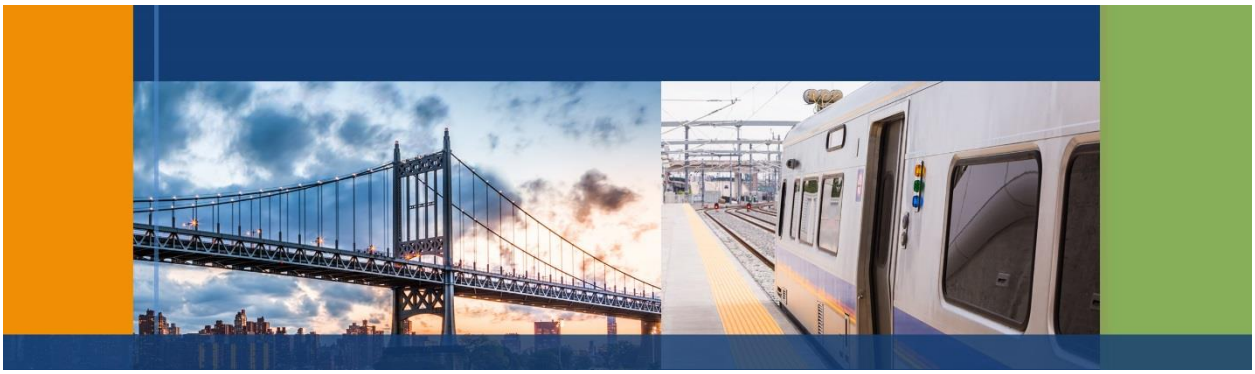


CHAPTER 2: Funding

Funding – Highways

This chapter presents data and analyses on funding trends for highways and transit across all levels of government and sources of funding. The revenue sources for investments in highways and bridges are discussed first in this section, followed by details on total highway expenditures and, more specifically, capital outlays. A separate section presents data on transit system funding, highlighting trends in revenues, capital, and operating expenditures.

The classification of the revenue and expenditure items in this section is based on definitions contained in *A Guide to Reporting Highway Statistics*, which is the instructional manual for States providing financial data for the *Highway Statistics* publication.[5]

Financing for highways comes from both the public and private sectors. Although the private sector's role in the delivery of highway infrastructure has been increasing, the public sector still provides most of the funding. The financial statistics presented in this chapter are drawn predominantly from State reports based on State and local accounting systems. Figures in these accounting systems can include some private-sector investment; in these cases, the amounts are generally classified as "Other Receipts." For additional information on public-private partnerships (P3s) in transportation, see http://www.fhwa.dot.gov/ipd/p3.

Revenues to fund construction, replacement, rehabilitation, maintenance, and other needed activities for highways and bridges are raised at all three levels of government—Federal, State, and local. Funding and expenditures across the different levels of government are closely intertwined. Most highway revenues raised at the Federal level support the Federal-aid Highway Program (FAHP), a Federally funded, State-administered program through which Federal funds are transferred primarily based on statutory formulas. Some Federal revenues are transferred to States or local governments via other means, such as discretionary grants. Direct Federal expenditures are limited to administrative and research activities plus construction and maintenance of the small share of roads and bridges owned by the Federal government. (See Chapter 1.) States also raise significant amounts of revenue for

KEY TAKEAWAYS

- Combined highway expenditures at the Federal, State, and local government levels totaled $223.2 billion in 2016.
- Revenues raised for use on highways by all levels of government totaled $272.1 billion in 2016, including a $51.9 billion one-time transfer of general funds to the Federal Highway Trust Fund (HTF).
- The amount spent on highways at all levels of government reached $223.2 billion in 2016. The largest portion, $144.6 billion (64.8 percent) was spent by States while $75.6 billion (33.9 percent) was spent by local governments.
- The $49.0 billion difference between highway revenues and highway expenditures represents the net increase during 2016 of the cash balances of the HTF plus comparable dedicated accounts at the State and local level. Without the $51.9 billion one-time transfer of general funds to the HTF, cash balances would have decreased in 2016.
- Total highway capital outlays on all systems reached $112.9 billion in 2016. Of this total, $26.4 billion (23 percent) was spent on the Interstate System, $59.2 billion (52 percent) was spent on the National Highway System (NHS), and $84.1 billion (74 percent) was spent on Federal-aid highways.
- The composition of highway capital spending shifted from 2006 to 2016. The share of highway capital spending directed toward system rehabilitation rose from 51.5 percent to 62.0 percent, the share used for system enhancement rose from 10.6 percent to 13.6 percent, and the share used for system expansion fell from 37.9 percent to 24.4 percent.
- Federal funding supported 39.7 percent of highway capital spending and 21.1 percent of total highway spending by all levels of government in 2016.
- Federally funded highway capital outlay grew by 2.6 percent per year from 2006 to 2016, compared with a 4.1-percent annual increase in capital spending funded by State and local governments.
- In recent years, some States have raised their fuel tax rates, adopted variable fuel tax rates, and increasingly explored alternative funding mechanisms.

[5] See http://www.fhwa.dot.gov/policyinformation/hss/guide/guide.pdf and http://www.fhwa.dot.gov/policyinformation/statistics.cfm. Note that both 2014 and 2016 saw transfers from the General Fund to the HTF.

use on highways, which are combined with Federal dollars to pay directly for highways and bridges, as well as to direct additional resources to local governments.

Highway Revenue and Transfer Terminology

Revenue and transfer terms used in this chapter include:

- Revenue: funds received by a government authority and intended for use on highways, including those from general fund appropriations, user charges, property taxes and assessments, investment income, and bond issue proceeds. Highway-user revenues that are used for non-highway purposes are not included.
- User Charges: taxes and fees imposed on the owners and operators of motor vehicles for their use of public highways, including motor-fuel taxes, tolls, motor-vehicle taxes, certificate-of-title fees, driver-license fees, weight-distance taxes, oversize-overweight permits, and trip permits.
- General Fund: Refers to the basic operating fund of a state, local, or the Federal government and is its chief operating fund. It records all assets and liabilities of the entity that are not assigned to a special purpose fund. Money comes into the general fund from a variety of taxes and fees levied by a governmental entity, some of which could be the same sources cited separately as other categories in the exhibits presented in this chapter. Amounts drawn from the general fund are referred to as General Fund Appropriations.
- Intergovernmental transfers: transfers of funds from one government (e.g., State, local government, or federal unit) to another. Includes Federal aid distributed from the HTF to States and local governments, State funds transferred to local governments, and local funds transferred to State governments.
- Reserves: funds that are received but not expended that same year; usually deposited into government accounts and retained there for future expenditure. This includes any funds that a State may set aside from fees or other receipts for later use and lump-sum transfers to the Highway Trust Fund intended for use over multiple years.

Exhibit 2-1 summarizes revenue and expenditure highlights for highways and bridges in 2016, the first year for which funds were authorized under the Fixing America's Surface Transportation (FAST) Act, enacted December 4, 2015. Total direct expenditures for highways and bridges in 2016 reached $223.2 billion. Total revenues for highways and bridges from all government sources totaled $272.1 billion in 2016. The $49.0 billion difference between total revenues and total expenditures represents amounts placed in reserves for use in future years; this equals the net increase during 2016 in the cash balances of the Highway Account of the HTF plus comparable dedicated accounts at the State and local level.

Total highway revenues included $117.7 billion generated from user charges, including motor fuel taxes, motor vehicle taxes and fees, and tolls. The remaining $154.5 billion was generated from a variety of other sources, or appropriated from general Federal, State, or local general revenues.

Total highway expenditures included $112.9 billion of highway capital expenditures and $95.9 billion of non-capital expenditures such as maintenance and traffic services, administration, highway and safety, and bond interest. The remaining $14.3 billion went for bond retirement.

The Federal government provided $44.2 billion to State and local governments for use on highways during 2016. Net transfers to State governments (transfers from Federal and local governments less transfers to local governments) totaled $28.7 billion, while net transfers to local governments totaled $15.5 billion.

Exhibit 2-1 ■ Summary of Government Revenue Sources and Direct Expenditures for Highways, 2016

Source	Highway Revenue, Billions of Dollars			
	Federal	State	Local	Total
User Charges[1]	$34.8	$77.5	$5.4	$117.7
Other	$54.8	$44.9	$54.8	$154.5
Total Revenues	**$89.6**	**$122.4**	**$60.1**	**$272.1**
Net Intergovernmental Transfers from (or to) Other Levels of Government	($44.2)	$28.7	$15.5	
Funds Drawn From (or Placed in) Reserves	($42.4)	($6.6)	$0.0	($49.0)
Total Transfers and Reserves Deposits/Withdrawals	**($86.6)**	**$22.1**	**$15.5**	**($49.0)**
Capital Outlay	$0.6	$84.0	$28.3	$112.9
Noncapital Expenditures	$2.3	$51.4	$42.1	$95.9
Bond Retirement	$0.0	$9.1	$5.3	$14.3
Total, All Direct Expenditures	**$3.0**	**$144.6**	**$75.6**	**$223.2**

[1] Amounts shown represent only the portion of user charges that are used to fund highway spending; a portion of the revenue generated by motor fuel taxes, motor vehicle taxes and fees, and tolls is used for mass transit and other nonhighway purposes. Gross receipts generated by user charges totaled $147.2 billion in 2016.

Sources: FHWA Bulletin: Highway Funding 2013–2016, Table HF-10B, and unpublished FHWA data.

Exhibit 2-2 summarizes expenditures by level of government for 2016. Capital outlay accounted for 50.6 percent of all expenditures, whereas noncapital expenditures accounted for 43.0 percent and bond retirement accounted 6.4 percent. States accounted for 64.8 percent of total direct expenditures in 2016, local governments accounted for 33.9 percent, and the Federal government accounted for 1.3 percent (primarily on Federally owned roads).

Exhibit 2-2 ■ Direct Expenditures for Highways by Expending Agency and Type, 2016

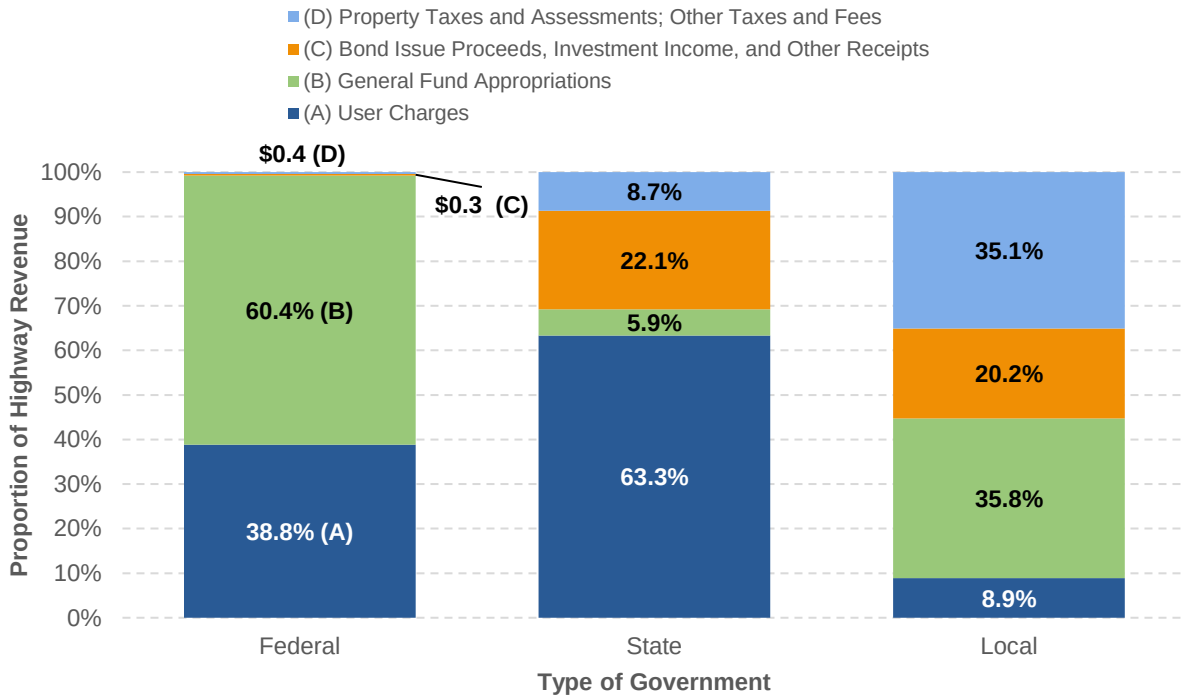
Category	Highway Expenditures (Billions of Dollars)				
	Federal	State	Local	Total	Percent
Expenditures by Type					
Capital Outlay	$0.6	$84.0	$28.3	$112.9	50.6%
Noncapital Expenditures	$2.3	$51.4	$42.1	$95.9	43.0%
Total, Current Expenditures	**$3.0**	**$135.5**	**$70.4**	**$208.8**	**93.6%**
Bond Retirement	**$0.0**	**$9.1**	**$5.3**	**$14.3**	**6.4%**
Total, All Expenditures	**$3.0**	**$144.6**	**$75.6**	**$223.2**	**100.0%**
Percent of Total	*1.3%*	*64.8%*	*33.9%*	*100.0%*	

Sources: FHWA Bulletin: Highway Funding 2013–2016, Table HF-10B, and unpublished FHWA data.

Revenue Sources for Highways

Revenues intended for highway and bridge construction, operations, and maintenance are raised at the Federal, State, and local levels of government. Revenues come from user charges (motor fuel taxes, motor vehicle taxes and fees, and tolls) and other sources, such as General Fund appropriations, other taxes, investment income, and debt financing (see *Exhibit 2-3*).

Exhibit 2-3 ■ Government Revenue Sources for Highways, 2016



Source	Highway Revenue, Billions of Dollars				
	Federal	State	Local	Total	Percent
User Charges[1]					
Motor Fuel Taxes	$29.1	$35.4	$1.0	$65.5	24.1%
Motor Vehicle Taxes and Fees	$5.7	$29.9	$2.0	$37.7	13.8%
Tolls	$0.0	$12.2	$2.3	$14.5	5.3%
Subtotal	**$34.8**	**$77.5**	**$5.4**	**$117.7**	**43.2%**
Other					
General Fund Appropriations[2]	$54.1	$7.2	$21.5	$82.8	30.4%
Property Taxes and Assessments	$0.0	$0.0	$12.7	$12.7	4.7%
Other Taxes and Fees	$0.4	$10.6	$8.4	$19.4	7.1%
Investment Income and Other Receipts[3]	$0.3	$12.2	$6.3	$18.8	6.9%
Bond Issue Proceeds	$0.0	$14.9	$5.8	$20.7	7.6%
Subtotal	**$54.8**	**$44.9**	**$54.8**	**$154.5**	**56.8%**
Total Revenues	**$89.6**	**$122.4**	**$60.1**	**$272.1**	**100.0%**

[1] Amounts shown represent only the portion of user charges that are used to fund highway spending; a portion of the revenue generated by motor fuel taxes, motor vehicle taxes and fees, and tolls is used for mass transit and other nonhighway purposes. Gross receipts generated by user charges totaled $147.2 billion in 2016.

[2] The $54.1 billion shown for Federal includes $51.9 billion transferred from the General Fund to the Highway Account of the Highway Trust Fund. The remainder supported expenditures by the FHWA and other Federal agencies that were not paid for from the Highway Trust Fund.

[3] The $0.3 billion figure shown for Federal includes $0.1 billion transferred from the balance of the Leaking Underground Storage Tank Fund to the Highway Account of the Highway Trust Fund.

Sources: FHWA Bulletin: Highway Funding 2013–2016, Table HF-10B, and unpublished FHWA data.

Highway Expenditure Terminology

Definitions for expenditure category types discussed in this chapter are:

- Capital outlay: funds used to purchase a fixed highway asset or to extend its useful life; these highway improvements can include new construction, reconstruction, resurfacing, rehabilitation, and restoration; and installation of guardrails, fencing, signs, and signals. It also includes the cost of land acquisition and other right-of-way costs and preliminary and construction engineering, in addition to construction costs.
- Maintenance: routine and regular expenditures required to keep the highway surface, shoulders, roadsides, structures, and traffic control devices in usable condition. These efforts include spot patching and crack sealing of roadways and bridge decks, and maintaining and repairing highway utilities and safety devices, such as route markers, pavement markings, signs, guardrails, fences, signals, and highway lighting.
- Highway and traffic services: activities designed to improve the operation and appearance of the roadway, including items such as the operation of traffic control systems, snow and ice removal, highway beautification, litter pickup, mowing, toll collection, and air quality monitoring.
- Current expenditures: all highway expenditures except for bond retirement (principal only).
- Noncapital expenditures: all current expenditures except for capital outlay (includes interest payments on bonds).

The $54.1 billion of Federal General Fund appropriations includes $51.9 billion transferred from the General Fund to the Highway Account of the HTF, as per the FAST Act. This one-time General Fund transfer to the HTF represents approximately 95.9 percent of total Federal General Fund appropriations for highways in 2016 and 57.9 percent of total Federal revenue for the year. Although the FAST Act authorized federal highway and public transportation programs through September 30, 2020, the entire $51.9 billion specified for the Highway Account was transferred at one time.

In addition to General Fund appropriations, bond issue proceeds ($20.7 billion) and investment income and other receipts ($18.8 billion) were among the largest sources of revenue, reflecting the use of alternative funding sources in recent years.

In addition to Federal funding from the HTF, States use a variety of revenue sources to support their transportation expenditures—including State fuel taxes, vehicle fees, sales taxes, tolls, mode-specific revenues, road pricing, cigarette taxes, and State lotteries. The investment income and other receipts category in *Exhibit 2-3* includes development fees and special district assessments and private-sector investment in highways, to the extent that such investment is captured in State and local accounting systems.

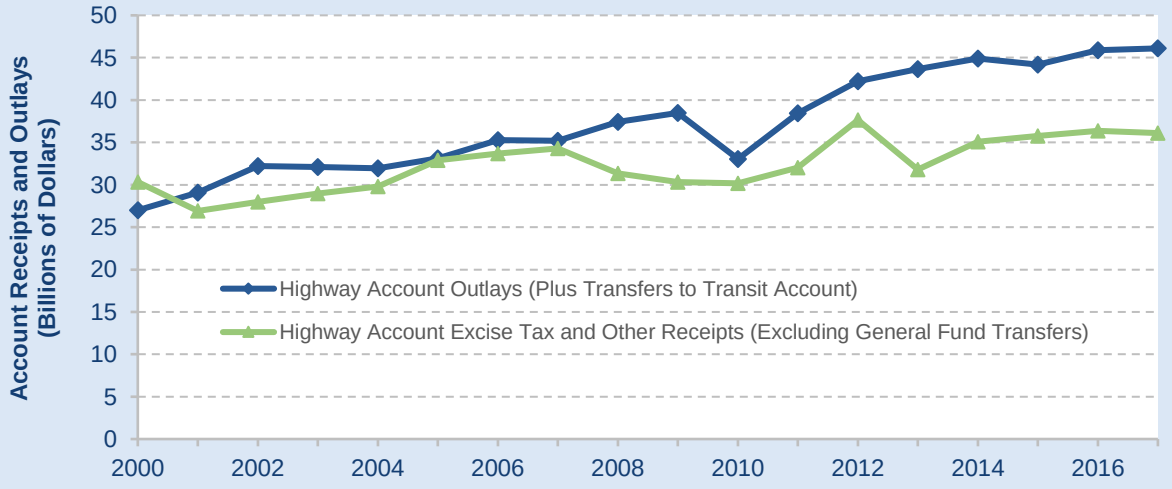
Exhibit 2-3 also shows that the types and relative proportions of revenues used to fund highways vary significantly by level of government, with States generating most of their revenue via dedicated user charges and local governments getting a large portion of their revenues from annual General Fund appropriations. Sixty-three percent of State government revenues ($77.5 billion) for highways and bridges were raised via user charges, mostly from States' motor fuel taxes ($35.4 billion) and motor vehicle taxes and fees ($29.9 billion).

HTF Highway Account Excise Tax Receipts and Expenditures

The last time that annual net highway excise tax and related receipts credited to the Highway Account of the HTF exceeded annual expenditures from the Highway Account was in 2000. As shown in *Exhibit 2-4*, for each year since 2000, total annual receipts to the Highway Account from excise taxes and other income (such as interest income and motor carrier safety fines and penalties) have been lower than the annual expenditures from the Highway Account (including amounts transferred from the Highway Account to the Transit Account). (Note that the HTF Highway Account receipts and outlays shown in *Exhibit 2-4* do not include transfers from the General Fund, such as the $51.9 billion transferred in 2016.) In the years 2005 through 2007, annual net receipts nearly reached the same amount as annual expenditures. The growth of outlays then outpaced increases in revenue, and in 2016 net receipts were equivalent to approximately three-fourths of outlays that year ($36.1 billion vs. $46.1 billion)

To help maintain a positive cash balance in the HTF, transfers from the General Fund to the HTF were legislatively mandated in Fiscal Years 2008, 2009, 2010, 2013, 2014, and 2016. In Fiscal Years 2012, 2014, and 2016, funds were also transferred from the balance of the Leaking Underground Storage Tank Fund to the HTF; the original source of these funds was revenues generated in previous years from a 0.1-cent-per-gallon portion of the Federal tax on motor fuels.

Exhibit 2-4 ■ Highway Trust Fund Highway Account Receipts and Outlays, Fiscal Years 2000–2017



Sources: Highway Statistics, various years, Tables FE-210 and FE-10.

In contrast, the largest portions of local governments' $60.1 billion in revenue came from General Fund appropriations ($21.5 billion; 35.8 percent of the total raised by local governments), followed by property taxes and assessments ($12.7 billion), and other taxes and fees ($8.4 billion). Meanwhile, in 2016 the largest portion of Federal government revenues raised was from General Fund appropriations, which accounted for nearly two-thirds of the total (60.4 percent or $54.1 billion); Federal motor fuel taxes accounted for another $29.1 billion. Of the $89.6 billion raised by the Federal Government, $42.4 billion was placed in reserves. State governments also placed some monies into reserves—$6.6 billion (see *Exhibit 2-1*).

State Fuel Taxes

In recent decades, fuel tax revenues have fallen in real terms because the Federal fuel tax and many State fuel taxes are fixed at static cents-per-gallon rates. In response, many States have structured their fuel taxes to change over time. Some of these taxes are periodically adjusted based on a measure of inflation, whereas others are calculated as a percentage of wholesale or retail fuel prices, or by some other criterion. In its 2016 report, the American Association of State Highway and Transportation Officials (AASHTO) reported that 19 States used variable-rate fuel taxes, and 10 States used a combination of fixed-rate and variable-rate fuel taxes to fund transportation. According to AASHTO's 2016 report, 42 States used passenger vehicle fees, 42 States used truck registration fees, and 18 used tolls to raise revenues for transportation investment.

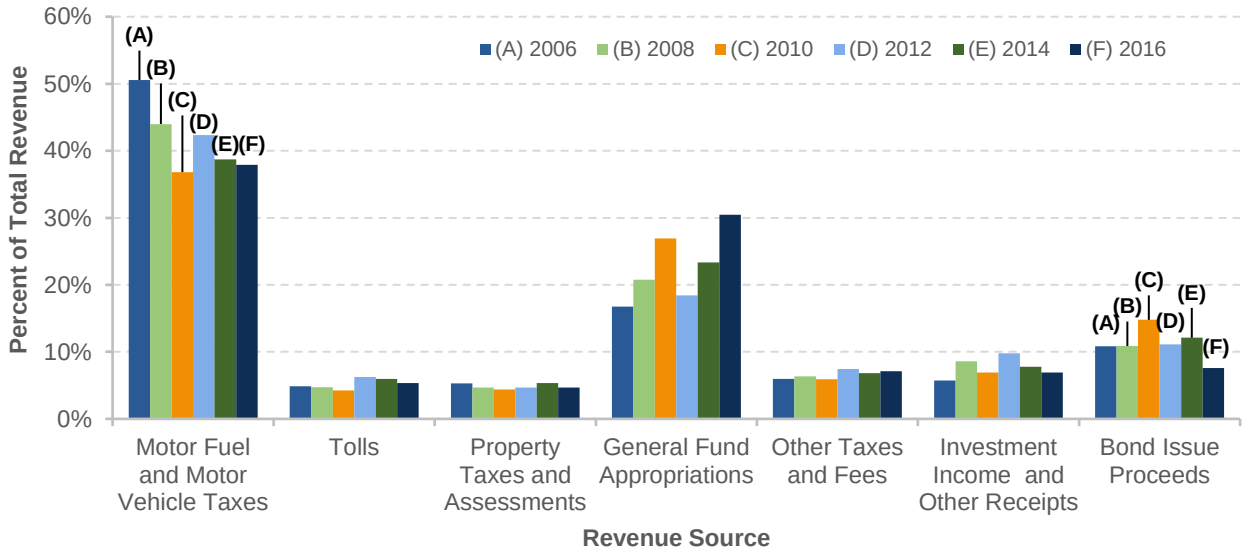
At the same time, State legislative activity with respect to transportation funding has increased. The National Conference of State Legislatures (NCSL) reports that in 2017, seven States (California, Indiana, Montana, South Carolina, Oregon, Tennessee, and West Virginia) had passed legislation to increase fuel taxes. One State (New Jersey) enacted legislation to increase State fuel taxes in 2016, eight States (Georgia, Idaho, Iowa, Michigan, Nebraska, South Dakota, Utah, and Washington) passed legislation to increase fuel taxes in 2015, and 10 more raised their gas tax or adjusted their formula between 2013 and 2015. In contrast, no State legislature approved an increase to fuel taxes in 2010, 2011, or 2012. (See http://www.ncsl.org/research/transportation/2013-and-2014-legislative-actions-likely-to-change-gas-taxes.aspx.)

Revenue Trends

From 2006 to 2016, total revenues for highways across all levels of government increased at an annual rate of 4.9 percent. *Exhibit 2-5* presents the trends in revenues used for highways by source for all levels of government over the past 10 years. The largest rate of increase during that time came from General Fund appropriations, which grew by an annual average rate of 11.3 percent, bolstered by the FAST Act's $51.9 billion one-time transfer recorded in 2016. Meanwhile, user fees overall increased by an annual rate of 2.3 percent, with tolls increasing at a higher rate than motor fuel and motor vehicle taxes (5.8 percent vs. 1.9 percent) but by a lesser dollar amount (from $14.4 billion to $14.5 billion for tolls; from $93.4 billion to $103.1 billion for motor vehicle taxes). Revenues from investment income and other receipts as well as other taxes and fees increased at a greater annual rate than the overall 4.9 percent revenue increase, by 6.9 percent and 6.8 percent, respectively. In contrast, revenues raised from property taxes/assessments and from bond issue proceeds grew comparatively slowly during this period at 3.6 percent and 1.2 percent, respectively.

The graph at the top of *Exhibit 2-5* shows the percentage share of each funding source by year for 2006–2016. It demonstrates that a relatively steady percentage of revenues came from tolls, property taxes/assessments, and other taxes and fees during that time, whereas the portion of revenues coming from General Fund appropriations varied significantly and the portion from motor fuel and motor vehicle taxes generally declined.

Exhibit 2-5 ■ Government Revenue Sources for Highways, 2006–2016



Source	Highway Revenue, Billions of Dollars						Annual Rate of Change 2016/2006
	2006	2008	2010	2012	2014	2016	
Motor Fuel and Motor Vehicle Taxes	$85.4	$84.7	$84.1	$91.5	$93.4	$103.1	1.9%
Tolls	$8.3	$9.1	$9.7	$13.5	$14.4	$14.5	5.8%
Subtotal: User Fees	**$93.7**	**$93.8**	**$93.8**	**$104.9**	**$107.8**	**$117.7**	**2.3%**
Property Taxes and Assessments	$9.0	$9.0	$10.1	$10.1	$12.8	$12.7	3.6%
General Fund Appropriations	$28.3	$40.0	$61.5	$39.8	$56.3	$82.8	11.3%
Other Taxes and Fees	$10.1	$12.2	$13.5	$16.1	$16.4	$19.4	6.8%
Investment Income and Other Receipts	$9.7	$16.6	$15.8	$21.1	$18.7	$18.8	6.9%
Bond Issue Proceeds	$18.3	$20.9	$33.7	$24.0	$29.2	$20.7	1.2%
Total Revenues	**$169.0**	**$192.6**	**$228.3**	**$216.1**	**$241.3**	**$272.1**	**4.9%**

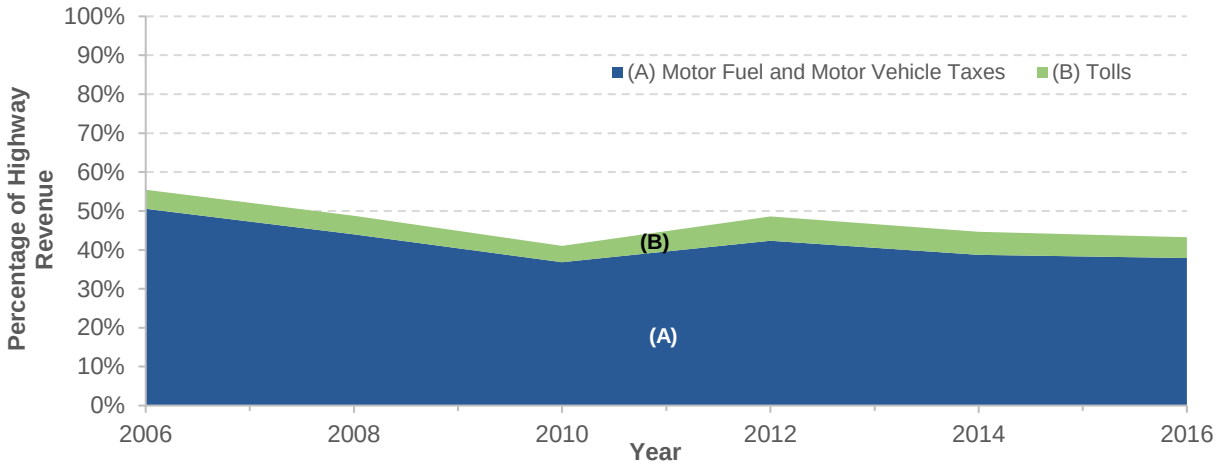
Sources: FHWA Bulletin: Highway Funding 2013–2016, Table HF-10B; Highway Statistics, various years, Table HF-10A.

In the most recent years, between 2014 and 2016, total revenues raised grew from $241.3 billion to $272.1 billion, driven mainly by a jump from $56.3 billion to $82.8 billion in General Fund appropriations and supported by an increase in revenues from motor fuel and motor vehicle taxes from $93.4 billion to $103.1 billion.[6] The amount of revenue raised increased or remained steady in each category except bond issue proceeds, which fell from $29.2 billion to $20.7 billion.

Following passage of the Federal-aid Highway Act of 1956 and establishment of the HTF, user charges such as motor fuel taxes, motor vehicle taxes, and tolls consistently provided most of the combined revenues raised for highway and bridge programs by all levels of government for many years. However, after 2008, due to flat user revenues and transfers to keep the HTF solvent, the share of user revenues fell below 50 percent. The share of revenues from user charges declined from more than 55 percent in 2006 to around 43 percent in 2016. *Exhibit 2-6* shows the share of highway revenue derived from user charges from 2006 to 2016. Revenues from user charges declined steadily from 2006 to 2010, then increased in 2012 before resuming their decline.

[6] Note that both 2014 and 2016 saw transfers from the General Fund to the HTF.

Exhibit 2-6 ■ Percentage of Highway Revenue Derived from User Charges, 2006–2016, All Units of Government



Source: FHWA Bulletin: Highway Funding 2013–2016, Table HF-10B, and unpublished FHWA data.

Highway Expenditures

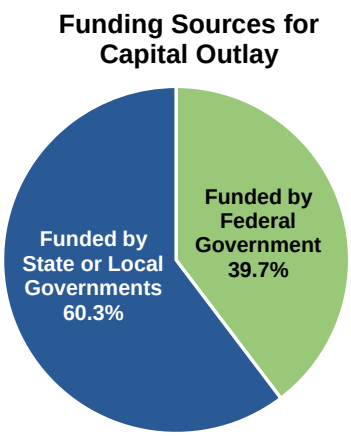
As noted in *Exhibit 2-2*, highway expenditures by all levels of government totaled $223.2 billion in 2016; $144.6 billion (64.8 percent of the total) was spent by States, $75.6 billion (33.9 percent) was spent by local governments, and $3.0 billion (1.3 percent) was direct Federal spending. Although the Federal government funded $47.2 billion of highway expenditures in 2016 (*Exhibit 2-7*), direct Federal spending (capital outlay, maintenance, administration, and research) was only $3.0 billion. The remaining was transferred to State and local governments.

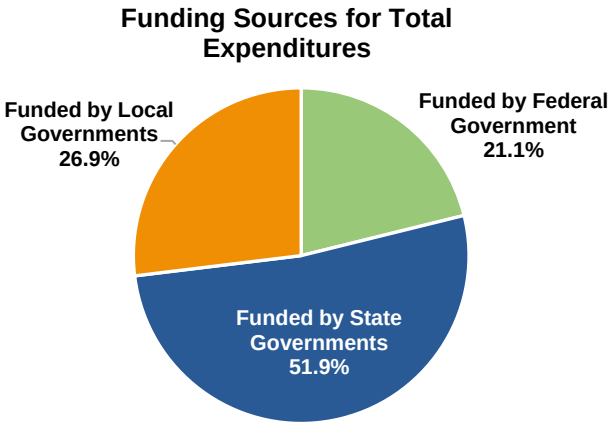
Exhibit 2-7 breaks down the total Federal, State, and local expenditures by type and level of government. The rows "Funding Sources for Capital Outlay" and "Funding Sources for Total Expenditures" in *Exhibit 2-7* indicate the level of government that provided the funding for those expenditures. These expenditures represent cash outlays, not authorizations or obligations of funds. (The terms "expenditures," "spending," and "outlays" are used interchangeably in this report.) Most of the funding for capital outlays came from State or local governments; they provided $68.1 billion of the $112.9 billion total, equivalent to 60.3 percent. Most of the Federal government's $3.0 billion in direct expenditures (i.e., the money spent directly on roads by the Federal government, and not transferred to States or placed in reserves, as presented in *Exhibit 2-1*) were for noncapital expenditures ($2.3 billion; see *Exhibit 2-1*).

State governments combined $42.4 billion in Federal funds, $98.7 billion in State funds, and $3.5 billion in local funding sources to support direct expenditures of $144.6 billion (64.8 percent of all highway expenditures). Local governments directly spent $1.8 billion of Federal funds, $17.2 billion of State funds, and $56.6 billion of local funds on highways, totaling $75.6 billion (33.9 percent of all highway expenditures).

Most Federal funds pay for capital outlays, whereas States direct their highway and bridge funds more broadly. In 2016, $44.8 billion in capital outlays originated from Federal funds, most of which ($42.4 billion) was expended by State governments (*Exhibit 2-7*). Total expenditures (capital outlays plus noncapital expenditures) funded by the Federal government were $47.2 billion, meaning that only $2.4 billion in Federal funding went to noncapital expenditures. In 2016, funds from State or local governments for capital outlays reached $68.1 billion, but total expenditures funded by State or local governments reached $176.0 billion ($115.9 billion and $60.1 billion, respectively). The Federally funded share of highway capital spending was 39.7 percent in 2016, whereas the Federally funded share of total highway spending was 21.1 percent.

Exhibit 2-7 ■ Direct Expenditures for Highways by Expending Agency and Type, 2016





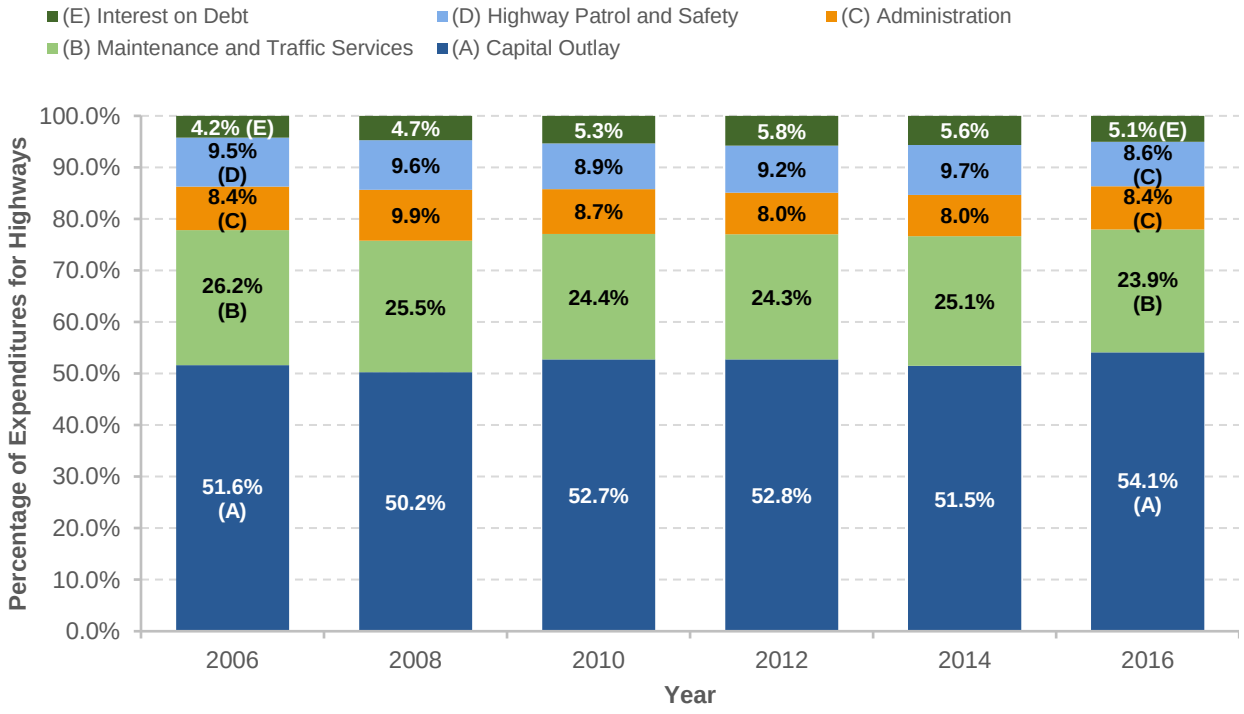
Category	Highway Expenditures (Billions of Dollars)				
	Federal	State	Local	Total	Percent
Funding Sources for Capital Outlay					
Funded by Federal Government	$0.6	$42.4	$1.8	$44.8	39.7%
Funded by State or Local Governments	$0.0	$41.7	$26.4	$68.1	60.3%
Total	**$0.6**	**$84.1**	**$28.2**	**$112.9**	**100.0%**
Funding Sources for Total Expenditures					
Funded by Federal Government	$3.0	$42.4	$1.8	$47.2	21.1%
Funded by State Governments	$0.0	$98.7	$17.2	$115.9	51.9%
Funded by Local Governments	$0.0	$3.5	$56.6	$60.1	26.9%
Total	**$3.0**	**$144.6**	**$75.6**	**$223.2**	**100.0%**

Sources: FHWA Bulletin: Highway Funding 2013–2016, Table HF-10B, and unpublished FHWA data.

Historical Expenditure and Funding Trends

All highway expenditures have grown at an annual rate of 3.2 percent (3.0 percent growth for current expenditures) in the 10-year period from 2006 to 2016 for all levels of government. (Note that this represents growth in nominal dollar terms; see the Constant-dollar Expenditures section below for a discussion of inflation-adjusted expenditure trends). *Exhibit 2-8* breaks out these expenditures since 2006 by type for all levels of government. Total expenditures by major expenditure type have increased at similar rates over the course of that time, with those types related to debt service increasing at slightly higher annual rates. Expenditures directed to bond retirement increased by 5.9 percent annually and payments for interest on debt increased by 4.8 percent annually between 2006 and 2016. The other type categories (maintenance and traffic services, administration, highway patrol and safety) increased at annual rates of between 2.0 and 2.9 percent. Capital outlays have remained near 50 percent of current expenditures since 2006, with a slight increase in 2016, as illustrated in the stacked bar chart at the top of *Exhibit 2-8*, increasing by 3.5 percent per year during the 10-year period.

Exhibit 2-8 ■ Expenditures for Highways by Type, All Units of Government, 2006–2016

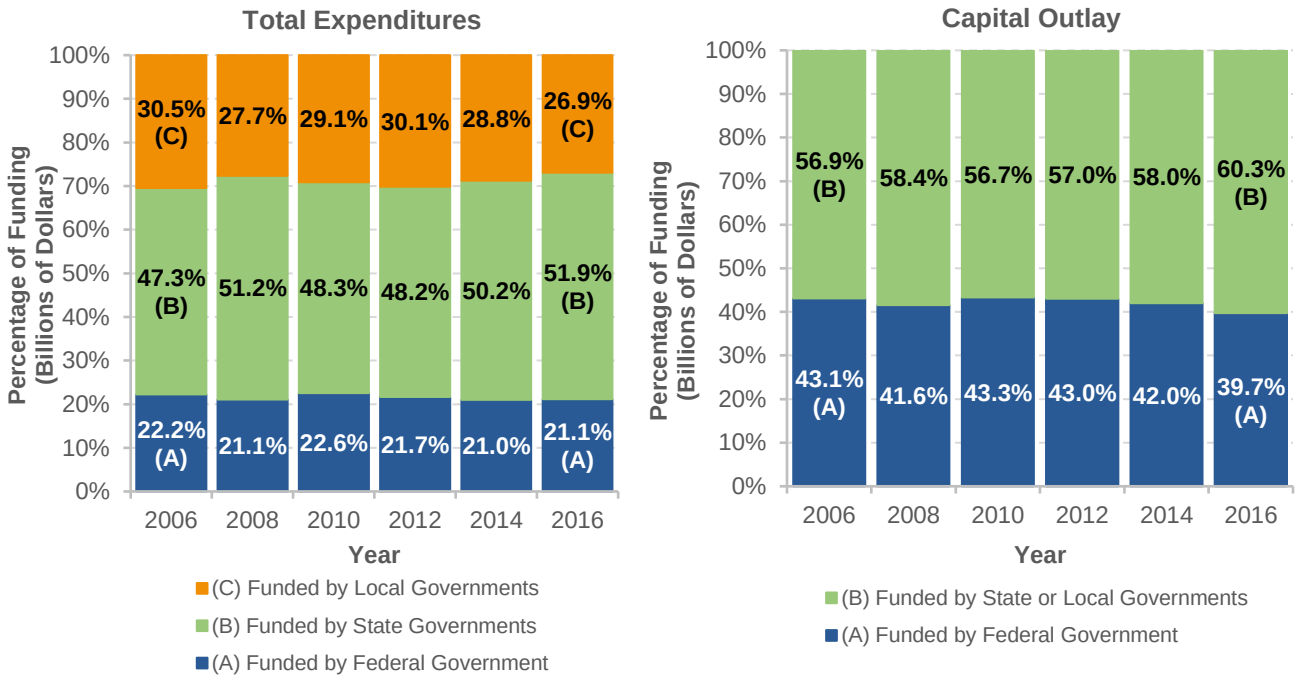


Category	Highway Expenditures, Billions of Dollars						Annual Rate of Change 2016/2006
	2006	2008	2010	2012	2014	2016	
Expenditure Type							
Capital Outlay	$80.2	$90.4	$100.0	$105.3	$105.4	$112.9	3.5%
Maintenance and Traffic Services	$40.8	$45.9	$46.3	$48.5	$51.4	$49.8	2.0%
Administration	$13.1	$17.8	$16.5	$16.0	$16.4	$17.5	2.9%
Highway Patrol and Safety	$14.7	$17.3	$16.8	$18.3	$19.8	$18.0	2.0%
Interest on Debt	$6.6	$8.5	$10.1	$11.5	$11.5	$10.6	4.8%
Total, Current Expenditures	**$155.5**	**$180.0**	**$189.7**	**$199.5**	**$204.6**	**$208.8**	**3.0%**
Bond Retirement	**$8.1**	**$8.6**	**$14.6**	**$18.9**	**$17.9**	**$14.3**	**5.9%**
Total, All Expenditures	**$163.5**	**$188.5**	**$204.3**	**$218.4**	**$222.6**	**$223.2**	**3.2%**

Sources: FHWA Bulletin: Highway Funding 2013–2016, Table HF-10B; Highway Statistics, various years, Table HF-10A.

The portion of total expenditures and of all capital outlays funded by State and local governments has increased faster than those funded by the Federal government between 2006 and 2016 (see *Exhibit 2-9*). Total expenditures funded by State governments increased at an average annual rate of 4.1 percent since 2006, whereas total federally funded expenditures increased by 2.6 percent and total expenditures funded by local governments increased by 1.9 percent. Growth in capital outlays followed similar patterns, increasing at an annual average rate of 4.1 percent for State and local government expenditures combined, and increasing by 2.6 percent for federally funded expenditures.

Exhibit 2-9 ■ Funding for Highways by Level of Government, 2004–2016



Category	Highway Funding, Billions of Dollars						Annual Rate of Change 2016/2006
	2006	2008	2010	2012	2014	2016	
Capital Outlay							
Funded by Federal Government	$34.6	$37.6	$43.3	$45.3	$44.2	$44.8	2.6%
Funded by State or Local Governments	$45.6	$52.8	$56.7	$60.0	$61.2	$68.1	4.1%
Total	**$80.2**	**$90.4**	**$100.0**	**$105.3**	**$105.4**	**$112.9**	**3.5%**
Federal Share	*43.1%*	*41.6%*	*43.3%*	*43.0%*	*42.0%*	*39.7%*	
Total Expenditures							
Funded by Federal Government	$36.3	$39.8	$46.1	$47.3	$46.7	$47.2	2.6%
Funded by State Governments	$77.4	$96.6	$98.7	$105.2	$111.8	$115.9	4.1%
Funded by Local Governments	$49.8	$52.2	$59.5	$65.8	$64.1	$60.1	1.9%
Total	**$163.5**	**$188.5**	**$204.3**	**$218.4**	**$222.6**	**$223.2**	**3.2%**
Federal Share	*22.2%*	*21.1%*	*22.6%*	*21.7%*	*21.0%*	*21.1%*	

Sources: FHWA Bulletin: Highway Funding 2013–2016, Table HF-10B; Highway Statistics, various years, Table HF-10A.

Although the Federal share of funding for capital outlays has decreased slightly (from 43.1 percent in 2006 to 39.7 percent in 2016) it remains nearly double the Federal share of total expenditures (which has fluctuated slightly between 21.0 percent and 22.6 percent). The stacked graphs at the top of *Exhibit 2-9* present funding by level of government between 2006 and 2016.

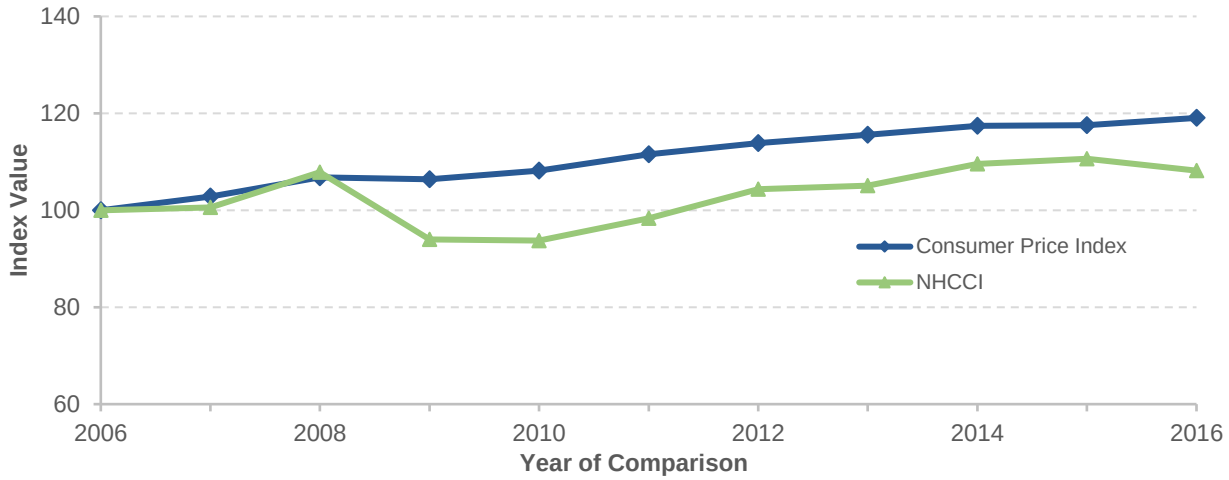
Constant-dollar Expenditures

When comparing costs and expenditures over time, the general increase in prices and the decrease in the purchasing value of money need to be considered. This report uses different indices for converting nominal-dollar (current year) highway spending to constant dollars for capital and noncapital expenditures. The types of inputs of materials and labor associated with various types of highway expenditures differ significantly: for example, on a dollar-per-dollar basis, highway maintenance activities are generally more labor-intensive than highway construction activities. For constant-dollar conversions for highway capital expenditures, the Federal Highway Administration (FHWA) National Highway Construction Cost Index (NHCCI) version 2.0 is used. Constant-dollar

conversions for other types of highway expenditures are based on the Bureau of Labor Statistics' Consumer Price Index.

Exhibit 2-10 illustrates the trends in cost indices used in the report, converted to a common base year of 2006. Over the 10-year period from 2006 to 2016, the Consumer Price Index increased significantly more than the increase in the NHCCI (119.1 vs. 108.2).

Exhibit 2-10 ■ Comparison of Inflation Indices (Converted to a 2006 Base Year), 2006–2016



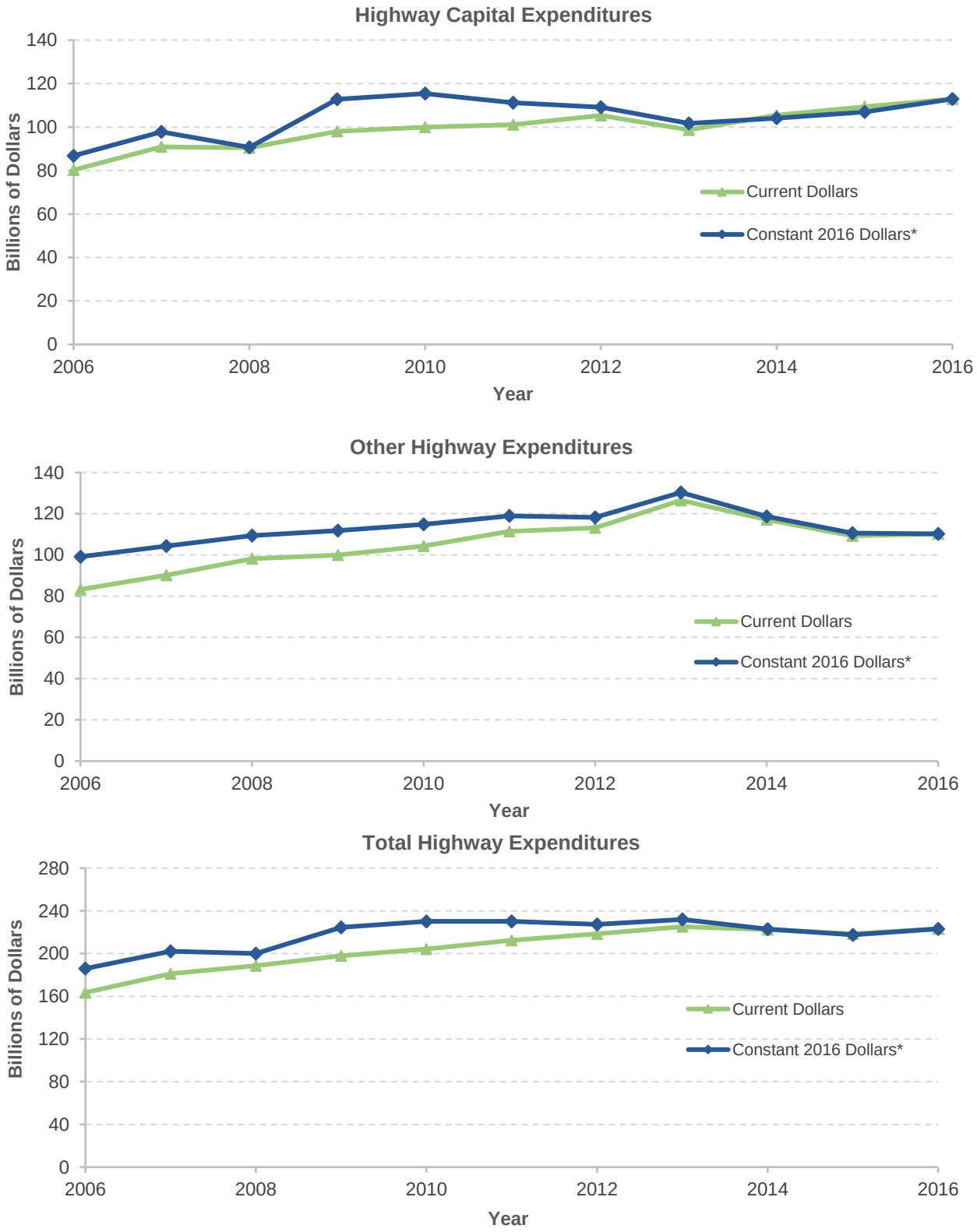
Note: To facilitate comparisons of trends from 2006 to 2016, each index was mathematically converted so that its value for the year 2006 would be equal to 100.

Sources: FHWA Highway Statistics, various years, Table PT-1 (http://www.bls.gov/cpi/).

In addition, the indices behaved differently. Whereas the Consumer Price Index rose steadily each year from 2006 to 2016, the NHCCI fluctuated significantly. Sharp increases in the prices of materials such as steel, asphalt, and cement caused NHCCI to increase up through 2008. Highway construction prices as measured by NHCCI then declined dramatically from 2008 to 2009, remained fairly flat in 2010, and then resumed an upward trend. Despite recent increases, the NHCCI has remained below the Consumer Price Index since 2009.

Exhibit 2-11 displays time-series data on highway expenditures in both current (nominal) and constant (real) 2016 dollars. Total highway expenditures in current dollars have generally increased since 2006, reaching $223.2 billion in 2016. However, in constant 2016 dollar terms, total highway expenditures have remained relatively flat since 2009. In current dollars, total highway expenditures increased by more than a third between 2006 and 2016 (from $163.5 billion to $223.2 billion, see *Exhibit 2-8*). Total noncapital (other) expenditures grew similarly by about 32 percent in current dollars (from $83.3 billion to $110.3 billion), and capital expenditures grew by approximately 41 percent during the same period (from $80.2 billion to $112.9 billion).

Exhibit 2-11 ■ Highway Capital, Noncapital, and Total Expenditures in Current and Constant 2016 Dollars, All Units of Government, 2006–2016



Note: Constant-dollar conversions for highway capital expenditures were made using the FHWA NHCCI. Constant-dollar conversions for other types of highway spending were made using the Bureau of Labor Statistics CPI.

Sources: Highway Statistics, various years, Tables HF-10A, HF-10, PT-1 (http://www.bls.gov/cpi/).

When expressed in constant 2016 dollars, the growth in total highway expenditures between 2006 and 2016 was 20 percent overall, and the values in constant and current dollars grew steadily and did not vary much as they converged in 2016. Capital expenditures, on the other hand, fluctuated when expressed in constant 2016 dollars from 2006 to 2009, and declined from 2010 to 2016, reflecting the fluctuations in the NHCCI.

Highway Capital Outlay

States provide FHWA with detailed data on what they spend on arterials and collectors, classifying capital outlay on each functional system into 17 improvement types. Direct State expenditures on arterials and collectors totaled $71.4 billion in 2016, drawing on a combination of State revenues, transfers from the Federal government, and transfers from local governments. These can be seen in *Exhibit 2-12*.

However, comparable data are not available for local government expenditures, direct expenditures by Federal agencies, or State government expenditures on local functional class roads off the National Highway System (NHS). Therefore, *Exhibit 2-13* presents an estimated distribution by broad categories of improvement types for the total $112.9 billion invested in 2016 on all systems, extrapolating from the available detailed data on the $71.4 billion of State expenditures on arterials and collectors. For this estimation, 17 highway capital improvement types have been allocated among three broad categories: system rehabilitation, system expansion, and system enhancement, as shown in *Exhibit 2-12*. These broad categories are also used in Part II of this report to discuss the components of future capital investment scenarios. These categories are defined as follows:

- **System rehabilitation:** capital improvements on existing roads and bridges intended to preserve the existing pavement and bridge infrastructure. These activities include reconstruction, resurfacing, pavement restoration or rehabilitation, widening of narrow lanes or shoulders, bridge replacement, and bridge rehabilitation. Also included is the portion of widening (lane addition) projects estimated for reconstructing or improving existing lanes. System rehabilitation does not include routine maintenance costs.
- **System expansion:** construction of new roads and new bridges and addition of new lanes to existing roads. Expansion includes all new construction, new bridges, and major widening, and most of the costs associated with reconstruction-with added capacity, except for the portion of these expenditures estimated for improving existing lanes of a facility.
- **System enhancement:** safety enhancements, traffic operation improvements such as the installation of intelligent transportation systems, and environmental enhancements.

As shown in *Exhibit 2-12*, most types of highway capital improvement reported by States are assigned to one of these three broad categories; however, engineering is split among the three categories and reconstruction-added capacity is divided between system rehabilitation and system expansion.

As previously noted, direct State expenditures on arterials and collectors totaled $71.4 billion in 2016. The highway capital improvement type with the largest amount of direct State expenditures on arterials and collectors in 2016 was $21.4 billion for restoration and rehabilitation (30.0 percent of the total); the second largest was engineering ($8.7 billion).

Exhibit 2-12 ■ State Highway Capital Outlay on Arterials and Collectors by Improvement Type, 2016

Type of Expenditure	Distribution of Capital Outlay, Billions of Dollars				
		System Expansion			
	System Rehabilitation	New Roads and Bridges	Existing Roads	System Enhancements	Total Outlay
Direct State Expenditures on Arterials and Collectors[1]					
Right-of-Way		$1.6	$2.1		**$3.8**
Engineering	$5.7	$0.9	$1.2	$0.9	**$8.7**
New Construction		$4.9			**$4.9**
Relocation			$0.8		**$0.8**
Reconstruction—Added Capacity	$1.9		$4.4		**$6.3**
Reconstruction—No Added Capacity	$5.1				**$5.1**
Major Widening			$2.5		**$2.5**
Minor Widening	$0.9				**$0.9**
Restoration and Rehabilitation	$21.4				**$21.4**
Resurfacing	$0.0				**$0.0**
New Bridge		$1.1			**$1.1**
Bridge Replacement	$5.5				**$5.5**
Major Bridge Rehabilitation	$0.5				**$0.5**
Minor Bridge Work	$3.6				**$3.6**
Safety				$2.6	**$2.6**
Traffic Management/Engineering				$1.1	**$1.1**
Environmental and Other				$2.5	**$2.5**
Total, State Arterials and Collectors	**$44.6**	**$8.5**	**$11.1**	**$7.2**	**$71.4**

[1] Improvement type distribution estimated based on 2014 data; 2015 and 2016 data were not available at time of report preparation.
Sources: Highway Statistics 2014, Table SF-12A, and unpublished FHWA data.

Of the $112.9 billion in total highway capital outlay on all systems, an estimated $70.0 billion (62.0 percent) was used for system rehabilitation, $27.6 billion (24.4 percent) was used for system expansion, and $15.3 billion (13.6 percent) was used for system enhancement (see *Exhibit 2-13*). Direct State expenditures on arterials and collectors accounted for more than half of total expenditures ($71.4 billion of $112.9 billion total).

Exhibit 2-13 ■ Estimated Highway Capital Outlay by Improvement Type, 2016

Type of Expenditure	Distribution of Capital Outlay, Billions of Dollars				
		System Expansion			
	System Rehabilitation	New Roads and Bridges	Existing Roads	System Enhancements	Total Outlay
Direct State Expenditures on Arterials and Collectors[1]					
Highways and Other	$35.1	$7.4	$11.1	$7.2	$60.7
Bridges	$9.6	$1.1	$0.0	$0.0	$10.6
Total, Arterials and Collectors	**$44.6**	**$8.5**	**$11.1**	**$7.2**	**$71.4**
Total, Arterials and Collectors, All Jurisdictions (Estimated)[2]					
Highways and Other	$41.4	$9.1	$13.2	$9.5	$73.1
Bridges	$11.7	$1.3			$13.1
Total, Arterials and Collectors	**$53.1**	**$10.4**	**$13.2**	**$9.5**	**$86.2**
Total Capital Outlay on All Systems (Estimated)[1]					
Highways and Other	$54.6	$11.8	$14.0	$15.3	$95.8
Bridges	$15.4	$1.7			$17.2
Total, All Systems	**$70.0**	**$13.6**	**$14.0**	**$15.3**	**$112.9**
Percent of Total	62.0%	12.0%	12.4%	13.6%	100.0%

[1] Improvement type distribution was estimated based on 2014 data; 2015 and 2016 data were not available at time of report preparation.
[2] Improvement type distribution was estimated based on State arterial and collector data.
Sources: Highway Statistics 2014, Table SF-12A, and unpublished FHWA data.

Exhibit 2-13 Estimation Procedures

Exhibit 2-13 reflects three types of estimates, one for 2014 State government capital expenditures on local functional class roads off the National highway system, another for 2014 direct local government and Federal government capital expenditures, and a third for converting 2014 values to 2016 values.

States report total capital expenditures via the FHWA-532 form and report detailed information on capital expenditures by improvement type and functional class on the FHWA-534 report. Reporting is optional for capital expenditures on local functional class roads off the National Highway System, so the differences between the totals reported on these two forms are inferred to represent spending on these roads. States voluntarily reported detailed capital expenditure data for $1.2 billion of their spending on local functional class roads in 2014, constituting 10.1 percent of total spending of $12.1 billion inferred to have occurred in that year. Of the $1.2 billion, States reported spending 64.6 percent for system preservation, 13.3 percent for system expansion, and 22.0 percent for system enhancement.

The percentage splits reported for local functional class roads were then compared with those reported for arterials and collectors, collectors, and rural minor collectors to identify any unexpected outliers. After minor adjustments based on this review, a distribution of 63.1 percent for system preservation, 14.9 percent for system expansion, and 22.0 percent for system enhancement was applied to the $12.1 billion inferred to have occurred on local functional class roads in 2014.

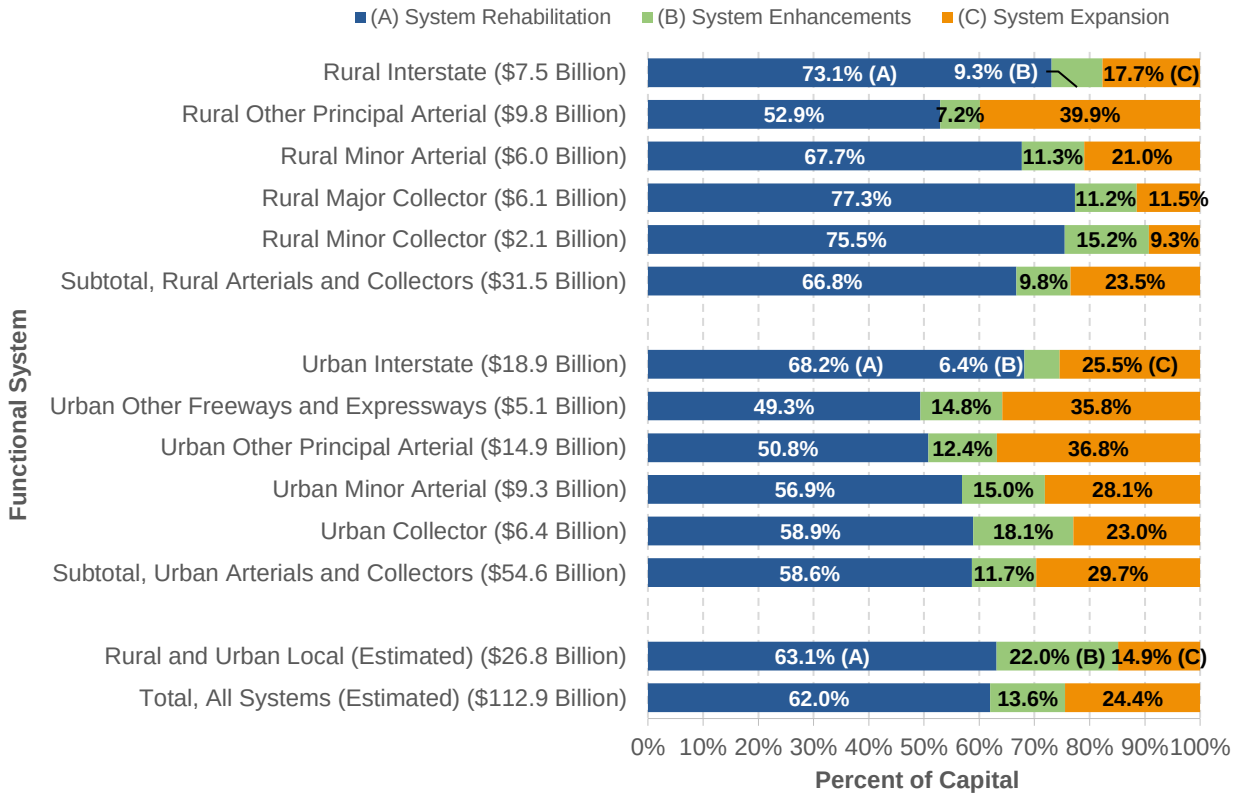
For direct local government expenditures and direct Federal government expenditures, the distribution of capital expenditure by improvement type off the NHS is assumed to be the same as that reported by States for each individual functional class. The share of local and Federal capital expenditures on the NHS and distribution of capital expenditure by improvement type on the NHS are derived based on local government spending data from prior years when such information was routinely collected from the States. The distribution of local and Federal government spending by functional class is based on the estimated distribution of travel, multiplied by weighting factors derived from spending data from prior years.

The conversion from 2014 values to 2016 values was accomplished by multiplying the 2014 percentage distributions described above by estimated values for total 2016 capital outlay at the Federal, State, and local levels. (The same approach was used to convert 2014 values to 2016 values for *Exhibit 2-12,* and for *Exhibits 2-14* through *2-20* as well.)

Highway funds are expended across a range of functional systems. *Exhibit 2-14* shows the distribution of capital expenditures by type and functional system. In 2016, $31.5 billion was invested on rural arterials and collectors, with 66.8 percent of those funds directed to system rehabilitation, and 23.5 percent to expansion; the remainder was directed to system enhancement. Capital outlays on urban arterials and collectors totaled $54.6 billion, of which 58.6 percent was for system rehabilitation and 29.7 percent was for system expansion.

The proportion of funds for system rehabilitation vs. system expansion varied the most among rural arterials and collectors. Among the individual functional systems, rural major collectors had the highest percentage of highway capital outlay directed to system rehabilitation (77.3 percent), whereas urban other freeways and expressways had the lowest percentage directed for that purpose (49.3 percent). The largest portion of capital outlays for expansion occurred on rural other principal arterials; the smallest amount on rural minor collectors.

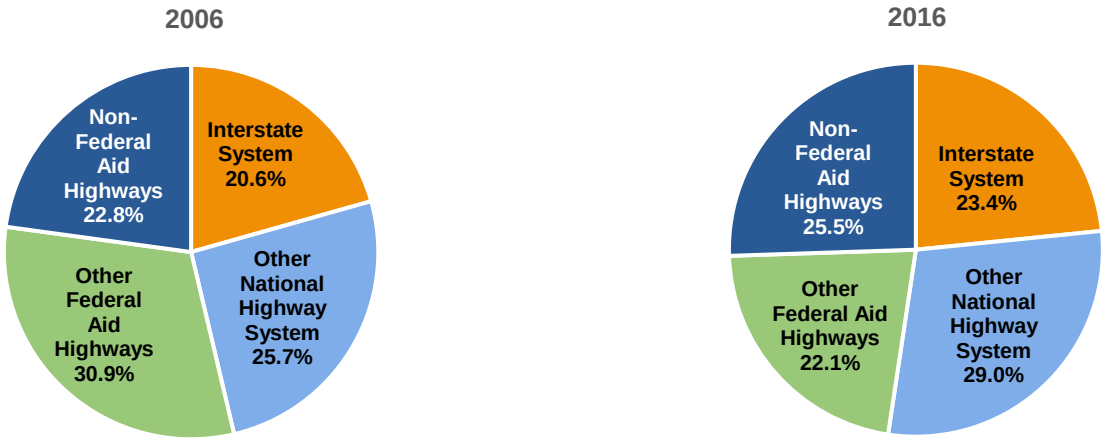
Exhibit 2-14 ■ Distribution of Capital Outlay by Improvement Type and Functional System, 2016



Note: The data for 2016 were estimated based on 2014 data; 2015 and 2016 data were not available at time of report preparation.
Sources: Highway Statistics 2014, Table SF-12A, and unpublished FHWA data.

Most highway capital outlays are made to build, expand, or improve Federal-aid highways ($61.9 billion out of $80.2 billion in 2006, increasing to $84.1 billion out of $112.9 billion in 2016), and the majority of those capital outlays are expended on the NHS ($37.2 billion in 2006, increasing to $59.2 billion in 2016), as shown in *Exhibit 2-15*. About half of capital outlays on the NHS in both 2006 and 2016 were for Interstates. In 2006, Other NHS roads comprised 25.7 percent ($20.6 billion) of total capital outlays, increasing to 29.0 percent ($32.7 billion) in 2016. Non-Federal-aid highways comprised 22.8 percent ($18.3 billion) of total expenditures in 2006 and 25.5 percent ($28.8 billion) in 2016. The only category showing a decrease in the percentage of total capital outlays between 2006 and 2016 was Other Federal-aid highways, which comprised 30.9 percent ($24.8 billion) of total capital outlays in 2006 and 22.1 percent ($25.0 billion) in 2016. This decline was due in part to the expansion of the NHS directed by the Moving Ahead for Progress in the 21st Century Act of 2012 (MAP-21), which reduced the mileage classified as Other Federal-aid highways.

Exhibit 2-15 ■ Distribution of Capital Outlay by System, 2006 vs 2016



2006 Capital Outlays, Billions of Dollars				2016 Capital Outlays, Billions of Dollars			
All Roads $80.2				All Roads $112.9			
Federal Aid Highways $61.9			Non-Federal-aid Highways $18.3	Federal Aid Highways $84.1			Non-Federal-aid Highways $28.8
National Highway System $37.2		Other $24.8		National Highway System $59.2		Other $25.0	
Interstate System $16.5	Other $20.6			Interstate System $26.4	Other $32.7		

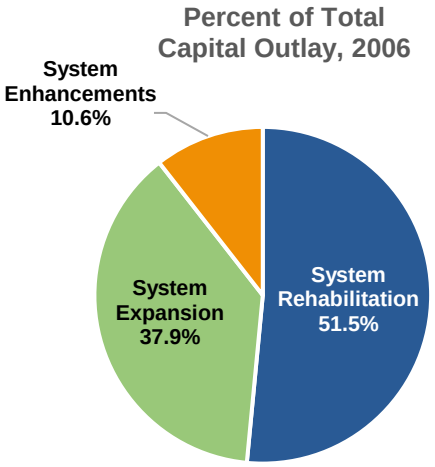
Note: Estimated based on 2014 data.

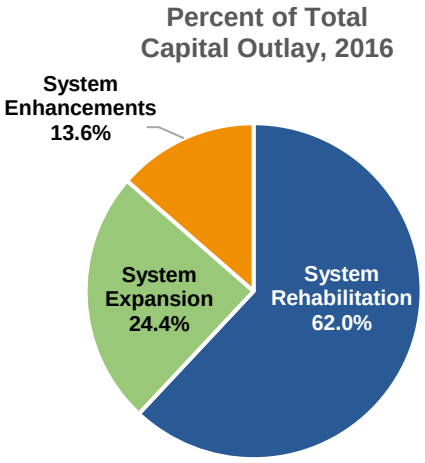
Sources: Highway Statistics 2014, Table SF-12A, and unpublished FHWA data.

Exhibit 2-16 shows trends in capital outlays by improvement categories from 2006 to 2016. Each year, a majority of capital outlays were directed to rehabilitation, reflecting the need to preserve the aging system. Despite already accounting for the majority of outlays, the share of total capital spending for system rehabilitation rose dramatically between 2008 and 2010, from 51.1 percent to 60.5 percent.

Meanwhile, as expenditures on system rehabilitation grew at an annual average rate of 5.4 percent between 2006 and 2016, expenditures on the second-largest of the three categories, system expansion, declined by an annual rate of 1.0 percent, mostly due to a 2.5-percent decline in expenditures for new routes. Expenditures on system enhancements increased by 6.1 percent, but the overall dollar values remain comparatively low (highest at $15.9 billion in 2012). Between 2006 and 2016, the share of capital outlay directed to rehabilitation grew from 51.5 percent to 62.0 percent while the share directed to enhancement rose from 10.6 percent to 13.6 percent; these increases were offset by a reduction in the share directed to expansion from 37.9 percent to 24.4 percent. These trends further illustrate the shifting priorities toward improving and enhancing the existing highway network.

Exhibit 2-16 ■ Capital Outlay on All Roads by Improvement Type, 2006–2016





Improvement Type	Capital Outlay, Billions of Dollars						Annual Rate of Change 2016/2006
	2006	2008	2010	2012	2014	2016	
System Rehabilitation							
Highway	$31.0	$33.5	$43.4	$45.8	$51.0	$54.6	5.8%
Bridge	$10.3	$12.7	$17.0	$16.4	$14.4	$15.4	4.1%
Subtotal	$41.3	$46.2	$60.5	$62.2	$65.4	$70.0	5.4%
System Expansion							
Additions to Existing Roadways	$14.0	$15.7	$15.0	$14.0	$13.2	$14.0	0.0%
New Routes	$15.2	$16.1	$11.4	$12.1	$11.0	$11.8	-2.5%
New Bridges	$1.2	$1.5	$0.9	$1.1	$1.6	$1.7	4.0%
Subtotal	**$30.4**	**$33.3**	**$27.4**	**$27.2**	**$25.9**	**$27.6**	**-1.0%**
System Enhancements	**$8.5**	**$10.9**	**$12.2**	**$15.9**	**$14.2**	**$15.3**	**6.1%**
Total	**$80.2**	**$90.4**	**$100.0**	**$105.3**	**$105.4**	**$112.9**	**3.5%**
Percent of Total Capital Outlay							
System Rehabilitation	52%	51%	60%	59%	62%	62%	
System Expansion	38%	37%	27%	26%	25%	24%	
System Enhancements	11%	12%	12%	15%	13%	14%	

Note: The data for 2016 were estimated based on 2014 data; 2015 and 2016 data were not available at time of report preparation.
Sources: Highway Statistics, various years, Table SF-12A, and unpublished FHWA data.

Capital Outlays on Federal-aid Highways

As discussed in Chapter 1, "Federal-aid highways" includes all roads except those in functional classes that are generally ineligible for Federal funding: rural minor collector, rural local, or urban local. *Exhibit 2-17* shows that total capital outlays on Federal-aid highways increased at an average annual rate of 3.1 percent from 2006 to 2016, slightly below the 3.5 percent annual growth for all roads, and reaching $84.1 billion in 2016. The largest increases in dollar amounts were in the earlier portions of this period, as total capital outlays increased by more than $8 billion between 2006 and 2008 ($61.9 billion to $70.0 billion) and by $5.7 billion from 2008 to 2010 ($70.0 billion to $75.7 billion).

The trends for expenditures on Federal-aid highways generally mirror those for all roads. The share of capital outlay on Federal-aid highways directed to system rehabilitation in 2016 was 61.3 percent,

slightly below the comparable percentage for all roads of 62.0 percent (see *Exhibit 2-13*). Expenditures for system rehabilitation grew at an annual rate of 5.4 percent and for system enhancements by 5.3 percent, while declining by 1 percent for system expansion.

Exhibit 2-17 ■ Capital Outlay on Federal-aid Highways by Improvement Type, 2006–2016

Improvement Type	Capital Outlay, Billions of Dollars						Annual Rate of Change 2016/2006
	2006	2008	2010	2012	2014	2016	
System Rehabilitation							
Highway	$22.9	$26.1	$33.1	$34.5	$38.1	$40.4	5.8%
Bridge	$7.7	$9.3	$12.5	$12.0	$10.5	$11.2	3.8%
Subtotal	**$30.6**	**$35.5**	**$45.6**	**$46.5**	**$48.6**	**$51.5**	**5.4%**
System Expansion							
Additions to Existing Roadways	$12.9	$14.3	$13.8	$12.8	$12.3	$13.1	0.1%
New Routes	$12.0	$12.8	$8.8	$9.3	$8.5	$9.0	-2.9%
New Bridges	$0.9	$1.0	$0.7	$0.8	$1.2	$1.3	3.7%
Subtotal	**$25.9**	**$28.1**	**$23.3**	**$22.9**	**$22.1**	**$23.4**	**-1.0%**
System Enhancements	**$5.5**	**$6.4**	**$6.8**	**$9.6**	**$8.6**	**$9.1**	**5.3%**
Total	**$61.9**	**$70.0**	**$75.7**	**$79.0**	**$79.3**	**$84.1**	**3.1%**
Percent of Total Capital Outlay							
System Rehabilitation	49.3%	50.7%	60.3%	58.9%	61.4%	61.3%	
System Expansion	41.9%	40.1%	30.8%	29.0%	27.8%	27.9%	
System Enhancements	8.8%	9.2%	9.0%	12.1%	10.8%	10.9%	

Note: The data for 2016 were estimated based on 2014 data; 2015 and 2016 data were not available at time of report preparation.
Sources: Highway Statistics, various years, Table SF-12A, and unpublished FHWA data.

Capital Outlays on the National Highway System

The NHS comprises roads essential to the Nation's economy, defense, and mobility, as described in Chapter 1. The NHS was expanded under MAP-21 from 4.0 percent of the Nation's highway mileage to approximately 5.3 percent. *Exhibit 2-18* shows that capital outlays for the NHS amounted to $59.2 billion in 2016. System rehabilitation expenditures of $35.8 billion accounted for the greatest share, followed by system expansion at $17.9 billion and system enhancements at $5.5 billion.

Over the 10-year period beginning in 2006, the share of system rehabilitation on the NHS jumped from 44.7 percent to 60.5 percent while the share of system expansion expenditures declined from 47.7 percent to 30.3 percent of total capital outlays. During the same period, the share of system enhancements on the NHS increased slightly from 7.6 percent to 9.2 percent.

Exhibit 2-18 ■ Capital Outlay on the National Highway System by Improvement Type, 2006–2016

Improvement Type	Capital Outlay, Billions of Dollars[1]						Annual Rate of Change 2016/2006
	2006	2008	2010	2012	2014	2016	
System Rehabilitation							
Highway	$12.3	$14.9	$19.9	$19.7	$27.0	$28.3	8.7%
Bridge	$4.3	$5.4	$7.4	$6.7	$7.1	$7.5	5.6%
Subtotal	**$16.6**	**$20.4**	**$27.3**	**$26.4**	**$34.1**	**$35.8**	**8.0%**
System Expansion							
Additions to Existing Roadways	$8.1	$9.2	$8.6	$8.0	$9.2	$9.7	1.8%
New Routes	$8.9	$8.6	$4.7	$5.6	$6.7	$7.1	-2.3%
New Bridges	$0.7	$0.6	$0.3	$0.5	$1.1	$1.1	5.1%
Subtotal	**$17.7**	**$18.3**	**$13.7**	**$14.1**	**$17.0**	**$17.9**	**0.1%**
System Enhancements	**$2.8**	**$3.3**	**$3.4**	**$4.0**	**$5.2**	**$5.5**	**6.8%**
Total	**$37.2**	**$42.0**	**$44.4**	**$44.6**	**$56.3**	**$59.2**	**4.8%**
Percent of Total Capital Outlay							
System Rehabilitation	44.7%	48.5%	61.6%	59.3%	60.6%	60.5%	
System Expansion	47.7%	43.7%	30.8%	31.7%	30.2%	30.3%	
System Enhancements	7.6%	7.8%	7.6%	9.0%	9.2%	9.2%	

[1] The National Highway System was expanded under MAP-21 from 4.0 percent of the Nation's highway mileage to approximately 5.4 percent. For 2014, all spending on principal arterials was assumed to have occurred on the National Highway System. The data for 2016 were estimated based on 2014 data; 2015 and 2016 data were not available at time of report preparation.

Sources: Highway Statistics, various years, Table SF-12B, and unpublished FHWA data.

Capital Outlays on the Interstate System

Exhibit 2-19 shows that from 2006 to 2016, capital outlay on the Interstate System increased annually by an average of 4.8 percent, to $26.4 billion in 2016, well above the 3.5 percent annual increase observed for all roads. This increase is also much higher than the average annual increase in capital outlay for all Federal-aid highways of 3.1 percent observed from 2006 to 2016.

The portion of expenditures going to system rehabilitation on the Interstate System increased from 49.9 percent in 2006 to 69.6 percent in 2016. In contrast, the portion expended on system expansion fell by nearly half, from 42.6 percent in 2006 to 23.2 percent in 2016.

The share of Interstate capital outlay directed to system rehabilitation in 2016 was higher than the comparable percentages for the NHS, Federal-aid highways, and all roads. This pattern is largely consistent with that from 2006 to 2016; the share of Interstate capital outlay directed to system rehabilitation was higher in each year than comparable percentages for the NHS or Federal-aid highways, although in some years it was lower than the comparable percentage for all roads. The share of Interstate capital outlay directed toward system enhancements was lower in each year than comparable percentages for all roads, Federal-aid highways, and the NHS.

Exhibit 2-19 ■ Capital Outlay on the Interstate System by Improvement Type, 2006–2016

Improvement Type	Capital Outlay, Billions of Dollars						Annual Rate of Change 2016/2006
	2006	2008	2010	2012	2014	2016	
System Rehabilitation							
Highway	$5.8	$7.5	$9.4	$8.9	$14.4	$15.1	10.1%
Bridge	$2.5	$3.3	$4.1	$3.8	$3.2	$3.3	2.8%
Subtotal	**$8.3**	**$10.8**	**$13.5**	**$12.7**	**$17.6**	**$18.4**	**8.3%**
System Expansion							
Additions to Existing Roadways	$3.2	$4.5	$3.5	$3.4	$3.8	$3.9	2.0%
New Routes	$3.5	$3.0	$1.7	$2.7	$1.7	$1.8	-6.7%
New Bridges	$0.3	$0.3	$0.1	$0.2	$0.4	$0.5	3.9%
Subtotal	**$7.1**	**$7.8**	**$5.3**	**$6.3**	**$5.9**	**$6.1**	**-1.4%**
System Enhancements	**$1.2**	**$1.4**	**$1.4**	**$1.5**	**$1.8**	**$1.9**	**4.5%**
Total	**$16.5**	**$20.0**	**$20.2**	**$20.5**	**$25.3**	**$26.4**	**4.8%**
Percent of Total Capital Outlay							
System Rehabilitation	49.9%	53.9%	66.7%	62.1%	69.6%	69.6%	
System Expansion	42.6%	38.9%	26.3%	30.5%	23.2%	23.2%	
System Enhancements	7.4%	7.1%	6.9%	7.3%	7.2%	7.2%	

Note: The data for 2016 were estimated based on 2014 data; 2015 and 2016 data were not available at time of report preparation.
Sources: Highway Statistics, various years, Table SF-12A, and unpublished FHWA data.

Project Finance and Alternative Funding Mechanisms

The early portion of this chapter focused on traditional sources of funding for transportation projects, which are primarily from such sources as taxes and other user fees such as tolls, bond issue proceeds, and investment income and other receipts (see *Exhibit 2-5*). In the face of stagnating public revenues and demanding fiscal requirements, transportation policymakers are increasingly interested in alternative funding sources and methods for further leveraging available funds. Many jurisdictions are relying on options such as public-private partnerships, Federal credit assistance, and other debt-financing tools. These project finance strategies could enable public agencies to transfer certain project delivery risks and deliver infrastructure projects earlier than would be possible through traditional mechanisms.

Project finance refers to specially designed techniques and tools that supplement traditional highway financing methods. They typically entail borrowing money, either through bonds, loans, or other financing mechanisms, or by partnering with the private sector. State and local governments rely on a variety of revenue mechanisms to generate revenue for transportation projects and can also make use of several Federal programs to support alternative funding. These funding approaches are introduced below.

Public-Private Partnerships

A growing number of States are using P3s for transportation projects. P3s are contractual agreements between a public agency and a private entity that allow for greater private-sector participation in the delivery and financing of transportation projects. Typically, this participation involves the private entity's assuming additional project risks, such as design, finance, long-term operation, maintenance, or traffic and revenue. P3s' delivery methods can be classified as "design-build," "operate-maintain," "design-build-operate-maintain," "design-build-finance," and "design-build-finance-operate-maintain." The most common type of public-private partnership is the "design-build" agreement, in which a private entity agrees to design and build a highway. Each method can offer advantages or disadvantages, depending on the specific project and parties involved. P3s are undertaken for a variety of purposes, including monetizing the value of existing assets, developing new transportation facilities, or rehabilitating or expanding existing

facilities. Although P3s offer certain advantages, such as increased financing capacity and reduced up-front costs, the public sector still must identify a source of revenue for the project to provide a return to the private partner's investment and must ensure that the goals and interests of the public are adequately secured.

As of early 2018, 35 States and the District of Columbia have enacted statutes that enable the use of various P3 approaches for the development of transportation infrastructure.[7] One private international consulting group, which maintains a public database of public-private partnerships by county and sector, had identified 162 transportation P3s by mid-2018, 20 of which were already in operation.[8]

Due to the inherent complexity of P3 agreements and the scale of the transportation projects involved, many States have adopted specific enabling legislation for these arrangements. A summary report developed by the National Conference of State Legislatures on these statutes is available at http://www.ncsl.org/Portals/1/Documents/transportation/P3_State_Statutes.pdf; additional information on P3s is available at http://www.fhwa.dot.gov/ipd/p3/index.htm.

Innovative Project Financing Profile: *Transform 66—Outside the Beltway*

The Virginia Department of Transportation (VDOT) and I-66 Express Mobility Partners LLC (EMP) are partnering to deliver *Transform 66—Outside the Beltway*, a major Interstate expansion and construction of managed tolled lanes designed to address critical regional transportation needs. The 50-year design-build-finance-operate-maintain public-private partnership concession arrangement between VDOT and EMP will finance the project without direct public investment, relying instead on a significant equity contribution by EMP, a federal Transportation Infrastructure Finance and Innovation Act (TIFIA) loan, and other state credit supports.

Funding Sources	TIFIA loan: $1,229 million Private Activity Bonds: $737 million Virginia State Infrastructure Bank loan: $39.0 million Equity contribution: $1,525 million

Under the agreement, EMP paid a $579 million concession fee upfront to the state transportation fund for use on other improvements in the corridor ($500 million) and for VDOT project oversight and contingency ($79 million). In addition, EMP has committed to provide $800 million for transit services and $350 million for other corridor improvements over the 50-year term of the agreement.

The project area currently experiences peak congestion periods of four to five hours per day, travel speeds that can drop to as low as 10–15 mph, higher than Virginia average crash rates, few alternative single-occupant vehicle routes, and a growing regional population. In one portion, it carries more than 220,000 vehicles per weekday.

Key elements of Transform 66—Outside the Beltway include:

- Two tolled, managed express lanes in each direction;
- The expansion to three general-purpose lanes in each direction for the length of the project;
- 11 miles of new bike and pedestrian trails; and
- The expansion of park and ride facilities, including over 4,000 parking spaces, with direct access to the new express lanes.

The project will also include the design, construction, and/or relocation of certain interchanges, bridges, and utilities, and improvements to auxiliary and bike lanes.
Major construction began in 2018; the express lanes are scheduled to open in 2022.

[7] FHWA, "State P3 Legislation," (https://www.fhwa.dot.gov/ipd/p3/legislation/); accessed June 20, 2018.
[8] Aninver InfraPPP Partners, "PPP PROJECTS IN (USA) UNITED STATES OF AMERICA," (http://www.infrapppworld.com/pipeline-html/projects-in-usa-united-states-of-america); accessed June 22, 2018.

Debt Financing

Some transportation projects are so large that their cost exceeds available current grant funding and tax receipts, or would consume so much of these current funding sources that they would delay many other planned projects. For this reason, State and local governments often seek financing for large projects through borrowing, which provides an immediate influx of cash to fund project construction costs. The borrower then retires the debt by making principal and interest payments over time. Tax-exempt municipal bonds, backed by future government revenues, are the most common method of borrowing by government agencies for transportation projects.

The bond issuance yields an immediate influx of cash in the form of bond proceeds. The State or local agency then retires its obligation by making principal and interest payments to the investors over time. Although bond financing imposes interest and other debt-related costs, bringing a project to construction more quickly than otherwise possible can sometimes offset these costs.

U.S. DOT's Build America Bureau

The Build America Bureau (the "Bureau") serves as a one-stop shop for project sponsors looking to leverage Federal transportation expertise, apply for Federal transportation credit programs, and explore ways to access private capital in public-private partnerships. The Bureau also provides access to credit and grant programs and technical assistance on innovative best practices in project planning, financing, delivery, and monitoring.

The Bureau is divided into two primary teams: (1) the Public Outreach and Project Development team, which works to educate project sponsors on DOT credits, funding programs, and innovative project delivery approaches such as public-private partnerships; and (2) the Credit Programs team, which underwrites and manages financing associated with credit programs such as TIFIA, including the Rural Projects Initiative, and Private Activity Bonds (PABs).

Technical Assistance and Credit Programs Offered

- Technical Assistance: Offers technical assistance to project sponsors, particularly to those that have not used TIFIA loans in the past.
- TIFIA Loans: Provides credit assistance for qualified projects of regional and national significance. The TIFIA credit program is designed to fill market gaps and leverage substantial private co-investment by providing supplemental and subordinate capital.
- Rural Projects Initiative: Offers assistance to rural areas, including loans up to 49 percent of eligible project costs, reduced interest rates, payment of application fees, and up to 35-year amortizations for qualifying projects.
- Private Activity Bonds: Provides private developers and operators with access to tax-exempt interest rates, significantly lowering the cost of capital and enhancing the investment prospects for transportation infrastructure.

Municipal Bonds

Municipal bonds are issued by State and local governments to raise money for public works projects such as the construction and maintenance of highways, bridges, ports, airports, public transit systems, and other infrastructure. The interest earned on many municipal bonds is tax-exempt, making them attractive to many investors. States and local governments can issue general obligation bonds that are backed by the full faith and credit of the State and are usually repaid from the government's tax receipts, and revenue bonds that are guaranteed by specific State revenue streams such as tolls or fares. In 2015, 32 States and the District of Columbia used bond proceeds for highways.[9]

[9] FHWA, *Highway Statistics 2015, Table SF-1.*

Grant Anticipation Revenue Vehicle

Specific to highways, a Grant Anticipation Revenue Vehicle (GARVEE) is a debt-financing instrument that can generate initial capital for major transportation projects. Section 115 of Title 23, United States Code, authorizes a State to use State revenues (in this instance, bond proceeds) to fund eligible Federal-aid projects and claim reimbursement for eligible expenditures from Federal-aid funds at a later date. The use of advance construction facilitates State issuances of GARVEE bonds. Future Federal-aid funds are used to repay the debt and related financing costs under the provisions of Section 122 of Title 23, United States Code. GARVEE bonds enable a State to accelerate construction timelines and spread the cost of a transportation facility over its useful life rather than just the construction period. The use of GARVEE bonds expands access to capital markets as an alternative, or in addition, to general obligation or revenue bonds. They are most appropriate for large, long-lived, nonrevenue-generating assets. As of December 2017, 26 States, two U.S. territories, and the District of Columbia had issued approximately $22.5 billion in GARVEEs.[10]

Private Activity Bonds

Private activity bonds (PABs) provide additional borrowing opportunities. PABs are debt instruments issued by State or local governments on behalf of a private entity, allowing a private project sponsor to benefit from the lower financing costs of tax-exempt municipal bonds. Section 11143 of Title XI of SAFETEA-LU amended Section 142(a) of the Internal Revenue Code to add highway and freight transfer facilities to the types of privately developed and operated projects for which PABs may be issued, allowing private activity on these types of projects while maintaining the tax-exempt status of the bonds. The law limits the total amount of such bonds to $15 billion and directs the Secretary of Transportation to allocate this amount among qualified facilities.[11] As of April 2018, nearly $8.25 billion in PABs had been issued for 23 projects.

Federal Credit Assistance

Federal credit assistance for highway improvements can take one of two forms: (1) loans, which enable project sponsors to borrow Federal funds from a State department of transportation or the Federal government; and (2) credit enhancements, through which a State department of transportation or the Federal government makes Federal funds available on a contingent (or standby) basis. Loans can provide the capital necessary to proceed with a project and reduce the amount of capital borrowed from other sources. Credit enhancement helps reduce risk to investors and thus allows project sponsors to borrow at lower interest rates. Loans also might serve a credit enhancement function by reducing the risk borne by other investors. Federal tools currently available to project sponsors include the Transportation Infrastructure Finance and Innovation Act (TIFIA) credit program, State Infrastructure Bank (SIB) programs, and Section 129 (23 U.S.C. 129 (a)(7)) loans.

The DOT Build America Bureau streamlines credit opportunities and grants and provides access to the various credit and grant programs. Additional information on credit assistance tools is available at https://www.fhwa.dot.gov/innovativeprograms/centers/innovative_finance/.

[10] FHWA, Center for Innovative Finance Support, (https://www.fhwa.dot.gov/ipd/finance/tools_programs/federal_debt_financing/garvees/garvee_state_by_state.aspx#top-banner-wrap).

[11] FHWA, Center for Innovative Finance Support, (https://www.fhwa.dot.gov/ipd/finance/tools_programs/federal_debt_financing/private_activity_bonds/default.aspx). Accessed June 2018.

A Comprehensive Information Source for Major Highway Projects

Transportation practitioners and researchers seek an accessible, searchable, and comprehensive information source with reliable and comparable data on major U.S. highway projects, whether delivered directly by a public agency or via a P3 concession. FHWA is currently engaged in a project to collect and consolidate data on large federally funded transportation projects into a publicly accessible online database. High-level benchmark data regarding project development, procurement, and implementation are being compiled and organized to allow for multiple types of analysis. Users will be able to track discretionary grant amounts, dollars leveraged, project delivery methods, and performance; they will also be able to compare metrics by procurement type, including for various types of P3s. With this information, a public agency could improve its pre-procurement (ex-ante) evaluation of project delivery options, as well as the procurement itself. The first phase of this project—the initial compilation of the benchmark data—has been made available to cooperating stakeholders. FHWA intends to seek a third-party sponsor in 2021 to maintain the data source and extend availability to all interested researchers.

Transportation Infrastructure Finance and Innovation Act

TIFIA is one of the most-used Federal credit assistance programs. Created as part of the 1998 Transportation Equity Act for the 21st Century (TEA-21, Pub. L. 105-178), the TIFIA credit program provides Federal credit assistance in the form of direct loans, loan guarantees, and standby lines of credit to finance surface transportation projects of national and regional significance. The program is designed to accelerate project delivery and leverage private co-investment by providing supplemental and subordinate capital. A TIFIA project must pledge repayment in whole or in part with dedicated revenue sources, such as tolls, user fees, special assessments (taxes), or other non-Federal sources.

From FY 1999 through the end of FY 2017, the TIFIA program provided $27.0 billion in 74 loans supporting $105.0 billion in total project costs.[12] The majority of these, 47 loans totaling $17.2 billion, financed road and highway projects (which cost $61.9 billion). By mid-2018, 13 of those loans—totaling $3.5 billion and having helped to finance $15.0 billion worth of transportation infrastructure—had been retired. Of the 74 total loans made from FY 1999 through FY 2017, 16 were for Design-Build-Finance-Operate-Maintain (DBFOM) highway projects where the financing responsibility was given to private partners.

State Infrastructure Banks

SIBs enable States to use their Federal apportionments to establish a revolving fund that, much like a bank, can offer low-cost loans and other credit assistance to help finance highway and transit projects. As of September 2016, 33 States and territories had entered into an estimated 834 SIB loan agreements for a total of $5.9 billion.

[12] FHWA, table "Projects Financed by TIFIA," (https://www.transportation.gov/tifia/projects-financed); accessed June 20, 2018.

State Transportation Funding Actions

According to U.S. DOT Highway Statistics from 2015, all 50 States and the District of Columbia made use of revenues raised from fuel taxes and from vehicle and motor carrier taxes. In addition, 30 States used tolls to raise revenues, 35 used appropriations from their general funds, and 33 made use of bond proceeds for transportation investment.

States have seen increased legislative activity around the other revenue sources used to fund transportation beyond fuel taxes. NCSL reports that in 2017, 145 tolling measures had been introduced and 14 of them enacted; 27 bonding initiatives had been introduced; and nine bills were introduced relating to vehicle miles traveled.[13] As part of a larger shift in focus to leverage private-sector funds and make use of alternative financing mechanisms, many States are issuing bonds or making use of Federal financing tools. More than half of the States issue either general obligation bonds or revenue bonds to finance roads and bridges according to a 2016 AASHTO report. At least half have also used Build America Bonds or GARVEE bonds.

Exhibit 2-20 ■ State Use of Financing Mechanisms for Roads and Bridges

Category	State Use of Financing Mechanisms for Roads and Bridges					
	State Bonding		Federal Tools			
	General Obligation Bonds	Revenue Bonds	Build America Bonds	GARVEE	Private Activity Bonds	TIFIA Credit Assistance
Number of States Using Finance Mechanism[1]	28	31	31	28	6	15

[1] Including the District of Columbia.

Source: Transportation Governance and Finance: A 50-State Review of State Legislatures and Departments of Transportation (AASHTO, 2016).

Value Capture

Transportation improvements increase accessibility and thereby make surrounding locations more desirable, increasing the value of nearby land and property. Value capture techniques harness a portion of the increased property values to pay for the transportation improvement or for future transportation investment. Although value capture techniques are used more commonly with transit projects, they are also used to fund highway improvements. Several different forms of value capture are used in the United States. The most common are noted below.

Right-of-Way Use Agreements (Air Rights)

Right-of-way use agreements, often referred to as air rights, involve the sale or lease of development rights in urban centers. The amount of built space that can be constructed on an air rights parcel (both above and below the surface) is determined by the site's zoning designation. Highway and transit agencies in the United States have used four models for extracting value from air rights: (1) one-time, up-front lease payments; (2) long- and short-term leases that provide access to land and air space for a specified period of time, usually with renewal options; (3) direct sale to a private developer, who then provides a long-term or perpetual easement to the public agency; and (4) sale of the air rights above the property with a grant of easement where the land owner gives a nonpossessory interest to the developer to use the air rights and have access to the ground for construction.

[13] National Conference of State Legislatures, "Transportation Funding And Finance State Bill Tracking Database," (http://www.ncsl.org/research/transportation/ncsl-transportation-funding-finance-legis-database.aspx#graph). Accessed June 1, 2018.

Development Impact Fees

Development impact fees are one-time charges levied by local governments on new development to help municipalities recover growth-related infrastructure and public service costs. They differ from other forms of value capture in that impact fees can be used to pay for off-site services such as local roads, schools, or parks. Development impact fees are used by local governments throughout the United States to fund transportation improvements.

Joint Development

Joint development involves the development of a transportation project and adjacent complementary private real estate development in which a private developer either implements the real estate improvement directly or gives money to a public-sector sponsor to offset the costs. Joint development is most common at transit stations. The two main forms of joint development are revenue-sharing arrangements and cost-sharing arrangements. When joint development involves private funding of public transportation improvements, it is a form of public-private partnership.

Negotiated Exactions

Negotiated exactions involve payments made by a developer as a condition for receiving municipal approvals. Negotiated exactions are determined on an ad hoc basis for individual projects, usually as part of the development approval process. They often take the form of one-time land transfers or cash payments, but may also involve construction activities or the provision of public services. Exactions have been used to contribute to the financing of transit stations, local roads, sidewalks, streetlights, and local water and sewer lines.

Sales Tax Districts

Sales tax districts levy an incremental sales tax on goods sold within a designated area. The additional tax revenue is then used to support the development of infrastructure improvements. The sales tax service area can be expected to derive benefits from the infrastructure improvements it helps to fund. Sales tax districts may also be implemented on a larger scale, such as a municipality or county. The incremental sales tax rate is established by statute. Sales tax district statutes also identify which types of investments the resulting funds may be used to support. Sales tax districts have been used to support transportation investments in Missouri, Kansas, Illinois, and Georgia, among other locations.

Special Assessments

Special assessments involve assessing incremental property taxes on land and buildings deriving direct benefits due to a transportation improvement. The tax levied typically represents a portion of the estimated benefit to the properties located with a designated zone in close proximity to the improvement. Special assessments are one of the most prominent forms of value capture in the United States and are authorized in all 50 States and the District of Columbia, either under explicit enabling legislation or by State constitutional provisions. In addition to transportation improvements, special assessments may also be used in other sectors, including water and wastewater.

Tax Increment Financing

Tax increment financing (TIF) is a value capture revenue tool that uses taxes on future gains in real estate values to pay for new infrastructure improvements; it creates funding for public or private projects by borrowing against the future increase in these property tax revenues. The intent is for the improvement to enhance the value of existing properties and encourage new development in the district. TIF is authorized by State law in nearly all 50 States and thousands have been established around the United States. TIF begins with the designation of a geographic area as a TIF district, usually established for a period of 20 to 25 years, during which time all incremental real estate tax revenues above the base rate at the time the district is established flow into the TIF district.

Although TIF has not been used extensively to fund transportation infrastructure, some State laws specifically authorize the use of TIF for transport purposes.

Transportation Utility Fees

Transportation utility fees are a financing mechanism that treats the transportation system like a utility in which residents and businesses pay fees based on their use of the transportation system rather than taxes based on the value of property they occupy. Transportation utility fee rates may be determined by the number of parking spaces, square footage, or gross floor area. The fees are paid on an ongoing monthly basis like a utility bill, instead of annual or quarterly installments the way real estate taxes are collected.

Funding – Transit

Transit funding comes from two major sources: public funds allocated by Federal, State, and local governments, and system-generated revenues earned from providing transit services. As shown in *Exhibit 2-21,* $65.1 billion was available for transit funding in 2016. Federal funding for transit includes fuel taxes dedicated to transit from the Mass Transit Account (MTA) of the Highway Trust Fund and General Fund appropriations. State and local governments also provide funding for transit from their General Fund appropriations and from fuel, income, sales, property, and other taxes, specific percentages of which can be dedicated to transit. These percentages vary considerably among taxing jurisdictions and by type of tax. Other public funds, from toll revenues and other sources, also may be used to fund transit. Most revenues classified as directly generated funds are passenger fares, comprising system-generated revenues, although transit systems earn additional revenues from advertising and concessions, park-and-ride lots, investment income, and rental of excess property and equipment.

KEY TAKEAWAYS

- Capital and operating expenses for transit in 2016 totaled $66.9 billion, including $18.2 billion for capital and $48.7 billion for operating expenses.
- Passenger fares contributed $15.8 billion, or 24 percent of all transit funds. Other directly generated funds such as parking revenues, concessions, and other sources contributed $9.0 billion, or 14 percent.
- Public assistance accounted for 62 percent of all funds, of which Federal funds accounted for 30 percent, State for 32 percent, and local for 38 percent.
- Capital investment grew at an average of 1.0 percent per year, from $15.2 billion in 2006 to $18.2 billion in 2016.
- Capital investments in rehabilitation of existing assets and expansion in 2016 were $12.7 billion and $6.7 billion, respectively, a 65/35-percent split. In 2006, the ratio was 73/27 percent.

Financial Indicators of the Top 10 Transit Agencies

- The average recovery ratio (fare revenues per total operating expenses) of the top 10 transit agencies ranged between 42 percent to 46 percent over the period 2016–2016.
- Average fare revenues per mile increased by 40 percent, from $4.65 per mile in 2006 to $6.20 per mile in 2016 (constant dollars).
- Operating costs per mile increased by 40 percent, from $10.10 per mile in 2006 to $14.10 per mile in 2016. Average labor costs for the top 10 transit agencies increased by 6.4 percent, from $9.40 per mile in 2006 to $10.00 per mile in 2016.

Exhibit 2-21 ■ Revenue Sources for Transit Funding, 2016

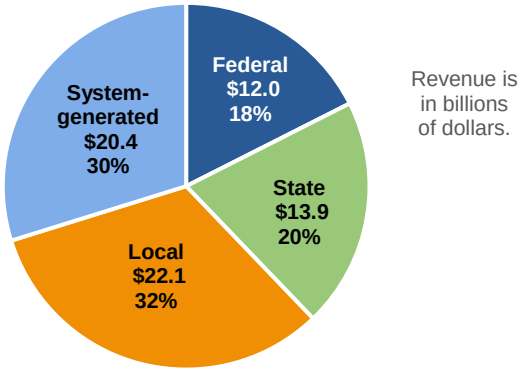
Category	Revenue Sources (Millions of Dollars)					Percent
	Directly Generated Funds	Federal	State	Local	Total	
Public Funds		**$11,999**	**$12,858**	**$15,473**	**$40,329**	**62%**
General Fund		$11,185	$3,674	$5,282	$20,141	31%
Fuel Tax			$1,121	$180	$1,302	2%
Income Tax			$515	$116	$630	1%
Sales Tax			$4,110	$7,440	$11,550	18%
Property Tax			$48	$615	$663	1%
Other Dedicated Taxes			$2,718	$963	$3,681	6%
Other Public Funds			$272	$252	$524	1%
Reduced Reporter Fed/State/Local		$814	$399	$625	$1,838	3%
System-generated Revenue	**$24,777**				**$24,777**	**38%**
Passenger Fares	**$15,789**				$15,789	24%
Other Revenue	**$8,988**				$8,988	14%
Total All Sources					**$65,107**	**100%**

Source: National Transit Database.

Level and Composition of Transit Funding

Exhibit 2-22 breaks down the sources of total urban and rural transit funding. In 2016, public funds of $40.3 billion were available for transit, accounting for 62 percent of total transit funding. Of this amount, Federal funding was $12.0 billion or 30 percent of total public funding and 20 percent of all funding from both public and nonpublic sources. State funding was $12.9 billion, accounting for 32 percent of total public funds and 18 percent of all funding. Local jurisdictions provided the bulk of transit funds at $15.5 billion in 2016, or 38 percent of total public funds and 24 percent of all funding. System-generated revenues were $24.8 billion or 38 percent of all funding.

Exhibit 2-22 ■ Public Transit Revenue Sources, 2016

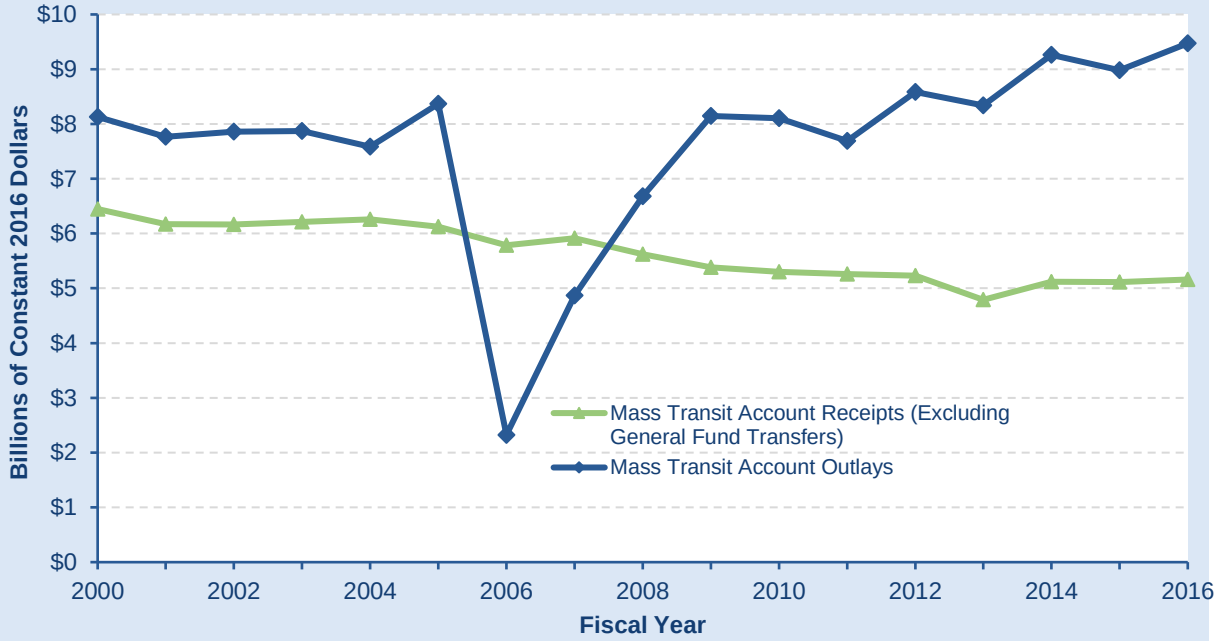


Source: National Transit Database.

How Long Has It Been since Excise Tax Revenue Deposited into the MTA Exceeded Expenditures?

The last time annual net receipts credited to the MTA of the Highway Trust Fund exceeded annual expenditures from the Highway Account was 2007. As shown in *Exhibit 2-23*, for nine of the 10 years since 2006, total annual receipts to the MTA from excise taxes and other income (including amounts transferred from the Highway Account) have been lower than the annual expenditures from the MTA.

Exhibit 2-23 ■ Mass Transit Account Receipts and Outlays, Fiscal Years 2000–2016



Note: As shown in 2016 constant dollars.

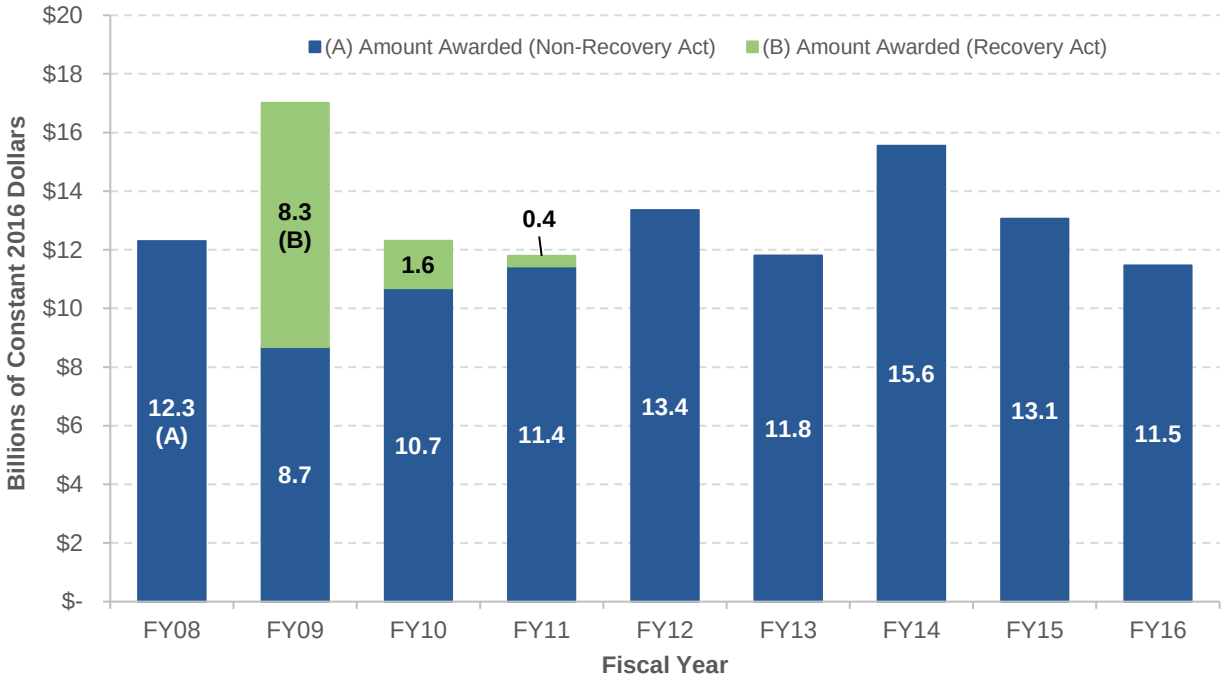
Sources: Highway Statistics, various years, Tables FE-210 (https://www.fhwa.dot.gov/policyinformation/statistics/2015/fe210.cfm) and FE-10 (https://www.fhwa.dot.gov/policyinformation/statistics/2016/fe10.cfm); Bureau of Labor Statistics Consumer Price Index. .

Federal Funding

Federal funding for transit comes from two sources: the general revenues of the U.S. Government, and revenues generated from fuel taxes credited to the Highway Trust Fund's MTA. The largest part of the transit funding from the Highway Trust Fund is distributed to grantees by formula, which is legislatively defined. A smaller part is distributed competitively or at agency discretion.

General revenue sources include income taxes, corporate taxes, tariffs, fees, and other government income not required by statute to be accounted for in a separate fund. The Transit Account is generally the largest source of Federal funding for transit, although in 2009 the Transit Account contribution was surpassed by Recovery Act funds from the General Fund. *Exhibit 2-24* shows how Recovery Act funds were awarded in 2009, 2010, and 2011 compared with other Federal funding from the Transit Account and the General Fund. Of the funds authorized for transit grants in the Federal Transit Administration's (FTA's) 2012 budget, 81 percent were derived from the Transit Account. Funding from the Transit Account in nominal dollars increased from $0.5 billion in 1983 to $12.8 billion in 2012, increasing to $14.0 billion in 2016.

Exhibit 2-24 ■ Recovery Act Funding Awards Compared to Other FTA Fund Awards, 2008–2016



Note: Peak in FY2014 was due to funds awarded in response to Hurricane Sandy.
Sources: Federal Transit Administration, Grants Data; Bureau of Labor Statistics, Consumer Price Index.

Since 1973, Federal statutes authorizing surface transportation have contained flexible funding provisions that enable transfers from certain highway funds to transit programs and vice versa. Transfers are subject to State and regional/local discretion, and priorities are established through statewide transportation planning processes. All States participate in the flexible funding program, except Arkansas, Delaware, Hawaii, Nebraska, North Dakota, South Dakota, and Wyoming. U.S. territories, including American Samoa, Guam, the Northern Mariana Islands, Puerto Rico, and the Virgin Islands, also do not participate. Flexible funding transferred from highways to transit fluctuates from year to year and is drawn from several different sources.

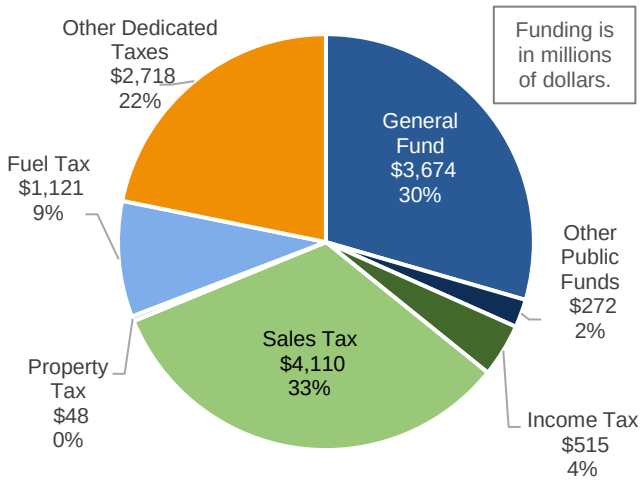
The Surface Transportation Block Grant Program is the primary source of Federal Highway Administration (FHWA) funds that are "flexed" to FTA to pay for transit projects. Funding may be used up to 80 percent of the eligible project costs. All capital and maintenance projects eligible for funds under current FTA programs are eligible for flex funds. These funds may not be used for operating assistance.

FHWA's Congestion Mitigation and Air Quality (CMAQ) Improvement Program funds are another source of flexed funds to support transit projects in air quality nonattainment areas. A CMAQ project must contribute to the attainment of the National Ambient Air Quality Standards by reducing air pollutant emissions from transportation sources. Capital and maintenance projects can be funded through CMAQ, which also includes some provision for transit operating assistance.

State and Local Funding

General funds and other dedicated public funds (vehicle licensing and registration fees, communications access fees, surcharges and taxes, lottery and casino receipts, and proceeds from property and asset sales) are important sources of funding for transit at both the State and local levels. State and local funding sources for transit are shown in *Exhibit 2-25*. Taxes—including fuel, sales, income, property, and other dedicated taxes—provide 65.3 percent of public funds for State and local sources. General funds provide 32.8 percent of transit funding, and other public funds provide the remaining 1.9 percent.

Exhibit 2-25 ■ State and Local Sources of Transit Funding, 2016



Source: National Transit Database.

System-generated Funds

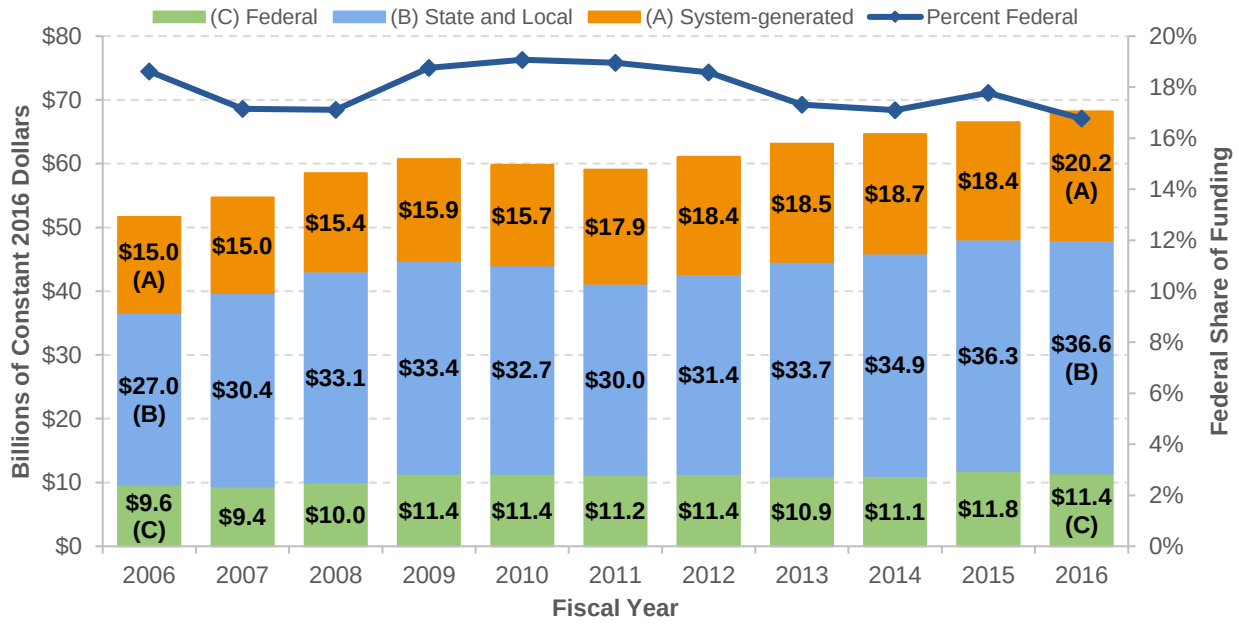
In 2016, system-generated funds were $24.7 billion and provided 38.1 percent of total transit funding. Passenger fares contributed $15.8 billion, accounting for 24.3 percent of total transit funds. These passenger fare figures do not include payments by State entities to transit systems that offset reduced transit fares for certain segments of the population, such as students and the elderly. These payments are included in the "other revenue" category.

Trends in Funding

Between 2006 and 2016, public funding for transit increased at an average annual rate of 2.7 percent, Federal funding increased at an average annual rate of 1.7 percent, and State and local funding increased at an average annual rate of 3.1 percent after adjusting for inflation (constant dollars). These trends are suggested in *Exhibit 2-26*.

Federal funding for transit, as a percentage of total funding for transit from Federal, State, and local sources combined, reached a peak of 43 percent in the late 1970s, and declined to near its present value by the early 1990s. State and local funding increased during this same period. *Exhibit 2-26* shows that, since 2006, the Federal government has provided between 17 and 19 percent of total funding for transit (including system-generated funds). In 2016, it provided 17 percent.

Exhibit 2-26 ■ Funding for Urban Transit by Government Jurisdiction, 2006–2016



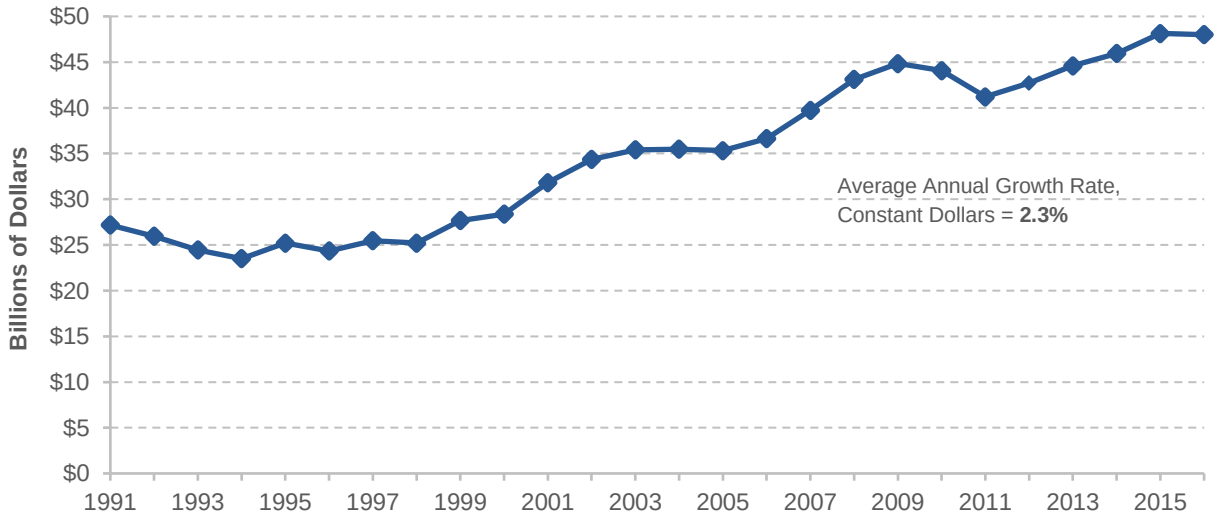
Note: Rural transit not included because the data were not reported to NTD prior to 2007.

Sources: National Transit Database; Bureau of Labor Statistics, Consumer Price Index.

Funding in Constant Dollars

Public funding for transit in constant (adjusted for inflation) dollars since 1991 is presented in *Exhibit 2-27*. Total public funding for transit was $48.0 billion in 2016. The growth in total funding accelerated during the period 2009–2010, slowed, and then turned negative over the 2010–2011 period, coinciding with the increase in Federal funding under the Recovery Act and a decline in State funding during the economic downturn. Funding has since returned to positive growth.

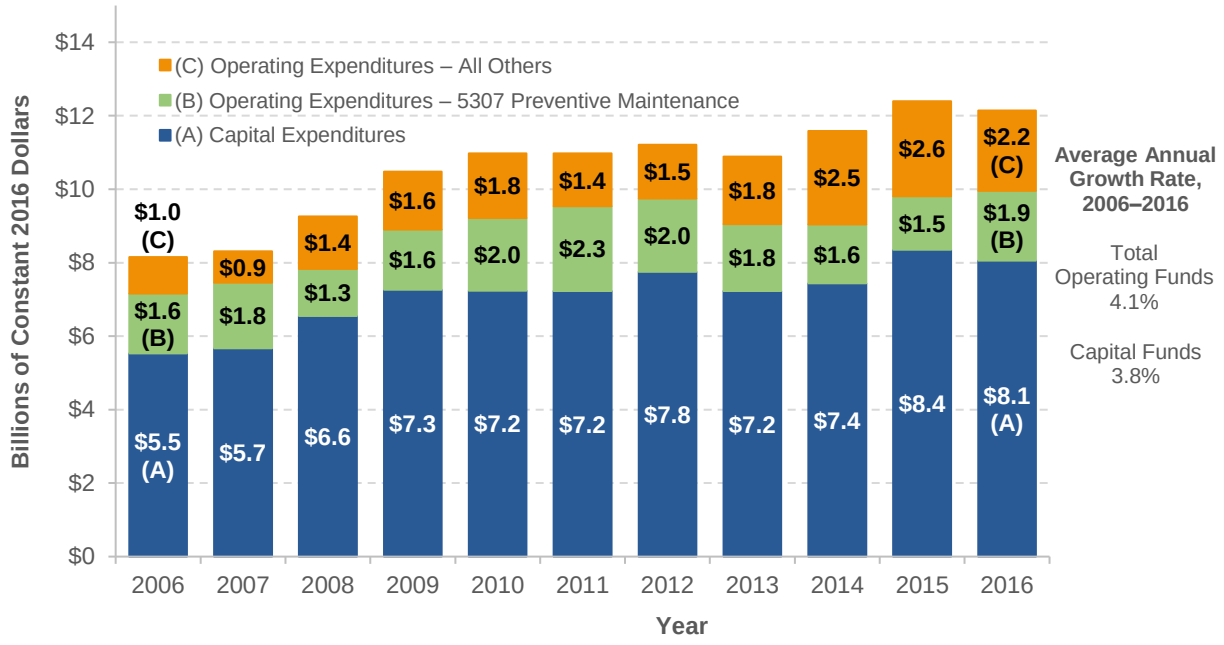
Exhibit 2-27 ■ Constant 2016 Dollar Public Funding for Public Transportation, 1991–2016 (All Sources)



Source: National Transit Database.

Federal funds directed to capital expenditures increased at an average annual rate of 3.8 percent from 2006 to 2016, while capital funds applied to operating expenditures increased by 4.1 percent annually during the same period (constant dollars). As indicated in *Exhibit 2-28*, $2.2 billion was applied to operating expenditures and $8.1 billion was applied to capital expenditures in 2016. Close to half of the operating expenditures were for preventive maintenance, which is reimbursed as a capital expense under FTA's 5307 grant program.

Exhibit 2-28 ■ Applications of Federal Funds for Transit Operating and Capital Expenditures, 2006–2016



Source: National Transit Database.

Capital Funding and Expenditures

Funding for capital investments by transit operators in the United States comes primarily from public sources. A relatively small amount of private-sector funding for capital investment in transit projects is generated through innovative financing programs.

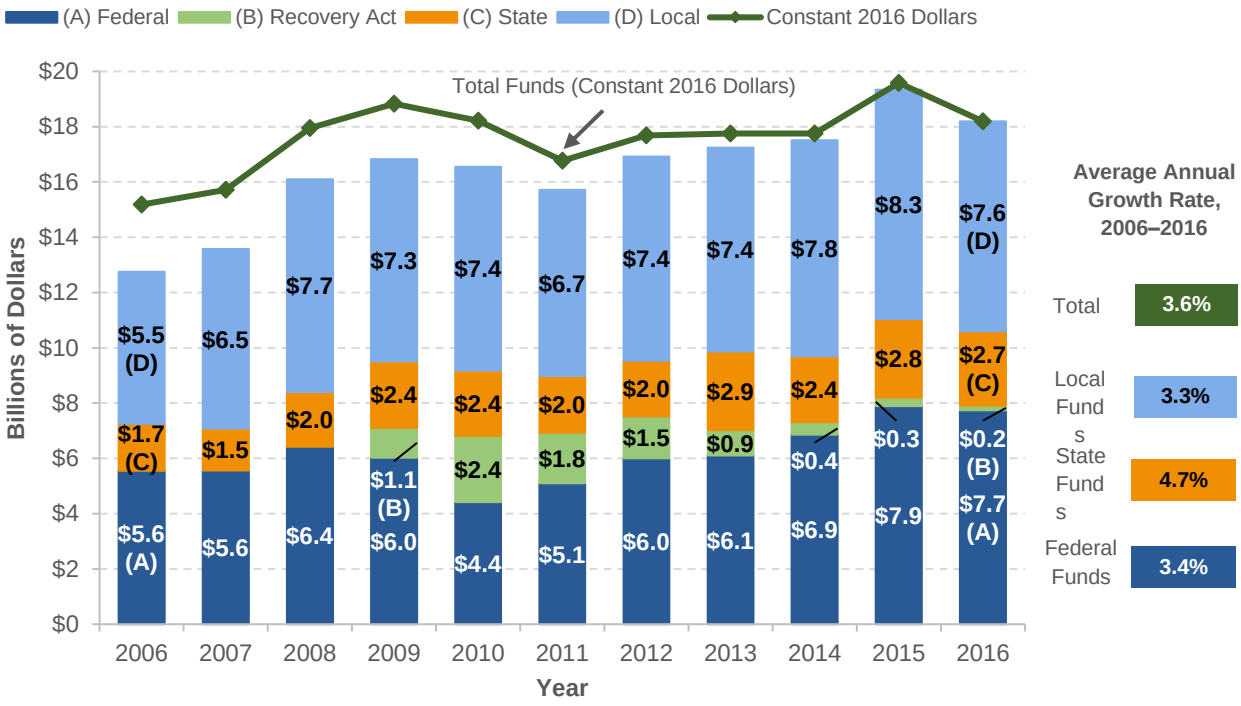
Capital investments include the design and construction of new transit systems, extensions of existing systems, and the modernization or replacement of existing assets. Capital investment expenditures can be made for the acquisition, renovation, and repair of vehicles (e.g., buses, railcars, locomotives, and service vehicles) or fixed assets (e.g., guideway elements, track, stations, and maintenance and administrative facilities).

As shown in *Exhibit 2-29*, total public transit agency expenditures for capital investment were $18.2 billion in 2016. This expenditure accounted for 27.9 percent of total available funds for transit. Federal funds provided $7.7 billion in 2016, accounting for 42.5 percent of total transit agency capital expenditures. State funds provided 14.7 percent and local funds provided 41.7 percent of total transit funding. Recovery Act funds provided the remaining 1.0 percent of revenues for agency capital expenditures in 2016 (constant dollars).

In 2010 and 2011, substantial amounts of Recovery Act funds were expended, and non-Recovery Act Federal funds decreased compared with levels in previous years. This decrease in the use of other Federal funds was likely related to the strict 2-year obligation limit specified for Recovery Act funds; these funds had to be used first due to their short period of availability. In 2012 and

thereafter, as most of the Recovery Act funds had been expended, expenditures using non-Recovery Act Federal funds returned to pre-2009 levels. Over the period 2006 to 2016, State funding for transit capital investments grew at a faster rate (4.7 percent) than did Federal or local funding (3.4 and 3.3 percent, respectively).

Exhibit 2-29 ■ Sources of Funds for Urban Transit Capital Expenditures, 2006–2016



Note: Rural transit not included because the data were not reported to NTD prior to 2007.
Sources: National Transit Database; Bureau of Labor Statistics, Consumer Price Index.

As shown in *Exhibit 2-30*, rail modes account for approximately three-quarters of transit capital expenditures. This is due to the higher cost of building fixed guideways and rail stations, and because fixed-route bus systems typically do not pay to build or maintain the roads on which they run.

In 2016, $14.1 billion, or 72.4 percent of total transit capital expenditures, was invested in rail modes of transportation, compared with the $5.3 billion, or 27.1 percent of the total, invested in nonrail modes. This investment distribution has been consistent over the past decade.

Fluctuations in the levels of capital investment in different types of transit assets reflect normal rehabilitation and replacement cycles and new investment.

Total guideway investment was $7.7 billion in 2016, and total investment in systems was $1.7 billion. Guideway includes at-grade rail, elevated structures, tunnels, bridges, track, and power systems for all rail modes, as well as paved highway lanes dedicated to fixed-route buses. Investment in systems by transit operators includes groups of devices or objects forming a network, most notably for train control, signaling, and communications. Total capital investment in rolling stock, both rail and nonrail, was only 25 percent of total transit capital investment.

How Does FTA Fund Major Transit Construction Projects?

FTA provides funding for the design and construction of light rail, heavy rail, commuter rail, streetcar, bus rapid transit, and ferry projects through a discretionary grant program known as Capital Investment Grants. Title 49 U.S.C. Section 5309 provides funds for new transit systems, extensions to current systems, and capacity expansion projects on existing transit lines currently at or over capacity. These types of projects are known more commonly as "New Starts," "Small Starts," and "Core Capacity" projects.

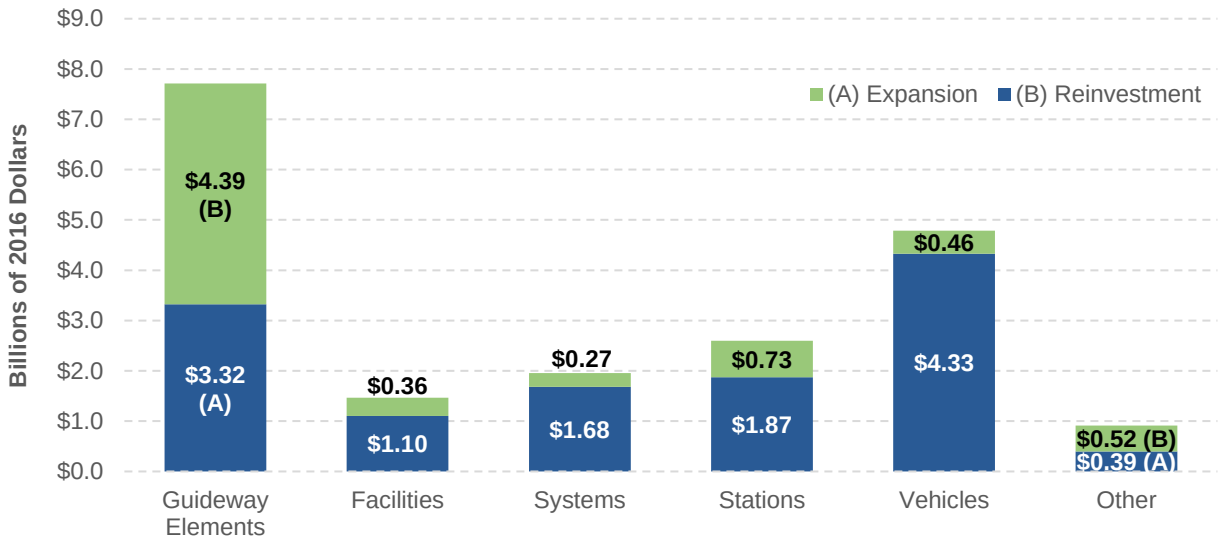
To receive funds from the Capital Investment Grant program, the proposed project must emerge from the metropolitan or statewide planning process and proceed through a multiyear, multistep process outlined in law, which includes a detailed evaluation and rating of the project by FTA. FTA evaluates proposed projects based on financial criteria and project justification criteria as prescribed by statute.

Under current law, Capital Investment Grant funding may not exceed 80 percent of a project's total capital cost. Generally, however, the Capital Investment Grant program share of such projects averages about 50 percent, due to the overwhelming demand for funds nationwide. Funds are typically provided over a multiyear period rather than all at once, due to the size of the projects and the size of the overall annual program funding level.

Most, but not all, major transit capital projects are constructed using Capital Investment Grant program funds, but some project sponsors choose to use other sources such as the FTA Urbanized Area Formula funds program. In 2016, total investment in vehicles, stations, and maintenance facilities was $4.7 billion, $2.6 billion, and $1.2 billion, respectively. "Vehicles" include the bodies and chassis of transit vehicles and their attached fixtures and appliances, but do not include fare collection equipment and movement control equipment, which are lumped under "Systems." "Stations" include station buildings, platforms, shelters, parking and other forms of access, and crime prevention and security equipment at stations. "Facilities" include the purchase, construction, and rehabilitation of administrative and maintenance facilities. Facilities also include investment in building structures, climate control, parking, yard track, vehicle and facilities maintenance equipment, furniture, office equipment, and computer systems.

"Other capital expenditures" include those associated with general administration facilities, furniture, equipment that is not an integral part of buildings and structures, data processing equipment, and shelters located at on-street bus stops. "Data processing equipment" includes computers and peripheral devices for which the sole use is in data processing operations.

Exhibit 2-30 ■ Urban Transit Capital Expenditures by Type, 2016



Other: These expenditures include furniture and equipment that are not an integral part of buildings and structures; they also include shelters, signs, and passenger amenities (e.g., benches) not in passenger stations.

Source: National Transit Database.

Exhibit 2-31 shows yearly capital expenditures for rehabilitation or expansion by mode. Rehabilitation expenses are those dollars used to replace service directly or to maintain existing service. Expansion expenses are those used to increase service. Examples of expansion expenses include procuring additional buses to create a new route, building a new rail line, or constructing an additional rail station on an existing rail line.

Exhibit 2-31 ■ Urban Capital Expenditures Applied by Rehabilitation or Expansion by Mode, 2006–2016

Category	Expenditures (Millions of Constant 2016 Dollars)						
	2006	2008	2010	2012	2014	2016	Average Annual Rate of Change 2016/2006
Rail Rehabilitation	$7,272	$8,678	$6,835	$5,776	$6,815	$7,953	0.9%
Rail Expansion	$3,705	$5,025	$6,289	$6,900	$6,137	$6,185	5.3%
Rail Total	**$10,977**	**$13,703**	**$13,124**	**$12,676**	**$12,953**	**$14,138**	**2.6%**
Nonrail Rehabilitation	$3,673	$3,605	$4,548	$4,347	$4,333	$4,756	2.6%
Nonrail Expansion	$423	$627	$554	$569	$350	$531	2.3%
Nonrail Total	**$4,096**	**$4,232**	**$5,103**	**$4,916**	**$4,683**	**$5,287**	**2.6%**
Rehabilitation Total	**$10,945**	**$12,283**	**$11,384**	**$10,123**	**$11,148**	**$12,709**	**1.5%**
Expansion Total	**$4,128**	**$5,652**	**$6,843**	**$7,469**	**$6,487**	**$6,717**	**5.0%**
Grand Total	**$15,073**	**$17,935**	**$18,227**	**$17,592**	**$17,635**	**$19,425**	**2.6%**

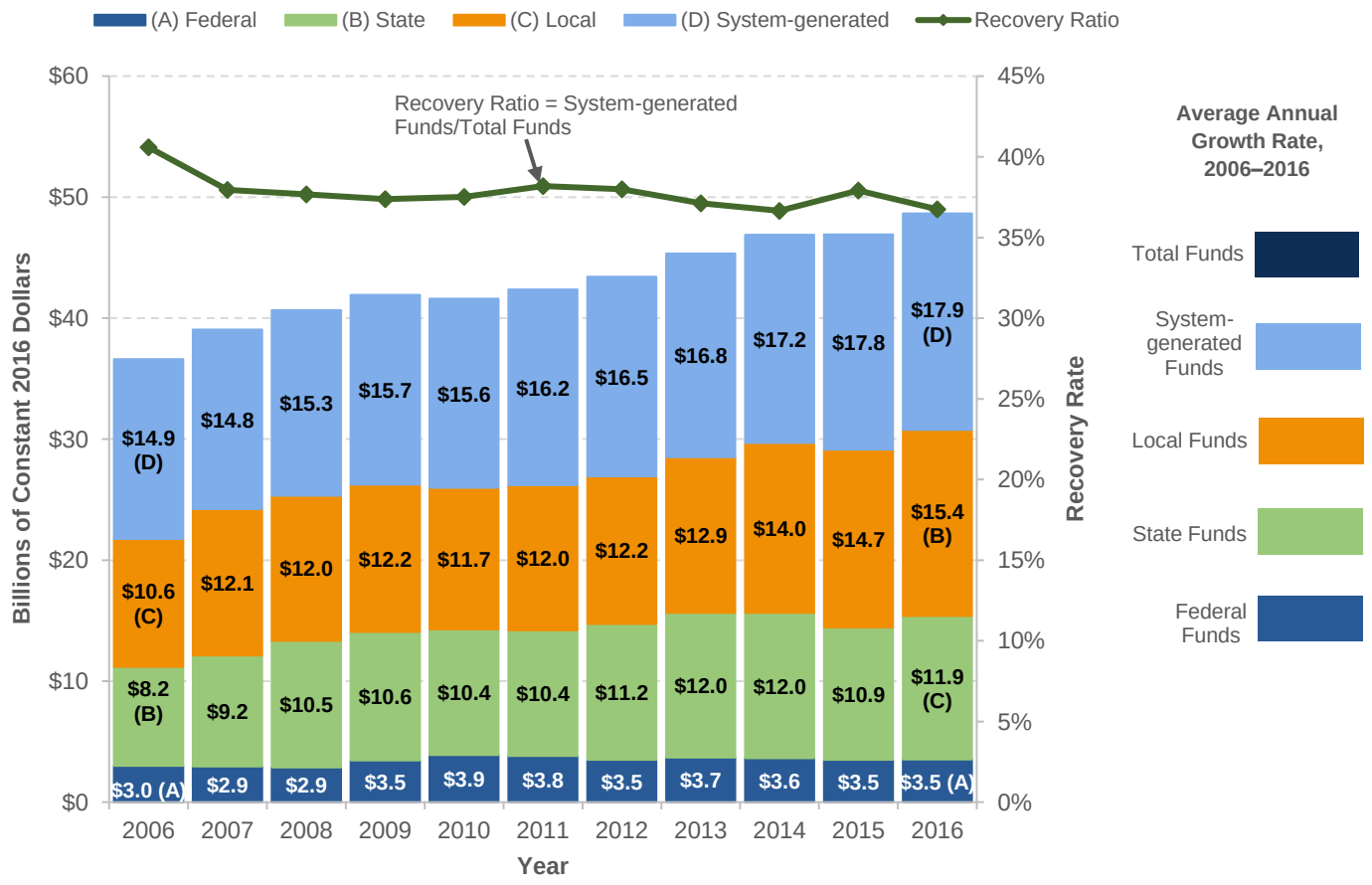
Sources: National Transit Database; Bureau of Labor Statistics Consumer Price Index.

After adjusting for inflation (constant dollars), total capital expenditures from 2006 to 2016 have increased by an annual average of 2.6 percent. Although rehabilitation expenses over this period have decreased slightly, service expansion investment, particularly in rail modes, has increased considerably. Average annual expenses for rail expansion had the largest increase over this time, with an average annual increase in expansion expenses of 5.3 percent.

Operating Expenditures

Transit operating expenditures include wages, salaries, fuel, spare parts, preventive maintenance, support services, and certain leases used in providing transit service. As indicated in *Exhibit 2-32*, $48.7 billion was available for operating expenses in 2016. The Federal share of operating expenses decreased from 9.4 percent in 2010 to 7.2 percent in 2016. The Urbanized Area Formula Program (Title 49 U.S.C. Section 5307) contributed 46 percent of all Federal funds for operating assistance. This program includes operating assistance for urbanized areas with populations less than 200,000, systems with fewer than 100 vehicles in urbanized areas (UZAs) with populations over 200,000, and capital funds eligible for operating assistance, such as preventive maintenance. Funds for the Rural Program (Title 49 U.S.C. Section 5311) contributed 4 percent, and funds from the State of Good Repair Program (Title 49 U.S.C. Section 5337), 34 percent. The remaining 15 percent included FTA, DOT, and other Federal funds. The share generated from system revenues decreased slightly from 38.0 percent in 2012 to 36.8 percent in 2016. The State share remained relatively stable, decreasing from 26.4 percent in 2013 to 24.4 percent in 2016. The local share of operating expenditures increased marginally from 28.1 percent in 2012 to 31.6 percent in 2016.

Exhibit 2-32 ■ Sources of Funds for Transit Operating Expenditures, 2006–2016



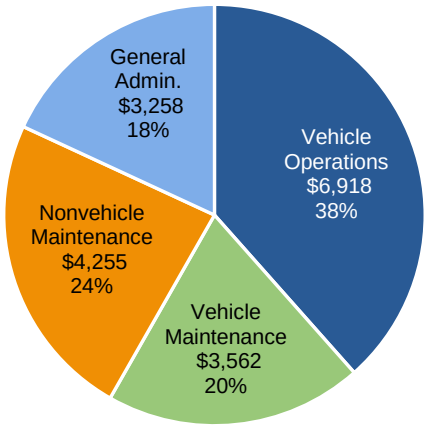
Sources: National Transit Database; Bureau of Labor Statistics Consumer Price Index.

Operating Expenditures by Type of Cost

Exhibits 2-33 and *2-34* illustrate how road and rail operations have inherently different cost structures because, in most cases, roads are not maintained by the transit provider, but tracks are. A significantly higher percentage of expenditures for rail modes of transportation is classified as nonvehicle maintenance, corresponding to the repair and maintenance costs of fixed guideway systems.

Exhibit 2-33 ■ Rail Operating Expenditures by Type of Cost, 2016

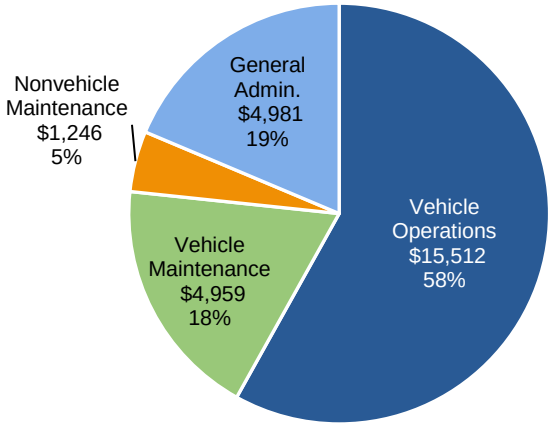
Total Expenditures: $17,992
Expenditures are in millions of dollars



Source: National Transit Database.

Exhibit 2-34 ■ Nonrail Operating Expenditures by Type of Cost, 2016

Total Expenditures: $26,698
Expenditures are in millions of dollars.



Note: Does not include rural agencies and agencies operating fewer than 30 peak vehicles.

Source: National Transit Database.

Cost Efficiency, Cost Effectiveness, and Service Effectiveness

Cost Efficiency is the relationship between cost inputs such as labor, fuel, and capital to service outputs such as vehicle miles and hours. Common metrics include labor expenses per hour and services per mile.

Cost Effectiveness is the relationship between cost inputs to service consumption, such as linked trips (number of boardings) and unlinked trips (one trip from origin to destination regardless of how many modes were used), and passenger miles. Common metrics are operating cost per trip and per passenger mile.

Service Effectiveness links service outputs to service consumption. Common metrics are trips per hour and passenger miles per revenue mile (load factor).

Operating Expenditures per Vehicle Revenue Mile

Operating expenditures per vehicle revenue mile (VRM) is one measure of financial or cost efficiency. As shown in *Exhibit 2-35*, operating expenditures per VRM for all transit modes combined were $10.53 in 2016. The average annual increase in operating expenditures per VRM for all modes combined between 2006 and 2016 was 1.0 percent in constant dollars.

Exhibit 2-35 ■ Urban Operating Expenditures per Vehicle Revenue Mile, 2006–2016

Mode	Expenditures (Millions of Constant 2016 Dollars)						
	Heavy Rail	Commuter Rail	Light Rail[1]	Fixed-Route Bus[2]	Demand Response[3]	Other[4]	Total
2006	$9.93	$15.63	$17.45	$9.99	$4.90	$4.76	**$9.50**
2007	$10.68	$15.62	$16.34	$10.14	$4.66	$6.01	**$9.67**
2008	$10.42	$15.50	$16.25	$10.30	$4.64	$5.48	**$9.62**
2009	$10.59	$16.28	$17.68	$10.48	$4.73	$5.12	**$9.76**
2010	$10.83	$16.12	$18.28	$10.62	$4.86	$4.98	**$9.89**
2011	$11.18	$16.06	$17.92	$10.56	$4.63	$4.70	**$9.79**
2012	$11.44	$16.26	$18.09	$10.59	$4.62	$4.80	**$9.85**
2013	$12.86	$16.69	$17.70	$10.65	$4.54	$4.66	**$10.11**
2014	$13.34	$17.00	$18.27	$10.80	$4.55	$4.65	**$10.30**
2015	$13.41	$17.02	$18.64	$10.83	$4.52	$4.94	**$10.35**
2016	$14.02	$17.34	$19.41	$10.91	$4.47	$4.98	**$10.53**
Average Annual Rate of Change 2016/2006	**3.5%**	**1.0%**	**1.1%**	**0.9%**	**-0.9%**	**0.4%**	**1.0%**

[1] Includes light rail, hybrid rail, and streetcar rail.

[2] Includes bus, bus rapid transit, and commuter bus.

[3] Includes demand response and demand response-taxi.

[4] Includes aerial tramway, Alaska railroad, cable car, ferryboat, inclined plane, monorail/automated guideway, público, trolleybus, and vanpool.

Sources: National Transit Database; Bureau of Labor Statistics, Consumer Price Index.

Exhibit 2-36 provides a range of service efficiency and effectiveness measures for two groups of aggregate data: Top 10 agencies (by ridership) as of 2016, and the national total of all urban and rural agencies in the United States. The table highlights several differences between the top 10 operators and the national average. For example, fare revenue per mile, farebox recovery, and average trips per hour are all higher for the top 10 compared with the national average, reflecting the high population densities (higher vehicle occupancies) and a larger share of riders traveling by rail (higher vehicle capacities) in the urban areas served by the top 10 operators. Similarly, the higher use of rail by the top 10 is also reflected in the operating cost per mile. In contrast, the cost per trip is higher for the national average, reflecting both lower vehicle occupancies and the dominance of bus services (and hence higher labor costs per vehicle) outside of the top 10 markets. Finally, fare revenues and costs have increased by as much as 40 percent over the period 2006 to 2016, whether assessed on a per mile or per trip basis.

As shown in *Exhibit 2-37*, analysis of the NTD reports for the top 10 transit agencies shows that the growth in operating expenses is led by the cost of fringe benefits, which have been increasing at a rate of 1.6 percent per year above inflation (constant dollars) since 2006. By comparison, average salaries at these 10 agencies decreased at an inflation-adjusted rate of 0.1 percent per year in that period. FTA does not collect data on the different components of fringe benefits, but increases in the cost of medical insurance typically drive growth rates in fringe benefits across the economy and likely drive the growth in this category. As illustrated in *Exhibit 2-38*, rail systems are more cost-efficient in providing service than are nonrail systems, once investment in rail infrastructure has been completed. (Indeed, this is one of the explicit tradeoffs that agencies consider when deciding whether to construct or expand an urban rail system.) Based on operating costs alone, heavy rail is the most efficient at providing transit service, and demand-response systems are the least efficient. It should be noted that the average capacities for all vehicle types are adjusted separately each year based on reported fleet averages.

Average Fares and Operating Costs, on a per-mile Basis, for the Nation's 10 Largest Transit Agencies

After adjusting for inflation, fares per mile have increased by 1.3 percent yearly from 2006 to 2016, whereas the average cost per mile has increased by 1.5 percent yearly. The result is a 0.2 percent yearly decrease in the "fare recovery ratio," which is the percentage of operating costs that passenger fares cover. The 2016 fare recovery ratio for these 10 agencies, which are all rail, was 45.1 percent. These agencies are more cost- and service-effective than the national average, which means that ridership grows at a rate greater than the rate of increase in service miles or operating expenses.

Exhibit 2-36 ■ Top 10 Agencies vs All Urban and Rural Agencies in the United States, 2006–2016

Category	Report Year											Average Annual Percent Increase	Percent Increase 2006–2016
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016		
Top 10 US Transit Operators													
Average Fare per Mile	$5.82	$5.57	$5.54	$5.55	$5.78	$6.25	$6.29	$6.52	$6.54	$6.65	$6.61	1.3%	13.5%
Average Cost per Mile	$12.60	$13.05	$12.73	$12.91	$13.18	$13.36	$13.70	$13.86	$14.18	$14.14	$14.66	1.5%	16.3%
Average Farebox Recovery Ratio	46.2%	42.7%	43.6%	43.0%	43.8%	46.8%	45.9%	47.1%	46.1%	47.0%	45.1%	-0.2%	-2.4%
Average Trips per Hour	60.9	63.9	63.3	60.4	62.4	63.8	66.0	65.3	65.5	63.3	62.3	0.2%	2.3%
Average Cost Per Trip	$3.03	$2.97	$2.94	$3.12	$3.12	$3.07	$3.06	$3.12	$3.19	$3.29	$3.43	1.3%	13.3%
Average Fare Per Trip	$1.40	$1.27	$1.28	$1.34	$1.37	$1.44	$1.40	$1.47	$1.47	$1.55	$1.55	1.0%	10.6%
National (All Urban and Rural Agencies)													
Average Fare per Mile	$3.37	$2.93	$2.92	$2.95	$2.99	$3.16	$3.20	$3.31	$3.32	$3.40	$3.34	-0.1%	-1.1%
Average Cost per Mile	$9.41	$8.62	$8.56	$8.62	$8.61	$8.63	$8.75	$8.84	$9.04	$9.37	$9.54	0.1%	1.4%
Average Farebox Recovery Ratio	35.8%	34.0%	34.2%	34.3%	34.7%	36.7%	36.6%	37.5%	36.8%	36.3%	35.0%	-0.2%	-2.4%
Average Trips per Hour	38.0	36.4	35.8	34.6	34.5	35.0	35.9	35.6	35.6	34.4	33.3	-1.3%	-12.5%
Average Cost Per Trip	$3.68	$3.60	$3.60	$3.78	$3.83	$3.76	$3.75	$3.81	$3.90	$4.17	$4.36	1.7%	18.3%
Average Fare Per Trip	$1.32	$1.23	$1.23	$1.30	$1.33	$1.38	$1.37	$1.43	$1.43	$1.51	$1.52	1.4%	15.4%

Note: Top 10 transit systems are MTA New York City, Chicago Transit Authority, Los Angeles County Metropolitan Transportation Authority, Washington Metropolitan Area Transit Authority, Massachusetts Bay Transportation Authority, Southeastern Pennsylvania Transportation Authority, New Jersey Transit Corporation, San Francisco Municipal Transportation Agency, Metropolitan Atlanta Rapid Transit Authority, and Maryland Transit Administration.

Sources: National Transit Database; Bureau of Labor Statistics, Consumer Price Index.

Exhibit 2-37 ■ Top 10 Agencies—Urban Growth in Labor Costs, 2006–2016

Cost Component	Average Cost per Vehicle Mile (Constant 2016 Dollars)											% Growth since 2006	Average Annual Rate of Change
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016		
Salaries	$5.5	$5.6	$5.2	$5.2	$5.3	$5.3	$5.3	$5.1	$5.2	$5.4	$5.5	**-0.8%**	**-0.1%**
Fringe Benefits	$3.9	$4.1	$3.7	$3.9	$4.1	$4.3	$4.3	$4.1	$4.2	$4.3	$4.5	**16.8%**	**1.6%**
Total Labor Cost	**$9.4**	**$9.8**	**$8.9**	**$9.1**	**$9.4**	**$9.6**	**$9.6**	**$9.2**	**$9.5**	**$9.7**	**$10.0**	**6.4%**	**0.6%**

Note: Top 10 agencies are MTA New York City, Chicago Transit Authority, Los Angeles County Metropolitan Transportation Authority, Washington Metropolitan Area Transit Authority, Massachusetts Bay Transportation Authority, Southeastern Pennsylvania Transportation Authority, New Jersey Transit Corporation, San Francisco Municipal Transportation Agency, Metropolitan Atlanta Rapid Transit Authority, and Maryland Transit Administration.

Sources: National Transit Database; Bureau of Labor Statistics, Consumer Price Index.

Exhibit 2-38 ■ Transit Operating Expenditures per Capacity-equivalent Vehicle Revenue Mile by Mode, 2006–2016

Mode	Expenditures (Constant 2016 Dollars)						
	Heavy Rail	Commuter Rail	Light Rail[1]	Fixed-route Bus[2]	Demand Response[3]	Other[4]	Total
2006	$3.95	$5.76	$6.33	$9.85	$24.05	$10.12	**$7.35**
2007	$4.29	$5.68	$5.93	$9.72	$19.61	$11.60	**$7.44**
2008	$4.21	$5.67	$5.97	$9.88	$20.06	$12.67	**$7.51**
2009	$4.27	$5.91	$6.35	$10.04	$20.65	$12.72	**$7.66**
2010	$4.38	$5.88	$6.55	$10.15	$19.78	$12.31	**$7.76**
2011	$4.52	$5.84	$6.07	$10.09	$20.44	$11.45	**$7.75**
2012	$4.62	$5.80	$6.20	$10.20	$19.87	$12.10	**$7.83**
2013	$5.54	$5.86	$5.85	$10.35	$19.79	$12.20	**$8.18**
2014	$5.54	$5.76	$5.80	$10.55	$21.40	$12.05	**$8.31**
2015	$5.53	$5.75	$5.86	$10.55	$21.47	$12.42	**$8.31**
2016	$5.83	$5.85	$6.06	$10.62	$21.38	$12.89	**$8.48**
Average Annual Rate of Change 2016/2006	**4.0%**	**0.1%**	**-0.4%**	**0.8%**	**-1.2%**	**2.4%**	**1.4%**

[1] Includes light rail, hybrid rail, and streetcar rail.

[2] Includes bus, bus rapid transit, and commuter bus.

[3] Includes demand response and demand response-taxi.

[4] Includes aerial tramway, Alaska railroad, cable car, ferryboat, inclined plane, monorail/automated guideway, público, trolleybus, and vanpool.

Sources: National Transit Database; Bureau of Labor Statistics, Consumer Price Index.

Operating Expenditures per Passenger Mile

Operating expense per passenger mile is an indicator of the cost-effectiveness of providing a transit service. It shows the relationship between service inputs as expressed by operating expenses and service consumption as measured in passenger miles traveled. Operating expenditures per passenger mile for all transit modes combined increased at an average annual rate of 1.2 percent between 2006 and 2016 when adjusted for constant dollars (from $0.71 to $0.79). These data are shown in *Exhibit 2-39*.

Exhibit 2-39 ■ Urban Operating Expenditures per Passenger Mile, 2006–2016

Mode	Expenditures (Constant 2016 Dollars)						
	Heavy Rail	Commuter Rail	Light Rail[1]	Fixed-Route Bus[2]	Demand Response[3]	Other[4]	Total
2006	$0.43	$0.43	$0.68	$0.94	$3.95	$0.61	**$0.71**
2007	$0.42	$0.42	$0.70	$0.96	$3.86	$0.70	**$0.70**
2008	$0.41	$0.43	$0.67	$0.95	$3.78	$0.64	**$0.70**
2009	$0.42	$0.46	$0.72	$0.98	$3.88	$0.65	**$0.72**
2010	$0.43	$0.47	$0.77	$0.99	$4.00	$0.63	**$0.74**
2011	$0.41	$0.44	$0.72	$0.97	$3.90	$0.61	**$0.71**
2012	$0.42	$0.46	$0.72	$0.95	$3.96	$0.61	**$0.71**
2013	$0.47	$0.47	$0.74	$0.96	$3.99	$0.60	**$0.72**
2014	$0.48	$0.50	$0.76	$0.97	$3.99	$0.60	**$0.74**
2015	$0.50	$0.50	$0.81	$1.05	$4.03	$0.63	**$0.78**
2016	$0.52	$0.51	$0.85	$1.07	$3.96	$0.64	**$0.79**
Average Annual Rate of Change 2016/2006	**1.9%**	**1.6%**	**2.2%**	**1.3%**	**0.0%**	**0.4%**	**1.2%**

[1] Includes light rail, hybrid rail, and streetcar rail.

[2] Includes bus, bus rapid transit, and commuter bus.

[3] Includes demand response and demand response-taxi.

[4] Includes aerial tramway, Alaska railroad, cable car, ferryboat, inclined plane, monorail/automated guideway, público, trolleybus, and vanpool.

Note: Includes only urban agencies operating over 30 vehicles in peak service included.

Sources: National Transit Database; Bureau of Labor Statistics, Consumer Price Index.

Farebox Recovery Ratios

The farebox recovery ratio represents farebox revenues as a percentage of total transit operating costs net of reconciling cash expenses. It measures users' contributions to the variable cost of providing transit services and is influenced by the number of riders, fare structure, and rider profile. Low regular fares, high availability and use of discounted fares, and high transfer rates tend to result in lower farebox recovery ratios. Farebox recovery ratios for 2006 to 2016 are provided in *Exhibit 2-40*. The average farebox recovery ratio over this period for all transit modes combined was 34.8 percent in 2016. Heavy rail had the highest average farebox recovery ratio at 57.1 percent. Farebox recovery ratios for total costs are not provided because capital investment costs are not evenly distributed across years. Rail modes have farebox recovery ratios for total costs that are significantly lower than for operating costs alone because of these modes' high level of capital costs.

Exhibit 2-40 ■ Urban Farebox Recovery Ratio by Mode, 2006–2016

Mode	Heavy Rail	Commuter Rail	Light Rail[1]	Fixed-route Bus[2]	Demand Response[3]	Other[4]	Total
2006	60.9%	49.5%	27.4%	28.6%	10.1%	39.6%	**36.0%**
2007	56.8%	49.5%	26.6%	26.6%	8.6%	35.4%	**34.0%**
2008	59.4%	50.3%	29.3%	26.3%	7.6%	32.9%	**34.2%**
2009	60.2%	48.0%	28.2%	26.7%	7.8%	35.4%	**34.3%**
2010	62.3%	48.6%	28.1%	26.8%	7.9%	37.2%	**34.7%**
2011	66.0%	52.1%	29.7%	28.0%	7.4%	38.0%	**36.7%**
2012	64.6%	51.8%	29.0%	28.2%	7.7%	40.1%	**36.6%**
2013	60.5%	50.8%	30.7%	28.5%	7.8%	40.4%	**36.6%**
2014	59.3%	50.1%	28.2%	27.7%	7.6%	40.4%	**35.8%**
2015	60.3%	52.0%	27.5%	27.1%	7.9%	41.8%	**36.1%**
2016	57.1%	52.1%	26.3%	25.9%	8.0%	40.0%	**34.8%**
Average Annual Rate of Change 2016/2006	**-0.6%**	**0.5%**	**-0.4%**	**-1.0%**	**-2.3%**	**0.1%**	**-0.3%**

[1] Includes light rail, hybrid rail, and streetcar rail.

[2] Includes bus, bus rapid transit, and commuter bus.

[3] Includes demand response and demand response-taxi.

[4] Includes aerial tramway, Alaska railroad, cable car, ferryboat, inclined plane, monorail/automated guideway, público, trolleybus, and vanpool.

Source: National Transit Database.