Report of the Tennessee Advisory Commission on Intergovernmental Relations

Building Tennessee's Tomorrow:

Anticipating the State's Infrastructure Needs

July 2014 through June 2019

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State of Tennessee

Tennessee Advisory Commission on Intergovernmental Relations
226 Capitol Boulevard, Suite 508
Nashville, TN 37243

August 30, 2016

The Honorable Ron Ramsey
Lt. Governor and Speaker of the Senate

The Honorable Beth Harwell
Speaker of the House of Representatives

Members of the General Assembly

State Capitol
Nashville, TN 37243

Ladies and Gentlemen:

Transmitted herewith is the fourteenth in a series of reports on Tennessee's infrastructure needs by the Tennessee Advisory Commission on Intergovernmental Relations pursuant to Public Chapter 817, Acts of 1996. That act requires the Commission to compile and maintain an inventory of infrastructure needed in Tennessee and present these needs and associated costs to the General Assembly during its regular legislative session. The inventory, by law, is designed to support the development by state and local officials of goals, strategies, and programs to

- improve the quality of life of all Tennesseans,
- support livable communities,
- and enhance and encourage the overall economic development of the state through the provision of adequate and essential public infrastructure.

This report represents the staff's continuing efforts to improve the inventory.

Information from the annual inventory is being used for local planning and community and economic development grants. In addition, anyone with an interest in infrastructure needs can access this information online at ctasdata.utk.tennessee.edu through a partnership with the University of Tennessee's County Technical Assistance Service. There you can compare counties and different types of infrastructure needs using online mapping services, extract data, and even link to the data.

Sincerely,

Senator Mark Norris
Chairman

Lynnisse Roehrich-Patrick
Executive Director

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MEMORANDUM

TO: Commission Members

FROM: Cliff Lippard
Interim Executive Director

DATE: 30 August 2016

SUBJECT: Annual Report on Tennessee's Public Infrastructure Needs

The Tennessee General Assembly charged the Commission in 1996 with developing and maintaining an inventory of public infrastructure needs "in order for the state, municipal and county governments of Tennessee to develop goals, strategies, and programs which would

- improve the quality of life of its citizens,
- support livable communities, and
- enhance and encourage the overall economic development of the state."

Each year since this mandate was created for the Commission, we have worked with the state's nine development districts to gather information from state and local officials for an inventory of Tennessee's public infrastructure needs. The information they provide is analyzed by commission staff, and an annual report is prepared for the General Assembly.

The current report is submitted for your approval. It is the fourteenth in the series and presents $41.5 billion of infrastructure improvements reported in the inventory by state and local officials. This most recent inventory includes projects that need to be in some stage of development during the five-year period July 2014 through June 2019. The report includes statewide information by type of infrastructure and by level of government, as well as information about the condition and needs of our public school facilities. The report also includes information about the availability of funding to meet reported needs and a comparison of county-area needs. County-area information about each type of infrastructure in the inventory, along with relevant legislation, inventory forms, and a glossary of terms, can be found in the appendixes to the report.

Building Tennessee's Tomorrow:

Anticipating the State's Infrastructure Needs

July 2014 through June 2019

EXECUTIVE SUMMARY

This report is the fourteenth in a series on infrastructure needs that began in the late 1990s. These reports to the General Assembly present Tennessee's public infrastructure needs as reported by local officials, those compiled by the Tennessee Department of Transportation, and those submitted by other state departments and agencies as part of their budget requests to the Governor. This report provides two types of information collected during fiscal year 2014-15 and covering the five-year period July 2014 through June 2019: (1) needed infrastructure improvements and (2) the condition of existing public school buildings. Infrastructure needs fall into six broad categories. See table 1.

Table 1. Summary of Reported Infrastructure Improvement Needs

Five-year Period July 2014 through June 2019

Category	Five-year Reported Estimated Cost	
Transportation and Utilities	$ 25,386,780,890	61.2%
Education	8,529,590,647	20.6%
Health, Safety, and Welfare	4,985,318,863	12.0%
Recreation and Culture	1,577,570,362	3.8%
General Government	613,802,595	1.5%
Economic Development	378,847,249	0.9%
Grand Total	**$ 41,471,910,606**	**100.0%**

A number of conclusions may be drawn from the information compiled in the inventory:

- Public infrastructure needs and the ability to meet them vary across the state, and wealth and population factors are strongly tied to both. In general, the more people a county has and the more its population grows, the more infrastructure it will need and, fortunately, the more wealth it will likely have to pay for those needs. As has been the case throughout the history of this inventory, relationships among these factors are strong and well demonstrated by the variation reported for each Tennessee county, although they are not perfectly aligned in any county. Some counties are able to meet their infrastructure needs more easily than others, some continue to report the same needs year after year, and even fast growing counties can find it difficult to

The Tennessee General Assembly charged the Tennessee Advisory Commission on Intergovernmental Relations (TACIR) with developing and maintaining an inventory of infrastructure needs "in order for the state, municipal, and county governments of Tennessee to develop goals, strategies, and programs that would

- improve the quality of life of its citizens,
- support livable communities, and
- enhance and encourage the overall economic development of the state."

Public Chapter 817, Acts of 1996.

meet their needs. And, relative to county population, counties with small populations need and complete just as much or more infrastructure than counties with large populations.

- The total estimated cost of public infrastructure improvements that need to be started or completed in fiscal years 2014 through 2019 is estimated at $41.5 billion. As shown in table 2, this total is $299 million less than the estimate in last year's inventory, a decrease of 0.7%, mainly because of a $611 million decrease in the Transportation and Utilities category that was driven by $1 billion in decreased costs for road projects already in the inventory.

Table 2. Comparison of Estimated Cost of Infrastructure Improvement Needs

July 2013 Inventory vs. July 2014 Inventory

	Reported Cost			
Category	**July 2013 through June 2018**	**July 2014 through June 2019**	**Difference**	**Percent Change**
Transportation and Utilities	$ 25,997,869,316	$ 25,386,780,890	$ (611,088,426)	-2.4%
Education	8,325,726,373	8,529,590,647	203,864,274	2.4%
Health, Safety, and Welfare	4,720,186,737	4,985,318,863	265,132,126	5.6%
Recreation and Culture	1,696,891,580	1,577,570,362	(119,321,218)	-7.0%
General Government	670,027,009	613,802,595	(56,224,414)	-8.4%
Economic Development	359,794,728	378,847,249	19,052,521	5.3%
Grand Total	**$ 41,770,495,743**	**$ 41,471,910,606**	**$ (298,585,137)**	**-0.7%**

- Officials are confident in obtaining funding for only $11.8 billion of the $32.7 billion needed to meet local infrastructure improvement needs. Most of that amount, $11.3 billion, is for needs that are fully funded; $528 million is for needs that are only partially funded; and another $20.9 billion is not yet available. These figures do not include improvements for which funding information is not collected, such as improvements at existing schools and those in state agencies' capital budget requests.
- Of the infrastructure improvements that were needed in 2009 and completed by 2014, 37.5% is owned by the state, 34.2% by counties, and 22.6% by cities. Special districts own 4.4%, and the remaining 1.3% is jointly owned. The government that owns infrastructure typically funds the bulk of its cost, and a variety of revenue sources are tapped. For example, the state collects taxes and appropriates those funds to their own projects and provides grants to the local level through programs at various agencies. Cities and counties fund most of their infrastructure improvements with revenue from property and sales taxes, while utility districts have a dedicated revenue source in the form of user fees. The federal government owns very little of the infrastructure in the inventory but provides substantial funding for transportation infrastructure.
- Unfunded infrastructure improvement needs are much less likely to be completed the longer they remain unfunded. For example,

of the improvements needed in the current inventory that have been in the conceptual stage for three years, 28.7% are now fully funded. Only 0.04% of conceptual needs that have been in the inventory for eight years are now fully funded, and 82.5% of that is for transportation improvements. Revenue sources matter when it comes to this growing backlog of unfunded infrastructure improvements. For example, transportation infrastructure depends on a revenue stream that has been declining relative to need for many years because fuel costs and the related taxes have declined, but water and wastewater infrastructure is paid for by utility customers, for which only 7.8% of 8-year old projects remain unfunded in this inventory.

- Transportation and Utilities has always been the single largest category in the inventory and it remains so despite a decrease of $611 million (2.4%) from last year to $25.4 billion. This decrease, driven by a combination of decreased costs for existing road projects and road projects that were completed, canceled, or postponed, would be greater if not for the addition of new projects. Nearly $200 million, or roughly one-fifth, of the decrease in road costs is reductions resulting from the Tennessee Department of Transportation's Expedited Delivery Program, which develops lower cost, more timely alternatives for projects that have been needed but not funded for a long time. Comprising 60.7% of estimated costs for all infrastructure improvements, transportation alone dwarfs all other types of infrastructure needs.
- Education is the second largest category and increased $204 million (2.4%) to $8.5 billion, mainly because of a $218 million (10.5%) increase in the amount needed to renovate or replace existing public school buildings. This increase was partially offset by an $80 million (5.1%) decrease in the need for new school space. Asked about the overall condition of their school buildings, public school officials reported that 91.6% are in good or better condition. Post-secondary education accounted for 29.9% of the increase in the education category—there was a $61 million (1.3%) increase in improvement needs at the state's public college and university campuses, which now stands at $4.6 billion.
- Health, Safety, and Welfare, the third largest category in the inventory, increased by $265 million (5.6%) to $5.0 billion. This increase resulted primarily from increases in the need for improved water and wastewater, as well as infrastructure needed for storm water. Water and wastewater accounts for the largest portion of the category at $3.3 billion; it increased by $202 million (6.5%) from last year as the cost and extent of EPA-decreed improvements in Nashville increased. The amount needed for storm water improvements increased by $95 million (91.9%) to $198 million, and the estimated cost for public health facilities improvements increased by $87 million (24.7%) to $441 million, both driven by

the addition of a few costly, new projects. The total cost of two other types of infrastructure in this category also increased: fire protection increased by $1.8 million (1.1%) to $168 million and public housing increased by $800,000 (75.6%) to $1.9 million. The estimated cost of infrastructure improvements needed for law enforcement and solid waste decreased—law enforcement decreased $117 million (12.6%) to $812 million, and solid waste decreased $5 million (15.9%) to $26 million—primarily a reflection of projects completed.

- The Recreation and Culture category decreased overall by $119 million (7.0%) to $1.6 billion because of decreases in all three types of infrastructure in this category but mainly because of community development projects that were completed, which reduced the total for that type of infrastructure by $79 million (29.5%) to $190 million. The estimated cost for libraries, museums, and historic sites decreased by $25 million (6.9%) to $343 million—few new projects of this type were added to the inventory, while several were completed, canceled, or reported as having a cost reduction. In addition, the estimated cost of infrastructure for recreation decreased $14 million (1.4%) to $1.0 billion as completed and canceled projects slightly outweighed the costs of new projects added.
- The estimated cost of General Government infrastructure improvements decreased by $56 million (8.4%) to $614 million. This category includes only two types of infrastructure: public buildings and other facilities. The estimated cost of improvements in other facilities such as those used for storage and maintenance decreased by $49 million (35.4%) to $89 million, and the need for improvements in public buildings decreased by $7 million (1.4%) to $525 million.
- The estimated cost of infrastructure improvements in the Economic Development category—the smallest category this year—increased by $19 million (5.3%) since the last inventory and now totals $379 million, mainly because a new $40 million industrial park access road project at the Airport Industrial Park in White County produced a net $28 million (11.8%) increase in the cost of industrial sites and parks, which now totals $261 million. The cost of business district development decreased by $9 million (6.8%) to $118 million.

Building Tennessee's Tomorrow:

Anticipating the State's Infrastructure Needs

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INTRODUCTION

One of the greatest fiscal challenges facing our elected officials is dealing with the nation's aging infrastructure. As the population grows and shifts, new classrooms must be built and equipped to meet our children's needs. As roads and bridges wear out, they must be repaired or replaced to ensure our safety. And as outdated water lines begin to crack and fail, they must be upgraded to carry clean drinking water safely and efficiently. These examples are just a few of the demands confronting state and local officials as they struggle with the daunting task of matching limited funds to seemingly unlimited needs.

Why do we rely on the public sector for roads, bridges, water lines, and schoolhouses instead of looking to the private sector? The private sector does a fine job of providing goods and services when it is possible to monitor and control their use and exclude those who cannot or will not pay an amount sufficient to generate profit. In the interest of general health and safety, excluding users is not always desirable, and profit may not always be possible. Public infrastructure is the answer when the service supported is essential to the common good and the private sector cannot profitably provide it at a price that makes it accessible to all. Therefore, we look to those who represent us in our public institutions to set priorities and find ways to fund them.

Why inventory public infrastructure needs?

The Tennessee General Assembly affirmed the value of public infrastructure in legislation enacted in 1996 when it deemed an inventory of those needs necessary "in order for the state, municipal, and county governments of Tennessee to develop goals, strategies, and programs which would

- improve the quality of life of its citizens,
- support livable communities, and
- enhance and encourage the overall economic development of the state

In the last 12 months, broken dams in South Carolina caused flooding and fatalities; a massive gas-leak in Los Angeles sickened and displaced thousands of families; and, of course, residents of Flint, Michigan, found out that their fears about toxic water were not unfounded—unsafe lead levels may have harmed Flint children for the rest of their lives. Our nation's refusal to face facts and take care of our roads, rails, bridges and pipelines has very real consequences, both for public safety and for our economy.

Ray LaHood, *Governing*, "Why Are We Letting Our Infrastructure Fall to Pieces?," April 11, 2016 http://www.governing.com/gov-institute/voices/col-washington-metro-rail-transit-critical-maintenance-infrastructure.html

through the provision of adequate and essential public infrastructure."[1] The public infrastructure needs inventory on which this report is based was derived from surveys of local officials by staff of the state's nine development districts,[2] the capital budget requests submitted to the Governor by state officials as part of the annual budget process, and bridge and road needs from project listings provided by state transportation officials. The Commission relies entirely on state and local officials to evaluate the infrastructure needs of Tennessee's citizens as envisioned by the enabling legislation.

What infrastructure is included in the inventory?

For purposes of this report, and based on the direction provided in the public act and common usage, public infrastructure is defined as

capital facilities and land assets under public ownership or operated or maintained for public benefit.

To be included in the inventory, infrastructure projects must not be considered normal or routine maintenance and must involve a capital cost of at least $50,000.[3] This approach, dictated by the public act, is consistent with the characterization of capital projects adopted by the Tennessee General Assembly for its annual budget.

Local officials were asked to describe anticipated needs for the period July 1, 2014, through June 30, 2034, classifying those needs by type of project. State-level needs were derived from capital budget requests. Both state and local officials were also asked to identify the stage of development as of July 1, 2014. The period covered by each inventory was expanded to 20 years in 2000 because of legislation requiring its use by the Commission to monitor implementation of Tennessee's Growth Policy Act.[4] Plans developed pursuant to that act established growth boundaries for annexation by the state's municipalities. This report focuses on the first five years of the period covered by the inventory.

Within these parameters, local officials are encouraged to report their needs as they relate to developing goals, strategies, and programs to improve their communities. They are limited by only the very broad purposes for public infrastructure as prescribed by law. No independent assessment of need constrains their reporting. In addition, the inventory includes bridge and road needs from project listings provided by state transportation and

[1] Chapter 817, Public Acts of 1996. For more information about the enabling legislation, see appendix A.
[2] For more information on the importance of the inventory to the development districts and local officials, see appendix B.
[3] School technology infrastructure is included for existing schools regardless of cost in order to provide information related to the technology component of the state's education funding formula.
[4] Chapter 672, Public Acts of 2000.

capital needs identified by state officials and submitted to the governor as part of the annual budget process.

How is the inventory accomplished?

The public infrastructure needs inventory is developed using two separate, but related, inventory forms.[5] Both forms are used to gather information from local officials about needed infrastructure improvements. The second form is also used to gather information about the condition of existing public school buildings, as well as the cost to meet all facilities mandates at the schools, put them in good condition, and provide adequate technology infrastructure. Information about the need for new public school buildings and for school system-wide infrastructure improvements is gathered in the first form. TACIR staff provide local officials with supplemental information from the state highway department about transportation needs, many of which originate with local officials. This information helps ensure that all known needs are captured in the inventory.

In addition to gathering information from local officials, TACIR staff incorporate capital improvement requests submitted by state officials to the Governor's Budget Office into the inventory. While TACIR staff spend considerable time reviewing all the information in the inventory to ensure accuracy and consistency, the information reported in the inventory is based on the judgment of state and local officials. In many cases, information is limited to that included in the capital improvements programs of local governments, which means that it may not fully capture local needs.

Projects included in the inventory are required to be in the conceptual, planning and design, or construction phase at some time during the five-year period July 2014 through June 2019. Projects included are those that need to be either started or completed during that period. Estimated costs for the projects may include amounts spent before July 2014 to start a project that needs to be completed during the five-year period or amounts to be spent after June 2019 to complete a project that needs to be started during the five-year period. Because the source of information from state agencies is their capital budget requests, all of those projects are initially recorded as conceptual.

In the context of the public infrastructure needs inventory, the term "mandate" is defined as *any rule, regulation, or law originating from the federal or state government that affects the cost of a project*.[6] The mandates most commonly reported are the Americans with Disabilities Act (ADA), asbestos, lead, underground storage tanks, and the Education Improvement Act (EIA). The EIA mandate was to reduce the number of students in each public school classroom by an overall average of about

[5] Both forms are included in appendix C.

[6] See the Glossary of Terms at the end of the report.

4½ by fall 2001. Tennessee public schools began working toward that goal with passage of the EIA in 1992 and met it by hiring a sufficient number of teachers. However, some schools still do not have sufficient classroom space to accommodate the additional classes and teachers required.

Except in the case of existing public schools, the inventory does not include estimates of the cost to comply with mandates, only whether the need was the result of a mandate; therefore, mandates themselves are not analyzed here other than to report the number of projects affected by mandates. Even in the case of public schools, with the exception of the EIA, the cost reported to TACIR as part of the public infrastructure needs inventory is relatively small—less than 1% of the total.

How is the inventory used?

The Public Infrastructure Needs Inventory is both a product and a continuous process, one that has been useful in

- short-term and long-range planning,
- providing a framework for funding decisions,
- increasing public awareness of infrastructure needs, and
- fostering better communication and collaboration among agencies and decision makers.

The inventory promotes planning and setting priorities.

The Public Infrastructure Needs Inventory has become a tool for setting priorities and making informed decisions by all stakeholders. Many decision makers have noted that in a time of tight budgets and crisis-based, reactive decisions, the annual inventory process is the one opportunity they have to set funding issues aside for a moment and think proactively and broadly about their very real infrastructure needs. For most officials in rural areas and in smaller cities, the inventory is the closest thing they have to a capital improvements program (CIP). Without the inventory, they would have little opportunity or incentive to consider their infrastructure needs. Because the inventory is not limited to needs that can be funded in the short term, it may be the only reason they have to consider the long-range benefits of infrastructure.

The inventory helps match critical needs to limited funding opportunities.

The Public Infrastructure Needs Inventory provides the basic information that helps state and local officials match needs with funding, especially in the absence of a formal capital improvements program. At the same time, the inventory provides information needed by the development districts to update their respective Comprehensive Economic Development Strategy Reports required annually by the Federal Economic Development

Administration. Unless a project is listed in that document, it will not be considered for funding by that agency. Information from the inventory has been used to develop lists of projects suitable for other types of state and federal grants as well. For example, many projects that have received Community Development Block Grants were originally discovered in discussions of infrastructure needs with local government officials. And it has also helped state decision makers identify gaps between critical needs and available state, local, and federal funding, including an assessment of whether various communities can afford to meet their infrastructure needs or whether some additional planning needs to be done at the state level about how to help them.

The inventory provides an annual review of conditions and needs of public school facilities.

The schools' portion of the inventory is structured so that the condition of all schools is known, not just the ones in need of repair or replacement. Data can be retrieved from the database and analyzed to identify particular needs, such as technology. This information is useful in pinpointing pressing needs for particular schools and districts, as well as providing an overview of statewide needs. This unique statewide database provides information about the condition and needs of Tennessee's public school facilities.

The inventory increases public awareness, communication, and collaboration among decision-makers.

The state's infrastructure needs have been reported to a larger public audience, and the process has fostered better communication between the development districts, local and state officials, and decision makers. The resulting report has become a working document used at the local, state, and regional levels. It gives voice to the often-underserved small towns and rural communities. Each update of the report provides an opportunity for re-evaluation and re-examination of projects and for improvements in the quality of the inventory and the report itself. This report is unique in terms of its broad scope and comprehensive nature. Through the inventory process, development districts have expanded their contact, communication, and collaboration with agencies not traditionally sought after (e.g., local boards of education, utility districts, and the Tennessee Department of Transportation) and strengthened personal relationships and trust with their more traditional local and state contacts. Infrastructure needs are being identified, assessed, and addressed locally and documented for the Tennessee General Assembly, various state agencies, and decision makers for further assessment and consideration.

What improvements have been made to the inventory?

As each inventory cycle comes to a close, TACIR staff review the collection and analysis process to identify ways to improve efficiency and accuracy.

It's time for states to turn their attention back to the type of infrastructure investments that will boost productivity, support business growth, create good jobs, provide a healthier environment, and improve opportunities for all their residents. With revenue returning in most states to pre-recession levels, low-interest rates for debt-financed projects, and the job market still recovering, conditions are right to make those investments now.

Elizabeth C. McNichol, *State Tax Notes*, "It's Time for States to Invest in Infrastructure," April 18, 2016 http://www.taxnotes.com/state-tax-notes/2016-04-18

Staff continually work to improve methods for project tracking and quality control. This year a new system was adopted to separate bridge improvements from other transportation needs and sort them by owner to make it easier to identify duplicate and completed projects. As a result, projects totaling $235 million were removed from the inventory.

What else needs to be done?

The data collection process continues to improve, and the current inventory is more complete and accurate than ever. The Commission has tried to strike a balance between requiring sufficient information to satisfy the intent of the law and creating an impediment to local officials reporting their needs. By law, the inventory is required of TACIR, but it is not required of state or local officials; they may decline to participate without penalty. Similarly, they may provide only partial information. This can make comparisons across jurisdictions and across time difficult. But with each annual inventory, participants have become more familiar with the process and more supportive of the program.

Improvements in the technological infrastructure of the inventory itself have set the stage for future efforts to make the inventory more accessible and useful to state and local policy makers and to researchers. Future work will include a closer look at financing the infrastructure needs across the state. TACIR staff also has begun analyzing the relationship between school level enrollment and the need for improvements at individual schools, augmenting analyses using system level enrollment.

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INFRASTRUCTURE NEEDS STATEWIDE

The estimated cost of public infrastructure needed statewide changed little overall.

State and local officials estimate the cost of public infrastructure improvements that need to be in some stage of development between July 1, 2014, and June 30, 2019, at $41.5 billion, a decrease of approximately $299 million (0.7%) from last year's report (see table 3).[7] This decrease, the

Table 3. Comparison of Estimated Cost of Needed Infrastructure Improvements

July 2013 Inventory vs. July 2014 Inventory

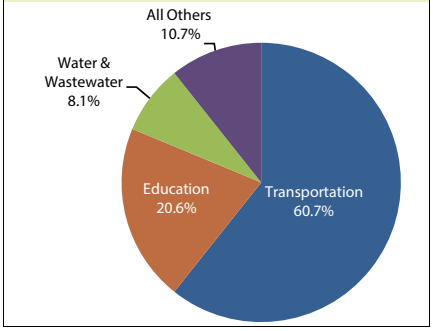
Category and Type of Infrastructure	July 2013 Inventory	July 2014 Inventory	Difference	Percent Change
Transportation and Utilities	**$ 25,997,869,316**	**$ 25,386,780,890**	**$ (611,088,426)**	**-2.4%**
Transportation	25,782,040,358	25,171,624,684	(610,415,674)	-2.4%
Other Utilities	215,828,958	215,156,206	(672,752)	-0.3%
Education	**$ 8,325,726,373**	**$ 8,529,590,647**	**$ 203,864,274**	**2.4%**
Post-secondary Education	4,577,656,766	4,638,558,536	60,901,770	1.3%
School Renovations and Replacements*	2,160,707,154	2,383,180,734	222,473,580	10.3%
New Public Schools and Additions	1,571,806,453	1,492,144,377	(79,662,076)	-5.1%
School System-wide	15,556,000	15,707,000	151,000	1.0%
Health, Safety, and Welfare	**$ 4,720,186,737**	**$ 4,985,318,863**	**$ 265,132,126**	**5.6%**
Water and Wastewater	3,136,007,005	3,338,497,987	202,490,982	6.5%
Law Enforcement	929,402,199	812,256,199	(117,146,000)	-12.6%
Public Health Facilities	353,529,500	440,857,700	87,328,200	24.7%
Storm Water	103,141,357	197,945,642	94,804,285	91.9%
Fire Protection	166,246,676	168,001,335	1,754,659	1.1%
Solid Waste	30,802,000	25,902,000	(4,900,000)	-15.9%
Housing	1,058,000	1,858,000	800,000	75.6%
Recreation and Culture	**$ 1,696,891,580**	**$ 1,577,570,362**	**$ (119,321,218)**	**-7.0%**
Recreation	1,058,970,329	1,044,472,729	(14,497,600)	-1.4%
Libraries, Museums, and Historic Sites	368,728,259	343,240,201	(25,488,058)	-6.9%
Community Development	269,192,992	189,857,432	(79,335,560)	-29.5%
General Government	**$ 670,027,009**	**$ 613,802,595**	**$ (56,224,414)**	**-8.4%**
Public Buildings	532,227,209	524,834,478	(7,392,731)	-1.4%
Other Facilities	137,799,800	88,968,117	(48,831,683)	-35.4%
Economic Development	**$ 359,794,728**	**$ 378,847,249**	**$ 19,052,521**	**5.3%**
Industrial Sites and Parks	233,412,814	261,036,115	27,623,301	11.8%
Business District Development	126,381,914	117,811,134	(8,570,780)	-6.8%
Grand Total	**$ 41,770,495,743**	**$ 41,471,910,606**	**$ (298,585,137)**	**-0.7%**

*School Renovations and Replacements 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 $3,541,536 in 2014 and $4,527,243 in 2013.

[7] For complete listings of all needs reported in the July 2014 inventory by county and by public school system, see appendixes D and F.

Figure 1. Percent of Total Reported Cost of Infrastructure Improvements by Type of Infrastructure

Five-year Period July 2014 through June 2019



first overall since 2009, is largely the result of a $611 million decrease in the Transportation and Utilities category driven by more than $1 billion in decreased costs for road projects already in the inventory—the first year-to-year decrease for this type of infrastructure. Despite this decrease, transportation infrastructure improvements account for about the same percentage of the total inventory this year (60.7%) as last (61.7%) and remain higher than in the 2011 and 2012 inventories (56.7% and 56.8%). Education infrastructure has been about the same percentage of total needs since 2007 and now stands at 20.6%; water and wastewater follows at 8.1% of the total. All other types of infrastructure projects combined make up 10.7%, similar to last year. See figure 1.

Improvements that support other public infrastructure total more than $548 million.

Some public infrastructure improvements are needed to support others rather than to directly support the private sector (homes, businesses, etc.). When that's the case, those costs are included with the infrastructure they support to show the full cost of that improvement. This is true for all property acquisition and some transportation, storm water, telecommunications, and other utilities improvements. For example, if a rail spur is needed to create a new industrial site, then the rail spur is recorded in the inventory as an industrial site project with transportation as its secondary project type. Similarly, if a sewer line or storm-water drain is needed for a new school, then the project is recorded as new school construction with water and wastewater or storm water as its secondary type. This dual classification allows more flexibility in analyzing the costs of different types of infrastructure improvements. Those costs are included with the infrastructure they support in table 3 and throughout this report except where they are broken out in table 4 below.

Table 4. Comparison of Infrastructure that Provides Direct Service to Private Sector and Infrastructure that Supports Other Public Infrastructure

Five-year Period July 2014 through June 2019

	Provide Direct Service to Private Sector		Support Other Public Infrastructure		Project Type Total
Type of Infrastructure	**Est. Cost [in millions]**	**Percent of Total**	**Est. Cost [in millions]**	**Percent of Total**	**Est. Cost [in millions]**
Transportation	$ 25,171.6	99.5%	$ 120.9	0.5%	$ 25,292.5
Water and Wastewater	3,338.5	98.5%	51.2	1.5%	3,389.7
Other Utilities	215.2	99.2%	1.8	0.8%	217.0
Storm Water	197.9	90.8%	20.1	9.2%	218.0
Property Acquisition	0.0	0.0%	353.7	100.0%	353.7
Grand Total	**$ 28,923.2**	**98.1%**	**$ 547.6**	**1.9%**	**$ 29,470.8**

Transportation infrastructure continues to dominate the inventory.

Transportation and Utilities is and always has been the largest category of infrastructure in the inventory and totals $25.4 billion this year, an overall decrease of $611 million since the last inventory. Transportation alone, at $25.2 billion, accounts for nearly all this category as well as all but a few hundred thousand dollars of the decrease. See table 3. The net $610 million decrease

in the estimated cost of transportation projects includes $1.3 billion in reduced costs for projects already in the inventory, $440 million worth of canceled projects, $335 million for projects now considered not needed within this report's five-year window, and $303 million for projects that were completed. Projects totaling $235 million were removed from the inventory because improved methods of project tracking and quality control identified duplicates and invalid information. The decreased costs are only partially offset by $1.4 billion in new projects and $622 million in project cost increases.

At $14.2 billion, road projects make up the majority (56.5%) of transportation infrastructure costs reported in the inventory, and these costs decreased by nearly $1.1 billion—the biggest change for any single type of infrastructure in the inventory. This reduction resulted from a combination of decreased costs for existing road projects and projects that were completed, canceled, or postponed, partially offset by increases in the cost of other projects as well as new ones. The estimated costs of projects are often revised from one inventory to the next because the size or scope changes or more precise information becomes available as projects progress from the conceptual stage through planning and design to construction. For example, since last year, the combined estimated cost of 116 road projects already captured by the inventory decreased more than $1 billion while the estimated cost of 212 other projects increased by more than $500 million.

Nearly $200 million, or roughly one-fifth, of the decrease in road costs is reductions produced by the Tennessee Department of Transportation's (TDOT) Expedited Project Delivery program, a structured process for identifying more cost-effective ways to meet transportation infrastructure objectives.[8] TDOT modified eight existing projects included in this inventory on state routes in Campbell, Claiborne, DeKalb, Hardeman, Loudon, Monroe, Scott, and Warren counties, reducing their combined estimated cost from $276 million to $80 million. Instead of building new roads or widening existing ones, TDOT will add guardrails, pavement markings, and signage and improve intersections, lanes, shoulders, curves, and bridges.

The estimated cost of improvements for the other type of infrastructure in the Transportation and Utilities category—other utilities, which includes electricity, gas, and telecommunications—decreased 0.3% to $215 million. Electric substation projects were completed in Alcoa ($7.3 million) and Morristown ($3 million), as was a $2.5 million gas main extension for Springfield in Robertson County. The estimated cost of two electrical system projects needed in Newport (Cocke County) decreased by $3.8 million—from $5 million to $1.2 million—because of a decrease in the

It's no secret that much of our country's infrastructure is aging; in fact, it's difficult to drive far without running into a construction project of some sort within our daily commute. Our roadways and brides, many of which were built during the early- to mid-twentieth century, are being repaired, widened, or replaced. And though the end goal is worthwhile, it's tough to ignore the congestion that goes hand-in-hand with these types of projects.

Ted Kniazewycx, *Tennessee Public Works Magazine*, "A Behind-the-Scenes Look at TDOT's Fast Fix 8 Project," May/June 2016 http://www.tnpublicworks.com/magazines/May-June2016/#p=8

[8] See http://tn.gov/tdot/section/strategic-transportation-investments and http://www.greenevillesun.com/news/tdot-commissioner-says-dept-taking-closer-look-at-road-project/article_01b50924-b10b-565d-becf-ce4052b857f9.html.

area each project will cover. Four new projects that add $14.1 million to the inventory, including a $6 million electric substation in Greeneville, partially offset these decreases.

School renovations and replacements drive increased Education infrastructure needs.

Education, which includes post-secondary and public school facilities, is the second largest category ($8.5 billion) and increased $204 million (2.4%). The cost of improving public school buildings, including both new space and improvements in existing school facilities, has been relatively flat overall since 2007 but increased 3.8% this year to $3.9 billion, mainly for school renovations and additions to existing schools. The estimated cost of improving existing school buildings, including renovations ($1.8 billion), whole-building replacements ($320 million), technology infrastructure ($113 million), and mandated facility upgrades ($113 million), increased by $222 million (10.5%) to a total of $2.4 billion—the sixth increase in the estimated cost for improving existing schools in the past seven inventories. The $1.8 billion in renovations includes $85 million in improvements needed by the state-owned Alvin C. York Agricultural Institute in Fentress County and the schools for the blind and the deaf. Improvements at these schools increased by a net $4 million—two new renovation projects at the Tennessee School for the Blind totaling $5.8 million were added, but this increase was partially offset by a $1.3 million decrease in the estimated cost of a project to replace air conditioning systems as well as the completion of a $470,000 parking lot. School system-wide needs for projects like bus garages and central office buildings, which serve entire school systems, increased slightly by $151,000 (1.0%). Projects under construction include security systems and phone system upgrades. The public schools chapter, presented later in this report, provides more information about infrastructure needs for the state's local school systems.

Improvements that can no longer be postponed create a new project backlog. It's a game of catch-up that never ends.

Victoria K Sicaras, *Public Works Magazine*, "Still Waiting on Impact," January 2016 http://www.pwmag.com/budgeting/2016-public-works-budget-forecast_o.aspx

The need for additions to existing schools increased for the third year in a row with a $38 million (11.0%) increase, while the need for new schools decreased $117 million (9.6%) as some local governments refined their plans in response to changing enrollment and other factors. For example, Shelby County reported needing a $57 million high school in their unincorporated area until a system consolidation and subsequent restructuring shifted the school district boundaries. Washington County recently decided that it made more sense to rehab their schools instead of spending $65 million on two K-8 schools. And Tipton County, which for the past eight inventories had reported that they needed $56 million to build three new schools to meet growing student enrollment, decided to renovate their existing buildings instead because enrollment peaked in 2009 at 11,781 and has since declined to 11,215 (4.8%).

After an increase of more than $600 million in 2013, the estimated cost of improvements needed at the state's post-secondary education campuses increased by just $61 million (1.3%) in 2014 and now totals just over $4.6

billion. More than 200 new projects totaling $1.4 billion were added to the inventory, including a $103 million College of Engineering facility and two large projects to replace and add new residence halls at the University of Tennessee in Knoxville ($234 million and $99 million each). New projects alone and increases totaling $204 million in the cost of projects already in the inventory outweigh the $980 million worth of projects completed in 2014, the $285 million canceled, and the $67 million of infrastructure needs that were postponed.

Health, Safety, and Welfare needs increased, mostly because of increased costs for water, wastewater, and storm water infrastructure.

Health, Safety, and Welfare, the third largest category in the inventory, increased $265 million (5.6%) to nearly $5.0 billion, mainly because of growing needs for improved water, wastewater, and storm water infrastructure. Water and wastewater accounts for the largest portion of the Health, Safety, and Welfare category at more than $3.3 billion. The amount needed for this type of infrastructure increased $202 million (6.5%) from last year, mainly because the estimated cost of two sewer-system improvements in Davidson County increased $296 million to a total of $736 million because of delays and changes in scope. These projects are needed to reduce combined storm water and sewer flows into the Cumberland River in Davidson County as required by the US Environmental Protection Agency in order to comply with the Clean Water Act. A $95 million increase in storm water needs, a 91.9% increase over last year, came mostly from the addition of $100 million for a floodwall and pump station along the Cumberland River in Nashville, a project recommended by Nashville's Metro Water Services after the devastating 2010 flood.

Public health facilities contribute $87 million to the increase in Health, Safety, and Welfare costs. New improvement needs added $93 million to this inventory, including $55 million for a Tri-Cities Veterans' Home in Sullivan County and $11.6 million for a new client resource center in Davidson County for the Tennessee Department of Intellectual and Developmental Disabilities. Cost increases for projects already in the inventory added another $28 million. Few projects were completed, the largest being Houston County's $7.5 million purchase of the Patients Choice Medical Center in Erin. The cancelation of two projects reduced the amount needed by $20 million. Also in this category, new fire protection projects as well as cost increases led to an overall $1.8 million increase despite $11.6 million in canceled projects and $10.6 million in postponed improvements. And a new seven-unit public housing project in Johnson City added $800,000 to this category.

Overall increases in water and wastewater, storm water, public health facilities, fire protection, and housing were offset somewhat by overall decreases in law enforcement and solid waste infrastructure. The estimated cost for law enforcement infrastructure improvements decreased $117

million (12.6%) to $812 million (following a $365 million decrease from 2012-13) mainly because projects costing $95.6 million were completed, including a $40 million police precinct and forensic laboratory in Nashville. And the proposed $40 million Greene County Justice Center was canceled. The fifteen projects added to this year's inventory cost just $33 million. The $4.9 million decrease in solid waste needs was the result of completion of projects costing $4.3 million and the addition of only one new, $350,000 project—a transfer station in Henry County—to this year's inventory.

Completed community development projects drove a decrease in Recreation and Culture costs.

The Recreation and Culture category decreased $119 million (7.0%) to $1.6 billion, with decreased costs for all three types of infrastructure in the category: community development; libraries, museums, and historic sites; and recreation. Two large community development projects, one in Sevier County and the other in Memphis, were completed, contributing to an overall decrease of $79.3 million. Sevier County completed the $44.5 million LeConte Pigeon Forge Civic Center, and Memphis completed the $43.6 million Beale Street landing and riverfront improvement project.

Costs for libraries, museums, and historic sites declined by $25 million, in large part because of decreased costs for projects already in the inventory. The most notable reduction results from a decision to renovate a donated building for the Coopertown Library and Historical Museum at a cost of $200,000 instead of building a new library and museum for $15 million. Projects completed, including a $4.3 million library expansion in Springfield and $4.2 million for two library expansions in Nashville, outweighed the cost of three new projects, the largest a $5 million library in Greene County.

The amount needed for recreation projects decreased by $14 million. Although 69 new projects added $91 million to this year's inventory, more than $77 million in projects were completed and another $47 million were canceled. Most notably, the $22 million Rocky Top Sports Arena in Gatlinburg was completed and opened in June 2014. Significant projects canceled include $19 million for a multipurpose recreation facility in Giles County, which will pursue a smaller indoor recreation facility elsewhere instead, and $7.5 million for an arena in Dyersburg, which has decided to expand existing buildings to meet its needs at a lower cost.

Completion of several projects and a change in scope reduced the amount needed for General Government buildings and facilities.

The estimated cost of infrastructure improvements in the General Government category, which includes other facilities and public buildings, decreased $56 million (8.4%) to $613 million since last year's inventory. The biggest portion of the $49 million decrease in other facilities comes from

Memphis, where a $46.2 million project to relocate a vehicle-maintenance shop near St. Jude Hospital was replaced with two less costly projects.

Completions and cancelations are responsible for a $7 million decrease in infrastructure needs for public buildings. Completed projects total more than $70 million, including nine state-owned projects totaling $53.8 million that include HVAC and mechanical system upgrades at the Andrew Jackson Building ($22 million) and Tennessee Tower ($20 million) in Nashville. Canceled projects total $31 million, including a $9 million project to turn the Old School Country Store in Surgoinsville (Hawkins County) into a town hall. Sixteen projects owned by the state totaling $20.1 million were also canceled, including $6.5 million in planned renovations at the Donnelley J. Hill State Office Building in Shelby County that has been closed instead. Offsetting these completions and cancelations were more than $52 million in new projects, most notably $23 million for a new state crime lab in Jackson, and cost increases for projects already in the inventory, including a $38 million increase for mechanical and electrical upgrades at Legislative Plaza and the War Memorial office building.

The cost of a single industrial park road project more than offset reductions resulting from Economic Development projects completed.

The Economic Development category increased $19 million (5.3%) overall to $379 million. The cost of industrial sites and parks increased $28 million (11.8%) largely because a new $40 million road project to open up land for development and create better access to the Airport Industrial Park in White County overshadowed the completion of ten other projects totaling $9.6 million and decreases of $9.3 million for projects remaining in the inventory. Increased costs reported for other projects already in the inventory total $13.6 million.

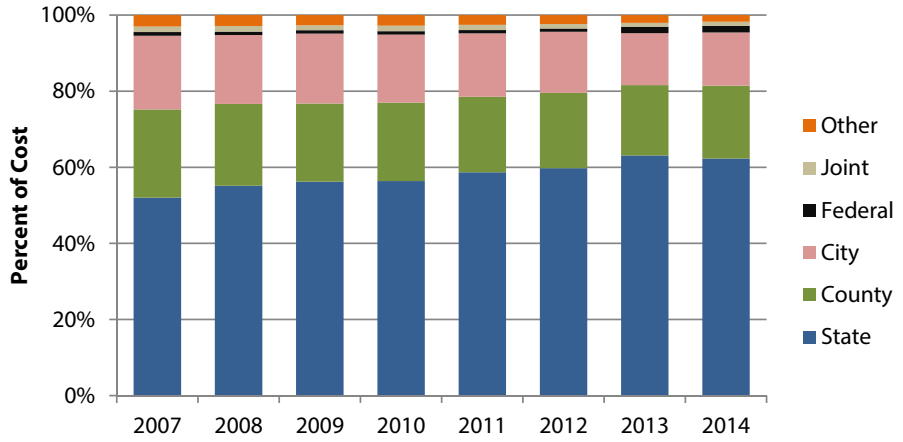
Business district development needs decreased $9 million (6.8%), mainly because $8.1 million in streetscape improvements along Dickerson Road in Nashville were completed. Cost decreases outweighed increases for most of the business-district-development projects remaining in the inventory, and four new projects added only $2.3 million to the category.

State infrastructure improvements continue to dominate overall, and county improvements continue to exceed those of cities.

The differing functions of the state and its cities and counties are illustrated by how the cost of each type of infrastructure is distributed among them. Based on cost, the majority of all public infrastructure needs in the inventory (62.3%) belong to state agencies (see figure 2), but just two types account for $24.1 billion of the $25.8 billion total reported for state government: transportation and post-secondary education. Nearly all im-

Figure 2. Percent of Total Reported Cost of Infrastructure Improvements by Government Ownership

2007 through 2014



provements in post-secondary education infrastructure (99.9%) are needed by the state's public colleges and universities, and more than three-fourths (77.1%) of transportation improvements are the responsibility of the state. The largest portion of four other infrastructure types are also the responsibility of the state. The largest of these four are law enforcement ($477 million) and public health facilities ($428 million). The amounts needed by the state for these two types of infrastructure exceed half of the totals for both (58.8% and 97.1%). The state is also responsible for 70.3% of the cost of libraries, museums, and historic sites ($241 million) and 55.7% of the cost of public buildings ($293 million). See table 5.

The cost of infrastructure needed by counties ($7.9 billion) greatly exceeds the amount needed by cities ($5.8 billion). County needs exceed half the cost of six of the 20 types of infrastructure in the inventory, while city needs dominate eight of them. Counties are responsible for most of new school and addition construction (90.4%), school system-wide infrastructure (89.2%), renovation and replacement of existing schools (85.7%), solid waste infrastructure (73.9%), industrial sites and parks (70.9%), and storm water infrastructure (51.0%). On the other hand, almost half the cost of water and wastewater (44.5%) and recreation (49.3%) infrastructure needs in the inventory belongs to cities, as does all of public housing (100%) and most of other utilities (70.9%), business district development (68.7%), fire protection (62.9%), other facilities (58.7%), and community development (61.7%) infrastructure. If transportation projects are excluded from total costs, ownership in terms of estimated costs is more evenly distributed between the state (39.3%) and its counties (34.6%) with the remainder divided among cities (20.2%), other types of governmental entities such as utility districts and special school districts (4.4%), joint ownership (1.4%), and only a tiny fraction (0.1%) in federal ownership. These percentages are nearly identical to those for projects from five years ago that have since been completed—37.5% state, 34.2% counties, 22.6% cities, 4.4% special districts, and 1.3% jointly owned—even those figures exclude improvements in existing school buildings and facilities belonging to state agencies.

Table 5. Total Estimated Cost in Millions and Percent of Total of Needed Infrastructure Improvements by Project Type and Level of Government

Five-year Period July 2014 through June 2019

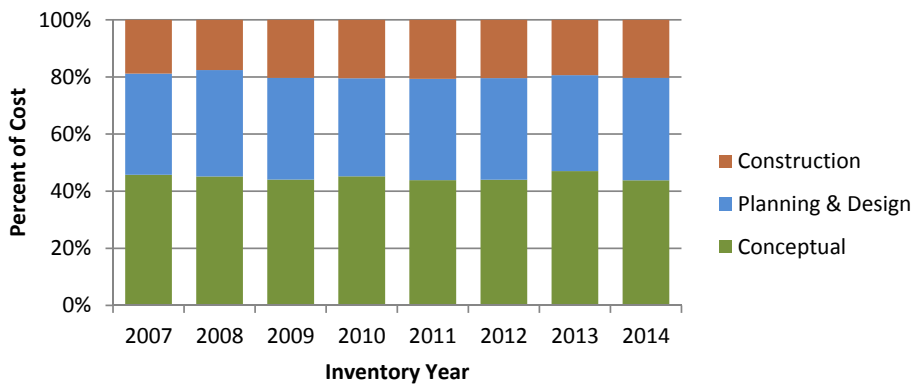
	City		County		State		Federal		Joint		Other		Total	
Category and Type of Infrastructure	**Estimated Cost [in millions]**	**Percent of Total**	**Estimated Cost [in millions]**	**Percent of Total**	**Estimated Cost [in millions]**	**Percent of Total**	**Estimated Cost [in millions]**	**Percent of Total**	**Estimated Cost [in millions]**	**Percent of Total**	**Estimated Cost [in millions]**	**Percent of Total**	**Estimated Cost [in millions]**	**Percent of Total**
Transportation and Utilities	**$ 2,662.6**	**10.5%**	**$ 2,356.1**	**9.3%**	**$ 19,419.2**	**76.5%**	**$ 698.0**	**2.7%**	**$ 234.0**	**0.9%**	**$ 16.9**	**0.1%**	**$ 25,386.8**	**100.0%**
Transportation	2,510.0	10.0%	2,316.2	9.2%	19,419.2	77.1%	698.0	2.8%	228.0	0.9%	0.3	0.0%	25,171.6	100.0%
Other Utilities	152.6	70.9%	39.9	18.5%	0.0	0.0%	0.0	0.0%	6.0	2.8%	16.6	7.7%	215.2	100.0%
Education	**$ 377.2**	**4.4%**	**$ 3,408.7**	**40.0%**	**$ 4,718.4**	**55.3%**	**$ 0.0**	**0.0%**	**$ 0.0**	**0.0%**	**$ 25.2**	**0.3%**	**$ 8,529.6**	**100.0%**
Post-secondary Education	0.4	0.0%	3.1	0.1%	4,635.1	99.9%	0.0	0.0%	0.0	0.0%	0.0	0.0%	4,638.6	100.0%
School Renovations and Replacements	241.8	10.1%	2,042.9	85.7%	83.3	3.5%	0.0	0.0%	0.0	0.0%	15.1	0.6%	2,383.2	100.0%
New Public Schools and Additions	134.9	9.0%	1,348.7	90.4%	0.0	0.0%	0.0	0.0%	0.0	0.0%	8.6	0.6%	1,492.1	100.0%
School System-wide	0.2	1.2%	14.0	89.2%	0.0	0.0%	0.0	0.0%	0.0	0.0%	1.5	9.5%	15.7	100.0%
Health, Safety, and Welfare	**$ 1,772.6**	**35.6%**	**$ 1,480.1**	**29.7%**	**$ 907.0**	**18.2%**	**$ 0.5**	**0.0%**	**$ 151.1**	**3.0%**	**$ 674.0**	**13.5%**	**$ 4,985.3**	**100.0%**
Water and Wastewater	1,487.2	44.5%	1,027.8	30.8%	0.0	0.0%	0.0	0.0%	149.8	4.5%	673.6	20.2%	3,338.5	100.0%
Law Enforcement	74.6	9.2%	260.3	32.0%	477.4	58.8%	0.0	0.0%	0.0	0.0%	0.0	0.0%	812.3	100.0%
Public Health Facilities	1.0	0.2%	11.4	2.6%	428.0	97.1%	0.5	0.1%	0.0	0.0%	0.0	0.0%	440.9	100.0%
Storm Water	95.8	48.4%	101.0	51.0%	0.0	0.0%	0.0	0.0%	0.8	0.4%	0.3	0.2%	197.9	100.0%
Fire Protection	105.6	62.9%	60.4	36.0%	1.7	1.0%	0.0	0.0%	0.3	0.2%	0.0	0.0%	168.0	100.0%
Solid Waste	6.6	25.3%	19.1	73.9%	0.0	0.0%	0.0	0.0%	0.2	0.8%	0.0	0.0%	25.9	100.0%
Housing	1.9	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	1.9	100.0%
Recreation and Culture	**$ 694.7**	**44.0%**	**$ 385.8**	**24.5%**	**$ 473.3**	**30.0%**	**$ 0.2**	**0.0%**	**$ 23.1**	**1.5%**	**$ 0.5**	**0.0%**	**$ 1,577.6**	**100.0%**
Recreation	515.3	49.3%	319.0	30.5%	205.4	19.7%	0.2	0.0%	4.6	0.4%	0.0	0.0%	1,044.5	100.0%
Libraries, Museums, and Historic Sites	62.2	18.1%	33.6	9.8%	241.4	70.3%	0.0	0.0%	6.1	1.8%	0.0	0.0%	343.2	100.0%
Community Development	117.2	61.7%	33.3	17.5%	26.5	14.0%	0.0	0.0%	12.3	6.5%	0.5	0.3%	189.9	100.0%
General Government	**$ 163.2**	**26.6%**	**$ 119.4**	**19.5%**	**$ 310.4**	**50.6%**	**$ 20.0**	**3.3%**	**$ 0.0**	**0.0%**	**$ 0.8**	**0.1%**	**$ 613.8**	**100.0%**
Public Buildings	111.0	21.1%	100.6	19.2%	292.6	55.7%	20.0	3.8%	0.0	0.0%	0.7	0.1%	524.8	100.0%
Other Facilities	52.2	58.7%	18.8	21.1%	17.9	20.1%	0.0	0.0%	0.0	0.0%	0.1	0.1%	89.0	100.0%
Economic Development	**$ 129.5**	**34.2%**	**$ 199.6**	**52.7%**	**$ 1.3**	**0.3%**	**$ 0.0**	**0.0%**	**$ 40.5**	**10.7%**	**$ 7.9**	**2.1%**	**$ 378.8**	**100.0%**
Industrial Sites and Parks	48.6	18.6%	185.1	70.9%	1.3	0.5%	0.0	0.0%	21.1	8.1%	5.0	1.9%	261.0	100.0%
Business District Development	81.0	68.7%	14.6	12.4%	0.0	0.0%	0.0	0.0%	19.4	16.5%	2.9	2.5%	117.8	100.0%
Grand Total	**$ 5,799.9**	**14.0%**	**$ 7,949.8**	**19.2%**	**$ 25,829.7**	**62.3%**	**$ 718.7**	**1.7%**	**$ 448.6**	**1.1%**	**$ 725.2**	**1.7%**	**$ 41,471.9**	**100.0%**

The estimated cost of infrastructure improvements in all three stages of development continues to trend upward.

The estimated cost of each infrastructure need in the inventory is reported as being in one of three stages—conceptual, planning and design, or construction. The distribution of costs by stage has remained relatively consistent over the past seven years (see figure 3), especially for those in the construction phase, as the estimated cost of infrastructure improvements in all three phases increased. Projects in the conceptual stage make up nearly half (43.8%), $18.2 billion, of the amount reported in the current inventory. Improvements in the planning and design stage total $14.9 billion (35.9%) and improvements under construction total $8.4 billion (20.3%). See figure 4 and table 6.

Figure 3. Percent of Total Reported Cost of Infrastructure Improvements by Stage of Development

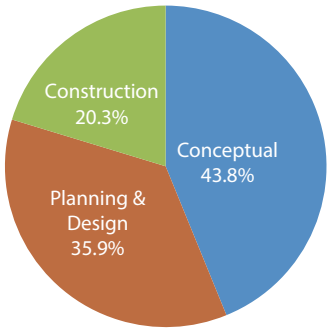
2007 through 2014



Over the last four inventories, the share of project costs in the Recreation and Culture and in the Health, Safety, and Welfare categories in the construction stage increased as the share of project costs in the conceptual stage decreased. Projects in these categories seem to be progressing from the conceptual stage to planning and from planning to construction. However, fluctuations for types within the categories can be obscured by trends at the category level. For example, although the overall percentage of Recreation and Culture costs in the construction stage rose each of the last two years, the percentage for the community development projects in that category fell.

Figure 4. Percent of Total Reported Cost of Infrastructure Improvements by Stage of Development

Five-year Period July 2014 through June 2019



State and federal mandates affect 3.0% of all projects.

Commission staff do not ask local or state officials to identify costs related to state and federal mandates, except for improvements at existing schools and new schools, because officials reporting their needs often do not have the detailed information necessary to separate that out of total project costs (e.g., the cost of access ramps and lowered water fountains required by the Americans with Disabilities Act [ADA]). They are asked, however, to indicate whether the cost of any projects are affected by mandates. While it is impossible to determine how much state and federal facilities mandates cost, it is possible to determine the overall number of projects affected by mandates—466 projects in this inventory; the number has been fewer than 500 in each inventory since 2007. The inclusion of bridges rated insufficient by a state inspector with an identified remedy and associated cost estimate in last year's report increased the total project count for transportation but not the number of projects affected by mandates and brought last year's

Table 6. Needed Infrastructure Improvements in Millions and Percent of Total

by Category, Project Type, and Stage of Development

Five-year Period July 2014 through June 2019

	Conceptual				Planning & Design				Construction			
Category and Type of Infrastructure	**Number**		**Cost**		**Number**		**Cost**		**Number**		**Cost**	
Transportation and Utilities	**7,259**	**81.3%**	**$ 10,367.3**	**40.8%**	**1,097**	**12.3%**	**$10,562.8**	**41.6%**	**574**	**6.4%**	**$ 4,456.7**	**17.6%**
Transportation	7,227	81.6%	10,240.6	40.7%	1,076	12.1%	10,504.2	41.7%	559	6.3%	4,426.9	17.6%
Other Utilities	32	47.1%	126.7	58.9%	21	30.9%	58.6	27.2%	15	22.1%	29.8	13.9%
Education	**2,615**	**63.3%**	**$ 4,673.7**	**54.8%**	**815**	**19.7%**	**$ 2,118.8**	**24.8%**	**700**	**16.9%**	**$ 1,737.1**	**20.4%**
Post-secondary Education	239	48.7%	2,078.9	44.8%	132	26.9%	1,357.6	29.3%	120	24.4%	1,202.0	25.9%
School Renovations and Replacements	2,128	65.0%	1,593.1	66.8%	603	18.4%	446.6	18.7%	545	16.6%	343.5	14.4%
New Public Schools and Additions	238	68.0%	992.0	66.5%	79	22.6%	311.4	20.9%	33	9.4%	188.8	12.7%
School System-wide	10	76.9%	9.7	62.0%	1	7.7%	3.2	20.4%	2	15.4%	2.8	17.6%
Health, Safety, and Welfare	**799**	**56.0%**	**$ 1,928.9**	**38.7%**	**398**	**27.9%**	**$ 1,537.7**	**30.8%**	**231**	**16.2%**	**$ 1,518.7**	**30.5%**
Water and Wastewater	557	54.0%	1,097.1	32.9%	302	29.3%	1,058.7	31.7%	173	16.8%	1,182.7	35.4%
Law Enforcement	85	53.8%	365.8	45.0%	47	29.7%	263.1	32.4%	26	16.5%	183.4	22.6%
Public Health Facilities	37	74.0%	331.2	75.1%	6	12.0%	46.8	10.6%	7	14.0%	62.8	14.3%
Fire Protection	76	71.7%	67.2	40.0%	17	16.0%	44.1	26.3%	13	12.3%	56.7	33.8%
Storm Water	31	55.4%	53.5	27.0%	19	33.9%	116.8	59.0%	6	10.7%	27.6	13.9%
Solid Waste	13	56.5%	14.2	54.9%	7	30.4%	8.2	31.5%	3	13.0%	3.5	13.6%
Housing	0	0.0%	0.0	0.0%	0	0.0%	0.0	0.0%	3	100.0%	1.9	100.0%
Recreation and Culture	**372**	**52.4%**	**$ 619.6**	**39.3%**	**217**	**30.6%**	**$ 487.0**	**30.9%**	**121**	**17.0%**	**$ 471.0**	**29.9%**
Recreation	298	53.3%	339.5	32.5%	170	30.4%	319.7	30.6%	91	16.3%	385.3	36.9%
Community Development	39	52.0%	101.1	53.3%	22	29.3%	38.8	20.5%	14	18.7%	49.9	26.3%
Libraries, Museums, and Historic Sites	35	46.1%	178.9	52.1%	25	32.9%	128.5	37.4%	16	21.1%	35.8	10.4%
Economic Development	**67**	**55.8%**	**$ 202.8**	**53.5%**	**26**	**21.7%**	**$ 43.2**	**11.4%**	**27**	**22.5%**	**$ 132.8**	**35.1%**
Business District Development	10	29.4%	18.8	15.9%	10	29.4%	12.3	10.4%	14	41.2%	86.8	73.6%
Industrial Sites and Parks	57	66.3%	184.1	70.5%	16	18.6%	30.9	11.8%	13	15.1%	46.1	17.7%
General Government	**114**	**57.0%**	**$ 384.5**	**62.6%**	**64**	**32.0%**	**$ 130.9**	**21.3%**	**22**	**11.0%**	**$ 98.4**	**16.0%**
Public Buildings	86	56.2%	343.7	65.5%	51	33.3%	108.7	20.7%	16	10.5%	72.4	13.8%
Other Facilities	28	59.6%	40.7	45.8%	13	27.7%	22.2	25.0%	6	12.8%	26.0	29.2%
Grand Total	**11,226**	**72.3%**	**$ 18,176.8**	**43.8%**	**2,617**	**16.9%**	**$14,880.4**	**35.9%**	**1,675**	**10.8%**	**$ 8,414.7**	**20.3%**

Note: The project count includes all projects at a school. A school can have more than one project and those projects can be in different stages. For complete listings of cost by project type, stage of development, and county, see appendix D.

Figure 5. Percent of Projects Affected by Mandates

2007 through 2014

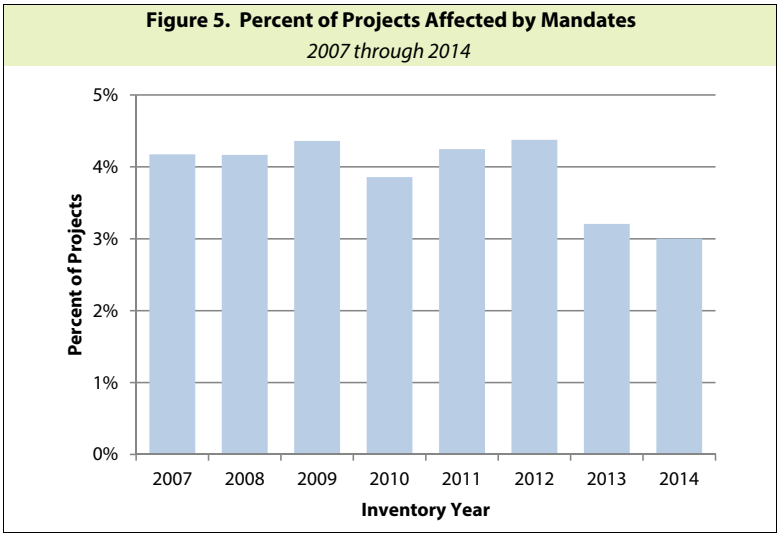


Table 7. Percent of Projects Affected by Mandates

Five-year Period July 2014 through June 2019

Type of Infrastructure	Number of Projects or Schools Reported	Projects or Schools Affected by Mandates	
		Number	Percent
Public Health Facilities	50	7	14.0%
School Renovations and Replacements	3,276	280	8.5%
Post-secondary Education	491	41	8.4%
Law Enforcement	158	9	5.7%
Recreation	559	30	5.4%
Community Development	75	4	5.3%
Libraries, Museums, and Historic Sites	76	4	5.3%
Public Buildings	153	6	3.9%
Business District Development	34	1	2.9%
Water and Wastewater	1,032	24	2.3%
Storm Water	56	1	1.8%
Fire Protection	106	1	0.9%
Transportation	8,862	57	0.6%
New Public Schools and Additions	350	1	0.3%
Industrial Sites and Parks	86	0	0.0%
Other Utilities	68	0	0.0%
Other Facilities	47	0	0.0%
Solid Waste	23	0	0.0%
School System-wide	13	0	0.0%
Housing	3	0	0.0%
Grand Total	15,518	466	3.0%

Note: The project count includes all projects at a school and a school can have more than one project.

percentage down from around 4.4% the previous year to 3.2%. See figure 5. The number decreased slightly, to 3.0% this year, as the total number of all projects in this year's inventory increased over last year.

Approximately 14.0% (7) of all needed improvements at public health facilities are affected by mandates (see table 7). Those mandates include ADA compliance, asbestos remediation, fire safety, and lead paint remediation. Local officials also reported that 8.5% (280) of school renovations and replacements are needed because of mandates, including the state's 1992 Education Improvement Act (EIA), which limits class size to 25 to 35 students depending on the grade level. Although the EIA tends to require new classrooms as student enrollments grow, of all the school systems with growing enrollment, only Rutherford County reported needing to build a new school because of it.

Outside of these top two, mandates affect just 1.5% of all infrastructure projects, as has been the case for many years. Transportation has the second largest number of projects affected by mandates, though those 57 projects are less than 1.0% of the total of 8,862 transportation projects.

Building Tennessee's Tomorrow:

Anticipating the State's Infrastructure Needs

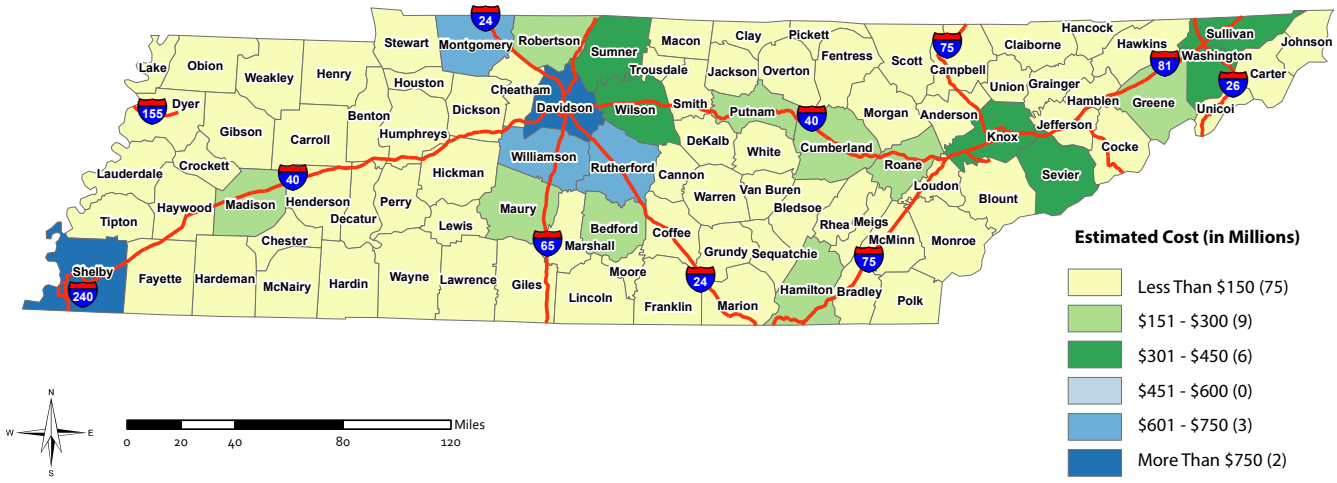
July 2014 through June 2019

INFRASTRUCTURE NEEDS BY COUNTY

Infrastructure needs vary widely across Tennessee's counties.

In general, the more people a county has and the more its population grows, the more infrastructure it will need and, fortunately, the more wealth it will likely have to pay for those needs. As has been the case throughout the history of this inventory, relationships among these factors are strong and well demonstrated by the variation reported for each Tennessee county, although they are not perfectly aligned in any county. Some counties are able to meet their infrastructure needs more easily than others, some continue to report the same needs year after year, and even fast growing counties can find it difficult to meet their needs. With state and regional projects factored out, the public infrastructure improvement needs reported for all counties across the state have a total cost estimated by local officials at nearly $13.8 billion. Map 1 shows how the cost varies by county across the state.

Map 1. Total Estimated Cost of Infrastructure Improvement Needs
Five-year Period July 2014 through June 2019

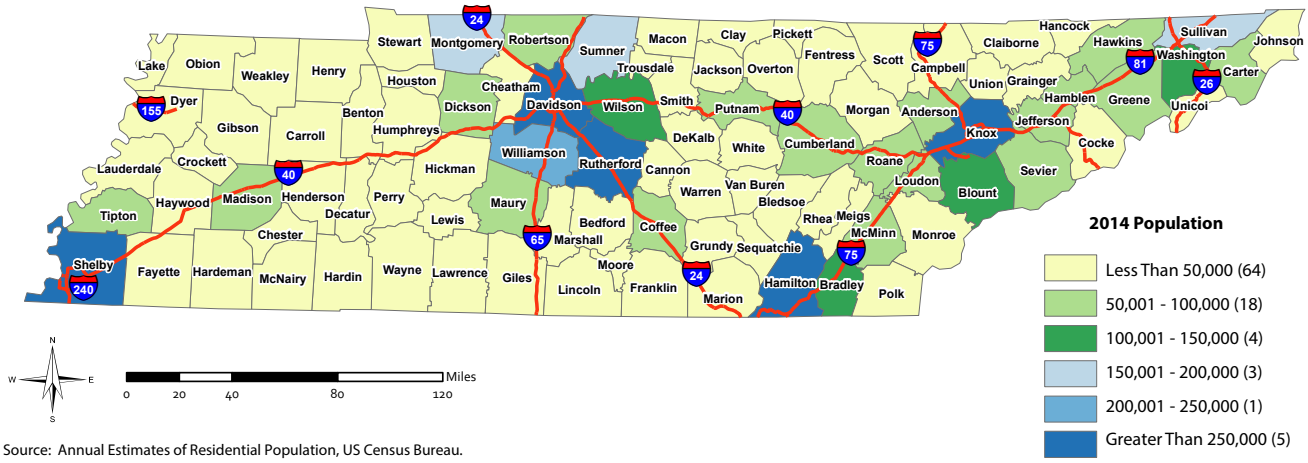


Five counties—Davidson and Shelby in the first tier for needed infrastructure improvements (dark blue in map 1), and Rutherford, Williamson, and Montgomery counties in the second tier (medium blue in map 1)—account for 42.7% ($5.9 billion) of the $13.8 billion needed for infrastructure improvements reported by local officials. Shelby and Davidson are also in the top tier (shaded dark blue) for total population in map 2, cost of completed improvements in map 4, property values in map 5, and taxable sales in map 6. They are the first and second most populous counties and are home to a quarter of the state's population. Between 2000 and 2014, Davidson and Shelby experienced the second and eighth greatest population growth in the state—Davidson grew by 98,027 and Shelby by 40,524. Not surprisingly, besides needing the most infrastructure

improvements,[9] these two counties also completed the most (see map 4), between them nearly a quarter (23.7%) of the state total. The surprising difference between these two counties is that Davidson completed the 15th most improvements per capita ($1,596) while Shelby completed the 68th most ($630). This is noteworthy because Davidson and Shelby have the two largest property and sales tax bases in the state, factors usually related to a county's ability to complete projects. It isn't clear why there is a large difference between the two. It may be that infrastructure needs and improvements in Shelby County were not being fully reported in the inventory.

Map 2. Total Population by County

2014

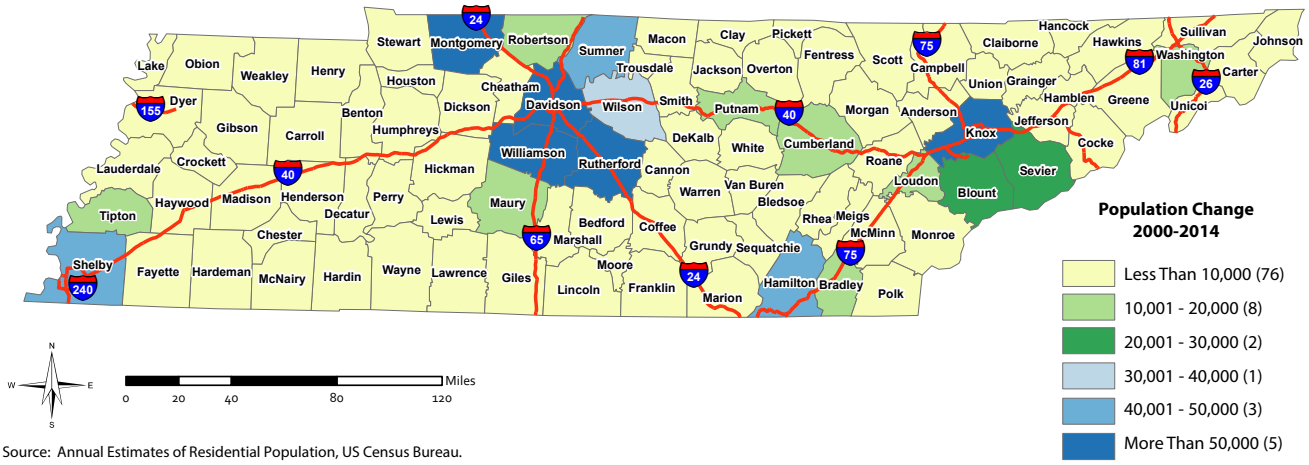


Source: Annual Estimates of Residential Population, US Census Bureau.

Rutherford, Williamson, and Montgomery counties round out the top five for infrastructure needs in map 1. Rutherford, the largest of the three (fifth for population) and the county that grew the most since 2000 (by 105,329 residents), reported needing the third most infrastructure improvements and completed the sixth most improvements. It has the sixth largest property and sales tax bases. Williamson, fourth for unmet needs, is the sixth most populous county. Between 2000 and 2014 its population grew by 77,129 residents, the third largest change behind Rutherford and Davidson. Population change is depicted in map 3. Williamson has completed more infrastructure improvements than most counties (third) and is fourth for property and fifth for sales tax bases. Montgomery, fifth for unmet needs, is the seventh most populous county; between 2000 and 2014 its population grew by 54,736 residents, the fifth largest increase. Montgomery is lagging in completed infrastructure improvements (eighth) and is tenth and eighth for property and sales tax bases.

[9] There are another $27.7 billion in regional needs across the state.

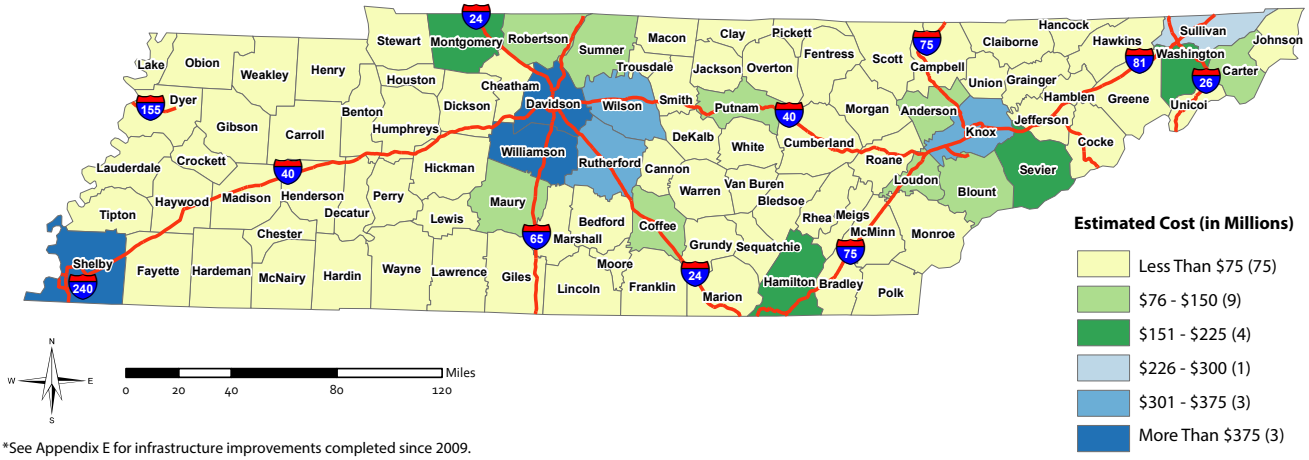
Map 3. Population Change by County
2000 to 2014



Source: Annual Estimates of Residential Population, US Census Bureau.

The next six counties are all in the fourth tier in map 1, shaded dark green—still above average and collectively accounting for $2.2 billion (16.1%) of the needed infrastructure improvements in the state. Knox County, like Davidson, is in the top tier for population, population change, property tax base, and sales tax base, but it ranks eighth for improvement needs and fourth for improvements completed (map 4, second tier). Knox would seem to be well situated to meet its infrastructure needs.

Map 4. Estimated Cost of Completed Infrastructure Improvements *Infrastructure Needs*
*Reported July 1, 2009 and Completed by July 1, 2014**

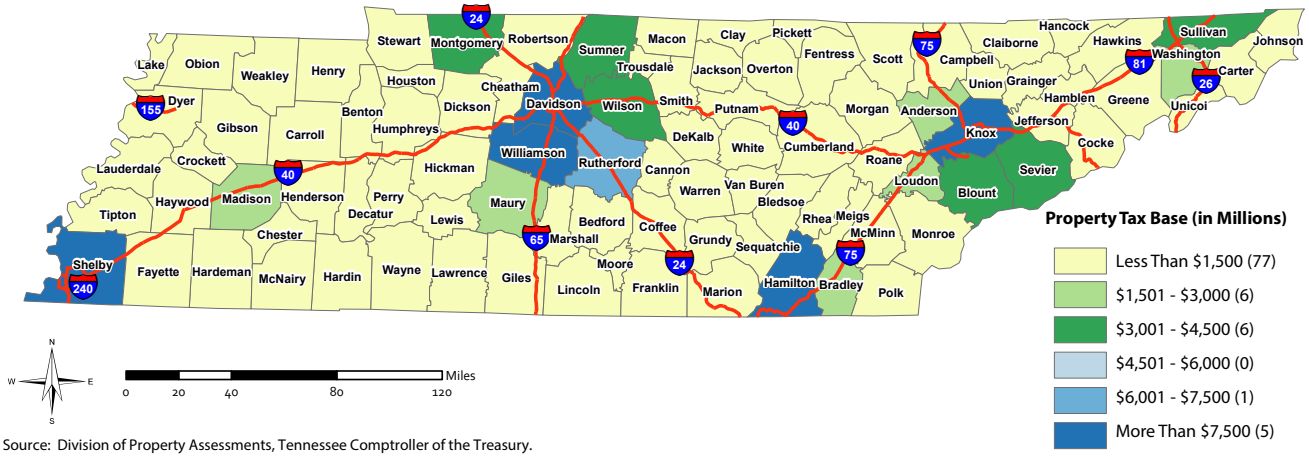


*See Appendix E for infrastructure improvements completed since 2009.

Improvement needs in three of the remaining five in the fourth tier in map 1 (Wilson, Washington, and Sevier) are reasonably aligned with their total populations, population growth, and property and sales tax bases (maps 2, 3, 5, and 6), as are their completed improvements (map 4). With one exception, all of these factors are within one tier of the fourth tier in each of those maps. Wilson County, the exception, is getting a lot done given its tax bases—it is fifth for completed infrastructure improvements (in the second tier in map 4) but only 12th for property tax base (in the fourth tier in map 5) and 13th for sales tax base (in the fifth tier in map 6). Wilson may be responding to its population growth, which is ninth among the 95 counties (see map 3). Similarly, Washington County, although growing more slowly, is getting more done than its property and sales tax bases would seem to support.

Map 5. Equalized Assessed Property Values by County

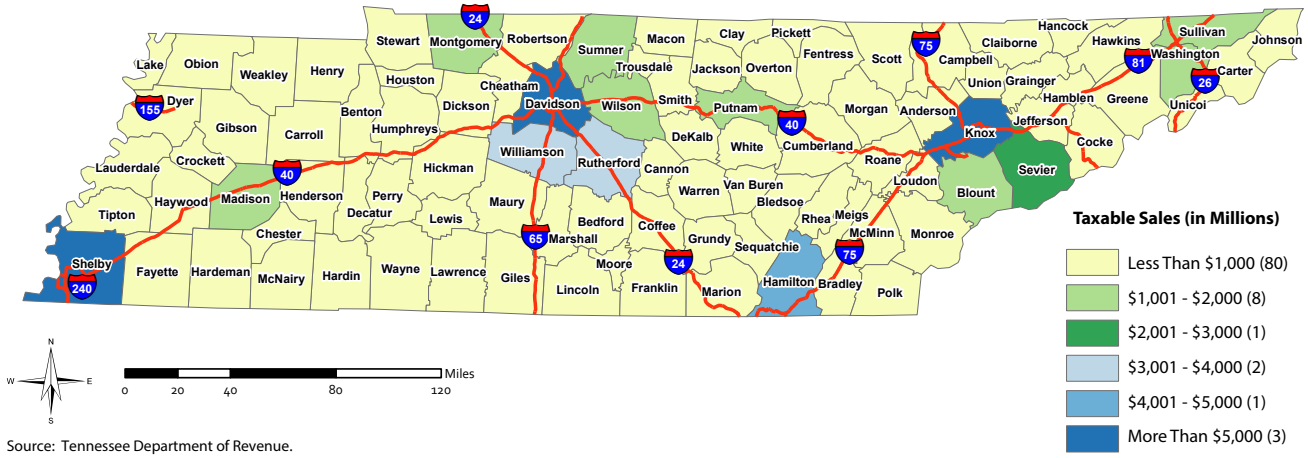
2014



Source: Division of Property Assessments, Tennessee Comptroller of the Treasury.

Map 6. Taxable Sales by County

2014



Source: Tennessee Department of Revenue.

Sevier, seventh for unmet needs, is in the fourth tier for population change, completed improvements, property values, and taxable sales (maps 3 through 6) and in the fifth tier for population (map 2). Home to Gatlinburg, Tennessee's "Gateway to the Smokies," Sevier's ability to complete the tenth largest amount of infrastructure improvements in the state is directly related to its large property (ninth largest in the state), and sales tax bases (the seventh largest in the state), and heavily supported by tourism.

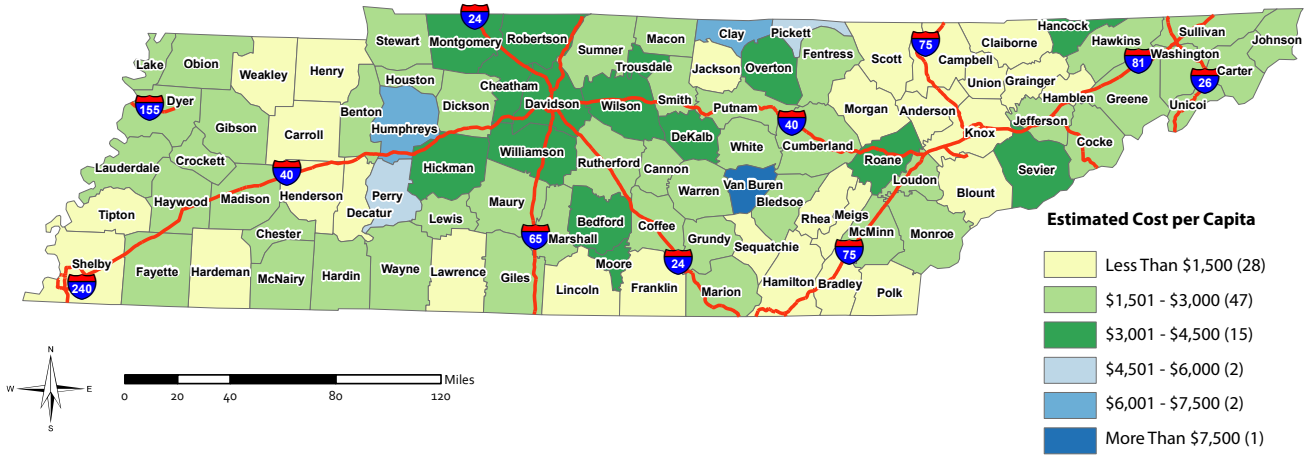
The other two counties in the fourth tier for infrastructure needs, Sullivan and Sumner, report needing less new infrastructure improvements than might be expected based on their population factors. Sumner is in the third tier for population (map 2) and the second for population growth (map 3), but its property and sales tax bases fall in the fourth and fifth tiers (maps 5 and 6). Sullivan is similarly situated although it is growing much more slowly (see map 3), which may explain its relatively low need for infrastructure improvements. Sumner, on the other hand, may be held back by its relatively small tax base.

Patterns become less obvious at this point and vary more among counties with smaller populations and fewer needs, partly because infrequent but large projects in smaller counties can affect their ranking for completion of infrastructure improvements.

Relative to their populations, counties with small populations need and complete just as much or more infrastructure than counties with large populations.

Relative to population, infrastructure needs do not vary all that much. Most counties fall in the bottom three tiers, including the large ones discussed above. Only five small counties stand out: Van Buren, Humphreys, Clay, Pickett, and Perry. See map 7. These five counties are in the lowest tier for needs (map 1).

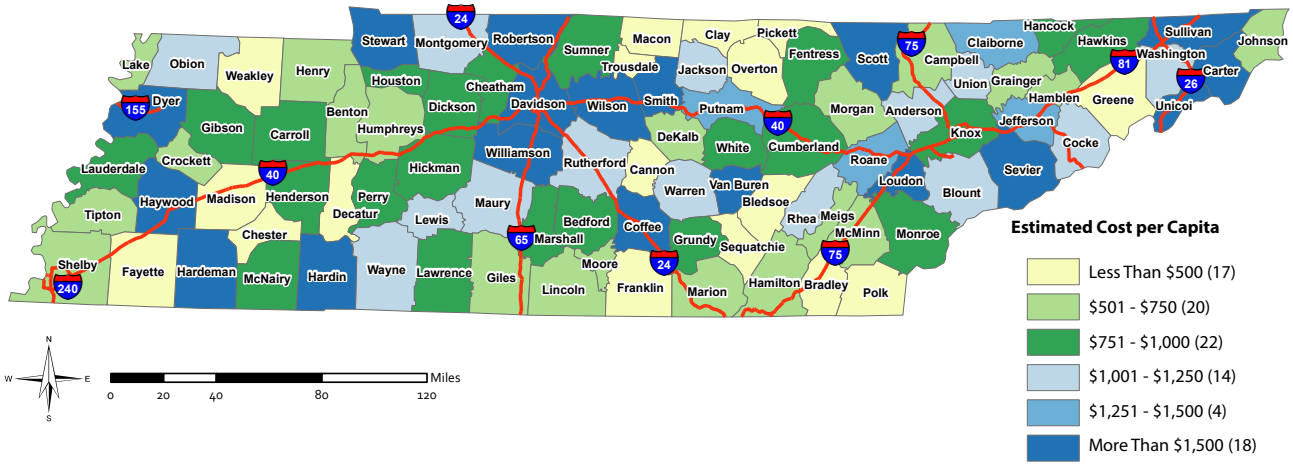
Map 7. Estimated Cost of Total Infrastructure Improvement Needs per Capita
Five-year Period July 2014 through June 2019



The state's second smallest county, with a population of only 5,633, Van Buren has needed $25 million since 2006 to install and replace water lines. Clay, with a population of 7,765, has needed $20 million since 2002 to construct gas lines throughout the county and connect to the city of Celina. Much larger, with a population of 18,135, Humphreys County has needed $10 million to replace a bridge and $8 million to provide water and sewer at an industrial park since 2007. Planned improvements to State Route 13 in Perry County, with a population of 7,822, increased from $7.5 million to $10.7 million. Pickett County, with a population of 5,124, has needed a new high school for ten years now, estimated to cost a relatively modest $15 million. Needs of this size would not be significant in a county with a large population, but they are big enough to cause these small counties to have the largest infrastructure needs per capita. Outside of these five counties, infrastructure needs appear to be better aligned with population. However, when you look at completed infrastructure improvements per capita in map 8, the counties are spread more evenly, with more in the top tier than in maps 1 through 7.

Map 8. Estimated Cost of Infrastructure Improvements Completed per Capita

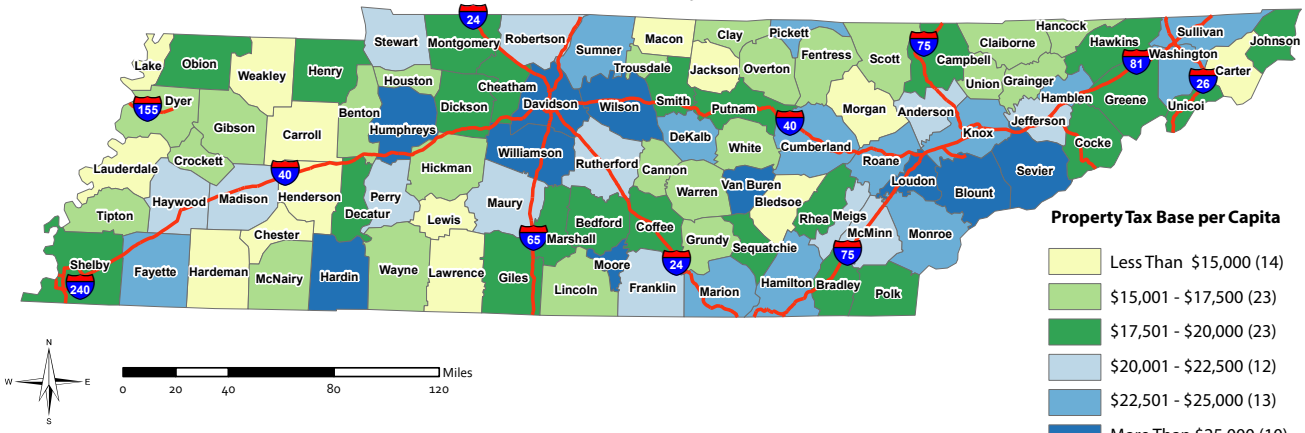
Infrastructure Needs Reported July 1, 2009 and Completed by July 1, 2014



The following maps suggest an explanation for the contrast between maps 7 and 8. There are exceptions of course, but counties in the top three or four tiers for infrastructure needs per capita (map 7) are more likely to be in one of those tiers for improvements completed per capita (map 8) if their per-capita tax bases are also in one of those tiers (maps 9 and map 10). For instance, Van Buren County is in the first tier for improvements needed per capita, improvements completed per capita, and property tax base per capita (maps 7, 8, and 9), despite having a per-capita sales tax base in the bottom tier, one of the nineteen smallest in the state (map 10).

Map 9. Equalized Assessed Property Values per Capita by County

2014

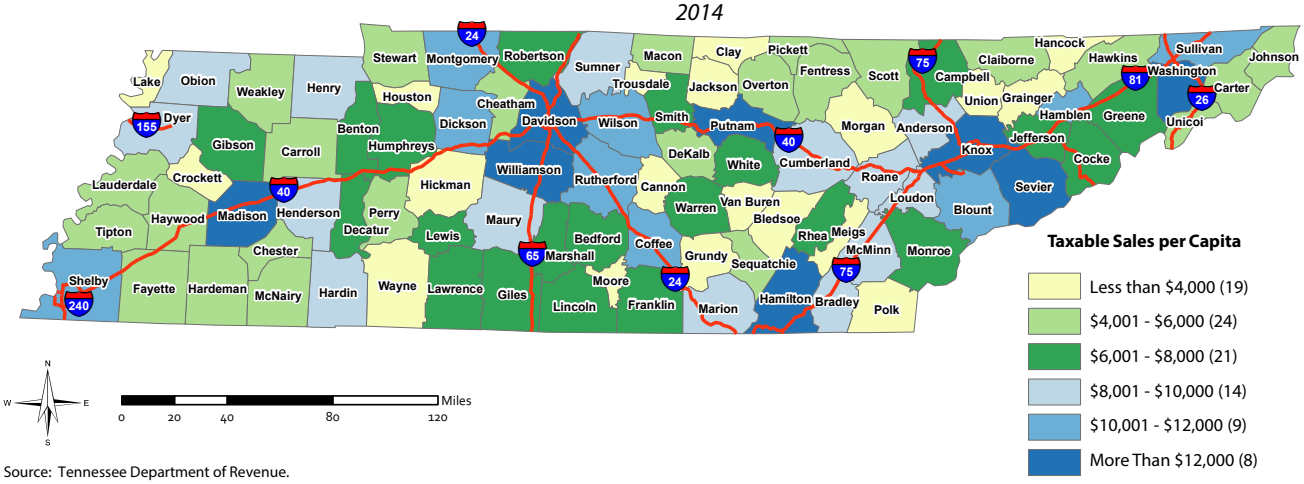


Source: Division of Property Assessments, Tennessee Comptroller of the Treasury.

Van Buren is an example of the huge difference one project can make in a county with a small population. It has the highest reported per capita completed improvements ($3,599) largely because of the completion of a $13.3 million interchange at state routes 111 and 284. Arguably, considering its design and funding, the project could be considered regional and therefore would not be part of the $20.3 million in completed improvements included in the per capita calculation, but the reporting local government and development district feel that it serves mostly local

Map 10. Taxable Sales per Capita by County

2014



Source: Tennessee Department of Revenue.

residents.[10] Without this project Van Buren would be in the middle of the pack for completed improvements per capita at $1,238.

Wealth and population factors are strongly tied to infrastructure needs and completed improvements.

The maps in this chapter seem to indicate that population along with population growth and access to the resources needed to fund infrastructure are tied to both how much infrastructure is needed and how much is completed. Statistical analysis supports this observation. Correlation measures are the simplest and most common statistical approach to evaluating relationships like these. Correlation coefficients measure the strength of the relationship between two sets of numbers. The strength is reported as a range from zero for no correlation to one for perfect correlation. The coefficient will be positive if one set of numbers increases as the other increases or decreases as the other decreases; it will be negative if one increases as the other decreases.

Because Tennessee's 95 counties vary so much in size—for instance, "Big Shelby," with 763 square miles of land area, is almost seven times the size of Trousdale, which is only 114 square miles—dividing each of the factors by square miles ensures that land area does not distort the analysis. When this is done, five factors—taxable property, taxable sales, income, population, and population gain or loss—stand out in relation to both needs and the ability to meet those needs.

These five factors, as well as population change rate, rank the same for infrastructure needs as they do for completed improvements, with wealth factors (revenue sources for local governments) coming first. See tables

The condition of roads, bridges, schools, water treatment plants, and other physical assets greatly influences the economy's ability to function and grow.

Elizabeth C. McNichol, *State Tax Notes*, "It's Time for States to Invest in Infrastructure," April 18, 2016 http://www.taxnotes.com/state-tax-notes/2016-04-18

[10] See http://www.tn.gov/assets/entities/tdot/attachments/studies-VanBurenSR-111atSR-284IJS.pdf for more details.

Table 8. Correlation Between Infrastructure Needed and Related Factors Divided by Land Area

Factor per Square Mile	Correlation with Improvement Needs per Square Mile
Taxable Property	0.90
Taxable Sales	0.89
Income	0.88
Population	0.84
Population Gain or Loss	0.80
Population Change Rate	0.38

Table 9. Correlation Between Infrastructure Completed and Related Factors Divided by Land Area

Factor per Square Mile	Correlation with Infrastructure Completed per Square Mile
Taxable Property	0.93
Taxable Sales	0.90
Income	0.90
Population	0.86
Population Gain or Loss	0.83
Population Change Rate	0.42

Table 10. Significance of Factors Affecting Infrastructure Needs and Completed Infrastructure

	Order of Significance	
Factors	Infrastructure Needed	Completed Improvements
Population	#1**	#2**
Income	#2**	Not Significant
Population Gain or Loss	#3**	Not Significant
Taxable Property	Not Significant	#1**
Taxable Sales	Not Significant	Not Significant
Variance Described (R^2)	0.86	0.9

** Highly Significant

* Significant

8 and 9. Population change rates, which get a lot of attention, are consistently only weakly correlated with unmet needs and completed improvements.

While correlation allows comparison of two factors at a time, regression analysis can compare a group of factors all together rather than in isolation to determine how they compare to each other. This kind of comparison can reveal subtler relationships than individual correlations can. And in fact, interactions among factors that look like strong predictors in isolation can produce surprising results. Regressions for the five highly correlated factors in tables 8 and 9 demonstrate that the set is a strong predictor of what counties need and are able to complete per square mile. This set of factors describes 86% of the variation in what is needed and 91% of the variation in what is completed. But although it is the second most strongly correlated factor for both needs and improvements made, sales tax base is not a significant factor when all five factors are considered together. This may be because the sales tax bases of many counties are too small to play a large role in meeting infrastructure needs. Indeed, the property tax base is the most significant for improvements completed. Population, which ranks fourth in the individual correlations, is the most significant factor in relation to infrastructure needs and the second most significant for completed improvements. See table 10. These results are not counterintuitive but confirm expectations that the need for infrastructure is driven by population factors, while the ability to meet those needs relates to the ability to fund them.

Building Tennessee's Tomorrow:

Anticipating the State's Infrastructure Needs

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FUNDING THE STATE'S INFRASTRUCTURE NEEDS

Nearly two thirds of infrastructure needs in the current inventory are not fully funded.

Information about funding for public infrastructure needs reported by officials indicates that 63.9% of the funds required to meet those needs was not available at the time the inventory was made, nearly the same as last year's 66.3%. Excluding improvements needed at existing schools and those drawn from capital budget requests submitted by state agencies, neither of which includes funding information, leaves $32.7 billion of which $11.3 billion is fully funded, $775 million more than the amount that was fully funded in the previous inventory. Another $528 million is available for improvements that are partially funded, bringing the total available to $11.8 billion or about 4.5% more than the $11.3 billion that was available for the infrastructure needs reported in last year's inventory. That leaves a need for another $20.9 billion, about 5.8% less than last year's shortfall of $22.1 billion. See table 11.

Officials reported that $11.8 billion is available to fund public infrastructure; of that amount, $11.3 billion is for infrastructure that is fully funded.

Table 11. Public Infrastructure Needs Summary of Funding Availability*

Five-year Period July 2014 through June 2019

	Funding Available [in billions]	Funding Needed [in billions]	Total Needs [in billions]
Fully Funded Needs	$ 11.3	$ 0.0	$ 11.3
Partially Funded Needs	0.5	6.0	6.6
Unfunded Needs	0.0	14.8	14.8
Total	**$ 11.8**	**$ 20.9**	**$ 32.7**

*Excludes infrastructure improvements for which funding availability is not known.

Note: Totals may not equal 100% because of rounding.

Funding sources vary based on ownership of infrastructure.

Improvements that were entirely unfunded in July 2014 comprise 45.4% of the total funding needed, down from last year's 53.2%. As always, more of the funding needed will become available as projects move from the conceptual stage to the planning and design stage, but a lack of funding will prevent some projects from ever being completed. In fact, most of the infrastructure needs reported in the July 2009 inventory that were not already fully funded were still needed five years later. The percentage

Although years of neglect have led to crumbling roads, unsafe bridges, outdated school buildings, and other disregarded needs of students, communities, and businesses, states now invest less in public infrastructure than they used to. Infrastructure spending is down when measured as a share of states' economies. Spending by state and local governments on all types of capital dropped from a high of 3 percent of the nation's GDP in the late 1960s to less than 2 percent in 2014. Infrastructure problems can't be solved by the federal government. States and localities own 90 percent of the nations' non-defense public infrastructure. That said, federal spending on infrastructure has fallen by half in the past 35 years, making the problem worse.

Elizabeth C. McNichol, *State Tax Notes*, "It's Time for States to Invest in Infrastructure," April 18, 2016 http://www.taxnotes.com/state-tax-notes/2016-04-18

of funding available for infrastructure improvements that progressed from the conceptual stage in 2013 to the planning and design stage in 2014 was 41.3% compared with 9.0% for needs that remained conceptual. Infrastructure improvements must be fully funded to move from the planning and design stage to the construction stage.

A look at infrastructure projects completed over the last five years reveals some interesting funding source patterns. The government that owns infrastructure typically funds the bulk of its cost, and a variety of revenue sources are tapped. For example, the state collects taxes and appropriates those 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 funding for all fully funded needs presented here except for transportation, which is funded primarily by the federal and state governments, and public health facilities and community development, both of which are funded primarily by the federal government (see table 12). It may appear that the state does not help pay for school buildings even though it does—although counties report funding more than four-fifths (83.3%) of new public school construction, and cities report funding the remainder (16.7%), 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 $700 million for fiscal year 2015-16.[11] The state pays more than half of that amount but does not earmark those funds for that specific purpose, therefore school systems have the flexibility to use those funds to meet various school needs and for various reasons generally report using them for operating costs rather than capital outlay. Counties also report funding all of the reported $6 million in school system-wide needs.

Local officials reported that 82.7% of the funding for county-owned projects will come from county sources. The same pattern is true of improvements reported in the 2009 inventory that have since been completed—counties paid 85.5% of the cost of meeting their infrastructure needs. Overall, counties provide funds for 16.8% of fully funded needs. In addition to the public schools and system-wide improvements discussed above, counties are the principal source of funding for six other types of infrastructure needs: law enforcement (79.7%), fire protection (70.9%), solid waste (60.2%), public buildings (58.7%), water and wastewater (53.8%), and recreation (50.9%).

[11] Tennessee Department of Education, 2014. "Capital" worksheet in "FY16 July Final.xlsm" workbook.

Table 12. Funding Source for Fully Funded Improvement Needs by Category and Type of Infrastructure [in millions]

Five-year Period July 2014 through June 2019

Category and Type of Infrastructure	State		Federal		Other		City		County		Special District		Total
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount
Transportation and Utilities	**$3,859.1**	**46.6%**	**$ 3,818.4**	**46.1%**	**$ 18.3**	**0.2%**	**$ 289.2**	**3.5%**	**$ 271.1**	**3.3%**	**$ 12.4**	**0.1%**	**$ 8,268.6**
Transportation	3,859.1	47.0%	3,816.5	46.5%	18.2	0.2%	238.7	2.9%	271.1	3.3%	1.2	0.0%	8,204.9
Other Utilities	0.0	0.0%	1.9	3.0%	0.1	0.2%	50.5	79.3%	0.0	0.0%	11.2	17.6%	63.7
Health, Safety, and Welfare	**$ 51.0**	**2.7%**	**$ 150.6**	**8.0%**	**$ 38.8**	**2.1%**	**$ 468.8**	**24.9%**	**$ 1,032.1**	**54.9%**	**$ 139.2**	**7.4%**	**$ 1,880.6**
Water and Wastewater	50.4	3.0%	130.7	7.9%	38.5	2.3%	410.1	24.7%	894.4	53.8%	139.2	8.4%	1,663.3
Law Enforcement	0.0	0.0%	10.4	9.5%	0.1	0.0%	11.8	10.8%	86.9	79.7%	0.0	0.0%	109.1
Fire Protection	0.2	0.2%	3.8	6.0%	0.0	0.0%	14.7	22.9%	45.5	70.9%	0.0	0.0%	64.1
Storm Water	0.0	0.0%	1.2	3.8%	0.0	0.0%	29.7	93.5%	0.8	2.5%	0.0	0.1%	31.7
Solid Waste	0.0	0.0%	0.0	0.0%	0.0	0.0%	2.6	39.8%	3.9	60.2%	0.0	0.0%	6.5
Public Health Facilities	0.0	0.0%	3.4	84.3%	0.0	0.0%	0.0	0.0%	0.6	15.7%	0.0	0.0%	4.0
Housing	0.4	23.4%	1.1	60.4%	0.3	16.1%	0.0	0.0%	0.0	0.0%	0.0	0.0%	1.9
Recreation and Culture	**$ 13**	**2.4%**	**$ 143.7**	**25.4%**	**26.8**	**4.7%**	**$ 128.4**	**22.7%**	**$ 253.5**	**44.8%**	**0.1**	**0.0%**	**$ 566.0**
Recreation	8.0	1.8%	99.7	22.1%	13.1	2.9%	100.7	22.3%	229.9	50.9%	0.1	0.0%	451.6
Community Development	3.7	6.5%	31.7	54.9%	2.1	3.6%	9.3	16.2%	10.9	18.8%	0.0	0.0%	57.7
Libraries, Museums, and Historic Sites	1.7	3.0%	12.3	21.7%	11.6	20.5%	18.4	32.4%	12.7	22.4%	0.0	0.0%	56.8
Education	**$ 0.0**	**0.0%**	**$ 0.4**	**0.1%**	**$ 0.0**	**0.0%**	**$ 54.8**	**16.5%**	**$ 277.5**	**83.4%**	**$ 0.0**	**0.0%**	**$ 332.7**
New Public Schools*	0.0	0.0%	0.0	0.0%	0.0	0.0%	54.4	16.7%	271.6	83.3%	0.0	0.0%	325.9
School System-wide	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	6.0	100.0%	0.0	0.0%	6.0
Post-secondary Education	0.0	0.0%	0.4	48.2%	0.0	0.0%	0.4	51.8%	0.0	0.0%	0.0	0.0%	0.8
Economic Development	**$ 8.5**	**6.1%**	**$ 14.3**	**10.2%**	**$ 4.9**	**3.5%**	**$ 74.5**	**53.3%**	**$ 34.7**	**24.8%**	**$ 2.9**	**2.1%**	**$ 139.8**
Business District Development	4.3	4.9%	0.9	1.0%	2.6	2.9%	68.4	77.4%	11.8	13.4%	0.3	0.3%	88.3
Industrial Sites and Parks	4.1	8.0%	13.4	26.1%	2.4	4.6%	6.1	11.9%	22.9	44.4%	2.6	5.0%	51.5
General Government	**$ 0.6**	**0.7%**	**$ 3.7**	**4.2%**	**$ 0.0**	**0.0%**	**$ 55.8**	**63.6%**	**$ 27.6**	**31.5%**	**$ 0.0**	**0.0%**	**$ 87.6**
Public Buildings	0.6	1.3%	1.7	3.7%	0.0	0.0%	17.1	36.3%	27.6	58.7%	0.0	0.0%	47.0
Other Facilities	0.0	0.0%	2.0	4.8%	0.0	0.0%	38.7	95.2%	0.0	0.0%	0.0	0.0%	40.6
Grand Total	**$3,932.7**	**34.9%**	**$ 4,131.1**	**36.6%**	**$ 88.9**	**0.8%**	**$ 1,071.5**	**9.5%**	**$ 1,896.6**	**16.8%**	**$ 154.7**	**1.4%**	**$ 11,275.4**

* Includes replacements of existing schools.

Although cities fund just 9.5% of all fully funded infrastructure needs, they contribute heavily to five types of infrastructure: other facilities (95.2%), storm water (93.5%), other utilities (79.3%), business district development (77.4%), and post-secondary education (51.8%). And more than 25% of fully funded solid waste; public buildings; and libraries, museums, and historic sites infrastructure are funded by cities. For libraries, museums, and historic sites, this constitutes the largest portion of the funding. Overall, cities provided 67.6% of the funds necessary for improvements they needed in 2009 and have completed since then, and they expect to provide 53.1% of the funds for current and future improvements.

Although special districts paid 74.9% of the cost of meeting their 2009 infrastructure needs and expect to fund 69.1% of their current and future costs, they do not provide the majority of funding for any type of infrastructure. Most special districts in Tennessee are water utilities, so it is no surprise that almost all (90.0%) special district funding is for water and wastewater improvements, but because most water and wastewater needs are met by cities, special district funding makes up only 8.4% of the total needed for that type. Most of the rest of special district funding is for other utilities (7.2%), making up 17.6% of that type.

Table 13. Comparison of Fully Funded Improvements to All Improvements

Five-year Period July 2014 through June 2019

Category and Type of Infrastructure	All Improvements* Estimated Cost [in millions]	Fully Funded Improvements Estimated Cost [in millions]	Fully Funded Improvements Percent of Total
Transportation and Utilities	**$ 25,309.0**	**$ 8,268.6**	**32.7%**
Transportation	25,093.8	8,204.9	32.7%
Other Utilities	215.2	63.7	29.6%
Health, Safety, and Welfare	**$ 4,078.3**	**$ 1,880.6**	**46.1%**
Water and Wastewater	3,338.5	1,663.3	49.8%
Law Enforcement	334.9	109.1	32.6%
Storm water	197.9	31.7	16.0%
Fire Protection	166.3	64.1	38.6%
Solid Waste	25.9	6.5	25.2%
Public Health Facilities	12.9	4.0	31.3%
Housing	1.9	1.9	100.0%
Education	**$ 1,450.2**	**$ 332.7**	**22.9%**
New Public Schools**	1,431.1	325.9	22.8%
School System-wide	15.7	6.0	38.0%
Post-secondary Education	3.4	0.8	24.3%
Recreation and Culture	**$ 1,136.5**	**$ 566.0**	**49.8%**
Recreation	847.9	451.6	53.3%
Community Development	181.4	57.7	31.8%
Libraries, Museums, and Historic Sites	107.2	56.8	52.9%
Economic Development	**$ 378.8**	**$ 139.8**	**36.9%**
Industrial Sites and Parks	261.0	51.5	19.7%
Business District Development	117.8	88.3	74.9%
General Government	**$ 303.4**	**$ 87.6**	**28.9%**
Public Buildings	232.3	47.0	20.2%
Other Facilities	71.1	40.6	57.1%
Grand Total	**$ 32,658.1**	**$ 11,275.4**	**34.5%**

*Excludes infrastructure improvements for which funding availability is not known.

** Includes replacement of existing schools.

The percentage of funding available varies greatly across types of infrastructure.

Table 13 breaks down the $11.3 billion available for fully funded needs by type of infrastructure and compares it with the total needed for each type of infrastructure. Although transportation and water and wastewater represent the largest portion of needs, neither type is the one most fully funded. That honor goes to public housing, which needs the least funding of any type of infrastructure in the current inventory. Only three projects, all in Johnson City and totaling $1.9 million, were reported, and most (60.4%) of the funding needed for them is federal with the rest coming from the state (23.4%) and other sources (16.1%). The recent history of this type of infrastructure in the inventory suggests that the need for it is generally not reported until it is fully funded.

Business district development is second with 74.9% fully funded, which isn't a surprise given how these types of projects often come about. Business district development can involve complex negotiations between partners, both private and public, and in many cases—as with public housing—funding is worked out before projects are announced. Cities propose funding three-fourths (77.4%) of business district developments with the rest from counties (13.4%), the state (4.9%), other sources (2.9%), the federal government (1.0%), and special districts (0.3%).

Next in order of percent fully funded after business district development are other (general government) facilities (57.1%); recreation infrastructure (53.3%); and libraries, museums, and historic sites (52.9%) with a little over half of the projects in all three types fully funded. Cities own and fund most (95.2%) other facilities improvements. Local governments fund most recreation improvements with more than half (50.9%) of the cost paid by counties and nearly a quarter (22.3%) by cities. Local governments fund just over half of improvements for libraries, museums, and historic sites (54.8%) with the rest coming from federal (21.7%), other (20.5%), and state (3.0%) sources. A single other facilities project, a $20 million public works complex that will be funded and owned by Knoxville, makes up half of the fully funded projects of that type, and two Nashville projects account for a quarter of all fully funded recreation needs, which include a $65 million baseball stadium and $59 million for park and greenway improvements. Half of the $20 million for new exhibits at the Pink Palace Family of Museums in Memphis, the single largest fully funded libraries-museums-and historic-sites improvement in the inventory, will come from the city and half will be privately funded.

Water and wastewater comes next with 49.8% of needs fully funded. Two fully funded sewer projects in Davidson County account for 22.0% of all water and wastewater needs; without them, the percentage of water and wastewater needs that are fully funded would be 35.6%. Water and wastewater infrastructure, needed to ensure clean drinking water and protect water supply sources, is completed at a greater rate than other types of infrastructure, likely because it has a reliable funding source—the revenue collected from its customers. Many of those customers are in sparsely populated areas that are expensive to reach with new water and sewer lines. To assist local communities, the state provides 3.0% of the funds for fully funded projects and the federal government provides 7.9%; the rest is funded locally, 24.7% by cities, 53.8% by counties, and 8.4% by special districts.

Next is fire protection with 38.6% of needs fully funded. Most of the funding for these improvements will be used to renovate existing fire stations or build new ones. Most of the funding is from local sources (70.9% county and 22.9% city) with the rest coming from federal (6.0%) and state (0.2%) sources. Two-thirds of the funds are for renovations of several fire stations in Nashville and most of the rest is for others under construction in Maury, Montgomery, Rhea, Sullivan, Williamson, and Wilson counties.

All totaled, the Census Bureau counts 39,000 special-purpose district governments, which are usually created to address—and raise revenue for—specific functions, such as airports, libraries, wastewater, mosquito control and so on. They exist separately from general-purpose governments, and may cross the borders of cities, counties, and states.

Frank Shafroth, *Governing Magazine*, "Redefining 'Special Districts' could have Big Taxing Consequences," May 2016 http://www.governing.com/columns/public-money/gov-special-districts.html

A new fire station was completed in Erin (Houston County) and a new EMS building, which will house the fire department, was completed in Clinton (Anderson County).

School system-wide projects are 38.0% fully funded and are needed for a variety of reasons. These projects, which support K-12 education, include central offices, support buildings, and maintenance and transportation facilities. Counties are the source of all funding for fully-funded improvements for this type because county systems were the only ones that reported system-wide needs in the inventory this year. Examples of unfunded school system-wide needs include the $1.5 million need for security upgrades in all schools in Dickson County and the $1.5 million need for a new central office for the Lebanon special school district.

Less than a third of each of the remaining types of public infrastructure in the inventory—transportation, law enforcement, community development, public health facilities, other utilities, solid waste, post-secondary education, new public schools, public buildings, industrial sites and parks, and storm water—are fully funded. Just 32.7% of transportation projects in the inventory are fully funded despite having several dedicated funding mechanisms, including federal and state fuel taxes and local wheel taxes, but those sources have fallen short of the amount needed in recent years. Because of the decline in fuel costs, federal fuel tax revenue in recent years has been insufficient to support Highway Trust Fund commitments to states and were supplemented with transfers from the US Treasury's general fund in 2008 through 2015 amounting to $65 billion.[12] Finally this past year, Congress passed a five-year, $305 billion transportation bill to bolster the fund, an estimated $4.5 billion of which will come to Tennessee.[13] For those transportation improvements that are fully funded, the state and federal governments fund roughly the same percentage (47.0% and 46.5%), as do cities and counties (2.9% and 3.3%).

At 32.6%, the amount of law enforcement infrastructure in the current inventory that is fully funded falls just a hair short of the amount of transportation infrastructure that's fully funded. Unlike transportation, however, most of the cost of law enforcement infrastructure is paid with general tax revenue, though in some cases federal loans and grants may be used. For example, the US Department of Agriculture offers the Community Facilities Direct Loan and Grant Program[14] for rural police stations. Most of the funding for fully funded law enforcement improvements is provided

Public-private partnerships have a long history, from private turnpikes to highway rest stops. Interest has been renewed in recent years as states seek alternative sources of funding. The Public-Private Transportation Act would lay out how a partnership between a private company and government could work, and it would give partnerships the power to borrow, purchase right of way, and collect fees.

Chas Sisk, Nashville Public Radio, *Middle Tennessee Lawmakers say the Answer to Traffic Congestion may be Private Businesses*, February 3, 2016 http://nashvillepublicradio.org/post/middle-tennessee-lawmakers-say-answer-traffic-congestion-may-be-private-businesses#stream/0

[12] The Status of the Highway Trust Fund and Options for Paying for Highway Spending, Before the Committee on Ways and Means of the U.S. House of Representatives,114th Cong. (2015) (statement of Chad Shirley, Deputy Assistant Director for Microeconomic Studies, Congressional Budget Office). https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/50298-TransportationTestimony_1.pdf.

[13] Himes, Jessica, "Fix America's Surface Transportation Signed into Law," Tennessee County News 38 No. 6 (2015).

[14] http://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program.

by county governments (79.7%), with the federal and city governments providing roughly the same percentages (9.5% and 10.8%).

Two more types of public infrastructure are more than 30.0% fully funded: community development, with 31.8% of its projects fully funded, and public health facilities at 31.3%. A couple of large projects account for most of the estimated cost of community development infrastructure in the inventory, and as with business district development infrastructure, local officials tend not to announce it until all partners are in agreement on what to build and how to fund it. Unlike business district development, which is mostly funded by local governments, about half of the funding for community development is federal (54.9%) with the rest coming from county (18.8%), city (16.2%), state (6.5%), and other (3.6%) sources. The two largest fully funded community development projects were a $12 million welcome center in Shelby County and an $11 million river walk in downtown Chattanooga, both of which are under construction.

Public health facilities are funded by many different federal sources, which collectively account for 84.3% of funds for fully funded improvements. For example, a $600,000 ambulance station is under construction in Cannon County, and half of the funding is from a federal Community Development Block Grant (CDBG). Counties provide the other 15.7%.

Other utility infrastructure—infrastructure owned by public gas and electric utilities—is close behind these two with 29.6% of projects fully funded, primarily with funds from electric and gas utility charges collected by cities (79.3%). Because those who benefit from the services they provide can be readily identified, utilities are required by state law to be self-funding and cannot be subsidized with tax revenue.[15]

Solid waste infrastructure is next in percent of needs that are fully funded (25.2%) with the total cost of needs for this type of infrastructure at $25.9 million and the amount of them fully funded at only $6.5 million. Construction of a landfill perimeter gas-collection system in Davidson County and expansion of a demolition landfill in Lawrence County together account for more than four-fifths (84.2%) of fully funded solid-waste needs, and all of the funding for these and other solid waste improvements is local.

Post-secondary education is next with 24.3% of the $3.4 million of needed infrastructure fully funded. The only improvements with funding information for this type are locally identified vocational education and continuing education projects. Just over half (51.8%) of the $830,000 in available funding is from cities and the rest is federal. All of the $2.6 million in additional required funds are for the Regional Institute of Technology Excellence in Marion County, which is unfunded.

Investment in the nation's infrastructure has long been a partnership between state and local governments and retail investors. State and local governments prioritize public projects, investment bankers provide products to help spread costs over the life of the project, investors buy in to earn reliable, often tax-free interest income, and then taxpayer dollars repay the bonds. Today, more and more communities are opting for alternatives to this traditional municipal-bond model in the form of direct loans from banks.

A few states, counties and cities voluntarily make information about their bank loans publicly available on the Municipal Securities Rulemaking Board's Electronic Municipal Market Access website (EMMA), the official public archive for financial documents and other information for municipal bondholders.

Lynnette Kelly, *Governing*, "The Hidden Risks of a Growing Way to Pay for Infrastructure," May 13, 2016 http://www.governing.com/gov-institute/voices/col-transparency-disclosure-bank-loans-infrastructure.html

[15] Tennessee Code Annotated, Section 7-82-403.

While new public school construction ranks third for the estimated cost of needed infrastructure improvements, it ranks 16th among the 20 infrastructure types for percent fully funded at 22.8%. Unlike in most states, school systems in Tennessee are not fiscally independent, which may hamper school officials' abilities to estimate funding and may at least partially account for the large percentage with no funding in table 14 on page 39.

Two more types of public infrastructure needs are about one-fifth fully funded. Public buildings, which include mainly county courthouses, county offices, city halls, and public works offices and are funded mostly with general tax revenue, are 20.2% fully funded. State-owned buildings are not included in this analysis because data received through the capital budget request process does not include funding information. Industrial sites and parks, 19.7% of which are fully funded, can be complex, with multiple components of other types of infrastructure such as roads, rail spurs, ports and various funding sources. For instance, an industrial park in Cumberland County needs water and wastewater improvements costing $9.5 million and is funded by the federal, state, and local levels of government. Funding for fully funded industrial sites and parks comes 44.4% from counties, 26.1% from federal, 11.9% from cities, 8.0% from the state, 5.0% from special districts, and 4.6% from other sources.

Table 14. Comparison of Improvements with no Funding to All Improvements

Five-year Period July 2014 through June 2019

Category and Type of Infrastructure	All Improvements* Estimated Cost [in millions]	Improvements with No Funding Estimated Cost [in millions]	Improvements with No Funding Percent of Total
Transportation and Utilities	**$ 25,309.0**	**$ 11,794.8**	**46.6%**
Transportation	25,093.8	11,668.1	46.5%
Other Utilities	215.2	126.7	58.9%
Health, Safety, and Welfare	**$ 4,078.3**	**$ 1,404.9**	**34.4%**
Water and Wastewater	3,338.5	1,035.6	31.0%
Law Enforcement	334.9	127.7	38.1%
Storm Water	197.9	153.5	77.5%
Fire Protection	166.3	65.0	39.1%
Solid Waste	25.9	14.2	54.9%
Public Health Facilities	12.9	8.8	68.7%
Housing	1.9	0.0	0.0%
Education	**$ 1,450.2**	**$ 907.7**	**62.6%**
New Public Schools**	1,431.1	895.4	62.6%
School System-wide	15.7	9.7	62.0%
Post-secondary Education	3.4	2.6	75.7%
Recreation and Culture	**$ 1,136.5**	**$ 363.0**	**31.9%**
Recreation	847.9	227.1	26.8%
Community Development	181.4	100.7	55.5%
Libraries, Museums, and Historic Sites	107.2	35.2	32.8%
Economic Development	**$ 378.8**	**$ 198.0**	**52.3%**
Industrial Sites and Parks	261.0	181.9	69.7%
Business District Development	117.8	16.1	13.6%
General Government	**$ 303.4**	**$ 159.4**	**52.6%**
Public Buildings	232.3	133.0	57.2%
Other Facilities	71.1	26.5	37.2%
Grand Total	**$ 32,658.1**	**$ 14,829.8**	**45.4%**

*Excludes infrastructure improvements for which funding availability is not known.

** Includes replacements of existing schools.

Finally, only 16.0% of storm water infrastructure needs are fully funded, down from 38.7% in the last inventory, mainly because of the addition of an unfunded $100 million flood mitigation project for Nashville that local officials say is unlikely to move forward in its current form despite the need. Aside from this project, which is intended to avoid a reoccurrence of the kind of massive damage caused by the 2010 flood, nearly all storm water improvements are needed to meet increasing environmental standards meant to encourage low-impact development. A new permit for cities and counties issued by the US Environmental Protection Agency will require developments to reduce runoff with improved landscaping or by collecting rainwater.[16] Almost all (96.9%) storm water

[16] https://www.nashville.gov/Water-Services/Developers/Low-Impact-Development.aspx

improvements will be owned by cities, and cities will also provide nearly all (93.5%) of the funding. The city of Greeneville needs $20 million for city-wide storm water controls, representing 10.1% of total storm water needs, but the project is not funded. If that project were to receive funding, the percentage of storm water needs that are fully funded would increase to 26.1%.

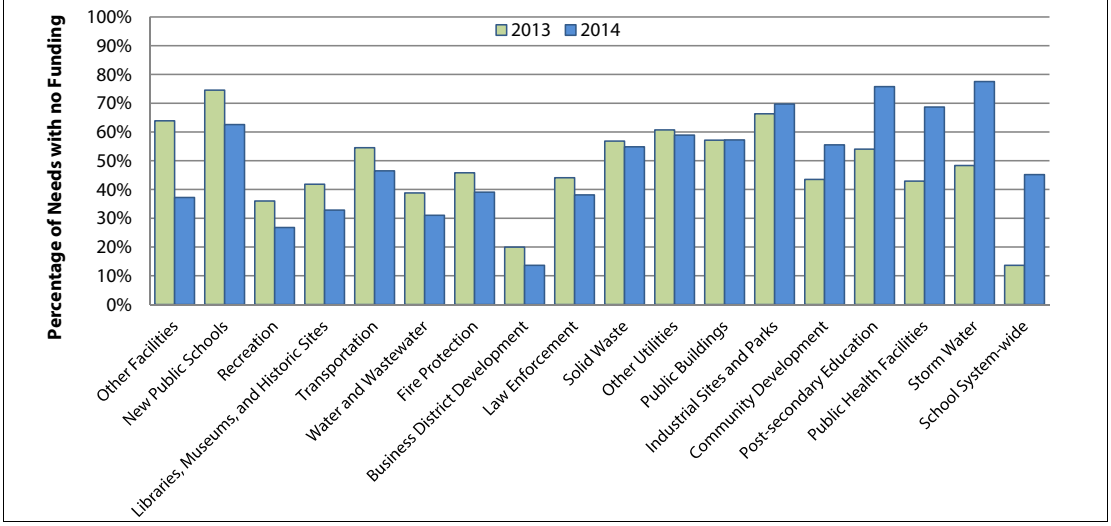
Overall, nearly $21 billion of infrastructure needs are not yet funded.

Overall, unfunded infrastructure improvements comprise nearly half (45.4%) of total estimated costs. At least half of the infrastructure improvements in ten types have no funding—storm water (77.5%), post-secondary education (75.7%), industrial sites and parks (69.7%), public health facilities (68.7%), new public schools (62.6%), school system-wide (62.0%), other utilities (58.9%), public buildings (57.2%), community development (55.5%), and solid waste (54.9%). See table 14.

The overall percentage of infrastructure needs that are not fully funded decreased from 53.2% to 45.4% since the last inventory, mainly because $2.4 billion in transportation improvements received at least some funding and another $440 million were canceled or will not be needed until after the five-year period covered by this report. The percentage unfunded for four other types of infrastructure also improved: other facilities; new public schools; recreation; and libraries, museums, and historic sites. The biggest improvement by far was the decrease from 63.9% to 37.2% in unfunded other-facility needs because the expected cost of unfunded public works buildings in Hamblen and Roane counties declined. The unfunded percentage for new public schools improved from 74.5% to 62.6% because $242 million in improvements across the state that were not fully funded were canceled, mainly because enrollment growth slowed or existing schools were renovated instead. Unfunded recreation infrastructure needs improved by a smaller amount, from 36.0% to 26.8%, as counties increased funding for recreation by more than $100 million, most of which ($60 million) was for the new baseball stadium in Nashville, which is now complete but wasn't at the time of the inventory. Funding identified for libraries, museums, and historic site improvements costing $20.4 million decreased the unfunded percentage for this type of infrastructure from 41.8% to 32.8%. Unfunded water and wastewater, fire protection, business district development, law enforcement, solid waste, and other utilities infrastructure needs also decreased. See figure 6.

Figure 6. Percentage of Improvements with No Funding by Type of Infrastructure

Comparison of July 2013 and July 2014 Inventories



Unfunded needs are much less likely to be completed.

Public infrastructure needs that spend many years in the conceptual stage become less and less likely ever to be funded. For example, of the improvements in the current inventory that have been in the conceptual stage for three years, 28.7% are fully funded, but only 0.04% of those that have been conceptual for eight years or more are. See table 15. Transportation accounts for 82.5% of the improvements in the conceptual stage for eight years or more, followed by water and wastewater and new public schools at far lower percentages (7.8% and 3.9%). As discussed earlier, the source of funding matters. For example, transportation infrastructure depends mainly on a revenue stream that has been declining relative to need for many years because fuel costs have declined, but water and wastewater infrastructure is paid for by utility customers.

Table 15. Percent of Improvements Fully Funded by Number of Years in the Conceptual Phase

	All Improvements	Fully Funded Improvements	
Number of Years in the Conceptual Phase	Estimated Cost [in millions]	Estimated Cost [in millions]	Percent of Total
0	$ 11,939.1	$ 7,340.0	61.5%
1	2,505.1	869.6	34.7%
2	2,824.7	1,670.3	59.1%
3	2,160.7	621.0	28.7%
4	1,502.9	199.5	13.3%
5	674.6	196.5	29.1%
6	1,693.5	181.5	10.7%
7	951.6	193.6	20.3%
8	8,406.1	3.2	0.04%
Grand Total	**$ 32,658.1**	**$ 11,275.4**	**34.5%**

Infrastructure needs that were not fully funded on July 1, 2009, were much less likely to be completed within five years than were fully funded needs, with most of the needs that were conceptual and unfunded in 2009 remaining so through 2014. Less than one-fifth (15.5%) of the infrastructure needs that were not fully funded on July 1, 2009, were completed by July 1, 2014, but more than half (52.6%) of the amount that was fully funded was completed. The difference was even greater for some types of infrastructure: 99.8% of law enforcement and 90.8% of community development infrastructure, 85.1% of public buildings, 79.7% of industrial sites and parks, and 75.7% of fire protection infrastructure that was fully funded in 2009 was completed within five years, but only 12.2%, 7.1%, 9.8%, 14.7%, and 11.4%, respectively, of the rest needed for those types of infrastructure was completed.

Nearly three-fourths of the unfunded needs from the 2009 inventory remain unfunded in the 2014 inventory, and the dollar amounts in both inventories are nearly the same: $14.8 billion in the 2014 inventory compared with $15.0 billion in 2009. Of the $15.0 billion of additional funding that was needed in 2009, $4.8 billion was identified by July 2014, and most of the needs that were funded received funding sooner rather than later: three-fifths ($3.0 billion) got funded in the 2010 through the 2011 inventories, while the other two-fifths ($1.8 billion) was funded in the following three inventories (2012 through 2014).

Building Tennessee's Tomorrow:

Anticipating the State's Infrastructure Needs

July 2014 through June 2019

PUBLIC SCHOOL INFRASTRUCTURE NEEDS

Estimated cost of public school facility improvements increases even as the need for new schools declines.

Tennessee's 141 public school systems need an estimated $3.8 billion in infrastructure improvements to be in some stage of development during the five-year period July 2014 through June 2019, a $139 million increase since last year (see table 16). The total estimated cost of school facility improvements needed declined from 2008 to 2009 but increased in each of the last five years, a trend that appears to follow the pattern of Tennessee's growth in gross domestic product during and after the Great Recession (see figure 7). As shown in table 16 and in figure 8 on page 38, this increasing trend in the estimated cost of school facility improvements is driven mainly by school renovations. The coincidence of those two trends suggests that improvement "needs" reported in the inventory are driven to a large extent by the availability of funds rather than by what is actually needed.

Table 16. Estimated Cost of Needed School Infrastructure Improvements by Type of Need

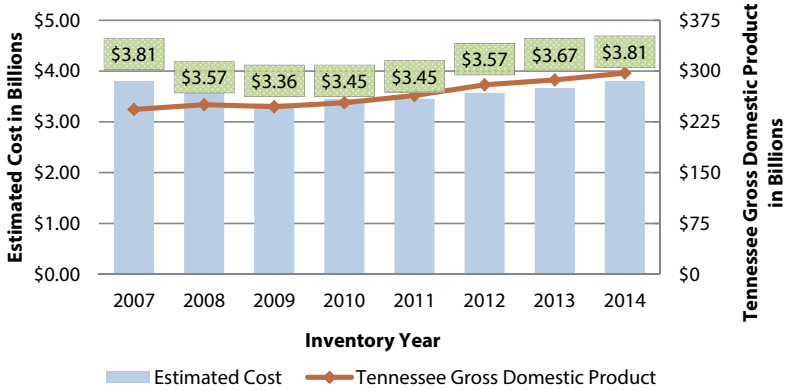
July 2013 Inventory Compared with July 2014 Inventory

Type of Infrastructure	July 2013 Inventory	July 2014 Inventory	Difference	Percent Change
New School Space	**$1,571,806,453**	**$1,492,144,377**	**$ (79,662,076)**	**-5.1%**
New Schools	1,228,385,383	1,110,941,383	(117,444,000)	-9.6%
Additions	343,421,070	381,202,994	37,781,924	11.0%
Improvements to Existing Schools	**$2,079,427,154**	**$2,297,880,734**	**$218,453,580**	**10.5%**
Renovations	1,464,182,369	1,751,622,242	287,439,873	19.6%
Replacement Schools	372,434,000	320,110,000	(52,324,000)	-14.0%
Technology*	128,278,362	112,671,588	(15,606,774)	-12.2%
Mandates	114,532,423	113,476,904	(1,055,519)	-0.9%
System-wide Needs	**$ 15,556,000**	**$ 15,707,000**	**$ 151,000**	**1.0%**
Statewide Total	**$3,666,789,607**	**$3,805,732,111**	**$138,942,504**	**3.8%**

*Technology includes projects with estimated costs below the $50,000 threshold used for other types of infrastructure in the inventory. Individual technology projects under the threshold totaled $4,527,243 in 2013 and $3,541,536 in 2014.

Figure 7. Total Estimated Cost of Needed School Infrastructure Improvements

July 2007 through July 2014 Inventories



Source: TACIR Staff analysis of Public Infrastructure Needs Inventory data and Bureau of Economic Analysis, US Department of Commerce

Improvements in public school facilities include both new space—entirely new schools and additions to existing schools—and upgrades at existing schools. While the total cost of school infrastructure has gradually increased since 2009, there appears to be a shift from adding new space to improving existing space in Tennessee's public

Figure 8. Estimated Cost of Needed New Space vs Estimated Cost of Needed Improvements to Existing Space

July 2007 through July 2014

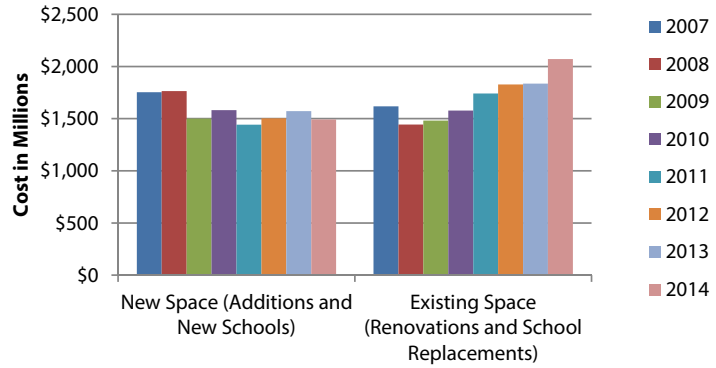
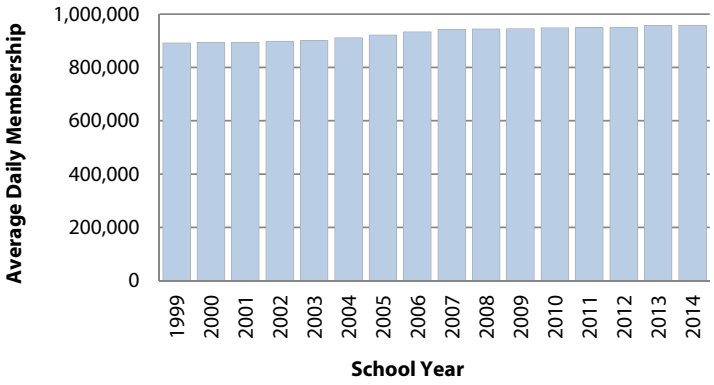


Figure 9. Number of Students in Tennessee Public Schools

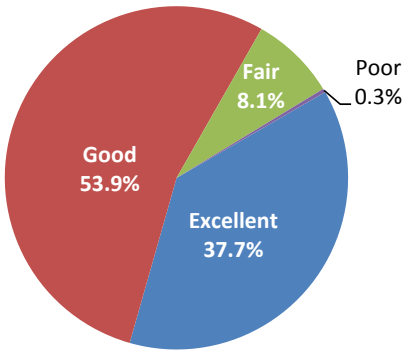
1999 through 2014



Source: Tennessee Department of Education

Figure 10. Overall Condition of Public School Buildings

As of July 1, 2014



schools (see figure 8). This shift may be partly the result of enrollment growth that began slowing in 2007, coinciding with the economic downturn, and continued to slow through 2014 (see figure 9). After a significant drop in 2009, the cost of adding new space has fluctuated and decreased $80 million (5.1%) since last year and now totals $1.5 billion. This decrease resulted mainly from a $117 million (9.6%) decrease in the estimated cost of new schools needed, which now totals $1.1 billion. The $38 million (11.0%) increase in the estimated cost of school additions, which now totals $381 million, wasn't enough to offset that decrease.

The cost of improving existing space (renovations, replacement schools, technology, and mandates) has steadily increased since 2008 and is now the highest ever reported. The estimated cost for renovations, which has steadily increased since 2009 as new needs were added and old ones remained unfinished or not even started, increased $287 million (19.6%) since last year, and the cost to replace existing schools, which has fluctuated since 2007, decreased by $52 million (14.0%) since last year and now totals $320 million for 14 schools. Of the 1,039 schools reporting a need for renovations in last year's inventory, only 157 of them were able to complete any renovations, and those renovations totaled $92 million; 383 (36.9%) did not report a need for new renovations nor did they complete any from the previous inventory ($504 million). Another 499 schools, including 184 with no renovation needs last year, added $434 million in renovation needs this year.

Local officials now report higher costs to renovate or replace existing schools, an average of $5.8 million per school for the 142 (8.4%) schools in fair or poor condition. Improvements in existing facilities are typically related to the condition of the

schools,[15] which is better overall now than in the initial years of this inventory. However, schools in good or better condition (829) have significant improvement needs as well—including both renovating and replacing classrooms or other components—an average of a little over $1.5 million per school. See figure 10 for the overall condition of public school buildings.

The need for technology infrastructure improvements decreased $16 million (12.2%) after increasing by a small amount last year, resuming the downward trend of the six preceding years. The estimated cost of meeting state and federal mandates, which also continues a fluctuating trend since 2007, decreased $1 million (0.9%). The cost for school system-wide improvements, such as bus garages and central office buildings that serve entire school systems, increased by $151,000 (1.0%).

Larger systems report larger total costs, but smaller systems often have greater costs per student.

School systems with more students have more school buildings and, therefore, greater infrastructure improvement needs than smaller systems. The ten systems with the greatest infrastructure needs account for 59.8% of the total estimated cost of all school facility improvements but less than half the total number of students enrolled in 2014. Nine are among the ten with the most students, but the tenth, Robertson County, ranks only 15th in enrollment. Some systems, for example Davidson and Shelby counties, reported a greater need to improve existing schools, while others, including Williamson, Montgomery, Wilson, Sevier, Robertson, and Rutherford counties, reported a greater need to build new schools. Sumner County reports needing about $59 million both for replacing schools and for improving existing space. See table 17.

Table 17. Ten School Systems with the Highest Total Costs for Facility Improvements

Five-year Period July 2014 through June 2019

	2014 Students		Estimated Cost				
School System	Number	Rank	Improvements to Existing Schools	New Space	System-wide Improvements	Total	Per Student
Davidson County	79,298	2	$ 617,014,200	$ 177,577,000	$ 0	$ 794,591,200	$ 10,020
Shelby County	117,811	1	380,314,282	6,350,000	0	386,664,282	$ 3,282
Williamson County	33,916	6	35,084,000	214,720,000	0	249,804,000	$ 7,365
Montgomery County	30,706	7	53,450,000	132,422,362	0	185,872,362	$ 6,053
Wilson County	16,446	9	26,815,940	151,500,000	0	178,315,940	$ 10,842
Sumner County	28,237	8	58,500,841	59,265,021	0	117,765,862	$ 4,171
Sevier County	14,304	10	32,072,168	79,673,000	0	111,745,168	$ 7,812
Robertson County	10,807	15	33,365,000	55,175,000	4,265,000	92,805,000	$ 8,587
Rutherford County	40,932	5	19,438,376	67,000,000	0	86,438,376	$ 2,112
Hamilton County	42,385	4	71,223,000	0	0	71,223,000	$ 1,680
Top Ten Total	**414,840**		**$ 1,327,277,807**	**$ 943,682,383**	**$ 4,265,000**	**$2,275,225,190**	**$ 5,485**
All Others	**543,440**		**970,602,927**	**548,461,994**	**11,442,000**	**1,530,506,921**	**$ 2,816**
State Total	**958,280**		**$ 2,297,880,734**	**$1,492,144,377**	**$ 15,707,000**	**$3,805,732,111**	**$ 3,971**

[15] Overall school conditions used in this inventory are self-rated by the school official based on definitions located in Appendix C.

Table 18. Ten School Systems with the Highest Cost per Student for Facility Improvements

Five-year Period July 2014 through June 2019

	2014 Students		Estimated Cost				
School System	Number	Rank	Improvements to Existing Schools	New Space	System-wide Improvements	Total	Per Student
Van Buren County	718	126	$ 800,000	$ 15,000,000	$ 0	$ 15,800,000	$ 22,001
Pickett County	747	124	167,500	15,000,000	0	15,167,500	20,293
Alcoa	1,812	97	0	33,400,000	0	33,400,000	18,429
DeKalb County	2,786	78	2,382,000	43,820,000	0	46,202,000	16,586
Overton County	3,238	71	8,860,000	43,700,000	0	52,560,000	16,230
Alamo	596	129	585,000	8,250,000	0	8,835,000	14,831
Lake County	840	122	10,810,000	0	0	10,810,000	12,868
Bristol	3,883	56	44,319,500	2,100,000	0	46,419,500	11,953
Wilson County	16,446	9	26,815,940	151,500,000	0	178,315,940	10,842
Davidson County	79,298	2	617,014,200	177,577,000	0	794,591,200	10,020
Top Ten Total	**110,365**		**$ 711,754,140**	**$ 490,347,000**	**$ 0**	**$ 1,202,101,140**	**$10,892**
All Others	**847,915**		**1,586,126,594**	**1,001,797,377**	**15,707,000**	**2,603,630,971**	**$ 3,071**
State Total	**958,280**		**$ 2,297,880,734**	**$ 1,492,144,377**	**$ 15,707,000**	**$ 3,805,732,111**	**$ 3,971**

By comparison, the needs of small school systems can seem insignificant unless analyzed in relation to the number of students they have enrolled. On that basis, the only large systems that stand out are Wilson and Davidson counties. The remaining systems in the top ten for total infrastructure costs per student all have fewer than 4,000 students enrolled. See table 18. The six school systems reporting the highest costs per student mainly need new schools. Van Buren and Pickett counties are first and second at $22,001 and $20,293 per student compared with the statewide average of $3,971. Van Buren and Pickett both need new high schools at a cost of $15 million each that have been in the inventory since 2005 and remain conceptual. They also need structural and technology upgrades at two schools. Alcoa needs $33 million ($18,429 per student) to build a new high school, DeKalb County needs a new $42 million high school ($16,586 per student), Overton County needs a new $40 million high school in the Rickman community ($16,230), and Alamo needs a little more than $8 million ($14,831 per student) to enlarge Alamo Elementary. Five of these six systems reported needing smaller amounts to renovate space at existing schools.

Lake County and Bristol reported large costs per student, but these costs were mainly to upgrade rather than add space. The amount per student Lake County needs to upgrade its schools ($12,868) is more than three times the state average and includes $7 million to renovate the cafeteria, the library, administrative offices, the gym, and over half of the classrooms at Margaret Newton Elementary School, as well as $4 million to renovate Lake County High School.

Like Lake County, Bristol needs three times the state per pupil average to upgrade its schools ($11,953), including $23 million to renovate Vance Middle School, $10 million to completely renovate Anderson Elementary, and $5 million to renovate 22 classrooms, the gym, the library, and the

cafeteria at Haynesfield Elementary. Bristol also needs $3 million for eight new classrooms and a gym at Avoca Elementary school and $3 million to renovate Tennessee High School, as well as $2 million to renovate Holston View Elementary.

The need for new schools decreased for the first time in three years while the need for additions continues to increase.

Local officials have reported needing new public schools every year since the infrastructure survey began. Statewide, local officials reported needing $1.1 billion for 57 new schools in the latest inventory averaging $19 million per school. Most of the net $117 million (9.6%) decrease was caused by the cancellation or postponement of seven new schools as four school systems refined their plans in response to changing enrollment and other factors. Part of it was a result of Murfreesboro completing an $18 million elementary school that had been reported as a need since 2002.

Shelby County needed a $57 million high school in their unincorporated area until a system consolidation and subsequent restructuring shifted the school system boundaries. Washington County recently decided to rehabilitate four schools instead of spending $65 million to build two new ones, while consolidation talks with Johnson City remain undecided. Tipton County, which for the past eight inventories had reported needing $56 million to build three new schools to meet growing student enrollment, decided that they only need to renovate their existing buildings because their enrollment is now on a downward trend. And Montgomery County postponed the need for a $45 million new high school until 2021 after adding onto an existing high school in 2011. Although a new school will likely be needed in the future, it's not needed in the timeframe captured by this inventory.

Officials in 26 school systems reported needing at least one new school in the current inventory even though seven had little to no growth in enrollment. Only 12 grew by more than 100 students since 2009, and seven lost more than 100 students. See table 19 for the change in enrollment from 2000 through 2014 for school systems that need new schools . The seven systems with large enrollment decreases (Cheatham, Campbell, Claiborne, Humphreys, Dickson, Overton, and Cumberland counties) gave a variety of reasons for needing new schools. Cheatham, Cumberland, and Humphreys counties both expect enrollment

Anticipating Needs and Revising Plans as Conditions Change

As with all types of infrastructure included in the inventory, changing circumstances can cause school facility improvements to be sped up, postponed, revised, or canceled. An example occurred recently in Montgomery County when the Clarksville Montgomery County School System updated their 10-year facility construction plan. The plan is updated annually based on models that project enrollment so facilities managers can anticipate when a school will be too small to meet state statutory class-size requirements. The school system's most recent analysis indicated that a new high school that has been in the inventory for some time will not be needed until 2021, partly because of an addition to Montgomery Central High School in 2011. Postponing the new school reduced the estimated cost of new schools in the inventory by $45 million.

For more information, see https://www.cmcss.net/documents/operations/10yearplan.pdf.

Table 19. Change in Student Enrollment 2009 to 2014 for School Systems that Need New Schools

Five-year Period July 2014 through June 2019

School System	Change in Student Enrollment 2009 to 2014	Estimated Cost of New Schools July 2014	
		Total	Per Student
Davidson County	7,005	$ 113,305,000	$1,429
Rutherford County	4,435	60,000,000	$1,466
Williamson County	4,154	200,000,000	$5,897
Montgomery County	2,305	104,822,362	$3,414
Sumner County	1,683	42,239,021	$1,496
Wilson County	1,668	151,500,000	$9,212
Bedford County	462	12,850,000	$1,565
Johnson City	316	14,000,000	$1,831
Cleveland	308	14,000,000	$2,715
Putnam County	252	26,000,000	$2,444
Murfreesboro	213	20,950,000	$2,963
Alcoa	175	33,400,000	$18,429
Pickett County	83	15,000,000	$20,069
Robertson County	34	55,175,000	$5,105
Sevier County	26	37,350,000	$2,611
Marshall County	20	30,900,000	$5,855
DeKalb County	(45)	42,000,000	$15,078
Van Buren County	(64)	15,000,000	$20,887
Macon County	(66)	10,000,000	$2,725
Cumberland County	(105)	14,000,000	$1,953
Overton County	(117)	40,000,000	$12,352
Dickson County	(197)	21,000,000	$2,562
Claiborne County	(210)	300,000	$67
Campbell County	(212)	150,000	$27
Humphreys County	(222)	7,000,000	$2,463
Cheatham County	(305)	30,000,000	$4,619
Total	**21,596**	**$ 1,110,941,383**	**$7,444**

to grow;[16] Campbell and Clairborne counties each need a separate space for alternative school students; Dickson County, which relies on portable classrooms at three schools, needs to build a new middle school because of overcrowding that resulted from past growth; and Overton County needs to build a new school in the southern park of their county that serves as a bedroom community for a growing Cookeville.

While some systems choose to build new schools, others add space to existing school buildings instead. Since the last inventory, there was a slight increase ($38 million) in the estimated cost of additions spread across 200 schools in 66 school systems. The cost of additions now totals $381 million, an average of $2 million per school, and nearly a quarter of which ($88 million) was added in this inventory. Additions to this inventory were mostly offset by $51 million in cancelled or completed additions. The largest net increase for additions ($12.5 million) was in Sumner County, most of which was for classrooms at Guild and George A. Whitten elementary schools and administrative space and classrooms at Station Camp Middle School. The second largest net increase ($11.8 million) for additions was in Jefferson County and was primarily for classrooms at Talbott Elementary. Twenty-one other school systems reported an increased need for additions for a total of 42 schools. Haywood County added $7.2 million to the inventory, $6 million of which is for specialized classrooms and a gym at Haywood High School. The remaining 20 systems are both large and small with a combined increase for additions of less than $51 million spread over 40 schools.

The number of schools in good or excellent condition decreased for the first time because of a reassessment of the condition of schools in Shelby County.

For each inventory, school officials rate the overall condition of their school buildings as well as the condition of each building component. As figure 11 shows, most of Tennessee's public school buildings have been in good or better condition for several years; a very small

[16] Humphreys and Cheatham school boards canceled the need for these new schools in the spring of 2016 because they experienced enrollment decreases instead.

percentage have been in fair or poor condition and are located throughout the state.[17]

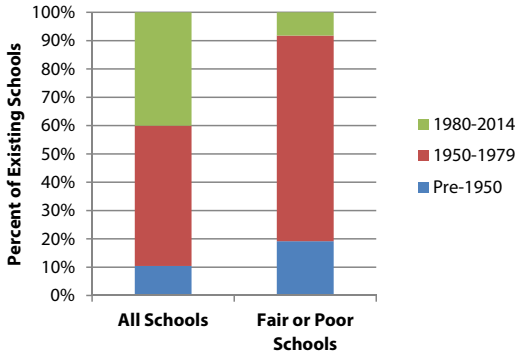
Figure 11. Overall Condition of Public School Buildings

July 2002 through July 2014

The number of school buildings in excellent condition decreased from 684 in the last inventory to 656, and the number rated good decreased from 974 to 937. Although most systems (104) reported no schools in fair or poor condition, 20 reported just one, and another 17 reported two or more. The number of schools in fair or poor condition increased by 64 from 82 in the last inventory to 146.[18] The increase was caused mainly by condition rating downgrades in Shelby County at some of its older schools.[19]

Schools in fair or poor condition tend to be older buildings.

Figure 12. All Schools by Year Built vs. Fair or Poor Schools



Not surprisingly, older schools are more likely to be in worse condition. Half of the public school buildings in use today, including more than 70% of the schools in fair or poor condition today, were built in the 1950s, 1960s, and 1970s when the Baby Boom generation was making its way through school. Only 10% of schools in use today were built before 1950, but 19% of school buildings rated fair or poor date to that period. By contrast, 40% of all schools were built in 1980 or later, and only 8% of those are in fair or poor condition. See figure 12.

School Facility Rating Scale

Excellent

Can be maintained in a "like new" condition and continually meet all building code and functional requirements with only minimal routine maintenance.

Good

Does not meet the definition of "excellent," but the structural integrity is sound and the facility can meet building code and functional requirements with only routine or preventive maintenance or minor repairs that do not hinder its use.

Fair

Structural integrity is sound, but the maintenance or repairs required to ensure that it meets building code or functional requirements hinder—but do not disrupt—the facility's use.

Poor

Repairs required to keep the structural integrity sound or to ensure that it meets building code or functional requirements are costly and disrupt—or in the case of an individual component may prevent—the facility's use.

Ratings used in the TACIR's Public Infrastructure Needs Inventory.

[17] For definitions of condition ratings used for the inventory, see appendix C.
[18] The number of schools in the inventory decreased from 1,740 in 2013 to 1,739 in 2014.
[19] Shelby County (55), Germantown (5), Bartlett (1), Collierville (1), and Lakeland (1).

Table 20. Estimated Cost to Renovate or Replace Schools in Fair or Poor Condition

Five-year Period July 2014 through June 2019

	All Schools		Schools in Fair or Poor Condition			
School System	Number of Schools	Estimated Cost to Renovate and Replace	Number of Schools	Percent Fair/Poor	Estimated Cost to Renovate and Replace	Percent of Renovation Needs
Shelby County	198	$ 283,544,277	57	28.8%	$ 161,323,602	56.9%
Davidson County	144	612,810,000	22	15.3%	189,192,000	30.9%
Hamilton County	73	71,223,000	7	9.6%	41,703,000	58.6%
Fayette County	10	16,530,000	5	50.0%	3,580,000	21.7%
Germantown	5	41,240,000	5	100.0%	41,240,000	100.0%
Sullivan County	22	58,795,000	4	18.2%	55,520,000	94.4%
Lauderdale County	7	22,464,800	3	42.9%	22,204,800	98.8%
Grundy County	7	6,765,000	3	42.9%	5,150,000	76.1%
Bradley County	17	13,115,000	3	17.6%	5,360,000	40.9%
Putnam County	18	31,200,000	3	16.7%	27,800,000	89.1%
Lake County	3	10,660,000	2	66.7%	10,660,000	100.0%
Morgan County	8	784,000	2	25.0%	627,000	80.0%
Bristol	8	42,107,000	2	25.0%	26,200,000	62.2%
Marion County	10	8,050,000	2	20.0%	7,870,000	97.8%
Coffee County	10	9,250,000	2	20.0%	9,250,000	100.0%
Monroe County	13	23,685,660	2	15.4%	15,919,920	67.2%
Knox County	88	23,808,029	2	2.3%	3,417,650	14.4%
Carroll County	2	210,000	1	50.0%	210,000	100.0%
Humboldt	4	6,900,000	1	25.0%	6,350,000	92.0%
Millington	4	15,659,000	1	25.0%	6,659,000	42.5%
DeKalb County	6	2,378,000	1	16.7%	175,000	7.4%
Polk County	6	2,125,000	1	16.7%	2,015,000	94.8%
Greeneville	7	3,575,000	1	14.3%	2,400,000	67.1%
Scott County	7	1,125,000	1	14.3%	790,000	70.2%
Oak Ridge	8	12,148,133	1	12.5%	10,850,000	89.3%
Benton County	8	2,802,000	1	12.5%	200,000	7.1%
Collierville	8	11,915,000	1	12.5%	6,000,000	50.4%
McMinn County	9	9,650,000	1	11.1%	6,600,000	68.4%
Marshall County	9	3,986,796	1	11.1%	200,000	5.0%
Bartlett	11	8,200,000	1	9.1%	1,200,000	14.6%
Johnson City	11	33,900,000	1	9.1%	33,900,000	100.0%
Claiborne County	13	3,059,000	1	7.7%	175,000	5.7%
Jefferson County	13	39,277,908	1	7.7%	24,463,908	62.3%
Bedford County	14	29,515,000	1	7.1%	28,885,000	97.9%
Carter County	15	14,639,193	1	6.7%	13,200,000	90.2%
Dickson County	16	17,402,948	1	6.3%	60,000	0.3%
Maury County	20	56,812,000	1	5.0%	45,175,000	79.5%
Subtotal	**832**	**$ 1,551,311,744**	**146**	**18%**	**$ 816,525,880**	**52.6%**
All Others	**907**	**520,420,498**				
State Total	**1,739**	**$ 2,071,732,242**				

The relatively few schools in fair or poor condition are located throughout the state.

Of the 146 schools rated fair or poor, 54.1% of them belong to the state's two largest school systems. Nearly 40.0% (57) are in Shelby County and were built on average 56 years ago. Another 15.1% (22) of schools in fair or poor condition are in Davidson County and average 52 years old. Hamilton County, the state's fourth largest school system, has the third largest number of schools in fair or poor condition (7); these buildings average 63 years old. The other 14 systems with more than one school in less than good condition have two to five schools rated fair or poor. See table 20 for the number and percent of schools in fair and poor condition and the estimated cost to renovate or replace them.

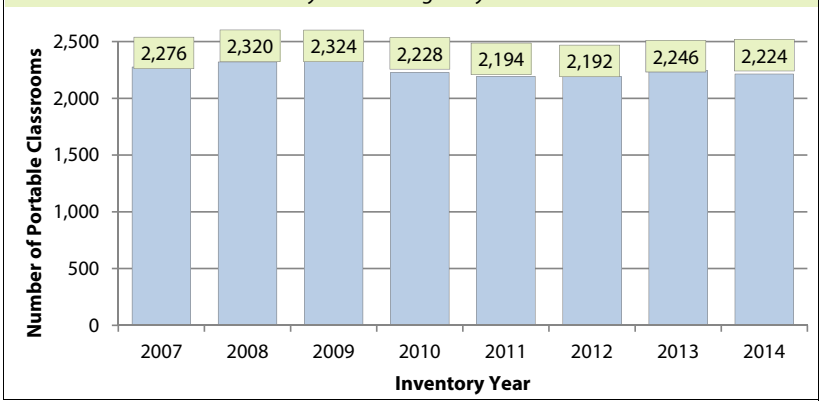
While more schools in fair or poor condition are in urban and suburban areas where school systems are larger and have more buildings, the systems with the highest percentages of their schools rated fair or poor are in rural areas. Three out of the four school systems reporting half or more of their schools in fair or poor condition are in rural areas—Lake, Carroll, and Fayette county systems. Lake County has only three schools, two of which are in less than good condition and were built before 1963. Fayette and Carroll county officials each reported half of their schools in fair or poor condition—ranging between 74 and 30 years in age.

The number of portables at Tennessee's public schools remains steady as enrollment growth has flattened out.

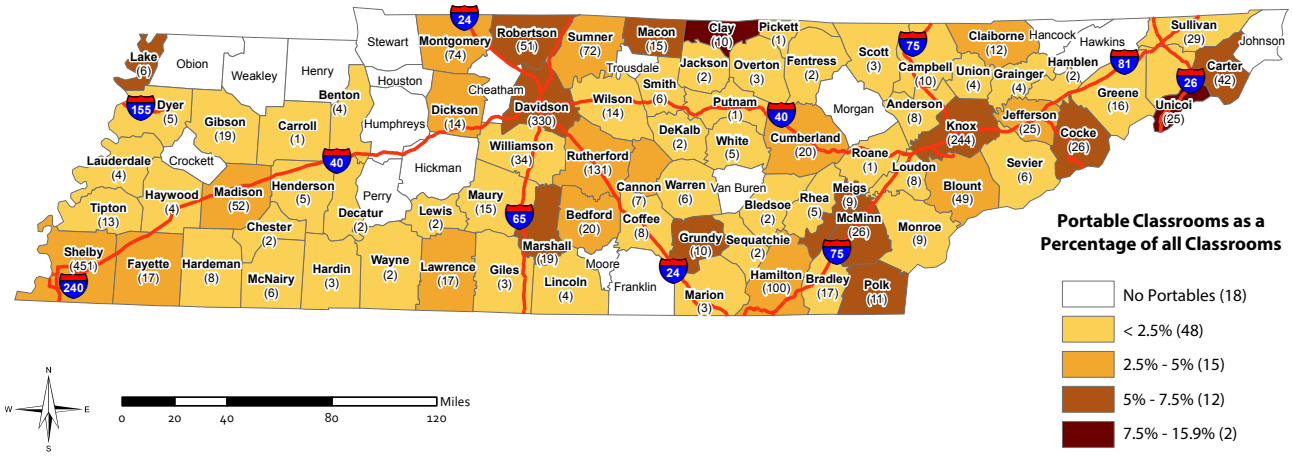
School systems use portables for a variety of reasons: to deal with unanticipated space shortages, such as those caused by natural disasters, as substitutes for space in poor condition, and to provide temporary classrooms for large influxes of new students while they plan more permanent solutions. For example, Dickson County is using portable classrooms at three schools because of overcrowding as they await construction of a new $21 million middle school. Love Chapel Elementary in Unicoi County had to move their students into 21 portable classrooms when a sinkhole opened up next to the school in 2012. And Jefferson County High School, a school building that is old and in bad shape, is using portables as a temporary solution while a $24 million comprehensive renovation is being planned. Statewide, school systems reported having 2,224 portable classrooms—3.1% of all classrooms in the state—down by 109 since the peak of 2,324 in the 2009 inventory and down by 31 since last year (see figure 13).

Figure 13. Number of Portable Classrooms

July 2007 through July 2014



Map 11. Portable Classrooms, Number and Percent of Total Classrooms by County
As of July 1, 2014



Information about each school system's use of portables can be found in appendix F-7.

Map 11, which sums system-level information on portables to the county level, shows that most counties (66 of 95) rely on portables for 2.5% or less of their total classrooms. Twenty-seven counties rely on portables for between 2.5% and 7.5% of their classrooms, and only two, Clay and Unicoi (shaded dark red in map 11), rely on them for more than 7.5%. Clay County's use of portables peaked at 12 (12.6%) in 2010 and is now 10 (11.6%). Unicoi County has 25 portables (10.5% of its total classrooms), up from 4 (1.7%) in 2012 when the 21 portable classrooms were added to house the students from the Love Chapel school. If not for those portables, the number in Unicoi County would now be less than in 2007.

Twenty-six school systems had more portable classrooms in 2014 than in 2007. While most school systems added only a few, five added more than ten—Knox (91), Unicoi (19), Montgomery (16), Williamson (13), and Cumberland (12). Knox County, with growing student enrollment, increased the number of portables in the system from 153 in 2007 to 244 by 2014. Slightly more than half of Knox's schools (48 of 88 schools) now have at least one portable on site compared with 41.9% in 2007. Montgomery County, where the student population has grown substantially (4th overall in student growth since 2007) increased its use of portables from 58 in 2007 to 74 in 2014. These were distributed across 14 of their 38 schools, eight of which increased portable usage, while five reduced their usage. Williamson County, which has had an even larger influx of new students (2nd overall in student growth since 2007), has increased their use of portable classrooms from 21 in 2007 to 34 in 2014. Cumberland County, with almost no enrollment growth since 2007, increased their use of portables from eight at two schools in 2007 to 20 at five schools in 2014 while renovating these schools.

Overall, 36 school systems reported fewer portable classrooms in 2014 than in 2007. Shelby County Schools, which consolidated with Memphis City Schools in 2013, eliminated the largest number of portables (49) since 2007 and now has 375. Hardin County eliminated 25 of the 28 portable classrooms it had in 2007, consolidating five existing schools that used portables into two schools that do not.[20] Davidson County was able to eliminate 21 portables since 2007 because of new schools and additions but still has 330. Similarly, Dyer County has only five portable classrooms, down from 25 in 2007. They replaced two schools in 2012. The other 32 systems with decreases used from one to 19 fewer portable classrooms, five of which now use zero portables.

The number of systems not using portables increased from 45 in 2007 to 48 in 2014, but five that had portables in 2007 no longer do, and two that did not now have them. Of the 43 systems that had no portables in 2007 and still don't have any, 30 decreased in enrollment by an average of 182 students, and 13 increased by an average of 174 students. Athens and Manchester, along with Hawkins, Franklin, and Moore counties had portable classrooms in 2007 but no longer do, possibly because of slow-growing or shrinking enrollment. Since 2007, Athens' enrollment decreased by 130 students, Hawkins County's decreased by 545, Franklin County's decreased by 456, and Moore County's decreased by only 56. However, Manchester's enrollment only increased by three students. The two systems that now use portables are Lauderdale (4) and Wayne (2) counties. Both reported renovation and addition needs and use portables while projects are under construction.

Some school systems (36) still have the same number of portable classrooms they had in 2007. Of those, the system with the most portables is Carter County, which has a total of 40 at ten of their 15 schools. Out of those ten, four schools averaging 56 years in age reported a need for $14 million in renovations and upgrades. A fifth canceled plans for a $17 million replacement school to focus on renovating the existing school building, and a seventh awaits completion of an addition. McMinn County has the second largest number of portables, using 26 of them at the same six schools in each of the past eight inventories. The average age of those schools is 51 years, and they reported needing an average of $488 thousand for renovations and upgrades (ranging from $200 thousand to $1.2 million per school). Enrollment in both systems has been trending downward: by 529 since 2007 and 127 since 2013 for Carter and 174 since 2007 and 103 since 2013 for McMinn. Unlike Carter and McMinn counties, Marshall County—with 19 portables since 2007—has increasing enrollment. Marshall County officials reported that five schools have been using the same number of portable classrooms since 2007; three of these schools reported a need for renovations, and one is in the process of constructing an addition.

[20] Nixon, North Savannah, Walker, Walnut Grove, and Whites elementary schools all used portables until 2010 when they consolidated into East Hardin and Northside elementary schools and subsequently removed all portable classrooms.

The cost of improving existing school buildings continues to increase, mainly for renovations, and now stands at $2.3 billion.

The estimated cost of improving space at existing schools increased by more than $218.4 million, from $2.1 billion to $2.3 billion, since the last inventory and includes renovations, replacements, technology upgrades, and changes prompted by state or federal facility mandates (see table 16). The increase was driven mainly by the condition of schools and is mostly for renovations and to a lesser extent for replacements. The cost of meeting mandates has fluctuated over the years but remains a relatively small percentage of total improvement costs and decreased slightly, from $115 million to $113 million, since the last inventory.

Technology infrastructure improvement needs remain low compared with pre-recession levels.

The need for technology infrastructure improvements at existing public schools decreased $16 million (12.2%), resuming the downward trend of the six preceding years after increasing by a small amount last year, and now totals $113 million (see figure 14) at 584 schools in 87 school systems. The cost of these upgrades, which include wiring, new computer labs, and security systems, appears to be leveling out after a downward trend since the 2007 inventory. This leveling out of technology improvements could be a result of schools entering a technology upgrade phase compared with when they had to install the initial technology infrastructure in the early 2000s. Technology infrastructure for new schools is included in their overall cost rather than in these figures.

Figure 14. Estimated Cost of Technology Needs [in millions]

July 2007 through July 2014

Systems seeking to improve school buildings have two choices: renovate or replace them.

In some cases entire schools need to be renovated or replaced; in other cases, only parts of schools need to be upgraded. The estimated cost to renovate or replace existing schools increased by $235 million, from $1.8 billion to $2.1 billion (see table 16), since the last inventory. Most of the increase ($287 million) is for renovations, continuing the increasing cost trend for a fifth year. The estimated cost of replacing schools decreased by $52 million to a total of $320 million.

The average amount per school needed to renovate or replace those in fair or poor condition is almost four times larger than the average cost to upgrade the 829 schools in good or excellent condition, $5.8 million

versus $1.5 million (see table 21). Since the last inventory, costs for school renovations increased slightly and still total roughly $1.7 billion. While on a per school basis school buildings in fair or poor condition cost more to fix than those in better condition, renovations at the 829 schools in good or excellent condition make up a larger part of the inventory—$1.1 billion, an average of $1.3 million dollars per school. Renovations needed to bring the 142 schools in fair or poor condition to good or excellent condition will require an estimated $655 million, an average of $4.6 million per school.

Table 21. Estimated Cost to Renovate or Replace Schools by School Condition

Five-year Period July 2014 through June 2019

School Condition	Number of Schools	Estimated Cost to Renovate	Estimated Cost to Replace	Totals	Average Cost Per School
Good or Excellent	829	$ 1,092,556,362	$ 158,950,000	$ 1,251,506,362	$ 1,509,658
Fair or Poor	142	655,365,880	161,160,000	816,525,880	5,750,182
Total	**971**	**$1,747,922,242**	**$ 320,110,000**	**$ 2,068,032,242**	**$ 2,129,796**

Note: The total for renovations does not include the $3,700,000 in facility upgrades captured in the school system-wide category used for the total renovation cost in Table 16.

Sometimes renovating a school is not enough to meet the needs of students, and schools have to be replaced. Local officials reported that they need $320 million to replace a total of 14 schools, a decrease of 14.0% ($52 million) from last year's report. The average cost to replace these schools is $23 million. Of the 14 schools, five are in good condition, six are in fair condition, two are in poor condition, and the one that had been in excellent condition needs to be replaced because of a dangerous sinkhole that threatens the building. These five schools in good condition are, on average, at least 70 years old. School systems that cannot immediately afford to replace schools may renovate them in the meantime. Cascade High School, built in 1976 in Bedford County, is a good example. They need $24 million to replace the school and approximately $5 million to upgrade the existing building, both so it can remain in use until the new high school is built and so it can be used as a middle school thereafter.