A Commission Report to the 107th General Assembly

Building Tennessee's Tomorrow:

Anticipating the State's Infrastructure Needs

July 2009 through June 2014

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State of Tennessee

Tennessee Advisory Commission on Intergovernmental Relations
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June 2011

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 ninth in a series of reports on Tennessee's infrastructure needs by the Tennessee Advisory Commission on Intergovernmental Relations (TACIR) pursuant to Public Chapter 817, Acts of 1996. That act requires the TACIR 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 TACIR's continuing efforts to improve the inventory.

Information from the annual inventory is being used for a study comparing school siting and land-use planning. 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. Plans include making it possible for anyone with an interest to easily access information about and compare the infrastructure needs of cities, counties, and regions.

Sincerely,

Senator Mark Norris
Chairman

Harry A. Green, Ph.D.
Executive Director

Building Tennessee's Tomorrow:

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EXECUTIVE SUMMARY

This report is the ninth in a series on infrastructure that began in the late 1990s. These reports to the General Assembly present Tennessee's public infrastructure needs as reported by local officials, those submitted by state departments and agencies as part of their budget requests to the Governor, and those compiled by the Tennessee Department of Transportation. The information presented in this report was collected during fiscal year 2009-10 and covers the five-year period of July 2009 through June 2014. It provides two types of information: (1) needed infrastructure improvements and (2) the condition of existing elementary and secondary (K-12) public schools. Needs fall into the six broad categories shown below.

Reported Infrastructure Needs	
Transportation & Utilities $19.5 billion	Education $7.7 billion
Health, Safety & Welfare $6.9 billion	Recreation & Culture $1.8 billion
Economic Development $1.1 billion	General Government $473 million
Grand Total $37.6 billion	

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

- The total need for public infrastructure improvements is estimated at $37.6 billion for 2009 through 2014—an increase of $269 million from the previous inventory—including the cost of upgrading existing public schools to good condition. This is the smallest increase since 1997, when these inventories were introduced.
- Three categories—Transportation and Utilities, Recreation, and Economic Development—all increased. The largest dollar increase was in Transportation and Utilities ($612 million).

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 which 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.]

Even though the increase in Transportation and Utilities needs is larger than the total increase in public infrastructure needs, it is substantially smaller than increases in previous years.

Even with a significant increase in transportation needs, total needs increased only slightly because four types—water and wastewater, new school construction, law enforcement, and public buildings—decreased by more than $100 million each. Even though the increase in Transportation and Utilities needs is larger than the total increase in public infrastructure needs, it is substantially smaller than increases in previous years. This category continues to account for about half of the total infrastructure needs in the inventory.

- Economic Development needs increased $109 million from the previous inventory. This increase can be attributed to an increase in the estimated cost of the convention center project in Nashville. Recreation and Culture increased slightly ($21 million or 1.2%). Recreation needs declined, but modest increases in community development and in libraries, museums, and historic sites more than offset that decline.
- Three of the six categories—Education; Health, Safety and Welfare; and General Government—decreased from the previous inventory. Health, Safety and Welfare decreased the most ($239 million) of any broad category with two project types—water and wastewater and law enforcement—declining by more than $100 million each. General Government needs fell by $177 million (27.3%), mainly because of a $164 million decrease in public buildings, the largest decrease of any individual type of infrastructure need. Fourteen public building projects reported in the last inventory were canceled, and 44 were completed.
- Education is the second largest category after Transportation and Utilities and includes mainly public schools and higher education facilities. The category as a whole declined $56 million. An $81 million increase in higher education needs was not enough to offset the $137 million decrease in public school needs. The only type of public school need that increased was system-wide needs, such as central offices and bus garages.
- For the third consecutive year, needs for school infrastructure improvements—including new schools and improvements or additions to existing schools—decreased by more than $100 million. The largest decrease, $127 million, is in new school construction needs, but the need reported for improvements at existing schools also declined. The decline in needs for new schools has followed a decline in enrollment. Enrollment

grew significantly from 2000 to 2007 but slowed. New school construction needs followed a similar pattern and have now decreased by more than $100 million for the second straight year.

- The overall condition of Tennessee's public school buildings continues to be consistent, with 91% of schools in good or excellent condition. This is the same level reported by local officials since July 2004 and a considerable improvement over the 59% reported in 1999. The estimated cost of infrastructure improvements reported in the inventory also seems to have stabilized at around $3.5 to $3.7 billion since 2001. (These figures do not include the needs of the state-owned special schools.)
- Local officials are confident of only $10.9 billion (which is about 18% more than in the previous inventory) of the $29.3 billion identified as local needs. (These figures do not include needs at existing schools or those in state agencies' capital budget requests.) Most of that amount, $10.3 billion, is for needs that are fully funded; another $700 million is for needs that are partially funded. That leaves another $18.4 billion of needs for which funding is not yet available. It is likely that more of the need will be met from existing funding sources as projects move through planning and design and into the construction phase, but it is impossible to know in advance how much.
- The effects of funding from the American Recovery and Reinvestment Act (ARRA) are beginning to show up in this inventory. Funding status in the previous inventory was reported as of July 1, 2008, before the ARRA was enacted. Funding status in the current inventory is reported as of July 1, 2009. By then, the ARRA was passed and funds had begun to flow to infrastructure needs. ARRA funding specifically reported for needs in the current inventory amount to $84 million. Funding sources reported in the inventory are usually not that specific, so the real total could be much higher.
- Fully funded public infrastructure needs increased by about $1.5 billion from last year. This increase is mainly from state and federal funding sources for unfunded transportation needs reported in previous inventories that were funded in the current inventory. It is possible that funding for these needs became available because ARRA funds for transportation

The overall condition of Tennessee's public school buildings continues to be consistent, with 91% of schools in good or excellent condition.

projects, such as paving that are not included in the inventory, freed up other federal and state dollars for road construction projects.

- State or federal mandates affect about 5% of all projects in the current inventory, the same as the last three years. About 15% of projects reported in 2001 were mandate related, but that percentage declined each year through 2004 when it fell below 5% for the first time. Although public elementary and secondary schools account for 41% of the total number of projects affected by facilities mandates, this is a substantial decline from the 60% in the previous inventory. The decline is largely because of the waning effect of the Education Improvement Act, which was fully implemented by fall 2001.
- Consistent with analysis of previous inventories, tax base factors and income correspond more closely to needs by county than population factors do, although total population and population density are good predictors of infrastructure needs as well. The strongest predictors of need may simply reflect the common sense inference that tax base and income tend to concentrate where population concentrates. Also, it is possible that the ability to fund infrastructure may influence local officials as they respond to the inventory.

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OVERVIEW

One of the greatest fiscal challenges facing our elected officials as they struggle with continuing budget shortfalls is the aging of the nation's 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 ever increasing demands that are plaguing state and local officials as they struggle with the daunting task of matching limited funds to unlimited needs. Federal funds received through the American Recovery and Reinvestment Act of 2009 (ARRA), which occurred just before the inventory reported here began, helped Tennessee meet some of its public infrastructure needs. But only a small portion was earmarked for infrastructure, and even if all ARRA funds had been spent on infrastructure, only a small percentage of estimated needs reported in this inventory could be met.

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 to 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. And so we look to those who represent us in our public institutions to set priorities and find ways to fund them. To do that, they need to know what our needs are.

This report is the ninth in a series that presents Tennessee's public infrastructure needs. It covers the five-year period of July 2009

Characteristics of Infrastructure

- It serves an essential public purpose.
- It has a long useful life.
- It is infrequent and expensive.
- It is fixed in place or stationary.
- It is related to other government functions and expenditures.
- It is usually the responsibility of local government.

Joint Task Force of the National Association of Home Builders and the National Association of Counties

through June 2014 and provides two basic types of information as reported by local and state officials: (1) needed infrastructure improvements and (2) the condition of existing elementary and secondary (K-12) public schools. The needs fall into the six broad categories in Table 1:

Table 1. Summary of Infrastructure Improvement Needs Reported
Five-year Period July 2009 through June 2014

Category	Number of Projects or Schools Reported		Five-year Reported Estimated Cost	
Transportation and Utilities	3,550	39.5%	$ 19,519,817,112	52.0%
Education	2,009	22.4%	7,663,212,602	20.4%
Health, Safety and Welfare	2,095	23.3%	6,910,054,843	18.4%
Recreation and Culture	929	10.3%	1,849,601,511	4.9%
Economic Development	158	1.8%	1,149,679,570	3.1%
General Government	236	2.6%	472,823,809	1.3%
Grand Total	**8,977**	**100.0%**	**$ 37,565,189,447**	**100.0%**

*For a complete listing of all reported needs by county and by public school system, see Appendices D and E.

**A list of the types of projects included in the six general categories is shown in Table 3. Descriptions of the project types are included in the Glossary of Terms at the end of this report.

***Includes improvement needs at existing schools. Number of projects includes the 1,730 schools for which needs were reported.

These needs are based on the full cost of projects that should be in any stage of development during the five-year period of July 2009 through June 2014. Projects included in this report have either start or completion dates during that period, so estimated costs for projects may include amounts spent before July 2009 or after June 2014. Officials reporting these needs are not asked to itemize costs by year. These needs represent the best estimates that state and local officials could provide and are not limited to what they can afford.

Why inventory public infrastructure needs?

The 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

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

[1]Chapter 817, Public Acts of 1996. For more information about the enabling legislation, see Appendix A.

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. This approach, dictated by the public act, is consistent with the characterization of capital projects adopted by the General Assembly for its annual budget.

Local officials were asked to describe the needs they anticipated during the period of July 1, 2009, through June 30, 2029, 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, 2009. The period covered by each inventory was expanded to twenty years in 2000 because of legislation requiring its use by the Commission to monitor implementation of Tennessee's Growth Policy Act.[3] 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 only by the very broad purposes for public infrastructure as prescribed by law. No independent assessment of need constrains their reporting. In

Top Three Infrastructure Concerns:

1. Roads
2. Wastewater
3. Schools

Report Card for America's Infrastructure http://www.infrastructurereportcard.org/state-page/tennessee

[2]For more information on the importance of the inventory to the development districts and local officials, see Appendix B.

[3]Chapter 672, Public Acts of 2000.

addition, the inventory includes bridge and road needs from project listings provided by state transportation and capital needs identified by state officials and submitted to the Governor as part of the annual budget process.

What have we learned about public infrastructure needs?

State and local officials report a total need for public infrastructure improvements estimated at $37.6 billion for 2009 through 2014—an increase of $269 million since the previous inventory—including the cost of upgrading existing public schools to good condition. This is the smallest increase in any inventory since 1997, when the inventories began. The $23.9 billion increase since the first infrastructure needs report represents both increased need for infrastructure and increased coverage by the inventory. Some of the larger increases between inventories resulted from improvements such as the inclusion of state agency projects (added for the 2002 report), projects from state transportation officials (added for the 2004 report), and additional bridge needs (added for the 2009 report). (See Table 2.)

Table 2. Comparison of Needed Infrastructure Improvements Reported for All Inventories

Report Year	Five-year Reported Estimated Cost [in billions]	Change from Previous Report [in billions]
1999	$13.7	NA
2001	$18.2	$4.5
2002	$20.5	$2.3
2004	$21.6	$1.1
2005	$24.4	$2.9
2007	$28.3	$3.8
2009	$34.2	$5.9
2010	$37.3	$3.1
2011	$37.6	$0.3

Transportation and Utilities needs continue to comprise more than half of the total infrastructure needs reported. This category has dominated the inventory since 2004 and continues to account for about half of the total infrastructure needs in the inventory. Transportation and Utilities needs increased $612 million (3.2%) (see Table 3). Even though the increase in Transportation and Utilities needs is larger than the total increase in public infrastructure needs, it is little more than half the increase in the last inventory ($1.2 billion) and little more than 20% of the one before ($3.2 billion).

Only two other categories—Recreation and Economic Development—increased. Economic Development needs increased by $109 million since the previous inventory because of a $170 million increase in the estimated cost of the convention center project in Nashville. Recreation and Culture increased slightly ($21 million or 1.2%).

Table 3. Comparison of Estimated Cost of Infrastructure Improvement Needs
July 2008 Inventory vs. July 2009 Inventory

Category	Reported Cost July 2008 through June 2013	July 2009 through June 2014	Difference	Percent Change
Transportation and Utilities	$ 18,908,218,135	$ 19,519,817,112	$ 611,598,977	3.2%
Education	7,719,426,046	7,663,212,602	(56,213,444)	-0.7%
Health, Safety and Welfare	7,149,042,548	6,910,054,843	(238,987,705)	-3.3%
Recreation and Culture	1,828,190,704	1,849,601,511	21,410,807	1.2%
Economic Development	1,041,132,520	1,149,679,570	108,547,050	10.4%
General Government	649,939,418	472,823,809	(177,115,609)	-27.3%
Grand Total	**$ 37,295,949,371**	**$ 37,565,189,447**	**$ 269,240,076**	**0.7%**

Recreation needs declined, but modest increases in the need for community development, libraries, museums, and historic sites more than offset that decline.

Total needs increased only slightly despite the increases in these three categories because of large declines in the other three categories. Four types of infrastructure—water and wastewater, new schools, public buildings, and law enforcement—decreased by more than $100 million each. Three of the six categories—Education; Health, Safety, and Welfare; and General Government—decreased since the previous inventory. The Education category as a whole declined by $56 million. An $81 million increase in higher education needs was not enough to offset the $137 million decrease in public school needs. Health, Safety, and Welfare needs decreased the most ($239 million) with two project types—water and wastewater and law enforcement—declining by more than $100 million each. General Government needs fell by $177 million (27.3%), mainly because of a $164 million decrease in public buildings, the largest decrease of any individual type of infrastructure need. Five large projects completed in Davidson County accounted for more than 40% ($67 million) of this decrease.

Nearly two-thirds of all infrastructure needs in the current inventory are unfunded. Local officials are confident of only $10.9 billion (which is about 18% more than in the previous inventory) of the $29.3 billion identified as local needs. (These figures do not include needs at existing schools or those in state agencies' capital budget requests.) Most of that amount, $10.3 billion, is for needs that are fully funded; another $700 million is for needs that are partially funded. That leaves another $18.4 billion of needs for which funding is not yet available. It is likely that more of the need will be met from existing funding sources as projects move through planning and design and into the construction phase, but it is impossible to know in advance how much. The effects of funding from the American Recovery and Reinvestment Act (ARRA) are beginning to show up in this inventory. ARRA funding specifically reported for needs in the current inventory amount to $84 million.

Funding available for fully funded public infrastructure needs increased by about $1.5 billion since last year. The $1.5 billion increase in fully funded needs is mainly from state and federal funding for

transportation infrastructure previously reported as unfunded. It is possible that funding for these needs became available because ARRA funds for transportation maintenance needs that are not included in the inventory (e.g., paving) freed up other federal and state dollars for road construction projects.

Most of the funding for most types of local infrastructure comes from local sources. Breaking the fully funded projects down into the 20 different types of infrastructure needs in the inventory, local governments (cities, counties, and special districts) are expected to raise more than 90% of the funding needed for 10 of the 20 types and more than 60% of the funding needed for 6 others. The one notable exception is transportation: state and federal sources are expected to provide 51% and 37%, respectively, of funding for transportation needs. The needs of state agencies are not included in the funding analysis in this report because they are drawn from capital budget requests that report only the funding sources proposed and not the funding that is available. Otherwise, figures for the state's contribution to meeting infrastructure needs would, of course, be much higher.

The overall condition of Tennessee's public school buildings remains strong with 91% of schools reported to be in good or excellent condition. The percentage of school buildings reported by local officials to be in good or excellent condition has remained unchanged since July 2004 and is a considerable improvement over the 59% reported in 1999. Infrastructure improvements for schools, including new schools, along with improvements and additions to existing schools are estimated by local officials to cost about $3.5 billion. This total is some $137 million less than the estimate in last year's report—a 3.8% decline. The decrease is attributable to a decline in new school construction needs, and while it is substantial, the total need remains well within the $3.5 to $3.7 billion range that has been the norm since 2001. (These figures do not include the needs of the state-owned special schools.)

School systems had an additional incentive to report their infrastructure needs for the current inventory. Information about the condition of public schools and facilities needs reported in this inventory and the last one was used by school systems as an indicator of need in applications to participate in the Qualified School Construction Bond (QSCB) program authorized by the ARRA and administered by the Tennessee State School Bond Authority (TSSBA). TSSBA issued the

bonds on behalf of Tennessee school systems in order to ensure the best possible loan terms.

In August 2010, the TSSBA had authority to issue approximately $212 million in school construction loans to 16 school districts. Of that $212 million, $85.7 million was allocated for various projects in the Metro Nashville Public Schools, Memphis City Schools, and Knox County School System. This allotment was set by federal government. The remaining funds were available for all systems to apply. The other thirteen school systems that have been approved for the QSCB funds are as follows: Blount, Cocke, Coffee, Dyer, Hawkins, Jefferson, Lauderdale, Maury, Sevier, Shelby, Sullivan, Trousdale, and Warren counties.

State or federal mandates affect about 5% of all projects in the current inventory for the third consecutive year. About 15% of projects reported in 2001 were mandate related, but that percentage declined each year through 2004 when it fell below 5% for the first time. Although public elementary and secondary schools account for 41% of the total number of projects affected by facilities mandates, this is a substantial decline from the 60% in the previous inventory. The decline is largely because of the waning effect of the Education Improvement Act (EIA), which was fully implemented by fall 2001.

Availability of resources to meet needs may explain the variability across counties in what local officials report in the inventory. Consistent with analysis of previous inventories, at the county level, reported needs correspond more closely to tax base factors and income than to population factors. Total population and population density are good predictors of infrastructure needs as well, but population growth rates are not. The significance of indicators of ability to fund infrastructure may reflect the common sense inferences that tax base and income tend to concentrate where population concentrates and that concentrated populations expect and demand more expensive infrastructure. On the other hand, the ability to fund infrastructure may strongly influence local officials as they respond to the inventory, making it less likely that they will report a need for infrastructure that they see no practical way to fund.

Consistent with analysis of previous inventories, at the county level, reported needs correspond more closely to tax base factors and income than to population factors.

What else needs to be done?

The data collection process continues to improve, and the current inventory is more complete and accurate than ever, particularly with respect to transportation needs. 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, which 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.

With each annual inventory, participants have become more familiar with the process and more supportive of the program.

Public Chapter 672, Acts of 2000, formally linked Tennessee's public infrastructure inventory and its Growth Policy Act (Public Chapter 1101, Acts of 1998), requiring that the inventory be used to help monitor implementation of the Act. One study, comparing school siting and land-use planning, is currently underway. 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. Plans include making it possible for anyone with an interest to easily access information about and compare the infrastructure needs of cities, counties, and regions. Future work should also include a closer look at variations across the state, such as how urban and rural areas differ in their ability to meet—and perhaps even assess—their infrastructure needs.

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INTRODUCTION: BASICS OF THE PUBLIC INFRASTRUCTURE NEEDS INVENTORY

The public infrastructure needs inventory is developed using two separate, but related, inventory forms.[4] 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 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 of July 2009 through June 2014, and have an estimated cost of at least $50,000. 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 2009 to start a project that needs to be completed during the five-year period or amounts to be spent after June 2014 to complete a project that

TACIR staff spend considerable time reviewing all the information in the inventory to ensure accuracy and consistency, but the information reported in the inventory is based on the judgment of state and local officials.

[4]Both forms are included in Appendix C.

Five Key solutions to improving Infrastructure:

1. Increase Federal Leadership in Infrastructure
2. Promote Sustainability and Resilience
3. Develop Federal, Regional, and State Infrastructure Plans
4. Address Life-Cycle Costs and Ongoing Maintenance
5. Increase and Improve Infrastructure Investment from All Stakeholders

Report card for America's Infrastructure, http://www.infrastructurereportcard.org/solutions

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.[5] 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 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, aside from the EIA, the cost reported to TACIR as part of the public infrastructure needs inventory is relatively small—less than 1% of the total.

The Public Infrastructure Needs Inventory–It Matters

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.

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

Short-Term and Long-Range Planning: Often the One Opportunity for Proactive Thinking

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.

For most officials in rural areas and in smaller cities, the inventory is the closest thing they have to a capital improvements program.

Decision Making: Matching 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 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. Most recently, this data was used to help identify projects that may eligible to receive funding through the American Recovery and Reinvestment Act.

A Special Case: 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 of information about Tennessee's public school facilities, conditions and needs continues to be used by the Comptroller's Office of Education Accountability in its review of schools placed on notice by the Department of Education.

Increased Public Awareness, Better Communication and Collaboration

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.

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, regional and state 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, 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.

INFRASTRUCTURE NEEDS STATEWIDE

Total needs reported increased by less than 1% since the last inventory.

State and local officials estimate the cost of public infrastructure improvements that should be started or completed sometime between July 1, 2009, and June 30, 2014, at $37.6 billion (see Table 4). This total is approximately $269 million more than the estimate in last year's report, an increase of only 0.7% (see Table 6). This is the smallest increase since the inventory began in 1997.

Table 4. Total Number and Estimated Cost of Infrastructure Improvement Needs
Five-year Period July 2009 through June 2014*

Category and Type of Need**	Number of Projects or Schools Reported		Five-year Reported Estimated Cost	
Transportation and Utilities	**3,550**	**39.5%**	**$ 19,519,817,112**	**52.0%**
Transportation	3,475	38.7%	18,890,536,778	50.3%
Other Utilities	69	0.8%	604,980,334	1.6%
Telecommunications	6	0.1%	24,300,000	0.1%
Education	**2,009**	**22.4%**	**$ 7,663,212,602**	**20.4%**
Non K-12 Education	656	7.3%	4,096,971,228	10.9%
Existing School Improvements	1,217	13.6%	1,905,950,380	5.1%
K-12 New School Construction	85	0.9%	1,548,048,421	4.1%
School System-wide Need	51	0.6%	112,242,573	0.3%
Health, Safety and Welfare	**2,095**	**23.3%**	**$ 6,910,054,843**	**18.4%**
Water & Wastewater	1,465	16.3%	4,004,577,600	10.7%
Law Enforcement	271	3.0%	1,880,411,799	5.0%
Public Health Facilities	92	1.0%	395,978,500	1.1%
Storm Water	82	0.9%	355,315,165	0.9%
Fire Protection	136	1.5%	218,981,756	0.6%
Solid Waste	46	0.5%	40,152,000	0.1%
Housing	3	0.0%	14,638,023	0.0%
Recreation and Culture	**929**	**10.3%**	**$ 1,849,601,511**	**4.9%**
Recreation	718	8.0%	1,084,915,057	2.9%
Libraries, Museums, & Historic Sites	104	1.2%	390,159,397	1.0%
Community Development	107	1.2%	374,527,057	1.0%
Economic Development	**158**	**1.8%**	**$ 1,149,679,570**	**3.1%**
Business District Development	38	0.4%	954,870,620	2.5%
Industrial Sites & Parks	120	1.3%	194,808,950	0.5%
General Government	**236**	**2.6%**	**$ 472,823,809**	**1.3%**
Public Buildings	205	2.3%	441,686,472	1.2%
Other Facilities	31	0.3%	31,137,337	0.1%
Grand Total	**8,977**	**100.0%**	**$ 37,565,189,447**	**100.0%**

*For complete listings of all needs reported in the July 2009 inventory by county and by public school system, see Appendices D and E.

**Descriptions of project types are included in the Glossary of Terms at the end of the report.

For the first time since the inventory began, infrastructure needs newly reported in the current inventory were not enough to offset needs that were completed or canceled. The amount canceled this time was the largest ever: $1.8 billion. Cancelled projects totaled only $550 million in the previous inventory. Cancelled projects totaled $1.6 billion in 2007, but total needs increased by 21%, mainly because of the addition of bridge improvement needs and a two-year time span between reports.

Needs are divided into six major categories of public infrastructure: Transportation and Utilities; Education; Health, Safety, and Welfare; Recreation and Culture; Economic Development; and General Government (see Table 3). Needs in all six categories increased in the last inventory, but only three categories increased in the current inventory. Economic Development needs increased by the largest percentage (10.4%), mainly because of an increase in the estimated cost of the new convention center in Nashville. The estimated cost of the convention center increased by approximately $170 million, from $455 million to $625 million. If not for this, Economic Development needs would have declined.

Table 5. Transportation Improvement Needs by Subtype
Five-year Period July 2009 through June 2014

Subtype	Number of Projects	Estimated Cost
Roads	1,351	$ 14,518,931,982
Bridges	1,609	2,288,749,184
Rail	77	1,081,527,084
Navigation	4	317,560,000
Intelligent Trans. System	23	196,614,940
Air	98	176,412,628
Sidewalks	180	154,171,419
Signalization	89	73,327,230
Other	39	60,542,311
Public Transit	5	22,700,000
Transportation Total	**3,475**	**$ 18,890,536,778**

Transportation needs increased by the largest dollar amount ($604 million), though only by a small percentage (3.3%). In previous reports, transportation needs increased by as much as 25%. Transportation and Utilities remains the single largest category, comprising 52% of all infrastructure needs. This category has consistently comprised nearly half of the total increase in infrastructure needs each year since the Commission's first report in 1999. It does not include water utilities; those needs are reported in the Health, Safety, and Welfare category.

The bulk of transportation needs are roads ($14.5 million [77%] of the $18.9 million total), but other types of transportation infrastructure are also needed, including bridges, rail, and navigation (see Table 5). Projects captured in the roads subtype may also include bridges, signalization, sidewalks, and other subtypes for which the cost is not broken out.

Table 6. Comparison of Estimated Cost of Infrastructure Improvement Needs
July 2008 Inventory vs. July 2009 Inventory

Category and Type of Need*	July 2008 Inventory	July 2009 Inventory	Difference	Percent Change
Transportation and Utilities	**$ 18,908,218,135**	**$ 19,519,817,112**	**$ 611,598,977**	**3.2%**
Transportation	18,286,392,901	18,890,536,778	604,143,877	3.3%
Other Utilities	591,584,334	604,980,334	13,396,000	2.3%
Telecommunications	30,240,900	24,300,000	(5,940,900)	-19.6%
Education	**$ 7,719,426,046**	**$ 7,663,212,602**	**$ (56,213,444)**	**-0.7%**
Non K-12 Education	4,016,123,406	4,096,971,228	80,847,822	2.0%
Existing School Improvements	1,923,171,646	1,905,950,380	(17,221,266)	-0.9%
K-12 New School Construction	1,675,471,865	1,548,048,421	(127,423,444)	-7.6%
School System-wide Need	104,659,129	112,242,573	7,583,444	7.2%
Health, Safety and Welfare	**$ 7,149,042,548**	**$ 6,910,054,843**	**$ (238,987,705)**	**-3.3%**
Water & Wastewater	4,162,819,492	4,004,577,600	(158,241,892)	-3.8%
Law Enforcement	1,980,569,500	1,880,411,799	(100,157,701)	-5.1%
Public Health Facilities	342,064,829	395,978,500	53,913,671	15.8%
Storm Water	339,665,653	355,315,165	15,649,512	4.6%
Fire Protection	202,913,334	218,981,756	16,068,422	7.9%
Solid Waste	50,547,000	40,152,000	(10,395,000)	-20.6%
Housing	70,462,740	14,638,023	(55,824,717)	-79.2%
Recreation and Culture	**$ 1,828,190,704**	**$ 1,849,601,511**	**$ 21,410,807**	**1.2%**
Recreation	1,137,238,748	1,084,915,057	(52,323,691)	-4.6%
Libraries, Museums, & Historic Sites	358,551,625	390,159,397	31,607,772	8.8%
Community Development	332,400,331	374,527,057	42,126,726	12.7%
Economic Development	**$ 1,041,132,520**	**$ 1,149,679,570**	**$ 108,547,050**	**10.4%**
Business District Development	810,314,520	954,870,620	144,556,100	17.8%
Industrial Sites & Parks	230,818,000	194,808,950	(36,009,050)	-15.6%
General Government	**$ 649,939,418**	**$ 472,823,809**	**$ (177,115,609)**	**-27.3%**
Public Buildings	605,264,485	441,686,472	(163,578,013)	-27.0%
Other Facilities	38,371,847	31,137,337	(7,234,510)	-18.9%
Propery Acquisition**	6,303,086	0	(6,303,086)	-100.0%
Grand Total	**$ 37,295,949,371**	**$ 37,565,189,447**	**$ 269,240,076**	**0.7%**

*Descriptions of project types are included in the Glossary of Terms at the end of the report.

**All property acquisition needs reported in 2009 support other types of infrastructure (e.g., new school construction) and are reported here as part of the cost of the type of infrastructure supported.

Four types of infrastructure needs decreased by more than $100 million: public buildings, water and wastewater, K-12 new school construction, and law enforcement. Public buildings decreased the most (27%) of any type of infrastructure ($164 million). Fifteen projects were canceled, and 44 were completed. Nearly one-third of the total decrease ($66.8 million) is attributed to the completion of five large, long-term renovation projects in Davidson County, each with a cost greater than $5 million.

Recreation and Culture was the only other category that increased (1.2%). While recreation needs decreased by $52 million, community development needs increased by $42 million. Libraries, museums,

and historic sites increased by $31.6 million. Recreation needs peaked in 2005 at $1.5 billion. They have declined every year since except 2008.

Water and wastewater needs tend to fluctuate. As economic growth and development decrease, so does the need for water and wastewater services. From July 2008 to July 2009, water and wastewater needs declined by approximately 3.8%. The completion of four large projects accounted for $125 million in reduced water and wastewater needs. A total of 203 projects were completed.

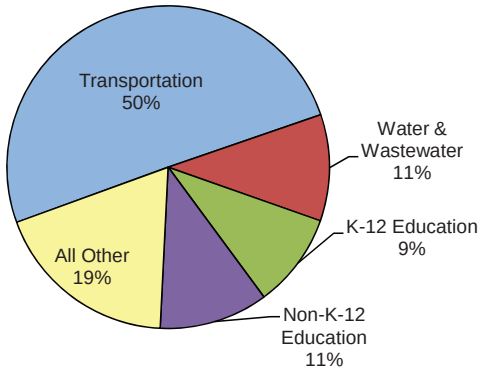
New school construction needs also tend to fluctuate. This year, these needs declined by $127 million—an amount roughly equal to last year's decrease. This trend is discussed in further detail in the school chapter later in this report. Education is the second largest category of infrastructure needs and decreased only slightly since the last inventory (-0.7%). Non K-12 education reported the smallest increase in recent years. State colleges and universities, which make up the largest portion of non K-12 education needs, are under the same fiscal constraints as local governments and may be hesitant to report new needs when funds are not available to meet existing needs. The scope of these needs often change from year to year. Existing needs are often canceled and re-reported. Seventy-four projects at Tennessee's public colleges and universities were canceled in this inventory.

Law enforcement needs have steadily increased over the years but decreased for the first time in this inventory. Although more than $200 million in law enforcement needs were added, that was not enough to offset the 53 completed or canceled projects, which totaled $389 million. Accounting for nearly half of this figure, two Shelby County projects were canceled—one to rebuild a correctional facility and the other to purchase space for a dispatch facility.

Telecommunications, which decreased 19.6%, was the only type of need in the Transportation and Utilities category that decreased. Three projects were completed. Telecommunications is one of the smallest project types, with only six projects totaling $24 million, and any change in a type this small can have a significant impact.

Transportation, Non K-12 Education, K-12 Education, and Water and Wastewater dominate statewide needs.

Figure 1. Percent of Total Reported Cost of Infrastructure Needs by Type of Project Five-year Period July 2009 through June 2014



As shown in Figure 1, four types of projects dominate the public infrastructure needs reported by state and local officials. Transportation needs alone have comprised at least half of the total in the last four reports. Water and wastewater infrastructure improvements and non K-12 education each comprise 11% of the total. Public school facilities improvements comprise another 9% of the total. Taken together, these four types of infrastructure represent 81% of the total needs reported in this inventory.

These four types continue to dominate inventory needs even though they are growing more slowly than they have in the past. Since the last inventory, water and wastewater needs decreased while transportation and non K-12 education needs grew less than 5%. While other categories experienced more modest growth in the last inventory, non K-12 education grew by more than 30% in the previous inventory.

As impressive as the figures for transportation and for water and wastewater needs are, they do not include infrastructure needed to support other projects. 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 is needed for a new school, then the sewer line is recorded as new school construction with water and wastewater as its secondary type. This two-dimensional classification facilitates more flexibility in analyzing the cost of different types of infrastructure improvements. The effect of including infrastructure needed to support other public infrastructure needs in the totals for selected types of projects is shown in Table 7. It is important to note that all property acquisition needs support other public infrastructure and would not show up in other tables in this report.

Table 7. Comparison of Needs That Support Direct Service to Private Sector and Needs that Support Other Public Infrastructure
Five-year Period July 2009 through June 2014

	Needs That Support Direct Service to Private Sector		Needs That Support Other Public Infrastructure		
	Estimated Cost [in millions]	**Percent of Total Need for Infrastructure Type**	**Estimated Cost [in millions]**	**Percent of Total Need for Infrastructure Type**	**Estimated Cost [in millions]**
Transportation	$18,891	99.5%	$100	0.5%	$18,991
Water and Wastewater	4,005	98.8%	48	1.2%	4,052
Storm Water	355	99.5%	2	0.5%	357
Property Acquisition	0	0.0%	348	100.0%	348
Telecommunications	24	37.8%	40	62.2%	64
Grand Total	**$23,275**	**97.7%**	**$538**	**2.3%**	**$23,812**

"We need to invest in urban schools, transportation, parks, health care, police protection, and infrastructure that make cities great magnets with gravity sufficient to draw back the creeping suburbs."

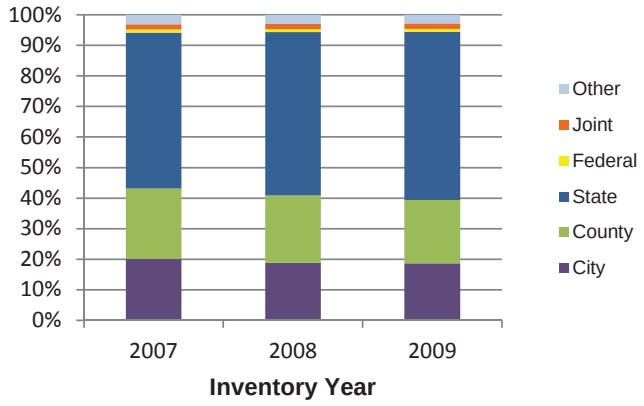
–Robert F. Kennedy, Jr.

New York Times, 2008.

State infrastructure needs continue to dominate overall, and county needs still exceed city needs.

Needs identified and reported in the inventory by local officials may be owned or controlled by a variety of entities, including state or federal agencies or public utilities. This is especially true of transportation needs, which are often reported by local officials, but nearly three-fourths of which are the responsibility of the state. In fact, although most needs are reported by local officials, state agencies own the largest percentage of infrastructure in the inventory, and that percentage is slowly increasing. Aside from the increase in the state's share of infrastructure needs, the distribution across all levels of government has remained fairly constant for the last three years. (See Figure 2.)

Figure 2. Percent of Total Reported Cost of Infrastructure Needs by Level of Goverment Five-year Period July 2009 through June 2014



The state's public colleges and universities comprise nearly all non K-12 education needs. In fact, transportation and non K-12 make up the bulk of state-owned infrastructure in the inventory, accounting for $18 million of the $21 million total reported by state government. The next largest areas of state responsibility are law enforcement and public health facilities. State needs exceed 60% of the totals for both types of infrastructure even though the dollar amounts are relatively small. (See Table 8.)

Cities remain responsible for the largest portion of needs in the Health, Safety, and Welfare and the Recreation and Culture categories. Cities are responsible for a significant portion of the need for storm water,

Table 8. Total Estimated Cost [in millions] of Infrastructure Improvement Needs by Type of Need and Level of Government
Five-year Period July 2009 through June 2014

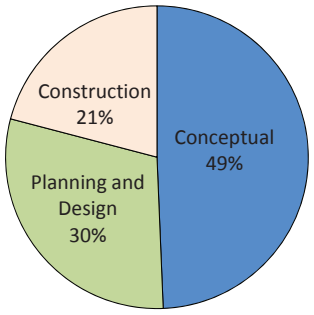
Category and Type of Need	City		County		State		Federal		Joint		Other		Total	
Transportation and Utilities	**$2,357.6**	**12.1%**	**$2,070.0**	**10.6%**	**$14,368.6**	**73.6%**	**$300.0**	**1.5%**	**$379.8**	**1.9%**	**$43.9**	**0.2%**	**$19,519.8**	**100.0%**
Transportation	2,182.4	11.6%	1,637.5	8.7%	14,368.6	76.1%	300.0	1.6%	379.8	2.0%	22.2	0.1%	18,890.5	100.0%
Other Utilities	158.0	26.1%	425.3	70.3%	0.0	0.0%	0.0	0.0%	0.0	0.0%	21.7	3.6%	605.0	100.0%
Telecommunications	17.1	70.4%	7.2	29.6%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	24.3	100.0%
Education	**$613.9**	**8.0%**	**$2,836.7**	**37.0%**	**$4,168.6**	**54.4%**	**$0.0**	**0.0%**	**$8.3**	**0.1%**	**$35.8**	**0.5%**	**$7,663.2**	**100.0%**
Non K-12 Education	3.9	0.1%	2.1	0.1%	4,082.7	99.7%	0.0	0.0%	8.3	0.2%	0.0	0.0%	4,097.0	100.0%
Existing School Improvements	461.5	24.2%	1,424.7	74.7%	0.0	0.0%	0.0	0.0%	0.0	0.0%	19.8	1.0%	1,906.0	100.0%
K-12 New School Construction	137.4	8.9%	1,394.6	90.1%	0.0	0.0%	0.0	0.0%	0.0	0.0%	16.0	1.0%	1,548.0	100.0%
School System-wide Need	11.1	9.9%	15.3	13.6%	85.9	76.5%	0.0	0.0%	0.0	0.0%	0.0	0.0%	112.3	100.0%
Health, Safety and Welfare	**$2,733.2**	**39.6%**	**$1,433.0**	**20.7%**	**$1,597.0**	**23.1%**	**$0.0**	**0.0%**	**$191.2**	**2.8%**	**$955.7**	**13.8%**	**$6,910.1**	**100.0%**
Water & Wastewater	2,008.8	50.2%	853.8	21.3%	0.0	0.0%	0.0	0.0%	186.9	4.7%	955.1	23.8%	4,004.6	100.0%
Law Enforcement	162.6	8.6%	478.2	25.4%	1,239.6	65.9%	0.0	0.0%	0.0	0.0%	0.0	0.0%	1,880.4	100.0%
Storm Water	340.8	95.9%	10.1	2.8%	1.0	0.3%	0.0	0.0%	3.0	0.9%	0.4	0.1%	355.3	**100.0%**
Public Health Facilities	1.2	0.3%	39.2	9.9%	355.7	89.8%	0.0	0.0%	0.0	0.0%	0.0	0.0%	396.0	100.0%
Fire Protection	194.1	88.6%	23.8	10.8%	0.6	0.3%	0.0	0.0%	0.3	0.1%	0.2	0.1%	219.0	100.0%
Solid Waste	11.2	27.8%	28.0	69.8%	0.0	0.0%	0.0	0.0%	1.0	2.4%	0.0	0.0%	40.2	100.0%
Housing	14.6	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	14.6	100.0%
Recreation and Culture	**$915.5**	**49.5%**	**$390.0**	**21.1%**	**$490.0**	**26.5%**	**$0.2**	**0.0%**	**$52.6**	**2.8%**	**$1.4**	**0.1%**	**$1,849.6**	**100.0%**
Recreation	553.5	51.0%	220.7	20.3%	264.0	24.3%	0.2	0.0%	45.1	4.2%	1.4	0.1%	1,084.9	100.0%
Community Development	283.1	75.6%	78.8	21.1%	5.0	1.3%	0.0	0.0%	7.6	2.0%	0.0	0.0%	374.5	100.0%
Libraries, Museums, & Historic	78.8	20.2%	90.4	23.2%	221.0	56.6%	0.0	0.0%	0.0	0.0%	0.0	0.0%	390.2	100.0%
Economic Development	**$182.7**	**15.9%**	**$913.9**	**79.5%**	**$0.2**	**0.0%**	**$0.0**	**0.0%**	**$35.5**	**3.1%**	**$17.3**	**1.5%**	**$1,149.7**	**100.0%**
Business District Development	133.9	14.0%	802.0	84.0%	0.0	0.0%	0.0	0.0%	19.0	2.0%	0.0	0.0%	954.9	100.0%
Industrial Sites & Parks	48.8	25.0%	112.0	57.5%	0.2	0.1%	0.0	0.0%	16.5	8.5%	17.3	8.9%	194.8	100.0%
General Government	**$230.6**	**48.8%**	**$136.9**	**29.0%**	**$85.3**	**18.0%**	**$20.0**	**4.2%**	**$0.0**	**0.0%**	**$0.0**	**0.0%**	**$472.8**	**100.0%**
Public Buildings	222.2	50.3%	127.8	28.9%	71.7	16.2%	20.0	4.5%	0.0	0.0%	0.0	0.0%	441.7	100.0%
Other Facilities	8.4	26.9%	9.1	29.4%	13.6	43.7%	0.0	0.0%	0.0	0.0%	0.0	0.0%	31.1	100.0%
Grand Total	**$7,033.4**	**18.7%**	**$7,780.4**	**20.7%**	**$20,709.7**	**55.1%**	**$320.2**	**0.9%**	**$667.5**	**1.8%**	**$1,054.0**	**2.8%**	**$37,565.2**	**100.0%**

fire protection, housing, and community development infrastructure. All housing project needs in the current inventory belong to cities.

Counties are now responsible for nearly 80% of needs reported in the Economic Development category, mainly because of the new convention center in Nashville, which accounts for 65% of public infrastructure to support business district development and 55% of the total for the Economic Development category. This facility is treated as a county need because, although metropolitan governments have the characteristics of incorporated places, they remain administrative divisions of the state with all the responsibilities of counties and are so treated as county governments in the inventory. Counties are also responsible for the majority of the solid waste needs (69%) and for other utilities needs (70%).

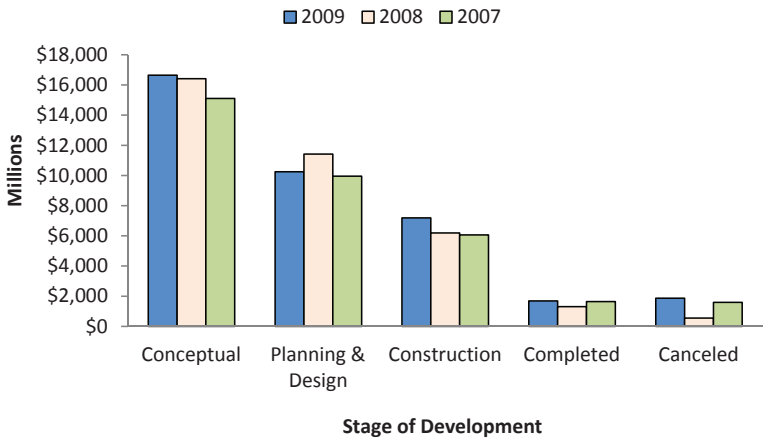
Conceptual needs still remain at nearly half of total estimated cost, but needs under construction increase.

Figure 3. Percent of Total Reported Cost of Infrastructure Needs by Stage of Development Five-year Period July 2009 through June 2014



Overall the distribution of needs by stage has remained consistent—conceptual needs make up 49% of the inventory, those in planning and design account for 30%, and those under construction make up the remaining 21% (see Figure 3); however, needs in the construction stage increased by nearly $1 billion (see Figure 4). This occurred mainly because of an increase in state and federal funding to meet those needs (discussed later in this report). The proportion of infrastructure needs already under construction increased in four of the six major categories—Transportation and Utilities, Education, Recreation and Culture, and Economic Development. Even with this increase, needs in the conceptual stage continue to dominate five of the six major categories of need. Needs in the sixth category, Economic Development, are mainly in the planning and design stage. Needs in the conceptual stage make up 16 out of 20 types of infrastructure. The largest conceptual percentage is for other facilities (74.9%). (See Table 9.)

Figure 4. Three Year Comparison Percent of Total Reported Cost of Infrastructure Needs by Stage Five-year Period July 2009 through June 2014



Needs for other utilities (e.g., electricity and gas; water and wastewater are reported separately) are weighted most heavily toward construction (71.8%), mainly because of two large, multi-phase projects: a $405 million project in Nashville for electrical system construction and a $59 million project to put utilities underground in Gatlinburg.

Table 9. Needed Infrastructure Improvements by Category, Project Type, and Stage of Development
Five-year Period July 2009 through June 2014*

	Conceptual				Planning & Design				Construction			
Category and Project Type**	**Number**		**Cost [in millions]**		**Number**		**Cost [in millions]**		**Number**		**Cost [in millions]**	
Transportation and Utilities	**2,247**	**63.3%**	**$ 9,511.5**	**48.7%**	**791**	**22.3%**	**$ 6,302.1**	**32.3%**	**512**	**14.4%**	**$ 3,706.3**	**19.0%**
Transportation	2,208	63.5%	9,425.8	49.9%	773	22.2%	6,192.6	32.8%	494	14.2%	3,272.2	17.3%
Other Utilities	36	52.2%	72.1	11.9%	15	21.7%	98.8	16.3%	18	26.1%	434.1	71.8%
Telecommunications	3	50.0%	13.6	56.0%	3	50.0%	10.7	44.0%	0	0.0%	0	0.0%
Education	**375**	**47.3%**	**$ 2,957.0**	**51.4%**	**157**	**19.8%**	**$ 1,449.4**	**25.2%**	**260**	**32.8%**	**$ 1,350.8**	**23.5%**
Non K-12 Education	299	45.6%	1,949.5	47.6%	128	19.5%	1,080.5	26.4%	229	34.9%	1,066.9	26.0%
K-12 New School Construction	51	60.0%	930.8	60.1%	18	21.2%	349.7	22.6%	16	18.8%	267.5	17.3%
School System-wide Need	25	49.0%	76.6	68.3%	11	21.6%	19.2	17.1%	15	29.4%	16.4	14.6%
Health, Safety and Welfare	**1,265**	**60.4%**	**$ 3,767.6**	**54.5%**	**465**	**22.2%**	**$ 1,381.1**	**20.0%**	**365**	**17.4%**	**$ 1,761.4**	**25.5%**
Water & Wastewater	858	58.6%	1,916.0	47.8%	346	23.6%	905.1	22.6%	261	17.8%	1,183.5	29.6%
Law Enforcement	178	65.7%	1,374.7	73.1%	43	15.9%	308.8	16.4%	50	18.5%	196.8	10.5%
Storm Water	38	46.3%	60.2	17.0%	22	26.8%	72.2	20.3%	22	26.8%	222.8	62.7%
Public Health Facilities	61	66.3%	244.0	61.6%	19	20.7%	49.0	12.4%	12	13.0%	103.1	26.0%
Fire Protection	98	72.1%	147.8	67.5%	24	17.6%	22.4	10.2%	14	10.3%	48.8	22.3%
Solid Waste	32	69.6%	24.8	61.8%	9	19.6%	9.3	23.0%	5	10.9%	6.1	15.1%
Housing	0	0.0%	0	0.0%	2	66.7%	14.3	97.7%	1	33.3%	0.3	2.3%
Recreation and Culture	**510**	**54.9%**	**$ 902.6**	**48.8%**	**249**	**26.8%**	**$ 600.1**	**32.4%**	**170**	**18.3%**	**$ 346.9**	**18.8%**
Recreation	387	53.9%	507.4	46.8%	193	26.9%	315.1	29.0%	138	19.2%	262.4	24.2%
Community Development	66	61.7%	166.1	44.4%	25	23.4%	164.8	44.0%	16	15.0%	43.6	11.6%
Libraries, Museums, & Historic Sites	57	54.8%	229.1	58.7%	31	29.8%	120.2	30.8%	16	15.4%	40.9	10.5%
Economic Development	**94**	**59.5%**	**$ 213.0**	**18.5%**	**47**	**29.7%**	**$ 722.5**	**62.8%**	**17**	**10.8%**	**$ 214.2**	**18.6%**
Business District Development	19	50.0%	75.1	7.9%	13	34.2%	679.5	71.2%	6	15.8%	200.3	21.0%
Industrial Sites & Parks	75	62.5%	137.9	70.8%	34	28.3%	43.0	22.1%	11	9.2%	13.9	7.1%
General Government	**127**	**53.8%**	**$ 244.7**	**51.8%**	**74**	**31.4%**	**$ 147.5**	**31.2%**	**35**	**14.8%**	**$ 80.6**	**17.1%**
Public Buildings	107	52.2%	221.4	50.1%	66	32.2%	140.2	31.7%	32	15.6%	80.0	18.1%
Other Facilities	20	64.5%	23.3	74.9%	8	25.8%	7.2	23.2%	3	9.7%	0.6	1.9%
Grand Total	**4,618**	**59.5%**	**$ 17,596.5**	**49.3%**	**1,783**	**23.0%**	**$ 10,602.6**	**29.7%**	**1,359**	**17.5%**	**$ 7,460.2**	**20.9%**

*For complete listings of costs by project type, stage of development, and county, see Appendix D.

**Descriptions of the project types are included in the Glossary of Terms at the end of the report. This table does not include existing public schools.

The only other type of infrastructure that is mainly under construction is storm water. A $94 million drainage expansion project in Memphis accounts for nearly half of these needs. The fact that these are under construction does not necessarily mean that these types of projects are more likely to be funded. It may mean that they are less likely to be reported when they are in the conceptual phase.

Education needs are still mostly conceptual but shifted more heavily toward construction than any other category, mainly because many needs at the state's colleges and universities (the bulk of non K-12 education) moved into construction. Only 58 projects in the last inventory were under construction; 229 projects in the current inventory are under construction. Twenty-seven of these cost more than $10 million each. Although nearly $1.1 billion of the total need is in construction, an increase of more than 400%, this is only 26% of the total need.

While infrastructure needs under construction in the Education category increased, those in the General Government category, specifically public buildings, declined by nearly half. In the previous inventory, $153 million in public building needs were under construction. In the current inventory, only $80 million of these needs are in the construction stage. This is a modest decrease considering the fact that public building needs decreased by $164 million overall (see Table 6).

Even though the needs in planning and design decreased in this inventory, they still represent 30% of the total costs reported (see Figure 3). For two types of infrastructure needs—housing and business district development—most of the funding needed is for infrastructure improvements that are in planning and design. For three-fourths of the infrastructure types in the inventory, 20% or more of the funding needed is for projects in planning and design. If not for requirements to include drawings with grant applications, much of these needs might have remained conceptual. Taken a step further, because these needs tend to be reported as being in planning and design when they first enter the inventory, it appears that they are not being reported when they are conceptual. Moreover, this delay in reporting needs may occur because local officials do not have sufficient information to estimate costs and do not include them in the inventory until they are putting grant applications together.

State and federal mandates affect 5% of all projects.

The inventory does not ask local or state officials to split the marginal cost of state and federal mandates—except for needs at existing schools—because officials reporting their needs often do not have the detailed information necessary to do so (e.g., the cost of ramps and lowered water fountains). The inventory does ask how many projects are affected by mandates. So while it is impossible to determine how much of the estimated total costs are attributed to state and federal mandates, we can say that the overall number of projects affected by mandates such as the federal Americans with Disabilities Act and the state Education Improvement Act (EIA) is a relatively small portion (5.2%) of the total number of projects in the inventory.

Moreover, the number of projects affected by mandates continues to decline. About 15% of projects reported in 2001 were related

The number of projects affected by mandates continues to decline.

Table 10. Percent of Projects Affected by Mandates
Five-year Period July 2009 through June 2014

Type of Project	Number of Projects or Schools Reported	Projects or Schools Affected by Mandates	
		Number	Percent
Existing School Improvements	1,217	266	21.9%
Non K-12 Education	656	61	9.3%
Transportation	3,475	26	0.7%
Water & Wastewater	1,465	26	1.8%
Recreation	718	25	3.5%
Law Enforcement	271	14	5.2%
School System-wide Need	51	11	21.6%
Public Buildings	205	10	4.9%
Public Health Facilities	92	10	10.9%
K-12 New School Construction	85	3	3.5%
Libraries, Museums & Historic Sites	104	3	2.9%
Solid Waste	46	2	4.3%
Community Development	107	1	0.9%
Storm Water	82	1	1.2%
Business District Development	38	0	0.0%
Fire Protection	136	0	0.0%
Housing	3	0	0.0%
Industrial Sites & Parks	120	0	0.0%
Other Facilities	31	0	0.0%
Other Utilities	69	0	0.0%
Telecommunications	6	0	0.0%
Grand Total	**8,977**	**459**	**5.1%**

to mandates. The percentage fell to 9% the following year, and the percentage affected by mandates has been just above or below 5% since July 2004. This is largely because of the declining effect of the EIA, which was completely implemented by fall 2001. Even so, new and existing elementary and secondary schools account for 41% of the total number of projects affected by facilities mandates. Existing schools are far more likely to be affected by mandates than any other type of project.

Building Tennessee's Tomorrow:

Anticipating the State's Infrastructure Needs

July 2009 through June 2014

FUNDING THE STATE'S INFRASTRUCTURE NEEDS

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

Information about the availability of funding to meet Tennessee's public infrastructure needs indicates that 63% of the funding needed is not yet available. This is a notable improvement since the previous report when 69% of the funding needed was not available. The inventory does not include information about the availability of funds to meet needs at existing schools or those drawn from the capital budget requests submitted by state agencies. Excluding those needs from the total of $37 billion reported for the period covered by the inventory leaves $29.3 billion in needs. Of this remaining amount, only $10.3 billion is for projects that are fully funded; another $654 million is for needs that are partially funded. That leaves another $18.4 billion of needs for which funding is not yet available.

About $10.9 billion of the funding needed to meet needs in the current inventory was available when the inventory began in July 2009. That is an increase of 18% over the $9.1 billion that was available in the previous inventory. Nearly all of this increase is from state and federal sources. Most of the available funding, $10.3 billion, is for needs that are fully funded; another $654 million is for needs that are partially funded. That leaves another $18.4 billion of needs for which funding is not yet available. Needs that were completely unfunded in July 2009 comprise more than half of the total funding needed. (See Table 11). This is a substantial improvement over the last inventory

Table 11. Summary of Funding Availability
Five-year Period July 2009 through June 2014

	Funding Available [in billions]	Funding Needed [in billions]	Total [in billions]
Fully Funded Needs	$ 10.3	$ 0	$ 10.3
Partially Funded Needs	0.7	3.0	3.6
Unfunded Needs	0	15.4	15.4
Total*	**$ 10.9**	**$ 18.4**	**$ 29.3**

*Amounts exclude needs for which availability of funds is unknown.

Local officials were asked to report whether each need submitted in the inventory was funded, and if so, from what source or sources: state, city, county, special district, federal or other. Funding gaps can be identified by comparing total estimated costs to the funding reported for each of these sources.

- If the funding by source equals the total estimated cost, then the need is fully funded.
- If no funding is reported by source, then the need is unfunded.
- If the funding by source does not equal the total estimated cost, then the need is only partially funded.

when unfunded infrastructure improvements amounted to more than 65% of the total needed. Based on past inventories, it is likely that more of the funding needed will become available as projects move through planning and design and into the construction phase, but it is impossible to know in advance how much.

Table 12 takes the $10.3 billion available for fully funded needs and breaks it down by type of need, and then compares it with the total needed for each type of infrastructure in the inventory. Transportation infrastructure needs account for more than 60% of the estimated cost of all needs included in this analysis and about the same percentage of the total funding available. Together with water and wastewater needs, it accounts for 78% of the total funding needed and only slightly less (77%) of

Table 12. Percent of Needs Fully-Funded by Type of Need
Five-year Period July 2009 through June 2014

Category and Project Type	Total Needs* [in millions]	Fully Funded Needs [in millions]	Percent of Total Needs Fully Funded
Transportation & Utilities	**$19,467.5**	**$6,735.2**	**34.6%**
Transportation	18,838.2	6,201.6	32.9%
Other Utilities	605.0	523.3	86.5%
Telecommunications	24.3	10.3	42.4%
Health, Safety and Welfare	**$5,313.10**	**$2,205.40**	**41.5%**
Water & Wastewater	4,004.6	1,685.3	42.1%
Law Enforcement	640.8	190.0	29.7%
Storm water	354.3	242.8	68.5%
Fire Protection	218.4	59.3	27.1%
Solid Waste	40.2	6.6	16.5%
Public Health Facilities	40.3	6.7	16.6%
Housing	14.6	14.6	100.0%
Education	**$1,591.7**	**$424.6**	**26.7%**
K-12 New School Construction	1,548.0	420.7	27.2%
School System-wide Need	26.4	0.3	0.9%
Non K-12 Education**	17.3	3.6	20.8%
Recreation and Culture	**$1,393.0**	**$479.6**	**34.4%**
Recreation	846.6	364.2	43.0%
Community Development	374.5	73.4	19.6%
Libraries, Museums & Historic Sites	171.8	42.0	24.4%
Economic Development	**$1,149.7**	**$276.7**	**24.1%**
Business District Development	954.9	242.1	25.4%
Industrial Sites & Parks	194.8	34.6	17.8%
General Government	**$397.4**	**$134.5**	**33.9%**
Public Buildings	379.9	131.1	34.5%
Other Facilities	17.5	3.4	19.4%
Grand Total	**$29,312.4**	**$10,256.0**	**35.0%**

*Excludes needs for which availability of funds is unknown.

**Excludes needs reported for the state's colleges and universities.

funding available. Even though these types of infrastructure represent the largest portion of needs, they are not the most fully funded.

The category with the highest percentage of fully funded needs is Health, Safety and Welfare at 41.5%; the Transportation and Utilities category is second at 34.6%. Health, Safety and Welfare needs include water and wastewater, housing, and storm water, which have some of the highest percentages in Table 12. All of the funding required for the public housing needs reported in the current inventory is available, although total funding available is only slightly higher than last year. The total amount needed is much lower than in the last inventory. Only three housing projects were reported: Memphis (Shelby County) is renovating 151 public housing units, and public housing units in Lewisburg (Marshall County) and Gruetli-Laager (Grundy County) will receive extensive upgrades. The needs in Memphis and Lewisburg have been in the inventory for more than five years; only the Gruetli-Laager project is new in this report.

Storm water needs are more than two-thirds fully funded. Projects reported in this inventory do not include needs that resulted from the flooding in the Nashville area in May 2010; those needs should be captured in the inventory that began in July of that year. Funding available for water and wastewater needs increased by 17% from last year, taking it to 42.1% fully funded, the 5th highest percentage in the table. The type of infrastructure need with the second highest percentage (87%) is other utilities, which falls in the Transportation and Utilities category. A single project accounts for 77% of the total funding needed for that type; a $405 million improvement and expansion of the electric system in Davidson County. If that project was not funded, the percentage for needs of that type would be much smaller.

The category with the lowest percentage of funding for fully funded needs is Economic Development at 24.1%. Economic Development had the second lowest percentage of fully funded needs in the previous inventory (26.2%). Business district development needs account for the majority of the Economic Development category (83%), and the new Nashville convention center accounts for two-thirds of that ($625 million). The convention center is only partially funded in this inventory; therefore the funds available are not included in this table even though $201 million is available.

Efficient public infrastructure investment and funding should

- add to community welfare
- reflect benefits to users, with public funding making up the shortfall between user charges and the overall costs of the infrastructure
- minimize the lifetime financing costs of a project.

Public Infrastructure Financing: An International Perspective. Chris Chan, Danny Forwood, Heather Roper and Chris Sayers , 2009. http://www.pc.gov.au/__data/assets/pdf_file/0003/86934/04-chapter2.pdf

While only 27% of all types of education needs are fully funded in this inventory, that is an improvement over the last inventory when only 22% of the need was fully funded. The Education category trailed all others in last year's inventory, but tops Economic Development in this report. Economic Development needs increased more than $100 million, but the amount that was fully funded increased only $3.4 million, so the percentage that was fully funded fell. By contrast, the funding needed for new public schools decreased in this inventory by nearly $81 million, but the amount for fully funded needs increased by more than $50 million. The percentage fully funded therefore, increased from 22% to 27%. New school needs comprise nearly all of the Education category because the inventory does not include sufficient information about funding sources and availability for existing public schools and the state's public colleges and universities.

School systems in Tennessee are not fiscally independent, which may hamper school officials' abilities to project funding and may at least partially account for the low percentages reported in Table 12. Even special school districts, which can tax property directly with the approval of the state legislature, are largely dependent on counties for most of their funds. Amounts in Table 12 for non K-12 education reported here are for head start centers, pre-schools, vocational training facilities, and higher education centers owned by city or county governments. Examples include a skills center in Tracy City and a community learning center in Robertson County.

Overall, unfunded needs comprise a little more than half (53%) of total estimated costs, a significant improvement since last year when the percentage of unfunded needs was close to two-thirds.

Table 13 breaks down the $15.4 billion in completely unfunded needs from Table 11 by type of infrastructure. Overall, unfunded needs comprise a little more than half (53%) of total estimated costs, a significant improvement since last year when the percentage of unfunded needs was close to two-thirds. Of the twenty types of infrastructure reported here, only telecommunications and school system-wide needs have an increase in unfunded needs. Both types of infrastructure are among the smallest needs in the inventory, and both had unfunded high percentages in previous inventories. Unfunded telecommunications needs remained about the same as last year; the percentage improved because the total need declined. Unfunded school system-wide needs increased from $14.6 million in the last inventory to $21 million in the current inventory. Little of those needs are fully funded (see Table 12).

Table 13. Percent of Needs with no Funding Reported by Type of Need
Five-year Period July 2009 through June 2014

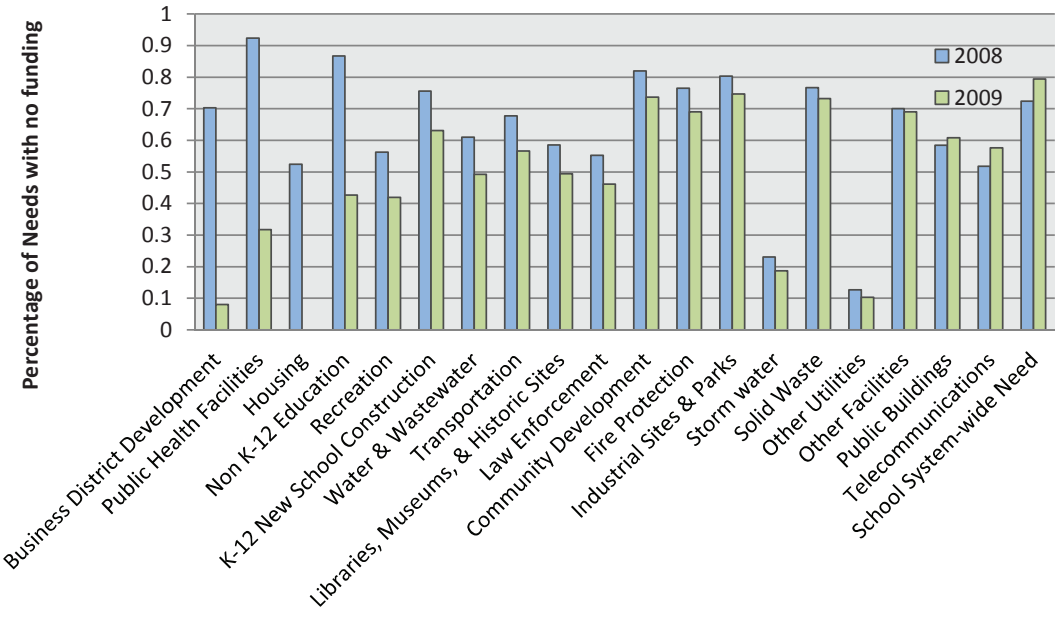
Category and Project Type	Total Needs* [in millions]	Needs with No Funding [in millions]	Percent of Total Needs with No Funding
Transportation & Utilities	**$19,467.5**	**$10,735.6**	**55.1%**
Transportation	$18,838.2	$10,659.0	56.6%
Other Utilities	605.0	62.6	10.3%
Telecommunications	24.3	14.0	57.6%
Health, Safety and Welfare	**$5,313.1**	**$2,526.5**	**47.6%**
Water & Wastewater	$4,004.6	$1,971.8	49.2%
Law Enforcement	640.8	295.5	46.1%
Storm water	354.3	66.3	18.7%
Fire Protection	218.4	150.7	69.0%
Public Health Facilities	40.3	12.8	31.7%
Solid Waste	40.2	29.4	73.2%
Housing	14.6	0	0.0%
Education	**$1,591.7**	**$1,005.2**	**63.1%**
K-12 New School Construction	1,548.0	976.8	63.1%
School System-wide Need	26.4	21.0	79.4%
Non K-12 Education**	17.3	7.4	42.7%
Recreation and Culture	**$1,393.0**	**$715.90**	**51.4%**
Recreation	846.6	355.0	41.9%
Community Development	374.5	275.9	73.7%
Libraries, Museums & Historic Sites	171.8	85.0	49.4%
Economic Development	**$1,149.7**	**$222.2**	**19.3%**
Business District Development	954.9	76.7	8.0%
Industrial Sites & Parks	194.8	145.5	74.7%
General Government	**$397.4**	**$243.0**	**61.2%**
Public Buildings	379.9	230.9	60.8%
Other Facilities	17.5	12.1	69.1%
Grand Total	**$29,312.4**	**$15,448.3**	**52.7%**

*Excludes needs for which availability of funds is unknown.

**Excludes needs reported for the state's colleges and universities.

The four types of infrastructure that improved the most in terms of needs that are not yet funded are public health facilities, housing, non K-12 education, and business district development (see Figure 5). Business district development is the fourth largest type of need in the current inventory. Since last year, unfunded business district development needs decreased from 70% to 8%, despite an increase in the total needed from $810 million to $955 million. The main reason for these changes was the partial funding of Nashville's new convention center and the increase in its total cost. Total needs for public health facilities declined, and unfunded needs of that type fell proportionally. The percentage for other utilities is low because most of the needs of that type are fully funded (see Table 12).

Figure 5. Percentage of Needs with no Funding By Type of Need
Comparison of July 2008 through July 2009 Inventories



An increase in state and federal funding for transportation infrastructure helped boost the total funding available for fully funded public infrastructure needs by $1.5 billion.

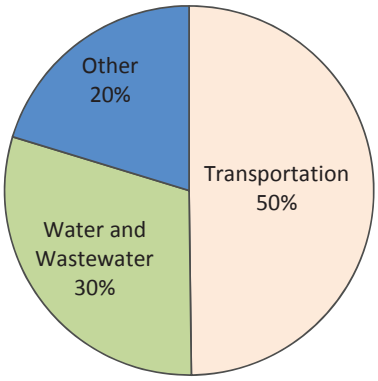
Fully funded infrastructure needs increased by about $1.5 billion since last year with $1.3 billion of that coming from state and federal sources. Funding from state sources increased by $685 million; funding from federal sources increased by $584 million. Funding from cities increased by $186 million, edging slightly ahead of county funding. Funding from counties, special districts, and other sources, such as donations from private corporations and individuals, remained about the same as last year. (See Table 14.)

Table 14. Funding Sources for Fully Funded Public Infrastructure Needs
Comparison of July 2008 through July 2009 Inventories

	2008-2013 Inventory		2009-2014 Inventory		Difference
Funding Source	Amount [in billions]	Percent	Amount [in billions]	Percent	Amount [in billions]
State	$2.6	30.0%	$3.3	32.3%	$0.7
Federal	2.0	22.9%	2.6	25.3%	0.6
City	1.9	21.4%	2.1	20.1%	0.2
County	2.0	22.8%	2.0	19.9%	0.0
Special District	0.2	2.6%	0.2	1.7%	0.0
Other	0.0	0.3%	0.1	0.6%	0.0
Total	**$8.8**	**100.0%**	**$10.3**	**100.0%**	**$1.5**

Half of all ARRA funding reported in this year's inventory is for transportation infrastructure. Another 30% ($25 million) is for water and wastewater. (See Figure 6.) Nearly half of the projects benefiting from these funds are new, smaller projects; the other half are larger projects that have been in the inventory for at least one year. The total amount of federal funding reported as stimulus funds is $84 million. The total amount received by Tennessee was much greater than that ($5.7 billion in total[6]), but not all funds awarded were for infrastructure. Some of the increase in federal funding in this inventory may be ARRA funding that was not reported as such. Moreover some projects that qualified for stimulus funds do not meet the definition of infrastructure used in the inventory—for example projects for paving or other maintenance needs are not included in this inventory.

Figure 6. Federal Stimulus Funding by Type of Project
Five-year Period July 2009 through June 2014



Total Funding: $84 million

Local revenues are the principal funding source for fully funded infrastructure needs.

Table 15 compares funding amounts for fully funded needs in the July 2009 inventory to those in the July 2008 inventory by funding source. Although state and federal funding sources increased significantly since last year, local revenues, which consist of city, county, and special district revenues, remain the principal source of funding for fully funded infrastructure needs. Local sources increased the least. Donations and other sources had remained consistent through previous reports but roughly doubled this year. Most of that change was in recreation needs, among them a $15 million project at the Memphis Zoo involving the construction of a new hippopotamus exhibit that was partially funded by a donation of $10 million from the Memphis Zoo Society.

Table 15. Funding Sources for Fully Funded Public Infrastructure Needs
Comparison of July 2008 through July 2009 Inventories

	2008-2013 Inventory		2009-2014 Inventory	
Funding Source	**Amount** [in billions]	**Percent**	**Amount** [in billions]	**Percent**
Local	$4.1	46.8%	$4.3	41.8%
State	2.6	30.0%	3.3	32.3%
Federal	2	22.9%	2.6	25.3%
Other	0	0.3%	0.1	0.6%
Total	**$8.8**	**100.0%**	**$10.3**	**100.0%**

[6]http://www.recovery.gov

States pay for about two-thirds of surface transportation spending. With less money available from the feds, their portion may need to grow—an increasingly familiar storyline in all areas of funding right now. Given that dynamic, states and localities are asking for more flexibility on how they can spend federal dollars and are endorsing plans that would allow the federal government to leverage the limited funds that are available.

http://www.governing.com/topics/transportation-infrastructure/six-ideas-for-fixing-the-nations-infrastructure-problems.html

State and federal agencies provide the most funding for transportation needs, but cities and counties contribute the most toward other needs.

Table 16 breaks fully funded needs down by category, type of infrastructure, and source of funds. State and federal sources are the largest contributors to infrastructure needs in the Transportation and Utilities category, funding more than 80% of those needs. Other than housing, which is funded entirely from federal sources in the current inventory, transportation is the only type of need for which state and federal sources provide most of the funding. Of the $6.2 billion available for transportation, $3.2 billion is from state sources and roughly $2.3 billion is from the federal government. Approximately $413 million for transportation needs comes from city sources, with $316 million coming from county sources, and $11 million coming from other sources. Other needs included in the Transportation and Utilities category are funded mainly from local sources. All of the fully funded telecommunication needs in the current inventory are funded by cities; 77% of funding for other utilities needs is from counties. As noted earlier, state needs are not included in this analysis.

Local governments provide more than 60% of funding for 16 of the 20 types of infrastructure needs and more than 90% of the funding for ten other types of needs: other utilities, telecommunications, law enforcement, storm water, solid waste, fire protection, new schools, non K-12 education (which excludes higher education in this analysis), business district development, and other general government facilities. Roughly half of the funding for Health, Safety, and Welfare needs comes from city sources. Cities provide more than 93% of the funding for storm water and fire protection needs, but nearly 89% of the funding for solid waste and 74% of law enforcement needs in this category comes from county sources.

Cities also contribute heavily to meeting needs in the Recreation and Culture category (44%). Other sources, such as donations, make up more than 40% of the funding for recreation needs, much of which is the $10 million from the Memphis Zoo Society for a new hippopotamus exhibit. Infrastructure needs in the General Government category are largely dependent on city sources for funding. Although counties funded most local non K-12 education needs in the past, those needs are primarily funded by city sources in this inventory.

Table 16. Funding Source by Category and Type of Infrastructure for Fully Funded Needs [in millions]
Five-year Period July 2009 through June 2014

	State		Federal		City		County		Special District		Other		Total
Category and Project Type	**Amount**	**Percent**	**Amount**	**Percent**	**Amount**	**Percent**	**Amount**	**Percent**	**Amount**	**Percent**	**Amount**	**Percent**	**Amount**
Transportation & Utilities	**$3,167.4**	**47.0%**	**$2,299.4**	**34.10%**	**$527.8**	**7.8%**	**$720.5**	**10.7%**	**$8.6**	**0.1%**	**$11.5**	**0.2%**	**$6,735.2**
Transportation	3,166.7	51.1%	2,295.3	37.00%	412.9	6.7%	315.5	5.1%	0.4	0.0%	10.8	0.2%	6,201.6
Other Utilities	0.7	0.1%	4.1	0.80%	104.6	20.0%	405.0	77.4%	8.3	1.6%	0.6	0.1%	523.3
Telecommunications	0.0	0.0%	0.0	0.00%	10.3	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	10.3
Health, Safety and Welfare	**$87.5**	**4.0%**	**$194.6**	**8.80%**	**$1,105.4**	**50.1%**	**$641.1**	**29.1%**	**$164.3**	**7.5%**	**$12.4**	**0.6%**	**$2,205.4**
Water & Wastewater	85.5	5.1%	172.6	10.20%	772.3	45.8%	482.2	28.6%	162.5	9.6%	10.3	0.6%	1,685.3
Law Enforcement	0.0	0.0%	0.1	0.00%	49.1	25.8%	140.8	74.1%	0.0	0.0%	0.0	0.0%	190.0
Storm water	1.3	0.5%	4.4	1.80%	226.8	93.4%	9.9	4.1%	0.4	0.2%	0.0	0.0%	242.8
Solid Waste	0.1	1.9%	0.0	0.00%	0.6	9.1%	5.9	89.1%	0.0	0.0%	0.0	0.0%	6.6
Fire Protection	0.0	0.0%	1.7	2.90%	56.0	94.5%	0.0	0.0%	1.5	2.5%	0.1	0.2%	59.3
Public Health Facilities	0.5	7.5%	1.2	17.10%	0.7	10.4%	2.4	35.1%	0.0	0.0%	2.0	29.8%	6.7
Housing	0.0	0.0%	14.6	100.00%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	14.6
Education	**$2.6**	**0.6%**	**$0.8**	**0.20%**	**$75.5**	**17.8%**	**$345.7**	**81.4%**	**$0.0**	**0.0%**	**$0.0**	**0.0%**	**$424.6**
K-12 New School Construction	2.5	0.6%	0.8	0.20%	73.1	17.4%	344.4	81.9%	0.0	0.0%	0.0	0.0%	420.7
Non K-12 Education	0.0	0.0%	0.0	0.00%	2.4	66.7%	1.2	33.3%	0.0	0.0%	0.0	0.0%	3.6
School System-wide Need	0.1	40.0%	0.0	0.00%	0.0	0.0%	0.2	60.0%	0.0	0.0%	0.0	0.0%	0.3
Recreation and Culture	**$29.9**	**6.2%**	**$85.7**	**17.90%**	**$209.2**	**43.6%**	**$121.9**	**25.4%**	**$0.0**	**0.0%**	**$32.9**	**6.9%**	**$479.6**
Recreation	23.2	6.4%	58.5	16.10%	160.7	44.1%	96.6	26.5%	0.0	0.0%	25.3	6.9%	364.2
Libraries, Museums, & Historic Sites	1.0	2.4%	9.7	23.10%	3.3	7.8%	21.9	52.3%	0.0	0.0%	6.0	14.3%	42.0
Community Development	5.7	7.7%	17.5	23.90%	45.2	61.6%	3.4	4.6%	0.0	0.0%	1.6	2.2%	73.4
Economic Development	**$15.5**	**5.6%**	**$9.9**	**3.60%**	**$67.1**	**24.2%**	**$176.4**	**63.7%**	**$5.9**	**2.1%**	**$1.9**	**0.7%**	**$276.7**
Business District Development	9.9	4.1%	3.7	1.50%	62.0	25.6%	166.5	68.8%	0.0	0.0%	0.0	0.0%	242.1
Industrial Sites & Parks	5.6	16.2%	6.3	18.10%	5.0	14.6%	9.8	28.5%	5.9	17.1%	1.9	5.5%	34.6
General Government	**$11.9**	**8.9%**	**$3.1**	**2.30%**	**$80.6**	**59.9%**	**$35.2**	**26.2%**	**$0.0**	**0.0%**	**$3.7**	**2.7%**	**$134.5**
Public Buildings	11.8	9.0%	3.1	2.30%	77.3	59.0%	35.2	26.8%	0.0	0.0%	3.7	2.8%	131.1
Other Facilities	0.1	2.9%	0.0	0.00%	3.3	97.1%	0.0	0.0%	0.0	0.0%	0.0	0.0%	3.4
Grand Total	**$3,314.8**	**32.3%**	**$2,593.5**	**25.3%**	**$2,065.7**	**20.1%**	**$2,040.8**	**19.9%**	**$178.9**	**1.7%**	**$62.4**	**0.6%**	**$10,256.0**

Counties are the principal source of funds in the Economic Development and Education categories. They are responsible for slightly less than two-thirds (64%) of needs in the Economic Development category. Funding for industrial sites and parks was split among all sources but not evenly, with counties providing the largest contribution (29%). According to information provided by local officials, counties are the principal source of funds for fully funded needs in the Education category. Nearly 81% of the funding for education needs analyzed here comes from county sources. Although funds reported for education needs are mainly local, Tennessee's public schools benefit from capital outlay funds provided by the state through its Basic Education Program (BEP) formula. The BEP is the funding formula used to allocate state education dollars to Tennessee K-12 schools. Through this formula, the state contributed nearly $1.1 billion for school capital outlays over the last five fiscal years (2005-06 through 2009-10).

As noted in a 2003 report by the Tennessee Comptroller's Office of Education and Accountability (*Funding Public Schools: Is the BEP Adequate?*), the BEP does not restrict how funds for capital outlays may be spent; school systems are given flexibility to use those funds to meet various needs. In other words, BEP funds for school capital outlays are fungible. They are interchangeable with other sources of funds, including local sources. School systems may choose how to report their use. They are generally used for various classroom needs, including teacher salaries. This gives the appearance that the state makes little or no contribution to school infrastructure even though its contribution is considerable. According to TACIR's 2009 report on *Capital Expenditures for Public Schools*, the school systems spend just over half of total BEP funds contributed by the state on capital outlays. In 2003-04, BEP state capital outlay funding was nearly $201 million. That same year school systems spent $371 million on capital projects.

State government provides half the funding for infrastructure needs in non-metropolitan counties.

In general, local funding is more significant in metropolitan counties than in non-metropolitan counties.[7] This is not surprising since local dollars are the main source of funds for many types of infrastructure that are most typical of more heavily populated areas, including water and wastewater, other utilities, new public schools, storm water, fire protection, business district development, and law enforcement needs. Non-metropolitan counties are far more dependent on state funds than their metropolitan counterparts. State sources provide more than twice as large a share of the funding in non-metropolitan counties as in metropolitan counties (50% compared with less than 23%). And nearly three quarters (74%) of needs in non-metropolitan counties are funded from a combination of state and federal sources. Less than half (49%) of funds for public infrastructure in metropolitan counties comes from these two sources. In fact, federal sources top the list of individual sources this year in metropolitan counties. Unlike non-metropolitan counties, there is nearly an even distribution of funds across state, federal, city and county sources. Special districts and other sources trail all others; the two sources combined contribute about 2.5% to

Transportation and non K-12 make up the bulk of state-owned infrastructure in the inventory, accounting for $18 million of the $21 million total reported by state government.

Table 17. Funding Sources for Fully Funded Needs in Metropolitan and Non-Metropolitan Counties Five-year Period July 2009 through June 2014

	Type of County					
	Metropolitan		Non-Metropolitan		Total	
Funding Source	Amount [in millions]	Percent	Amount [in millions]	Percent	Amount [in millions]	Percent
State	$1,516.4	22.8%	$1,798.4	50.0%	$3,314.8	32.3%
Federal	1,747.5	26.2%	846.0	23.5%	2,593.5	25.3%
City	1,509.2	22.7%	556.4	15.5%	2,065.7	20.1%
County	1,717.0	25.8%	323.7	9.0%	2,040.8	19.9%
Special District	139.5	2.1%	39.4	1.1%	178.9	1.7%
Other	28.7	0.4%	33.7	0.9%	62.4	0.6%
Total*	**$6,658.3**	**100.0%**	**$3,597.7**	**100.0%**	**$10,256.0**	**100.0%**

*Excludes needs of state agencies, including higher education and existing public schools.

[7]Thirty-eight Tennessee counties are part of the federal Office of Management and Budget's Metropolitan Statistical Areas (MSAs). The general concept of an MSA is that of a large population nucleus together with adjacent communities that have a high degree of social and economic integration with that core based on commuting patterns. The U.S. Office of Management and Budget (OMB) defines MSAs for purposes of collecting, tabulating, and publishing federal data.

fully funded needs in metropolitan counties and 2.0% non-metropolitan counties (see Table 17). But as noted earlier, state funds reported in the inventory typically do not include BEP funds made available for school capital outlays. If those funds were reported as having been spent on school facilities, the state percentages here would be higher for both metropolitan and non-metropolitan counties.

SCHOOL INFRASTRUCTURE NEEDS CONTINUE TO DECLINE[8]

Needs for school infrastructure improvements, including new schools and improvements or additions to existing schools, have declined by more than $100 million for the third inventory in a row but are still estimated to cost nearly $3.5 billion. This year's $137 million decrease is a 3.8% decline. (See Table 18.) Of the three types of needs reported—new school construction, existing schools, and system-wide needs—only system-wide needs increased since the last report. This category is quite small compared to existing schools and new school construction needs. The relatively small increase of $7.7 million represents 41.5% growth, yet this is still below 2007 levels. Examples of system-wide needs include central offices, maintenance buildings, and bus garages. In the previous report, system-wide needs decreased. Figure 7 demonstrates the fluctuations in system-wide needs over the years.

Figure 7. System Wide Needs 2001 through 2009

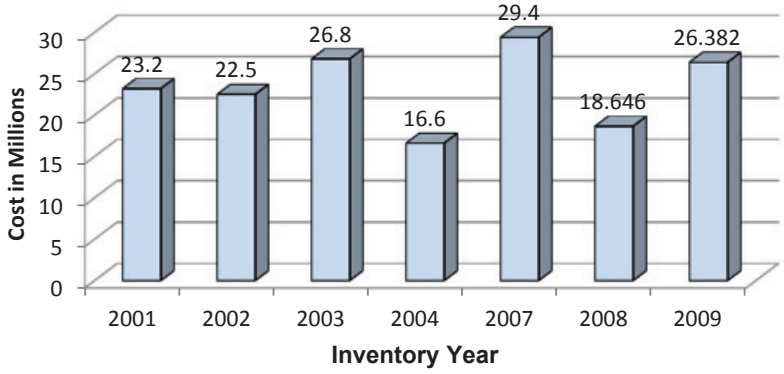


Table 18. Reported Cost of Public School Infrastructure Needs by Type of Need
Five-year Period July 2009 through June 2014

Type of Need	July 2008 Inventory	July 2009 Inventory	Difference	Percent Change
New School Construction	**$ 1,675,471,865**	**$ 1,548,048,421**	**$ (127,423,444)**	**-7.6%**
Enrollment Growth & Other New School Needs	1,647,897,787	1,531,762,524	(116,135,263)	-7.0%
EIA-related Needs	27,574,078	16,285,897	(11,288,181)	-40.9%
Existing Schools	**$ 1,923,171,646**	**$ 1,905,950,380**	**$ (17,221,266)**	**-0.9%**
Facility Component Upgrades	1,576,189,566	1,538,396,140	(37,793,426)	-2.4%
Technology	236,708,447	232,817,364	(3,891,083)	-1.6%
Federal Mandate	44,278,483	51,025,326	6,746,843	15.2%
EIA Mandates	48,377,600	45,659,000	(2,718,600)	-5.6%
Other State Mandates	17,617,550	38,052,550	20,435,000	116.0%
System-wide Needs	**$ 18,646,000**	**$ 26,382,000**	**$ 7,736,000**	**41.5%**
Statewide Total	**$ 3,617,289,511**	**$ 3,480,380,801**	**$ (136,908,710)**	**-3.8%**

[8]This section of the report covers only local public school systems. It does not include the state's special schools, and therefore, totals presented here will not match totals elsewhere in the report.

Mandate needs increased slightly from the previous inventory.

Total mandate needs increased by 10% from the previous year. The only type of state mandate that decreased between the July 2008 and July 2009 inventories was the Education Improvement Act (EIA). Fire code upgrade needs more than doubled. Most of the $20 million increase ($16 million) is for fire code compliance at Science Hill High School in Johnson City. Without that project, total needs would have decreased by 1.7%.

Table 19. Total Reported Cost of Facilities Mandates at Public Schools
Five-year Period July 2009 through June 2014

Mandates	July 2008 Mandate Cost [in millions]	July 2009 Mandate Cost [in millions]	Difference [in millions]
State Mandate Total	**$ 93.6**	**$ 100.0**	**$ 6.4**
State EIA (New & Existing Schools)	76.0	61.9	(14.0)
State Fire Codes	17.6	38.1	20.4
Federal Mandate Total	**$ 43.8**	**$ 51.0**	**$ 7.3**
Asbestos	10.8	12.4	1.6
Americans with Disabilities Act	32.9	38.6	5.7
Underground Storage Tanks	0	0	0
Lead	0.1	0.1	0
Mandate Total	**$ 137.3**	**$ 151.0**	**$ 13.7**

Enrollment growth remains slow.

Enrollment growth has been relatively flat statewide for several years, while the number of new public schools has steadily increased (see Figures 8 and 9). As shown in Figure 8, the number of public schools continued to grow. In some years it has grown by as many as 24 or as little as three. The largest increase in the number of schools occurred between 2001 and 2002, which was the year the class-size mandate of the EIA went into effect. The smallest occurred between 2007 and 2008. The number of new schools has increased by 16 in the current inventory. This coincides with the $127 million decrease in needs reported for new schools. It is reasonable to expect the number of new schools needs to continue to decline in future inventories unless enrollment growth returns to pre-recession levels.

Figure 8. Number of Public Schools
2001 through 2009

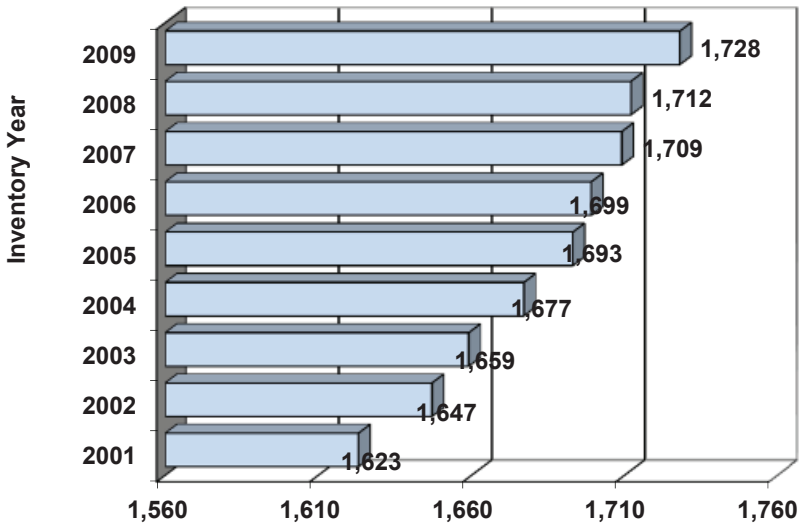
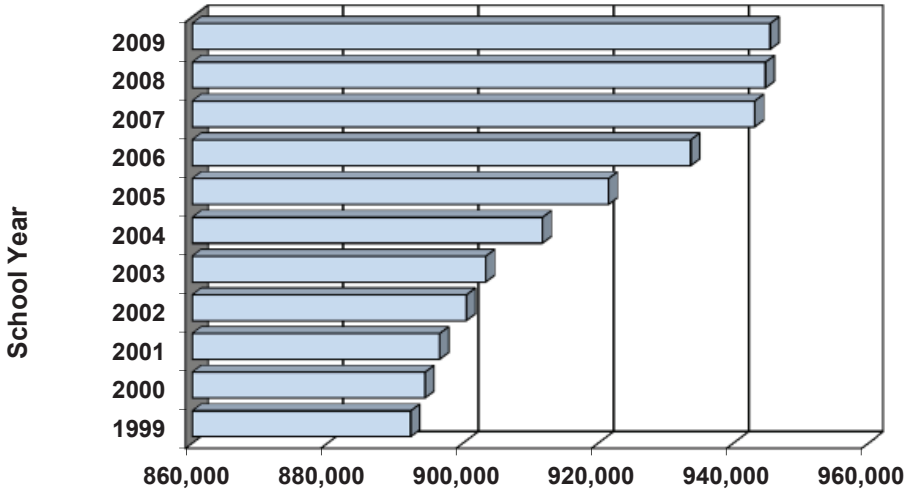


Figure 9. Number of Students in Public Schools
2001 through 2009



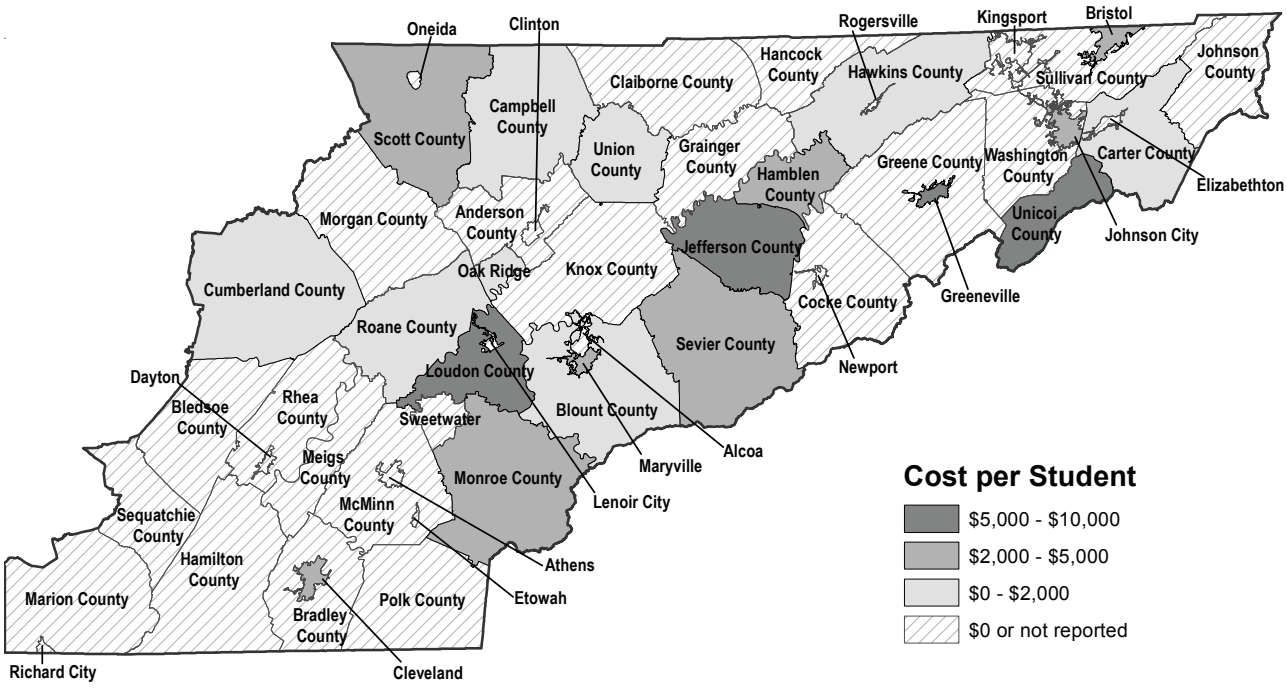
New school construction needs decline for the second year in a row.

In this inventory and in the previous inventory, the decline in overall public school infrastructure needs is mainly new school construction. However, the decrease between the 2006 and 2007 inventories was directly related to the conclusion of a large technology initiative in Memphis. New school construction needs increased during that period ($183 million), but have declined steadily since then.

Based on information reported in the current inventory, new schools cost on average about $18 million, but estimated costs vary considerably depending on the size of the school, the population it serves, and its location. The most expensive new school in the current inventory is to replace Lebanon High School in Wilson County, which is estimated to cost $69 million. Because new schools are expensive, they can cost a lot per student, especially when the number of students is proportionally small. In the current inventory, three school systems report new school needs of more than of $10,000 per student—Coffee County, DeKalb County, and Pickett County—based on comparing the total need in each system with the total number of students per system. To put this in perspective, the state funding formula figures for school construction equal $12,307 per student.

New School Needs in East Tennessee. While 33 out of the 53 systems in East Tennessee reported no new school construction needs, four have needs that are expected to cost more than $5,000 per student: Greeneville, Jefferson County, Loudon County, and Unicoi County (see Figure 10). Greeneville and Unicoi County each have less than 3,000 students. Each system needs a new middle school. Loudon and Jefferson counties both have between 5,000 and 8,000 students with $40 million in needs reported.

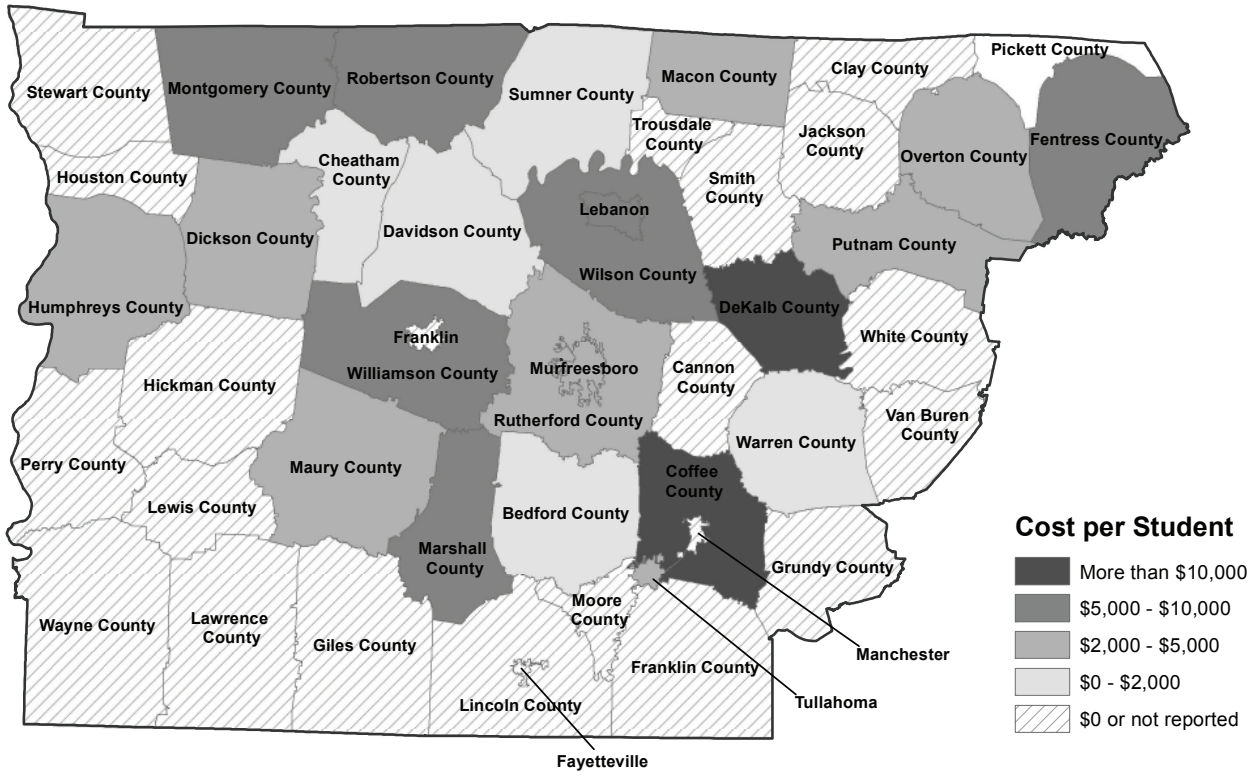
Figure 10. East Tennessee New School Construction Needs—Cost per Student
Five-year Period July 2009 through June 2014



New School Needs in Middle Tennessee. The three systems reporting the highest cost per student for new schools (Coffee County, DeKalb County, and Pickett County) are all located in Middle Tennessee (see Figure 11). Coffee County needs $57 million for two new schools, which includes $45 million for a high school that has been in the conceptual phase for six years. DeKalb County needs $42 million for a new school that remains in the inventory after three years. With only 682 students, Pickett County is one of the smallest systems. Because it is so small, the relatively modest cost it reports for the high school it has needed since 2005 ($15 million) results in the largest cost per student reported by any school system in the state ($22,556).

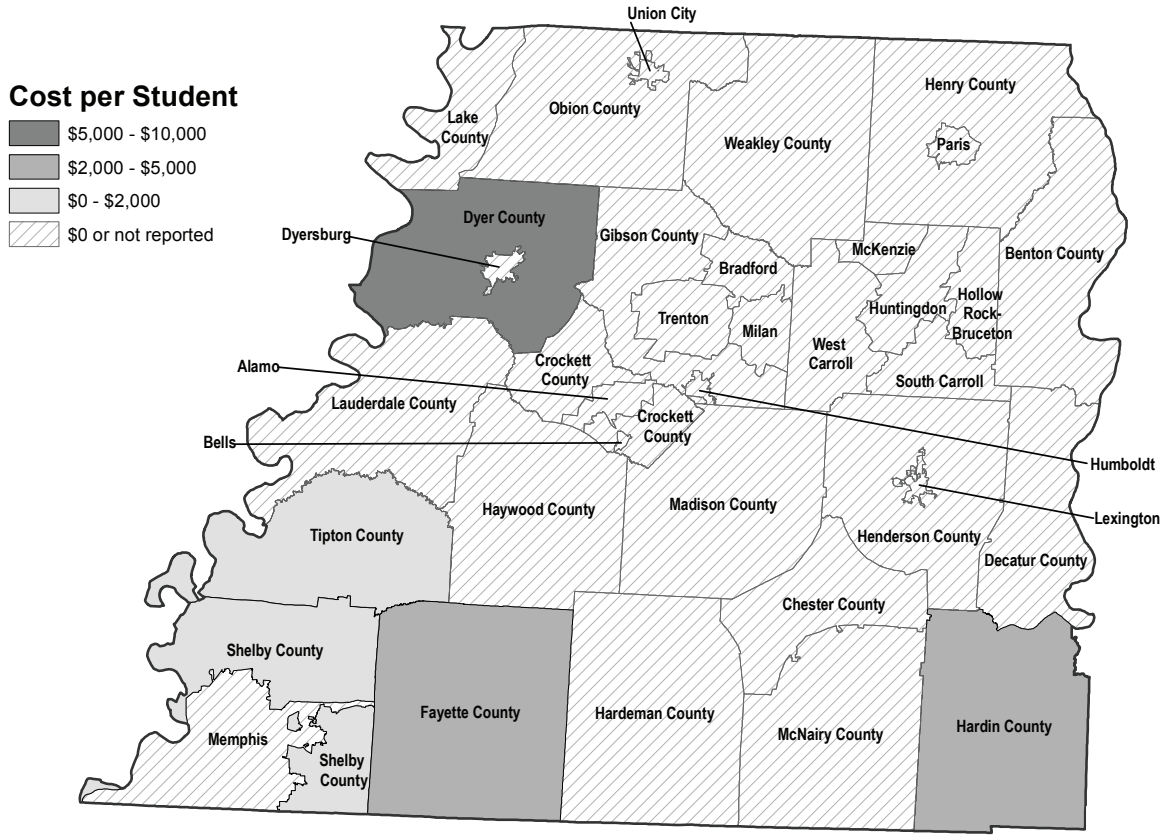
In terms of total estimated costs for new schools, the six highest are found in Middle Tennessee: Williamson County, Montgomery County, Wilson County, Rutherford County, Coffee County, and Robertson County. Needs in Williamson County are the highest by far with $275 million reported. With the exception of Coffee County, these systems have been among the fastest growing systems over the past decade. All rank in the top 15 for enrollment growth. Rutherford, Williamson, and Montgomery counties rank 1st, 2nd and 3rd in the state for enrollment growth; Wilson is 6th, and Robertson is 14th. Coffee County ranks 36th.

Figure 11. Middle Tennessee New School Construction Needs—Cost per Student
Five-year Period July 2009 through June 2014



New School Needs in West Tennessee. Dyer County is the only system in West Tennessee with needs greater than $5,000 per student (see Figure 12). The total cost for two replacement schools is $18.2 million or $5,292 per student. Only four other West Tennessee school systems need new schools: Fayette County, Hardin County, Shelby County, and Tipton County. Fayette County and Hardin County are similar in total need and number of students served. Needs for each total just over $3,000 per student. The Hardin County school has been in the inventory for seven years; the school in Fayette County has been reported for three years. Both remain conceptual. Shelby County reports a need for $40 million to replace three schools, and Tipton County needs $11 million to build a new school in Munford.

Figure 12. West Tennessee New School Construction Needs—Cost per Student*
Five-year Period July 2009 through June 2014



***There are 136 public school systems in Tennessee. The Carroll County system was removed from all statistical analyses because it does not serve elementary school students, and therefore, is not comparable to the other 135 systems.**

Most of Tennessee's public schools are in good or excellent condition, and needs have declined slightly.

Nearly equal to new school construction costs, the estimate for upgrading, replacing and adding to existing schools is around $1.5 billion. Of this amount, $376 million is for additions to accommodate enrollment growth. The average cost to upgrade all components at all schools to good or better condition is $1,627 per student. Twenty-five school systems have a cost per student of $100 or less, including 19 that reported no upgrade needs. This includes the total estimated costs of putting individual classrooms, as well as entire schools, in good condition. The inventory uses a rating scale that is carefully defined, but rating individual schools and school components is left to the judgment of local officials. The vast majority of officials in Tennessee's public school systems rate the condition of their buildings as good or excellent. But even schools in overall excellent condition may have individual components, such as classrooms and libraries, that need to be upgraded or replaced periodically.

Ninety-three percent of Tennessee's 135 full-service school systems rate at least three-fourths of their school buildings as being in good or excellent condition (see Table 20). But Bristol, Coffee County, and Grundy County consider less than half of their school buildings to be in good or excellent condition. Coffee and Grundy counties both report five out of eight schools (62.5%) in less than good condition. Grundy County officials estimate, for their five schools, a need of $6.7 million

Table 20. Number and Percent of School Systems in Good or Excellent Condition

Five-year Period July 2009 through June 2014

Percent of Schools Good or Excellent	Number of School Systems	Percent of School Systems
None	0	0.0%
Less than 25%	0	0.0%
25 to 50%	3	2.2%
50 to 75%	6	4.4%
75 to 100%	35	25.9%
100%	91	67.4%
Total*	**135**	**100.0%**

*There are 136 public school systems in Tennessee. The Carroll County system was removed from all statistical analyses because it does not serve elementary school students, and therefore, is not comparable to the other 135 systems.

The condition, location and nature of school infrastructure affect access and quality of education:

- The closer a school is to children's homes; the more likely they are to attend.
- Where the quality of infrastructure is improved, enrolment and completion rates are also improved and there is less teacher absenteeism.
- Where the condition of school facilities is improved, learning outcomes are also improved.

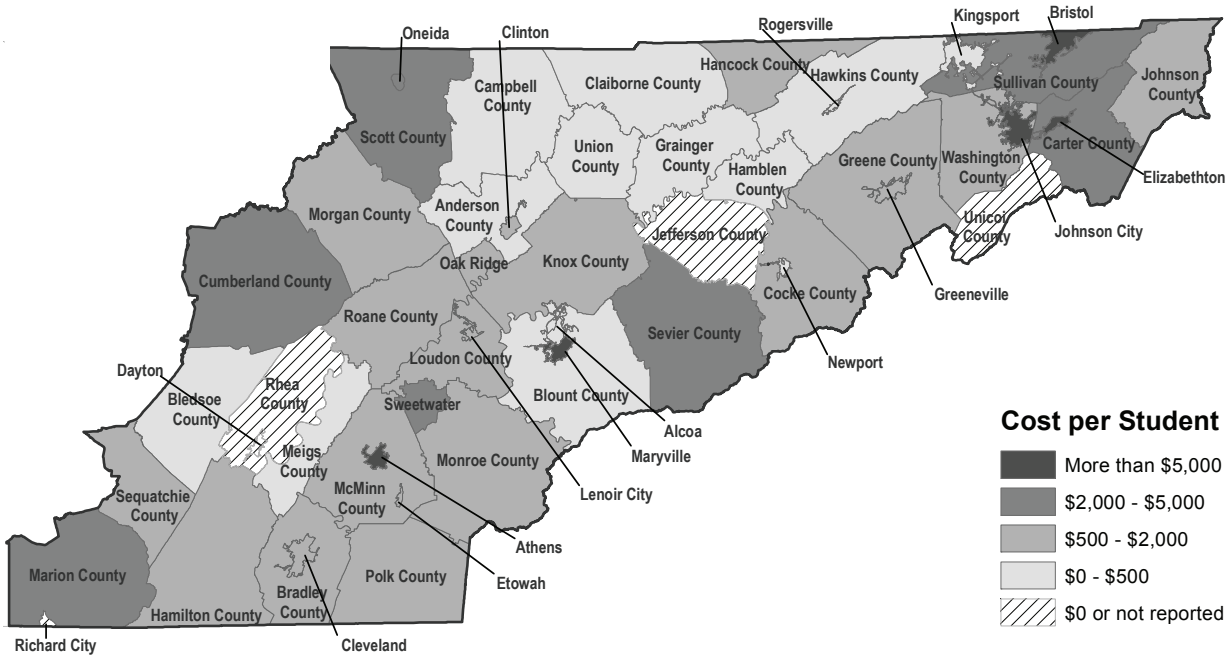
Delivering Cost Effective and Sustainable School Infrastructure. Roger Bonner, P K Das, Ripin Kalra, Bill Leathes, and Nigel Wakeham. http://www.dfid.gov.uk/Documents/publications1/del-cost-eff-sust-sch-infra.pdf.

to bring them up to good condition. Coffee County's estimate is $22.1 million. Bristol reports an even higher percentage of schools in less than good condition (75%). Bristol also reports the highest cost per student to put all of their schools in good condition ($13,539). Two schools in Bristol have upgrade or replacement costs greater than $10 million: $23 million is needed at Vance Middle School to replace and upgrade components in fair condition; nearly $11 million is needed at Anderson Elementary to upgrade classrooms and replace other components, including the heating and cooling system.

Ten school systems estimate that they need more than $5,000 per student at existing school building. Five of those systems report all schools in good or excellent condition. (The needs of these ten systems are described in detail further in this section.) Their cost per student may be high because the number of students is relatively small compared with the facility improvement needs reported.

School Upgrade Needs in East Tennessee. Five systems in East Tennessee need more than $5,000 per student: Athens, Bristol, Elizabethton, Johnson City, and Maryville (see Figure 13). Johnson City and Maryville each report one school with extremely high needs. Science Hill High School, in Johnson City, needs $51 million to upgrade or replace components in less than good condition. By far, this school has the highest total cost at $67.5 million, including $16 million for fire codes and $125,000 for technology improvements. The second highest cost was reported for Maryville High School, which needs $47.7 million for additions to the existing facility and $350,000 for technology. Even though Maryville High School is rated in good condition, the city saw a 20% increase in the number of students in their system

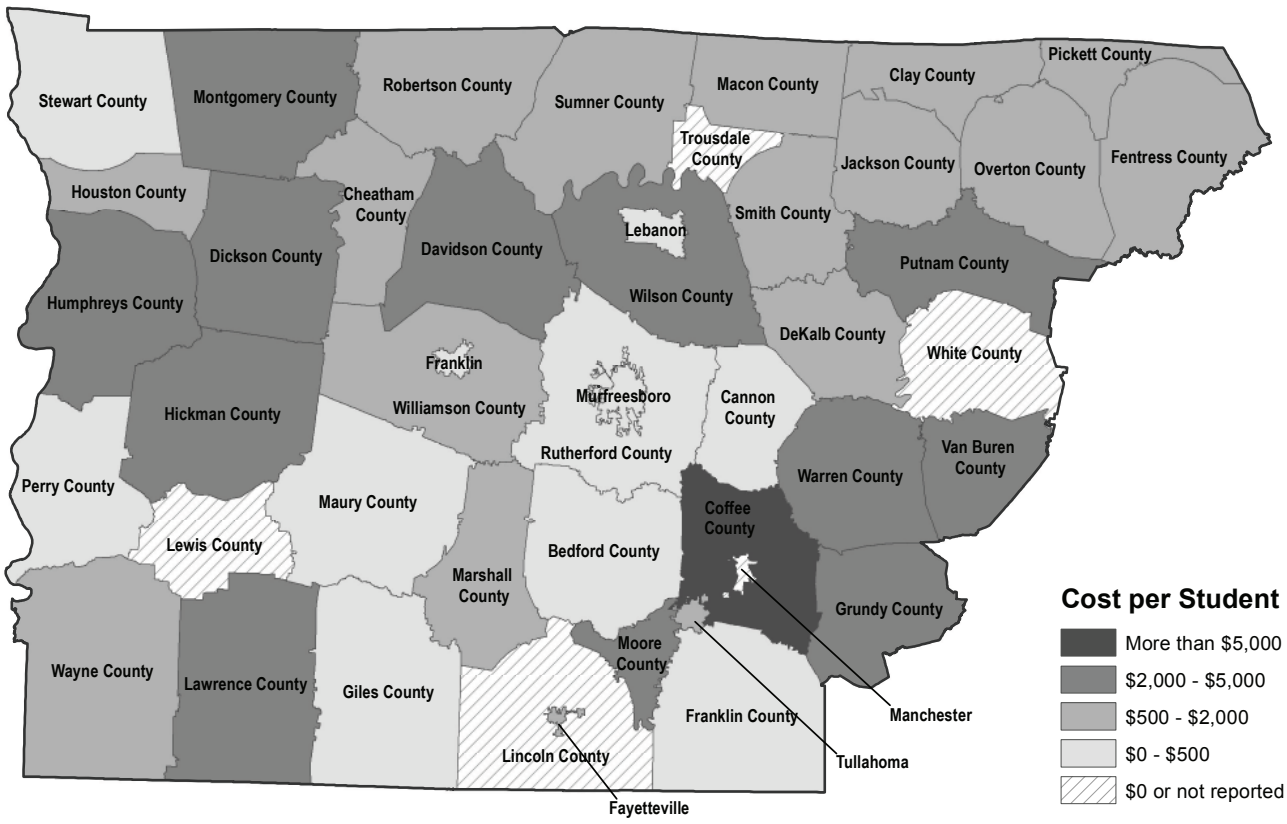
Figure 13. East Tennessee Cost per Student to Upgrade to Good or Excellent Condition
Five-year Period July 2009 through June 2014



over the past decade, which created a need for additions to the existing school. Athens is another system in East Tennessee with all of its schools in good or excellent condition but reports that it needs $9.7 million for improvements at its six schools. Nearly half ($4.5 million) is for additions; the remainder is for upgrading and replacing individual classrooms. Likewise, Elizabethton reports all six schools in good or excellent condition but needs $8.4 million to upgrade or replace components at five schools and $5.4 million for additions to four schools.

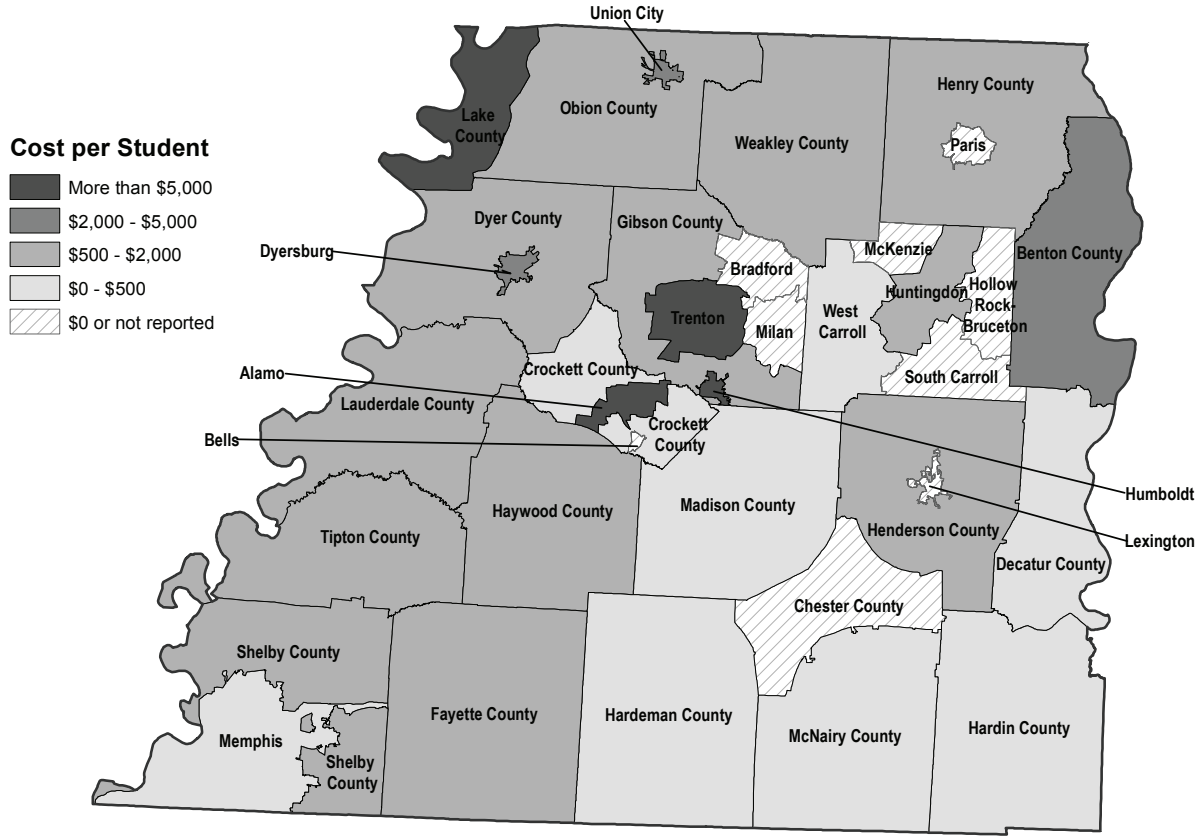
School Upgrade Needs in Middle Tennessee. Coffee County is the only school system in Middle Tennessee that needs more than $5,000 per student (see Figure 14). Coffee County's new school needs are also among the highest in the state; in total they report a cost of $18,115 per student for all needs. Five other systems—Davidson County, Van Buren County, Putnam County, Humphreys County and Wilson County—need between $4,000 and $5,000 per student. With only two schools, Van Buren County is an example of a small system (782 students) with relatively small needs ($3.3 million) that translate into a high cost per student ($4,220 per student).

Figure 14. Middle Tennessee Cost per Student to Upgrade to Good or Excellent Condition
Five-year Period July 2009 through June 2014



School Upgrade Needs in West Tennessee. Four school systems in West Tennessee—Lake County, Alamo, Humboldt and Trenton—need more than $5,000 per student to improve existing school facilities (see Figure 15). Lake County is another example of a small system with a high cost per student. While the total amounts of improvements there, at $11.4 million, are among the lowest in the state, the amount needed per student, at $12,675, is the second highest in the state. All three schools in Lake County report a need to upgrade mainly classrooms, but the entire high school needs to be upgraded and $6.9 million is needed at one elementary school. Memphis, the state's largest school system, needs only $391 per student. With more than 100,000 students, it is one of eight systems in West Tennessee with a cost less than $500 per student. Alamo and Trenton both rate all of their school buildings good or excellent but estimate needs of more than $5,000 per student. Alamo needs $7 million in additions to its one elementary school to accommodate population growth. Trenton needs nearly $8 million at its three schools for a combination of needs, including a new roof, additional classrooms for pre-k and other grades, a new cafeteria, and new administrative offices. These two systems have small student populations, which causes their relatively small needs to have a large impact.

Figure 15. West Tennessee Cost per Student to Upgrade to Good or Excellent Condition
Five-year Period July 2009 through June 2014



***There are 136 public school systems in Tennessee. The Carroll County system was removed from all statistical analyses because it does not serve elementary school students, and therefore, is not comparable to the other 135 systems.**

The need for portable classrooms is decreasing.

Although portable classrooms can provide a temporary solution to overcrowding or an alternative to substandard permanent classrooms, they are generally perceived as less desirable than permanent buildings. Although portable classrooms may offer more privacy, they may also pose safety and security challenges for teachers and students, and they may be less energy efficient.

Table 21. Number of School Systems by Range of Percent of Classrooms In Portable Buildings
Five-year Period July 2009 through June 2014

Percent of Classrooms In Portables	Number of School Systems	Percent of School Systems
None	46	34.1%
Less than 5%	66	48.9%
5% to 10%	19	14.1%
10% to 15%	4	3.0%
More than 15%	0	0.0%
Total*	**135**	**100.0%**

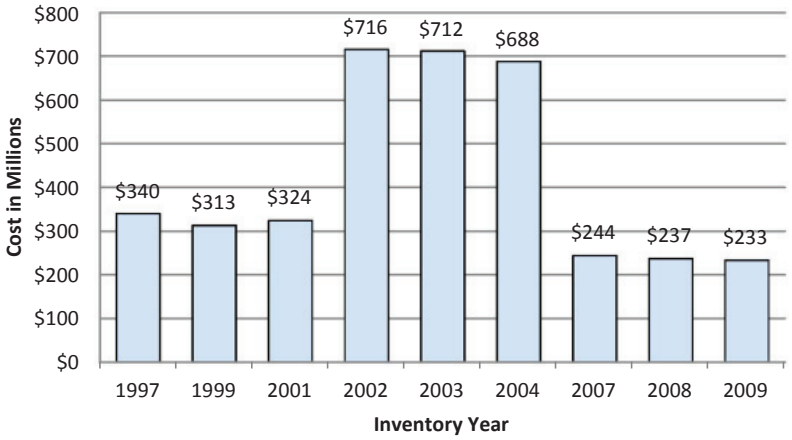
*There are 136 public school systems in Tennessee. The Carroll County system was removed from all statistical analyses because it does not serve elementary school students, and therefore, is not comparable to the other 135 systems.

Two-thirds of Tennessee's public school systems and about one-third of its 1,728 schools have portable or temporary classrooms. Statewide, the number has decreased only slightly since the last inventory—from 2,308 to 2,296 classrooms. This is not surprising as enrollment growth continues to slow. Only four school systems (Bradford Special School District, Cannon County, Clay County and Jefferson County) have more than 10% of their classes in portables (see Table 21). None of these school systems has significant enrollment growth.

Technology needs continue to decline, though significant needs remain.

Roughly $233 million in current school technology needs have been reported, representing a $4 million decrease since last year. This is the lowest amount reported since the inventory began, though considerable needs remain (see Figure 16). The 3-year peak from 2002 to 2004 was caused by a technology initiative in Memphis. No major change in statewide technology needs has occurred since that initiative was completed.

Figure 16. Estimated Cost of Technology Needs at Existing Public Schools
1997 through 2009



Technology needs may not be reported as specific, individual projects but as an overall figure. Moreover, school systems establish replacement cycles for things like computers, so they may be recurring needs that remain in the inventory from year to year. These things can make it impossible to determine whether a specific technology need is being met. Technology needs like T1 lines, 21st Century Classrooms, networking, and security systems tend to be one time needs.

Forty-one systems now report that they have no need to upgrade technology in their schools. This is a sharp increase over the 15 systems that reported no needs in July 2000. An additional 45 need less than $100 per student to meet their technology needs (see Table 22). Ten systems now report a need greater than $400 per student. Of these, four systems—Dyersburg, Memphis, Richard City, and Scott County—all report technology needs that exceed $1,000 per student.

Table 22. Number of School Systems by Range of Technology Costs per Student

Five-year Period July 2009 through June 2014

Technology Cost per Student	Number of School Systems	Percent of School Systems
None	41	30.4%
Less than $100	45	33.3%
$100 to $200	23	17.0%
$200 to $300	10	7.4%
$300 to $400	6	4.4%
More than $400	10	7.4%
Total*	**135**	**100.0%**

*There are 136 public school systems in Tennessee. The Carroll County system was removed from all statistical analyses because it does not serve elementary school students, and therefore, is not comparable to the other 135 systems.

Building Tennessee's Tomorrow:

Anticipating the State's Infrastructure Needs

July 2009 through June 2014

REPORTED INFRASTRUCTURE NEEDS BY COUNTY[9]

One of the difficulties of comparing infrastructure needs across counties is the lack of information about existing infrastructure. No such data is compiled, and without it, it is hard to evaluate the reasonableness of reported needs. Needs in a county could be high because the area has historically had insufficient infrastructure or low because they have been able to meet their needs in the past. Both situations would be reasonable, but reported needs could also be low because local officials do not wish to report needs they do not expect to be met, or they could be high because the items reported are desirable but not necessary.

With each inventory, TACIR staff assesses the potential for over- or under-reporting by comparing reported needs to indicators of need, such as county size and population, and to factors related to ability to fund infrastructure, such as taxable property and sales. With state and regional projects factored out, the infrastructure needs reported for all counties across the state have a total cost estimated by local officials of nearly $23 billion.

Since last year, total infrastructure needs decreased by approximately $1.3 billion—the largest decrease since the inventory began in 1997. Most of the decrease was in the ten counties with the greatest needs in Table 16, which is not surprising because they comprise more than 50% of all the needs reported. The total decrease within these ten is approximately $925 million. Half of the decrease ($500 million) was in Shelby County. While most of the top ten counties in Table 16 experienced significant reductions in needs, Hamilton and Sevier counties each had increases of approximately $150 million.

Factors influencing relative levels of infrastructure investment include

- demographic factors (population, population growth, migration, fertility and morbidity),
- composition of a region population,
- geographic factors,
- technological factors,
- institutional regulatory settings, and
- improved efficiency of service delivery and investment outcomes.

Public Infrastructure Financing: An International Perspective. Chris Chan, Danny Forwood, Heather Roper and Chris Sayers , 2009. http://www.pc.gov.au/__data/assets/pdf_file/0004/86935/05-chapter3.pdf

[9]For information on each county, see Appendix D.

The largest infrastructure needs are in counties with the largest population–smallest reported needs are not so easily explained.

Not surprisingly, the greatest infrastructure needs in terms of total estimated costs were reported for counties with the largest populations. The rankings of most of the top ten counties are explained by their populations, population densities or population gains. Blount and Sullivan counties are the only ones in the top ten for population that are not also in the top ten for greatest total needs; Wilson and Sevier counties are the only ones among the top ten for reported needs that are not among the ten largest (see Tables 23 and 24). The relationship between population and infrastructure needs is not as strong for the bottom ten counties. Only three of the ten smallest counties (Trousdale, Moore and Lake) are among the bottom ten for total reported need.

All the counties that were in the top ten for reported needs last year are still in the top ten this year. Five of the ten counties reporting the greatest total needs—Davidson, Shelby, Hamilton, Knox, Rutherford, and Montgomery—are in that group for the seventh consecutive year. Sumner dropped from the group after being included for six consecutive years. Other counties that rank in the top ten have done so for several consecutive years as well: Williamson (six years), Sevier (four years), and Wilson (three years). For the six previous inventories that analyzed county-level information, the ten counties with the greatest needs have consistently had more than 49% of the state's total population and anywhere between 55% and 63% of the total infrastructure needs. The percentages are comparable this year.

The pattern is not as strong for the bottom ten counties, with various counties appearing on that list in each report comparing counties. Lake County appeared on the list of lowest needs seven years in a row; Crockett County has been among the ten with the least needs in the last six reports, including this one. Lewis, Sequatchie, and Weakley are among the bottom ten for total reported need for the fourth time, but none of these had appeared on that list fourth times in a row. Sequatchie is reporting the least infrastructure needs for the first time since making the initial list in the 2001 infrastructure needs report.

Table 23. Largest and Smallest Reported Infrastructure Needs by County
Excluding Projects Identified as Regional
Five-year Period July 2009 through June 2014

Rank	County	Total Reported Cost	Percent of Total	2009 Population	Percent of Total	Cost per Capita
1	Davidson	$3,489,668,075	15.3%	635,710	10.1%	$5,489
2	Shelby	2,743,480,208	12.0%	920,232	14.6%	2,981
3	Hamilton	1,019,813,966	4.5%	337,175	5.4%	3,025
4	Williamson	916,726,876	4.0%	176,838	2.8%	5,184
5	Rutherford	903,094,476	3.9%	257,048	4.1%	3,513
6	Knox	845,504,776	3.7%	435,725	6.9%	1,940
7	Sevier	733,308,495	3.2%	86,243	1.4%	8,503
8	Montgomery	730,090,551	3.2%	160,978	2.6%	4,535
9	Wilson	596,498,448	2.6%	112,377	1.8%	5,308
10	Washington	558,261,938	2.4%	120,598	1.9%	4,629
	Top Ten Subtotal	**$12,536,447,809**	**54.8%**	**3,242,924**	**51.5%**	**$3,866**
	All Others	**$10,141,431,697**	**44.4%**	**2,897,411**	**46.0%**	**$3,500**
86	Trousdale	23,931,577	0.1%	7,922	0.1%	3,021
87	Chester	23,414,711	0.1%	16,312	0.3%	1,435
88	Weakley	22,143,088	0.1%	33,459	0.5%	662
89	Decatur	21,328,530	0.1%	11,525	0.2%	1,851
90	Lewis	18,974,646	0.1%	11,521	0.2%	1,647
91	Moore	16,698,326	0.1%	6,096	0.1%	2,739
92	Lake	15,422,056	0.1%	7,303	0.1%	2,112
93	Crockett	15,399,120	0.1%	14,492	0.2%	1,063
94	Lincoln	15,194,756	0.1%	33,374	0.5%	455
95	Sequatchie	13,489,410	0.1%	13,915	0.2%	969
	Bottom Ten Subtotal	**85,996,220**	**0.8%**	**155,919**	**2.5%**	**$1,193**
	Grand Total	**$22,863,875,726**	**100.0%**	**6,296,254**	**100.0%**	**$3,631**

The estimated cost of infrastructure needs for the bottom ten counties has grown from 0.5% in the 2001 infrastructure report to 0.8% in this report, while their population has remained stable at between 2.5% and 2.8% throughout all reports. Consequently, the group's reported needs per capita have been increasing and have more than doubled since the 2001 report.

The population rankings have changed little since the TACIR staff began making these county comparisons in 2000. The ten smallest counties are still the smallest, and nine of the ten largest counties in 2000 were still in the top ten in 2009. Washington County was 10th in 2000 and now ranks 11th; Blount was 11th in 2000 and now ranks 10th. The percentage of the population concentrated in the ten largest counties has remained almost the same across the previous six reports, fluctuating right around 52.5% across all six reports making these comparisons. There is a slightly increase in this report (from 52.5% to 53.4%).

Interestingly, while the bottom ten counties in the population comparison table (Table 24) remained exactly the same in all seven reports, and their percentage of the total population increased only slightly between 2000 and 2009 (from 1.1% of the state's population to 1.2%), their share of the total cost of needed infrastructure improvements varied from 1.0% of the total to 1.6%. The pattern among these counties over the seven reports again illustrates the disproportionate effect that even relatively small projects can have in the very smallest counties.

Table 24. Infrastructure Needs Reported by Most and Least Populous Counties
Excluding Projects Identified as Regional
Five-year Period July 2009 through June 2014

Rank	County	2009 Population	Percent of Total	Total Reported Cost	Percent of Total
1	Shelby	920,232	14.6%	$2,743,480,208	12.0%
2	Davidson	635,710	10.1%	3,489,668,075	15.3%
3	Knox	435,725	6.9%	845,504,776	3.7%
4	Hamilton	337,175	5.4%	1,019,813,966	4.5%
5	Rutherford	257,048	4.1%	903,094,476	3.9%
6	Williamson	176,838	2.8%	916,726,876	4.0%
7	Montgomery	160,978	2.6%	730,090,551	3.2%
8	Sumner	158,759	2.5%	498,320,765	2.2%
9	Sullivan	154,552	2.5%	398,085,742	1.7%
10	Blount	122,784	2.0%	336,169,905	1.5%
	Top Ten Subtotal	**3,359,801**	**53.4%**	**$11,880,955,340**	**52.0%**
	All Others	**2,863,531**	**45.5%**	**$10,611,139,273**	**46.4%**
86	Jackson	10,875	0.2%	46,563,313	0.2%
87	Houston	8,154	0.1%	38,062,715	0.2%
88	Trousdale	7,922	0.1%	23,931,577	0.1%
89	Clay	7,895	0.1%	75,806,500	0.3%
90	Perry	7,826	0.1%	24,610,127	0.1%
91	Lake	7,303	0.1%	15,422,056	0.1%
92	Hancock	6,588	0.1%	25,279,999	0.1%
93	Moore	6,096	0.1%	16,698,326	0.1%
94	Van Buren	5,480	0.1%	66,835,000	0.3%
95	Pickett	4,783	0.1%	38,571,500	0.2%
	Bottom Ten Subtotal	**72,922**	**1.2%**	**$371,781,113**	**1.6%**
	Grand Total	**6,296,254**	**100.0%**	**$22,863,875,726**	**100.0%**

Population gains are more closely related to infrastructure needs than population growth rates.

Eight of the ten counties with the largest total infrastructure needs in Table 23 are also among the ten with the largest population gains between 2000 and 2009 (Table 25). Only two of the counties with the smallest needs in Table 23 are among the ten with greatest population losses[10] in Table 25. A total

[10]All bottom ten counties lost population during that period.

of 20 counties lost population during the period. The relationship between infrastructure needs and population gain is somewhat stronger than the relationship between needs and total population for the top ten, but somewhat weaker for the bottom ten.

Five of the ten counties with the greatest infrastructure needs are in Middle Tennessee: Davidson, Williamson, Rutherford, Wilson, and Montgomery. (Sumner County no longer appears on the list.) All five counties are among the top ten for population gain (see Table 25), and two (Davidson and Rutherford) are also among the ten most densely populated counties (see Table 27). Four of the five—Davidson, Williamson, Rutherford, and Montgomery—are among the ten largest for population (see Table 24). And three—Rutherford, Williamson, and Wilson—are among the ten with the fastest growth rates (see Table 26). TACIR's statistical analysis of all 95 counties indicates that all of these populations measures except growth rates are closely related to infrastructure needs.

Table 25. Infrastructure Needs for the Ten Counties with the Largest and Smallest Population Gains
Excluding Projects Identified as Regional
Five-year Period July 2009 through June 2014

Rank	County	Population 2000	Population 2009	Gain (Loss)	Total Reported Cost
1	Rutherford	182,023	257,048	75,025	$903,094,476
2	Davidson	569,891	635,710	65,819	3,489,668,075
3	Knox	382,032	435,725	53,693	845,504,776
4	Williamson	126,638	176,838	50,200	916,726,876
5	Hamilton	307,896	337,175	29,279	1,019,813,966
6	Sumner	130,449	158,759	28,310	498,320,765
7	Montgomery	134,768	160,978	26,210	730,090,551
8	Wilson	88,809	112,377	23,568	596,498,448
9	Shelby	897,472	920,232	22,760	2,743,480,208
10	Blount	105,823	122,784	16,961	336,169,905
	Top Ten Subtotal	**2,925,801**	**3,317,626**	**391,825**	**$12,079,368,046**
	All Others	**2,544,054**	**2,767,235**	**223,181**	**$10,068,745,640**
86	Polk	16,050	15,648	-402	77,823,934
87	Hardeman	28,105	27,613	-492	94,730,886
88	Benton	16,537	16,025	-512	41,069,425
89	Lauderdale	27,101	26,471	-630	65,192,386
90	Lake	7,954	7,303	-651	15,422,056
91	Haywood	19,797	18,881	-916	122,322,008
92	Carroll	29,475	28,517	-958	43,922,361
93	Morgan	19,757	18,738	-1,019	116,567,948
94	Obion	32,450	31,431	-1,019	47,252,766
95	Weakley	34,895	33,459	-1,436	22,143,088
	Bottom Ten Subtotal	**219,428**	**211,393**	**-8,035**	**$715,762,040**
	Grand Total	**5,689,283**	**6,296,254**	**606,971**	**$22,863,875,726**

A comparison of Tables 26 and 23 demonstrates that a county's rate of growth is a poor predictor of infrastructure needs. Only four of the fastest growing counties are in the top ten for infrastructure needs: Rutherford, Williamson, Wilson, and Sevier. All but Sevier County appear in the top ten for population gain shown in Table 25, but so do five others from the top infrastructure needs list. Among the bottom ten in Table 26, only two counties—Weakley and Lake—also appear in the bottom ten for total reported infrastructure needs in Table 23. These two counties also appear among the bottom ten for population gain in Table 25. All of the slowest growing counties shown in Table 26 consistently declined in population between 2000 and 2009.

Table 26. Infrastructure Needs Reported for the Ten Fastest and Slowest Growing Counties
Excluding Projects Identified as Regional
Five-year Period July 2009 through June 2014

Rank	County	Population 2000	Population 2009	Growth Rate	Total Reported Cost
1	Rutherford	182,023	257,048	41.2%	$903,094,476
2	Williamson	126,638	176,838	39.6%	916,726,876
3	Fayette	28,806	38,785	34.6%	130,297,760
4	Wilson	88,809	112,377	26.5%	596,498,448
5	Sequatchie	11,370	13,915	22.4%	13,489,410
6	Robertson	54,433	66,581	22.3%	229,986,928
7	Bedford	37,586	45,947	22.2%	145,626,430
8	Sumner	130,449	158,759	21.7%	498,320,765
9	Maury	69,498	84,302	21.3%	136,317,298
10	Sevier	71,170	86,243	21.2%	733,308,495
	Top Ten Subtotal	**800,782**	**1,040,795**	**30.0%**	**$4,303,666,886**
	All Others	**4,699,855**	**5,074,086**	**8.0%**	**$18,009,833,755**
86	Polk	16,050	15,648	-2.5%	77,823,934
87	Hancock	6,786	6,588	-2.9%	25,279,999
88	Benton	16,537	16,025	-3.1%	41,069,425
89	Obion	32,450	31,431	-3.1%	47,252,766
90	Carroll	29,475	28,517	-3.3%	43,922,361
91	Pickett	4,945	4,783	-3.3%	38,571,500
92	Weakley	34,895	33,459	-4.1%	22,143,088
93	Haywood	19,797	18,881	-4.6%	122,322,008
94	Morgan	19,757	18,738	-5.2%	116,567,948
95	Lake	7,954	7,303	-8.2%	15,422,056
	Bottom Ten Subtotal	**188,646**	**181,373**	**-3.9%**	**$550,375,085**
	Grand Total	**5,689,283**	**6,296,254**	**10.7%**	**$22,863,875,726**

Examination of growth rates contributes little to the understanding of why some counties appear at the top or bottom for total infrastructure needs. TACIR's statistical analysis indicates little relationship between the two. Nor are the lists of counties with the top- and bottom-ten growth rates as stable as the other top-ten-bottom-ten lists from year to year. Three counties—Williamson, Rutherford, and Sevier—have been among the ten fastest growing in all seven reports that have made this comparison, and only two—Haywood and Obion—have been among the ten with the smallest growth rates.

Infrastructure needs per capita are not lower in counties with higher population densities.

Conventional wisdom holds that population density should produce lower infrastructure costs because of economies of scale. The idea is that the most densely populated counties should have the lowest per capita infrastructure needs because more people share the same infrastructure (e.g. more homes per mile of water or sewer line; more buildings per mile of road). This relationship is not borne out by TACIR's infrastructure inventories based either on comparisons of counties that rank high and low for population density or on statistical analysis. In fact, TACIR analysis consistently indicates either a significant or a highly significant correlation between population density and higher infrastructure costs.

Table 27. Infrastructure Needs Reported by Most and Least Densely Populated Counties

Excluding Projects Identified as Regional

Five-year Period July 2009 through June 2014

Rank	County	2009 Population	Land Area [square miles]	Population per Square Mile	Total Reported Cost	Cost per Capita
1	Davidson	635,710	502	1,266	$3,489,668,075	$5,489
2	Shelby	920,232	755	1,220	2,743,480,208	2,981
3	Knox	435,725	508	857	845,504,776	1,940
4	Hamilton	337,175	542	622	1,019,813,966	3,025
5	Rutherford	257,048	619	415	903,094,476	3,513
6	Hamblen	63,033	161	391	202,420,792	3,211
7	Sullivan	154,552	413	374	398,085,742	2,576
8	Washington	120,598	326	370	558,261,938	4,629
9	Williamson	176,838	583	303	916,726,876	5,184
10	Sumner	158,759	529	300	498,320,765	3,139
	Top Ten Subtotal	**3,259,670**	**4,939**	**660**	**$11,575,377,614**	**$3,551**
	All Others	**2,931,400**	**32,504**	**90**	**$10,822,807,422**	**$3,692**
86	Decatur	11,525	334	35	21,328,530	1,851
87	Humphreys	18,274	532	34	78,019,113	4,269
88	Clay	7,895	236	33	75,806,500	9,602
89	Bledsoe	12,967	406	32	34,443,482	2,656
90	Hancock	6,588	222	30	25,279,999	3,837
91	Pickett	4,783	163	29	38,571,500	8,064
92	Stewart	13,340	458	29	37,845,000	2,837
93	Wayne	16,506	734	22	62,951,439	3,814
94	Van Buren	5,480	273	20	66,835,000	12,196
95	Perry	7,826	415	19	24,610,127	3,145
	Bottom Ten Subtotal	**105,184**	**3,775**	**28**	**$465,690,690**	**$4,427**
	Grand Total	**6,296,254**	**41,217**	**153**	**$22,863,875,726**	**$3,631**

In the latest inventory, six of the ten counties reporting the greatest needs are among the ten most densely populated—Shelby, Davidson, Knox, Hamilton, Rutherford, and Williamson. Only one county reporting the lowest infrastructure needs, Decatur, is among the ten most sparsely populated (compare Tables 23 and 27). There are several possible explanations for this seeming incongruity, first among them, the fact that all six high-needs and high-density counties—Shelby, Davidson, Knox, Hamilton, Rutherford, and Williamson—are among the ten with the largest population gains from 2000 to 2009. High growth may counter the effect of economies of scale.

Another explanation—one that may follow from the first—is that scale is a long-term economic benefit that enables a governmental entity to serve citizens more efficiently over time but has no relationship to initial investment costs. In addition, densely populated areas may require such infrastructure as storm-water drains, sidewalks, street lighting, and traffic signaling that is not necessary in sparsely populated areas. Finally, urban residents may simply demand and receive more infrastructure-related services than rural residents, and the types of services they need or desire (such as underground wiring) may be more expensive.

Notably, in this report, three of the most sparsely populated counties have high needs per capita: Clay, Pickett, and Van Buren. Needs reported for these counties are so high that they cause the overall need per capita for the bottom ten counties to exceed that of any other group (see Table 27). All three are examples of how large but infrequent projects in small counties can cause those counties to appear to have much higher needs than would be expected. Perhaps the best example among these counties is the need for a new high school in Pickett County. This may only occur once every 30 or more years. High schools often remain in use for more than 50 years, but when one is needed-even when it is proposed to be built at a relatively low cost, as this project is—it will skew population comparisons like this one.

Two projects cause Clay County's per capita costs to be much higher than would be expected based on its population and growth: a $34 million road construction project currently underway on State Route 52 and a $20 million gas line extension that would reach all residents who want natural gas. Similarly, a $13 million interchange for local traffic on State Route 11, a $25 million dollar project to replace water

lines throughout the county, and a $10 million housing project boost per capita needs in Van Buren County to the highest in the state for this inventory. Needs like this often go unfunded for extended periods in small counties because they cannot fund them.

Greatest needs per capita reported mainly for small counties.

Infrastructure needs per capita seem to bear little relationship to any population factor except possibly total population (see Table 28). Table 28 shows the top ten and bottom ten counties for infrastructure needs reported per capita, along with their populations, population gains and growth rates, and land area and population densities. There are fast- and slow-growing counties in both sets of ten presented in this table, but there are no high-density or large population counties in the bottom ten. Sevier is the only relatively large county that appears among the top ten for per capita needs.

The other nine counties in the top ten demonstrate the fact that needs such as courthouse renovations, new schools, and road improvements that would seem moderate or even small in large counties have a disproportionate effect when compared to population in small counties. Van Buren County, which has a population of only 5,480, has been among these ten counties in all seven TACIR reports presenting this information. Only Weakley County has been among the bottom ten for reported needs per capita in all seven reports with county level analysis. Sequatchie's placement in the bottom ten is surprising because of its rapid growth.

Statistical analyses confirm inferences about population and infrastructure needs, but tax base factors are more closely related to reported needs.

Analysis of the top ten and bottom ten counties for various population factors presumed to be related to infrastructure needs suggests conclusions that can be verified by statistical analysis of all ninety-five counties. Statistical analysis can also suggest explanations for things general observation cannot and help estimate infrastructure needs that may have been missed by the inventory. The inventory is entirely voluntary on the part of local officials, and they may participate more or less enthusiastically depending on how valuable they consider the

Table 28. Population Factors for Counties with Highest and Lowest Estimated Costs per Capita
Excluding Projects Identified as Regional
Five-year Period July 2009 through June 2014

Rank	County	Population 2000	Population 2009	Change	Growth Rate	Land Area [sq. miles]	Population Density	Total Reported Cost	Cost per Capita
1	Van Buren	5,508	5,480	-28	-0.50%	273	20	$66,835,000	$12,196
2	DeKalb	17,423	18,954	1,531	8.80%	305	62.2	197,640,000	10,427
3	Fentress	16,625	17,677	1,052	6.30%	499	35.5	173,664,250	9,824
4	Clay	7,976	7,895	-81	-1.00%	236	33.4	75,806,500	9,602
5	Sevier	71,170	86,243	15,073	21.20%	592	145.6	733,308,495	8,503
6	McMinn	49,015	52,739	3,724	7.60%	430	122.6	426,983,359	8,096
7	Pickett	4,945	4,783	-162	-3.30%	163	29.4	38,571,500	8,064
8	Cumberland	46,802	54,109	7,307	15.60%	682	79.4	433,891,136	8,019
9	Cannon	12,826	13,860	1,034	8.10%	266	52.2	89,900,500	6,486
10	Haywood	19,797	18,881	-916	-4.60%	533	35.4	122,322,008	6,479
	Top Ten Subtotal	**252,087**	**280,621**	**28,534**	**11.30%**	**3,979**	**4.7**	**$2,358,922,748**	**$8,406**
	All Others	**5,103,741**	**5,668,904**	**565,163**	**11.10%**	**32,382**	**8.7**	**$20,142,884,753**	**$3,553**
86	Obion	32,450	31,431	-1,019	-3.10%	545	57.7	47,252,766	1,503
87	Chester	15,540	16,312	772	5.00%	289	56.5	23,414,711	1,435
88	Lawrence	39,926	41,314	1,388	3.50%	617	66.9	56,873,687	1,377
89	Madison	91,837	97,317	5,480	6.00%	557	174.7	117,516,995	1,208
90	Hickman	22,295	23,805	1,510	6.80%	613	38.9	26,155,666	1,099
91	Crockett	14,532	14,492	-40	-0.30%	265	54.6	15,399,120	1,063
92	Sequatchie	11,370	13,915	2,545	22.40%	266	52.3	13,489,410	969
93	Weakley	34,895	33,459	-1,436	-4.10%	580	57.7	22,143,088	662
94	Franklin	39,270	41,310	2,040	5.20%	555	74.5	24,628,026	596
95	Lincoln	31,340	33,374	2,034	6.50%	570	58.5	15,194,756	455
	Bottom Ten Subtotal	**333,455**	**346,729**	**13,274**	**4.00%**	**4,856**	**692.4**	**$362,068,225**	**$1,044**
	Grand Total	**5,689,283**	**6,296,254**	**606,971**	**10.70%**	**41,217**	**152.8**	**$22,863,875,726**	**$3,631**

process to be. Variations in their willingness or ability to provide comparable information about their needs may help explain the seemingly weak relationship between population factors and the infrastructure needs reported by counties that appear on the bottom ten lists.

To answer these questions, TACIR analysts compared various factors related to local governments' ability to fund infrastructure, as well as factors related to need. The first comparison produced the set of simple correlation measures, called correlation coefficients, presented in Table 29. Correlation coefficients measure the strength of the relationship between two sets of numbers and range from zero to one. 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

Table 29. Correlation between Reported Infrastructure Needs and Related Factors in Order of Strength of Relationship

Factors Related to Reported Needs	Correlation Coefficient
Taxable Property Value	0.964
Taxable Sales	0.956
Personal Income	0.942
2009 Population	0.926
2009 Population Density	0.922
Population Gain or Loss	0.735
Land Area (square miles)	0.286
Population Growth Rate	0.273

as the other decreases. A perfect relationship between the two sets of numbers would be either 1.0 or -1.0.

Table 29 shows a strong relationship between reported needs and both taxable property and taxable sales. These results are consistent with previous reports; however, most population factors show nearly as strong a relationship with reported needs. In contrast, the coefficient for population growth rate and reported needs, at only 0.273, is insignificant. The coefficients for population factors confirm the general inferences drawn from the top-ten-bottom-ten review:

- Total population is a strong indicator of infrastructure needs.
- Higher population densities correspond to higher total infrastructure needs, and lower densities correspond to lower total needs.
- Population gain is closely related to infrastructure needs, but growth rate, which has a correlation coefficient below 0.3, is not.
- Land area is a weak indicator of needs. Of the factors compared here, only growth rate is weaker.

The most interesting inference from the comparison, however, is that **tax base factors and income consistently correspond more closely to reported needs than the population factors do**. These near perfect relationships suggest that indicators of ability to fund infrastructure may strongly influence local officials as they respond to the inventory, or they may simply reflect the common sense inference that tax base and income tend to concentrate where population concentrates.