of secondary road pavements, including both high- and low-volume roads, are rated in poor or very poor condition. This is in part because, from 2010–2019, the state prioritized improving the condition of interstates and primary roads over secondary roads. The portion of interstate and primary pavements in sufficient condition increased from 74 to 87 percent during this time, while the portion of secondary pavements in sufficient condition declined from 66 to 60 percent.

The CTB recently took action to improve the condition of secondary roads by setting different targets for high- and low-volume primary and secondary roads and increasing the condition target for high-volume secondary roads from 65 to 82 percent. The condition of high-volume secondary roads is expected to improve as a greater portion of maintenance funding is allocated to these roads. High-volume secondary road condition increased from 60 to 63 percent between 2020 and 2021, and VDOT projects conditions will meet the new target of 82 percent by 2025. However, at the same time, the condition of interstates and low-volume primary roads is expected to decline slightly, because targets for these systems were lowered to make funding available for the secondary system. These new targets seem like a reasonable way to prioritize the condition of the most-used roads across the state.

FIGURE 3-2
Pavements on interstates and primary roads meet condition targets, but secondary roads need improvement



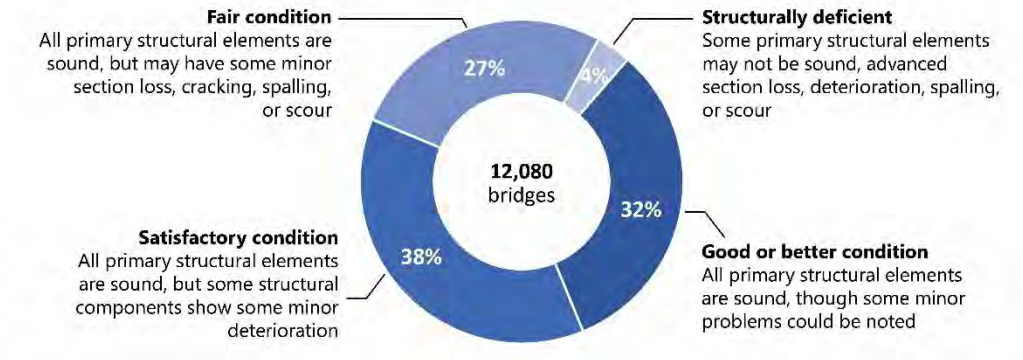
SOURCE: VDOT pavement condition data (2021).

Bridges

The vast majority of VDOT-maintained bridges are structurally sound. Only 4 percent of bridges statewide are rated as structurally deficient, meaning they have deficiencies to their deck, superstructure, and/or substructure. Even fewer bridges on the interstate (1 percent) and primary (3 percent) systems are structurally deficient. There are fewer bridges structurally deficient than in prior years; 8 percent of bridges were rated as structurally deficient a decade ago.

Despite improvements in bridge condition overall, there are still a substantial number of bridges in the state that could soon be in structurally deficient condition. More than one quarter of the state's bridges are rated in fair condition and are just one point on a 10-point rating scale away from being rated structurally deficient. These bridges are still structurally sound, but may have some minor section loss and surface issues (Figure 3-3).

FIGURE 3-3
Vast majority of VDOT-maintained bridges are structurally sound, but some are in fair condition and will eventually require substantial maintenance



SOURCE: JLARC analysis of VDOT bridge data (2021).
NOTE: Only includes bridges that are owned and maintained by VDOT and are on the National Bridge Inventory. Bridge condition is based on FHWA's general condition rating (GCR). Bridges with GCR of 7 or better = "good or better." Bridges with GCR of 6 = "satisfactory." Bridges with GCR of 5 = "fair." Bridges with GCR of 4 or less = "structurally deficient." "Spalling" is cracking or flaking of material. "Scour" is sediment loss around bridge footings due to water flow and erosion.

Though the vast majority of bridges are structurally sound, the state's bridge infrastructure is aging and some bridges are past their intended lifespan. Most (92 percent) bridges in the state were designed with a 50-year life span, and more than half (52 percent) of the state's bridges were built before 1970 and are now over 50 years old. Because of aging, there are now fewer bridges in good or better condition than there were a decade ago (32 percent, down from 37 percent), and more bridges in satisfactory or fair condition (62 percent, up from 55 percent).

> *"The aging of [bridges] is…the greatest challenge facing VDOT's highway structures."*
>
> **– VDOT Maintenance and Operations Comprehensive Review (2019)**

Structurally deficient bridges are not necessarily a safety risk. The 10-point rating scale used to describe bridge condition includes five ratings (0 to 4) within the category of "structurally deficient," and there are two ratings (3 and 4) within structural deficiency during which bridges are generally still in service. Nonetheless, bridges that are structurally deficient are closely monitored to ensure they are safe for traffic and are subject to weight restrictions or closed if inspectors determine there is a safety risk.

In addition to roads and bridges, VDOT maintains 22 special structures. These include five tunnels, eight moveable bridges, and nine complex structures. Special structures are large, complex assets with unique maintenance needs. Special structures are generally in fair condition, and VDOT has taken several steps to better plan for addressing their unique needs. (See Appendix E for more information about the condition of special structures.)

VDOT maintenance funding appears sufficient to improve condition and meet performance targets

VDOT uses two main funding programs to maintain its road network: the Highway Maintenance and Operations Program (HMOP) and the State of Good Repair (SGR) program. These funding programs support VDOT's paving and bridge repair projects, as well as routine maintenance and operations, such as mowing and snow removal. For FY22, VDOT has budgeted $2 billion for road maintenance and operations. Most of this funding, $1.83 billion (90 percent), will come from the HMOP, while the remaining $197 million (10 percent) will come from the SGR program.

Recent changes have improved HMOP funding outlook

The HMOP is VDOT's primary source of funding for maintenance and operations. In terms of maintenance, the HMOP pays for routine pavement and bridge repairs, as well as more significant repaving and bridge rehabilitation projects. In 2019, VDOT determined that projected HMOP funding was insufficient, and an additional $183 million per year would be needed to meet the CTB-established condition targets for pavements and bridges.

Since 2019, the state made three policy changes to close the projected $183 million funding gap. First, the CTB adjusted the state's pavement condition targets, lowering targets for interstates and low-volume primary roads, while increasing targets for high-volume secondary roads. The net difference of these actions is expected to reduce pavement maintenance costs. Second, the CTB adjusted the state's bridge condition targets, lowering targets across all systems and shifting focus to average bridge condition. Finally, VDOT altered its approach to bridge maintenance by focusing more on bridge preservation and rehabilitation, rather than just replacement. This approach extends the lifespan of aging bridges and is less costly than waiting until bridges are in such poor condition that they have to be replaced. These changes are expected to reduce the yearly funding gap to $38 million (80 percent reduction). The remaining gap is expected to eventually be met by new revenues from the 2020 increases to state transportation taxes. Over the next five fiscal years, VDOT expects these revenues will provide an additional $40 million annually for maintenance.

These three policy changes were reasonable approaches, but the state's expanding road infrastructure network could put pressure on VDOT's maintenance budget over the long term. Over the past few years, the state has increased state and regional funding available for road expansion and other improvement projects. For example, a series of interstate expansion projects between Northern Virginia and Richmond are expected to contribute to higher future maintenance costs in these districts and the Fredericksburg district. Similarly, widening projects and new climbing lanes planned for I-81 will expand maintenance needs along the entire corridor. Some VDOT staff expressed concerns about expansion, stating: "We add lane miles each year, which adds to the cost of maintenance."

When VDOT needs more money for maintenance and operations than it receives under statutory funding allocations, the CTB has the discretion and flexibility to allocate more funding to the HMOP. The Code of Virginia allows the CTB to direct as much funding as is "reasonable and necessary" for maintenance. However, this funding would ultimately come at the expense of the state's improvement programs without additional revenue.

A portion of HMOP funding has historically been dedicated to special structure operation and routine maintenance, but special structure condition had declined in recent years because of insufficient funding. In 2019, VDOT projected an annual funding gap of $152 million relative to special structure needs. To address this gap, VDOT plans to continue to allocate $50 million of the HMOP on average each year for special structures operations. In addition, the 2020 General Assembly established dedicated funding for special structures. The amount of dedicated funding will gradually increase, but will be $80 million in FY23 and is indexed to inflation annually thereafter. This new funding more than doubled the state's planned funding for special structures, and VDOT staff indicated it should be sufficient to address their maintenance needs. (For additional discussion, see Appendix E.)

State could improve bridge condition and reduce total lifecycle costs by funding more bridges in fair condition through SGR program

The SGR program provides funding for addressing pavements and bridges that are in the poorest condition, including deteriorated pavements and structurally deficient bridges. Both the VDOT- and locally maintained systems can receive SGR funding, but funds can only be used for interstate and primary road pavements and bridges in the National Bridge Inventory.

The SGR funding allocation process follows a reasonable approach and is working effectively. Condition ratings are used to determine whether a pavement or bridge is eligible for SGR funds, and potential projects are then prioritized and selected for funding. Historically, the process has worked as designed and the highest priority projects have been selected for funding. Funding has not been sufficient to meet all project requests in a given year, but projects that were initially passed by in earlier years have moved up the priority list and been funded in subsequent years.

Currently, SGR funding can be used only to address bridges that are already structurally deficient. As noted above, 27 percent of Virginia's aging bridges are in fair condition (i.e., one rating point away from being structurally deficient on the 10 point rating scale). The Code of Virginia currently prohibits SGR funds from being used on bridges before they are rated as structurally deficient—even when it is clear that this will happen in the relatively near future.

Expanding SGR program eligibility to allow VDOT and localities to proactively address problems with bridges before they become structurally deficient would be a less expensive and safer way to maintain bridges. Structurally deficient bridges generally

have to be fully replaced, while bridges in slightly better condition can often be rehabilitated at a much lower cost than full bridge replacement. Preventive rehabilitation can extend the service life of a bridge by decades, sometimes by more than 30 years.

VDOT recently undertook three different bridge projects, which illustrate that proactive rehabilitation can extend the life of a bridge for a fraction of the cost of replacement (Table 3-1). VDOT was able to rehabilitate rather than replace Bridge C because VDOT took action before it became structurally deficient. Many bridges can also be rehabilitated multiple times, further extending their service life for less cost. For example, if Bridge C was rehabilitated again in 40 years for the same cost as the first rehabilitation, that would extend its service life through the lifetime of Bridge A for roughly one-tenth of the cost of Bridge A's replacement.

TABLE 3-1
Timely rehabilitation is most cost-effective bridge maintenance strategy

	Age (years)	Action taken	Cost (per square foot)	Years to next major action	Cost per year of beneficial life (per square foot)
Bridge A	58	Replacement	$1,123	75	$15.00
Bridge B	48	Late rehabilitation	161	30	5.40
Bridge C	49	Timely rehabilitation	66	40	1.65

SOURCE: JLARC interview with VDOT.
NOTE: All bridges on interstates. Bridges A and B were both structurally deficient. Bridge C was not.

Adjusting SGR program eligibility to extend funding to bridges in fair condition is not expected to require additional funding. Rather, VDOT and localities will be able to use available funding to address more bridges, rehabilitating some to prevent them from becoming structurally deficient and replacing others that are beyond rehabilitation potential.

RECOMMENDATION 4
The General Assembly may wish to consider amending § 33.2-369 of the Code of Virginia to improve bridge safety and reduce long-term costs by allowing the State of Good Repair program to fund bridges that are in fair condition, specifically those that have a general condition rating less than or equal to 5.0.

If passed, the federal transportation reauthorization and infrastructure bill would provide new funding to address bridge deficiencies. The legislation allows funding to be used for preventive maintenance and rehabilitation of bridges before they become structurally deficient. Nonetheless, the General Assembly should still make changes to the state's funding program to address bridge condition, as the state's bridge rehabilitation needs outweigh potential federal funding.

SGR funding cap has resulted in two districts receiving insufficient funding to address structurally deficient bridges

SGR funding is allocated across the nine VDOT districts, and then between the VDOT- and locally maintained systems within each district. Funds are allocated based on the condition of pavements and bridges and the estimated cost to address problems. Under statute, a district can receive no less than 5.5 percent and no more than 17.5 percent of all available SGR funds, with some exceptions allowed (sidebar). The floor and cap ensure funding is spread throughout the state but otherwise appear arbitrary.

Per § 33.2-369 of the Code of Virginia, **the CTB has the authority to waive the 17.5 percent cap** when the cap inhibits VDOT's ability to address key pavement or bridge needs because of extraordinary circumstances. This authority has only been used once since the program was created. In 2019, the cap was waived to allow VDOT to address needs along the Hampton Roads Bridge-Tunnel.

Because of the 17.5 percent district cap on funding, two districts have not received proportional shares of SGR funds in recent years. Each year from FY19–22, the Richmond district accounted for 23 percent of SGR needs and the Hampton Roads district accounted for 22.5 percent. However, in each year, each district received the capped 17.5 percent amount of funding. These districts would have each received about $35 million more in total SGR funding over these four fiscal years without a cap. This funding would have been split among the VDOT- and locally maintained systems in each district, mostly to address structurally deficient bridges.

The SGR program funding cap could be raised or eliminated to provide more funding to districts with more needs. This would allow VDOT districts and local governments to better address deteriorated pavements and structurally deficient bridges in their jurisdictions. Making such a change would result in at least some of the seven districts that are already below the 17.5 percent cap receiving less SGR funding, however the new funding would be proportional to their needs (sidebar).

In each district, **SGR needs exceed available funding.** The seven districts have not been receiving more funding than they need. Rather, they have been receiving a slightly disproportionately larger share of funding and fewer of their needs have gone unmet, compared with the Richmond and Hampton Roads districts.

If the General Assembly wants to allow needs to completely drive funding, then the funding cap (and the floor) should be eliminated. This would result in each district receiving its proportional share of funds. Based on FY22 allocations, this change would increase the share of funding for two districts (Richmond and Hampton Roads) and reduce funding for the other seven. Three districts would receive less than the current 5.5 percent minimum (Lynchburg, Culpeper, and Northern Virginia).

If the General Assembly wants to improve the proportionality of funding relative to need, while continuing to ensure all districts receive a minimum share, the cap could be raised and the floor kept the same or lowered. For example, the cap could be raised to 20 percent, and the floor kept at 5.5 percent. Based on FY22 allocations, this change would increase the share of funding for two districts (Richmond and Hampton Roads) and slightly reduce funding for the other seven districts. However, no district would receive less than the current 5.5 percent minimum.

RECOMMENDATION 5

The General Assembly may wish to consider amending § 33.2-369 of the Code of Virginia to allow the State of Good Repair (SGR) program to fund more of the estimated bridge and pavement repair needs in construction districts by (i) eliminating the 17.5 percent cap and 5.5 percent floor on the proportion of SGR funding that a district can be allocated or (ii) raising the cap on the proportion of SGR funding that a district can be allocated to 20 percent but maintaining the 5.5 percent floor.

Local roads and bridges are not in as good condition as the VDOT system

Many Virginia localities are responsible for maintaining their own roadways, including all cities, towns with populations of more than 3,500 (or otherwise authorized), and two counties (Arlington and Henrico). These are generally urbanized areas where there is a need to closely coordinate road work with utilities maintenance, such as repairing water, sewer, internet, or natural gas lines running underneath city streets. Many urban roads are extensions of primary or secondary roads on the VDOT system. For example, urban segments of U.S. 1 and U.S. 460 are locally maintained.

Localities that maintain their own roads do not have to meet CTB pavement or bridge condition targets; however, they are required by state law to maintain roads in a condition VDOT deems satisfactory to continue receiving state funding (sidebar). The state primarily provides funds through maintenance payments. State maintenance payments to localities totaled $478 million in FY22. Localities are also eligible for SGR funds for qualifying pavement and bridge projects. Localities received about $52 million in SGR funding in FY22.

VDOT inspects arterial roads in localities at least once a year and documents deficiencies **to determine if roads are in satisfactory condition.** These are visual inspection and identify issues, such as potholes or rebar showing through concrete, which the locality should address in the next six months.

Local system condition data is centrally collected by VDOT for most bridges and extensions of primary roads. There is no central collection of pavement condition on secondary or other urban roads. While many localities collect this data for their own planning purposes, collection and reporting methods vary.

Virginia's fiscal stress index describes a locality's ability to generate revenue from its own sources, relative to other localities in the state. Lack of revenue-generating ability is considered fiscal stress. The Commission of Local Governments reports fiscal stress scores each year.

More locally maintained roads and bridges are not in as good condition as the VDOT system

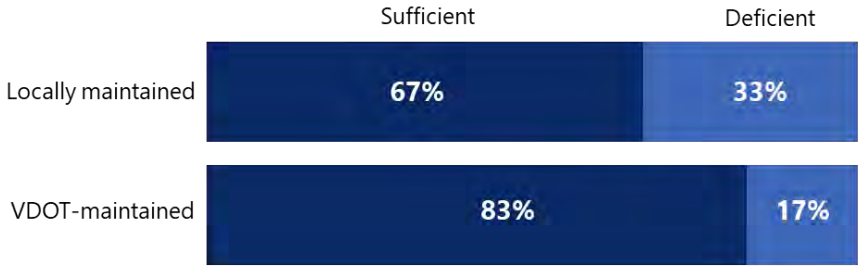
Locally maintained roads are in poorer condition than those maintained by VDOT. Only 67 percent of locally maintained primary pavements are in sufficient condition, compared with 83 percent of those maintained by VDOT (Figure 3-4). While comparable data is not available for locally maintained secondary roads (sidebar), local public works staff uniformly state that their secondary roads are not in as good condition as their primary roads.

Localities with primary roads in the poorest condition are generally those that are slightly more fiscally stressed (sidebar). Among the most fiscally stressed cities, 64 percent of primary road pavements are in sufficient condition, compared with 71 percent of primary roads in cities that are the least fiscally stressed. Cities and towns in the Richmond district had the least primary roads in good condition—only 56 percent of lane miles are in sufficient condition.

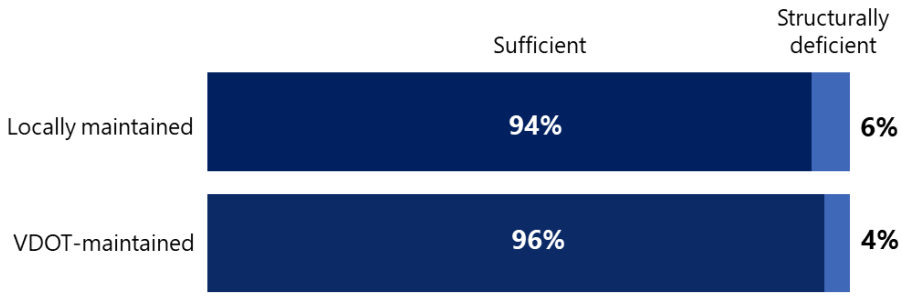
Similarly, slightly more bridges maintained by localities are structurally deficient than those maintained by VDOT. Statewide, 6 percent (63 per 1,000) of bridges maintained

by localities are structurally deficient, compared with 4 percent (35 per 1,000) maintained by VDOT (Figure 3-4). Most notably, localities in some VDOT districts have significantly more structurally deficient bridges than others and compared to VDOT-maintained bridges. For example, eighteen percent of locally maintained bridges in the Culpeper district and 11 percent in the Bristol district are structurally deficient. Unlike with pavement, there is no relationship between the condition of bridges maintained by localities and a locality's fiscal stress index.

FIGURE 3-4
More locally maintained primary pavements are deficient than VDOT roads



Slightly more locally maintained bridges are structurally deficient than VDOT bridges



SOURCE: JLARC analysis of VDOT pavement data (2020) and bridge data (FY21)
NOTE: Pavement condition is measured using critical condition index. "Sufficient condition" is pavement rated as fair or better. "Deficient condition" is pavement rated poor or very poor. "Locally maintained" pavements only includes primary extension pavements. "VDOT-maintained" pavements includes all pavements on primary highway system. Bridge condition is based on FHWA's general condition rating (GCR). Bridges with GCR of 4 or better = "sufficient." Bridges with GCR of 4 or less = "structurally deficient." Both "locally maintained" and "VDOT-maintained" only include bridges on the National Bridge Inventory.

State funding does not fully cover cost to maintain local roads and bridges

Localities reported they don't have enough funding to adequately maintain their roads and bridges, which forces them to defer needed maintenance. Since 1932, the state has provided payments to help fund local road maintenance from the transportation rev-

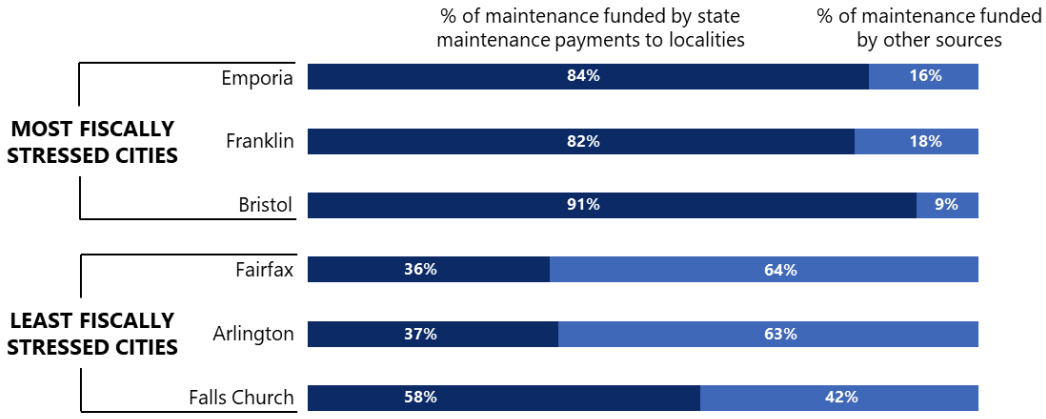
enues it collects. The amount of funding localities receive is based on a statutory formula that accounts for the number of lane miles in the locality (sidebar). Localities are heavily dependent on the state's maintenance payments, which accounted for 86 percent of local maintenance spending over the past five years, on average. While many localities use their own tax revenues to support road maintenance activities, localities generally expect state payments to cover the full cost of maintaining local portions of the road network. There is no guidance in state law, though, about the proportion of total local maintenance that should be funded by the state.

Maintenance payments for cities and towns are determined by the number of moving lane miles, which are lane miles available to peak-hour traffic (§ 33.2-319). These do not include turn lanes, ramps, bike lanes, or dedicated parking lanes.

Maintenance payments for Arlington and Henrico counties, are based on all lane miles (§ 33.2-366).

Most localities interviewed expressed concerns with the amount of state funding available through the maintenance payment program. For example, one locality described an annual $17 million funding gap between the payments they receive from the state and their actual maintenance needs. Local transportation staff said that their local governments were often unable to address funding gaps because road maintenance must compete against other needs, such as education and social services, for limited local funds. Larger and more affluent localities appear better able to address funding gaps than smaller and more fiscally stressed localities. For example, over the past five years, state funding accounted for 90 percent of maintenance expenditures among the most fiscally stressed cities compared with just 70 percent in the least fiscally stressed cities (Figure 3-5).

FIGURE 3-5
Fiscally stressed cities are more dependent on state funding for maintenance



SOURCE: JLARC analysis of local maintenance spending data from VDOT and FY18 fiscal stress data from Virginia Commission on Local Governments (2020).
NOTE: Represents a 5-year (FY15–19) median of annual local maintenance payment relative to local maintenance expenditures. Only includes maintenance expenditures. Does not include capital outlay expenditures.

Because localities are heavily dependent on state maintenance payments and locally maintained roads are generally not in as good condition as VDOT roads, increasing maintenance payments could help improve local road conditions. Beginning in FY23, new revenues from the 2020 increases in transportation taxes will be directed to the

local maintenance program. From FY23–27, $11 million in additional funding, on average, will be allocated to the local maintenance program annually for paving efforts. This should help localities improve the condition of local roads and bring condition more in line with the VDOT system. However, it will not fully close the gap between funding and need that some localities identified.

While some localities appear to have sufficient funding to adequately maintain their systems, differences in local system conditions and local ability to commit transportation funding suggest some localities may need additional support. The state could change the way it provides maintenance payments to localities to better reflect each locality's needs. The CTB does not have the authority to change the maintenance payment formula, which is set in statute. The General Assembly would need to change current law and grant the CTB the authority to develop and implement a new approach.

The allocation of local maintenance payments could be changed in several ways. One option would be to direct the CTB to adjust the state's decades-old funding formula to better account for the actual differences in maintenance costs among localities. For example, it could account for how many bridges a locality has—which are more expensive to maintain—or the traffic volume on each locality's roads. The main challenge would be for the CTB to determine which metrics to use and how they should be weighted, which has been challenging to do in the past.

A second option would be to direct the CTB to distribute funds based on pavement and bridge condition relative to benchmarks, in the same manner that funding is distributed across the VDOT system. Under this approach, localities with assets in the poorest condition would receive proportionally larger shares of available funds each year. While this would ensure funds are distributed based on need, the state would likely encounter additional costs associated with collecting and centrally compiling uniform condition data. Condition data for locally maintained secondary roads is not collected in some cities and towns, and data that is collected is not uniform or centrally compiled at the state level. The cost to implement this change could range from a hundred thousand dollars up to $2 million per year, depending on the data collection methods used and the extensiveness and frequency of collection.

A third option would be to keep the current formula but direct the CTB to target some portion of additional funding at localities that have both deficient primary roads and high fiscal stress. This would be a relatively precise way to direct funds to where they may be needed most, and it would have a low administrative burden. The main challenges of this approach would be for the CTB to determine how much of the maintenance payment fund to set aside for this purpose, the thresholds for qualification (e.g., how many deficient roads and how much fiscal stress), and what funding increases would be appropriate for the localities that qualify.

Significant changes to the way maintenance payments are determined could result in some localities receiving lower amounts of funding than they do under the current

formula. However, this could be avoided if changes are paired with the expected increase in funding over the next five fiscal years, and localities are held harmless for any loss in state funds. The CTB could distribute general program funding to localities using the current method of number of lane miles. However, the board could change the way it distributes the new 2020 omnibus-related funding and other future annual funding increases to target localities with a high proportion of pavement and bridges in poor condition and high levels of fiscal stress. Allocating new funding using a new method could continue each year as program funding grows. This would phase in a new, more need-based funding allocation method, but would ensure localities do not experience a loss of state funding.

POLICY OPTION 3

The General Assembly could consider amending § 33.2-319 of the Code of Virginia to modify how maintenance payment program funds are distributed to cities and towns by (i) eliminating the current funding formula and directing the CTB to develop and approve a new formula that better accounts for the different drivers of maintenance costs; (ii) eliminating the current funding formula and directing the CTB to award funds based on an assessment of pavement and bridge conditions in each locality; or (iii) directing the CTB to develop an approach for directing additional funding to localities that have a high proportion of pavements and bridges in poor condition and have relatively high indicators of fiscal stress.

One concern about linking local maintenance funding with road condition is that it could be a disincentive for localities to maintain the condition of their roads. Localities could be inclined to let roads and bridges deteriorate so that they receive more funding from the state. However, this seems unlikely as local staff described in interviews that they face significant political and local pressure to maintain roads and bridges in good condition.

Additionally, accountability measures could mitigate the likelihood of local governments purposefully not maintaining their roads. As discussed, VDOT monitors the condition of some roads that localities maintain each year. Further, localities are required to report road maintenance and construction expenditures to VDOT each year to ensure that state funds are not used for other purposes. VDOT could use these existing processes to monitor and ensure that new funding is used by localities appropriately to improve the condition of roads and bridges. If VDOT found that localities were not appropriately using state funds, as permitted in the Code of Virginia, the CTB could withhold future funding.

4 Planning for Improvements

The state is responsible for planning future improvements to the surface transportation system. To do this effectively, the state needs to monitor long-term trends—such as population growth and urbanization—and determine how those trends may affect the system. Understanding long-term trends allows the state to take strategic actions to prepare for the future, such as changing how it assesses needs and distributes funding.

The state should also have processes to identify transportation needs of statewide or regional significance, such as serious congestion or safety problems on interstates and other major corridors. After needs are identified, the state should have processes to further study them to determine how they can be addressed in the most effective and cost-efficient manner. By identifying and studying needs, and accounting for long-term considerations, the state is able to select and fund improvements that best address transportation system needs (Figure 4-1).

FIGURE 4-1
Key steps in planning for and funding transportation improvements

SOURCE: JLARC analysis.

Most state responsibilities for improvement planning fall to the Office of Intermodal Planning and Investment (OIPI) under the secretary of transportation. OIPI is required to develop Virginia's statewide transportation plan, called VTrans. The plan's main purpose is to assess long-term trends, identify transportation needs, and prioritize them for study. The VTrans plan covers a 20-year time period and is updated every four years. VTrans is reviewed and approved by the Commonwealth Transportation Board (CTB).

Responsibility to study transportation needs has historically been vested with the Virginia Department of Transportation (VDOT) and the Department of Rail and Public

Transportation (DRPT). While both agencies will continue to have a role in conducting studies, OIPI is assuming responsibility for coordinating the study selection process, and beginning this year studies were selected through an extension of the VTrans process. This change was overseen by the CTB, and the CTB maintained final authority to approve which studies were pursued.

Virginia's local governments and regional bodies, such as Metropolitan Planning Organizations (MPOs) and Planning District Commissions (PDCs), also have their own transportation planning responsibilities (sidebar). To ensure planning is properly coordinated across the Commonwealth, local and regional planners should be included in the state's processes and be able to use state plans and data to inform their own efforts.

Planning to address freight needs is important in Virginia because of the large volumes of commercial traffic that flow through the Port of Virginia and the I-81 and I-95 corridors. The state's planning processes consider both freight and passenger traffic when evaluating needs and studying potential improvements. The state also performs some additional freight-specific planning, as required under federal law, and has grant programs for freight rail. Freight-related planning and grant programs are discussed in Appendix F.

Local governments must develop transportation plans as part of their statutorily required 5-year Comprehensive Plans (§ 15.2-2223).

MPOs are responsible for developing long-term regional transportation plans and documenting use of federal transportation funds. In Virginia, MPO responsibilities typically fall under a PDC or other regional organization that encompasses the MPO area.

PDCs receive funding and technical assistance from VDOT to facilitate long-term regional transportation planning in rural areas (§ 15.2-4200 et seq.).

State effectively evaluates long-term trends and prepares as needed to adapt for the future

Long-term trends, such as population shifts and the adoption of new vehicle technologies, have the potential to affect the state's transportation system in different ways. For example, population growth in one part of the state can put increasing demand on regional roads and transit, while population loss in another region can have the opposite effect. Identifying these long-term trends and evaluating how they may affect the transportation system is necessary for the state to prepare and adapt for the future.

OIPI leads Virginia's long-term trend evaluation process and identifies strategic actions needed to adapt to changes. OIPI's responsibility to evaluate long-term trends is part of its VTrans planning duties. The CTB is responsible for implementing these strategic actions, which could include taking action as a board or directing state transportation agencies to undertake certain initiatives.

OIPI effectively identifies trends that will affect the transportation system over next 20 years

Under VTrans, OIPI has identified 10 key trends that are expected to affect the state's transportation system over the next 20 years. These trends can be grouped under four megatrends: technological, environmental, sociodemographic, and economic trends (Figure 4-2). OIPI developed these trends through a literature review.

FIGURE 4-2
Ten ongoing trends are expected to impact transportation system

Megatrend		Trend	Status
Technological advancements		Adoption of electric vehicles	Underway
		Adoption of highly autonomous vehicles	Emerging
		Growth in shared mobility	Underway
Climate patterns		Increase in flooding risk	Underway
Socio-demographic changes		Increase in workplace flexibility	Underway
		Growth of professional service industry	Underway
		Growth of 65+ cohort	Underway
		Population and employment shifts	Underway
Consumption patterns		Growth in e-commerce	Underway
		Greater automation of goods and services	Emerging

SOURCE: OIPI Long-Term Risk & Opportunity Register (2021), JLARC summary analysis.
NOTE: JLARC characterizes a trend as underway or emerging based on a qualitative consideration of nature and duration of trend.

OIPI's identification of long-term trends is effective. The trends OIPI has identified are consistent with those identified by JLARC's review of research literature and through interviews with experts. OIPI's megatrends and trends encompass the key environmental, technological, and societal factors research and subject-matter experts indicate will affect the state's transportation system over the next 20 years.

These long-term trends are expected to affect the state's transportation system in different ways. Collectively, the trends will likely affect the capacity, accessibility, safety, condition, and sustainability of the system. Additionally, the adoption of electric vehicles has the potential to reduce the state's transportation revenues (sidebar). The impact of some trends might counterbalance or offset the impact of other trends. For example, while the adoption of highly autonomous vehicles is projected to improve safety, the adoption of electric vehicles is projected to result in a greater number of crashes because of an increase in vehicle miles traveled (sidebar).

Some of these trends are well underway, while others are still emerging. For example, electric vehicles are currently being bought and sold in the marketplace, yet only account for 0.3 percent of vehicles in Virginia. In contrast, the adoption of highly autonomous vehicles like self-driving cars is just emerging. While there are publicly available vehicles with autonomous driving features, highly or fully autonomous vehicles are still being tested and have not yet entered the marketplace. The status of trends

Increasing adoption of electric vehicles could eventually reduce the amount of revenue the state is able to collect from fuel taxes. However as discussed in Chapter 2, this impact is unlikely to be felt in the next 10 or more years.

Electric vehicle adoption is expected to increase vehicle miles traveled because electric vehicles cost less to operate than gas-powered cars. The lower cost per mile is expected to result in increased vehicle mile traveled.

affects the speed with which the state needs to prepare for and adapt to them. The state will generally needs to react more quickly to trends already underway, whereas there is more time to plan for and adapt to trends that are still emerging.

Unforeseen changes can accelerate the speed with which trends unfold and affect the transportation system. An example of this is the COVID-19 pandemic. Although workplace flexibility was predicted to increase even before the pandemic, the pandemic has likely accelerated this trend. As such, the impacts of this trend—most notably, decreased morning and evening commuting trips in certain regions of the state—are being realized sooner than previously predicted. These types of changes are difficult to predict and plan for.

State is extensively evaluating long-term trends to prepare for potential impacts

OIPI extensively evaluates the potential impact of long-term trends using a data-driven process. As part of VTrans long-term planning, OIPI evaluates how long-term trends could affect Virginia's transportation system. Past VTrans plans have included some of this type of analysis, but the current process is following a new and more structured approach. Under the current process, OIPI examines how the 10 long-term trends could affect each of the state's five transportation goals set by the CTB: economic competitiveness and prosperity; accessible and connected places; safety for all users; proactive system management; and healthy communities and sustainable transportation communities.

OIPI evaluates the potential impacts of trends on CTB's goals by modeling several scenarios and their projected outcomes in 2045. For example, when evaluating safety projections, OIPI considers the implications of the growth in autonomous vehicles (likely to reduce accidents) and electric vehicles (likely to cause additional crashes by putting more drivers on the road). Using different scenarios, OIPI assumes different rates of autonomous and electric vehicle adoption and models the net changes in vehicle crashes by 2045.

By using several different but plausible scenarios—such as low, medium, and high impact scenarios of each trend—OIPI estimates how long-term trends may affect Virginia's transportation system. For example, OIPI estimates that between 900 and 1,400 miles of Virginia roads are at risk because of sea-level rise by 2045. Similar scenario analyses have been used by regional organizations in Northern Virginia and Hampton Roads in their long-term planning efforts.

Once the potential long-term impacts are identified, OIPI works with the CTB, state transportation agencies, and other key stakeholders to identify strategic actions needed to prepare for the future. Such strategic actions include funding initiatives and policy changes, such as funding mechanisms that leverage revenue from alternative fuel vehicles as electric vehicle adoption increases. They can also include actions to improve aspects of long-term planning, such as investment in better data collection to improve

the state's understanding of flooding risks. OIPI also plans to continue monitoring trends and updating the CTB on any changes and their implications. Most CTB members (79 percent) were satisfied that VTrans is adequately preparing the state to address future trends that may affect the transportation system, but a few thought it could better account for climate change impacts.

State already taking action to adapt to some trends

Many long-term trends affecting transportation are already well underway, and the state has already taken action to prepare for and adapt to these changes. The actions range from changes to state law to the development of pilot programs by state agencies.

Trend: Adoption of electric vehicles

The state has taken several steps to prepare for and support the adoption of electric vehicles—one of the main technological advancements expected to affect the transportation system. The secretary of transportation and state agencies have conducted multiple studies assessing the state's readiness for electric vehicles and identifying opportunities to further support electric vehicle adoption. The most recent study was completed in March 2021.

Many studies of electric vehicle adoption have identified an increased need for charging infrastructure. In Virginia, a nonprofit group affiliated with James Madison University is monitoring charging infrastructure deployment. The General Assembly passed legislation in 2021 requiring the Department of Mines, Minerals, and Energy (DMME) to analyze electric vehicle charging infrastructure and identify gaps in the network as part of the state's energy plan. This analysis will be included in the next energy plan (to be completed by October 1, 2022), and will result in recommendations for legislative, regulatory, or other public or private action. To expand the charging network, the state has committed $14 million from its share of the 2016 Volkswagen Clean Air Act violations settlement to infrastructure installation. Additionally, the proposed federal infrastructure bill would provide Virginia with several million dollars in additional funding for charging infrastructure.

Increased adoption of electric vehicles is eventually expected to reduce fuel sales, as more of the vehicle fleet is converted. A drop in fuel sales will eventually lead to a loss of fuel tax revenues. Legislation adopted in 2020 created two new revenue sources, the Highway Use Fee and Mileage Based User Fee, which could eventually replace lost fuel tax revenues. (Chapter 2 includes further discussion of these fees.)

Trend: Adoption of highly autonomous vehicles

The state is also preparing for the increased adoption of highly autonomous vehicles. VDOT's research group, the Virginia Transportation Research Council (VTRC), has conducted multiple studies on automated vehicles, their potential impact on the state's transportation system, and how the state can prepare to adapt to them. For example,

one study recommended that VTRC test digital traffic control devices—key infrastructure that supports highly autonomous vehicles—along a corridor in the state to gain experience operating this type of service. Additionally, VDOT is monitoring and conducting strategic planning related to automated vehicles through its Office of Strategic Innovation.

In addition to planning, state transportation agencies have begun to take action to support highly autonomous passenger and transit vehicles. VDOT has deployed some technologies on several state corridors that allow information to be broadcast from transportation infrastructure to autonomous passenger vehicles. For example, in Northern Virginia, some traffic signals can send information to highly autonomous vehicles so the vehicles know the signal is changing and can adjust accordingly. VDOT, in collaboration with VTRC and the Virginia Tech Transportation Institute, has also designated sections of many roads throughout the state as connected and automated vehicle demonstration corridors. These designated roadways, which include sections of I-95, I-66, and U.S. 29, are now places where new technologies can be tested. Further, the state has begun partnering with stakeholders to test autonomous transit vehicles. In 2019, VDOT supported an autonomous shuttle on a military base in Arlington County. Additionally, DRPT and VDOT are currently partnering with Fairfax County and other stakeholders to pilot a driverless public transit shuttle in the county.

Trend: Increased flooding risk

Vulnerability to flooding from climate change is a problem for the transportation system statewide. OIPI's long-term trend analysis found that sections of roadways in all regions of the state are at increased flood risk in the future because of sea-level rise, storm surge, and/or inland and riverine flooding from extreme precipitation events. Local and regional stakeholders around the state indicated that they already face increased flooding on their roadways, including primary roads that are regularly submerged and temporarily impassable after significant rainfall. Heavy rains can also lead to landslides that block roadways in mountainous regions of the state. In addition to temporary problems, flooding has a negative impact on the condition of transportation infrastructure. Regular or extreme flooding can deteriorate or wash away pavements, bridges, and even road beds.

To adapt to and try to mitigate the risks associated with increased flooding, in 2021, the General Assembly directed that flood resiliency be incorporated into transportation planning and funding decisions. Resiliency has been added as a key goal in VTrans and has been incorporated into the Smart Scale scoring and project recommendation processes through OIPI's assessment of system reliability. VDOT has also incorporated revised precipitation intensity, duration, and frequency assumptions into its drainage manual standards, which are used for public road projects and by private developers. Other state efforts in this area include studies of recurrent flooding by Vir-

ginia higher education institutes and development of a Coastal Adaptation and Resilience Master Plan by the secretary of natural resources. These studies, while broader in scope, help inform transportation planning.

Incorporating resiliency into planning and funding decision-making should improve the sustainability of the transportation network over time. This will result in more resilient projects being selected for funding, such as those that plan to use more flood-resistant materials, and thus the construction of more sustainable assets.

Virginia's process to identify needs is well designed but could be extended in rural areas

Virginia identifies areas where transportation improvements are needed through the VTrans planning process, led by OIPI. State transportation needs are identified based on goals and need categories that have been established by CTB (Table 4-1). Statute requires that needs be identified through a data-driven process that engages local and regional stakeholders and promotes multimodal solutions.

TABLE 4-1
State transportation goals and need categories as established by the CTB

Goal	Need category
Economic competitiveness and prosperity	- Congestion mitigation - Improved reliability (road, rail)
Accessible and connected places	- Transit access to low-income areas, other areas of need - Transit, pedestrian, & bike access to places of employment - Access to industrial and office park developments [a] - Improvements needed for dense residential and commercial development areas [b]
Safety for all users	- Roadway safety - Pedestrian safety
Proactive system management	- Preserve current traffic capacity on major corridors
Healthy communities and sustainable transportation communities	- Promote transportation demand management options that reduce single-passenger vehicle traffic and emissions [c]

SOURCE: VTrans policy and technical guides.
NOTE: The goals are shown as approved by the CTB. The need categories have been slightly rephrased by JLARC to summarize similar categories or provide additional explanation of a category. [a] Defined as "Industrial and Economic Development Areas" in VTrans policies. [b] Defined as "Urban Development Areas" in VTrans policies and The Code of Virginia (§ 15.2-2223.1). [c] Includes options such as park and ride lots to encourage transit and van- or car-pooling.

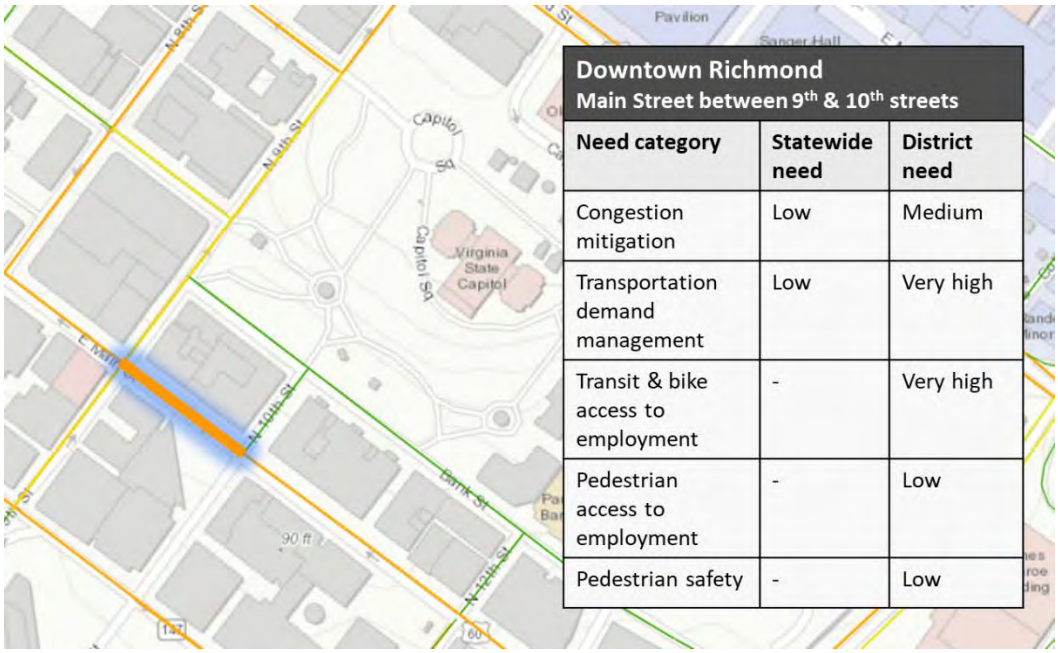
Needs are identified through a data-driven process that engages key stakeholders

VTrans uses a data-driven process to identify where transportation needs might exist. For example, VTrans measures congestion on roadways using traffic flow data from VDOT, the Federal Highway Administration (FHWA), and a private data analytics

firm. In another example, VTrans measures transit access to low-income areas using state data on transit stops and demographic data from the U.S. Census Bureau. This data-driven approach allows OIPI to identify all potential issues affecting a specific component of the transportation system.

The VTrans website has an interactive map that shows all identified transportation needs statewide. A planner, analyst, or even interested member of the public can review a specific intersection or road segment and see all the needs that have been identified for that part of the transportation system, by need category and its statewide or regional importance (Figure 4-3). This level of information is available for all of the state's urban metropolitan areas and designated statewide corridors, as well as a several specified economic development areas.

FIGURE 4-3
VTrans provides detailed information on needs down to specific road segments and intersections



SOURCE: VTrans webmaps and shapefile data.
NOTE: This level of detail is only available for those areas of the state that are included in VTrans needs assessments, such as urban areas, their surrounding region, and major corridors. Other than safety concerns and, in a few instances, economic development needs, limited information is available for many rural roads.

The VTrans process proactively engages local and regional stakeholders and uses their input to modify and refine its needs assessment. In the most recent round of needs identification, completed in 2019, OIPI held 13 regional workshops and 39 meetings and webinars around the state. Workshops were attended by representatives from 83 cities and counties, 30 towns, 32 MPOs and PDCs, 16 transit agencies, and several

additional stakeholders. Following the workshops, OIPI shared a draft needs document with stakeholders for additional feedback. OIPI staff made adjustments to the VTrans methodology in response to stakeholder input, such as expanding the definition of employment centers to include freight-dependent employers. Most local and regional stakeholders interviewed by JLARC indicated their engagement with the VTrans process was positive and helpful.

VTrans identifies needs in a way that encourages consideration of multimodal solutions. For example, although VTrans will identify a congestion problem on a roadway, it does not require congestion be addressed through a road-specific project, such as widening the road. The solution could instead be reducing demand on the road by promoting use of other transportation modes, such as bike or transit.

The finalized VTrans needs analysis is again shared with local and regional stakeholders for use in their own planning efforts. Several local and regional stakeholders confirmed that they use this information when determining what transportation studies and projects to pursue.

VTrans appears to be generally effective at identifying transportation needs of statewide significance. Seventy-eight percent of CTB members surveyed indicated that VTrans effectively identifies all of the transportation needs that are most important to the state. The few that did not noted that, while VTrans may not identify *all* needs, it does identify *most* needs.

VTrans may not identify some regionally significant transportation needs along rural corridors

VTrans is directed to identify transportation needs of *state* and *regional* significance. It is not required, though, to identify all needs. Consequently, VTrans is focused on assessing needs along corridors of statewide significance, in urban metropolitan areas, and in areas designated for dense housing, commercial, or economic development. The only transportation need that is assessed on every part of the transportation system statewide is safety. While this approach is consistent with statute, it means that VTrans does not identify or evaluate every type of transportation need in many rural areas of the state.

The VTrans approach could exclude some transportation needs of *regional* significance in rural areas related to the CTB's economic competitiveness and prosperity goal. The CTB has already taken some steps to address economic development concerns under its accessible and connected places goal (sidebar), but a few gaps remain. For example, staff with one locality interviewed by JLARC staff indicated that improvements were needed to one of the main routes connecting their locality to the rest of the region. They believed these improvements would make it easier for residents to travel to and from work and commercial areas and potentially help attract new employers. However, because the route was not a designated corridor of statewide significance and is not in

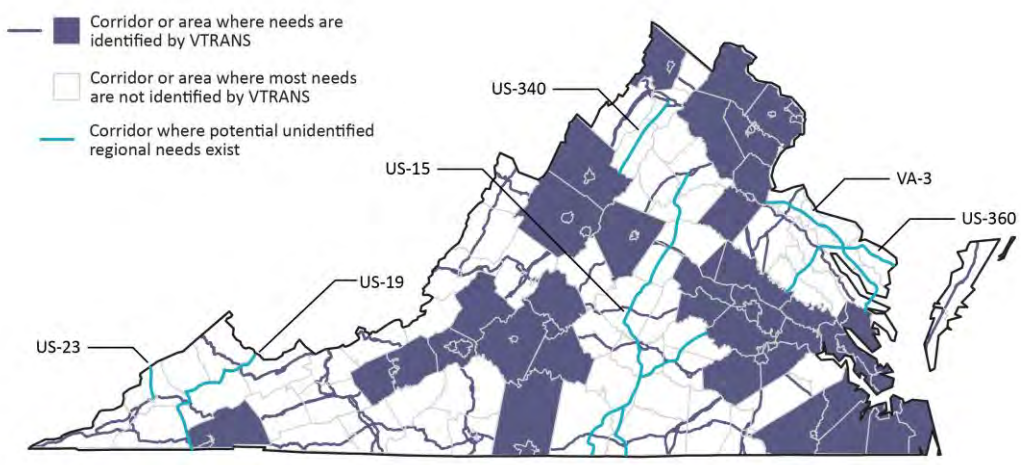
In 2020, the CTB expanded VTrans needs assessments to include access needs related "Industrial & Economic Development Areas," which are locally identified industrial and office park sites submitted to the Virginia Economic Development Partnership's Business Ready Sites Program. The main goal of this change was to provide rural areas with opportunities to pursue transportation projects supporting their economic development initiatives.

an urban area, VTrans did not evaluate potential congestion and travel time reliability needs along the route.

Exclusion from VTrans means the state may not identify some regionally significant needs, and deserving projects may not be eligible for funding under Smart Scale—the state's main improvement funding program. If a need is not identified under VTrans, then it cannot be addressed through Smart Scale funding. If regionally important routes are excluded from the state's main needs assessments, then rural localities served by these routes, including some small towns and cities, may not be able to seek funding for projects that could address smaller, but locally significant, congestion and reliability issues.

JLARC identified several potential corridors of regional significance in rural areas that are not included in VTrans needs assessments (Figure 4-4). These routes are one of the main transportation corridors for one or more counties and often carry as much or more traffic than nearby corridors of statewide significance, based on VDOT traffic data. Given the importance of these routes to the localities they serve, and the relatively high volume of traffic they carry for their region, any unidentified needs along these routes could be regionally significant and would merit evaluation under VTrans.

FIGURE 4-4
VTrans does not evaluate some potential transportation needs on a few corridors of regional significance



SOURCE: VTrans webmaps and shapefile data, JLARC analysis of potential routes of regional significance.
NOTE: In the unshaded areas, VTrans identifies safety needs, access to some industrial and office park sites, but not other types of needs (e.g., congestion, reliability). Other potential routes of regional significance identified by JLARC staff but not shown on this map include US-33 (Central Virginia), US-501 (Southside), and VA-33 (Middle Peninsula).

To ensure that all regionally significant needs are identified, the CTB should amend its VTrans policy to include corridors of regional significance as one of the areas to be

evaluated. Regionally significant corridors should be defined to include routes that serve as one of the main travel corridors linking one or more localities to nearby localities in Virginia or a neighboring state. The routes identified in this report are not intended to be a comprehensive list of regional corridors. OIPI should conduct its own analysis to identify regionally significant corridors using VDOT traffic data and outreach to local governments and PDCs in rural areas.

RECOMMENDATION 6

The Commonwealth Transportation Board should designate corridors of regional significance to be included in the VTrans needs identification process.

State has been studying many needs and is revising study selection process to target highest priorities

After a transportation need is identified, it should be studied further to determine how the need can best be addressed. For example, if there are a high number of crashes at an intersection, a study can identify why crashes are occurring and how they can be reduced. If the study finds that vehicles are not slowing down in time to fully stop at a traffic light, then the solution could be adding rumble strips and a sign indicating a traffic light is ahead. If the study finds that vehicles are being hit while merging into traffic, then the solution might be adding a merge lane. Simple needs, such as these, can be studied by the traffic engineering staff at VDOT districts. For longer sections of roadways or complex interchanges, larger-scale studies are needed.

VDOT has performed large-scale studies of needs along almost all of the state's designated corridors of statewide significance, as well as on many other additional routes. The entire I-81, I-95, and I-64 corridors have been studied to identify potential ways to address needs. Studies of the state's other interstate corridors are planned or in progress. Key sections of major, non-interstate highways across the state have been studied under the VDOT STARS and arterial preservation programs (sidebar). In its large-scale studies, VDOT uses data, modeling, site analysis, and stakeholder engagement to understand needs and develop solutions.

VDOT studies are intended to find the most cost-effective solutions to the specific problems observed. This approach can significantly reduce the cost of proposed solutions, as illustrated in the following case study.

The STARS program studied the highest priority transportation needs in each of the nine VDOT districts. Each district would propose studies, and VDOT's central office would determine which studies to pursue, based on analyses of congestion and safety data and district and local and regional stakeholder engagement.

The arterial preservation program studied sections of major state highways where development was occurring that could affect safety and capacity. Study locations were determined by planning staff in VDOT's central office, based on an analysis of congestion and safety data.

CASE STUDY
Safety improvement project on Route 55 in Warren County

The cost to address safety problems on a stretch of Route 55 in Warren County was reduced from $32 million to $1.6 million following a VDOT STARS study. The study found that safety problems could be addressed by making several low-cost improvements—such as more visible signs, raised pavement markings, and the addition of rumble strips—instead of pursuing the original and more costly proposal to divide the section and widen it into four lanes.

For rail and transit needs, DRPT has studied several major rail corridors and puts together a federally required Virginia Statewide Rail Plan. DRPT also has looked at transit needs across jurisdictions. For example, DRPT is currently evaluating the feasibility of different transit options between the Franconia-Springfield Metro station in Fairfax County and the Quantico Marine Base in Prince William County, as directed by the General Assembly. Although DRPT conducts some transit studies, transit agencies are generally responsible for studying their own needs, such as if and how to redesign their systems to better meet community needs. The 2018 General Assembly required transit agencies serving urban areas to regularly examine system design in new Transit Strategic Plans (TSPs). Agencies have begun developing TSPs, but full implementation has been delayed by the COVID-19 pandemic.

Historically, transportation study selection has not been formally linked to the needs identified under VTrans. The selection process is currently being revised to more closely link these two key steps. In March 2021, the CTB approved a policy that directs the $12 million that the state has available for transportation studies to fund studies that examine the highest priority (priority 1) VTrans needs. Study priorities are determined using VTrans data on the severity and magnitude of observed problems, such as hours of delay and number of drivers affected by a congestion issue. Prioritization takes into consideration influencing factors, such as exposure to flooding, and are discussed with local and regional stakeholders. The study prioritization process takes into consideration both statewide- and district-level needs, and is designed to share planning dollars across all regions of the state. Potential studies are proposed by OIPI staff and approved by the CTB.

The CTB and OIPI staff should ensure stakeholders continue to be involved in the study selection process. Under the prior process, localities and regional organizations reported that they were able to work with their local VDOT district administrators to get their highest priority needs studied. For example, stakeholders in the Bristol district reported that the district's planning consultant performed extensive outreach to identify what needs should be studied under the STARS program. This level of engagement helped ensure that local and regional stakeholders supported the projects identified under studies. This support is critical, because local and regional organizations are the ones who must ultimately choose which projects to submit for funding.

VDOT leadership indicated that the change in how large studies are selected will not impact the ability of localities to have small-scale needs reviewed by VDOT staff. For example, VDOT district traffic engineering staff will still be available to review minor needs, such as simple intersection improvements.

State monitors transportation system performance to support planning and investment decisions, and many performance measures need improvement

OIPI monitors the overall performance of the state's surface transportation system to help guide planning and investment decisions. Some of the performance metrics monitored by OIPI are federally required, including safety, infrastructure condition, system reliability, congestion, and air quality (sidebar). OIPI also monitors other measures that are related to the state's transportation goals. OIPI reports on performance to the CTB regularly and to the General Assembly biennially.

FHWA requires that states set targets and monitor system performance including safety, infrastructure condition, system reliability, freight movement and economic vitality, congestion, and air quality. State performance must be reported to FHWA every four years. OIPI leads the state's performance monitoring, and, following approval from the CTB, first set targets for Virginia in 2018.

OIPI's performance monitoring helps guide state planning and investment decisions. For example, OIPI and VDOT used safety performance data to determine that systemic safety improvements, such as high-visibility backplates and rumble strips, are a better investment of the state's limited safety funding compared with spot improvements, such as widening a section of road. In response to these findings, in December 2019, the CTB approved a new policy that shifted funding to systemic projects.

OIPI's monitoring indicates that Virginia is making progress toward some of the state's transportation goals, but needs to improve aspects of safety and congestion (Table 4-2). Some measures of system reliability, congestion, and safety have worsened in recent years. For example, from 2017 to 2019, truck travel time reliability worsened, and the percentage of non-single-occupancy vehicle travel did not change. Some areas of the state, such as Northern Virginia, I-95 north of Fredericksburg, and areas in Hampton Roads, are prone to heavy congestion, and their major roadways are considered unreliable. Additionally, the number of traffic-related fatalities in Virginia increased from 2018 to 2020.

Despite negative trends on some measures, other measures show that Virginia is improving. The number of traffic-related serious injuries decreased from 2016 to 2020. Congestion improved marginally statewide, along the urban crescent, and within Northern Virginia from 2016 to 2018. In FY19, prior to the COVID-19 pandemic, transit ridership increased across nearly half of the state's transit agencies. Additionally, as discussed in Chapter 3, the state is generally meeting targets for infrastructure condition, and the condition of the state's infrastructure is improving. As discussed in Chapter 6, transit agencies across the state are also generally meeting targets relative to the condition of transit assets.

TABLE 4-2
State is making progress on some transportation goals but needs to improve congestion and safety

Goal	Trend	Measure
Economic competitiveness and prosperity	Worsening	- Congestion - Travel time reliability - Passenger rail on-time performance
Accessible and connected places	Maintaining	- Accessibility to activity centers - Transit ridership
Safety for all users	Worsening	- Fatalities and fatality rate - Serious injury and serious injury rate - Bicycle and pedestrian fatalities and serious injuries
Proactive system management	Improving	- Bridge condition - Pavement condition - Transit asset condition
Healthy communities and sustainable transportation communities	Improving	- Vehicle miles traveled, and per capita - Electric vehicle fleet - Statewide on-road mobile emissions

SOURCE: JLARC summary analysis.
NOTE: Based on pre-pandemic data. "Trend" characterizes the average direction of all of the measures that make up each goal. Some measures within each goal may be trending differently than the goal overall. For example, although the state's performance relative to safety is worsening, the number of serious injuries has improved. The "trend" is worsening because of increased fatalities. "Measures" are summarized and are not exhaustive of all measures OIPI monitors.

5 Improvement Funding

In addition to funding the maintenance and operation of the existing surface transportation system, the state must also fund needs that improve the system, such as those that address safety and congestion problems (sidebar). Because transportation improvements are costly and there are many improvement requests, the state does not have enough revenue to fund all desired improvements. Given funding constraints, funding programs should prioritize projects and other improvements that best meet state, regional, and local needs. Funding should be fairly awarded based on merit and equitably distributed across transportation modes and regions.

There are four major state funding categories for transportation system improvements: Smart Scale, revenue sharing, interstate programs, and safety (Figure 5-1). Although these programs are state managed, several of them also receive federal revenues. Each program also has a different project prioritization and selection process based on program goals and who makes the final funding decisions. In addition to the state-managed programs, Virginia has created three regional programs that play a major role in funding improvements (sidebar).

Improvement funding in this chapter generally refers to funding for programs that expand or improve the transportation system. These can include construction projects, such as building new roads and sidewalks, as well as other investments, such as investing in new transit assets or operational improvements for roadways.

Regional programs are funded through a portion of regional taxes that flow through three statutorily established regional tax authorities in Northern Virginia, Hampton Roads, and the Richmond region. Regional revenues appear in Virginia's budget but are controlled by regional bodies, localities, and transit agencies.

FIGURE 5-1
Five major program areas account for $1.7B in improvement allocations (FY22)

SOURCE: JLARC analysis of FY22 Commonwealth Transportation Fund and FY22 VDOT budgets.
NOTE: Some programs, such as Smart Scale and Safety, receive a significant portion of funds from federal sources. The $481M in regional programs is estimated annual revenue for regional projects in Central Virginia, Northern Virginia, and Hampton Roads. Interstate funding includes I-81 and Interstate Operations and Enhancement Program. Some federal improvement and other programs not shown.

A single improvement project may be funded through one or more of the state and regional funding programs. A project can also receive funds from other sources, such as federal grant programs, local governments, and toll revenues. Projects can often be

financed with significant debt issuance. While these other funding sources are not discussed here, they can be important for some projects.

This chapter examines the Smart Scale, revenue sharing, and regional programs. Interstate programs are discussed in Appendix G, and the highway safety program is discussed in Appendix H. The 2020 General Assembly made changes significantly affecting how funding is allocated to each of these programs, and these changes are discussed in Appendix C.

Smart Scale program is objective, and funding outcomes generally appear fair

Smart Scale is Virginia's largest program to fund transportation improvements. The program provides funds for transportation projects across all modes, including road, pedestrian/bike, transit, and rail projects. Smart Scale funds, among other projects: improvements to highway interchanges, road intersections, and turn lanes; new road lanes and bridge expansions; and new sidewalks or bike paths and improved pedestrian road crossings. A single funded project often includes multiple improvements. For example, while some of a project's funding could be used to fund road improvements, another portion could be used to add sidewalks.

Smart Scale funds a wide range of project sizes. While the median project award is about $4 million, past awards have ranged from $44,000 up to $300 million.

Smart Scale has been in place since 2014, and a new round of Smart Scale funding is awarded every two years. The total amount of funding available under Smart Scale funding had declined across the first three rounds, but was increased in round four (Figure 5-2). The increase in funding for the fourth round came mostly from 2020 legislation that raised state transportation taxes and created new regional taxes. (See Chapter 2). Funding should increase further in future rounds as the changes from the 2020 session become fully phased in. In addition, the federal infrastructure and reauthorization package, if enacted, could provide an average of over $270 million in *new* funding in each of the next five years for federal-aid highway programs—some of which would be used for Smart Scale.

FIGURE 5-2
Since 2014, Smart Scale has awarded $5 billion in multimodal project funding

SOURCE: JLARC analysis of Smart Scale program data.
NOTE: [a] Total funding award amount for Round 1 is larger because it contains additional years of program allocations; the program began in 2014 but funding was not awarded until 2016. [b] Bus transit includes transportation demand management (TDM) projects, such as park and ride lots. Many projects are multimodal in nature; projects are grouped based on primary improvement type provided by program applicants and the Office of Intermodal Planning and Investment.

Smart Scale scores proposals objectively and is refined over time

Only localities, transit agencies, and regional bodies (MPOs and PDCs) can apply for Smart Scale funding (though the Commonwealth Transportation Board [CTB] can submit up to two projects each round). To be eligible, a project must address a need identified in the state's VTrans plan. The Office of Intermodal Planning and Investment (OIPI) staff score projects based on established criteria and make funding recommendations to the CTB, based on scoring results. The CTB approves projects for funding based on staff recommendations and limited use of its own discretion. Projects are not selected through a political process or by state agencies. Smart Scale projects compete for two different pools of funding: district and statewide (sidebar). In the district pool, applicants compete for funding against other projects in their Virginia Department of Transportation (VDOT) district. In the statewide pool, applicants compete for funding against all other applicants in the state.

District Smart Scale funds come from the Construction District Grant Program (CDGP) fund. For some districts, CDGP funds are supplemented with a special account funded by regional fuels taxes.

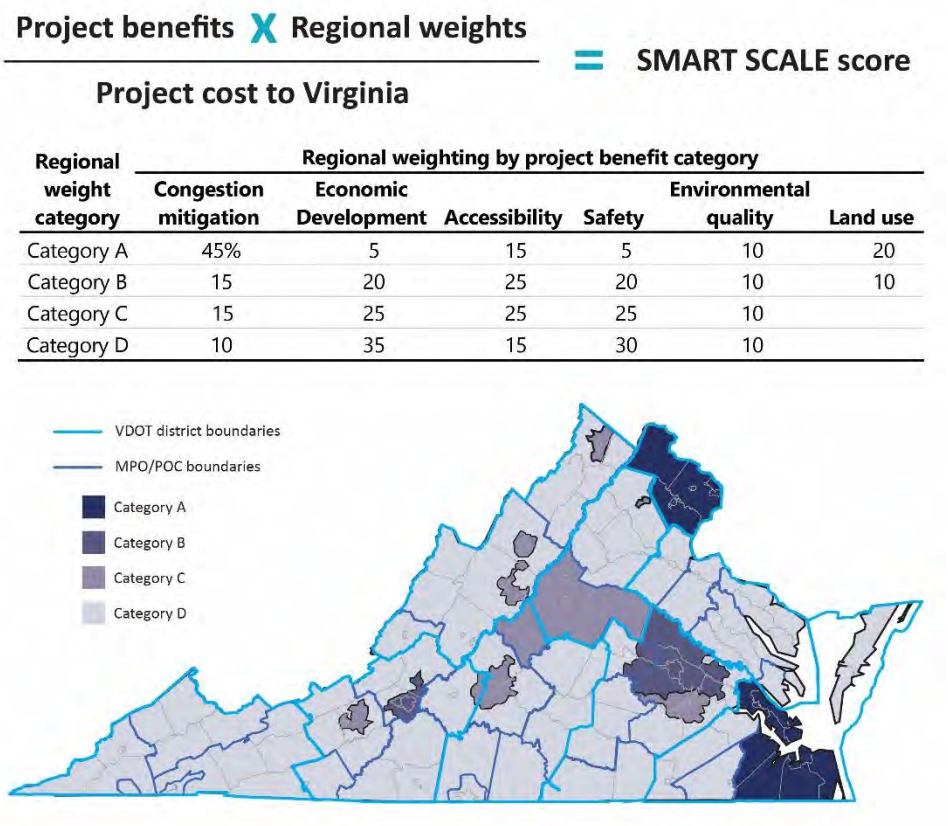
Statewide Smart Scale funds come from the High Priority Projects program fund.

Smart Scale objectively scores projects based on expected benefits and costs

Smart Scale determines which projects to fund by objectively assessing each project's expected *benefits* relative to the *cost* to the state of funding the project (Figure 5-3). *Benefits* are determined using established criteria, weighted according to region. For example, congestion mitigation is one of the benefit criterion, and the extent to which

a project mitigates congestion accounts for 45 percent of a project's total benefits score in the Northern Virginia and Hampton Roads regions. *Cost* is the amount of money that is being requested under Smart Scale, not the total cost of the project. The total Smart Scale project score is a ratio of expected benefits to cost—higher ratios are better. This allows the state to objectively assess a project's likely benefits relative to the state's cost to fund the project. Project scoring is performed by OIPI.

FIGURE 5-3
Projects are scored based on benefits, regional weights, and state costs



Regional weight category	Regional weighting by project benefit category					
	Congestion mitigation	Economic Development	Accessibility	Safety	Environmental quality	Land use
Category A	45%	5	15	5	10	20
Category B	15	20	25	20	10	10
Category C	15	25	25	25	10	
Category D	10	35	15	30	10	

SOURCE: 2022 Smart Scale Technical Guide and JLARC analysis.
NOTE: Individual benefit measures and weights are not shown. Each benefit value is also normalized relative to the highest scoring project in each round. Total project costs often exceed the cost included in the Smart Scale score, and the costs included in the score are only funds requested from the Commonwealth by applicants.

> *"The way they do Smart Scale seems appropriate. It doesn't seem to be a political process…It's a transparent and systematic process for scoring things."*
>
> **– Local public works department**

Smart Scale scoring is generally viewed as objective and transparent and is consistent with a 2010 JLARC recommendation. Transportation experts interviewed by JLARC staff indicated that Virginia's Smart Scale project prioritization process is considered a model among states. Only a few other states, such as North Carolina and Utah, appear to have a similar process in place. Virginia localities and regional transportation entities who participate in Smart Scale generally agreed that scoring was objective, despite other concerns about the program (discussed below). The Smart Scale process

also addresses a prior JLARC recommendation that project selection should be objective and data-driven.

Smart Scale scoring processes have been evaluated and revised after each round

OIPI staff and the CTB have revised the Smart Scale scoring process based on applicant feedback. Each round, staff review scoring, collect applicant feedback, and recommend changes where warranted. This has resulted in several changes to how project *benefits* are scored. For example, safety scores were changed after round 2 to remove data on crashes involving DUIs from safety measures, because DUI crashes are usually unrelated to infrastructure concerns. Land use scores and weights are currently being examined to see if they unfairly favor more densely populated areas. This feedback process helps to improve the program's ability to more accurately assess project benefits.

VDOT is also taking steps to improve the quality and consistency of Smart Scale *cost* estimates. As part of the application process, VDOT and DRPT review and validate estimates of the project's total cost for all Smart Scale applications. Several localities interviewed by JLARC staff indicated that VDOT's cost estimates seemed inconsistent or far too high. Because projects are selected based primarily on benefit-cost calculations, inaccurate or inconsistent cost estimates can make the process unfair. Cost estimates that are consistently too high also create inefficiency because they can lead to inflated bids, waste, and slack in project funding that could be put to better use. State agencies have acknowledged this potential problem, and VDOT has both hired staff and created a cost estimation manual to bring more consistency and quality to project cost estimation.

Smart Scale funding outcomes generally appear equitable across regions and project types, despite local concerns

While localities generally said that Smart Scale was objective, they also expressed concerns about what projects they have been able to fund through the program. Localities were concerned that Smart Scale:

- does not provide each locality its fair share of project funding;
- favors localities that have access to regional funding programs (which can be leveraged to increase chances of Smart Scale success);
- favors smaller projects over larger and more costly projects, even if larger projects are better solutions.

Despite local perceptions, projects are generally funded in proportion to population across the state

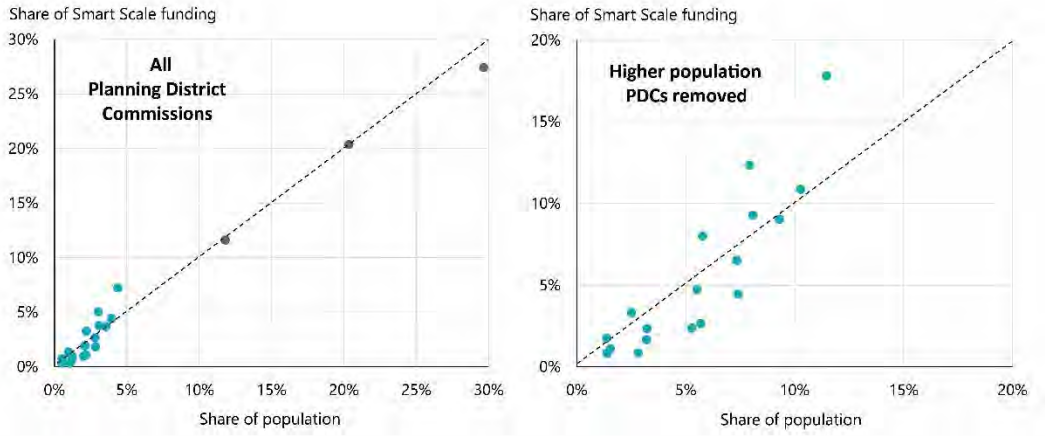
Both larger and more rural localities expressed concern that Smart Scale funding is not equally distributed. There is a perception among localities, and some state officials, that rural and smaller localities may struggle to compete in Smart Scale. Some small

localities have never submitted applications or never received funding. However, larger localities have expressed the opposite concern—that they do not receive their fair share because their land acquisition costs are higher, reducing their project scores.

Population is used as an indicator of need. Population is used here as a proxy for funding need because (1) Smart Scale is a multimodal program and using only measures of highway need would not reflect how funding should be distributed, and (2) population is correlated with other proxies for need such as vehicle miles traveled on roadways, transit use, and pedestrian activity.

JLARC analysis of Smart Scale outcomes shows that funding awards to each region were strongly correlated with population, suggesting program funds are generally equitably distributed across the state. Figure 5-4 illustrates that funding awards by planning district commission (PDC) are aligned with PDC population (sidebar). Over all rounds, areas with smaller (and less dense) populations have received a little less funding proportional to their populations (PDCs below the line in the chart on the right), but Smart Scale funding for these areas increased significantly in round 4 because of new funding dedicated to certain VDOT districts. This new fund will continue to be available in future rounds of Smart Scale.

FIGURE 5-4
Funding for all Smart Scale rounds is well aligned with region population



SOURCE: JLARC analysis of Smart Scale awards and data provided by OIPI. Planning District Commission population data from Weldon Cooper Center population estimates in 2019/2020 Biennial PDC report, supplemented with data from U.S. Census Bureau estimates.
NOTE: Chart shows 45° line. Correlation coefficient for funding and population is 0.99 when including all PDCs, and 0.89 when excluding Hampton Roads, Northern Virginia, and Richmond. Funding for Round 4 includes regional gas taxes dedicated to areas of the state NOT in PRTC, NVTC, HRTAC, CVTA, or I-81 arrangements. Excluding this funding source would increase the share of funding received by PDCs covering PRTC, NVTC, HRTAC, CVTA, and I-81 localities. Projects in one PDC may also directly benefit Virginians living in a different PDC.

In addition, CTB members representing both urban and rural areas of the state indicated that Smart Scale was fair. When surveyed by JLARC staff, all CTB members who responded (14 CTB members) agreed or strongly agreed that Smart Scale allocates funds in a fair and reasonable manner. All CTB members who responded (13 CTB members) also said all localities are able to apply and effectively compete for Smart Scale funding.

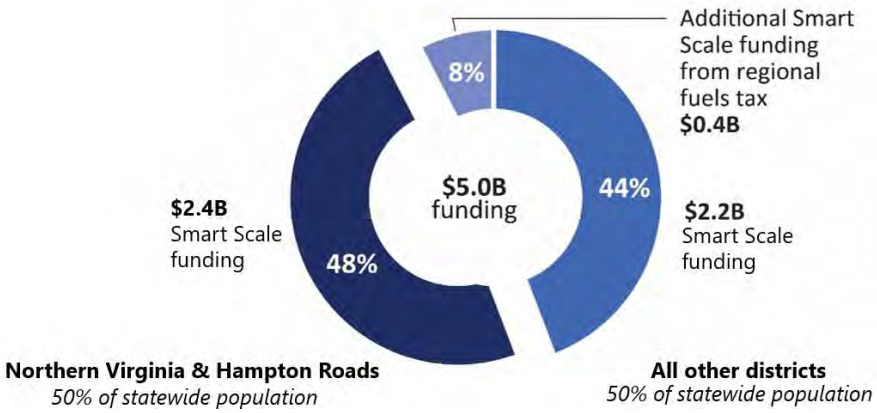
Contrary to perceptions, areas with regional funding programs do not appear to receive more Smart Scale funding

Some localities also expressed concern that areas of the state with more funding from regional taxes are more competitive in Smart Scale, especially when competing for the statewide pool of Smart Scale funds. The localities with access to regional funding programs in past rounds of Smart Scale are those in Northern Virginia and Hampton Roads. Localities in the Richmond region will have access to regional funds during future rounds.

The concern is that localities with access to regional funds can apply these funds to their Smart Scale projects, which reduces their Smart Scale requests and boosts their project scores. (Smart Scale scores projects based on a ratio of project benefits and costs.) The cost portion of the score is the amount of funds being requested, not the total project cost. This means the less money a locality requests for a project, the better its cost score will be.

Despite these perceptions, JLARC analysis of Smart Scale funding awards found that the program has not disproportionally benefited localities with access to regional funding programs. Funding distributed to localities with regional programs was reasonably even relative to population considering all rounds of Smart Scale (Figure 5-5). One reason for the parity is that there is now more Smart Scale funding available for localities that do not have access to regional programs. This additional funding comes from new regional fuel taxes established in 2020 and is illustrated by the smallest piece of the pie chart in Figure 5-5.

FIGURE 5-5
Districts with regional tax authorities have not received significantly more Smart Scale funding over all Smart Scale rounds



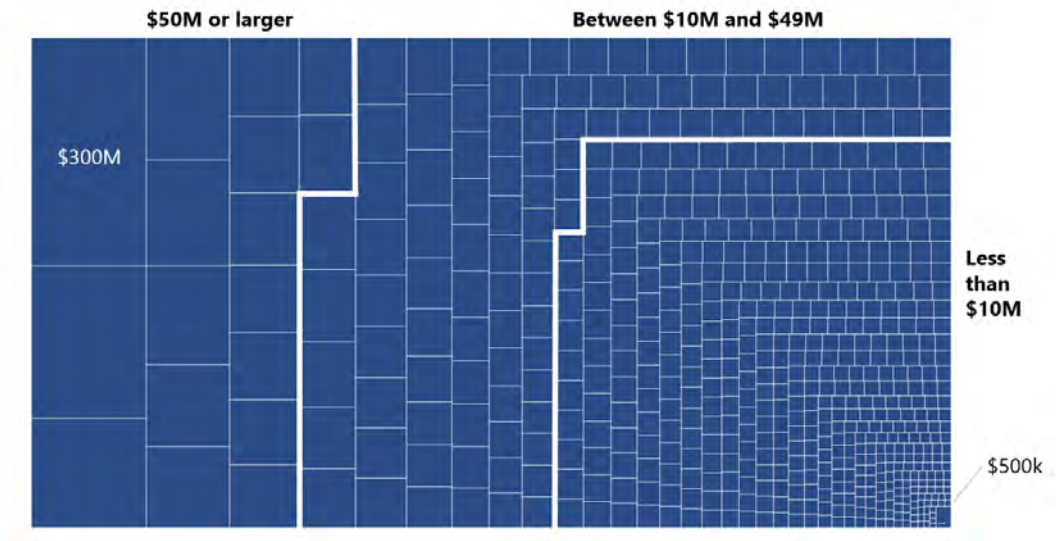
SOURCE: JLARC analysis of Smart Scale awards and data provided by OIPI; January 2021 presentation to the CTB; population data from Weldon Cooper Center population estimates supplemented with data from U.S. Census Bureau.
NOTE: Multijurisdictional projects are allocated evenly across districts where necessary. The Richmond district now has the CVTA regional tax authority, but funds were not yet available in Rounds 1-4 of Smart Scale shown here.

Large projects can be funded through Smart Scale and other programs, though Smart Scale cannot fund all project requests

Some localities also are concerned that they struggle to fund large, costly projects. In particular, several localities indicated to JLARC staff that it is difficult to fund large highway projects.

However, while many large project requests are not funded, the program does award funding to large projects. Large projects make up a smaller *number* of funded projects, but account for a substantial portion of the amount of funding awarded (Figure 5-6). Two-thirds of funding has been awards of $10 million or more, and about a third of funding has been awards $50 million or larger.

FIGURE 5-6
About a third of all Smart Scale funding awards have been $50 million or larger



SOURCE: JLARC analysis of Smart Scale program data from Office of Intermodal Planning and Investment.
NOTE: Includes awards data from data from 2015–2021 (all Smart Scale rounds). Each box represents a single Smart Scale award amount; size of box is in proportion to funding received. Chart shows Smart Scale award amount sizes since program inception. The smallest funding awards are grouped together in the bottom right corner.

Virginia has also been able to build major projects using various funding sources, including Smart Scale. The Federal Highway Administration (FHWA) considers a project "major" if it costs more than $500 million and receives federal financial assistance. Virginia has built or is building nine "major" projects since the FHWA started counting such projects in 2000—fourth among states behind only Texas, California, and Florida (despite having the 30th largest public road network and 12th largest population). Five projects larger than $500 million received a total of $795 million in funding from the Smart Scale program, or 16 percent of all Smart Scale funding, despite representing just 0.8 percent of the *number* of funded projects.

While large projects are funded through Smart Scale, not every large project that is proposed can or should be funded. First, it would not be possible to fund all large projects submitted for scoring. For example, funding all project requests of over $25 million that were not funded in the most recent round would have required more than double the program's total available funding. Second, most of the large projects that were not funded were not as beneficial as less costly projects, according to the state's scoring process. Limiting funding of large projects to those with the greatest benefit is a judicious use of state funds.

Recent changes may improve the program's ability to fund both large and small projects. The new regional fuels tax levied in parts of the state without regional authorities should enable those areas to fund more projects in Smart Scale in those regions, because those new revenues now flow into Smart Scale. More funding should also flow to the Smart Scale program for projects in all regions from the expected overall increases in state transportation revenues. In addition, the federal infrastructure and reauthorization package, if passed, would provide an average of about $270 million in new funding in each of the next five years for federal-aid highway programs in Virginia—some of which would be used for Smart Scale.

Top local priorities do not always score well, but CTB can use discretion to deviate from scoring results to address them

A good project selection process must balance the objective merits of projects with local and regional priorities. Local and regional communities will not support projects they do not want. Localities interviewed by JLARC staff expressed consistent concern that they could not fund top local priorities through Smart Scale. They typically indicated that, while they are able to fund some of the projects they want, their highest priorities often go unfunded.

> *"Overall, Smart Scale transparency is good. Having fully funded projects is good. But we've had challenges getting our top priorities funded."*
>
> **– Local public works department**

While local priorities are not explicitly taken into account in project scores, there are two ways that local preferences are already integrated into the process. Localities choose the projects they submit for scoring, so any project they submit should be a project they want. Localities can also improve their preferred projects' scores by providing additional funding from other resources, such as regional funds or other state and federal grant programs.

The CTB also has the discretion to fund some lower-scoring projects over higher-scoring projects, if it believes there is ample justification. The CTB has changed funding from initial staff recommendations in each round of Smart Scale, though it is unclear how much of this deviation is to solely address local priorities. Some CTB funding changes are made because more funding becomes available for the next highest scoring project or a project is withdrawn, while other changes are made because the CTB chooses different projects. In the most recent funding round, for example, eight projects in the staff-recommended scenario worth $92 million were "unfunded" and replaced with 19 different projects worth $201 million—or less than 15 percent of

total funding awarded. The CTB's authority to make changes to staff recommendations gives it the ability to adapt to changes and transparently apply discretionary judgment.

> *"We understand that when you have hundreds of projects and millions of dollars in the program you can't be as subjective, but maybe there's a way to include local input more."*
>
> **– Local public works department**

To allow the CTB to better understand local priorities that might deviate from Smart Scale scoring to address local priorities in limited situations, localities could be asked to formally rank the projects they submit by priority. While these rankings would not affect projects' objective Smart Scale scores, the CTB could use this information to better select projects that both score well and still achieve local goals. OIPI has collected this information in past rounds of Smart Scale and could resume the practice. This would be a better option than explicitly factoring local priorities into scoring, which would distort benefit-cost scores and move Smart Scale further from its main goal of objective and transparent project prioritization.

Providing the CTB with more information on local priorities would not expand their ability to deviate from funding the highest-scoring projects. The CTB *currently* has the authority to deviate from staff-recommended funding scenarios but does not do so frequently. Including information on local priorities in the Smart Scale process would simply provide the CTB with more information to make better decisions in the limited instances in which they wish to deviate from staff recommendations. The vast majority of funding decisions should continue to be driven by Smart Scale scores.

RECOMMENDATION 7

The Commonwealth Transportation Board should change its Smart Scale policy to require applicants to rank their project submissions in order of applicant priority to provide the board with additional information to inform the board's funding decisions.

Smart Scale scores could be supplemented with benefit-cost analyses

There are multiple approaches to assessing the benefits of transportation projects, each with strengths and weaknesses. For example, Smart Scale scores take into account differences in regional needs, by emphasizing criteria like congestion or economic development, and scores projects relative to each other on each criterion. While this process provides objective scores for projects, it does not clearly quantify a given project's return on investment. Conversely, a more traditional benefit-cost analysis monetizes benefits, which can better illustrate the value and magnitude of a project's return on investment. However, this approach does not account for differences in regional needs and can also leave out some difficult-to-monetize project benefits (Table 5-1).

Eventually incorporating some monetized benefit-cost analyses into project selection could help the CTB choose the best projects and improve transparency. Doing so would give the CTB and Smart Scale applicants more information about a project's return on investment and enable better comparisons among large projects competing for statewide funding. For example, monetized, discounted benefit-cost scores could

give a better indication of whether large highway projects, which rely mostly on congestion reduction scores, are worth pursuing and how they compare to alternatives. Doing so would help applicants better understand Smart Scale scoring, which many applicants identified as one of their main concerns about the program.

TABLE 5-1
Supplementing Smart Scale with benefit-cost analyses would have advantages

	Smart Scale	Monetized benefit-cost
Objectively scores projects	✓	✓
Takes into account regional goals	✓	
Accounts for difficult-to-quantify benefits	✓	
Easy to compare projects statewide		✓
Shows return on investment		✓

SOURCE: JLARC analysis.

Incorporating some elements of traditional benefit-cost analyses into Smart Scale would not be unusual, as these types of analyses are already required for some other transportation funding programs. Federal guidance to states applying for discretionary grants is to calculate monetized benefits and costs in this way, and Virginia already uses monetized benefit-cost scores to evaluate return on investment for interstate projects in other funding programs. However, Smart Scale is a much larger program, and requiring a traditional benefit-cost analysis for every project submitted for funding could create unnecessary administrative burdens.

OIPI could pilot monetized benefit-cost scores for large projects in the next round of Smart Scale—for informational purposes—to see if and how Smart Scale scoring could be improved. Using large projects as a sample would cover a large share of project requests while minimizing the costs of the pilot effort. Projects over $50 million have represented over half of funding requested but under 10 percent of the number of project requests. If the pilot shows that benefit-cost scores add value to the current process and are not overly-burdensome to produce, OIPI could start incorporating benefit-cost scores in later Smart Scale rounds.

POLICY OPTION 4
The Office of Intermodal Planning and Investment (OIPI) could develop a methodology for piloting monetized benefit-cost scores in round five of Smart Scale funding awards. OIPI could require project applicants to submit the data needed for OIPI to perform this analysis. The pilot effort should be for informational purposes and limited to the top 5 to 10 percent of the most costly Smart Scale applications.

Revenue sharing program was changed in response to pandemic, but some changes could be reversed

The state's revenue sharing program is a VDOT-managed grant match program that helps fund all types of local transportation projects. To qualify, projects must be included in local capital improvement plans or the state's VTrans plan. By statute, improvement projects are given priority, but maintenance projects can also be selected if there is enough funding available. Each locality is limited to $5 million in grant awards per year, and they must provide a 50 percent match on any funds they receive. The program is authorized to provide up to $100 million in grants per year, statewide.

Local transportation staff indicated the revenue sharing program has filled an important gap by funding lower-cost projects that address local priorities. Localities use funds for projects such as new sidewalks and minor road construction, some of which are not eligible for Smart Scale or other state and federal funding programs. To illustrate the difference in the size of projects these programs fund, the median award under the revenue sharing program was $325,000, compared with $4 million under Smart Scale.

In 2020, as part of a larger emergency response to the pandemic, the CTB took several General Assembly-approved actions that affected the revenue sharing program (sidebar). These actions appear to have been reasonable and necessary to keep Virginia's transportation agencies functioning, continue maintenance activities, and avoid disrupting ongoing improvement projects. However, as transportation funds recover, the CTB should consider reversing some of these changes.

CTB took several emergency actions affecting the revenue sharing program: (a) transferred unused program cash balances from previously approved projects to fill budget gaps, (b) shifted funding for previously approved projects to FY21–24, based on project schedules, (c) moved new grant awards planned for FY21–22 to FY25–26, and (d) changed the timeline for the upcoming grant award cycle.

Wait time between grant application and award should be reduced

Per the CTB's policy, the revenue sharing program is intended "to provide funding for *immediately* needed improvements or to supplement funding for existing projects" (emphasis added). However, the CTB's pandemic changes shifted the program from a cycle where grants are awarded between one and two years after application to between five and six years after application, as part of its strategy to address pandemic-related budget shortfalls.

Localities indicated that a five- or six-year wait for revenue sharing funds is not justified given the simpler types of projects this money is used for. These projects, such as minor intersection improvements, require far less design and engineering than more complex Smart Scale projects and can be started within a few years or even months after approval. Waiting five or six years increases project costs, because of the effects of inflation on materials and labor. The longer period also creates administrative challenges in documenting projects in local capital improvement plans.

Now that the temporary reduction in revenues due to the pandemic is over, the CTB should return the revenue sharing program to a shorter award timeline. However, the previous one- to two-year timeline may have resulted in inefficient use of funds. In

2020, VDOT analyzed how long it took localities to spend their revenue share grants, and found that a majority of money was not used until the third year after funds were awarded. That means many funds were simply sitting "in the bank" instead of being put to use. To speed up the award timeline, while still being mindful of cash management, the CTB could move the program to a cycle that awards grants between three and four years after application. This would allow localities to receive grants earlier but not before they are ready to use them.

RECOMMENDATION 8

The Commonwealth Transportation Board should change its revenue sharing program policy to make grant awards available in the second biennium after grant applications are submitted (three to four years after application).

Lost funding for FY23–24 budget biennium could be restored

The CTB's pandemic changes stopped any new revenue sharing grants from being awarded for FY21–24. This means that localities will have not received $400 million in funding that would otherwise have been distributed. Too much time has passed to fully restore FY21–22 funding (the FY21–22 budget cycle ends in July 2022), but the $200 million in funding for the FY23–24 cycle could still be restored.

Restoration of FY23–24 revenue sharing funding could be made contingent on the state collecting higher than expected transportation revenues. FY23 could potentially be restored from a FY22 surplus. Funding for FY23, and for FY24, could also come from a revised, higher revenue projection for the upcoming biennial budget. (Revenue projections will be completed in December.) The revenue sharing program is one of several programs that would be eligible to receive any additional transportation funds. Directing a portion of funds to the program would be reasonable, because it was one of the programs most affected by the pandemic response.

Restoring FY23–24 funding for the revenue sharing program would require General Assembly action. The General Assembly would need to appropriate an additional $100 million per year in program grant funds in the FY23–24 Appropriation Act. (Additional appropriation is needed to allow new grants to be made because, as part of the pandemic response, the CTB reprogrammed funds from previous grant awards into these years.) Once funding is appropriated, the CTB, in cooperation with the secretary's office and VDOT's local assistance division, would then need to determine which projects would qualify for the restored funding and approve new grant awards.

POLICY OPTION 5

The General Assembly could appropriate an additional $100 million per year in revenue sharing program funds in the FY23–24 Appropriation Act. The appropriation for FY23 could be made contingent on a FY22 surplus.

POLICY OPTION 6

The Commonwealth Transportation Board, in cooperation with the secretary of transportation and the Virginia Department of Transportation, could determine which local projects qualify to receive any additional revenue sharing program funds for FY23–24 and could then approve new grant awards.

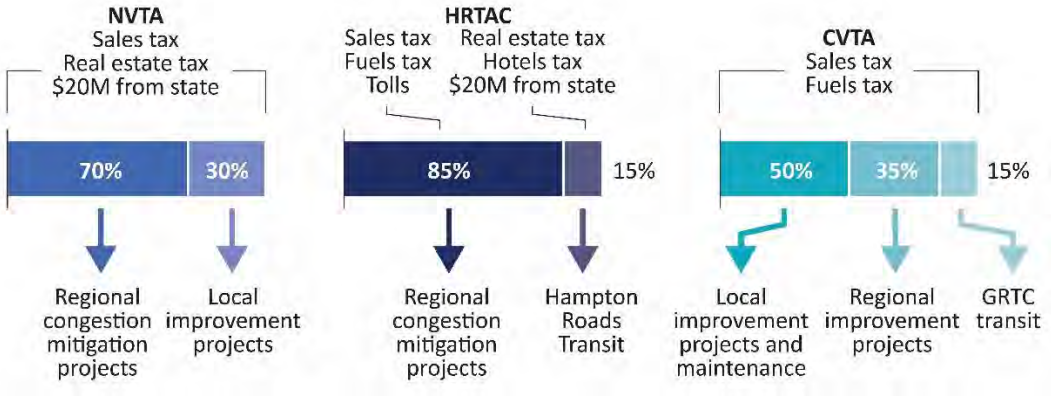
Regional bodies receive significant revenues to fund projects, though approaches differ by region

Three major regional tax authorities have been established in Virginia statute over the past 20 years: Northern Virginia Transportation Authority (NVTA, 2002), Hampton Roads Accountability Commission (HRTAC, 2014), and Central Virginia Transportation Authority (CVTA, 2020).

Three major regional transportation funding programs are controlled by statutorily established regional tax authorities: NVTA, HRTAC, and CVTA (sidebar). These programs are funded by taxes that flow through these regional authorities, and they can raise or leverage additional funds by levying tolls, entering into public-private partnerships, and issuing debt. NVTA and HRTAC have well-established programs and are planning to spend $984 million on regional projects in FY22. CVTA was created in 2020 and has yet to allocate funds to regional projects but will receive about $70 million in revenue in FY22 that can be allocated to future regional projects (another $130 million will go to GRTC and member localities).

The statutorily established purpose of each regional program is slightly different, but each appears to suit regional needs. For example, the main purpose for both NVTA and HRTAC is to fund regional projects that reduce congestion, while the CVTA can fund a wider range of projects and distributes a larger share of funds to localities for local construction and maintenance (Figure 5-7).

FIGURE 5-7
Regional authorities allocate revenue to regional projects, localities, and transit



SOURCE: JLARC analysis of Code of Virginia and documents from HRTAC and NVTA.
NOTE: Regional fuels tax and hotels taxes are collected in Northern Virginia for transportation but do not flow through NVTA. NVTA also receives a portion of the state IOEP fund for allocation to interstates. CVTA and NVTA allocation shares are set in state law, while HRTAC allocation percentages between HRT and highway projects are calculated based on respective dedicated revenues. Although NVTA does not distribute transit funds like HRTAC and CVTA, other Northern Virginia regional tax revenues flow to the area's transit agencies through a separate regional body called the Northern Virginia Transportation Commission.

Regional program funding decisions appear to be transparent and driven by an objective needs assessment. As required under statute, a governing commission that includes General Assembly members, locally elected officials, and CTB members approves the funding decisions. Both NVTA and CVTA are required to prioritize regional project funding based on objective criteria. NVTA has established criteria and a project review process that is similar to the state's Smart Scale program, while CVTA staff are still developing a process.

Hampton Roads also appears to be make funding selections through an objective prioritization process, but this process should be established in law. While law does not require HRTAC to use an objective project prioritization process, HRTAC projects are selected from a list of projects that have been prioritized based on objective criteria by HRTPO (the regional planning body). The state should codify this process into law to ensure it remains an established practice.

RECOMMENDATION 9

The General Assembly may wish to consider amending § 33.2-2600 of the Code of Virginia to require that projects considered for funding through the Hampton Roads Transportation Fund be evaluated and prioritized based on objective and quantifiable benefits and costs.

The creation of regional funding programs has allowed large projects to move forward that may not have proceeded otherwise. First, the programs raise new regional funding from taxes and tolls that can be focused on large projects of regional significance. Second, the programs can issue regional tax- and toll-backed debt to finance the upfront costs of large projects, without affecting the debt capacity of the Commonwealth. For example, in addition to regional transportation tax revenues, HRTAC will receive toll revenue from a future, regional network of interstate express lanes. Since 2018, HRTAC has issued over $1.5 billion in long-term debt backed by tax revenue for the Hampton Roads Bridge-Tunnel expansion and several other major interstate projects, and plans to issue significantly more debt backed by both taxes and tolls in the next five years.

Other regions in Virginia may want to establish their own regional funding authorities and programs in the future. If another area of the state reaches the consensus needed to create a new regional authority, the General Assembly should generally follow the process it has used to establish existing authorities. The General Assembly has created each individual authority in its own section of law, and tailored the purpose of each authority to meet the unique needs of the region. In most cases, regional funding for transportation projects is required by law to be allocated through an objective project prioritization process, which is a practice that should continue. JLARC staff surveyed CTB members and interviewed local officials and regional planners from across the state, and they did not identify a pressing need for a new regional authority in any

particular part of the state (though some stakeholders indicated that the Fredericksburg area could benefit from one).

6 Transit Condition and Funding

Public transit systems enable people to move throughout the state, facilitating commerce, employment, and many other aspects of daily life. Transit is often a cheaper alternative than other forms of transportation, and is many people's only option. Transit also has additional benefits, such as reducing the number of passenger vehicles on the road to ease congestion.

In Virginia, transit includes buses, light rail, commuter rail, heavy rail, ferries, and paratransit (sidebar). Forty transit agencies operate and maintain transit systems in the state. Transit agencies are either operated by a local government or are regional agencies managed by multiple local governments. The largest transit agency is the Washington Metropolitan Area Transit Authority (WMATA), which operates a major multistate transit system that includes parts of Virginia, Maryland, and Washington, D.C. (sidebar).

Paratransit is on-demand, often door-to-door transit services for individuals with disabilities who are unable to use other transit options. Under the Americans with Disabilities Act of 1990, transit agencies must provide paratransit services.

WMATA, commonly referred to as "Metro," is a tri-jurisdictional agency that operates heavy rail, fixed-route bus, and paratransit services in Northern Virginia. WMATA is an interstate compact among Virginia, Maryland, and Washington, D.C.

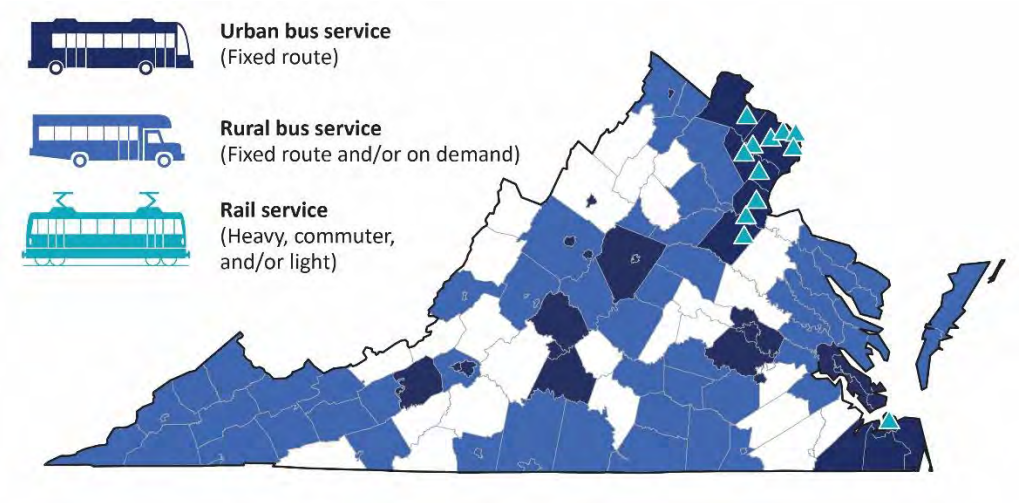
The size and services of transit agencies vary widely across the state, generally based on population and needs. Some transit agencies operate large systems across an urbanized region; others are limited to a single small city or town; and some provide services over widespread rural areas (Figure 6-1). Transit agencies offer different services depending on their population's needs, such as on-demand bus services instead of fixed-route services. Transit mostly serves commuters in some areas, while in others it is a general means of transportation.

Transit systems are funded through federal, state, and local funds, and fare revenues. In FY22, 50 percent of all transit funding was budgeted to come from local sources, 20 percent each from federal and state sources, and 10 percent from fare revenues. In some regions of the state, such as Northern Virginia, Hampton Roads, and Richmond and its surrounding counties, local sources include regional tax and toll revenue.

Transit agencies incur operating and capital expenses. Operating expenses include fuel and labor, while capital expenses include the costs to rehabilitate, replace, or add assets, such as vehicles, facilities, and technologies. In FY22, the state's six-year improvement program allocates $758 million to transit. Fifty percent of this is dedicated to WMATA, and the other 50 percent is for other Virginia transit agencies and programs.

Virginia's transit agencies are overseen by the Department of Rail and Public Transportation (DRPT). DRPT monitors, coordinates, and reports on transit agencies, and manages several state and federal transit grant programs. In addition to transit, the Virginia Passenger Rail Authority is responsible for intercity passenger rail services in Virginia, including overseeing Amtrak services. For the purposes of this report, passenger rail is considered separately from transit and is discussed in Appendix I.

FIGURE 6-1
Transit options are available throughout the state



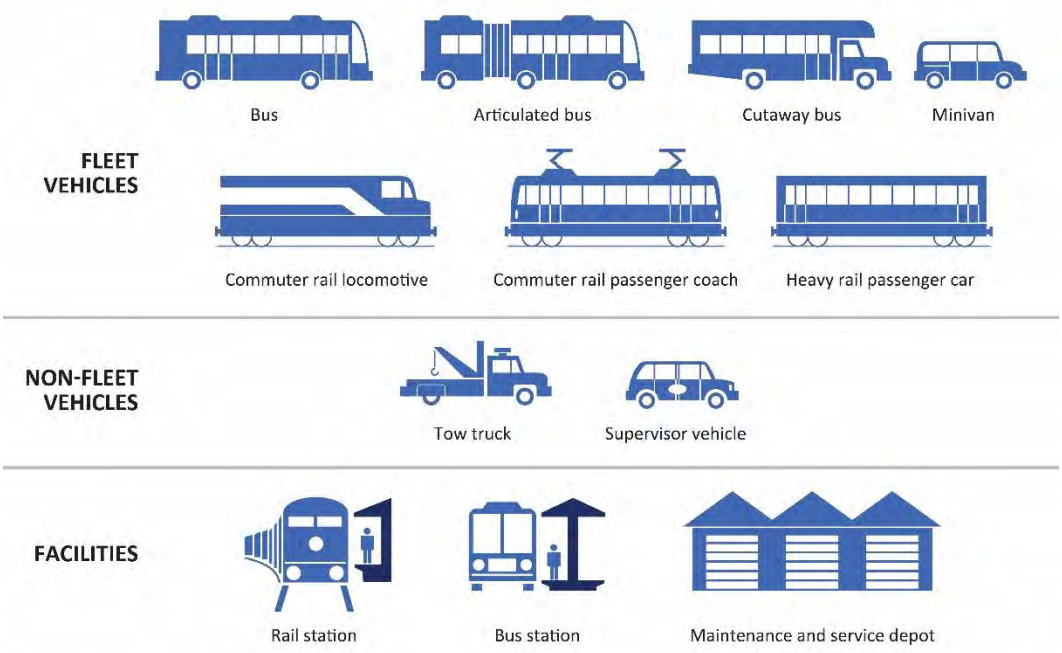
SOURCE: DRPT FY20 Report.
NOTE: Rail service does not include intercity Amtrak passenger rail service.

Transit assets generally in state of good repair, but several agencies have backlog of capital needs

Transit agencies maintain different assets, including various types of fleet vehicles, non-fleet vehicles, and facilities (Figure 6-2). Agencies that operate rail systems also maintain and operate rail infrastructure, such as track. These assets need to be well maintained to ensure services are safe and reliable.

The Federal Transit Administration (FTA) classifies transit agencies into two tiers. Larger transit agencies that operate more than 100 vehicles are Tier I. Smaller agencies that operate 100 or fewer vehicles are Tier II. Virginia has six Tier I agencies—Fairfax Connector (Fairfax), Greater Richmond Transit Company (GRTC), Hampton Roads Transit (HRT), Potomac and Rappahannock Transportation Commission's OmniRide (PRTC), Virginia Railway Express (VRE), and WMATA—and 34 Tier II agencies.

FIGURE 6-2
Transit agencies maintain variety of assets



SOURCE: JLARC staff.
NOTE: Assets shown are for illustrative purposes and are not comprehensive of all types of transit fleet vehicles, non-fleet vehicles, and facilities.

Virginia transit assets are generally well maintained, but some agencies are using aging or deteriorated assets

Most transit assets in Virginia are well maintained. Nearly all the state's rail infrastructure is considered to be in a state of good repair (sidebar). More than 90 percent of facilities and fleet vehicles are in a state of good repair, as are 70 percent of non-fleet vehicles (Table 6-1).

All four asset types in Virginia are, on average, maintained better than the national average. Fleet vehicles in particular are substantially better maintained than the national average. Facilities and rail infrastructure are also better maintained than the national average, but not by as much as fleet or non-fleet vehicles.

Although most transit agency assets are well maintained, some agencies have one or more asset classes where condition could be improved. Among Tier I providers, less than half of GRTC and HRT's non-fleet vehicles reported were in a state of good repair. PRTC's fleet vehicles were not in as good condition as other transit agencies in Virginia and nationally. WMATA had a lower percentage of facilities in good repair. Multiple Tier II agencies had assets in worse condition than both the state and the nation in one or more areas. These were mostly agencies that serve a mix of rural and urban areas, such as those serving the greater Roanoke, Williamsburg, and Charlottesville areas. DRPT staff indicated this was likely because the service lives of the

Transit agencies report asset condition to DRPT and the FTA. This condition data can be used to determine if assets have met or exceeded their useful life and are no longer in a state of good repair. Transit agencies set their own benchmarks for the condition of their assets.

fleet vehicles used by these agencies, such as transit vans, are relatively short and so they may be using some vehicles past their service life. Several Tier I agencies were not meeting their internally determined condition benchmarks in one or more areas.

TABLE 6-1
Majority of transit assets among transit agencies in state of good repair (2019)

Tier	Agency	Fleet vehicles	Non-fleet vehicles	Facilities	Rail infrastructure
Tier I	Fairfax	100%	86%	100%	-%
	GRTC	86	35 [a]	100	-
	HRT	83	41 [a]	97	100
	PRTC	71 [a]	100	100	-
	VRE	100	100	100	100
	WMATA [b]	94	71 [a]	82 [a]	98
	Total	**93**	**69**	**92**	**98**
Tier II	Urban	84	86	92	-
	Urban & Rural	53 [a]	56 [a]	80 [a]	-
	Rural	93	84	100	-
	Total	**81**	**80**	**93**	**-**
Virginia (total)		**91**	**70**	**92**	**98**
United States (total)		**80**	**63**	**88**	**94**

SOURCE: JLARC analysis of FTA National Transit Database data (2019) and FTA National Transit Summaries and Trends 2019 report.

NOTE: [a] transit company not meeting condition benchmark. [b] WMATA's 7000 series rail cars (60 percent of fleet) were recorded as being in a state of good repair based on their age. In October 2021, a National Transportation Safety Board investigation found that a manufacturing defect had contributed to a derailment, and WMATA suspended operation of the 7000 series. Subsequent inspections found that 20 of the 748 cars had the manufacturing defect. Table only includes assets that are reported and include data on useful life or condition rating. The percentage of fleet/non-fleet vehicles in a state of good repair is the number of revenue/non-revenue vehicles not at or exceeding their useful life benchmark compared to the number of revenue/non-revenue vehicles with a useful life benchmark reported. The percentage of facilities in a state of good repair is the number of facilities with a condition rating of 3.0 or higher compared to the number of facilities with condition ratings reported. The percentage of rail infrastructure in a state of good repair is the percentage of track segments not under performance restrictions.

Assets that are not in a state of good repair do not necessarily pose a safety risk. For example, a bus whose age exceeds its useful life benchmark would be considered not in a state of good repair even if it is well maintained and safe.

Federal safety requirements are intended to keep transit agencies from putting unsafe assets into service. Transit agencies are required to conduct safety planning, which is generally linked with asset management to mitigate any safety risks associated with asset condition. Agencies use asset condition and safety risk information to prioritize asset repair and replacement. Accidents involving transit agencies are investigated by federal agencies.

Transit agencies generally replace vehicles when they reach the end of their useful life, if the agencies have adequate funding. When an agency cannot afford to replace a vehicle, it may have to defer replacement and continue using the vehicle beyond its expected life (sidebar). If this continues over a few years, agencies can develop a backlog of vehicle replacement needs. Currently, there are 487 fleet vehicles in need of replacement among Virginia's Tier I and Tier II agencies (not including WMATA). Funding is the primary barrier for transit agencies to replace assets or improve their condition (discussed later in this chapter).

Large transit agencies report need for more passenger amenities to improve system use and access

Large transit agencies reported the need to add and improve passenger amenities, such as bus shelters and benches. These amenities are important for agencies that offer fixed

route bus services, because they give passengers a place to sit and shelter from the elements as they wait. This encourages system use and improves access to communities that depend on transit services.

Several transit agencies reported that many bus stops along their system lack basic passenger amenities. Transit agencies indicated some stops do not have crosswalks or sidewalks, and a stop can be little more than a sign stuck in the ground.

The state currently lacks information on the full magnitude of needed improvements to passenger amenities. However, recent transit strategic planning requirements will require larger transit agencies to describe their asset management policies, including for passenger amenities. A few large transit agencies reported they were making improvement of passenger amenities a priority as they seek to bring riders back to their systems following the COVID-19 pandemic. In addition, DRPT's transit equity and modernization study will likely provide more information on access to transit (sidebar).

HJ 542 (2021 Special Session I) directed DRPT to **study transit equity and modernization** in the state. This study will be complete by August 1, 2022.

State funding is sufficient to support transit operations but does not meet all capital needs

Virginia funds transit agencies to support both operations and capital investments. For most transit agencies, state support is provided through DRPT's Making Efficient and Responsible Investments in Transit (MERIT) programs for (1) operating assistance and (2) capital assistance. (State funding for WMATA is provided separately and is discussed later in this chapter.)

The MERIT programs provided transit agencies with $103 million in operating assistance and $109 million in capital assistance in FY22. The state recently increased funding for MERIT programs about 25 percent ($34 million per year, on average) as part of the transportation legislation passed in 2020 (sidebar). Most of this new funding ($29 million per year, on average) will go toward capital assistance. Trends in budgeted and projected funding are shown in Table 6-2.

2020 omnibus transportation legislation increased several state transportation taxes and changed how tax revenues are allocated to different transportation modes and purposes. This included changes to how funds are allocated to the Commonwealth Mass Transit Fund and the MERIT programs. Additional discussion of tax and revenue changes is provided in Chapter 2 and Appendix C.

TABLE 6-2
State has increased transit funding under the MERIT operating and capital assistance programs

	Budgeted			Projected				
	FY20	FY21	FY22	FY23	FY24	FY24	FY26	FY27
MERIT operating assistance	$95M	$97M	$103M	$104M	$101M	$105M	$108M	$109M
MERIT capital assistance	77[a]	39	109[a]	68	68	70	73	74

▲2020 legislation funding increase begins

SOURCE: DRPT six-year improvement programs.
NOTE: [a] FY20 and FY22 capital assistance amounts were unusually high because of the allotment of carry over funding from previous years and, for FY22, other one-time funding. The amount of additional FY22 funding from carry over and other sources was $22.6 million.

In addition to MERIT funding, the 2020 General Assembly created the Transit Ridership Incentive Program, which provides about $20 million per year in state grants to improve regional transit and provide transit access to low-income communities in urban areas, including "zero fare" initiatives. FY22 was the first year of grant awards under the program.

Transit agencies have sufficient operating funds in near term, but longer term sustainability is uncertain because of pandemic impacts

MERIT operating assistance provides funds to help transit agencies pay for day-to-day expenses, like driver wages and bus fuel. Transit agencies have historically depended on state funds for about 18 percent of their operating costs, although the exact amount varies among agencies. Agencies draw on several other sources to cover their operating expenses, including local government subsidies, federal funds, and fare revenues. Because of the COVID-19 pandemic, transit agencies experienced a steep decline in fare revenues and became more dependent on federal funds (Table 6-3).

TABLE 6-3
Fare revenues have declined as percentage of transit agency funding since start of COVID-19 pandemic

Funding source	Pre-pandemic % of revenues (FY20, budgeted)	Post-pandemic % of revenues (FY22, budgeted)	Percent change
Local funds	44%	50%	+14%
State MERIT operating assistance	18	18	0
Federal operating assistance	12	20	+67
Fare revenues	21	9	-57
Other	5	3	-40

SOURCE: DRPT six-year improvement programs.
NOTE: Includes all Virginia transit agencies except WMATA.

Federal government has provided three rounds of pandemic relief: the Coronavirus Aid, Relief, and Economic Security Act (CARES, March 2020), Coronavirus Response and Relief Supplemental Appropriations Act (CRRSAA, December 2020), and American Rescue Plan Act (ARPA, March 2021). Fund use is largely unrestricted and funds do not need to be spent for several years.

Virginia transit agencies' revenue from fares declined 57 percent from pre-pandemic levels, mainly from lost ridership. The loss of fare revenues created a substantial budget gap at many transit agencies (ranging from several thousand dollars at smaller agencies to $25 million at VRE). So far, agencies have been able to use federal relief funds to bridge budget gaps (sidebar). However, transit agencies indicated that they expect to expend most or all of these federal funds within the next few years. If fare revenues have not recovered by that time, the state will need to determine what, if any, additional funding it will provide to help transit agencies maintain operations.

If the 2021 federal transportation reauthorization and infrastructure act is passed, it will help address the budget gaps created by a long-term loss of fare revenues for smaller transit agencies but not large urban agencies. The act would increase funding for federal transit formula funds by about $65 million annually (36 percent more than previously provided). These funds could be used by smaller agencies to pay for both

capital and operational expenses and, for many agencies, should be enough to close any operating budget gap. However, transit agencies that serve large urban areas (populations of 200,000 or more) cannot use federal funds for operating expenses, and so the act would not help them directly address any operating budget gaps.

Transit capital needs projected to outpace available funds, despite recent funding increases

Most transit agencies in Virginia, large and small, rely heavily on state MERIT capital assistance and federal funds to support their capital programs. In interviews, some stakeholders said their capital needs exceed available funding. Without sufficient funding, transit agencies are sometimes forced to defer replacement of vehicles and other assets.

The state's MERIT capital assistance program helps transit agencies pay to replace existing assets, such as aging fleet vehicles, and invest in new assets, such as additional vehicles or new technologies. The program pays up to 68 percent of the cost of replacing assets to maintain a state of good repair, 68 percent of the cost of new "minor enhancements," and 50 percent of new "major enhancements" (sidebar). Transit agencies were complimentary of the program and indicated state assistance was critical for helping maintain vehicle fleets and improving their systems.

Minor enhancements include addition of a vehicle for minor service expansions, new equipment, technology, or system infrastructure to improve operations, such as new fare machines or security monitoring systems.

Major enhancements include addition of multiple vehicles to more significantly expand service and renovation, replacement, or addition of facilities, such as bus transfer stations and maintenance buildings.

A 2019 DRPT review identified a $42 million per year gap between projected MERIT capital funding and the state's share of transit agency asset needs (FY21–25). To try and address this gap, MERIT funding was increased as part of the 2020 omnibus transportation legislation. While the added revenues will significantly help address transit asset needs, the COVID-19 pandemic reduced the amounts of new revenue collected, and DRPT continues to project a funding gap.

The total transit needs gap projected for the next five years (FY23–27) is $226 million, based on the most recent needs estimate and revenue projections. This includes a backlog of state of good repair replacement needs ($52 million), minor enhancements ($57 million), and major enhancements ($117 million). If these asset needs are not addressed, the gap between needs and funding will continue to grow over the long term. A DRPT analysis of potential vehicle replacement needs at transit agencies in the upcoming five-year cycle (FY28–32) indicates that needs in future funding cycles could be as high as or greater than the projected funding gap for the next five years. This further suggests that the projected gap between needs and funding could be a reoccurring problem if not addressed.

The state can help address the transit asset needs gap by using transportation revenue surpluses. The state reported a $365.8 million surplus in transportation revenues for FY21. The CTB has the statutory authority to distribute this surplus, consistent with guidance in statute and the Appropriation Act. The CTB should use FY21 surplus funds to restore $39.8 million in lost transit revenues, essentially returning revenues to the amounts originally projected before the pandemic. Restored transit funds could be

wholly directed to the MERIT capital assistance program, which is where the funds are currently most needed. This $39.8 million restoration would address three-fourths of the projected backlog in state of good repair replacement needs. If the state experiences another surplus in FY22, additional funds from that surplus could also be directed to MERIT capital assistance to close the gap on state of good repair needs and to reduce the gap for minor and major enhancement needs.

RECOMMENDATION 10

The Commonwealth Transportation Board should direct $39.8 million in FY21 transportation revenue surplus funds to the Commonwealth Mass Transit Fund to restore funding to pre-pandemic levels and direct these funds to be distributed to transit agencies under the MERIT capital assistance program.

POLICY OPTION 7

The Commonwealth Transportation Board could direct a portion of any future FY22 transportation revenue surplus to the Commonwealth Mass Transit Fund, and direct these funds to be distributed to transit agencies under the MERIT capital assistance program to help address any remaining, unfunded transit asset needs.

Other state funding programs and new federal funding could also help pay for transit capital needs. Transit agencies are eligible to apply for project funds under Smart Scale, the state's main transportation improvement funding program. Transit projects often receive high scores under the program. If transit agencies are able to receive Smart Scale funding for some minor or major enhancement projects, it would reduce the need for MERIT capital assistance. On the federal side, as previously noted, the proposed 2021 transportation reauthorization and infrastructure act would increase federal formula funds by about $65 million annually. All transit agencies, large and small, could use these funds for capital expenses. The bill also would provide new funds for other application-based grant programs that Virginia transit agencies will be able to compete for against agencies nationwide.

State transit funding could be modified to ensure fair distribution of post-pandemic operating funds and promote access

MERIT operating assistance is distributed to transit agencies using a formula that considers each agency's operating costs, ridership, vehicle use, and performance across several metrics. The current funding formula was implemented in FY20 in response to legislation requiring DRPT to make funding more performance-based. MERIT capital assistance amounts are determined based on a needs assessment, using several criteria. The CTB approves all funding formulas and criteria and the final annual funding amounts.

DRPT should monitor post-pandemic ridership recovery and how it affects distribution of MERIT operating assistance

The COVID-19 pandemic has affected ridership at transit agencies, which has implications for how MERIT operating assistance funds are distributed in the future. Distribution amounts are based in part on each agency's ridership, and some transit agencies have experienced much greater ridership losses than others during the pandemic. In the near term, these differences need to be accounted for to ensure that agencies that have experienced heavy ridership losses are not penalized by receiving less assistance.

For example, ridership on the Richmond area's GRTC system is down only 14 percent from pre-pandemic levels, whereas Loudoun County Transit is down 80 percent. The differences are due to the different populations each agency serves and how dependent their riders are on transit for work and other travel. If these ridership numbers were plugged into the current funding formula, GRTC would get a larger share of funding, while Loudoun would see its funding drop significantly. This would be unfair to Loudoun, because its ridership losses are mainly due to the pandemic's effect on commuter traffic in the area.

Over the past two years, DRPT has used pre-pandemic ridership numbers to help determine MERIT operating assistance amounts. This approach has avoided penalizing transit agencies that have, through no fault of their own, experienced drastic ridership losses. However, it appears likely that ridership will not rebound to pre-pandemic levels soon. Over the next few years, permanent changes in ridership need to be acknowledged to ensure that funding continues to be fairly distributed across transit agencies.

DRPT should continue to monitor ridership recovery at transit agencies during FY22–23 and develop options for changing the MERIT operating assistance formula in advance of the FY24 funding cycle. When developing these options, DRPT should consider how to avoid harming agencies that continue to have lower ridership from the pandemic while not providing them a disproportionately large share of state assistance. DRPT should present options for change to the CTB for its consideration and approval prior to FY24 funding awards.

RECOMMENDATION 11

The Department of Rail and Public Transportation should monitor COVID-19 pandemic ridership recovery at transit agencies and develop options for changing the MERIT operating assistance program formula to avoid harming agencies that continue to have lower ridership following the pandemic while not providing them a disproportionately large share of state assistance. Options should be presented to the Commonwealth Transportation Board before FY24 funding awards are made.

MERIT operating and capital program funding formula could be adjusted to promote transit access in low-income areas

One of the CTB-adopted state transportation goals is to promote access, including improving the transportation options available in low-income areas. While the MERIT operating assistance program considers several aspects of transit agency performance when determining funding awards, it does not consider how well agencies are doing in promoting transit access to low-income areas. The current performance adjustments consider efficiency (ridership per vehicle miles and hours) and cost effectiveness (cost per vehicle miles and hours, cost per rider). Several transit agencies indicated that these metrics favor commuter services along busy routes, and fail to reward localized bus services that provide essential access to few riders, including residents of low-income areas. Consequently, they said the program does not reward current efforts or incentivize changes that increase access.

DRPT should review how performance is being measured under the MERIT operating assistance formula, identify metrics that could be used to promote transit access to low-income areas and other areas of need, and present options for changes to the CTB. DRPT staff indicated they are examining this and related issues under their transit equity and modernization study, which will result in an interim report this year and a final report next year.

RECOMMENDATION 12

The Department of Rail and Public Transportation (DRPT) should review the performance metrics for the MERIT operating assistance program to determine if and how they could be changed to promote transit access to low-income areas and other areas of need. DRPT should present options to the Commonwealth Transportation Board for consideration by December 2022.

For MERIT's capital assistance program, the criteria for distributing capital funds could be changed to emphasize passenger amenities, such as bus stops and shelters, which improve access. Both DRPT and transit agencies indicated that these amenities are lacking across many systems. For example, the director of one Tier I transit agency noted: "We have people standing in ditches waiting for buses." The lack of basic amenities can dissuade transit use by people who have other alternatives, and can be denigrating to some people who do not have alternatives. Staff at large transit agencies indicated that improving passenger amenities is a priority for them.

MERIT program scores minor capital enhancements based on: (1) operating efficiency, (2) frequency, travel time, and/or reliability, (3) accessibility and/or customer experience, and (4) safety and security. Each category is worth up to 10 points.

DRPT indicated that, under its current MERIT capital scoring criteria, passenger amenity projects tend to not score well. DRPT classifies passenger amenities as "minor enhancements" and scores them alongside investments needed to expand transit services or improve system operations. Minor enhancements are scored using four criteria approved by the CTB (sidebar). While amenities can score well on some criteria, they do not score well on others. DRPT should review the criteria used to score minor

enhancements to see how passenger amenity projects could be made more competitive and present the CTB with options for changing the criteria.

RECOMMENDATION 13

The Department of Rail and Public Transportation (DRPT) should review the criteria for scoring minor enhancements in the MERIT capital assistance program to determine how they could be changed to make passenger amenity projects, such as bus stops and shelters, more competitive. DRPT should present options for changes to the Commonwealth Transportation Board for consideration by December 2022.

Another way to improve access is to design transit services and routes in a way that best serves the community and meets demand. Agencies have done this to some extent in the past. For example, Danville's transit agency has evolved to provide more on-demand "reserve-a-ride" services and fewer fixed-route services, and has been cited as a model for small urban transit. GRTC in Richmond completed a system redesign and expansion in 2018, and saw ridership grow 15 percent before the pandemic.

Transit demand can vary widely by community, depending on factors such as income and demographics of the population being served, the types of employment in the region (e.g., office jobs, essential services jobs), and the viability of other modes of travel. Consequently, there is no uniform way to estimate if there is unmet demand for transit across the state.

The state already has taken action to encourage transit agencies to better evaluate and meet their communities' unique demand. The 2018 General Assembly passed legislation requiring transit agencies serving urbanized areas to develop Transit Strategic Plans (TSPs). In developing TSPs, agencies are required to assess community transit needs and determine how their systems can be changed to better meet those needs. The development of TSPs has been delayed by the pandemic, but the three TSPs that have been completed indicate these plans can effectively encourage evaluation of transit needs and service improvements. TSPs must be updated every five years.

Current funding for WMATA is sufficient, but long-term sustainability depends on pandemic recovery

WMATA is the largest transit system in Virginia, accounting for almost two-thirds of the state's transit ridership before the pandemic. In the mid-2010s, WMATA had significant condition, safety, and performance issues with its vehicles and facilities. The condition of assets had deteriorated substantially because of aging and underinvestment. Virginia and other WMATA members have increased funding and improved the system, but WMATA may face additional funding challenges from lost ridership and fare revenues due to the COVID-19 pandemic.

Virginia's significant capital investments in WMATA have helped improve the system's condition

In 2017, Virginia's governor commissioned an independent panel to review WMATA's operating, governance, and financial conditions. This report included multiple recommendations to improve the aging system, including a significant need for capital investment. As a result of these recommendations, Virginia, Maryland, and Washington, D.C., committed $500 million annually in new capital funds to help WMATA address its needs, in addition to the $150 million in capital funds they were already providing as a match to federal funds, and other state and local operating assistance. The new $500 million will pay for needs identified in the 10-year capital improvement plan that was adopted in 2018. Virginia's share of funding contributions for capital *and* operating for the next two years are shown in Table 6-4.

TABLE 6-4
State will provide $744M to WMATA over next two fiscal years

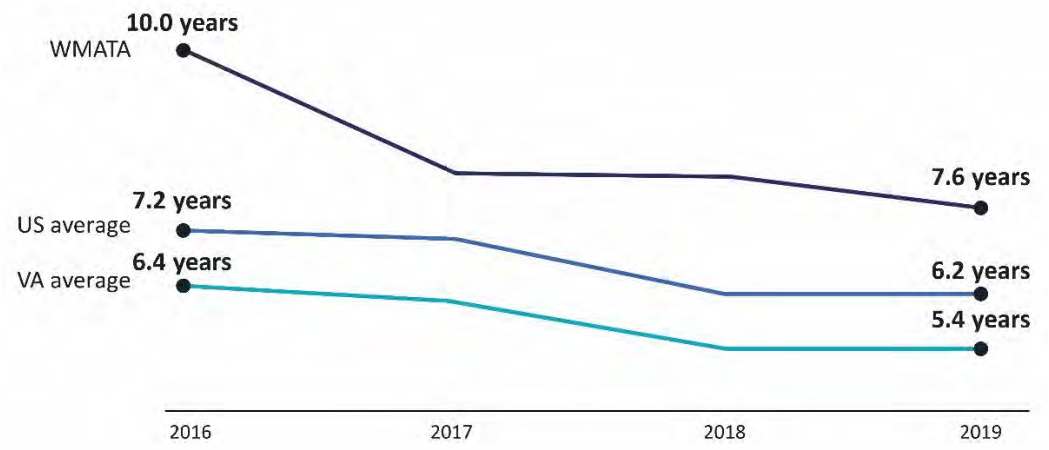
	FY22	FY23
State and regional WMATA capital funds (Virginia's share of $500 million, started FY19)	$155 M	$135 M[a]
State match on federal PRIIA capital funds	50	50
State subsidy for Virginia local government capital and operating obligations	177	177
Total	382	362

SOURCE: DRPT FY22–27 Six Year Improvement Program.
NOTE: PRIIA = Passenger Rail Investment and Improvement Act. State subsidy for local government obligations flow through the Northern Virginia Transportation Commission (NVTC). This helps offset payments owed by Virginia's WMATA compact localities: Alexandria, Arlington, Fairfax City, Fairfax County, Falls Church, and Loudoun.
[a] DRPT staff indicated that while the Six-Year Improvement Program shows $135.1 million in projected allocations for FY23, Virginia's true obligation is $154.5 million and that this obligation will be met.

Since 2018, WMATA has been implementing needed capital improvements to address safety and performance concerns, resulting in condition and operational improvements. Staff with DRPT and the Northern Virginia Transportation Commission, which provide state and regional oversight of WMATA, reported that WMATA is in compliance with its statutory reporting requirements and implementing needed improvements in accordance with its strategic plan. WMATA's August 2021 capital program progress report identified the many improvements it has made to passenger-facing infrastructure, including outdoor platforms, escalators, elevators, passenger facilities in rail stations, bus shelters, and communications. Data on WMATA asset condition confirms that the condition of assets is improving. For example, the average age of WMATA fleet vehicles has been reduced every year since 2016 (Figure 6-3). However, WMATA will need to address a manufacturing defect with its 7000 series rail cars—which account for 60 percent of its fleet—that was recently identified as a safety risk. Inspections found the defect present in 20 of 748 total cars. This issue

comes on top of a separate maintenance problem with WMATA's 6000 series of cars, which are just now being returned to use.

FIGURE 6-3
WMATA has been deploying new assets to reduce the age of its fleet, but fleet is still older than national and Virginia average



SOURCE: JLARC analysis of FTA National Transit Database data (2019).

Despite the issues with cars, WMATA's work has significantly improved system operations. For example, since 2018, incidents involving train offloads and fires, and emergency track repairs, are down 60 and 50 percent, respectively. The agency also has had no traction power cable fire incidents since FY18. Further, from FY17 to before the COVID-19 pandemic, Metrorail's on-time performance increased 20 percent, and equipment reliability increased 190 percent.

WMATA could face major budget gap if ridership does not return to pre-pandemic levels when federal relief funds expire

Many of WMATA's regular riders, especially on its Metrorail system, are office commuters. With the onset of the pandemic, many of these riders began telecommuting or using alternative means of travel to commute to work. WMATA ridership has not recovered from pandemic losses; as of August 2021, weekday rail ridership is 26 percent of its pre-pandemic level, and bus ridership is 58 percent. Ridership has been steadily increasing since February 2021, but WMATA surveys of system riders suggest many are not planning to return in the near future.

WMATA depends heavily on passenger fare and parking revenues to fund its operations. In FY19, the last year before the pandemic, fare and parking revenues accounted for 39 percent of WMATA's operating budget. Fare revenues for FY21 were down 60 percent, or $300 million, compared with FY19.

Like many other transit systems, WMATA's operating budget is being buoyed by federal pandemic relief funds. Funding from CARES, CRRSAA, and ARPA accounted

for 35 percent of WMATA's operating budget in FY22. This funding is being used to offset revenue losses from low ridership and fund additional expenses. With this significant federal pandemic-related relief support and steady ridership recovery, WMATA projects that it will be able to continue operating current service levels through at least the end of FY23. However, that was before the recent service reductions due to problems with its 7000 series cars, which could harm ridership recovery.

If WMATA ridership has not largely recovered by the time relief funds are spent, or additional funding is not secured, the system will likely face a budget gap. Previously, before it received additional federal relief funding, WMATA considered cutting rail and bus services to 30 and 50 percent of pre-pandemic levels, respectively, to address budget gaps. Therefore, it is expected WMATA would consider similar options when federal relief funding runs out, if additional funding is not secured. In the near term, this may not be problematic if ridership has not returned to pre-pandemic levels. However, if service cuts do occur, they would likely have a disproportionate effect on low-income riders, who often do not have viable transportation alternatives. Addressing the budget gap would fall to the WMATA compact members: Virginia, Maryland, and Washington, D.C. (The proposed federal transportation reauthorization and infrastructure act would not help WMATA address operating budget shortfalls because, as a large urban transit agency, WMATA cannot use federal formula funds for operating purposes.)

Appendix A: Study resolution

Resolution of the Joint Legislative Audit and Review Commission directing staff to review transportation infrastructure and funding in the Commonwealth of Virginia

Authorized by the Commission on November 16, 2020

WHEREAS, Virginia has diverse transportation needs and transportation facilities, such as the Metro in Northern Virginia, the Port of Virginia in Hampton Roads, highways traversing the mountainous regions of Southwest Virginia, and intercity rail throughout the state; and

WHEREAS, prior to the COVID-19 pandemic, changes were made to expand transportation revenues but gasoline tax revenue was still highly dependent on vehicle miles traveled by increasingly fuel-efficient vehicles; and

WHEREAS, during the pandemic, vehicle miles traveled declined substantially and it is unclear whether miles traveled will return to pre-pandemic levels, which may cause a permanent reduction in transportation revenues; and

WHEREAS, due to the substantial investments in transportation, and the various entities that have the authority to administer such investments, there is a need for an independent review of the current state of transportation funding and systems in the Commonwealth; now, therefore be it

RESOLVED, that the Joint Legislative Audit and Review Commission shall direct staff to study the state of the Commonwealth's transportation infrastructure, funding, and preparedness for change.

In conducting its study, the Joint Legislative Audit and Review Commission shall review (i) the state of the highways and transportation infrastructure in the Commonwealth; (ii) funding sources used by transportation entities; (iii) trends in vehicle miles traveled and changes in commuting patterns; (iv) challenges facing transportation facilities and infrastructure, particularly the Port of Virginia, Interstate 81, and Interstate 95, due to increased activity and use and potential solutions for such challenges; (v) the impact of the increase in the number of vehicles with noncombustion engines or more fuel-efficient combustion engines on transportation funding and alternatives to ensure that the owners and operators of such vehicles are contributing a fair share to transportation funding in the Commonwealth; and (vi) the preparedness to adapt to changes within the transportation landscape due to advances in technology.

JLARC shall make recommendations as necessary and review other issues as warranted.

All agencies of the Commonwealth, including the Virginia Department of Transportation, Department of Rail and Public Transportation, Commonwealth Transportation Board, the Virginia Academy of Science, Engineering, and Medicine, the Virginia Tech Transportation Institute, and Metropolitan Planning Organizations shall provide assistance, information, and data to JLARC for this study, upon request. JLARC staff shall have access to all information in the possession of agencies pursuant to § 30-59 and § 30-69 of the Code of Virginia. No provision of the Code of Virginia shall be interpreted as limiting or restricting the access of JLARC staff to information pursuant to its statutory authority.

Appendix B: Research activities and methods

Key activities performed by JLARC staff for this study include:

- structured interviews with (i) officials from the office of the secretary of transportation, (ii) Virginia state transportation agency leadership and staff, (iii) regional planning organization staff, (iv) local government transportation staff, (v) transit agency leadership, (vi) Virginia and national transportation researchers and experts, and (vi) Virginia transportation associations;
- survey of the members of the Commonwealth Transportation Board (CTB);
- analysis of historical and projected transportation revenues and spending, including projections of future fuel tax revenues;
- review of state transportation funding and mileage-based user fee programs in other states;
- analysis of state and local road and transit system condition data;
- analysis of the sufficiency and distribution of funds under all of the state's main maintenance and improvement funding programs, such as sufficiency of funds provided for the Virginia Department of Transportation (VDOT) and locally maintained road systems, how Smart Scale improvement funds are distributed across the state, and sufficiency and distribution of funds to transit agencies;
- review of Virginia's transportation tax structure and revenue allocation structure, including changes made by the 2020 General Assembly;
- review of state and regional transportation plans and supporting data and documentation;
- review of policies and procedures for state funding programs; and
- observation of CTB meetings.

Structured interviews and survey

Structured interviews were a key research method for this report. Over 90 interviews were conducted, predominantly over the phone or via video conference. Key interviewees included the secretary of transportation and leadership at state transportation agencies, transportation officials with local governments and regional planning organizations, transit agency directors, and state and national transportation experts and associations. JLARC staff also conducted a survey of the 17 members of the CTB.

Secretary and state agency staff

JLARC interviewed the secretary of transportation and deputy and assistant secretaries to understand their perspective on transportation funding in Virginia and the many changes that have been made to funding in the past few years, including the changes made by the 2020 General Assembly. These interviews also helped to better understand how the COVID-19 pandemic has affected transportation revenues and funding programs, and what actions the state took in response to the pandemic.

JLARC staff interviewed agency leadership and program directors at the Office of Intermodal Planning and Investment (OIPI), VDOT, Department of Rail and Public Transportation (DRPT), Department of Motor Vehicles (DMV), Department of Taxation (TAX), the Virginia Transportation Research Council, and the Virginia Port Authority. These interviews often included several officials from each agency, such as agency directors and program leads. These interviews helped JLARC staff understand numerous topics critical to the study, including how revenues are projected for various transportation taxes, how the state identities and studies transportation needs, how its major transportation funding programs work, and how long-term trends are expected to affect the state's transportation system.

Regional bodies, local governments, and transit agencies

JLARC staff conducted interviews with transportation officials at regional planning bodies, local governments, and transit agencies from across the state. Interviewees represented all geographical areas of the state, and included a mix of urban, suburban, and rural localities. Interviewees included numerous representatives from each of the state's three major metropolitan areas, where a majority of Virginia's population resides.

At the regional level, JLARC staff interviewed officials representing the three regional tax authorities (Central Virginia Transportation Authority [CVTA], Northern Virginia Transportation Authority [NVTA], Hampton Roads Transportation Accountability Commission [HRTAC]), five Metropolitan Planning Organization regions, and four rural Planning District Commissions. At the local level, JLARC staff interviewed transportation planning officials with eight counties, seven cities, and one town. For cities, the town, and one county, interviews also included public works officials with responsibilities for street maintenance. For transit, JLARC staff interviewed officials with the Northern Virginia Transportation Commission—which coordinates all transit agencies in the Northern Virginia area, including the Washington Metropolitan Area Transit Authority (WMATA or "Metro")—and three Tier I transit agencies and one Tier II transit agency.

These interviews were critical for gaining first-hand stakeholder perspectives on the condition of VDOT- and locally maintained roads and regional and local transit systems. Interviews were also critical for gaining stakeholder perspectives on the sufficiency of state transportation funding and how it is distributed under the state's major funding programs. Interviews also contributed to JLARC staff's understanding of several other topics.

Experts and associations

JLARC staff interviewed several state and national transportation experts and associations. Expert interviewees included representatives from the American Association of State Highway and Transportation Officials (AASHTO), Madrus Consulting, Eno Center for Transportation, National Conference of State Legislatures (NCSL), the U.S. Energy Information Administration (EIA), Virginia Tech Transportation Institute (VTTI), University of Virginia Center for Transportation Studies, a data privacy expert from Indiana University (IU), and two former VDOT commissioners. JLARC staff also interviewed representatives from the Virginia Association of Metropolitan Planning Organiza-

tions, Virginia Transit Association, Virginia Trucking Association (VTA), Virginia Maritime Association (VMA), Virginia Transportation Construction Alliance, Virginia Association of Counties, and Virginia Municipal League.

These interviews provided JLARC with in-depth perspective and understanding in specific areas of expertise. For example, interviews with AASHTO, Madrus, Eno, and NCSL helped staff understand how Virginia's transportation revenue structure and major funding programs compare to other states. Interviews with EIA helped staff understand federal fuel consumption projections, and interviews with IU helped understand the privacy concerns of state mileage-based user fee programs. Interviews with VTA and VMA helped understand concerns about how the state's transportation network serves freight.

Survey of CTB members

JLARC staff surveyed the 17 members of the CTB, including both ex-officio and appointed members. Sixteen of 17 members responded (a 94 percent response rate). This survey was important for gaining the perspective of CTB members on state transportation revenues and funding programs broadly and on specific concerns that had been raised by regional and local stakeholders.

Data collection and analysis

JLARC staff performed several data analyses, including analyses of state revenue and spending data, projected fuel tax revenues, transportation infrastructure condition, and how transportation funding is distributed through the major state transportation funding programs. These analyses provided critical information for every topic that was evaluated under this study.

Historical and projected state transportation revenues and spending

JLARC reviewed and analyzed transportation revenue, spending, and debt data from several sources to better understand historical patterns and expectations. Sources included the following:

- historical Commonwealth Transportation Fund revenue collections;
- TAX forecasts of Commonwealth Transportation Fund revenues by source;
- CTB, VDOT, and DRPT budgets;
- six-year financial plans (SYFPs);
- Governor's Advisory Council on Revenue Estimates (GACRE) reports and presentations to the Joint Money Committees;
- historical data on appropriations and expenditures;
- highway use fee collections from DMV;
- Debt Capacity Advisory Committee (DCAC) reports and related data; and
- various other data files provided by transportation agencies.

State fuel tax revenue outlook

JLARC staff analyzed fuel tax revenue collections and the future outlook for state fuel tax revenues. This outlook was assembled after discussions with TAX, EIA, and others.

Staff combined several data sources to produce a mid-term outlook. First, TAX projections and historical data were used to understand the revenue outlook through FY24. TAX uses a regression model to forecast the state revenue outlook for official purposes.

Second, JLARC staff combined fuel consumption scenarios with inflation forecasts to produce a mid-term outlook for FY24–FY30. Fuel tax revenues are a function of consumption and tax rates. Staff used fuel consumption scenarios from the EIA's 2020 and 2021 Annual Energy Outlooks to understand a range of likely outcomes for on-road gas and diesel consumption by light duty, commercial light truck, and heavy freight vehicles. Diesel and gasoline consumption were examined separately, but consumption of both fuel types is summed in the final analysis. These potential outcomes were adjusted by forecasts of inflation (CPI-U) from TAX/IHS Markit and the Congressional Budget Office. (Virginia's fuel tax rates will increase with inflation moving forward.) While producing the outlook, JLARC reviewed other fuel tax revenue forecasts including the forecast that KPMG produced for VDOT's 2019 Revenue Sustainability study as well as the Congressional Budget Office's long-term outlook for federal fuel tax revenues.

JLARC staff made two key informed assumptions in this analysis. First, fuel consumption in Virginia is assumed to change at a rate consistent with national forecasts. Before making this assumption, staff reviewed historical fuels sales data to confirm trends were reasonably aligned. Second, JLARC assumed in the "low" revenue scenario that federal fuel economy policies similar to Obama-era policies would be in place through 2030 and would impact consumption scenarios in the same manner as in earlier forecast years when the policy was in place. Staff did not incorporate any assumptions about additional electric vehicle incentives, mandates, investments, or technological breakthroughs in battery technology.

State and local road and transit system condition

JLARC staff performed several analyses of data on the condition of state and local roads and transit assets.

JLARC staff performed some analyses of data on the condition of VDOT-maintained roads and supplemented this analysis with information from document reviews and data requests to VDOT. JLARC analyzed 2020 data from VDOT's open data portals, Virginia Roads and the VDOT Dashboard, to assess the condition of state-maintained pavement and bridges. Staff analyzed the condition of pavements and bridges across VDOT districts and along major interstate corridors. Staff also relied on document reviews (discussed more below) and data analyses conducted by VDOT for updated road and bridge condition.

JLARC staff performed several analyses of the condition of locally maintained pavements and bridges. Staff analyzed FY20 data on the condition of locally maintained primary extension pavements from VDOT's Local Assistance Division and 2020 data on the condition of locally maintained bridges from Virginia Roads. Staff compared pavement and bridge condition across VDOT districts, and assessed any relationship between pavement or bridge condition and a locality's fiscal stress (as defined by the Commission on Local Governments). This analysis found that localities in some regions had pavement and bridges in better condition than others. Additionally, localities that were more fiscally stressed had roads in worse condition, but there was no relationship between fiscal stress and bridge

condition. Staff also analyzed how condition compared to local expenditures and local funding sources for roads maintenance from FY15–19. Historical data on local expenditures also came from VDOT's Local Assistance Division. This analysis found that localities that contributed less local funding to road maintenance and relied more heavily on state funding had roads in slightly worse condition than localities that contributed more local dollars.

JLARC also analyzed 2020 data on pavement and bridge condition from the U.S. Department of Transportation's Bureau of Transportation Statistics for comparison to other states. This data included miles of public roads in good or fair condition (based on International Roughness Index) and percentage of bridges in good, fair, and poor condition.

JLARC staff analyzed data collected and published by the Federal Transit Administration (FTA). Staff analyzed 2019 data from FTA's National Transit Database on fleet vehicle condition, non-fleet vehicle condition, facility condition, rail infrastructure condition, and performance measure targets. Staff used FTA's definitions of state of good repair to describe the condition of transit assets across the state's Tier I and Tier II agencies. Tier II transit agencies were aggregated by urban, rural, and mixed urban and rural groupings, depending on the area in which they operate. JLARC staff used this data to compare transit asset condition in Virginia with other states.

State and local spending on road maintenance and operations

JLARC staff performed several analyses of state and local spending on road maintenance and operations.

JLARC staff analyzed historical, budgeted, and projected funding of VDOT's Highway Maintenance and Operations Program (HMOP), State of Good Repair (SGR), and special structures programs. Staff identified historical funding from CTB budgets from FY11–22.

JLARC staff performed several additional analyses regarding the State of Good Repair (SGR) program. Staff analyzed SGR bridge project selections from FY17–22 to assess if the project selection follows the procedures outlined in CTB policies. JLARC staff performed analysis of the funding awards made under the SGR program for FY19–22 to determine how much funding Richmond and Hampton Roads districts would have received during these fiscal years if their allocations were not capped. Finally, staff analyzed hypothetical program allocation scenarios if the cap was adjusted or eliminated and funding was redistributed.

JLARC staff analyzed data from VDOT's Local Assistance Division on local maintenance expenditures, total payments provided to localities, and local assistance payment rates from FY09–22

Funding provided through Smart Scale and other state and regional improvement programs

JLARC staff performed several analyses of funding awards made through the Smart Scale program. First, staff developed and reviewed summary statistics for funding awards by funding round, project type, applicant type, project region, award size, project size, and several other categories to better understand funding outcomes. Second, to understand the distribution and geographic equity of funding awards, staff grouped funding awards by planning district commission, compared awards to planning district commission population, and calculated correlation coefficients. Staff performed this population analysis at the VDOT district level to compare funding awards in regions with tax authorities

to those without tax authorities. Funding award amounts were used for this analysis rather than the *number* of funded projects because projects can vary significantly in size and cost, and comparing the number of projects would not differentiate between a $50,000 Smart Scale award and a $300 million Smart Scale award. Staff did various other analyses using program data, such as calculating the "success rate" of various application types, examining the composition of projects that were submitted but not funded, reviewing changes made after staff-recommended funding scenarios, and analyzing the types of projects funded in each funding "step" of Smart Scale.

JLARC staff performed several analyses of funding awards made under the revenue sharing program for FY12–FY22 (although note FY21–22 awards were shifted to FY25–26). Staff analyzed funding data to determine how awards had been distributed across the state to different localities, and if that distribution was proportional to population. The analysis also looked at the types of projects funded by the program and the range, median, and average funding awards. Staff also analyzed how funding was distributed across VDOT districts and localities to see if fiscally distressed localities were less able to participate in the program, because they would theoretically be less able to contribute the 50 percent local match. The analysis found no relationship between those two factors. Finally, JLARC staff reviewed the results of a 2020 VDOT analysis of how long it had taken localities to spend their revenue sharing grant awards.

JLARC staff analyzed data on historical, budgeted, and projected funding under the Highway Safety Improvement Program from FY13–FY27 to determine if funding was fairly allocated across the VDOT- and locally maintained systems, following the 2019 change to fund systematic improvements instead of spot improvements.

JLARC staff also analyzed various data sources on regional funding arrangements to understand the regional revenue outlook and how regional funds are used. This included reviewing historical and forecasted revenues for the NVTA, Potomac and Rappahannock Transportation Commission, CVTA, HRTAC, and I-81, as well as regional fuels taxes in other localities. In addition, staff reviewed a sample of budget, financial statement, and project allocation documents from NVTA and HRTAC and documentation on debt for NVTA, HRTAC, and the I-81 arrangement.

Transit funding and ridership

JLARC staff performed several analyses of data collected and published by DRPT.

Staff analyzed historical, budgeted, and projected funding data for the MERIT operating and capital programs and WMATA in DRPT's six year improvement programs (SYIP), from the FY17–22 SYIP to the most recent FY22–27 SYIP. This data was used to identify and describe major funding changes that have occurred in the past few years, namely major increases in WMATA and MERIT capital funding and smaller increases in MERIT operating funding.

JLARC staff analyzed the MERIT operating fund formula, calculations, and awards to understand how the formula worked and if transit agencies had been treated fairly when the new formula was instituted for FY20. The analysis found that funding is still largely determined by the size and cost of a transit agency, adjusted slightly based on performance metrics. Despite concerns raised by transit agencies, the analysis found a sudden loss of a few hundred riders at a given agency (from something like the loss of a local employer) does not have a great effect on the amount of MERIT funding

provided. The analysis also found that transitional funds prevented most agencies from losing money during the transition from the old funding formula to the new MERIT formula. Only one agency ultimately lost any substantial amount of funds due to the change in the formula, and the amount lost by that agency was less than $6,000.

JLARC staff analyzed transit agency operating budget data and ridership data collected by DRPT to understand how agencies had been impacted by the COVID-19 pandemic, including lost fare revenue. The analysis also looked at several potential recovery scenarios for transit agencies, but ultimately these were determined to be unreliable because of the large amount of uncertainty and difference in how transit agencies may use their federal pandemic relief funds (CARES, CRRSAA, and ARPA) and adjust services to cover budget shortfalls and adjust to ridership losses.

JLARC staff analyzed DRPT data on future capital program revenues and transit agency capital needs (for FY22–27) to estimate the gap between funds and needs. This analysis looked at both state and federal funding gaps, and estimated how the federal funding gap would be affected by an influx of additional federal dollars under the proposed 2021 surface transportation reauthorization and infrastructure act.

Document and research literature review

JLARC staff performed extensive reviews of state documents, studies, reports, laws, and policies. JLARC staff also reviewed research literature related to surface transportation. The key reviews carried out are summarized below.

- Review of Virginia's transportation tax and revenue allocation structure, including changes made by the 2020 General Assembly. The primary sources for this review included the Code of Virginia, past and current Appropriation Acts, presentations given to the CTB, materials provided by VDOT, and other budget documents.
- Review of VDOT reports and presentations given to the CTB regarding current and historical pavement, bridge, and special structure condition.
- Review of state transportation plans and supporting data and documentation. Sources reviewed included the Code of Virginia; current and historical VTrans plans, policies, and procedures (including the interactive VTrans website); interstate corridor, STARS, and arterial preservation program studies; presentations to the CTB and subsequent CTB actions; and the OIPI, VDOT, and DRPT websites, studies, and reports. JLARC staff also examined regional transportation plans developed by Transportation Planning Organizations for the Northern Virginia, Hampton Roads, and Richmond regions.
- Review of policies and procedures for state funding programs. Sources reviewed included the Code of Virginia; current and historical plans, policies, procedures for the State of Good Repair, Local Maintenance Payments, Smart Scale, Revenue Sharing, I-81 Corridor Improvement, Interstate Operations and Enhancement, Highway Safety, MERIT capital assistance, and MERIT operating assistance programs; presentations to the CTB and subsequent CTB actions; and the OIPI, VDOT, and DRPT websites, studies, and reports.
- Review of reports on other states' transportation funding. Key sources reviewed included reports and statistics from the Federal Highway Administration, the National Association

of State Budget Officers, NCSL, AASHTO, the American Petroleum Institute, U.S. Office of Energy Efficiency and Renewable Energy, and the International Fuels Tax Association. Staff also reviewed reports and laws related to other states' mileage-based user fee programs as well as some states' transportation project selection processes.

- Review of peer-reviewed academic research and other publications on long-term trends and their expected effect on transportation systems. Sources reviewed include *Transportation, Travel Behavior and Society, Transportation Research Part A: Policy and Practice, IATSS Research,* and *Transportation Research Part D: Transport and Environment*, and publications from the National Academy of Sciences, International Council for Clean Transportation, U.S. Department of Energy, U.S. Department of Transportation, Virginia Transportation Research Council, and state agencies. Staff also attended webinars related to long-term trends led by OIPI and REMI.

CTB meetings

JLARC staff attended all meetings of the CTB that occurred during the course of the study, either virtually or in-person. JLARC staff also reviewed select segments of past CTB meeting from 2018 to present. In addition to observing meetings, JLARC staff reviewed materials presented to the CTB and subsequent actions taken by the CTB.

JLARC staff also observed meetings or reviewed minutes of the CTB's Rail and Transit Subcommittee and the Transit Service Delivery Advisory Committee.

Appendix C: Transportation revenues and fund allocation

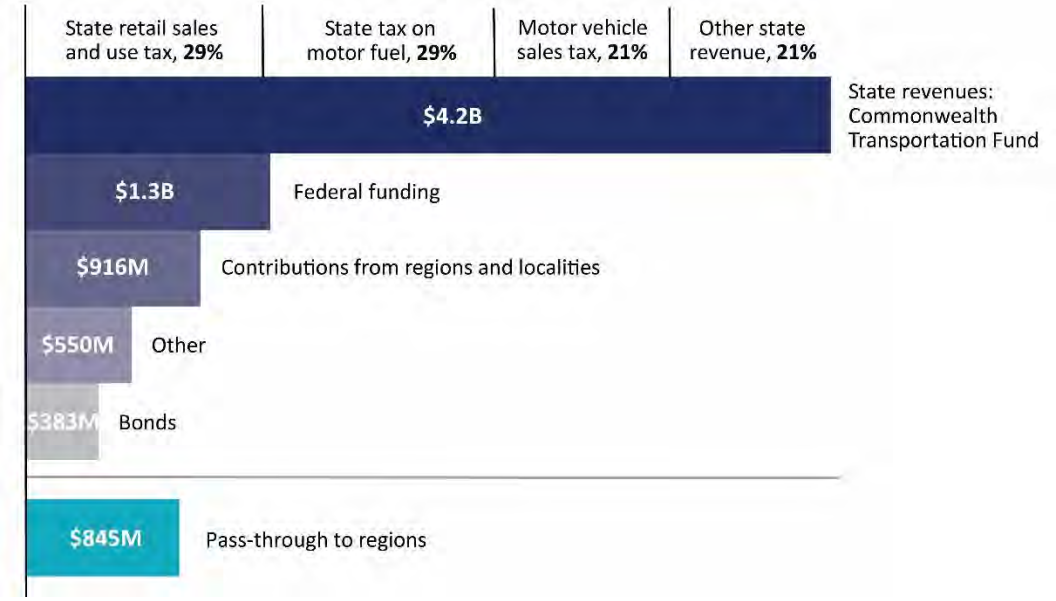
The extent to which Virginia is able to maintain, operate, administer, plan, and improve the surface transportation system depends largely on (1) how much revenue is raised and (2) how available funds are allocated among priorities.

The amount of funding available for transportation in Virginia depends on state revenue collection and federal funding programs—but also on revenues raised at the regional and local levels within the state. Allocation of these funds is based on formulas set in law and policy as well as the discretion of decision-making bodies. The 2020 General Assembly significantly changed both state and regional revenue collection and fund allocation, mostly through the "omnibus" transportation bill (Acts of Assembly, Chapters 1230 and 1275).

State increased existing state and regional transportation revenues and added new revenue sources in recent years; federal funding has been stagnant but could increase over the next five years

Surface transportation in Virginia is funded by a variety of revenues collected at the federal, state, regional, and local levels (Figure C-1). Most state, federal, and regional revenue flows through the state budget, while localities typically both raise and spend funds locally.

FIGURE C-1
Virginia's transportation revenues come from several sources (FY22)



SOURCE: JLARC analysis of FY22 Commonwealth Transportation Fund budget, I-81 bond issuance.
NOTE: Pass-through revenues are regional taxes that are collected by the state and transferred to three regional authorities (Northern Virginia Transportation Authority [NVTA], Central Virginia Transportation Authority [CVTA], and Hampton Roads Transportation Accountability Commission [HRTAC]) and WMATA. Support from regions and localities includes mostly HRTAC and NVTA contributions to construction projects, which often begin as regional "pass through" revenues. "Other" includes mostly regional fuel taxes dedicated to Smart Scale, I-81 program funding, and a small amount of general funds.

Virginia increased three main state revenues over the past decade

While a number of state revenue sources are dedicated to transportation, the three main sources are (1) a tax on motor fuels, (2) part of the state retail sales and use tax, and (3) a tax on motor vehicle sales. These revenues make up over 80 percent of state transportation revenues (Table C-1)

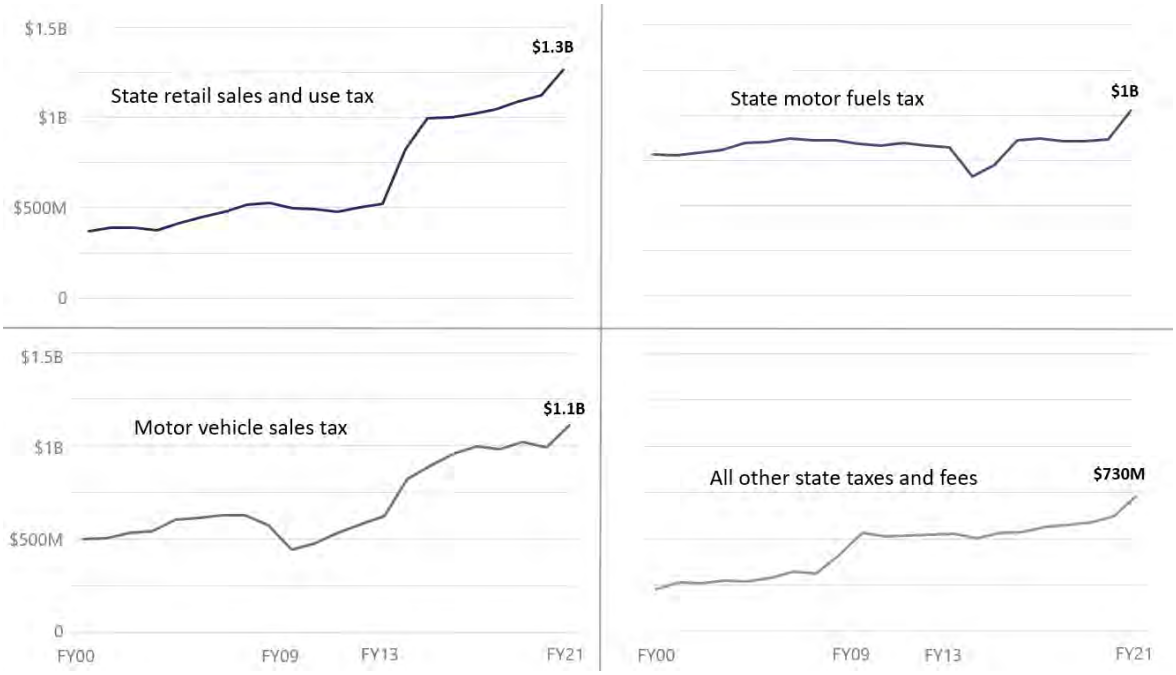
TABLE C-1
$4B in state revenues come from three main sources (FY22 projected)

State CTF revenue source	Description	Revenue ($M)	Percent
State motor fuels tax	26.2 cents/gallon on gas and 27 cents/gallon on diesel	$1,239	31%
Retail sales and use tax	0.9% tax on most retail sales (0.5% on food)	1,215	30
Motor vehicle sales tax	4.15% tax on vehicle sales	900	22
Motor vehicle registration fees	License and registration fees (base fee is $21)	203	5
Insurance premiums tax	1/3 of revenue from tax on insurance premiums	172	4
International Registration Plan	Fees on commercial vehicles in IRP program	74	2
State recordation taxes	12% of revenue from deed recordation taxes	57	1
Road tax	Additional fuel tax on some commercial vehicles	47	1
Highway use fee	Fee on fuel efficient and electric vehicles	47	1
Motor vehicle rental tax	4% tax on vehicle rentals	30	1
Other	Miscellaneous taxes and fees	19	0.5
	TOTAL	$4,001	100%

SOURCE: Code of Virginia; Commonwealth Transportation Fund Budget FY22, VDOT information on transportation revenue sources.
NOTE: Revenue amounts are projected for FY22 and are subject to change. Tax rate on vehicle rentals is 10%, but only a portion is directed to the CTF.

The General Assembly increased tax rates for transportation revenues over the past decade, increasing available funding. Notably, in 2013, Virginia increased the sales and use tax dedicated to transportation and phased in an increase to the vehicle sales tax. In 2019, the state increased taxes on heavy commercial vehicles. In 2020, the state began to phase in tax increases on motor fuels. Figure C-2 illustrates revenue increases for motor vehicle sales taxes and retail sales taxes related to 2013 legislation. A major state fuel tax rate increase is being phased in through FY22 and is only partially represented in the chart.

FIGURE C-2
Three main state transportation revenues have increased over past decade (FY2000-FY2021 shown)



SOURCE: JLARC analysis of actual revenues from Department of Taxation and August 2021 Review of General Fund Revenues and the Virginia Economy for Fiscal Year 2021 (GACRE presentation).
NOTE: State fuel tax rate increases are being phased in through FY22 and are not reflected in the fuel tax chart.

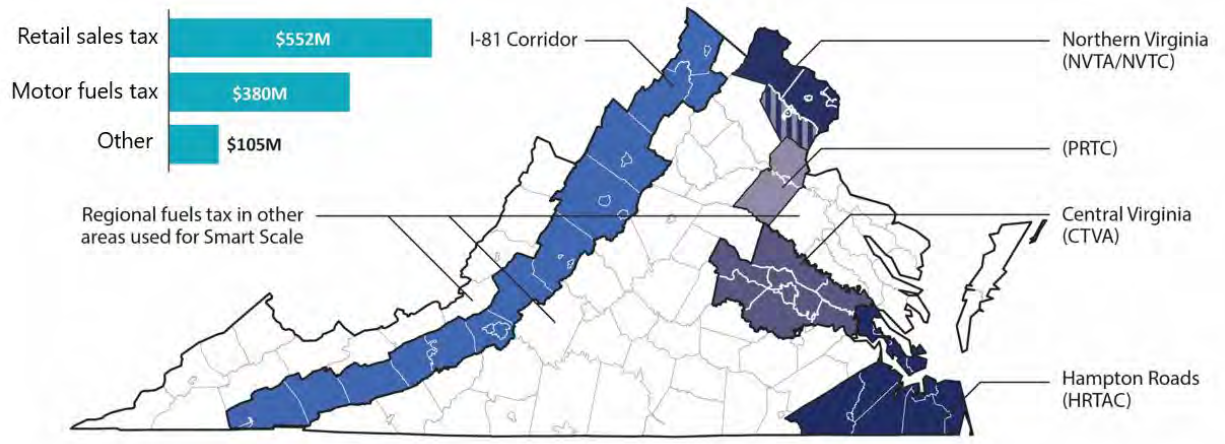
Transportation revenues for specific regions have expanded over time

Revenues from state-established *regional* transportation taxes have grown significantly in recent years and are projected to reach over $1 billion in FY22. Regional taxes vary from one part of the state to the next, and revenues are distributed in different ways. All of the major regional transportation taxes were added in the past decade.

Regional taxes in Northern Virginia, Hampton Roads, and the Richmond area include fuel, retail sales, and other taxes. Taxes in these three areas are expected to generate over $800 million in revenues in FY22, most of which goes toward system improvements and transit. These revenues are passed through to regional transportation authorities (Figure C-3). For example, the Hampton Roads Bridge-Tunnel expansion project is being funded primarily through regional taxes in Hampton Roads.

In all other parts of the state, a regional fuels tax of 7.7 cents per gallon is levied. For localities along the I-81 corridor, tax revenues flow to the I-81 corridor improvement program (~$60M/year). For localities in the Potomac and Rappahannock Transportation Commission (PRTC) area, regional taxes flow to localities and transit operators (~$40M/year). For localities in the Northern Virginia Transportation Commission (NVTC), regional fuel taxes flow to WMATA and localities (~$60M/year) (other regional taxes in Northern Virginia flow through the Northern Virginia Transportation Authority [NVTA]). For all other areas of the state, the regional fuel tax funds projects in the relevant VDOT district through the state's Smart Scale program (~$100M/year).

FIGURE C-3
Several regional transportation tax arrangements will raise about $1B in FY22

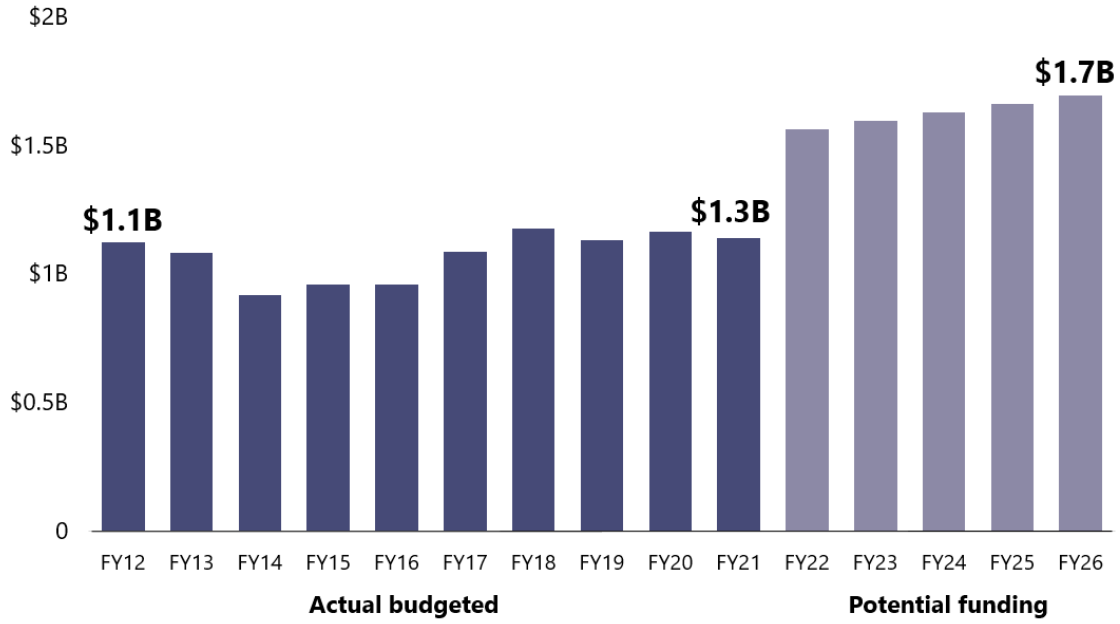


SOURCE: JLARC analysis of Code of Virginia; Department of Taxation revenue estimates for FY22; Department of Motor Vehicles.
NOTE: Specific transportation revenue sources and distributions vary by region. FY22 projected revenues for regions shown. "Other" is mostly made up of transient occupancy taxes and grantor's taxes levied in Hampton Roads and Northern Virginia. Three localities are members of both NVTA and PRTC and have special tax distribution rules. (PRTC is an organization that coordinates transit agencies in its member localities. Prince William County and the cities of Manassas and Manassas Park are members of both PRTC and NVTA, but not NVTC.) Includes some revenues that flow to WMATA from Northern Virginia. NVTA began to collect revenues in 2013, HRTAC was created in 2014 and CVTA in 2020. I-81 regional tax started in 2019. Regional motor fuels taxes in the rest of the state are collected as of 2020.

Federal funding for transportation has been relatively stagnant but could increase significantly over the next five years

The federal government also plays an important role in funding Virginia's transportation system, and federal funding represents $1.3 billion of Virginia's transportation budget. While state and regional revenues have increased over time, federal funds flowing to Virginia had remained relatively flat over the past decade (Figure C-4). However, if proposed federal legislation is passed, Virginia could expect an average of at least $270 million annually in new funding for highways and bridges and at least $60 million annually in new funding for public transit in each of the next five years—in addition to formula funding continued at current levels and several new competitive grants (including significant increases in passenger rail grants).

FIGURE C-4
Federal funding for Virginia was relatively flat over the past decade but could increase significantly over the next five years if proposed federal bill is passed



SOURCE: JLARC analysis of CTF budgets and six-year financial plans. Includes budgeted federal revenues from both FHWA and FTA sources. Federal Funds Information for States analysis of *Infrastructure Investments and Jobs Act*.
NOTE: Potential federal funds include estimates of formula-apportioned funds for highway and transit programs and do not include a range of other competitive grant and transportation-related programs. Estimates for FY22 to FY26 are subject to change.

2020 law streamlines state revenue distribution and funds additional priorities

Many transportation revenues flow into Virginia's transportation funds. Decision-making bodies and agency staff then allocate Virginia's transportation funds to different transportation purposes and programs according to laws, policies, plans, and discretion.

The 2020 General Assembly significantly changed high-level requirements for how most transportation funds will be allocated. The primary changes will:

- streamline state transportation revenue distribution by directing most state revenues to the Commonwealth Transportation Fund;
- consolidate and increase funding for mass transit and passenger rail programs; and
- increase the amount of funding allocated specifically for interstates, highway safety, and special structures.

Streamlining revenue distribution will help to reduce volatility in allocations to specific transportation programs. Before 2020, state transportation revenue flows were more complex because specific state revenue streams were divided up and directed to specific programs and funds. Directing most revenues to a single fund should reduce funding fluctuations in programs previously funded by specific revenue sources.

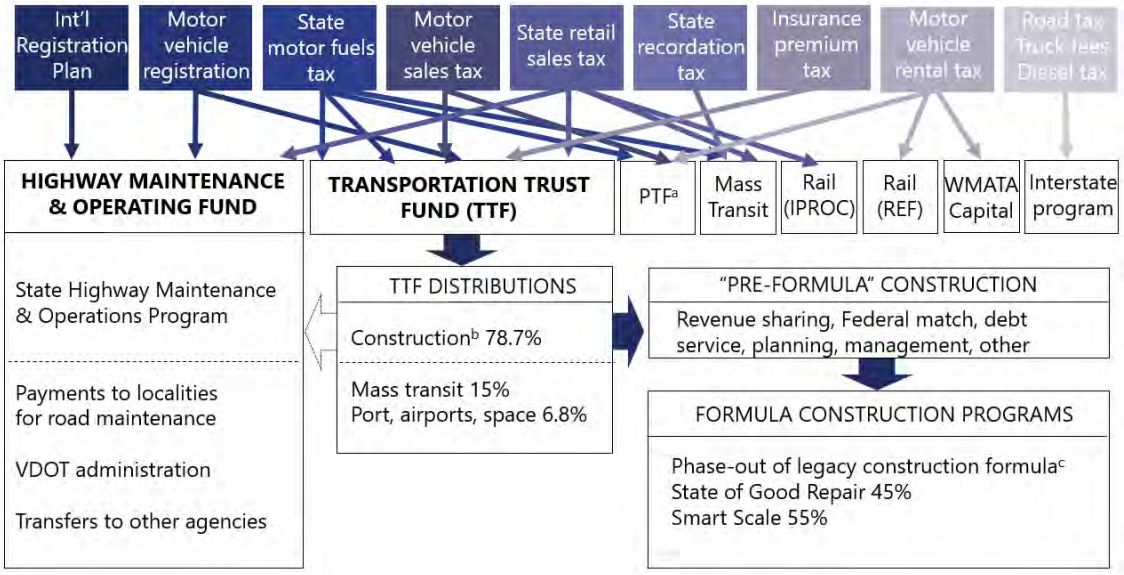
The new allocation structure should not reduce funding for any major programs and increases funding for transit, passenger rail, and roads. Based on a review of data provided by state agency staff and six-year planning documents, it does not appear the new allocation will reduce funding for any major programs. In addition, Virginia increased state revenues through 2020 legislation, providing more funding overall. Increased revenues and changes to revenue distributions should enable Virginia to provide more dedicated state funding to passenger rail and mass transit. Presentations from agency staff indicate an expected increase of 45 percent for passenger rail and transit because of the changes. Changes should also provide sustained funding for newer highway programs. The 2020 law added a program to fund the state's special structures, created a program specifically for funding for interstate improvements (building on the I-81 program established in 2019), and expanded funding for highway safety programs.

It is too soon to determine if the specific amounts and shares of funding that each program will receive is appropriate. Because of the uncertainty around the COVID-19 pandemic, the General Assembly gave the Commonwealth Transportation Board additional authority to phase in changes to *allocation* shares by FY24—so the full effect of the changes will not be known for some time. Additionally, *revenues* available for allocation were both affected by COVID-19 and not fully phased-in as of the writing of this report.

Figure C-5 depicts how state transportation revenues were distributed prior to 2020 legislative changes as well as how funds will be allocated moving forward. There are now five main steps in allocating available state transportation revenues: (1) take funds required for certain designated programs, such as special structures maintenance, "off the top" and allocate them to these programs; (2) split remaining funding between the Highway Maintenance Operating Fund (HMOF) and Transportation Trust Fund (TTF); (3) allocate funds among primary functional areas and programs in the HMOF and TTF; (4) take out "pre-formula" funds from the construction account for the revenue sharing program, federal matching programs, debt service, and other areas; and (5) allocate remaining construction funds among primary improvement programs such as Smart Scale.

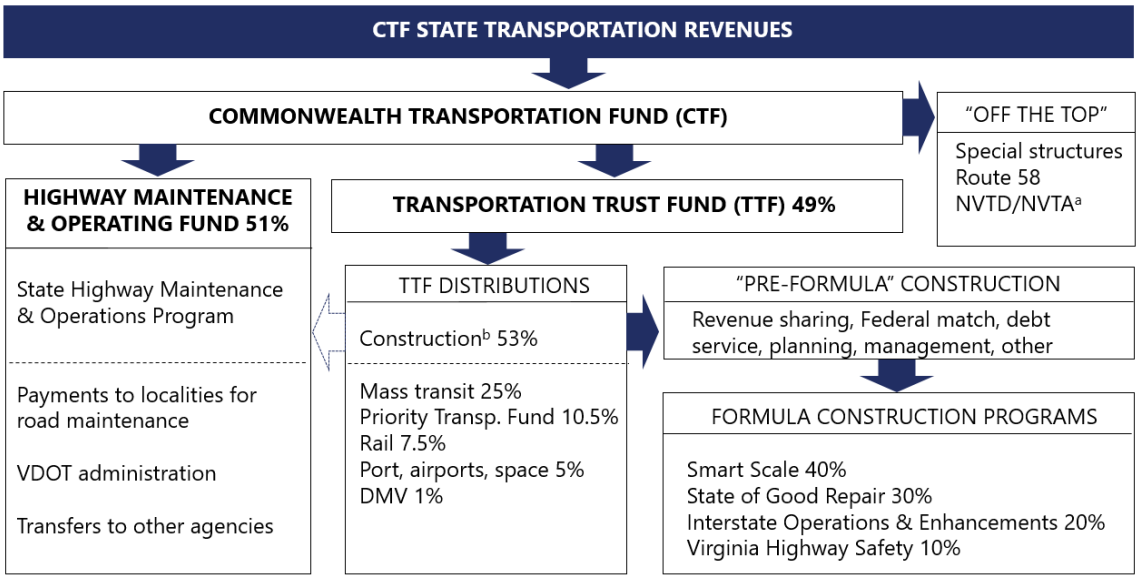
FIGURE C-5
2020 law streamlines revenue distribution, changes allocations, and establishes programs

Old structure distributed portions of state revenues across many funds



NOTE: Illustrates flow of state revenues only; certain fund allocation paths are simplified.
[a] PTF stands for Priority Transportation Fund. [b] Construction fund allocation can be drawn on for state maintenance and operations through "crossover". [c] Through FY21, the state phased out a construction funding formula that provided funding based on road system.

New structure streamlines distributions and changes allocations to functional areas and programs



NOTE: Illustrates flow of state revenues only; certain fund allocation paths are simplified. [a] $40M is taken from distributions for funds in Northern Virginia before allocations. [b] Construction fund allocation can be drawn on for state maintenance and operations through "crossover". Note that $20M in state recordation taxes are now transferred to Hampton Roads Transit, but these funds do not flow through the CTF and are not shown above. New structure shown above will be fully phased-in by FY24.
SOURCE: Documents provided by VDOT; JLARC analysis; Code of Virginia.

Appendix D: Tolling, public-private partnerships, and debt

In addition to raising revenue through taxes and fees to pay for the transportation system, Virginia also tolls roads and bridges. A small number of these toll roads are state-owned and operated, while a larger number are built and operated by private entities in exchange for toll revenue. Virginia continues to use these public-private partnerships (P3s), particularly in more densely populated parts of the state. P3s take many forms and can also be used without tolling.

Toll revenue and other transportation revenues can be used to issue debt to *finance* transportation projects. Borrowing to pay for transportation improvements, such as major road expansions or bridge construction, enables the state (and other entities) to move forward with projects that would be difficult or inefficient to fund with pay-as-you go spending.

Commonwealth currently operates and maintains a small number of toll roads that generate modest revenue

There are three main types of toll roads, each of which can be owned, operated, and maintained by a private company or a public entity. Traditional toll roads charge a flat fee for driving a given length of roadway. Other toll roads charge a higher fee at peak periods. Finally, some tolls on specific lanes can vary based on traffic conditions, and in the case of high-occupancy toll lanes, how many passengers are in each vehicle. Typically, toll revenues contribute to the maintenance and operation of the toll road and help pay for any debt service. Excess revenues in some arrangements must be used for a particular purpose such as multimodal improvements, while most additional revenue is deposited into the Toll Facilities Revolving Account (TFRA) – which can ultimately be used for a variety of purposes.

VDOT owns and operates four toll facilities that generate modest revenue. In total, the four toll roads that VDOT currently operates are expected to generate $34 million in FY22, or less than 1 percent of state transportation revenues (Table D-1). Revenues collected from tolls in part support the operations and maintenance of each facility. In some cases, tolls support other initiatives. For example, a portion of I-66 Inside the Beltway toll revenues are remitted back to the Northern Virginia Transportation Commission to use on multimodal projects, as part of the "Commuter Choice" program (though toll revenues have not met initial expectations because of COVID-19 impacts).

TABLE D-1
Four state-owned and -operated toll facilities generate modest revenue (FY22, projected)

Facility	Location	Toll revenue ($M)	Use of revenues
Powhite Parkway Extension	Chesterfield County	$11	Maintenance, operations, payment to Chesterfield, TFRA
Coleman Bridge	Gloucester County	6	Maintenance, operations, debt service, TFRA
I-66 Inside the Beltway	Arlington and Fairfax counties	15	Maintenance and operations, multi-modal improvements, TFRA
I-64 Express lanes	Norfolk [a]	2 [a]	Operations, TFRA

SOURCE: Commonwealth Transportation Fund and VDOT FY22 budgets.
NOTE: [a] The Hampton Roads Express Lane Network (HRELN) is currently being significantly expanded. TFRA stands for Toll Facilities Revolving Account. Excess revenues available in TFRA after debt service, maintenance, operations, and administrative expenses are paid can be used for various other purposes per Code of Virginia § 33.2-1529.

Several other toll roads and bridges in Virginia are maintained and operated by other public and private entities, rather than the Commonwealth. For example, the Dulles Toll Road was built by VDOT but is now operated by the Metro Washington Airports Authority, while the Dulles Greenway is privately owned and operated. The downtown expressway and related tolled facilities in Richmond are operated by the Richmond Metropolitan Transportation Authority, while the Pocahontas Parkway is privately operated. Similar arrangements apply to the Chesapeake Bay Bridge Tunnel, Chesapeake Expressway, Dominion Boulevard, and Norfolk Bridge in Hampton Roads.

Other recently-established or planned toll roads delivered and/or operated through public-private partnerships, such as new express lanes in Northern Virginia, are discussed below.

Virginia continues to use public-private partnerships for a variety of transportation improvements and operations, often supported by toll revenue

Public-private partnerships (P3s) are contractual agreements between private companies and governments (who typically own transportation assets). Two common transportation P3s are (1) design, build, finance, operate, and maintain (DBFOM) agreements where a private company takes on the bulk of a *new* project and maintains and operates the asset once it is complete in exchange for tolls, user fees, or payments from the government, and (2) long-term lease agreements in which a private company operates and maintains an *existing* facility in exchange for user fee or toll revenue. In both models, some toll revenue may be remitted back to the government. DBFOM projects typically involve debt issuance to finance construction. There are also simpler P3s, such as design-build (DB) contracts, where a government pays a contractor to design and build an infrastructure improvement but then the government owns, maintains, and operates the asset.

P3s have benefits and drawbacks. While P3s can enable governments to improve efficiency and transfer risk, they can also have challenges. P3s can lock governments into contracts that limit the government's options over time. Poorly structured contracts may fail to adequately transfer risk, and in some cases these agreements can impose burdensome tolls or user fees. States can mitigate these concerns by developing strong, clear contracts and practicing good contract management.

VDOT's Office of Public-Private Partnerships implements Virginia's P3 program under Virginia's P3 law and is generally well-regarded. VDOT P3 staff focus on arranging projects delivered under Virginia's P3 law. Multiple experts interviewed by JLARC indicated Virginia's P3 program is a leader among states. Virginia's program is governed by the 1995 Public-Private Transportation Act (PPTA, Code of Virginia § 33.2-1800), which authorizes P3s subject to approval by a public entity and implementation requirements and stipulates the powers and duties of the private entity. The PPTA also requires P3 arrangements to be in the public interest.

P3s in Virginia have varied stated goals, though recent P3s aim to address highway congestion and provide travel options in densely populated areas (Table D-2). The toll road network in Northern Virginia, largely developed through P3s, continues to expand with the goals of reducing congestion, improving safety, providing alternative travel options, and increasing travel reliability. Recent projects in the region have involved adding or modifying highway lanes in combination with developing transit and other options. The primary goals of the Hampton Roads Bridge-Tunnel expansion (HRBT), a design-build contract, is to reduce congestion and increase travel reliability. Other projects, such as the Coalfields Expressway in Southwest Virginia, aim to generate economic development, improve access, and reduce travel time.

P3 agreements in Virginia have different designs, funding sources, and financing arrangements. Express lane networks in Northern Virginia have typically been funded through tolling agreements, where a private company expands transportation infrastructure in exchange for future toll revenues it receives from operating the road. The HRBT expansion will be funded through regional and state transportation revenues, as well as tolls from the Hampton Roads express lane network. These significant P3 projects often involve issuing debt, typically in the form of commercial toll-backed revenue bonds or federal infrastructure loans designed for such projects.

TABLE D-2
Recent PPTA projects are mostly tolled highway projects in densely populated areas

Project	Description	Funding source	Status (completion date)
Route 28	Route 28 widening and other improvements in phases from 1988 through 2020 through design-build contracts in Fairfax and Loudoun counties.	State revenues Local tax district Regional revenues	Completed (2020) [a]
Route 58	Design-build contracts to widen Route 58 in Southern Virginia.	State revenues	Under construction (2026) [b]
I-495 Express lanes	New high-occupancy toll (HOT) lanes and existing infrastructure replacement in Fairfax County.	Tolls State revenues	Completed (2012)
I-95 Express lanes	New tolled lanes and conversion of lanes to tolled lanes from Stafford to Fairfax Counties. A portion of toll revenues are used for multimodal improvement projects.	Tolls	Completed (2014)
Elizabeth River Tunnels	Construction of new tolled tunnels in Hampton Roads.	Tolls State revenues	Completed (2016)
I-395 Express lanes	HOV lanes converted to toll lanes and new lanes added in Arlington and Fairfax counties. Revenues flow to a private operator, and a portion of toll revenue will be used for transit projects.	Tolls	Completed (2020)
Transform I-66: Outside the Beltway	Addition of tolled express lanes in Fairfax and Prince William counties and park and ride, trails, and expanded transit options on I-66.	Tolls	Under construction (2022)
I-95 Express lanes extension (FRED EX)	Addition of tolled express lanes in Stafford County.	Tolls	Under construction (2022)
Route 12/Route 460 (Coalfields Expressway)	Ongoing highway construction in Southwest Virginia to link major highways. Partnership with coal firm for earth removal for construction.	Federal revenues Private effort	Under construction (2025 for Corridor Q)
Hampton Roads Bridge Tunnel expansion	Design-build contract to expand Hampton Roads Bridge-Tunnel between Hampton and Norfolk cities.	Regional revenues State revenues Tolls	Under construction (2025)
I-495 Express lanes Extension (495 NEXT)	Extension of express lanes north from Tysons Corner to the Potomac River.	Tolls	Under construction (2026)

SOURCE: VDOT P3 office; program data posted in VDOT websites; VDOT presentations; FHWA Center for Innovative Finance; Route 28 Tax District Advisory Board meeting; interviews with VDOT staff.
NOTE: [a] Most recent Route 28 PPTA widening project completed in June 2020. [b] There have been several phases of Route 58 projects; The Lover's Leap portion in Patrick County is expected to be completed in 2026. The table above is not a comprehensive list of all of Virginia's PPTA projects.

Significant debt is issued to finance transportation projects, though much of it does not currently affect Commonwealth's borrowing limits

Virginia issues significant debt to finance the construction of transportation infrastructure. From FY11–FY20, transportation debt backed by state revenues represented 24 percent of state tax-supported debt used by the Commonwealth. State transportation debt is paid off with various revenue sources, including state transportation revenues, tolls, regional transportation revenues, and federal transportation funding.

The two major debt programs backed by *state* taxes are the Capital Projects Revenue (CPR) bonds and Route 58 bonds (Table D-3). CPR debt is serviced from state revenues in the Priority Transportation Fund (PTF). Funds in the PTF can be used for several purposes according to state law, but are currently being used to finance rail projects in the Transforming Rail in Virginia Initiative (formerly known as the Atlantic Gateway and Rail Initiative). CPR bond proceeds have previously been allocated to various construction projects, transit capital projects, and to match federal funds (such as for WMATA and the Dulles rail project). Route 58 bonds are issued to finance projects on that corridor and are currently being used for improvements on the Lover's Leap portion of the highway in Patrick County. The state also spends more limited state revenues servicing Northern Virginia Transportation District (NVTD), Route 28, and Oak Grove debt.

TABLE D-3
Two major bond programs currently account for most of Virginia's state tax-supported debt

Bond category	FY22 debt service ($M)	Debt outstanding [a] ($M)	Authorized, unissued[b] ($M)	Revenue source
Capital Projects Revenue (CPR)	$193	$2,200	$243	State revenues
Route 58	30	58	596	State revenues
Route 28	9	69	-	Local tax district State revenues
NVTD [c]	13	72	25	State revenues Local revenues
Oak Grove	2	2	-	State revenues

SOURCE: Information provided by VDOT; 2020 DCAC report; CTB bonding resolutions; Code of Virginia; presentations to the CTB.
NOTE: [a] Debt outstanding as of January 2020. [b] Authorized, but unissued debt as of June 2020. [c]The NVTD Fund established in Code of Virginia §33.2-2400 receives $40 million in state revenues from the Commonwealth Transportation Fund for WMATA and Northern Virginia Transportation Authority and additional local revenues.

In addition to debt issued through the CPR and Route 58 programs, the Commonwealth also has the authority to issue significant debt for I-81 and I-66 improvement programs. The state plans to issue nearly $1 billion in debt for I-81 programs, both in the form of federal loans and revenue bonds. I-81 debt is backed by a fuels tax in jurisdictions along the corridor. The General Assembly also authorized the Commonwealth to issue $1 billion in toll-backed debt as part of the I-66 Inside the Beltway program, which will be used mostly for the Transforming Rail in Virginia initiative (discussed in Appendix I). Agency staff are monitoring I-66 toll revenue collections, which will determine the state's approach to debt issuance moving forward.

Virginia also uses shorter-term Grant Anticipation Revenue Vehicles (GARVEE) bonds to advance expected federal construction funding. GARVEE bonds are backed by expected federal grants and account for $76 million in available funds in FY22. GARVEE proceeds finance construction projects, and bond proceeds are committed to Virginia's Smart Scale programs in FY22. There are caps on how much the state borrows through GARVEE bonds to reduce risk.

Transportation revenues and debt can affect the state's ability to borrow for non-transportation purposes, though transportation debt's impact on the debt capacity model is being reviewed. The Debt Capacity Advisory Commission sets a target that debt service should not represent more than 5 percent of blended revenues, including a portion of transportation revenues and debt. This means transportation revenues and debt service implicitly affect how much the state can borrow in other areas of government while continuing to meet debt targets. For example, increases in the state fuels tax rate would increase the state's borrowing capacity, while issuing bonds to build new roads based on that revenue would decrease the state's borrowing capacity. The 2021 Appropriation Act directed the secretary of finance and a workgroup to examine whether transportation revenue and debt should be treated differently than other debt the Commonwealth issues.

However, not all debt and revenue for transportation projects currently affects how much Virginia can borrow in other areas of government. State transportation revenues and debt tied to the Transportation Trust Fund (TTF)—including Route 28, Route 58, Northern Virginia Transportation District Program, Oak Grove Connector, and Capital Projects Revenue (CPR) bonds—*do* impact the state's debt capacity. Conversely, revenues supporting highway maintenance and operations, federal revenues, federal GARVEE debt, and regional revenues and debt *do not* impact the state's debt capacity. Specifically, debt backed by the Hampton Roads Transportation Commission, Northern Virginia Transportation Authority, Central Virginia Transportation Authority, and I-81 revenues *do not* impact how much the state can borrow while meeting debt targets.

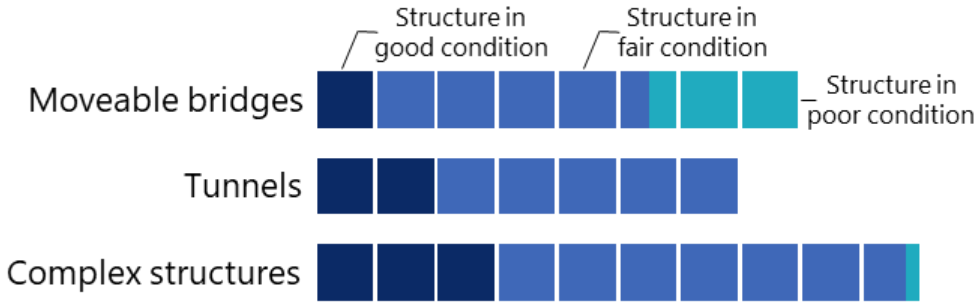
Appendix E: Special structures condition and funding

In addition to roads and bridges, the Virginia Department of Transportation (VDOT) maintains 22 of the state's 25 special structures. These include five tunnels, eight moveable bridges, and nine complex structures. The other three special structures—the Pocahontas Parkway and the Midtown and Downtown Elizabeth River tunnels—are maintained by private entities through public-private partnerships. Special structures are large, complex assets with unique maintenance needs that require significant investment.

Special structures are generally in fair condition

Most of the state's special structures are in fair condition. VDOT recently developed a performance metric to assess the condition of major components of moveable bridges and tunnels as well as the health of these structures overall. Based on this metric, in September 2021, VDOT determined that 12 of 15 moveable bridges and tunnels are in fair condition. One moveable bridge (Chincoteague Bridge) is in good condition and two moveable bridges (Benjamin Harrison and Gwynn's Island bridges) and one span of the Berkley Bridge are in poor condition. VDOT has not yet adapted new performance metrics for the third category of special structures, which it calls complex structures. However, in 2018, VDOT determined that most complex structures were in fair condition. Three complex structures were rated in good condition, and part of the Hampton Roads Bridge-Tunnel (one of four approach bridges) was in poor condition. Figure E-1 summarizes condition ratings across each of the three types of special structures.

FIGURE E-1
Most special structures in fair condition



SOURCE: Data for moveable bridge and most tunnel condition based on overall health index from VDOT presentation to CTB on September 14, 2021. Data for complex structure condition and condition of Midtown and Downtown Elizabeth River Tunnels from VDOT VITAL Infrastructure Report, 2018.
NOTE: Each square represents one special structure. The Hampton Roads Bridge-Tunnel (HRBT) and Monitor Merrimac Memorial Bridge-Tunnel's approaches, and Berkley Bridge spans are each considered "one" special structure. In the case of the HRBT approaches, one approach is in poor condition and the other three are in fair condition. In the case of the Berkley Bridge, one span is in poor condition and one is in fair condition.

State has increased special structures funding to address maintenance needs

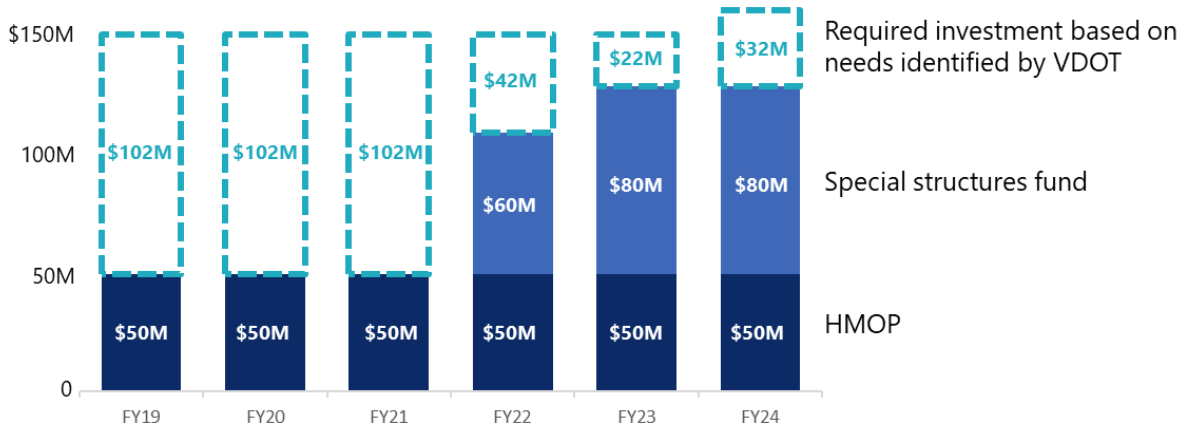
VDOT allocates funding across special structures based on the highest priority needs. In 2019, VDOT developed a long-range plan that identified and prioritized the maintenance, operations, component replacement, and structure replacement needs expected across all 25 structures over the next 50 years. Funding is allocated to projects in order of this prioritization so that the most critical projects are addressed first.

Special structure condition declined in recent years because of insufficient funding. In the past, VDOT's primary funding source for special structures was the Highway Maintenance and Operations Program (HMOP). VDOT spent on average $50 million a year of HMOP funding to support special structure operations and routine maintenance. This funding was insufficient to meet all special structures needs, which led to deferred work, a backlog of maintenance projects, and deterioration of these assets.

The state has recently increased funding to better maintain its special structures. As part of a comprehensive review of the program in 2019, VDOT identified that special structures will require significant investment over the next 50 years to keep these assets in sufficient and operable condition. As such, VDOT committed to continue to allocate, on average, $50 million of the HMOP annually to special structures operations. To further address funding needs, the 2020 General Assembly established dedicated funding for special structures. Per the Code of Virginia, the fund will receive $80 million annually, adjusted upwards at the rate of inflation. Initial funding is being phased in gradually due to the COVID-19 pandemic. VDOT's budget showed $0 for the fund in FY21 and $60 million in FY22. VDOT expects funding to increase to the Code-directed $80 million in FY23. This new funding will more than double the state's investment in special structures going forward.

Despite the increased funding for special structures, a small funding gap remains between the needs identified in the special structure 50-year long-term plan and current allocations. Based on projections from VDOT's comprehensive review, on average, an additional $32 million will be needed annually starting in FY24 to meet special structure needs (Figure E-2). However, VDOT staff, including district administrators responsible for maintaining special structures, indicated that, despite this gap, they believe the funding being provided will allow them to meet their updated maintenance plans for each of the special structures.

FIGURE E-2
State investment in special structures increased, but small funding gap remains



SOURCE: JLARC analysis of VDOT Annual Budgets and VDOT Comprehensive Review of Maintenance and Operations (2019), and JLARC summary analysis.
NOTE: "HMOP" funding represents average annual allocation from Highway Maintenance and Operations Program to special structure operations and routine maintenance. "Required investment" represents average required investment over next 50 years. "Required investment" increases by $10 million in FY24 and years thereafter due to completion of Hampton Roads Bridge-Tunnel addition and its maintenance and operational needs.

Current investment will allow VDOT to improve structures

VDOT staff are optimistic about special structures funding, and believe that new funding will allow the agency to meet the state's needs and improve the condition of these structures. VDOT district administrators reported in interviews that work scheduled in the 50-year long-term plan has already begun and progress is being made toward addressing outstanding maintenance needs. Further, VDOT expects that current funding will allow the agency to improve the condition of many special structures over the next decade. For example, VDOT projects that all of the state's moveable bridges and tunnels will be in good or fair condition in 10 years (Figure E-3)

FIGURE E-3
VDOT projects all moveable bridges and tunnels will be in good or fair condition in 10 years

SOURCE: Based on projected overall health index from VDOT presentation to CTB on September 14, 2021.
NOTE: Each square represents one special structure. The Berkley Bridge spans are considered "one" special structure, and both are expected to be in good condition in 10 years. Does not include expected condition of Midtown and Downtown Elizabeth River Tunnels.

The only concern among VDOT staff regarding special structures and program funding—as with VDOT's maintenance and operations program generally—is unexpected needs resulting from new assets being added to the state-maintained system. If new structures that VDOT is responsible for operating and maintaining are added into the state's road system, the needs of the special structures program would increase. VDOT's long-term plan only includes the expected needs of the structures the agency is currently responsible for and does not account for new additions to the system (other than the addition of the new Hampton Roads Bridge-Tunnel, which is currently under construction). However, VDOT staff noted that they will continue to monitor the financial sustainability of the special structures program to address this issue proactively, if needed.

If, despite new funding, funding proves to be a challenge to meeting special structure needs as it has been in the past, the Commonwealth Transportation Board (CTB) has the means to address the funding gap. The Code of Virginia expressly permits the CTB to direct additional highway maintenance funding to special structures if it determines more funding is needed. Such a change would need to be considered carefully, however, because it would decrease the funds available for other purposes, such as pavement and bridge maintenance or improvements.

Appendix F: Freight planning and freight rail grant programs

Freight needs are important in Virginia because of the large volumes of commercial traffic that flow through the Port of Virginia, along major interstate and highway corridors, and across privately owned rail networks.

Virginia plans for freight needs in several ways. The state performs freight-specific planning, as required under federal law. As part of those requirements, the state has recently established freight advisory committees and is updating a strategic-level freight plan. In addition to freight-specific planning, the state accounts for freight needs in its general transportation planning activities. When identifying and studying transportation needs, state planners looks at potential problems affecting all traffic along the system, which includes freight needs and passenger traffic needs. While some freight stakeholders were satisfied with the state's approach, others thought freight needs could be better accounted for.

In addition to its general transportation funding programs, which can benefit freight interests alongside passengers, the state has three grant programs for improving privately owned freight rail networks. One of these grant programs is in the process of being established to replace a program that ended in 2020.

State is taking steps to better identify and address freight needs in its transportation planning process

Virginia is taking several steps to better understand freight-related transportation needs and to incorporate them into transportation planning and, ultimately, improvement projects.

State recently established two freight advisory committees

In 2020, the secretary of transportation established two committees to engage representatives of freight interests. The Freight Advisory Committee was created to provide policy advice on freight issues to the secretary of transportation and the Commonwealth Transportation Board. The committee's goals are to (1) identify opportunities for improving freight and logistics infrastructure, (2) review and recommend legislative, regulatory, and other policy matters related to freight movement across modes, (3) provide advice on the effects of emerging technologies as they relate to freight transportation, and (4) provide advice for improving freight mobility across the state. Committee members include representatives of cargo owners, trade associations, warehouse and distribution companies, trucking companies, rail interests (Class 1 and shortline), and industrial economic development interests.

The secretary has formed a second Freight Technical Committee to support the Freight Advisory Committee. One of the technical committee's main responsibilities is to work with staff from the Office of Intermodal Planning and Investment (OIPI) on the development of the Virginia's federally required state freight plan. The technical committee membership includes representatives from several state agencies, including the Virginia Department of Transportation (VDOT), Department of Rail and Public Transportation (DRPT), Department of Motor Vehicles, and the Port of Virginia, to name a few.

State is developing new freight plan that uses data to help understand freight movement and identify strategic actions

Federal law requires all states to develop state freight plans. Although it is not a new requirement to have a freight plan, in 2020 the state began an effort to make the plan more data driven and improve engagement with stakeholders.

OIPI is developing the state's new freight plan as part of its overall VTrans transportation planning efforts. In developing the plan, OIPI has analyzed several data sets to better understand and quantify how freight moves through the state and to identify freight-specific needs. OIPI has examined data on (1) the flow of commodity goods across the state's road network and through the Port of Virginia, (2) location and concentration of storage and distribution facilities across the state, including concentration by region and by transportation corridor, (3) truck safety along Virginia roads (frequency and severity of accidents involving trucks), and (4) truck traffic congestion and reliability issues on Virginia roads (i.e., freight bottlenecks). OIPI staff said the goal is to use these analyses to develop strategic actions for addressing freight needs, as part of the larger VTrans effort to identify strategies needed to adapt to both near- and long-term challenges. OIPI staff indicated they are engaging stakeholders, through the Freight Advisory Committee and Freight Technical Committee, to help develop proposed strategic actions.

Freight needs are accounted for along with other transportation needs in (a) state needs assessments and (b) studies of major interstates and other corridors

The main way that the state identifies transportation needs of statewide and regional significance is through the VTrans planning process. The VTrans process uses data, such as traffic safety and congestion data, and engagement of regional and local stakeholders to identify potential problems along the transportation system. When assessing needs, VTrans does not distinguish between commercial freight traffic and other traffic. Instead it looks at potential problems affecting *all* traffic along the system. While the process does not specifically separate out freight needs, this approach should effectively capture freight needs along corridors and within regions with heavy freight traffic.

VTrans look at needs in all of the state's main freight corridors and regions. For example, Virginia's freight plan identified I-95, I-81, I-77, I-64, and US-58 as the main freight corridors, based on the volume of freight traffic carried. The freight plan identified the Northern Virginia, Hampton Roads, Richmond, and Roanoke regions as having the highest concentration of freight-handling facilities. VTrans assesses transportation needs that can affect freight traffic in all of these corridors and regions, such as safety problems, congestion issues, and economic development needs. Additionally, starting with the most recent needs assessment, VTrans assesses transportation needs related to industrial and economic development areas, which can serve as potential future freight hubs for manufacturing facilities and distribution centers. (For additional details on the VTrans needs identification process, see Chapter 4.)

Once transportation needs are identified, they should be studied to identify cost-effective solutions, such as construction projects or operational improvements. The state has performed, or is in the process of performing, studies of all the major interstate corridors and segments of other major highways. These studies look at how to mitigate safety, congestion, and other problems that affect

freight and other traffic along the corridor or road segment under review. For example, the I-81 corridor study identified several projects intended to account for truck needs and improve overall safety and travel times. These include projects such as extending merge lanes to allow trucks and other slower-moving vehicles more space to safely join traffic, truck climbing lanes on steep inclines, and lane widening along the more heavily trafficked segments of the interstate.

Freight needs are of special interest to the Hampton Roads region because it is home to the Port of Virginia's marine terminals as well as several privately owned bulk cargo terminals. These facilities generate a substantial amount of truck and freight rail traffic through the region. Staff with the Hampton Roads Transportation Planning Organization (HRTPO), which serves as the region's Metropolitan Planning Organization, indicated that their planning efforts account for freight needs in two main ways. First, HRTPO has had a regional Freight Transportation Advisory Committee since 2009. This committee includes representatives from maritime shipping interests, railroads, and cargo owners. The committee is intended to provide guidance on freight needs to inform regional transportation planning. Second, HRTPO's planning explicitly incorporates freight needs as one of the factors used to identify the 282 candidate projects for its 2045 long-range transportation plan. Freight-specific projects in the plan include separation of at-grade rail crossings (which reduces risk of crashes that can harm drivers and slow freight rail while also reducing road congestion), better road access to a future Port of Virginia terminal, and regional corridor improvements that facilitate both freight and passenger movements.

Virginia has few major freight bottlenecks, and freight stakeholders indicated the state is moving in the right direction for addressing freight needs

National reviews of freight bottlenecks—areas with severe congestion and reliability problems that effect freight movement— have found that few major bottlenecks exist in Virginia. The Federal Highway Administration's 2019 list of Major Freight Highway Bottlenecks and Congested Corridors lists four Virginia locations in its top 100. Three of these are in Northern Virginia, along I-95, I-395, and I-495. The fourth is the segment of I-95 between Fredericksburg and Northern Virginia. (A segment of I-64, in Virginia Beach, had been on the list in 2018 but was removed in 2019.) The American Transportation Research Institute's list of Top 100 Truck Bottlenecks, which used a different methodology, included only one Virginia location, at the interchange of I-66 and I-395 in Northern Virginia.

Representatives of Virginia's port, trucking, and maritime industries generally indicated the state has taken appropriate steps to better identify and address freight needs. These freight stakeholders were supportive of the formation of the Freight Advisory Committee as a way to permanently engage freight interests in state transportation policy-making and planning. Stakeholders also complimented OIPI's shift to a more data-driven state freight plan and needs identification process.

Stakeholders had different opinions about how effective state funding programs are at addressing freight needs. One stakeholder indicated that state funding programs generally account for freight needs. For example, the stakeholder said that Smart Scale criteria adequately account for freight interests, and the I-81 corridor plan did a good job of identifying projects that benefit freight movement. Two other stakeholders thought freight needs could be more explicitly addressed in Smart Scale, with one noting that studies of needs along interstates and other major corridors have sometimes failed to

consider freight. These stakeholders also indicated that the state has not provided sufficient funding for major improvement projects along the state's main freight corridors but acknowledged that the 2020 changes to transportation taxes could make more funds available for future improvements. Despite raising several concerns, one stakeholder noted: "The early feedback [from freight stakeholders] is Virginia does a good job in considering freight needs, but we can always do better."

State grant programs provide funds for freight rail improvements

DRPT manages several state grant programs for private freight rail carriers. The goal of these programs is to support freight rail improvements that have economic or other benefits to the state. The programs are the Rail Industrial Access (RIA) program, the Rail Preservation Fund (RPF), and the new FREIGHT program ("Freight Rail Enhancement to Increase Goods and Highway Throughput" program). The programs are expected to issue a combined amount of up to $20 million in grants per year, once the FREIGHT program is established.

Rail Industrial Access program

The RIA program provides grants for extending rail service to manufacturing, industrial, and other facilities. The program transfers some of the truck traffic generated by a facility to privately maintained rail networks. Eligible applicants include the facility owner/operator, another private interest, or the local government where the facility is located. The program issues grants of up to $450,000. Grants require a 30 percent match from the applicant. The program shares $5.5 million in annual funding with a similar VDOT facility access program. JLARC's 2021 report, *Trade and Transportation Incentives*, includes more information about the RIA program and its economic impacts.

Rail Preservation Fund

The RPF program provides grants for system improvements to Virginia's nine shortline railroads. These railroads provided critical links between the two national Class I railroads (Norfolk Southern and CSX), industrial areas, and public and private port facilities. For example, one shortline serves as the main connection to the Port of Virginia's Norfolk International Terminals. Per DRPT: "The fund promotes the continuation of rail service by achieving Federal Railroad Administration Class 2 track safety standards, allowing freight service to operate at speeds up to 25 mph. It also promotes development of rail transportation support facilities, encouraging industrial growth and promoting truck diversion from Virginia's highways." No more than half of available RPF funds can be dedicated to any one project. Grants require a 30 percent match by the applicant or an equivalent "in-kind contribution." The program provides about $8 million in grants per year.

FREIGHT program

The FREIGHT program was established in September 2021 as a partial replacement for the now defunct Rail Enhancement Fund (REF). The old REF program was eliminated in 2020 when the General Assembly created the new Virginia Passenger Rail Authority and transferred responsibilities for passenger rail from DRPT to the new authority. Whereas the REF program provided grants for both passenger and freight rail improvements, the new FREIGHT program is focused solely on providing grants for freight improvements.

Per CTB-approved program guidance, FREIGHT grants can be used for a wide variety of rail improvement projects. Projects can include improvements related to tracks, equipment, rolling stock, right of ways, and facilities. Grants will be available to private railroad companies, the Port of Virginia, local governments, nonprofits, and other private businesses. DRPT staff estimate the program will have about $6 million in grant funding available per year.

Since the new FREIGHT Fund is focused solely on freight improvements, DRPT staff expects funding to be distributed more evenly between Virginia's shortline and Class I railroads. Under the REF program, the shortline railroads rarely applied for or received funding.

Appendix G: Interstate highway funding programs

Virginia's main interstate improvement programs are the I-81 corridor improvement program and new Interstate Operations Enhancement Program (IOEP). The I-81 program was created in 2019 and receives funding from IOEP as well as other regional sources (Table G-1). The IOEP was created in 2020 to manage the state's share of revenues that are obligated for I-81 and to provide additional state revenues for projects on other interstates, especially those with substantial freight traffic. Although the two programs overlap, the I-81 program is treated separately for discussion purposes in this report.

TABLE G-1
State IOEP and dedicated regional taxes fund interstate improvements (FY23, projected)

Corridor	Expected state IOEP funding	Additional dedicated funding [c]
I-81	$69M	$63M
I-95	26	-
I-64/664	19	-
Northern Virginia interstates [a]	13	-
Other interstate improvements [b]	31	-

SOURCE: 2021 presentations to the Commonwealth Transportation Board.
NOTE: [a] The NVTA receives a portion of IOEP funding for allocation to interstates in member jurisdictions. [b] The CTB has discretion to allocate remaining funding to projects on any interstate, including I-81, I-95, I-64, I-77, I-85, I-295, and I-66. [c] The table does not show all regional funds spent on interstate improvements. For example, HRTAC funds are used on I-64/664 but are not dedicated specifically to those interstates and so are not listed here.

I-81 corridor improvement program is progressing as expected and includes $2.9 billion in improvements

Projects along the I-81 corridor are funded and selected differently than other interstate projects. I-81 projects are funded by a mix of state IOEP funds and a dedicated regional fuels tax charged in localities along the I-81 corridor. In combination, the IOEP and regional fuels tax should generate more than $130 million each year for the corridor. I-81 improvement projects are selected by the Commonwealth Transportation Board (CTB) with advice and recommendations from a special advisory committee. This process makes the corridor unique relative to other interstate corridors and more similar to other regional arrangements in the state.

The state has started on $2.9 billion in I-81 improvement projects, as planned. Initial needed projects were identified in a 2018 corridor study, and several projects are already complete or under construction. The most recent I-81 progress report to the CTB indicated several operational improvements, such as traffic cameras, curve improvements, and highway safety patrol programs have been completed along with capital projects like acceleration/deceleration lane extensions. Most planned projects, including lane widenings, are expected to be completed by 2033. Additionally, $100 million in I-81 funds are being used to extend Amtrak passenger rail service in Southwest Virginia, and some I-81 funds will be used to operate intercity bus service in the western part of the state.

Progress on the I-81 improvement program does not appear to have been negatively affected by the COVID-19 pandemic. Program financing has continued as planned, backed by regional fuel tax revenue that has exceeded initial expectations. While most corridor financing is expected to come from $870 million in federal transportation loans, the state has also issued $103 million in revenue bonds (which have initially received strong debt ratings). As with other regional transportation arrangements, this debt should not affect the Commonwealth's borrowing capacity.

IOEP program will fund improvements on I-95, I-64, and other interstates

The IOEP allocates state improvement funds to interstates based on freight traffic volume. A substantial amount (44 percent) of IOEP funding is for projects in the I-81 corridor improvement program. The next largest share of IOEP funds goes to I-95, I-64/664, and Northern Virginia interstates (37 percent), and the remainder goes to any interstate at the discretion of the CTB (20 percent).

For interstates other than I-81, funding is directed based on studies of each interstate corridor, staff recommendations based on CTB policy, and CTB discretion. The current program prioritizes areas on interstate corridors that lead to delays, crashes, and closures. By statute, funds must first go toward operational improvements (e.g., signs and emergency towing) and transportation demand management projects (e.g., transit and park and ride) before significant capital improvements (e.g., adding new lanes). The CTB has already dedicated some funds for I-64 and I-95 based on corridor studies and will direct the remaining funding based on new policies and staff recommendations moving forward.

IOEP will receive increased funding moving forward. One-fifth of state construction funds will go to the IOEP by FY24, which will significantly increase the amounts available for interstate improvements. This increase should help address local concerns about interstate improvements, which localities view as the state's responsibility.

Appendix H: Highway safety funding program

Virginia's Highway Safety Improvement Program (VHSIP) pools state and federal revenues for road safety improvement projects. There are two parts to the program: (1) infrastructure safety improvements managed by the Virginia Department of Transportation (VDOT) and (2) behavioral strategies that reduce crashes managed by the Department of Motor Vehicles. The program's funding total is $87.5 million per year in FY22 and FY23.

Historically, about $65 million in VHSIP funds go toward infrastructure safety improvements each year. This funding is further split across the VDOT-maintained system (about 80 percent of funding) and locally maintained systems (about 20 percent of funding).

In 2019, the Commonwealth Transportation Board (CTB) directed safety program funds to go toward systematic improvements instead of spot improvement projects, which appears to make more efficient use of limited funds. Spot improvement projects are those that address a single safety issue in a relatively confined segment or roadway, such as adding turn lanes and signalization to intersections. Systematic improvements address safety issues across a broad portion of the road network and include low-cost improvements such as adding high-visibility signage, rumble strips, and clearer markings for pedestrian crossings across a road system. VDOT's research found that these improvements could save over 60 lives and prevent more than 1,100 injuries per year, once fully deployed. VDOT's research found systematic improvements had greater net benefits than spot projects and recommended the CTB change its funding approach to highway safety to focus on systematic improvements.

VDOT began deploying systematic improvements on the VDOT-maintained system in 2020. Because most improvements are still being deployed, there is not yet sufficient data available to measure the effort's success. The majority of improvements to the VDOT system are expected to be fully deployed by FY26.

Systematic improvements on locally maintained systems have not yet started but are planned to begin in FY24. VDOT staff indicated that local improvements were delayed because safety funding for spot projects had already been allocated to localities through FY23, and they did not want to cancel these existing projects. A few localities that have regularly applied for safety program funds in the past expressed concern about a perceived loss of funding, but it appears that no funds for addressing local safety needs have been taken away.

Even though CTB now prioritizes systematic improvements, VDOT staff indicated it is still important to make spot improvements. Once systematic improvements are fully deployed, safety program funding can be directed back to spot projects. In the meantime, spot safety projects are eligible for funding from other sources, including Smart Scale and revenue sharing.

Appendix I: Passenger rail oversight and funding

Passenger rail is a key part of Virginia's surface transportation system. Passenger rail connects Virginia's largest urban areas to each other and the rest of the country. By shifting passenger traffic from Virginia's roads to rail, the state can reduce road congestion, increase safety, and improve air quality. The state has significantly increased its role in supporting and expanding passenger rail in the last few years.

State created new passenger rail authority and increased funding to expand and improve passenger rail services

The state has made significant changes to passenger rail oversight and funding in the last two years. On the oversight side, the General Assembly created the Virginia Passenger Rail Authority (VPRA) in 2020. VPRA took over many of the responsibilities previously held by the Department of Rail and Public Transportation (DRPT). VPRA was given the responsibility to contract for passenger train services in the state, including administering state funding for state-sponsored Amtrak services. VPRA was also given the authority to purchase, own, and make improvements to rail infrastructure.

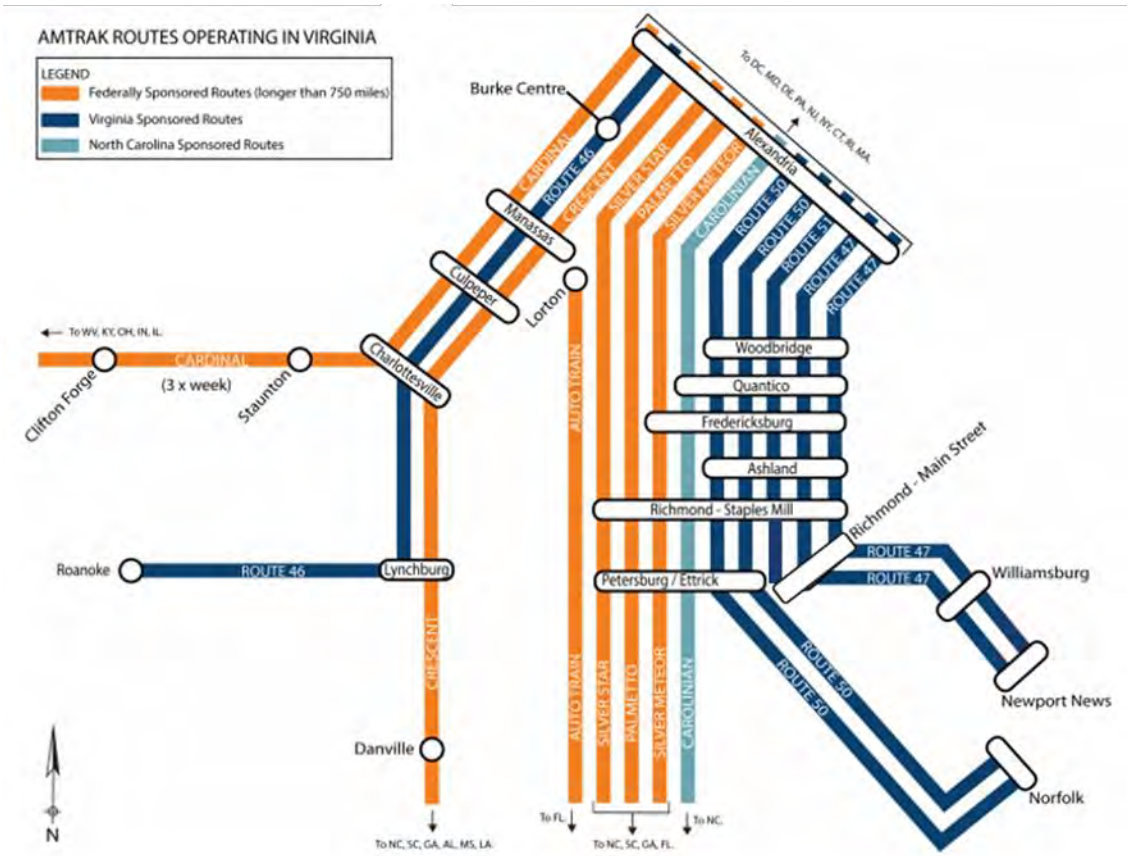
VPRA's board was appointed in 2020 and began regular meetings in October of that year. The board appointed an executive director in April 2021, and all but one senior management positions have since been filled, along with several critical project management positions. VPRA has also implemented several key policies, such as board delegation, human resources, and procurement policies. VPRA leadership indicated they are continuing to establish governing policies and hire remaining staff.

The state has also greatly increased the amount of funds dedicated to passenger rail. The 2020 omnibus transportation bill created the Commonwealth Rail Fund and dedicated 93 percent of fund revenues to passenger rail. Under the change, the portion of funds dedicated to passenger rail is expected to increase from an estimated $80 million per year before 2020 to about $150 million per year by FY25. As noted below, there are also several million in additional state funds being dedicated to passenger rail capital acquisitions and improvements. A majority of this new funding will pay for the acquisition and improvement of passenger rail infrastructure under VPRA.

Amtrak provides passenger rail service throughout Virginia with support from state

Amtrak operates passenger rail services in Virginia. Amtrak provides services to 20 cities and towns in the state, primarily along the I-95, I-64, and U.S. 29 corridors (Figure I-1). Amtrak routes serve all of the state's largest urban areas.

FIGURE I-1
Amtrak operates 13 routes in Virginia



SOURCE: VPRA.

Amtrak operates two types of services in Virginia: state-supported short-distance routes and federally supported long-distance routes. State-supported routes began in 2008, when the federal government delegated funding responsibility for Amtrak routes that are less than 750 miles in length to the states. The federal government continues to provide funding support for long-distance routes over 750 miles. Virginia has four state-supported routes, serving Hampton Roads, Richmond, and Roanoke. If the state stopped providing funding for these routes, they would cease operations.

Many Virginians use passenger rail, but the COVID-19 pandemic has significantly affected Amtrak operations and ridership. In federal FY19, Amtrak ridership in Virginia totaled approximately 1.5 million, including 925,000 passengers on state-supported routes. Ridership on state-supported routes had been growing and more than doubled in the past decade. However, due to the pandemic, Amtrak significantly reduced services throughout the state, at one point temporarily suspending all except four service routes. Ridership dropped 96 percent in April 2020 compared to pre-pandemic ridership. As of August 2021, ridership on state-supported routes is nearly the highest it has been since the pandemic began; however, ridership remains down, and is only 64 percent of what it was in August 2019.

Virginia funds Amtrak operations in state

Virginia supports its state-supported Amtrak routes by providing operational funding and leasing the capital assets used for these routes, such as engines and train cars, from Amtrak. For FY22, VPRA budgeted $45 million for Amtrak state-supported services. Approximately 90 percent ($40 million) is budgeted for operations, and the remaining 10 percent ($5 million) is reserved for capital equipment.

State funding for Amtrak has been affected by the COVID-19 pandemic. As with transit agencies, Amtrak services rely in part on fare revenues to cover a portion of operating costs on both federal- and state-supported routes. Fare revenue from state-supported routes in Virginia totaled $41 million in FY19. Due to low ridership associated with the COVID-19 pandemic, fare revenues have been down almost 50 percent, totaling just $22 million in FY20. Virginia received approximately $50 million in federal pandemic-related relief to help pay for the cost of continuing to operate state-supported routes at lower ridership levels.

Virginia has recently expanded Amtrak services and will continue to expand over next decade

Virginia has expanded Amtrak services across the state in recent years. Virginia first sponsored rail service in 2009, extending service to Lynchburg. Since then, the state has expanded service to Richmond, Norfolk, Newport News, and, most recently, Roanoke. The state also recently began sponsoring a thru-way bus connecting Bedford with the passenger rail station in Lynchburg.

The state is planning to continue expanding the number of state-supported Amtrak services over the next 10 years, as it completes various phases of the Transforming Rail in Virginia capital program (discussed below). Over the next decade, seven additional services will be added to Richmond, Newport News, Norfolk, and Roanoke. The state is also working to extend service from Roanoke to Christiansburg by 2026.

Virginia is pursuing a $4 billion capital program to acquire and improve passenger rail infrastructure

The state has put forward a multi-billion dollar plan—called the Transforming Rail in Virginia program—to acquire and make improvements to rail infrastructure along two major corridors. The overall goal of the program is to improve and expand passenger rail services. To do this, the state has entered into agreements to purchase track, right of way, and other infrastructure from CSX and Norfolk Southern. The state, along with regional and federal partners, plans to make additional capital investments to improve key segments of this infrastructure.

State pursuing infrastructure improvements along Richmond-Washington, D.C., rail corridor and acquiring infrastructure for potential future service expansions

Under the agreement with CSX, the state—along with CSX, Amtrak, and Virginia Railway Express (VRE)—has planned $3.7 billion in capital investments for passenger rail. The state is purchasing 223 miles of track and 386 miles of right of way from CSX, at an estimated cost of $$525 million. The state also plans to make $3.2 billion in capital improvements along the newly acquired infrastructure. The CSX infrastructure being acquired is located along three segments: Washington, D.C.,–Petersburg, Petersburg–Ridgeway N.C., and Doswell–Clifton Forge (Figure I-2).

FIGURE I-2
Transforming Rail in Virginia initiative includes improvements and right-of-way and track acquisitions

SOURCE: DRPT.

The acquisition will allow the state to establish two dedicated, VPRA-owned and managed passenger rail tracks between Washington, D.C., and Petersburg (except for the section that passes through Ashland). The main goal of this acquisition is to separate passenger and freight rail traffic, allowing for faster and more reliable Amtrak and VRE passenger rail services. Currently, because tracks are shared, passenger trains are regularly delayed by freight trains along this busy segment, and freight movement can be stalled during rush hour in Northern Virginia from VRE commuter rail services.

The state plans to focus all $3.2 billion in capital improvements on the Washington, D.C.,-Petersburg segment. Improvement projects include adding additional tracks in congested areas, building a bypass in Northern Virginia, making station improvements, and constructing a new $1.7 billion bridge across the Potomac River (the "Long Bridge" project). The projects will proceed in two phases, with the first phase planned to be complete in 2026 and the second phase in 2030. VPRA leadership indicated these improvements will address several chokepoints along the system and further facilitate faster, more reliable passenger rail services.

No capital improvements are planned for the two other infrastructure segments being acquired, Petersburg–Ridgeway and Doswell–Clifton Forge. The state purchased this infrastructure to preserve it for a future potential expansion of passenger rail services.

The $3.7 billion in funding for the CSX agreement is spread over 10 years and shared among the state, federal and regional partners, bond financing, and federal grant programs. The state's share of almost

$1.5 billion comes from existing transportation funding sources, with the largest contributions coming from VPRA's portion of annual Commonwealth Rail Fund revenues and a share of the Priority Transportation Fund. Federal contributions are currently around $1 billion, with Amtrak committing $944 million of that total. Bond financing is estimated at $1 billion and will be based on the state's share of ticket revenues from state-supported Amtrak services and I-66 toll revenues. VRE and the Northern Virginia Transportation Authority have also committed close to $250 million to the initiative. Funding sources and contribution amounts are not finalized, and VPRA reported they continue to pursue federal grants opportunities. The proposed infrastructure bill could provide funding for some rail projects.

State pursuing infrastructure acquisitions and improvements between Roanoke and Christiansburg

Under the agreement with Norfolk Southern, the state has planned $257 million in capital investments over five years for passenger rail for the rail segment between Roanoke and Christiansburg. The state is purchasing 28.5 miles of track and right of way from Norfolk Southern, at an estimated cost of $38.2 million. The state also plans to make $219 million in capital improvements along the newly acquired infrastructure. Planned projects include improvements to the Roanoke rail yard, addition of seven miles of new track siding, signaling and track upgrades, a new maintenance facility and passenger platform, and other improvements. The goal of these improvements is to extend fast and reliable passenger rail services from the current terminus at Roanoke to a new passenger station in Christiansburg. In 2021, the General Assembly authorized the creation of the New River Valley Passenger Rail Station Authority to assist with creating and supporting the new station.

Appendix J: Agency responses

As part of an extensive validation process, the state agencies and other entities that are subject to a JLARC assessment are given the opportunity to comment on an exposure draft of the report. JLARC staff sent an exposure draft of the full report to the secretary of labor, the Virginia Department of Transportation (VDOT), and the Virginia Department of Rail and Public Transportation (DRPT). JLARC staff also sent relevant sections of the report to the Office of Intermodal Planning and Investment, the Virginia Passenger Rail Authority, the Virginia Department of Taxation, and the Department of Motor Vehicles.

Appropriate corrections resulting from technical and substantive comments are incorporated in this version of the report. This appendix includes response letters from the secretary of labor, VDOT, and DRPT.

COMMONWEALTH of VIRGINIA

Office of the Governor

Shannon Valentine
Secretary of Transportation

October 27, 2021

Hal Greer, Director
Joint Legislative Audit and Review Commission
Suite 2101
919 East Main Street
Richmond, Virginia 23219

Dear Director Greer:

On behalf of those who serve in the agencies and offices within the Transportation Secretariat, I thank you and the Joint Legislative Audit and Review Commission (JLARC) for this study of Virginia's surface transportation system, *Transportation Infrastructure and Funding*, and for the opportunity to review and respond to this draft report. I wish to express appreciation to Justin Brown, Mark Gribbin and your team for their diligence and considerate engagement throughout this process. In many respects, this review confirmed the efficacy of many significant decisions made by the General Assembly in recent years, revealed opportunities for improvement, and affirmed a number of strategies currently underway.

In 2020, the General Assembly passed the Omnibus Transportation legislation, which restructured transportation revenues and provided a sustainable funding program to serve as a bridge over the next decade while longer-term solutions, such as a Mileage-Based User Fee (MBUF), are further studied for future consideration. The Omnibus funding was intended to be phased in and fully implemented in 2024. While year one of this phased process was interrupted by the COVID-19 pandemic and we are only a few months into year two, this report confirms a ten-year horizon (perhaps beyond) and supports the General Assembly's decision to restructure, index and diversify transportation revenue sources.

INFRASTRUCTURE CONDITIONS

Virginia has made significant progress in improving its infrastructure over the last decade. In 2019, VDOT undertook a comprehensive review of its nearly 130,000 lane miles of pavement, 22,000 structures and 25 Special Structures. Based on that comprehensive review, VDOT developed a new investment strategy to achieve long-term, sustainable performance targets. This strategy promotes a preservation-first approach to extend the life of bridges and pavements, and introduces an innovative health index to guide investment decisions for Special Structures. This health index and the agency's comprehensive approach to highway maintenance, are positioning Virginia as the leader in bringing stability and consistency to life cycle asset management.

Building on these efforts, VDOT will recommend to the Commonwealth Transportation Board (CTB) that the State of Good Repair (SGR) Prioritization Process and Funding Distribution Policy be reviewed during calendar year 2022. This review will examine a collective approach of funding

pavements and bridges through the maintenance and SGR programs. This review will evaluate Board policy, federal funding and legislative requirements to develop a single unified approach to ensure the investment strategy developed can be successfully implemented.

VDOT appreciates the analysis JLARC completed regarding the condition of locally-maintained roads and bridges. Over the past several years a number of steps have been taken to assist localities including –

- making locally-maintained primary roads eligible for state funds for reconstruction;
- establishing the SGR program with a focus on bridge repair without regard of ownership; and
- increasing funding for city and town maintenance payments through the 2020 Omnibus Transportation legislation with an initial investment of $10.7 million in FY23 and increasing with inflation thereafter.

Using the statewide, comprehensive review as a guide, VDOT will undertake a review of the local maintenance program to analyze the JLARC recommendations and evaluate potential modifications that may improve overall road and bridge conditions. Key to this evaluation will be conducting a baseline analysis of the roads and bridges maintained by localities. Given the essential role of data collection, it is anticipated this evaluation could take two years to complete and develop recommendations.

IDENTIFICATION OF TRANSPORTATION NEEDS

Your study found that the VTrans planning process effectively identifies needed improvements through a data-driven process. The study further noted that there may be gaps on certain corridors in rural areas. In 2019, the CTB expanded the needs considered in VTrans to include industrial and economic development area criteria. This need is considered without regard to roadway type or location. Safety and economic development needs have been identified along rural and regional roadways throughout the Commonwealth. For example, there are identified economic development needs on Route 19 in Tazewell County due to the Bluestone Regional Business and Technology Center, and on Route 15 due to the Wingspread Industrial Site. While congestion and accessibility have not yielded differentiated needs along regional corridors to date, the Office of Intermodal Planning and Investment (OIPI) is undertaking a review of the criteria and will engage the Board during the next VTrans update.

REVENUE SHARING PROGRAM

The CTB took a number of actions in late 2020 to balance the forecasted reduction in transportation revenues due to COVID-19 while maintaining Virginia's commitment to all fully funded projects. A number of programs were impacted including SMART SCALE's District Grant and High Priority programs, Revenue Sharing, State of Good Repair and transit programs. At the CTB September and October Board meetings, OIPI made a number of recommendations to the Board regarding the restoration of these opportunity costs with the FY21 Commonwealth Transportation Fund (CTF) surplus and potentially from funds identified by the December forecast should revenues increase. The recommendations included moving the allocation of funds to the Revenue Sharing program to years three and four of the Six-Year Improvement Program and allocating additional funds to the program in FY23 and FY24 if the December forecast increases available revenues. These recommendations align substantially with JLARC's findings regarding the Revenue Sharing program.

VIRGINIA'S TRANSIT ASSETS

During the past several years, Virginia has taken significant steps to improve the health of our transit assets. As stated in JLARC's report, 90% of facilities and fleet vehicles and 70% of non-fleet

vehicles are in a State of Good Repair. This is due in large measure to the funding commitment to the Commonwealth Mass Transit Trust Fund, up 43% since 2018. In addition, there are opportunities to fund capital projects through SMART SCALE and toll revenue programs in Northern Virginia, as well as the creation of funding streams such as the Hampton Roads Regional Transit Fund, dedicated funding for the Greater Richmond Transit Company through the Central Virginia Transportation Authority, and the Commuter Rail Operating and Capital Fund for the Virginia Railway Express. In addition, in 2018 the Commonwealth made a significant commitment to improving the safety and reliability of WMATA by committing $154.5 million per year in dedicated capital funding, which is leveraged to generate a total of $500 million annually from Virginia, Washington DC and Maryland.

While JLARC is technically correct in citing the gap between locally-documented needs and availability of capital funding, transit capital requests ebb and flow over time, with demand in the near term representing a peak in that capital cycle predominantly due to delayed applications during COVID-19. Over the past three years, DRPT has funded 80% of State of Good Repair and 62% of minor enhancement projects requested by program applicants, representing significant investment and supporting prioritized needs. Since 2018, with the implementation of the Making Efficient and Responsible Investments in Transit (MERIT) transit program reforms and the introduction of transit strategic plans, DRPT has made major strides to better define, prioritize and allocate capital funding.

According to *Virginia Code* § 33.2-1526.1 and CTB policy, DRPT is required to conduct a review of MERIT every three years, with the first review occurring in 2022. DRPT will work with the Transit Service Delivery Advisory Committee (TSDAC), composed of the transit industry and local governments across Virginia, to identify strategies to improve both the capital and operating assistance programs. As a part of this review, DRPT and TSDAC will review JLARC's recommendations and examine how MERIT can be revised to avoid harming agencies that continue to experience declines in ridership due to the pandemic and encourage investments in passenger amenities which support and encourage transit ridership.

During the 2022 General Assembly Session, DRPT will complete its work on the Transit Equity and Modernization Study, the result of House Joint Resolution 542 passed in 2021, which directed DRPT to examine transit accessibility, adequacy of infrastructure, transit electrification, emerging technologies, transit safety, system engagement and governance, and transit accessibility. With information and recommendations emerging from this study, DRPT will be in a position to better document and demonstrate how the Commonwealth's transit programs can improve accessibility and address inequities in transit service.

AS WE MOVE FORWARD, we will continue to be grateful to you and the Commission for this opportunity to take stock of where we are in an effort to improve where we are going. Your diligent review and thoughtful recommendations will remain a guidepost within the Transportation Secretariat. It is a privilege to know we are all working together to serve the citizens of our Commonwealth.

Warmest regards,

Shannon Valentine

COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION

Stephen C. Brich, P.E.
Commissioner

1401 East Broad Street
Richmond, Virginia 23219

(804) 786-2701
Fax: (804) 786-2940

October 26, 2021

Mr. Hal E. Greer, Director
Joint Legislative Audit and Review Commission
919 East Main Street, Suite 2101
Richmond, Virginia 23219

Dear Mr. Greer,

Thank you for the opportunity to review and provide comment on the draft report, ***Transportation Infrastructure and Funding.*** We have been able to review its content and recommendations that apply to the Virginia Department of Transportation (VDOT) and the functions performed by the agency. VDOT's responses to the report have been provided to the Office of the Secretary of Transportation for inclusion in a response for the Secretariat, to include all agencies.

Sincerely,

Stephen C. Brich, P.E.
Commissioner of Highways

COMMONWEALTH of VIRGINIA

Jennifer L. Mitchell
Director

Virginia Department of Rail and Public Transportation
600 E. Main Street, Suite 2102
Richmond, VA 23219

Ph: 804-786-4440
Fax: 804-225-3752
Virginia Relay Center
800-828-1120 (TDD)

October 26, 2021

Mr. Hal Greer, Director
Joint Legislative Audit and Review Commission
919 East Main Street
Suite 2101
Richmond, Virginia 23219

Dear Mr. Greer,

Thank you for sending the draft Transportation Infrastructure and Funding JLARC report. We appreciate the opportunity to review the draft report. Our comments are consolidated with a response from the Secretary of Transportation, who is responding on behalf of all the modal agencies.

If you have any questions or need additional information, please do not hesitate to contact me at 804-335-5947 or via email at j.mitchell@dprt.virginia.gov.

Sincerely,

Jennifer L. Mitchell

Jennifer L. Mitchell, Director

Cc: Mark Gribbin, Chief Legislative Analyst

JLARC.VIRGINIA.GOV
919 East Main Street Suite 2101 Richmond, VA 23219