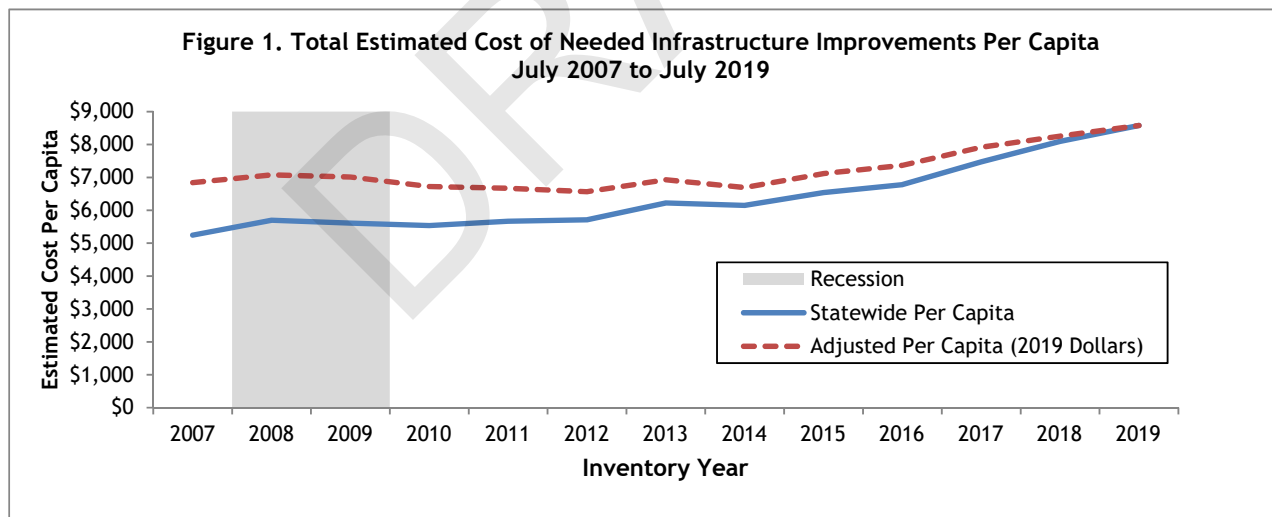


Building Tennessee’s Tomorrow: Anticipating the State’s Infrastructure Needs

July 2019 through June 2024

INFRASTRUCTURE NEEDS OVERVIEW

The estimated cost of all needed public infrastructure improvements in Tennessee increased for the fifth straight reporting period, even when adjusted for inflation⁹ and population (see figure 1). State and local officials report an increase of approximately \$3.8 billion (6.9%) in this year’s inventory (see table 1), which brings the estimated cost of public infrastructure improvements that need to be in some stage of development (see figure 2) between July 1, 2019, and June 30, 2024, to \$58.6 billion.¹⁰ Improvements needed for the following categories continue to account for most of the total estimated cost of the inventory: Transportation and Utilities; Education; and Health, Safety, and Welfare. This year, the categories most responsible for the reported increase in total estimated cost are Transportation and Utilities, followed by General Government. The percentage of available funding was approximately two percent more than last year—65.1% of the estimated cost of the needed improvements reported in this year’s inventory is not funded.



⁹ Federal Reserve Bank of St. Louis, State and Local Government Consumption Price Index

¹⁰ For complete listings of all needs reported in the July 2019 inventory by county and by public school system, see appendixes D and E.

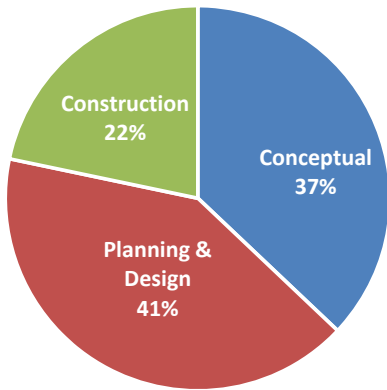
Table 1. Comparison of Estimated Cost of Needed Infrastructure Improvements
July 2018 Inventory vs. July 2019 Inventory

Category and Type of Infrastructure	July 2018 Inventory	July 2019 Inventory	Difference	Percent Change
Transportation and Utilities	\$ 29,651,243,317	\$ 32,670,440,353	\$ 3,019,197,036	10.2%
Transportation	29,015,019,523	32,020,010,236	3,004,990,713	10.4%
Other Utilities	621,623,794	636,930,117	15,306,323	2.5%
Broadband	14,600,000	13,500,000	(1,100,000)	-7.5%
Education	\$ 14,246,486,112	\$ 14,204,150,607	\$ (42,335,505)	-0.3%
Post-secondary Education	5,294,860,200	5,568,647,945	273,787,745	5.2%
School Renovations*	5,183,563,629	5,145,291,243	(38,272,386)	-0.7%
New Public Schools and Additions	3,662,243,566	3,379,444,419	(282,799,147)	-7.7%
Other Education**	68,385,000	75,815,000	7,430,000	10.9%
School System-wide	37,433,717	34,952,000	(2,481,717)	-6.6%
Health, Safety, and Welfare	\$ 7,627,165,311	\$ 7,713,235,286	\$ 86,069,975	1.1%
Water and Wastewater	4,719,823,231	4,957,877,144	238,053,913	5.0%
Law Enforcement	1,526,440,076	1,428,365,792	(98,074,284)	-6.4%
Public Health Facilities	613,883,943	603,519,229	(10,364,714)	-1.7%
Housing	398,315,000	328,117,911	(70,197,089)	-17.6%
Fire Protection	260,234,739	278,593,015	18,358,276	7.1%
Storm Water	76,680,335	84,102,924	7,422,589	9.7%
Solid Waste	31,787,987	32,659,271	871,284	2.7%
Recreation and Culture	\$ 2,133,066,709	\$ 2,246,547,802	\$ 113,481,093	5.3%
Recreation	1,444,088,524	1,658,649,685	214,561,161	14.9%
Libraries, Museums, and Historic Sites	478,769,651	354,799,838	(123,969,813)	-25.9%
Community Development	210,208,534	233,098,279	22,889,745	10.9%
General Government	\$ 851,106,273	\$ 1,459,012,414	\$ 607,906,141	71.4%
Public Buildings	699,327,621	1,285,545,780	586,218,159	83.8%
Other Facilities	151,778,652	173,466,634	21,687,982	14.3%
Economic Development	\$ 300,121,560	\$ 285,874,421	\$ (14,247,139)	-4.7%
Industrial Sites and Parks	195,680,057	214,741,363	19,061,306	9.7%
Business District Development	104,441,503	71,133,058	(33,308,445)	-31.9%
Grand Total	\$ 54,809,189,282	\$ 58,579,260,883	\$ 3,770,071,601	6.9%

*School Renovations include school technology projects with estimated costs below the \$50,000 threshold used for other types of infrastructure included in the inventory. Individual technology projects under the threshold totaled \$3,692,173 in 2019 and \$4,519,318 in 2018.

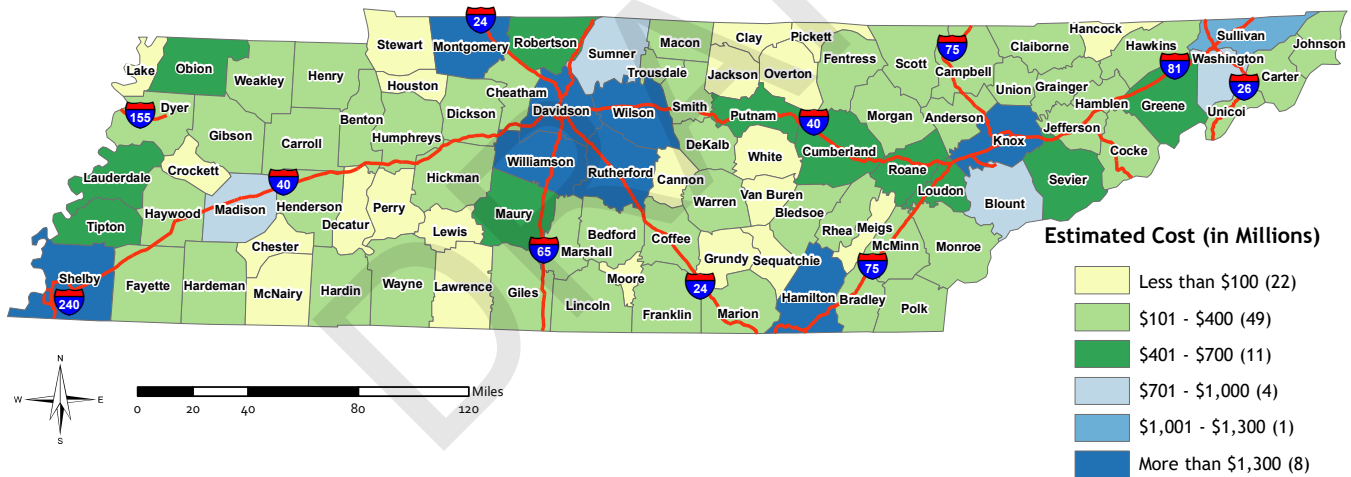
**Other Education includes infrastructure improvements reported at state educational institutions not associated with institutes of higher education or at the county, city, or special school systems level. Examples include the Tennessee School for the Deaf and Alvin C. York Institute.

Figure 2. Percent of Total Reported Cost of Infrastructure Improvements by Stage of Development
Five-year Period July 2019 through June 2024



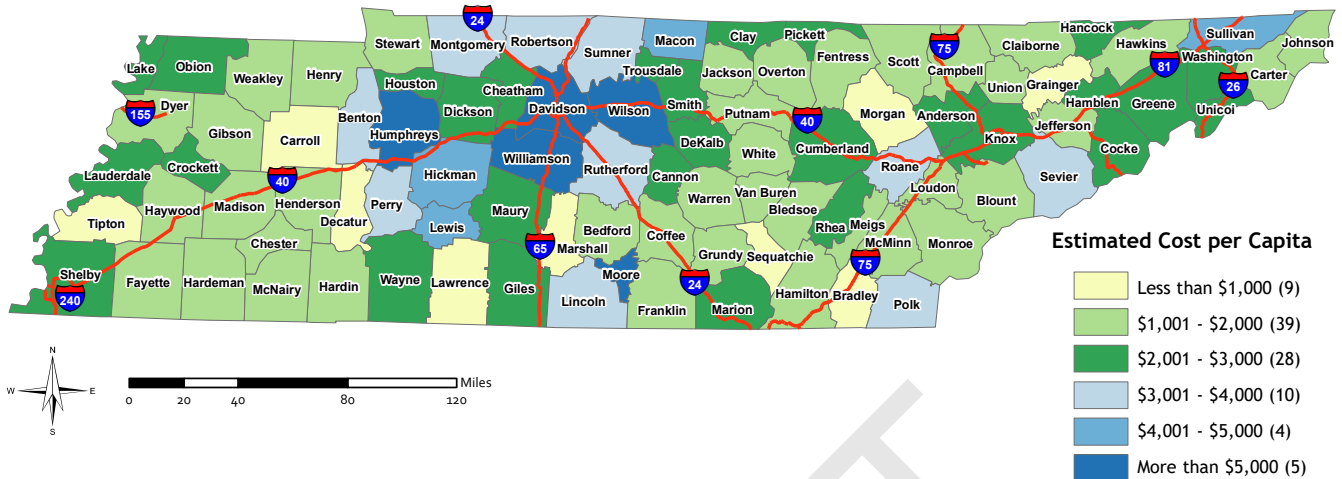
Public infrastructure is needed in every corner of the state, from highly populated counties like Shelby and Davidson to rural counties like Humphreys and Pickett. In general, it has been the case throughout the history of this inventory that the more people living in a county and the more that population grows, the more infrastructure the county will need (see map 1). However, relative to their populations, counties with small populations need just as much or more infrastructure than counties with large populations (see map 2). Individual county summaries, starting on page 21, offer a breakdown of infrastructure needs by county.

Map 1. Total Estimated Cost of Infrastructure Improvement Needs
Five-year Period July 2019 through June 2024



Note: County totals include the total estimated cost of both regional and local infrastructure needs but do not include the \$4,985,180,993 for infrastructure improvements that cross county lines.

**Map 2. Estimated Cost of Total Local Infrastructure Needs Per Capita
Five-year Period July 2019 through June 2024**



Public infrastructure needed for transportation, utilities, and general government accounts for 96.2% of the increase in this year's inventory.

Of the \$3.8 billion increase in infrastructure needs reported in this year's inventory, almost \$3.0 billion (80.1%) is attributable to increases in the estimated cost for transportation and utilities, followed by \$608 million (16.1%) for increases in the cost of general government. Infrastructure needs for transportation and utilities increased for the fifth year in a row – by \$3.0 billion, mainly because of new road projects and sidewalk projects.

The \$608 million increase in needed improvements for general government infrastructure is also attributable to the overall increase in the total estimated cost of the inventory. Most of this increase is from the \$586 million rise in needed improvements for public buildings, while the need for improvements at other facilities increased by \$22 million. The increase in the estimated cost of needed improvements to public buildings stems mainly from \$678 million in new projects. State Government is responsible for over \$615 million in new projects, and approximately \$252 million is needed for renovations at state buildings in Nashville including the Nashville Supreme Court (\$139 million), War Memorial (\$62 million), and Legislative Plaza (\$51 million).

Increases in needs reported for other categories in the inventory— Recreation and Culture (\$113 million) and Health, Safety and Welfare (\$86 million)—are relatively small in comparison. Reported needs decreased in two categories: Education (\$42 million) and Economic Development (\$14 million). See table 1.

The total estimated cost for needed transportation infrastructure continues to be the largest item in the inventory.

Transportation and Utilities is and always has been the largest category of infrastructure in the inventory, based on total estimated cost. It totals \$32.7 billion this year—55.8% of the inventory. Transportation alone, at \$32.0 billion, accounts for nearly all of this category and is larger than all other categories in the inventory—Education at \$14.2 billion (24.2%), Health, Safety, and Welfare at \$7.7 billion (13.2%), Recreation and Culture at \$2.2 billion (3.8%), General Government at \$1.5 billion (2.5%), and Economic Development at \$286 million (0.5%).

The need for other utilities increased, while the need for broadband infrastructure decreased slightly.

Needs reported for other utilities increased by \$15 million (2.5%) in this year's inventory and now total \$637 million. Local officials report the need for \$13.5 million in broadband infrastructure, in just the fourth year of reporting this category, a decrease of about \$1.1 million from last year. Broadband development by government entities is the only need allowed for in the inventory, and very little is expected to be reflected in this category because the nature of broadband deployment in rural areas relies less on municipal utility districts, which are sub-entities of municipal governments.

Education needs remained about the same as documented in the last annual report. Increases in needed infrastructure improvement on college campuses was offset by the completion of new school space and a decrease in the needed improvements at existing public schools.

School systems must comply with the Tennessee Constitution's guarantee of the right of access to public education,¹¹ as well as with the Tennessee Education Improvement Act of 1992,¹² which places limits on the number of students in classrooms. School systems with growing enrollment face the challenge of providing enough space for students, while other school systems need to renovate or replace their schools because of age, condition, or issues concerning school restructuring or consolidation, all while costs increase. Similar issues face Tennessee's public institutions of higher education—dormitories need to be replaced because of their age, and classrooms and labs need to be added or upgraded to meet typical market demands, but those could change in next year's report as the effects of

¹¹ Article XI, Section 12, Constitution of the State of Tennessee.

¹² State of Tennessee Comptroller of the Treasury. 2004. "The Education Improvement Act: A Progress Report." https://comptroller.tn.gov/content/dam/cot/orea/advanced-search/orea-reports-2004/2004_OREA_EdImpAct.pdf.

the COVID-19 pandemic start to affect the Public Infrastructure Needs Inventory.

In this year's inventory, a slight decrease of \$42 million (0.3%) in the Education category, compared to last year, is the result of offsetting changes in the estimated costs of different types of education. Estimated costs increased for post-secondary education (\$274 million (5.2%)) and other education (\$7 million (10.9%)), but these increases were mainly offset by the \$283 million (7.7%) decrease in the total estimated cost for new public school and additions, which totals \$3.4 billion. The decrease was caused by the \$427 million in completions, \$106 million in canceled projects, and \$16 million in cost decreases. This was partially offset by the addition of \$167 million in new projects and \$100 million in cost increases to existing needs.

The decrease of \$38 million (0.7% from last year) in the need to renovate public K-12 schools also contributed to the overall decrease, and it now totals \$5.1 billion. This decrease in needed improvements to existing space results from the \$35 million reduction in school renovations and the \$1 million decrease in needs related to federal mandates. This year, the reported estimated cost for technology infrastructure was \$2 million less than last year. These needs have been steadily decreasing over the years as technology changes from hardwired infrastructure to wireless, which are not as expensive to install. See table 2.

Table 2. Estimated Cost of School Infrastructure Improvements by Type of Need
July 2018 Inventory vs. July 2019 Inventory

Type of Infrastructure	July 2018 Inventory	July 2019 Inventory	Difference	Percent Change
New School Space	\$ 3,662,243,566	\$ 3,379,444,419	\$ (282,799,147)	-7.7%
New Schools	3,026,282,606	2,743,671,984	(282,610,622)	-9.3%
Additions	635,960,960	635,772,435	(188,525)	0.0%
Improvements to Existing Schools	\$ 5,183,563,629	\$ 5,145,291,243	\$ (38,272,386)	-0.7%
Renovations	4,969,913,400	4,934,789,181	(35,124,219)	-0.7%
Technology*	114,674,935	112,348,367	(2,326,568)	-2.0%
Mandates	98,975,294	98,153,695	(821,599)	-0.8%
System-wide Needs	\$ 37,433,717	\$ 34,952,000	\$ (2,481,717)	-6.6%
Statewide Total	\$ 8,883,240,912	\$ 8,559,687,662	\$ (323,553,250)	-3.6%

*Technology includes school projects with estimated costs below the \$50,000 threshold used for other types of infrastructure included in the inventory. Individual technology projects under the threshold totaled \$3,692,173 in 2019 and \$4,519,318 in 2018.

Because of the condition of many Tennessee schools, improvements to existing space are necessary. Although 11.1% of public schools (190) in Tennessee were rated by their local school officials as being in fair or poor condition, 175 of those schools need improvements to existing space, which accounts for 48.3% of total estimated existing space needs. See figure 3, table 3, and appendix E.

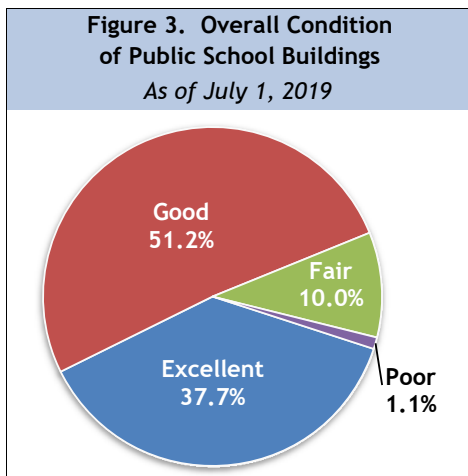


Table 3. Renovation Costs by School Condition
Five-year Period July 2019 through June 2024

School Condition	Number of Schools	Estimated Cost to Renovate	Average Cost Per School
Good or Excellent	866	\$ 2,546,778,958	\$ 2,940,853
Fair or Poor	175	2,378,647,081	13,592,269
Total	1,041	\$ 4,925,426,039	\$ 4,731,437

Note: Does not include facility upgrades captured in the school system-wide category used for the total renovation cost in Table 2.

The need for new school space decreased in this year’s inventory by \$283 million (7.7%) to a new total of \$3.4 billion. Local officials reported a small decrease of only \$1 million in the need for additions to existing schools, along with a \$283 million (9.3%) decrease in reported needs for new schools (see table 2), mainly because 13 schools worth \$437 million were completed in 11 school systems.

The cost of needed education infrastructure has increased over the years mainly because of the rising cost of construction materials and labor. The US Bureau of Labor Statistics’ New School Construction Price Index rose almost 40 points (30.5%) from July 2010 to July 2019,¹³ and RSMMeans data by Gordian, an industry-leading construction cost estimating company, shows growth in square-foot costs for schools increasing similarly.¹⁴ In 2010, the average cost of a completed new school in Tennessee was \$18 million. Thirteen schools—ranging from a new \$172 million high school in Rutherford County to a \$16 million elementary school for the city of Cleveland—were completed since last year’s report for a total cost of \$427 million, averaging \$33 million per school. Over the next five years, local officials report needing 70 more schools at an average of \$39 million each.

The need for upgrades to aging sewer and drinking water systems, along with needs for new infrastructure to protect us from fires, accounts for most of the increase in the Health, Safety, and Welfare category.

Tennessee’s aging water and wastewater systems have exposed the need to upgrade sewage treatment and sewage collection infrastructure. Approximately 45% of the annual sewage flow treated in wastewater facilities originates from groundwater or rainwater leaking through deteriorated sewage pipes, joints, or manholes.¹⁵ This year’s inventory

¹³ US Bureau of Labor Statistics. 2019. <https://data.bls.gov/timeseries/PCU236222236222>.

¹⁴ RSMMeans data by Gordian. 2017. “Square Foot Costs with RSMMeans Data.”

¹⁵ ASCE. 2016. “Report Card for Tennessee’s Infrastructure.” <https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/2016-TN-Infrastructure-Report-Card-Full-Report-Final-1.pdf>.

includes an increase in the estimated cost for water and wastewater infrastructure—from \$238 million (5.0%) to a new total of \$5.0 billion. Most of this increase is attributable to the addition of \$476 million in new projects, one of which is for an \$80 million water treatment plant in Chattanooga along with over \$32 million in improvements to existing treatment plants in Knoxville. The increase was partially offset by \$220 million in completed projects, \$173 million in cost decreases to existing projects, and \$24 million in cancelations. The need for fire protection also increased by \$18 million (7.1%) and now totals \$279 million. La Vergne needs \$10 million for a fire headquarters expansion, and Memphis needs \$6 million for a new fire station. The rest of the needs reported are much smaller and scattered across the state.

The need for upgrades to existing public buildings increased significantly, and projects that support recreation and cultural assets continue to increase.

After seeing a decrease in last year's report, the estimated cost of needed infrastructure for public buildings increased \$586 million (83.8%) and now totals \$1.3 billion, mainly because of large increases to renovation projects on state buildings. The cost for infrastructure needed for other facilities—structures that are publicly owned but not typically open to the public, like maintenance facilities and salt bins—increased \$22 million (14.3%) to a total of \$173 million.

Among needs reported for recreation and cultural assets, the estimated cost for such infrastructure increased for a third year by \$215 million (14.9%) to a total of \$1.7 billion. The estimated cost for libraries, museums, and historic sites flipped from last year's increase and now shows a decrease of \$124 million (25.9%) and totals \$355 million. The need for infrastructure improvements that support community development shows an increase of \$23 million (10.9%), totaling \$233 million in this year's inventory.

The estimated cost for needed infrastructure at industrial sites and parks increased by \$19 million (9.7%) to a new total of \$215 million, while the estimated cost of infrastructure supporting business districts decreased by \$33 million (31.9%) and now totals \$71 million.

In this year's inventory, funding is lacking for more than two-thirds of the estimated cost of needed improvements.

Information about funding for public infrastructure needs reported by officials indicates that 65.1% of the funds required to meet those needs was not available at the time the inventory was conducted—this was relatively unchanged from last year's 67.0%. Excluding improvements needed at existing schools and those drawn from capital budget requests submitted by state agencies—neither of which includes funding information—only \$15.5 billion in funding is available for the remaining \$44.3 billion in needs (see table 4). Typically, as a project evolves, funding sources are

identified and pursued. Regarding the infrastructure inventory process, planning and design cannot take place without acquiring some funds. Of course, a lack of funding will prevent certain projects from ever being completed. In fact, most of the infrastructure needs reported in the July 2014 inventory that were not already fully funded were still needed five years later. As in prior years, funding for needs reported in the inventory comes from federal, state, and local sources.

Table 4. Public Infrastructure Needs Summary of Funding Availability*
Five-year Period July 2019 through June 2024

	Funding Available [in billions]	Funding Needed [in billions]	Total Needed [in billions]
Fully Funded Improvements	\$ 14.6	\$ 0.0	\$ 14.6
Partially Funded Improvements	0.9	4.0	4.9
Unfunded Improvements	0.0	24.8	24.8
Total	\$ 15.5	\$ 28.8	\$ 44.3

*Excludes infrastructure improvements for which funding availability is not known.
 Note: Totals may not equal 100% because of rounding.

The government that owns the infrastructure typically funds the bulk of its cost, and a variety of revenue sources are used. For example, the state collects taxes and appropriates funds to its own projects but also provides grants to local governments through programs in various state agencies. Even so, cities and counties fund most of their infrastructure improvements with their own property and sales tax revenues, while utility districts fund their improvements primarily with dedicated revenue sources in the form of user fees.

Because most of the state’s infrastructure needs are not included in this analysis, local government sources—mainly counties and cities—provide the majority of capital for all the fully-funded needs presented here. Exceptions include transportation, which is funded primarily by the federal and state governments. Industrial sites and parks also receive a substantial portion of funding from federal and state government. Broadband, recreation, storm water, housing, libraries, museums, and historic sites also rely on the federal government for significant portions of their reported funding (see table 5). It may appear that the state does not help pay for school buildings even though it does—although counties report funding 93.7% of new public school construction, the state provides an equivalent amount through its Basic Education Program (BEP) funding formula. The formula includes funds for capital outlay, an amount that topped \$781 million for fiscal year 2019-20.¹⁶ The state’s share accounts for half of that amount, but those funds are not earmarked for that specific purpose; therefore, school systems have the flexibility to use those funds to meet various school needs,¹⁷ and some systems use them for operating costs rather than capital outlay.

¹⁶ Tennessee Comptroller of the Treasury, Office of Research and Education Accountability. 2019. BEP Calculator 2019-20.

¹⁷ Tennessee Comptroller of the Treasury. 2017. “Basic Education Program: A Funding Formula, Not A Spending Plan.” <https://comptroller.tn.gov/content/dam/cot/orea/documents/bep/BEPFundingInfographic.pdf>.

Table 5. Funding Source by Category and Type of Infrastructure for Fully Funded Improvement Needs [in millions]
Five-year Period July 2019 through June 2024

Category and Project Type	State		Federal		Other		City		County		Special District		Total Amount
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	
Transportation and Utilities	\$ 1,273.6	14.4%	\$ 4,714.4	53.3%	\$ 20.0	0.2%	\$ 970.0	11.0%	\$ 1,869.9	21.1%	\$ 5.0	0.1%	\$ 8,852.9
Transportation	1,273.1	15.2%	4,714.4	56.1%	15.0	0.2%	524.5	6.2%	1,869.2	22.3%	0.0	0.0%	8,396.2
Other Utilities	0.5	0.1%	0.0	0.0%	5.0	1.1%	445.5	97.5%	0.7	0.2%	5.0	1.1%	456.7
Broadband	0.0	0.0%	4.0	57.1%	0.0	0.0%	3.0	42.9%	0.0	0.0%	0.0	0.0%	7.0
Health, Safety and Welfare	\$ 29.4	0.7%	\$ 105.4	2.5%	\$ 54.0	1.3%	\$ 2,376.9	56.0%	\$ 1,389.1	32.7%	\$ 288.9	6.8%	\$ 4,243.7
Water and Wastewater	4.9	0.1%	70.7	2.1%	33.1	1.0%	2,024.2	59.9%	997.9	29.5%	249.0	7.4%	3,379.7
Law Enforcement	0.0	0.0%	0.0	0.0%	0.0	0.0%	132.2	29.1%	319.9	70.5%	1.5	0.3%	453.6
Housing	22.1	7.9%	30.2	10.8%	20.9	7.5%	161.6	57.7%	8.6	3.1%	36.4	13.0%	279.8
Fire Protection	0.0	0.0%	0.7	1.2%	0.0	0.0%	46.4	84.8%	7.6	13.9%	0.0	0.0%	54.7
Public Health Facilities	1.4	2.8%	1.1	2.2%	0.0	0.0%	0.0	0.0%	48.5	94.9%	0.0	0.0%	51.1
Storm Water	0.4	2.2%	2.0	12.8%	0.0	0.0%	12.1	75.6%	1.1	6.9%	0.4	2.5%	16.0
Solid Waste	0.6	7.1%	0.5	6.1%	0.0	0.0%	0.5	5.2%	5.5	63.6%	1.6	18.1%	8.7
Education	\$ 1.0	0.1%	\$ 0.0	0.0%	\$ 0.0	0.0%	\$ 11.0	1.6%	\$ 626.0	93.7%	\$ 30.3	4.5%	\$ 668.3
New Public Schools	1.0	0.2%	0.0	0.0%	0.0	0.0%	10.0	1.5%	609.8	93.7%	30.3	4.7%	651.1
School System-wide	0.0	0.0%	0.0	0.0%	0.0	0.0%	1.0	5.8%	16.2	94.2%	0.0	0.0%	17.2
Recreation and Culture	\$ 14.1	3.0%	\$ 124.9	26.4%	\$ 14.4	3.0%	\$ 198.7	41.9%	\$ 121.6	25.7%	\$ 0.0	0.0%	\$ 473.7
Recreation	12.3	3.7%	114.7	34.6%	3.3	1.0%	133.3	40.2%	67.9	20.5%	0.0	0.0%	331.5
Libraries, Museums, and Historic Sites	1.1	1.7%	6.8	10.5%	11.1	17.1%	20.8	32.1%	25.1	38.6%	0.0	0.0%	65.0
Community Development	0.7	0.9%	3.4	4.4%	0.0	0.0%	44.6	57.7%	28.5	36.9%	0.0	0.0%	77.2
Economic Development	\$ 32.1	23.0%	\$ 8.5	6.1%	\$ 5.2	3.7%	\$ 30.8	22.1%	\$ 61.1	43.8%	\$ 1.9	1.3%	\$ 139.5
Industrial Sites and Parks	32.1	28.1%	6.5	5.6%	5.2	4.5%	7.6	6.7%	61.1	53.5%	1.9	1.6%	114.3
Business District Development	0.0	0.0%	2.0	8.1%	0.0	0.0%	23.2	91.9%	0.0	0.0%	0.0	0.0%	25.2
General Government	\$ 2.3	1.3%	\$ 0.9	0.5%	\$ 0.2	0.1%	\$ 76.3	43.8%	\$ 90.8	52.1%	\$ 3.7	2.1%	\$ 174.2
Public Buildings	2.3	1.9%	0.9	0.8%	0.0	0.0%	44.0	37.9%	65.7	56.5%	3.4	2.9%	116.2
Other Facilities	0.0	0.0%	0.0	0.0%	0.2	0.3%	32.3	55.8%	25.1	43.3%	0.4	0.6%	58.0
Grand Total	\$ 1,352.4	9.3%	\$ 4,954.0	34.0%	\$ 93.8	0.6%	\$ 3,663.8	25.2%	\$ 4,158.5	28.6%	\$ 329.7	2.3%	\$ 14,552.2