

Building Tennessee's Tomorrow: **Anticipating the State's Infrastructure Needs**

July 2008 through June 2013

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July 2010

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

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Speaker of the House of Representatives

Members of the General Assembly

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Ladies and Gentlemen:

Transmitted herewith is the eighth 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 has been used by the Comptroller's Office of Education Accountability to study high priority public schools identified by the Department of Education. Information on water and wastewater needs has been shared with staff of the Department of Environment and Conservation's grant programs. Future plans for reports include analysis of funding availability and location in relation to boundaries established under the Growth Policy Act (Public Chapter 1101, Acts of 1998) as required by Public Chapter 672, Acts of 2000.

Sincerely,

Senator Mark Norris
Chairman

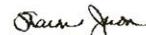
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Recognizes

*Tennessee Development Districts
Infrastructure Needs Survey
Innovation Award
2009*


Executive Director


President

The Tennessee Advisory Commission on Intergovernmental Relations' statewide Public Infrastructure Needs Inventory program was recognized by the National Association of Development Organizations (NADO) as a 2009 Innovation Award winner. NADO's annual innovation awards program has been recognizing creative approaches to regional community and economic development since 1986.

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

July 2008 through June 2013

EXECUTIVE SUMMARY

This report is the eighth 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. It covers the five-year period of July 2008 through June 2013 and 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 \$18.9 billion | Education \$7.7 billion |
| Health, Safety & Welfare \$7.1 billion | Recreation & Culture \$1.8 billion |
| Economic Development \$1.0 billion | General Government \$649 million |
| Grand Total \$37.3 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 \$37.3 billion for 2008 through 2013—a one-year increase of \$3.1 billion—including the cost of upgrading existing public schools to good condition. The \$23.6 billion increase since the 1999 report represents both increased need for infrastructure and increased coverage by the inventory.
- Transportation and Utilities needs increased \$1.2 billion since the last inventory and \$13.6 billion since the first report. This category now makes up 51% of the total infrastructure need in the inventory.

Adequate infrastructure is as essential to economic growth as economic growth is to individual prosperity.

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.]

- For only the second time in inventory history, needs in all six categories increased from the previous report. In fact, of the 22 specific types of infrastructure needs included in the inventory, only 8 decreased and only one decreased more than 10%. The category with the most significant change is Economic Development; its total is \$424 million more than the estimate in last year's report—a 69% increase. This is a large increase for any category, but considering the small size of Economic Development the dollar amount is even more significant. Most of the increased need is for a \$455 million convention center in downtown Nashville.
- Local officials are confident of funding for only \$9.1 billion of the \$29.2 billion identified as local needs. (These figures do not include needs at existing schools or those taken from state agencies' capital budget requests.) Most of that amount, \$8.6 billion, is for needs that are fully funded; another \$500 million is for needs that are partially funded. That leaves another \$20.1 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. Some projects are expected to receive funding from the American Recovery and Reinvestment Act (ARRA); however, the amount of ARRA funds that will be used to meet these needs is as yet unknown. The next inventory should provide more information about the use of ARRA funds.
- The category with the greatest unfunded need is Education, with funding sources known for only a quarter of the needs reported there. This figure does not include needs at existing schools because they are reported in such detail that breaking the funding apart by source is impossible. Nor does it include the needs of the state's higher education institutions because they are drawn from state capital budget requests, which propose funding sources, but typically do not indicate their availability. The availability of funds for local education needs may be understated because school systems in Tennessee are not fiscally independent, which may hamper school officials' ability to project funding.
- The overall condition of Tennessee's public school buildings has stabilized with 91% of them 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, hovering in the \$3.5 to \$3.7 billion range since 2001. The new total of \$3.6 billion is \$110 million less than the amount in last year's report. (These figures do not include the needs of the state's special schools.)

School systems have an additional incentive to fully report their infrastructure needs for the next inventory, which is already in progress. Information about the condition of public schools and facilities needs reported in the inventory was used by school systems as an indicator of need in applications to participate in the Qualified School Construction Bonds authorized by ARRA. The QSCB program was administered by the Tennessee State School Bond Authority, which issued the bonds on behalf of Tennessee school systems in order to ensure the best possible loan terms. The TSSBA is in the process of determining which school systems will be awarded QSCB proceeds in 2010, and needs reported in the inventory will be used in this process again.

- State or federal mandates affect about 5% of all projects in the current inventory, the same as the last three years, and the number of projects affected by mandates continues to decline. 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. The decline is largely because of the waning effect of the Education Improvement Act, which was completely phased in by fall 2001. Even so, public elementary and secondary schools account for 60% of the total number of projects affected by facilities mandates.
- Consistent with analyses of previous inventories, at the county level, tax base factors and income correspond more closely to reported needs than population factors do, although total population and population density are good predictors of infrastructure needs as well. 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. The weakest predictors of those considered by TACIR staff are land area and population growth rates.

Building Tennessee's Tomorrow:

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July 2008 through June 2013

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July 2008 through June 2013

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 down and 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 burdensome task of matching limited funds to unlimited needs.

Last year's federal stimulus act can address only a small portion of the needs reported in this inventory. According to officials with Governor Bredesen's Recovery Act Management Office, Tennessee received a total of \$700 million from the American Recovery and Reinvestment Act (ARRA) that could be used in whole or in part to meet its public infrastructure needs. All of the funds have been allocated. Even if all of it were spent on infrastructure, it would meet less than 2% of the estimated cost of the needs reported by state and local officials in the current inventory.

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 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.

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

This report is the eighth in a series that presents Tennessee's public infrastructure needs. It covers the five-year period of July 2008 through June 2013 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 six broad categories:

**Table 1. Summary of Infrastructure Improvement Needs Reported
Five-year Period July 2008 through June 2013***

| Category** | Number of Projects or | | Five-year Reported | |
|------------------------------|-----------------------|---------------|--------------------------|---------------|
| | Schools Reported | | Estimated Cost | |
| Transportation and Utilities | 3,367 | 37.5% | \$ 18,908,218,135 | 50.7% |
| Education*** | 2,024 | 22.5% | 7,719,426,046 | 20.7% |
| Health, Safety and Welfare | 2,178 | 24.2% | 7,149,042,548 | 19.2% |
| Recreation and Culture | 966 | 10.7% | 1,828,190,704 | 4.9% |
| Economic Development | 165 | 1.8% | 1,041,132,520 | 2.8% |
| General Government | 290 | 3.2% | 649,939,418 | 1.7% |
| Grand Total | 8,990 | 100.0% | \$ 37,295,949,371 | 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 2008 through June 2013. Projects included are those that need to be either started or completed at anytime during that period. Estimated costs for the projects may include amounts spent before July 2008 to start a project that needs to be completed during the five-year period or amounts to be spent after June 2013 to complete a project that needs to be started during the five-year period. Officials reporting these needs are not asked to break out the costs by year. These needs represent the best estimates that state and local officials could provide and do not represent only what they anticipate being able to afford.

Why inventory public infrastructure needs?

The General Assembly proclaimed 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

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

officials by staff of the state's nine development districts,² the capital budget requests submitted to the Governor by state officials as part of the annual budget process, and bridge and road needs from project listings provided by state transportation officials. The Commission relies entirely on state and local officials to evaluate the infrastructure needs of Tennessee's citizens as envisioned by the enabling legislation.

What infrastructure is included in the inventory?

For purposes of this report, based both 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.

Further, 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, 2008, through June 30, 2028, 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, 2008. The period covered by each inventory was expanded to twenty years in 2000 because of legislation requiring its use by TACIR to monitor implementation of Tennessee's Growth Policy Act.³ Plans developed pursuant to that act establish growth boundaries for the anticipated twenty-year population increase and business expansion. 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

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.

Top Three Infrastructure Concerns:

1. Roads
2. Wastewater
3. Schools

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

the very broad purposes for public infrastructure listed in the law. No independent assessment of need constrains their reporting. In addition, the inventory includes capital needs identified by state officials and submitted to the Governor as part of the annual budget process and, for the fourth time, bridge and road needs from project listings provided by the Tennessee Department of Transportation.

What have we learned about public infrastructure needs?

State and local officials report a total need for public infrastructure improvements estimated at \$37.3 billion for 2008 through 2013—an increase of \$3.1 billion from the previous inventory—including the cost of upgrading existing public schools to good condition. The \$23.6 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.) Improvements in reporting the state's road and bridge needs contributed to a \$13.8 billion increase in the Transportation and Utilities category since the first inventory was completed.

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 |

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 now comprises 51% of the inventory. In just one year, Transportation and Utilities needs increased \$1.2 billion (7%), but for the first time since the July 2003 inventory, all other categories of need increased as well. In fact, of the 22 specific types of infrastructure needs included in the inventory, only 8 decreased and only one decreased more than 10%. While Transportation and Utilities increased by the largest dollar amount,

Economic Development needs increased by the largest percentage. That category's 69% increase resulted from a doubling of business district development needs, nearly all of which is accounted for by the \$455 million convention center that is being built in Nashville.

The Education category increased by the second largest dollar amount—over \$942 million. This 14% increase is because of a billion dollars of additional needs at Tennessee's public colleges and universities, needs that continue to go unfunded. The Health, Safety and Welfare category increased by nearly \$397 million (6%) because of water and wastewater needs that continue to grow. General Government needs increased almost \$87 million (15%) because of new or improved public building needs. The smallest increase was in Recreation and Culture needs (\$56 million or 3%); the largest increase in that category was for community development.

Less than a third of all infrastructure needs in the current inventory were fully funded at the time of the inventory. The inventory does not include funding information for needs at existing schools or for needs drawn from the capital budget requests submitted by state agencies. Excluding those needs from the total of \$37.3 billion reported for the period covered by the inventory leaves \$29.2 billion in needs. Of this remaining amount, only \$9.1 billion is available. Most of it, \$8.6 billion, is for needs that are fully funded; another \$500 million is for needs that are partially funded. That leaves another \$20.2 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. Some projects are expected to receive funding from the American Recovery and Reinvestment Act (ARRA); however, the amount of ARRA funds that will be used to meet these needs is as yet unknown. The next inventory should provide more information about the use of ARRA funds.

Education is the category of infrastructure with the greatest unfunded need. Less than a quarter of education needs are fully funded, but Economic Development, Transportation and Utilities, and Recreation and Welfare don't fare much better with 26%, 28%, and 29% (respectively) fully funded. Figures for Education needs do not include needs at existing schools because they are reported in such detail that breaking apart the funding is difficult. Nor do they include needs for the state's colleges and universities, which are taken from

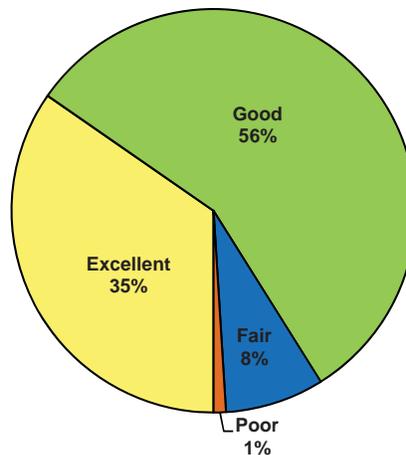
the state budget request and which propose funding sources, but do not indicate their likely availability. The availability of funds for local education needs may be understated because school systems in Tennessee are not fiscally independent, which may hamper school officials' ability to project funding.

Most of the funding for most types of local infrastructure comes from local sources. Breaking the fully funded projects down into the 22 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 8 of the 22 types and more than 60% of the funding needed for 10 others. The one notable, though not surprising, exception is transportation: state and federal sources are expected to provide 46% and 39%, 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. If they were, 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. (See Figure 1.) This has been the case since 2004. Infrastructure improvements for schools, including new schools, along with improvements and additions to existing schools, are estimated by local officials to cost slightly more than \$3.6 billion. This total is some

\$110 million less than the estimate in last year's report—a 3% 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. The only kind of elementary and secondary school facility need that increased in this inventory is upgrades at existing schools.

Figure 1. Condition of Schools as Reported by Local Officials



School systems have an additional incentive to fully report their infrastructure needs for the next inventory, which is already in progress. Information about the condition of public schools and facilities needs reported in the inventory was used by school systems as an indicator of need in applications to participate in the Qualified School Construction Bonds (QSCB) authorized by ARRA. The QSCB program was administered by the Tennessee State School Bond Authority (TSSBA), which issued the bonds on behalf of Tennessee school systems in order to ensure the best possible loan terms.

Last year, the TSSBA had authority to issue approximately \$185 million through the program. Of that amount, \$42 million was allocated by the U.S. Department of Education to the Memphis City Schools, \$21 million to Metropolitan Nashville and Davidson County Schools and the remainder, \$122 million, was made available to other school systems. Twenty-five systems requested funds through the program, and 11 proposals were funded. Many of these needs had been reported in the inventory for several years. The TSSBA is in the process of determining which school systems will be awarded QSCB proceeds in 2010, and needs reported in the inventory will be used in this process again.

State or federal mandates affect about 5% of all projects in the current inventory, for the third consecutive year. The inventory of needs does not require separate estimates of the cost of federal and state mandates except for those affecting existing public school buildings, so it is not possible to determine how much of the total estimated costs of other needs are attributable to mandates. The number of projects affected by mandates continues to decline. About 15% of projects reported in 2001 were mandate related. The percentage fell to 9% the following year and continued to decline each year through 2004 when it fell below 5%. The percentage of projects affected by mandates has remained at about that level since then and now stands at just over 5%. This is largely because of the declining effect on infrastructure needs of the Education Improvement Act, which was completely phased in by fall 2001. New and existing K-12 schools, however, account for 60% of the total number of projects affected by facilities mandates.

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

The Importance of Investing in Public School Infrastructure

The quality of schools infrastructure has a significant influence on student achievement, and in turn on future economic competitiveness.

Schools' location, design, and physical condition are important determinants of neighborhood quality, regional growth and change, and quality of life.

Integrating Infrastructure Planning: The Role of Schools, Deborah Koy, Jeffrey M. Vincent, Carrie Makarewicz. http://metrostudies.berkeley.edu/pubs/reports/013_ACCESS_RoleSchools.pdf

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 intensely developed 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.

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. TACIR 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, making 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.

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 Growth Policy Act. One such project, 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 other 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.

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

July 2008 through June 2013

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 2008 through June 2013, 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 2008 to start a project that needs to be completed during the five-year period or amounts to be spent after June 2013 to complete a project that

⁴Both forms are included in Appendix C.

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.

⁵See 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.

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 to find ways to help them. Most recently, this data was used to help identify projects that may be 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 Tennessee Department of Education.

Increased Public Awareness, Better Communication, and Collaboration

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.

Building Tennessee's Tomorrow:

Anticipating the State's Infrastructure Needs

July 2008 through June 2013

INFRASTRUCTURE NEEDS STATEWIDE

Total Needs Reported Increased 9.0% Since Last Report

State and local officials estimate the cost of public infrastructure improvements that should be started or completed sometime between July 1, 2008, and June 30, 2013, at \$37.3 billion (see Table 3). This is an increase of \$3.1 billion, or 9.0%, since the last report (see Table 4).

**Table 3. Total Number and Estimated Cost of Needed Infrastructure Improvements
Five-year Period July 2008 through June 2013***

| Category and Project Type** | Number of Projects or | | Five-year Reported | |
|--------------------------------------|-----------------------|---------------|--------------------------|---------------|
| | Schools Reported | | Estimated Cost | |
| Transportation and Utilities | 3,367 | 37.5% | \$ 18,908,218,135 | 50.7% |
| Transportation | 3,298 | 36.7% | 18,286,392,901 | 49.0% |
| Other Utilities | 62 | 0.7% | 591,584,334 | 1.6% |
| Telecommunications | 7 | 0.1% | 30,240,900 | 0.1% |
| Education | 2,024 | 22.5% | \$ 7,719,426,046 | 20.7% |
| Non K-12 Education | 685 | 7.6% | 4,016,123,406 | 10.8% |
| Existing School Improvements | 1,192 | 13.3% | 1,923,171,646 | 5.2% |
| K-12 New School Construction | 95 | 1.1% | 1,675,471,865 | 4.5% |
| School System-wide Need | 52 | 0.6% | 104,659,129 | 0.3% |
| Health, Safety and Welfare | 2,178 | 24.2% | 7,149,042,548 | 19.2% |
| Water & Wastewater | 1,492 | 16.6% | 4,162,819,492 | 11.2% |
| Law Enforcement | 292 | 3.2% | 1,980,569,500 | 5.3% |
| Public Health Facilities | 99 | 1.1% | 342,064,829 | 0.9% |
| Storm Water | 90 | 1.0% | 339,665,653 | 0.9% |
| Fire Protection | 138 | 1.5% | 202,913,334 | 0.5% |
| Housing | 19 | 0.2% | 70,462,740 | 0.2% |
| Solid Waste | 48 | 0.5% | 50,547,000 | 0.1% |
| Recreation and Culture | 966 | 10.7% | \$ 1,828,190,704 | 4.9% |
| Recreation | 752 | 8.4% | 1,137,238,748 | 3.0% |
| Libraries, Museums, & Historic Sites | 100 | 1.1% | 358,551,625 | 1.0% |
| Community Development | 114 | 1.3% | 332,400,331 | 0.9% |
| Economic Development | 165 | 1.8% | \$ 1,041,132,520 | 2.8% |
| Business District Development | 40 | 0.4% | 810,314,520 | 2.2% |
| Industrial Sites & Parks | 125 | 1.4% | 230,818,000 | 0.6% |
| General Government | 290 | 3.2% | \$ 649,939,418 | 1.7% |
| Public Buildings | 259 | 2.9% | 605,264,485 | 1.6% |
| Other Facilities | 18 | 0.2% | 38,371,847 | 0.1% |
| Property Acquisition | 13 | 0.1% | 6,303,086 | 0.0% |
| Grand Total | 8,990 | 100.0% | 37,295,949,371 | 100.0% |

*For complete listings of all needs reported in the July 2008 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.

While the increase from the previous report seems dramatic, it is in line with the average⁶ one-year increase of 9.4%. The previous report showed a three-year change. As shown in the following table, every major category of need increased since the last inventory. This is only the second time that all categories have reported an increase.

**Table 4. Comparison of Estimated Cost of Needed Infrastructure Improvements
July 2008 Inventory vs. July 2007 Inventory**

| Category and Project Type* | July 2007 Inventory | July 2008 Inventory | Difference | Percent Change |
|--------------------------------------|----------------------------|----------------------------|-------------------------|-----------------------|
| Transportation and Utilities | \$ 17,722,418,638 | \$ 18,908,218,135 | \$ 1,185,799,497 | 6.7% |
| Transportation | 17,106,712,172 | 18,286,392,901 | 1,179,680,729 | 6.9% |
| Other Utilities | 598,697,566 | 591,584,334 | (7,113,232) | -1.2% |
| Telecommunications | 17,008,900 | 30,240,900 | 13,232,000 | 77.8% |
| Education | \$ 6,777,206,905 | \$ 7,719,426,046 | \$ 942,219,141 | 13.9% |
| Non K-12 Education | 3,015,869,156 | 4,016,123,406 | 1,000,254,250 | 33.2% |
| Existing School Improvements | 1,899,734,970 | 1,923,171,646 | 23,436,676 | 1.2% |
| K-12 New School Construction | 1,798,581,339 | 1,675,471,865 | (123,109,474) | -6.8% |
| School System-wide Need | 63,021,440 | 104,659,129 | 41,637,689 | 66.1% |
| Health, Safety and Welfare | \$ 6,751,104,157 | \$ 7,149,042,548 | \$ 397,938,391 | 5.9% |
| Water & Wastewater | 3,855,354,975 | 4,162,819,492 | 307,464,517 | 8.0% |
| Law Enforcement | 1,826,201,324 | 1,980,569,500 | 154,368,176 | 8.5% |
| Public Health Facilities | 323,093,268 | 342,064,829 | 18,971,561 | 5.9% |
| Storm Water | 371,226,805 | 339,665,653 | (31,561,152) | -8.5% |
| Fire Protection | 220,725,045 | 202,913,334 | (17,811,711) | -8.1% |
| Housing | 100,188,740 | 70,462,740 | (29,726,000) | -29.7% |
| Solid Waste | 54,314,000 | 50,547,000 | (3,767,000) | -6.9% |
| Recreation and Culture | \$ 1,771,858,638 | \$ 1,828,190,704 | \$ 56,332,066 | 3.2% |
| Recreation | 1,118,526,947 | 1,137,238,748 | 18,711,801 | 1.7% |
| Libraries, Museums, & Historic Sites | 367,547,066 | 358,551,625 | (8,995,441) | -2.4% |
| Community Development | 285,784,625 | 332,400,331 | 46,615,706 | 16.3% |
| Economic Development | \$ 617,120,154 | 1,041,132,520 | \$ 424,012,366 | 68.7% |
| Business District Development | 375,758,154 | 810,314,520 | 434,556,366 | 115.6% |
| Industrial Sites & Parks | 241,362,000 | 230,818,000 | (10,544,000) | -4.4% |
| General Government | \$ 562,998,278 | \$ 649,939,418 | \$ 86,941,140 | 15.4% |
| Public Buildings | 526,287,575 | 605,264,485 | 78,976,910 | 15.0% |
| Other Facilities | 32,754,867 | 38,371,847 | 5,616,980 | 17.1% |
| Property Acquisition | 3,955,836 | 6,303,086 | 2,347,250 | 59.3% |
| Grand Total | \$ 34,202,706,770 | \$ 37,295,949,371 | \$ 3,093,242,601 | 9.0% |

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

Transportation and Utilities continues to be the largest category, comprising nearly 51% of all infrastructure needs. The Transportation and Utilities category has represented nearly half of the total increase since TACIR's first report on infrastructure needs. It does not include water utilities;

⁶This average is calculated by using the compound average growth rate, using July 1999 to July 2008 as the beginning and end years.

those needs are reported in the Health, Safety and Welfare category. Transportation needs alone increased \$1.2 billion (6.9%) since the last report and \$13.8 billion since the first. These large increases occurred for two reasons: efforts by staff of TACIR and the Tennessee Department of Transportation to stabilize the reporting process and the discovery of additional needs not previously reported. For example, detailed bridge remediation needs were added in the July 2007 inventory. When most people think of transportation needs they automatically think of road or bridge projects. Of the ten transportation subtypes, road is the largest with 75% of the total estimated cost (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 5. Transportation Needs by Subtype
Five-year Period July 2008 through June 2013

| Subtype | Number of Projects | Estimated Cost | Percent of Total |
|-----------------------------|--------------------|--------------------------|------------------|
| Roads | 1,342 | \$ 13,790,662,357 | 75.4% |
| Bridges | 1,494 | 2,464,697,479 | 13.5% |
| Rail | 63 | 1,032,813,847 | 5.6% |
| Navigation | 5 | 321,935,000 | 1.8% |
| Sidewalk | 166 | 219,306,536 | 1.2% |
| Air | 95 | 171,131,778 | 0.9% |
| Intelligent Trans. System | 22 | 153,277,355 | 0.8% |
| Signalization | 75 | 73,735,967 | 0.4% |
| Public Transit | 4 | 30,600,000 | 0.2% |
| Other | 32 | 28,232,582 | 0.2% |
| Transportation Total | 3,298 | \$ 18,305,643,900 | 100.0% |

Telecommunications, which increased 77.8%, was the fastest growing need in the Transportation and Utilities category. Two large projects were added to the inventory, one for a public safety communication system in Maryville costing \$6.8 million and a \$10 million project to expand broadband in Hamblen County. Not every type of infrastructure need included in the Transportation and Utilities category has grown since the last inventory. The estimated cost of other utilities needs declined a small amount from the previous inventory (-1.2%).

General Government had the second fastest growth rate of any category of infrastructure needs. It has always been either the smallest or the second smallest of the six categories in dollar terms, so increases and decreases that might go unnoticed in other categories can easily cause large percentage changes in this relatively small category. Most of the

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>

15.4% increase in General Government needs shown in Table 3 is for new or improved public buildings, but the largest percentage increase within the category was for property acquisition needs. None of the needs reported in the last inventory for this type were completed or cancelled, and five new projects were added. The largest project added was a \$1 million expansion of equipment storage and other facilities for the Clarksville Street Department.

The Education category is the second largest category in dollar terms and had the third largest percentage increase in total needs. The state's colleges and universities ("non K-12 education" in the tables) grew nearly \$1 billion over the previous year—more than the total for the entire Education category. Facility improvements needed at existing public elementary and secondary schools increased only slightly (1.2%) over the previous year, and the need for new schools actually decreased. The large percentage increase in system-wide public school needs—the third fastest growing type of need shown in Table 3—happened mainly because of needs at the state's four special schools. Six of the 16 new projects in this type were at the School for the Deaf in Knoxville; it now accounts for one-third of all system-wide needs.

But the biggest story in the Education category is that the facilities needs at Tennessee's public colleges and universities, in these tough economic times, continue to go unfunded. The near \$1 billion increase in the latest inventory is on par with the increase in the last one. And that does not include routine maintenance needs, which are not reported in the inventory for any type of facility. These continued increases can be attributed to a lack of funds to complete or even start them. Of the 549 projects in the 2007 inventory, only five were completed. At the same time, 159 new projects were added.

The Recreation and Culture and the Health, Safety and Welfare categories had smaller increases than the other four categories. The Recreation and Culture category had the smallest increase of all categories. Community development needs increased the most of any type of infrastructure need reported in this category, accounting for most of the \$46 million increase reported for the entire category. The Health, Safety and Welfare category had the second smallest increase in the current inventory after having the second largest increase—in both dollar and percentage terms—in the last inventory. The driving

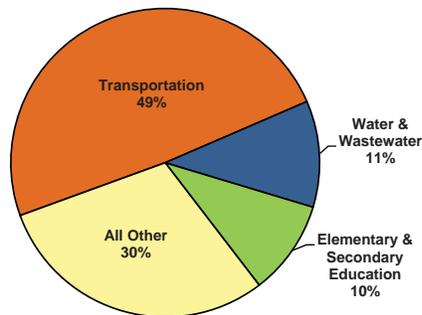
force that year was water and wastewater, which is still growing, but not as rapidly as it had been.

Transportation, Education, and Water and Wastewater Continue to Dominate Statewide Needs

As shown in Figure 2, three types of projects dominate reported needs. This has been true since the public infrastructure needs inventory began more than 10 years ago. Transportation needs alone have comprised nearly half or more of the total for the last three reports. Water and wastewater infrastructure improvements and public school

facilities improvements comprise 11% and 10% of the total. These three types of need combined represent 70% of the total estimated cost of public infrastructure needs reported in this inventory and continue to dominate the inventory even though they are growing more slowly now than in the past. Transportation and water and wastewater needs grew less than 10% in this inventory; both had grown more than 20% in the previous inventory.

Figure 2. Percent of Total Reported Cost of Infrastructure
Five-year Period July 2008 through June 2013



State Infrastructure Needs Continue to Dominate Overall, and County Needs Still Exceed City Needs

Although most of the projects in the public infrastructure needs inventory are identified and reported by local officials, they may ultimately be owned or controlled by a variety of entities, including state or federal agencies or public utilities. This is especially true for transportation needs, nearly three-fourths of which are the responsibility of the state, and non K-12 education needs, nearly all of which are the responsibility of the state. The combination of these two types of needs accounts for nearly \$22 billion or 48% of the total reported in the inventory and \$18 billion of the \$20 billion total in state needs. The next largest areas of state responsibility after education and transportation are law enforcement, public health facilities, and other facilities, all of which have state-dollar amounts that exceed 60% of the total needed. Even though the percentages are high for these types, the dollar amounts are relatively small.

With significantly increased needs identified for the state's colleges and universities, state-level needs now account for more than half of the infrastructure needs reported in the Education category (see Table 6). But within that category, county governments, which bear primary responsibility for funding local education, continue to dominate the types of need most closely associated with public school facilities, including nearly 90% of new school construction needs. Counties are also responsible for the bulk of solid waste needs (66% of the total) and most of the public infrastructure needs reported in both types of economic development projects—81% of business district development needs and 61% of industrial sites and parks. The new convention center being built in Nashville accounts for half the estimated cost of business district development needs reported in the inventory. 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 so are treated as county governments in the inventory.

Cities remain responsible for the largest portion of needs in both the Health, Safety and Welfare category and the Recreation and Culture category, but they no longer dominate four of the six categories as they once did. Cities are responsible for a significant portion of the need for storm water (90%), fire protection (80%), housing (72%), and community development infrastructure (76%). For example, of the 19 housing projects in the inventory, 12 are owned by cities. The city of Memphis is responsible for the two largest housing projects reported in the inventory.

Stage of Development Varies with Type of Project; State Needs Are Far More Likely to be in the Conceptual Stage

The economy has been taking a toll on the ability of the state and local governments to carry their infrastructure projects to completion. Needs in the conceptual stage now 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 construction stage make up a smaller percentage—only 18% of the total—than in previous inventories. In contrast, projects in the conceptual stage now comprise nearly half of the total cost of projects in the inventory. (See Table 7). It's important to note in this context that stage of development for this inventory was reported as

Table 6. Total Estimated Cost [in millions] of Needed Infrastructure Improvements by Project Type and Level of Government
Five-year Period July 2007 through June 2012

| Category and Project Type | City | County | State | Federal | Joint | Other | Total | | | | | | |
|--------------------------------------|------------------|--------------|------------------|--------------|-------------------|--------------|----------------|-------------|----------------|-------------|------------------|--------------|-------------------|
| Transportation and Utilities | \$2,236.7 | 11.8% | \$2,237.9 | 11.8% | \$13,743.8 | 72.7% | \$300.0 | 1.6% | \$372.8 | 2.0% | \$16.9 | 0.1% | \$18,908.2 |
| Transportation | 2,064.3 | 11.3% | 1,798.6 | 9.8% | 13,743.8 | 75.2% | 300.0 | 1.6% | 372.8 | 2.0% | 6.8 | 0.0% | 18,286.4 |
| Other Utilities | 155.6 | 26.3% | 425.9 | 72.0% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 10.1 | 1.7% | 591.6 |
| Telecommunications | 16.8 | 55.6% | 13.4 | 44.4% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 30.2 |
| Education | \$630.4 | 8.2% | \$2,932.7 | 38.0% | \$4,093.4 | 53.0% | \$0.0 | 0.0% | \$2.3 | 0.0% | \$60.6 | 0.8% | \$7,719.4 |
| Non K-12 Education | 3.9 | 0.1% | 2.5 | 0.1% | 4,007.4 | 99.8% | 0.0 | 0.0% | 2.3 | 0.1% | 0.0 | 0.0% | 4,016.1 |
| Existing School Improvements | 475.6 | 24.7% | 1,410.5 | 73.3% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 37.1 | 1.9% | 1,923.2 |
| K-12 New School Construction | 146.6 | 8.7% | 1,505.4 | 89.8% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 23.5 | 1.4% | 1,675.5 |
| School System-wide Need | 4.4 | 4.2% | 14.3 | 13.7% | 86.0 | 82.2% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 104.7 |
| Health, Safety and Welfare | \$2,810.9 | 39.3% | \$1,621.3 | 22.7% | \$1,514.2 | 21.2% | \$0.0 | 0.0% | \$163.0 | 2.3% | \$1,039.7 | 14.5% | \$7,149.0 |
| Water & Wastewater | 2,077.2 | 49.9% | 884.4 | 21.2% | 1.4 | 0.0% | 0.0 | 0.0% | 160.3 | 3.9% | 1,039.5 | 25.0% | 4,162.8 |
| Law Enforcement | 196.5 | 9.9% | 539.3 | 27.2% | 1,244.8 | 62.8% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 1,980.6 |
| Storm Water | 305.9 | 90.1% | 32.2 | 9.5% | 0.7 | 0.2% | 0.0 | 0.0% | 0.8 | 0.2% | 0.0 | 0.0% | 339.7 |
| Public Health Facilities | 2.0 | 0.6% | 73.3 | 21.4% | 266.7 | 78.0% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 342.1 |
| Fire Protection | 163.0 | 80.3% | 38.8 | 19.1% | 0.6 | 0.3% | 0.0 | 0.0% | 0.3 | 0.1% | 0.2 | 0.1% | 202.9 |
| Housing | 50.8 | 72.1% | 19.7 | 27.9% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 70.5 |
| Solid Waste | 15.5 | 30.7% | 33.5 | 66.2% | 0.0 | 0.0% | 0.0 | 0.0% | 1.6 | 3.1% | 0.0 | 0.0% | 50.5 |
| Recreation and Culture | \$873.6 | 47.8% | \$412.5 | 22.6% | \$481.8 | 26.4% | \$0.2 | 0.0% | \$59.8 | 3.3% | \$0.3 | 0.0% | \$1,828.2 |
| Recreation | 574.7 | 50.5% | 256.9 | 22.6% | 267.1 | 23.5% | 0.2 | 0.0% | 38.1 | 3.4% | 0.3 | 0.0% | 1,137.2 |
| Community Development | 251.5 | 75.6% | 70.5 | 21.2% | 2.8 | 0.9% | 0.0 | 0.0% | 7.7 | 2.3% | 0.0 | 0.0% | 332.4 |
| Libraries, Museums, & Historic Sites | 47.4 | 13.2% | 85.2 | 23.8% | 211.9 | 59.1% | 0.0 | 0.0% | 14.0 | 3.9% | 0.0 | 0.0% | 358.6 |
| Economic Development | \$197.3 | 18.9% | \$793.8 | 76.2% | \$0.2 | 0.0% | \$0.0 | 0.0% | \$37.9 | 3.6% | \$11.9 | 1.1% | \$1,041.1 |
| Business District Development | 133.6 | 16.5% | 653.2 | 80.6% | 0.0 | 0.0% | 0.0 | 0.0% | 23.5 | 2.9% | 0.0 | 0.0% | 810.3 |
| Industrial Sites & Parks | 63.7 | 27.6% | 140.6 | 60.9% | 0.2 | 0.1% | 0.0 | 0.0% | 14.4 | 6.3% | 11.9 | 5.2% | 230.8 |
| General Government | \$251.2 | 38.6% | \$257.2 | 39.6% | \$113.5 | 17.5% | \$20.0 | 3.1% | \$7.9 | 1.2% | \$0.1 | 0.0% | \$649.9 |
| Public Buildings | 244.1 | 40.3% | 248.2 | 41.0% | 85.1 | 14.1% | 20.0 | 3.3% | 7.7 | 1.3% | 0.1 | 0.0% | 605.3 |
| Other Facilities | 3.0 | 7.8% | 7.9 | 20.6% | 27.5 | 71.7% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 38.4 |
| Property Acquisition | 4.1 | 65.1% | 1.1 | 17.0% | 0.9 | 14.0% | 0.0 | 0.0% | 0.3 | 4.0% | 0.0 | 0.0% | 6.3 |
| Grand Total | \$7,000.1 | 18.8% | \$8,255.4 | 22.1% | \$19,946.9 | 53.5% | \$320.2 | 0.9% | \$643.8 | 1.7% | \$1,129.6 | 3.0% | \$37,296.0 |

Table 7. Needed Infrastructure Improvements by Project Type and Stage of Development
Five-year Period July 2008 through June 2013*

| Category and Project Type** | Conceptual | | Planning & Design | | Construction | |
|--------------------------------------|--------------|--------------------|-------------------|--------------------|--------------|--------------------|
| | Number | Cost [in millions] | Number | Cost [in millions] | Number | Cost [in millions] |
| Transportation and Utilities | 1,966 | \$ 8,334.6 | 900 | \$ 7,081.4 | 501 | \$ 3,492.3 |
| Transportation | 1,935 | 8,263.9 | 877 | 7,023.6 | 486 | 2,998.9 |
| Other Utilities | 28 | 57.1 | 21 | 45.9 | 13 | 488.6 |
| Telecommunications | 3 | 13.6 | 2 | 11.9 | 2 | 4.8 |
| Education | 544 | \$ 3,972.5 | 214 | \$ 1,355.8 | 74 | \$ 468.0 |
| Non K-12 Education | 448 | 2,772.4 | 179 | 1,032.7 | 58 | 211.1 |
| K-12 New School Construction | 62 | 1,118.0 | 19 | 301.6 | 14 | 255.8 |
| School System-wide Need | 34 | 82.1 | 16 | 21.4 | 2 | 1.1 |
| Health, Safety and Welfare | 1,228 | \$ 3,469.7 | 592 | \$ 1,893.5 | 358 | \$ 1,765.9 |
| Water & Wastewater | 807 | 1,761.9 | 419 | 1,198.2 | 266 | 1,202.7 |
| Law Enforcement | 190 | 1,279.1 | 70 | 440.2 | 32 | 261.3 |
| Storm Water | 42 | 73.4 | 23 | 67.8 | 25 | 198.4 |
| Public Health Facilities | 66 | 184.0 | 25 | 97.3 | 8 | 60.7 |
| Fire Protection | 87 | 129.9 | 34 | 31.1 | 17 | 41.8 |
| Housing | 4 | 16.1 | 10 | 43.1 | 5 | 11.3 |
| Solid Waste | 32 | 25.2 | 11 | 15.7 | 5 | 9.6 |
| Recreation and Culture | 525 | \$ 1,027.3 | 290 | \$ 488.5 | 151 | \$ 312.4 |
| Recreation | 407 | 520.8 | 225 | 371.2 | 120 | 245.2 |
| Community Development | 65 | 254.2 | 32 | 42.5 | 17 | 35.7 |
| Libraries, Museums, & Historic Sites | 53 | 252.3 | 33 | 74.8 | 14 | 31.5 |
| Economic Development | 93 | \$ 224.9 | 51 | \$ 563.7 | 21 | \$ 252.5 |
| Business District Development | 16 | 91.8 | 15 | 492.7 | 9 | 225.8 |
| Industrial Sites & Parks | 77 | 133.2 | 36 | 71.0 | 12 | 26.6 |
| General Government | 154 | \$ 290.1 | 82 | \$ 204.5 | 54 | \$ 155.3 |
| Public Buildings | 135 | 262.6 | 76 | 189.6 | 48 | 153.1 |
| Other Facilities | 14 | 26.0 | 2 | 11.9 | 2 | 0.4 |
| Property Acquisition | 5 | 1.5 | 4 | 2.9 | 4 | 1.9 |
| Grand Total | 4,510 | \$ 17,319.1 | 2,129 | \$ 11,587.4 | 1,159 | \$ 6,466.3 |

*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.

of July 1, 2008. The recession began six months earlier and was likely already showing its effects.

As Table 7 illustrates, the distribution by stage of development varies for different types of projects. The majority of the cost is in the conceptual stage of development for 16 of the 21 types of infrastructure needs reported in the inventory. School-system-wide needs, which are now dominated by the state's special schools, were the most likely of all types to be in the conceptual stage, but more than half of infrastructure improvements needed for the other public education institutions were also in the conceptual stage. Information about improvement needs at existing schools is not included in this analysis because there are numerous small projects in varying stages of development reported for existing schools, making it impossible to identify a single stage for each school.

While the largest share of needs is in the conceptual stage, those in planning and design, at nearly one-third of total cost reported, are substantial. In dollar terms, housing, business district development, and property acquisition are all mainly in the planning and design stage of development. More than a quarter of most types of needs were reported to be in planning and design. If not for requirements to include drawings with grant applications, much of this need might have remained conceptual.

The largest percentage (82.6%) of costs in the construction phase is for other utilities, such as electricity and gas. This is because of two large, multi-phase projects: one in Nashville for electrical system construction totaling \$405 million, and the other for underground utilities in Gatlinburg worth \$59 million. The only other type of need with a majority of its needs in construction is storm water. Nearly half of these needs is accounted for by one \$94 million project in Memphis for drainage expansion.

State and Federal Mandates Affect 5% of All Projects

TACIR does not ask local or state officials to split out 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). TACIR does ask how many projects are affected by mandates. So while it is impossible to determine how

much of the estimated total costs are attributable 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.

Table 8. Percent of Projects Reported to Involve Facilities Mandates by Type of Project
Five-year Period July 2007 through June 2012

| Type of Project | Number of Projects or Schools Reported | Projects or Schools Affected by Mandates | |
|--------------------------------------|--|--|-------------|
| | | Number | Percent |
| Existing School Improvements | 1,192 | 266 | 22.3% |
| School System-wide Need | 52 | 8 | 15.4% |
| Public Health Facilities | 99 | 10 | 10.1% |
| Non K-12 Education | 685 | 62 | 9.1% |
| Law Enforcement | 292 | 19 | 6.5% |
| Solid Waste | 48 | 2 | 4.2% |
| Recreation | 752 | 30 | 4.0% |
| Public Buildings | 259 | 10 | 3.9% |
| K-12 New School Construction | 95 | 3 | 3.2% |
| Storm Water | 90 | 2 | 2.2% |
| Water & Wastewater | 1,492 | 31 | 2.1% |
| Libraries, Museums, & Historic Sites | 100 | 1 | 1.0% |
| Community Development | 114 | 1 | 0.9% |
| Transportation | 3,298 | 20 | 0.6% |
| Fire Protection | 138 | 0 | 0.0% |
| Housing | 19 | 0 | 0.0% |
| Business District Development | 40 | 0 | 0.0% |
| Industrial Sites & Parks | 125 | 0 | 0.0% |
| Other Facilities | 18 | 0 | 0.0% |
| Other Utilities | 62 | 0 | 0.0% |
| Property Acquisition | 13 | 0 | 0.0% |
| Telecommunications | 7 | 0 | 0.0% |
| Grand Total | 8,990 | 465 | 5.2% |

Moreover, the number of projects affected by mandates continues to decline. About 15% of projects reported in 2001 were mandate related. The percentage fell to 9% the following year, and the percentage affected by mandates continues to stand at just over 5%. This is largely because of the declining effect of the EIA, which was completely phased in by fall 2001. Even so, new and existing elementary and secondary schools account for 60% of the total number of projects affected by facilities mandates. Existing schools are far more likely to be associated with mandates than any other type of project.

Building Tennessee's Tomorrow:

Anticipating the State's Infrastructure Needs

July 2008 through June 2013

FUNDING THE STATE'S INFRASTRUCTURE NEEDS

Less Than a Third of All Infrastructure Needs in the Current Inventory Are Fully Funded

Information about the availability of funding to meet Tennessee's public infrastructure needs indicates that more than two thirds is not yet available. The inventory does not include funding information for needs at existing schools or for needs 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 \$29.2 billion in needs. Of this remaining amount, only \$9.1 billion is for projects that are fully funded. Most of it, \$8.6 billion, is for needs that are fully funded; another \$500 million is for needs that are partially funded. That leaves another \$20.1 billion of needs for which funding is not yet available. (See Table 9.)

**Table 9. Summary of Funding Availability
Five-year Period July 2008 through June 2013**

| | Funding Available [in billions] | Funding Needed [in billions] | Total [in billions] |
|------------------------|------------------------------------|---------------------------------|------------------------|
| Fully Funded Needs | \$ 8.6 | \$ 0 | \$ 8.6 |
| Partially Funded Needs | 0.5 | 1.1 | 1.6 |
| Unfunded Needs | 0 | 19.0 | 19.0 |
| Total* | \$ 9.1 | \$ 20.1 | \$ 29.2 |

*Excluding needs for which availability of funds is unknown.

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. Some projects are expected to receive funding from the American Recovery and Reinvestment Act (ARRA); however, the amount of ARRA funds that will be used to meet these needs is as yet unknown. The next inventory should provide more information about the use of ARRA funds.

Table 10 on the following page takes the \$8.6 billion dollars available for fully funded needs (from Table 9), breaks it down by type of need, and compares it to the total needed for each type of project in the

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.

inventory. Fully funded transportation projects account for more than half the estimated cost of all fully funded infrastructure needs. Even so, only 26% of transportation needs in dollar terms are fully funded. Interestingly, the type of need with the highest percentage in Table 10—other utilities—falls in the same broad category (Transportation and Utilities), and only one project of that type is fully funded: a project to expand and improve the electric system in Davidson County. But that one \$511 million project accounts for 79% of the total estimated cost reported for other utilities, and \$511 million is 86% of the total estimated cost of other utilities needs reported in this inventory. Still, because transportation needs dominate the Transportation and Utilities category, fully funded projects make up only 28% of the category as a whole in dollar terms.

Table 10. Percentage of Needs Fully Funded by Type of Need
Five-year Period July 2008 through June 2013

| Category and Project Type | Total Needs [in millions] | Fully Funded Needs [in millions] | Percent of Total Needs Fully Funded |
|---------------------------------------|--------------------------------------|---|--|
| Transportation & Utilities | \$ 18,865.6 | \$ 5,352.1 | 28.4% |
| Transportation | 18,243.8 | 4,826.3 | 26.5% |
| Other Utilities | 591.6 | 511.0 | 86.4% |
| Telecommunications | 30.2 | 14.8 | 48.9% |
| Health, Safety and Welfare | \$ 5,634.8 | \$ 2,001.5 | 35.5% |
| Water & Wastewater | 4,161.4 | 1,470.5 | 35.3% |
| Law Enforcement | 735.8 | 245.1 | 33.3% |
| Storm water | 338.9 | 215.1 | 63.5% |
| Solid Waste | 50.5 | 9.6 | 19.0% |
| Fire Protection | 202.3 | 45.4 | 22.4% |
| Public Health Facilities | 75.4 | 3.3 | 4.3% |
| Housing | 70.5 | 12.6 | 17.9% |
| Education | \$ 1,702.9 | \$ 375.7 | 22.1% |
| K-12 New School Construction | 1,675.5 | 370.0 | 22.1% |
| Non K-12 Education | 8.7 | 1.7 | 19.0% |
| School System-wide Need | 18.6 | 4.0 | 21.5% |
| Recreation and Culture | \$ 1,388.5 | \$ 398.0 | 28.7% |
| Recreation | 909.4 | 313.5 | 34.5% |
| Libraries, Museums, & Historic Sites | 146.7 | 42.6 | 29.0% |
| Community Development | 332.4 | 42.0 | 12.6% |
| Economic Development | \$ 1,041.1 | \$ 273.3 | 26.2% |
| Business District Development | 810.3 | 238.1 | 29.4% |
| Industrial Sites & Parks | 230.8 | 35.2 | 15.2% |
| General Government | \$ 541.2 | \$ 192.3 | 35.5% |
| Public Buildings | 524.1 | 186.2 | 35.5% |
| Other Facilities | 10.9 | 2.5 | 22.6% |
| Property Acquisition | 6.3 | 3.7 | 58.8% |
| Grand Total | \$ 29,174.2 | \$ 8,593.0 | 29.5% |

Overall, fully funded projects account for close to 30% of the total estimated cost of public infrastructure needs included in this analysis. And fully funded needs account for a like percentage of the Recreation and Culture category. The Economic Development category comes close at 26%.

Education needs trail all others in this comparison, though not by much. Almost all of the education needs—and nearly all of the fully funded education needs—included in this table are for new school construction, and only 22% (\$370 million) are fully funded. Needs at existing schools are not reported here because those needs are reported in such detail (e.g., individual components, such as classrooms, and individual mandates, such as ADA compliance, that may be a subcomponent of another project) that it is impossible to break out the funding for them by source.

School systems in Tennessee are not fiscally independent, which may hamper school officials' ability to project funding and may at least partially account for the low percentages reported in Table 10. 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 10 for Non K-12 education are very small because needs reported by the state's colleges and universities, like other needs reported in state capital budget, are not included in this analysis. Amounts that are reported here are for head start centers, pre-kindergarten schools, and vocational training and higher education centers owned by city or county governments. Examples are a skills center in Tracy City and a technology center in Chester County.

Two broad categories of need are tied with the largest percentages at the category level in Table 10: General Government and Health, Safety and Welfare. Fully funded needs reported in each of these categories account for more than a third of the total funding needed, but there is a lot of variation within these categories. In fact, the Health, Safety and Welfare category includes both the type of need with the smallest fully funded percentage (public health facilities, 4.3%) and the type with the second largest fully funded percentage (storm water projects, 63.5%).

Table 11 on the next page is almost the mirror image of Table 10. It breaks the \$19.0 billion in completely unfunded needs from Table 9 down by type of need. Unfunded needs comprise more than half the needs in all categories and more than three-fourths of Education needs. Health, Safety and Welfare, which tied with General Government for the most fully funded category in Table 10, looks better than any other category in Table 11, but even so, its unfunded needs make up 59% of total needs in that category. In fact, unfunded needs comprise

In developed areas where public facilities need upgrading or expansion, innovative financing methods may include

- general property taxes
- sales taxes
- excise taxes
- tax increment financing
- business districts
- bonds
- motor fuel taxes
- various types of special taxing districts.

In areas of new development, financing may involve

- special taxing districts
- exactions
- common exactions for basic infrastructure
- impact fees
- excise taxes.

Innovative Methods of Local Government Infrastructure Financing: A Guide to Comprehensive Financial Planning for Local Governments, Paul Nicolosi, <http://webapps.icma.org/pm/9011/>

more than half of every type of public infrastructure need except other utilities, storm water and property acquisition. The extremes are the same as in Table 10, with public health facilities at 92% and other utilities at 13%. Comparing tables 10 and 11 indicates that the majority of needs in all categories were either fully funded or completely unfunded, and very few were partially funded.

**Table 11. Percentage of Needs with no Funding Reported by Type of Need
Five-year Period July 2008 through June 2013**

| Category and Project Type | Total Needs* [in millions] | Needs with No Funding [in millions] | Percent of Total Needs with no Funding |
|---------------------------------------|---------------------------------------|--|---|
| Transportation & Utilities | 18,865.6 | 12,485.9 | 66.2% |
| Transportation | 18,243.8 | 12,393.8 | 67.9% |
| Other Utilities | 591.6 | 76.6 | 13.0% |
| Telecommunications | 30.2 | 15.5 | 51.1% |
| Health, Safety and Welfare | 5,634.8 | 3,299.5 | 58.6% |
| Water & Wastewater | 4,161.4 | 2,513.6 | 60.4% |
| Law Enforcement | 735.8 | 399.7 | 54.3% |
| Storm water | 338.9 | 83.0 | 24.5% |
| Solid Waste | 50.5 | 38.6 | 76.4% |
| Fire Protection | 202.3 | 154.7 | 76.4% |
| Public Health Facilities | 75.4 | 69.6 | 92.4% |
| Housing | 70.5 | 40.2 | 57.1% |
| Education | 1,702.9 | 1,286.7 | 75.6% |
| K-12 New School Construction | 1,675.5 | 1,265.2 | 75.5% |
| Non K-12 Education** | 8.7 | 6.8 | 77.6% |
| School System-wide Need | 18.6 | 14.6 | 78.5% |
| Recreation and Culture | 1,388.5 | 875.8 | 63.1% |
| Recreation | 909.4 | 514.5 | 56.6% |
| Libraries, Museums, & Historic Sites | 146.7 | 89.1 | 60.8% |
| Community Development | 332.4 | 272.2 | 81.9% |
| Economic Development | 1,041.1 | 737.9 | 70.9% |
| Business District Development | 810.3 | 569.7 | 70.3% |
| Industrial Sites & Parks | 230.8 | 168.2 | 72.9% |
| General Government | 541.2 | 339.6 | 62.7% |
| Public Buildings | 524.1 | 328.6 | 62.7% |
| Other Facilities | 10.9 | 8.4 | 77.4% |
| Property Acquisition | 6.3 | 2.6 | 41.2% |
| Grand Total | 29,174.2 | 19,025.2 | 65.2% |

*Excludes needs for which availability of funds is unknown.

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

Local Revenues Remain the Principal Source of Funding for Fully Funded Public Infrastructure Needs

Table 12 compares funding amounts for fully funded needs in July 2008 to those in July 2004 by funding source. Local revenues, which consist of city, county, and special district revenues, remain the principal source of funding for fully funded infrastructure needs. Other sources, such as donations,

and state sources are consistent amounts in this comparison, but state sources are a smaller percentage of the total amount in this analysis. Federal and local sources fluctuated nearly the same amount in dollars but the percentage of federal sources increased the most of all sources. As noted earlier, the needs of state agencies, including higher education, are not analyzed here because they are drawn from capital budget requests that report only the funding sources proposed, not the funding that is available.

Table 12. Funding Sources For Fully Funded Public Infrastructure Needs
Five-year Period July 2008 through June 2013
Compared with July 2004 Inventory

| Funding Source | 2004-2009 Inventory | | 2008-2013 Inventory | |
|----------------|---------------------|---------------|---------------------|---------------|
| | Amount [billions] | Percent | Amount [billions] | Percent |
| Local | \$3.6 | 46.4% | \$4.1 | 47.7% |
| State | 2.4 | 30.9% | 2.4 | 27.3% |
| Federal | 1.7 | 21.9% | 2.1 | 24.7% |
| Other | 0.1 | 0.8% | 0.0 | 0.3% |
| Total | \$7.8 | 100.0% | \$8.6 | 100.0% |

The overall increase of \$800 million for fully funded infrastructure needs was split evenly between local and federal sources. Both increased from the last report by about \$400 million, and consequently, so did their share of funding for fully funded projects. The increase in local funding is attributable to the \$405 million electric system upgrade in Davidson County mentioned earlier. The increase in federal funding is mainly for transportation projects, which climbed \$548 million from 2004 to 2008. In fact, federal funding available for some types of needs reported in the inventory declined dramatically. Federal funding for community development, housing, and libraries, museums, and historic sites decreased by 75% or more. State and other funding available for fully funded projects remained about the same, but declined proportionally because of the increases in local and federal funding.

Table 13 on the next page breaks the information in Table 12 for local funding in the current inventory into city, county, and special district sources. From this perspective, city and county sources make up about the same percentage as state and federal sources, but the state is providing the largest amount (\$2.4 billion) for fully funded needs. Federal and county sources come close at \$2.1 billion and \$2.0 billion respectively, and city sources are close behind at \$1.9

The current economic slowdown and turmoil in the housing and credit markets threaten to further constrain state and local infrastructure spending. Because states and municipalities rely heavily on property and sales taxes, the housing correction and consumer slowdown are creating a budgetary crisis for many state and local governments.

Bernard L. Schwartz: New America Foundation, June 19, 2008. Cited from [Redressing America's Public Infrastructure Deficit, June 10 2008, http://transportation.house.gov/Media/File/Full%20Committee/20080610/Schwartz%20Testimony_6-10-08.pdf]

billion. Special districts and other sources contribute the smallest amount to fully funded needs at less than 4% of the total for the two combined.

**Table 13. Funding Sources For Fully Funded Needs
Five-year Period July 2008 through June 2013**

| 2008-2013 Inventory | | |
|---------------------|-------------------|---------------|
| Funding Source | Amount [billions] | Percent |
| State | \$2.4 | 27.3% |
| Federal | 2.1 | 24.6% |
| Other | 0.0 | 0.3% |
| City | 1.9 | 21.8% |
| County | 2.0 | 23.3% |
| Special District | 0.2 | 2.7% |
| Total | \$8.6 | 100.0% |

State and Federal Agencies Provide the Most Funding for Transportation Needs, While Cities and Counties Contribute the Most Toward All Other Needs

Table 14 breaks the funding for fully funded needs down by category and type of infrastructure, as well as by funding source. State and federal sources are the largest contributors of funds to infrastructure needs included in the Transportation and Utilities category, providing roughly 76% of funds for these needs. Transportation is the only type of need for which state and federal sources provide most of the funding. Of the \$4.8 billion reported for transportation, \$2.2 billion is expected to come from state sources and \$1.9 billion from the federal government. In addition, \$379 million for transportation needs comes from county sources, \$344 million from city sources, and \$11 million from special districts and other sources. More than 67% of telecommunication funding comes from city sources and nearly 80% of other utility funding comes from county sources. As noted earlier, state needs are not included in this analysis.

More than half (53%) of the funding for Health, Safety and Welfare needs comes from city sources. In fact, cities provide more than 70% of the funding for storm water, fire protection, and housing needs. Almost all (97%) of the special district funding reported in this category is from water utilities for their water and wastewater needs.

Table 14
 Table 14. Funding Source by Category and Type of Infrastructure for Fully Funded Needs [in millions]
 Five-year Period July 2008 through June 2013

| Category and Project Type | City | | County | | State | | Federal | | Special Districts | | Other | | Total |
|---------------------------------------|----------------|--------------|--------------|--------------|----------------|--------------|----------------|--------------|-------------------|--------------|-------------|-------------|----------------|
| | Amount | Percent | Amount | Percent | Amount | Percent | Amount | Percent | Amount | Percent | Amount | Percent | |
| Transportation & Utilities | 451.7 | 8.4% | 788.7 | 14.7% | 2,228.3 | 41.6% | 1,868.3 | 34.9% | 3.5 | 0.1% | 11.6 | 0.2% | 5,352.1 |
| Transportation | 343.9 | 7.1% | 378.9 | 7.9% | 2,227.7 | 46.2% | 1,864.5 | 38.6% | 0.4 | 0.0% | 11.0 | 0.2% | 4,826.3 |
| Other Utilities | 97.9 | 19.2% | 405.0 | 79.3% | 0.7 | 0.1% | 3.8 | 0.7% | 3.1 | 0.6% | 0.6 | 0.1% | 511.0 |
| Telecommunications | 10.0 | 67.6% | 4.8 | 32.4% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 14.8 |
| Health, Safety and Welfare | 1,097.4 | 54.8% | 492.2 | 24.6% | 63.6 | 3.2% | 130.2 | 6.5% | 216.9 | 10.8% | 1.1 | 0.1% | 2,001.5 |
| Water & Wastewater | 809.5 | 55.1% | 260.8 | 17.7% | 62.2 | 4.2% | 121.4 | 8.3% | 215.4 | 14.7% | 1.0 | 0.1% | 1,470.5 |
| Law Enforcement | 61.7 | 25.2% | 183.4 | 74.8% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 245.1 |
| Storm water | 181.2 | 84.2% | 28.2 | 13.1% | 1.3 | 0.6% | 4.4 | 2.1% | 0 | 0.0% | 0 | 0.0% | 215.1 |
| Solid Waste | 0.6 | 6.2% | 8.9 | 92.7% | 0.1 | 1.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 9.6 |
| Fire Protection | 33.4 | 73.6% | 9.6 | 21.2% | 0 | 0.0% | 0.8 | 1.8% | 1.5 | 3.2% | 0.1 | 0.3% | 45.4 |
| Public Health Facilities | 1.1 | 33.1% | 1.3 | 38.5% | 0 | 0.0% | 0.9 | 28.4% | 0 | 0.0% | 0 | 0.0% | 3.3 |
| Housing | 10.0 | 79.4% | 0 | 0.0% | 0 | 0.0% | 2.6 | 20.6% | 0 | 0.0% | 0 | 0.0% | 12.6 |
| Education | 33.8 | 9.0% | 337.5 | 90.9% | 0.4 | 0.1% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 375.7 |
| K-12 New School Construction | 33.3 | 9.0% | 336.7 | 91.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 370.0 |
| Non K-12 Education | 0.5 | 30.1% | 0.8 | 45.7% | 0.4 | 24.1% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 1.7 |
| School System-wide Need | 0 | 0.0% | 4.0 | 100.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 4.0 |
| Recreation and Culture | 170.5 | 42.8% | 128.4 | 32.3% | 22.6 | 5.7% | 71.9 | 18.1% | 0 | 0.0% | 4.6 | 1.2% | 398.0 |
| Recreation | 138.0 | 44.0% | 100.3 | 32.0% | 16.3 | 5.2% | 57.4 | 18.3% | 0 | 0.0% | 1.4 | 0.5% | 313.5 |
| Libraries, Museums, & Historic Sites | 15.5 | 36.4% | 22.1 | 51.8% | 0.4 | 0.9% | 1.5 | 3.5% | 0 | 0.0% | 3.2 | 7.4% | 42.6 |
| Community Development | 17.0 | 40.4% | 6.0 | 14.4% | 5.9 | 14.1% | 13.0 | 31.0% | 0 | 0.0% | 0 | 0.0% | 42.0 |
| Economic Development | 48.8 | 17.9% | 171.5 | 62.8% | 23.3 | 8.5% | 24.3 | 8.9% | 0.5 | 0.2% | 4.9 | 1.8% | 273.3 |
| Business District Development | 43.4 | 18.2% | 161.7 | 67.9% | 13.0 | 5.5% | 17.0 | 7.2% | 0 | 0.0% | 3.0 | 1.3% | 238.1 |
| Industrial Sites & Parks | 5.4 | 15.3% | 9.8 | 27.9% | 10.3 | 29.3% | 7.3 | 20.7% | 0.5 | 1.4% | 1.9 | 5.4% | 35.2 |
| General Government | 75.8 | 39.4% | 77.9 | 40.5% | 8.5 | 4.4% | 22.1 | 11.5% | 0.5 | 0.3% | 7.5 | 3.9% | 192.3 |
| Public Buildings | 71.1 | 38.2% | 77.6 | 41.7% | 8.1 | 4.3% | 21.9 | 11.8% | 0 | 0.0% | 7.5 | 4.0% | 186.2 |
| Other Facilities | 2.1 | 87.3% | 0.1 | 2.5% | 0 | 0.0% | 0.3 | 10.2% | 0 | 0.0% | 0 | 0.0% | 2.5 |
| Property Acquisition | 2.6 | 70.4% | 0.2 | 4.7% | 0.4 | 11.5% | 0 | 0.0% | 0.5 | 13.5% | 0 | 0.0% | 3.7 |

Cities also contribute heavily to meeting Recreation and Culture needs at 43% of the fully funded total, but counties also make a significant contribution (32%). Again, a little less than two-thirds (63%) of needs in the Economic Development category are funded by county sources, making them the main source of funds for these needs. Furthermore, the infrastructure needs in the General Government category are dependent primarily on city and county sources for funding. Contributions from both sources constitute approximately 80% of General Government funding.

According to information provided by local officials, counties are the chief source of funds for fully funded needs in the Education category. Nearly all (91%) of the funding for education needs analyzed here come from county sources, and all of the funds for school system-wide needs are from county sources. A single maintenance, technology, and food service building in Williamson County accounts for the entire \$4 million reported for fully funded school system-wide needs, meaning that it is the only fully funded project of its kind in the inventory.

Even though funds reported for education needs in the infrastructure needs inventory 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's K-12 schools. Through this formula, the state contributed nearly \$1.1 billion for school capital outlay over the last five fiscal years (2005-06 through 2009-10). Nevertheless, 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 outlay may be spent; school systems are given flexibility to use those funds to meet various school needs.

In other words, BEP funds for school capital outlay are fungible—interchangeable with other sources of funds, including local sources. Consequently, school systems may choose how they wish to report their use, and generally choose to report that they were used for various classroom needs, including teachers' salaries. This gives the appearance that the state makes little or no contribution to school infrastructure even though its contribution is considerable. For example, according to TACIR's 2009 report, *Capital Expenditures for Public Schools*, the school systems spend just over half the total BEP funds contributed by the state on capital outlays. In 2003-04, BEP

state capital outlay funding was nearly \$201 million, and the amount school systems actually spent on capital projects was \$371 million.

Tennessee's public schools are also benefiting from federal stimulus funds. In 2009, the Tennessee State School Bond Authority (TSSBA) received approximately \$185 million of Qualified School Construction Bonds (QSCB) as part of the ARRA. Of that amount, \$42 million was allocated by the U.S. Department of Education to Memphis City Schools, \$21 million to Metropolitan Nashville and Davidson County Schools and the remainder, \$122 million, was given to the state to allocate to other school systems. QSCBs are issued by states or local governments for the construction, rehabilitation or repair of public school facilities and to acquire land for the construction of a public school facility. TACIR staff worked with the Comptroller's Division of Bond Finance to develop criteria and an application form for the QSCB program. Data used for the development of these criteria came from this inventory. In addition to Memphis City Schools and Metropolitan Nashville and Davidson County Schools, 25 school systems requested funds through this program, and 11 of them were funded. The 2010 allocation has an estimated \$213 million available for competitive application.

State Government is the Largest Source of Funds in Non-Metropolitan Counties

Based on public infrastructure needs that are fully funded, non-metropolitan counties are far more dependent on state funds than their metropolitan counterparts.⁷ State sources provide more than twice as much funding in non-metropolitan counties as in metropolitan counties—43% compared with less than 20%. And nearly three quarters (72%) of needs in these counties are funded from a combination of state and federal sources, while only 43% of funds in metropolitan counties come from these two sources. On the other hand, special districts play a much larger role in funding the needs of metropolitan counties than they do in non-metropolitan counties. Similarly,

⁷Thirty-eight Tennessee counties are part of the federal Office of Management and Budget's Metropolitan Statistical Areas (MSAs). The general concept of a metropolitan statistical area is that of a large population nucleus, together with adjacent communities, having 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 metropolitan statistical areas for purposes of collecting, tabulating, and publishing federal data.

other sources—non-governmental sources—are far more significant in metropolitan counties. (See table 15.)

Table 15. Funding Sources for Fully Funded Needs in Metropolitan and Non-Metropolitan Counties
Five-year Period July 2008 through June 2013

| | Type of County | | | | Total [in millions] |
|------------------|-------------------------|---------------|-------------------------|---------------|------------------------|
| | Metropolitan | | Non-Metropolitan | | |
| | Amount [in millions] | Percent | Amount [in millions] | Percent | |
| State | 1,149.0 | 19.8% | 1,197.7 | 43.1% | 2,346.7 |
| Federal | 1,318.0 | 22.7% | 798.8 | 28.8% | 2,116.8 |
| Other | 26.8 | 0.5% | 2.9 | 0.1% | 29.7 |
| City | 1,429.7 | 24.6% | 448.4 | 16.2% | 1,878.1 |
| County | 1,695.3 | 29.1% | 304.9 | 11.0% | 2,000.2 |
| Special District | 197.8 | 3.4% | 23.7 | 0.9% | 221.5 |
| Total | 5,816.7 | 100.0% | 2,776.3 | 100.0% | 8,593.0 |

Building Tennessee's Tomorrow:

Anticipating the State's Infrastructure Needs

July 2008 through June 2013

REPORTED PUBLIC SCHOOL FACILITY CONDITIONS AND NEEDS⁸

School infrastructure improvements—including new schools and improvements or additions to existing schools—that need to be started or completed sometime during the five-year period of July 2008 through June 2013 are estimated to cost more than \$3.6 billion. This total is some \$110 million less than the estimate in last year's report, a 3% decline. (See Table 16.)

**Table 16. Reported Cost of Public School Infrastructure Needs by Type of Need
Five-year Period July 2008 through June 2013**

| Type of Need | July 2007 Inventory | July 2008 Inventory | Difference | Percent Change |
|---------------------------------|-------------------------|-------------------------|-------------------------|-------------------|
| New School Construction | \$ 1,798,581,339 | \$ 1,675,471,865 | \$ (123,109,474) | -6.8% |
| Enrollment Growth & Other Needs | 1,746,729,373 | 1,647,897,787 | (98,831,586) | -5.7% |
| EIA-related Needs | 51,851,966 | 27,574,078 | (24,277,888) | -46.8% |
| Existing Schools | \$ 1,899,734,970 | \$ 1,923,171,646 | \$ 23,436,676 | 1.2% |
| Facility Component Upgrades | 1,497,506,841 | 1,576,189,566 | 78,682,725 | 5.3% |
| Technology | 244,309,144 | 236,708,447 | (7,600,697) | -3.1% |
| Federal Mandate | 51,293,076 | 44,278,483 | (7,014,593) | -13.7% |
| EIA Mandates | 74,237,600 | 48,377,600 | (25,860,000) | -34.8% |
| Other State Mandates | 32,388,309 | 17,617,550 | (14,770,759) | -45.6% |
| System-wide Needs | 29,430,000 | 18,646,000 | (10,784,000) | -36.6% |
| Statewide Total | \$ 3,727,746,309 | \$ 3,617,289,511 | \$ (110,456,798) | -3.0% |

Both new school construction and system-wide needs decreased since the previous inventory; however, needs at existing schools increased 1.2% because of facility component upgrades. Facility component upgrades needed in this inventory are mainly additions. This increase, coupled with a decrease in reported new and replacement school needs, may signal a shift from building new schools to adding on to existing schools because of budget constraints or because enrollment growth has slowed.

Need for New Schools Decreases as Enrollment Growth Slows

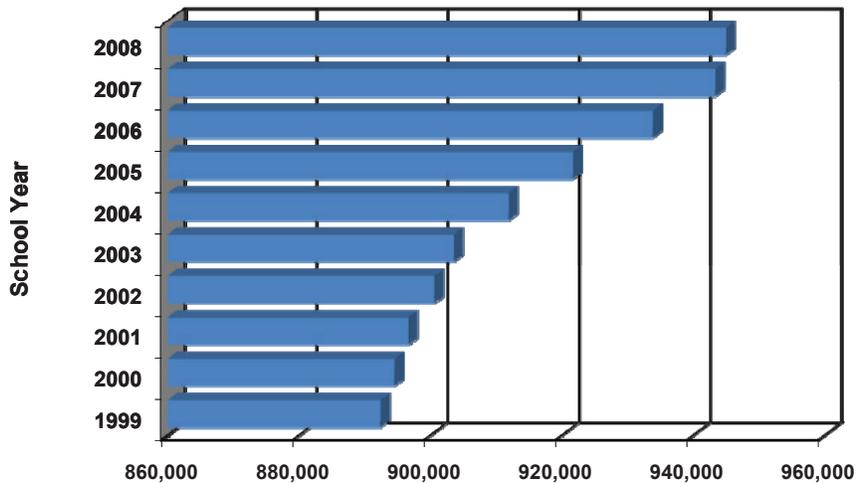
A major concern for some local officials throughout the life of the inventory has been keeping up with the cost of rapid enrollment growth, but statewide enrollment growth has begun to slow after years of rapid growth. Enrollment growth boomed from 2004 to 2007, ranging from just under 1% statewide in 2004 to just over 1.3% in 2006. Growth had been less than half of a percent in earlier years—as little as 0.24% in 2000 and 2001—and has now dropped to 0.17%. (See Figure 3.) Nearly two-thirds of the

⁸This 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.

increase during the peak years of 2004 through 2007 occurred in Davidson and surrounding counties in Middle Tennessee:

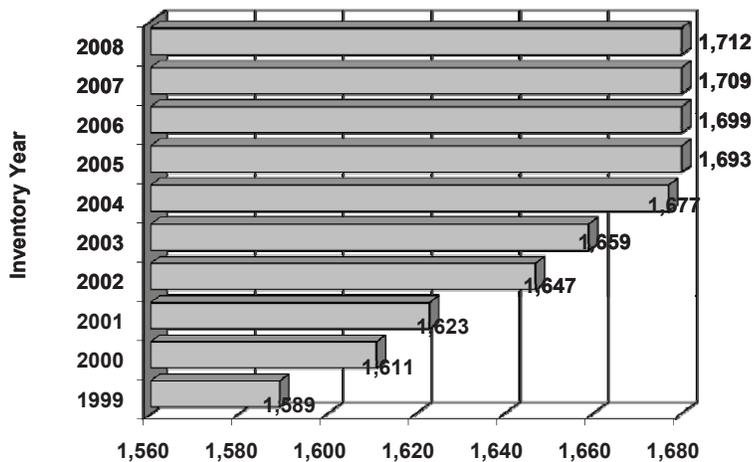
- Rutherford County (7,191 or 18%)
- Williamson County (6,274 or 16%)
- Davidson County (3,687 or 9%)
- Montgomery County (2,860 or 7%)
- Sumner County (2,402 or 6%)
- Wilson County (2,049 or 5%)
- Robertson County (1,105 or 3%)

Figure 3. Number of Students in Public Schools 2001 through 2008



The Knoxville area also experienced relatively high enrollment growth in those years, though not as high as the Nashville area: Knox County, 2,538 or 6% of the statewide total; Sevier County, 1,489 or 4% of the total; and Blount county, 1,281 or 3%. The only other county that grew by more than 1,000 students was Bradley County, just east of Chattanooga (1,044 or 3%).

Figure 4. Number of Public Schools 1999 through 2008



Growth in the need for new schools reported by local officials has also slowed (see Figure 4). It is possible that the decrease in new school needs is because of slower enrollment growth. As shown in Figure 4, the number of schools appears to have plateaued. This leveling out may be temporary because of tough economic times, which have dampened growth as well as spending. And it is possible that officials are not reporting all needs because they know that funds are not available, but the two graphs—enrollment and number of schools—have similar shapes, indicating that the slower growth in the number of new schools is being driven by slower growth in enrollment.

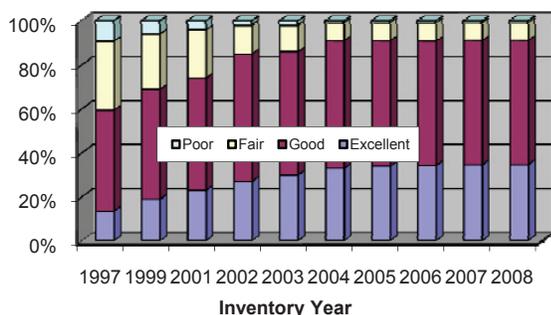
Nevertheless, we expect that there will be a moderate increase in needs reported in the next inventory because of the federal Qualified School Construction Bonds program authorized by the American Recovery and Reinvestment Act. Tennessee school systems can earn points when applying for these bonds if they have reported their needs in TACIR’s public infrastructure needs inventory. Consequently, we may see an increase in reporting in the next inventory.

Most of Tennessee’s Public Schools Are in Good or Excellent Condition, but Upgrade Needs Remain

Defining what constitutes a high-quality learning environment is both subjective and difficult. The rating scale used in this inventory is carefully defined, but rating individual schools and school components is left to the judgment of local officials. While the ideal standard is a qualitative rating of “excellent,” as a practical matter, the inventory captures the cost of getting schools into “good” condition—both overall and for each facility component.

The vast majority of Tennessee’s public school systems rate the condition of their buildings 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. So the inventory includes the estimated cost of putting these individual components, as well as entire schools, in good condition. Figure 5 illustrates how much the condition of Tennessee’s public school buildings has improved since the inventory began.

Figure 5. Overall Condition of Public School Buildings 1997 through 2008



ings has improved since the inventory began. Local officials now report that around 91% of their schools are in good or better condition—about the same percentage as the previous two reports, but considerably better than the 59% reported in 1999.

More than 90% of Tennessee’s 135 full-service school systems rate at least three-fourths of their facilities good or excellent overall. (See Table 17.) Only three rate more than half of their schools in less than

Table 17. Cost per Student to Put All Components in Good Condition by Percent of Schools Currently in Good or Excellent Condition
Five-year Period July 2008 through June 2013

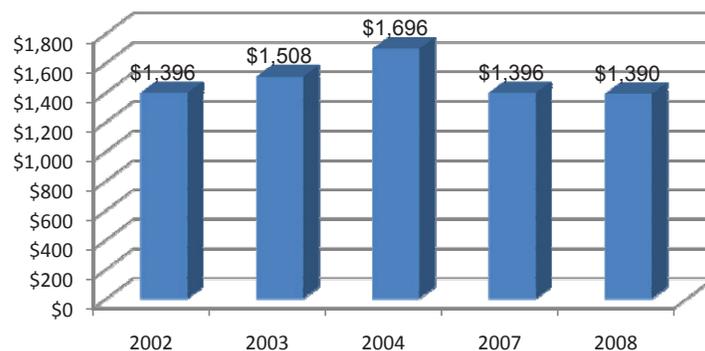
| Percent of Schools Good or Excellent | Number of School Systems | Percent of School Systems | Cost Per Student to Put All School Components in Good Condition |
|--------------------------------------|--------------------------|---------------------------|---|
| None | 0 | 0.0% | \$0 |
| Less than 25% | 0 | 0.0% | \$0 |
| 25 to 50% | 3 | 2.2% | \$4,767 |
| 50 to 75% | 7 | 5.2% | \$3,578 |
| 75 to 100% | 33 | 24.4% | \$829 |
| 100% | 92 | 68.1% | \$1,009 |
| Total* | 135 | 100.0% | \$1,390 |

*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.

good condition: Coffee County, Grundy County, and Bristol City. Both Bristol City and Coffee County report 75% of their schools in less than good condition. Grundy County has a slightly lower percentage of schools in less than good condition (63.5%). Coffee County reports the highest cost per student (\$6,385). New Union Elementary in Coffee County has a large renovation project totaling \$9 million to replace two portable classrooms, upgrade 12 permanent classrooms, and perform other general renovations. Without this large project, the county's cost per student would fall to \$4,346 for Coffee County, and the cost for the three systems with more than half their schools in less than good condition would drop from \$4,767 to \$3,912 per student.

The cost per student to upgrade all components at all schools to good or better condition remained nearly the same from the previous inventory to the current inventory and about the same as it was in 2002. The cost per student rose through 2004, peaking then at nearly \$1,700. (See Figure 6.)

Figure 6. Cost Per Student to Upgrade All Facilities in Less Than Good Condition



The Number of Portable Classrooms Continues to Increase

Two-thirds of Tennessee’s public school systems and about one-third of its 1,677 schools have portable or temporary classrooms. The number statewide has increased 2% since the last inventory, from 2,257 to 2,308 classrooms. Eight school systems have more than 10% of their classes in portables (see Table 18). Two of those systems have more than 15% of their classes in portable classrooms: Bradford Special School District (17.1%) and Clay County (15.2%). Bradford Special School District only has two schools and six portable classrooms.

Table 18. Number of School Systems by Range of Percent of Classrooms in Portable Buildings Five-year Period July 2008 through June 2013

| Percentage of Classrooms in Portables | Number of School Systems | Percent of School Systems |
|---------------------------------------|--------------------------|---------------------------|
| None | 46 | 34% |
| Less than 5% | 62 | 46% |
| 5% to 10% | 20 | 15% |
| 10% to 15% | 5 | 4% |
| More than 15% | 2 | 1% |
| Total* | 135 | 100% |

*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.

Of the eleven systems with growth in excess of 1,000 students for 2004 through 2007 (see page 34), Rutherford County has the highest percentage of classes in portables (7%). Portable classrooms are not necessarily inferior to permanent classrooms; in fact, the opposite is sometimes true, for example, when they are used to replace substandard permanent classrooms.

Figure 7. Number of Portable Classrooms July 2005 through July 2008

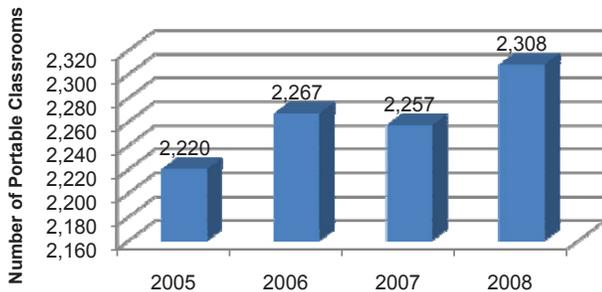


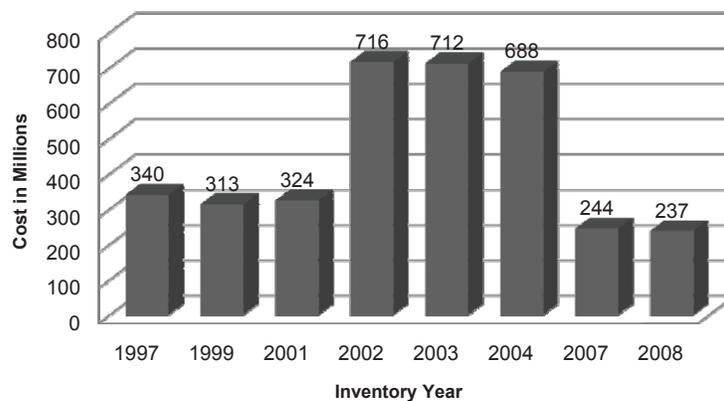
Figure 7 illustrates the increasing use of portable classrooms. Most of the increase from 2007 to 2008 can be attributed to three school systems—Williamson County, Rhea County, and Jefferson County—

all adding more than 15 portables in 2008. Williamson County alone, a high growth system, added 24 portables from 2007 to 2008.

Technology Needs Continue to Decline, Hitting the Lowest Level in the History of the Inventory

Technology needs are unique in the public infrastructure needs inventory in that the need does not have to cost \$50,000 or more to be included. The current technology needs reported equal \$236 million, a \$7 million decrease from the previous year and the lowest amount ever reported. The 3-year peak from 2002 through 2004 was caused by a technology initiative in the Memphis school system. Without this initiative, needs reported in the inventory were gradually declining. (See Figure 8.)

Figure 8. Estimated Cost of Technology Infrastructure Needs at Existing Public Schools 1997 through 2008



Forty-three systems now report no need to upgrade technology in their schools, which is four more than in the previous inventory, and 47 more need less than \$100 per student to meet their technology infrastructure needs (see Table 19). But six systems—Dyersburg, Memphis, Montgomery County, Oak Ridge, Richard City, and Scott County—all have technology infrastructure needs that exceed \$1,000 per student.

Table 19. Number of School Systems by Range of Technology Infrastructure Costs per Student Five-year Period July 2008 through June 2013

| Technology Cost per Student | Number of School Systems | Percent of School Systems |
|-----------------------------|--------------------------|---------------------------|
| None | 43 | 31.9% |
| Less than \$100 | 47 | 34.8% |
| \$100 to \$200 | 22 | 16.3% |
| \$200 to \$300 | 8 | 5.9% |
| \$300 to \$400 | 6 | 4.4% |
| More than \$400 | 9 | 6.7% |
| 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 2008 through June 2013

REPORTED INFRASTRUCTURE NEEDS BY COUNTY⁹

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 needed.

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 at nearly \$24 billion.

Greatest Total Needs Are Reported for Largest Counties

Not surprisingly, the greatest infrastructure needs in terms of total estimated costs were reported for the counties with the largest populations. Seven counties are among the top ten for total need and the top ten for total population. Blount, Sullivan, and Sumner counties are the only ones in the top ten for population that are not also in the top ten for greatest total needs; Sevier, Washington, and Wilson counties are the only ones among the top ten for reported needs that are not among the ten largest (compare Tables 20 and 21). The relationship between population and infrastructure needs is not as strong for the bottom ten counties. Only three of the ten smallest counties (Hancock, Perry, and Lake) are among the bottom ten for total reported need.

While county "top ten" rankings in many of the tables vary from year to year, the list of the most heavily populated counties changes very little. Nine of the ten largest counties in 2000 were still in the top ten in 2008. Washington County was 10th in 2000 and now ranks 11th; Blount was 11th in 2000 and now ranks 10th. The total infrastructure needs list is almost as stable. Davidson County is still number one on the list of counties with the greatest total infrastructure needs and has held this spot for four years. Without a new \$455 million Nashville downtown convention center project, Davidson County would fall behind Shelby County and rank second in Table 20 with 13.7% of the total need reported.

⁹For information on each county, see Appendix D.

**Table 20. Largest and Smallest Reported Infrastructure Needs by County
Excluding Projects Identified as Regional
Five-year Period July 2008 through June 2013**

| Rank | County | Total Reported Cost | Percent of Total | 2008 Population | Percent of Total | Cost per Capita |
|----------------------------|------------|--------------------------|------------------|------------------|------------------|-----------------|
| 1 | Davidson | \$ 3,754,680,707 | 15.5% | 626,144 | 10.1% | \$5,997 |
| 2 | Shelby | 3,285,700,724 | 13.6% | 906,825 | 14.6% | \$3,623 |
| 3 | Williamson | 1,160,905,379 | 4.8% | 171,452 | 2.8% | \$6,771 |
| 4 | Rutherford | 964,257,592 | 4.0% | 249,270 | 4.0% | \$3,868 |
| 5 | Knox | 905,863,398 | 3.7% | 430,019 | 6.9% | \$2,107 |
| 6 | Hamilton | 851,609,914 | 3.5% | 332,848 | 5.4% | \$2,559 |
| 7 | Montgomery | 786,135,000 | 3.2% | 154,756 | 2.5% | \$5,080 |
| 8 | Washington | 588,044,490 | 2.4% | 118,639 | 1.9% | \$4,957 |
| 9 | Sevier | 585,234,092 | 2.4% | 84,835 | 1.4% | \$6,898 |
| 10 | Wilson | 579,500,767 | 2.4% | 109,803 | 1.8% | \$5,278 |
| Top Ten Subtotal | | \$ 13,461,932,063 | 55.6% | 3,184,591 | 51.2% | \$4,227 |
| All Others | | \$ 10,523,727,313 | 43.5% | 2,897,089 | 46.6% | \$3,633 |
| 86 | Grundy | 29,310,200 | 0.1% | 14,220 | 0.2% | \$2,061 |
| 87 | Stewart | 28,787,000 | 0.1% | 13,226 | 0.2% | \$2,177 |
| 88 | Decatur | 25,282,688 | 0.1% | 11,288 | 0.2% | \$2,240 |
| 89 | Lewis | 24,437,270 | 0.1% | 11,564 | 0.2% | \$2,113 |
| 90 | Hancock | 23,020,736 | 0.1% | 6,693 | 0.1% | \$3,440 |
| 91 | Perry | 21,706,987 | 0.1% | 7,753 | 0.1% | \$2,800 |
| 92 | Weakley | 21,191,522 | 0.1% | 33,375 | 0.5% | \$635 |
| 93 | Crockett | 15,791,895 | 0.1% | 14,186 | 0.2% | \$1,113 |
| 94 | Lake | 14,857,122 | 0.1% | 7,323 | 0.1% | \$2,029 |
| 95 | Sequatchie | 8,748,118 | 0.0% | 13,580 | 0.2% | \$644 |
| Bottom Ten Subtotal | | \$ 213,133,538 | 0.9% | 133,208 | 2.1% | \$1,600 |
| Grand Total | | \$ 24,198,792,914 | 100.0% | 6,214,888 | 100.0% | \$3,894 |

Six of the ten counties reporting the greatest total needs—Davidson, Shelby, Hamilton, Knox, Rutherford, and Montgomery—are in that group for the sixth consecutive time. Williamson County is part of the group for the fifth straight time, Sevier County is part of it for the third time in a row, and Wilson County is in the top ten for the second time in a row. Washington County is among the top ten in need for the first time, mainly because of two large new projects: a \$23.7 million road-widening project from North of State Road 381 to South of State Road 354 and a \$16 million new elementary school. For the five previous inventories,¹⁰ the ten counties with the greatest needs consistently had more than 49% of the state's total population and anywhere from 55% to 63% of the total infrastructure needs. The percentages are comparable this year.

¹⁰Five previous inventories refer to the 1999-2004, 2001-2006, 2002-2007, 2003-2008, and 2004-2009 inventories.

The pattern is not as strong for the bottom ten counties with various counties appearing on that list in each report comparing counties. Lake and Hancock Counties have been on the list of counties reporting the least needs in all six reports; Crockett County has been among the ten with the least needs in last five reports including this one. Perry County has now been among the bottom ten for total reported need three times in a row, but it was not among the bottom ten in earlier reports. Lewis, Sequatchie, and Weakley counties are among the bottom ten for total reported need for the third time, but none of those has appeared on that list three times in a row. Grundy County is among the ten counties reporting the least infrastructure needs for the first time since making the initial list in the 2001 infrastructure needs report; Decatur and Stewart counties are among the ten reporting the least needs for the first time ever.

**Table 21. Infrastructure Improvement Needs Reported
by Most and Least Populous Counties
Excluding Projects Identified as Regional
Five-year Period July 2008 through June 2013**

| Rank | County | 2008 Population | Percent of Total | Total Reported Cost | Percent of Total |
|----------------------------|------------|---------------------|---------------------|------------------------|---------------------|
| 1 | Shelby | \$ 906,825 | 14.6% | 3,285,700,724 | 13.6% |
| 2 | Davidson | 626,144 | 10.1% | 3,754,680,707 | 15.5% |
| 3 | Knox | 430,019 | 6.9% | 905,863,398 | 3.7% |
| 4 | Hamilton | 332,848 | 5.4% | 851,609,914 | 3.5% |
| 5 | Rutherford | 249,270 | 4.0% | 964,257,592 | 4.0% |
| 6 | Williamson | 171,452 | 2.8% | 1,160,905,379 | 4.8% |
| 7 | Sumner | 155,474 | 2.5% | 563,615,682 | 2.3% |
| 8 | Montgomery | 154,756 | 2.5% | 786,135,000 | 3.2% |
| 9 | Sullivan | 153,900 | 2.5% | 328,593,327 | 1.4% |
| 10 | Blount | 121,511 | 2.0% | 285,938,692 | 1.2% |
| Top Ten Subtotal | | \$ 3,302,199 | 53.1% | 12,887,300,415 | 53.3% |
| All Others | | \$ 2,839,843 | 45.7% | 10,920,218,960 | 45.1% |
| 86 | Jackson | 10,847 | 0.2% | 45,616,086 | 0.2% |
| 87 | Houston | 8,137 | 0.1% | 33,666,715 | 0.1% |
| 88 | Trousdale | 7,822 | 0.1% | 31,364,969 | 0.1% |
| 89 | Clay | 7,794 | 0.1% | 75,104,500 | 0.3% |
| 90 | Perry | 7,753 | 0.1% | 21,706,987 | 0.1% |
| 91 | Lake | 7,323 | 0.1% | 14,857,122 | 0.1% |
| 92 | Hancock | 6,693 | 0.1% | 23,020,736 | 0.1% |
| 93 | Moore | 6,195 | 0.1% | 30,657,327 | 0.1% |
| 94 | Van Buren | 5,481 | 0.1% | 72,965,000 | 0.3% |
| 95 | Pickett | 4,801 | 0.1% | 42,314,097 | 0.2% |
| Bottom Ten Subtotal | | \$ 72,846 | 1.2% | 391,273,539 | 1.6% |
| Grand Total | | \$ 6,214,888 | 100.0% | 24,198,792,914 | 100.0% |

Table 22. Reported Infrastructure Costs for the Ten Counties with the Largest and Smallest Population Increases Excluding Projects Identified as Regional Five-year Period July 2008 through June 2013

| Rank | County | Population | | Gain (Loss) | Total Reported Cost |
|----------------------------|------------|------------------|------------------|----------------|--------------------------|
| | | 2000 | 2008 | | |
| 1 | Rutherford | 182,023 | 249,270 | 67,247 | 964,257,592 |
| 2 | Davidson | 569,891 | 626,144 | 56,253 | 3,754,680,707 |
| 3 | Knox | 382,032 | 430,019 | 47,987 | 905,863,398 |
| 4 | Williamson | 126,638 | 171,452 | 44,814 | 1,160,905,379 |
| 5 | Sumner | 130,449 | 155,474 | 25,025 | 563,615,682 |
| 6 | Hamilton | 307,896 | 332,848 | 24,952 | 851,609,914 |
| 7 | Wilson | 88,809 | 109,803 | 20,994 | 579,500,767 |
| 8 | Montgomery | 134,768 | 154,756 | 19,988 | 786,135,000 |
| 9 | Blount | 105,823 | 121,511 | 15,688 | 285,938,692 |
| 10 | Sevier | 71,170 | 84,835 | 13,665 | 585,234,092 |
| Top Ten Subtotal | | 2,099,499 | 2,436,112 | 336,613 | \$ 10,437,741,223 |
| All Others | | 3,379,262 | 3,574,930 | 195,668 | 13,194,698,198 |
| 86 | Benton | 16,537 | 16,193 | (344) | 35,219,617 |
| 87 | Crockett | 14,532 | 14,186 | (346) | 15,791,895 |
| 88 | Polk | 16,050 | 15,671 | (379) | 139,676,596 |
| 89 | Lauderdale | 27,101 | 26,692 | (409) | 56,006,420 |
| 90 | Decatur | 11,731 | 11,288 | (443) | 25,282,688 |
| 91 | Lake | 7,954 | 7,323 | (631) | 14,857,122 |
| 92 | Carroll | 29,475 | 28,719 | (756) | 38,440,708 |
| 93 | Haywood | 19,797 | 19,024 | (773) | 170,241,258 |
| 94 | Obion | 32,450 | 31,375 | (1,075) | 49,645,667 |
| 95 | Weakley | 34,895 | 33,375 | (1,520) | 21,191,522 |
| Bottom Ten Subtotal | | 210,522 | 203,846 | (6,676) | \$ 566,353,493 |
| Grand Total | | 5,689,283 | 6,214,888 | 525,605 | \$ 24,198,792,914 |

The share of the estimated cost of infrastructure needs for the bottom ten counties has grown from 0.5% in the 2001 infrastructure report to 0.9% in this report, while their share of the state's population has remained generally stable at between 2.5% and 2.8% for all reports except one making these comparisons. 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 then are still the smallest, and nine of the ten largest counties in 2000 were still in the top ten in 2008. The percentage of the population concentrated in the ten largest counties has remained almost the same across all previous five reports, fluctuating right around 52.5% across all six reports making these comparisons, and there is only a slight increase in this report (from around 52.5% to 52.9%).

Interestingly, while the bottom ten counties in the population comparison table (Table 21) remained exactly the same in all six reports making this comparison, and their percentage of the total population has stayed within a tenth of a percent of the current 1.2%, their share of the total cost of needed infrastructure improvements varied from 1.0% to 2.0% of the total, which is to say that the high has been as much as double the low. The pattern among these counties over the six reports, again, illustrates the disproportionate effect that even relatively small projects can have in the very smallest counties.

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 most densely populated counties should have the lowest per capita infrastructure needs. 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.

In the latest inventory, seven of the ten counties reporting the greatest needs are among the ten most densely populated—Shelby, Davidson, Knox, Hamilton, Rutherford, Williamson, and Washington. Two of the counties reporting the lowest infrastructure needs are among the ten most sparsely populated (compare Tables 20 and 23). There are several possible explanations for this seeming incongruity, first among them, the fact that five of the seven high-needs and high-density counties (all except Shelby and Washington) are among the ten with the largest population gains from 2000 to 2008. 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 that has no relationship to initial investment costs. Improving infrastructure may be inherently more costly in densely populated urban areas because of higher land and labor costs and the need to relocate or modify existing infrastructure to accommodate new infrastructure.

Table 23. Infrastructure Improvement Needs Reported by Most and Least Densely Populated Counties Excluding Projects Identified as Regional Five-year Period July 2008 through June 2013

| Rank | County | 2008 Population | Land Area [square miles] | Population per Square Mile | Total Reported Cost | Cost per Capita |
|----------------------------|------------|------------------|--------------------------|----------------------------|--------------------------|-----------------|
| 1 | Davidson | 626,144 | 502 | 1,247 | \$ 3,754,680,707 | \$5,997 |
| 2 | Shelby | 906,825 | 755 | 1,202 | 3,285,700,724 | \$3,623 |
| 3 | Knox | 430,019 | 508 | 846 | 905,863,398 | \$2,107 |
| 4 | Hamilton | 332,848 | 542 | 614 | 851,609,914 | \$2,559 |
| 5 | Rutherford | 249,270 | 619 | 403 | 964,257,592 | \$3,868 |
| 6 | Hamblen | 62,132 | 161 | 386 | 162,834,734 | \$2,621 |
| 7 | Sullivan | 153,900 | 413 | 373 | 328,593,327 | \$2,135 |
| 8 | Washington | 118,639 | 326 | 364 | 588,044,490 | \$4,957 |
| 9 | Williamson | 171,452 | 583 | 294 | 1,160,905,379 | \$6,771 |
| 10 | Sumner | 155,474 | 529 | 294 | 563,615,682 | \$3,625 |
| Top Ten Subtotal | | 3,206,703 | 4,939 | 649 | \$ 12,566,105,947 | \$3,919 |
| All Others | | 2,903,244 | 32,504 | 89 | \$ 11,165,536,078 | \$3,846 |
| 86 | Humphreys | 18,149 | 532 | 34 | 83,084,017 | \$4,578 |
| 87 | Decatur | 11,288 | 334 | 34 | 25,282,688 | \$2,240 |
| 88 | Clay | 7,794 | 236 | 33 | 75,104,500 | \$9,636 |
| 89 | Bledsoe | 13,142 | 406 | 32 | 37,556,478 | \$2,858 |
| 90 | Hancock | 6,693 | 222 | 30 | 23,020,736 | \$3,440 |
| 91 | Pickett | 4,801 | 163 | 29 | 42,314,097 | \$8,814 |
| 92 | Stewart | 13,226 | 458 | 29 | 28,787,000 | \$2,177 |
| 93 | Wayne | 16,614 | 734 | 23 | 57,329,386 | \$3,451 |
| 94 | Van Buren | 5,481 | 273 | 20 | 72,965,000 | \$13,312 |
| 95 | Perry | 7,753 | 415 | 19 | 21,706,987 | \$2,800 |
| Bottom Ten Subtotal | | 104,941 | 3,775 | 28 | \$ 467,150,889 | \$4,452 |
| Grand Total | | 6,214,888 | 41,217 | 151 | \$ 24,198,792,914 | \$3,894 |

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. And 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. Finally, urban areas may function as regional hubs for various services or may choose to invest in infrastructure projects such as convention centers in order to compete for a bigger slice of the national economic market.

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. All three are examples of how large but infrequent projects in small counties can temporarily cause those counties to appear to have much higher than expected needs. Perhaps the best example among these counties is the need for a new high school in Pickett County estimated to cost around \$15 million. A project like that in a county like Pickett may occur only once every 30 or more years. High schools in small counties

have often remained 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 reconstruction 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 these often go unfunded for extended periods in small counties because they cannot fund them.

Population Gains Are More Closely Related to Infrastructure Needs Than Population Growth Rates Are

Eight of the ten counties with the largest total infrastructure needs (Table 20) are also among the ten with the largest population gains between 2000 and 2008 (Table 22). Four of the counties with the smallest needs in Table 20 are among the ten with greatest population losses¹¹ in Table 22. A total of 19 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 and for the bottom ten.

Five of the ten counties with the greatest infrastructure needs are in Middle Tennessee (Davidson, Williamson, Rutherford, Wilson, and Montgomery). All five counties are among the top ten for population gain (see Table 22), and three—Davidson, Rutherford, and Williamson—are also among the ten most densely populated counties (see Table 23). Four of the five—Davidson, Montgomery, Rutherford, and Williamson—are among the ten with the largest populations (see Table 21). And three—Rutherford, Williamson, and Wilson—are among the ten with the fastest growth rates. TACIR's statistical analysis of all 95 counties indicates that all of these population measures except growth rates are closely related to infrastructure needs.

¹¹All bottom ten counties lost population during that period.

A comparison of Table 24 below with Table 20 indicates 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: Williamson, Rutherford, Sevier, and Wilson. These same four counties also appear among the top ten for population gain shown in Table 22, but so do four others from the top infrastructure needs list, for a total of eight that are among both the top ten for total needs and the top ten for total population gain. Among the bottom ten in Table 24, only four counties—Crockett, Decatur, Lake, and Weakley—also appear among the bottom ten for total reported infrastructure needs in Table 20. These four counties also appear among the bottom ten for population gain in Table 22. These bottom ten counties actually declined in population between 2000 and 2008, as did nine others.

Table 24. Cost of Needed Infrastructure Improvements Reported for the Ten Fastest and Slowest Growing Counties Excluding Projects Identified as Regional Five-year Period July 2008 through June 2013

| Rank | County | Population 2000 | Population 2008 | Growth Rate | Total Reported Cost |
|----------------------------|------------|------------------|------------------|--------------|--------------------------|
| 1 | Rutherford | 182,023 | 249,270 | 36.9% | \$ 964,257,592 |
| 2 | Williamson | 126,638 | 171,452 | 35.4% | 1,160,905,379 |
| 3 | Fayette | 28,806 | 38,173 | 32.5% | 182,879,895 |
| 4 | Wilson | 88,809 | 109,803 | 23.6% | 579,500,767 |
| 5 | Sequatchie | 11,370 | 13,580 | 19.4% | 8,748,118 |
| 6 | Robertson | 54,433 | 64,898 | 19.2% | 281,517,638 |
| 7 | Sevier | 71,170 | 84,835 | 19.2% | 585,234,092 |
| 8 | Sumner | 130,449 | 155,474 | 19.2% | 563,615,682 |
| 9 | Bedford | 37,586 | 44,696 | 18.9% | 190,919,380 |
| 10 | Loudon | 39,086 | 46,445 | 18.8% | 258,852,339 |
| Top Ten Subtotal | | 770,370 | 978,626 | 27.0% | \$ 4,776,430,882 |
| All Others | | 4,739,108 | 5,062,706 | 6.8% | \$ 18,829,815,979 |
| 86 | Clay | 7,976 | 7,794 | -2.3% | 75,104,500 |
| 87 | Polk | 16,050 | 15,671 | -2.4% | 139,676,596 |
| 88 | Crockett | 14,532 | 14,186 | -2.4% | 15,791,895 |
| 89 | Carroll | 29,475 | 28,719 | -2.6% | 38,440,708 |
| 90 | Pickett | 4,945 | 4,801 | -2.9% | 42,314,097 |
| 91 | Obion | 32,450 | 31,375 | -3.3% | 49,645,667 |
| 92 | Decatur | 11,731 | 11,288 | -3.8% | 25,282,688 |
| 93 | Haywood | 19,797 | 19,024 | -3.9% | 170,241,258 |
| 94 | Weakley | 34,895 | 33,375 | -4.4% | 21,191,522 |
| 95 | Lake | 7,954 | 7,323 | -7.9% | 14,857,122 |
| Bottom Ten Subtotal | | 179,805 | 173,556 | -3.5% | \$ 592,546,053 |
| Grand Total | | 5,689,283 | 6,214,888 | 9.2% | \$ 24,198,792,914 |

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 six reports that have made this comparison, and only two—Haywood and Obion—have been among the ten with the smallest growth rates in all six.

Greatest Needs Per Capita Reported Mainly for Small Counties

Infrastructure needs reported per capita seem to bear little relationship to any population factor except possibly total population. Table 25 shows the top ten and bottom ten counties for infrastructure needs reported per capita, along with their populations, population gains and growth rates, and their 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 populous counties in the bottom ten. Williamson and Sevier are the only two relatively populous counties that appear among the top ten for per capita needs. They are growing rapidly in raw numbers (4th and 10th largest gain; see Table 22) and in percentage terms (2nd and 7th highest percentages; see Table 24). Other populous, high-growth counties, most notably Montgomery and Rutherford, report much lower per capita needs (27th and 46th highest).

The other eight 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 5,481, has been among these ten counties now in all six TACIR reports presenting this information. A \$25 million water project along with four other projects equaling \$40.9 million place it at the top of the list for needs per capita in this report. Three of these four projects relate to State Route 111 and have been in the inventory for at least four years now; the other project is a new \$10 million dollar housing project. Without these five projects, Van Buren would fall out of the top ten, and its revised rank would be 36th with a per capita need of only \$4,591. This is an extreme example of how large, unmet needs can place a small county that would not otherwise be there in the top ten for per capita costs and keep them there until those needs are met.

Only Weakley County has been among the bottom ten for reported needs per capita in all six reports. Tipton and Lauderdale Counties were among the bottom ten for per capita needs in all five earlier reports. Tipton was a surprise because it had been a high-growth county, but it is no longer on this list, nor is it among the top ten for either population gain or growth rate in this report.

Table 25. Population Factors for Counties w/Highest and Lowest Estimated Costs per Capita
 Excluding Projects Identified as Regional
 Five-year Period July 2008 through June 2013

| Rank | County | Population 2000 | Population 2008 | Change | Growth Rate | Land Area [sq. miles] | Population Density | Total Reported Cost | Cost per Capita |
|----------------------------|------------|--------------------|--------------------|----------------|----------------|--------------------------|-----------------------|--------------------------|--------------------|
| 1 | Van Buren | 5,508 | 5,481 | (27) | -0.5% | 273 | 20 | 72,965,000 | \$13,312 |
| 2 | Clay | 7,976 | 7,794 | (182) | -2.3% | 236 | 33 | 75,104,500 | \$9,636 |
| 3 | DeKalb | 17,423 | 18,694 | 1,271 | 7.3% | 305 | 61 | 175,246,600 | \$9,374 |
| 4 | Haywood | 19,797 | 19,024 | (773) | -3.9% | 533 | 36 | 170,241,258 | \$8,949 |
| 5 | Polk | 16,050 | 15,671 | (379) | -2.4% | 435 | 36 | 139,676,596 | \$8,913 |
| 6 | Pickett | 4,945 | 4,801 | (144) | -2.9% | 163 | 29 | 42,314,097 | \$8,814 |
| 7 | Greene | 62,909 | 66,157 | 3,248 | 5.2% | 622 | 106 | 501,719,580 | \$7,584 |
| 8 | Cumberland | 46,802 | 53,590 | 6,788 | 14.5% | 682 | 79 | 374,161,248 | \$6,982 |
| 9 | Sevier | 71,170 | 84,835 | 13,665 | 19.2% | 592 | 143 | 585,234,092 | \$6,898 |
| 10 | Williamson | 126,638 | 171,452 | 44,814 | 35.4% | 583 | 294 | 1,160,905,379 | \$6,771 |
| Top Ten Subtotal | | 379,218 | 447,499 | 68,281 | 18.0% | 4,424 | 39 | \$ 3,297,568,350 | \$7,369 |
| All Others | | 4,940,800 | 5,388,245 | 447,445 | 9.1% | 31,727 | 14 | \$ 20,434,675,888 | \$3,792 |
| 86 | Gibson | 48,152 | 49,257 | 1,105 | 2.3% | 603 | 82 | 73,989,196 | \$1,502 |
| 87 | Lincoln | 31,340 | 33,116 | 1,776 | 5.7% | 570 | 58 | 49,196,142 | \$1,486 |
| 88 | Henry | 31,115 | 31,770 | 655 | 2.1% | 562 | 57 | 43,676,877 | \$1,375 |
| 89 | Madison | 91,837 | 96,376 | 4,539 | 4.9% | 557 | 173 | 131,632,046 | \$1,366 |
| 90 | Carroll | 29,475 | 28,719 | (756) | -2.6% | 599 | 48 | 38,440,708 | \$1,339 |
| 91 | Franklin | 39,270 | 41,165 | 1,895 | 4.8% | 555 | 74 | 50,442,838 | \$1,225 |
| 92 | Crockett | 14,532 | 14,186 | (346) | -2.4% | 265 | 53 | 15,791,895 | \$1,113 |
| 93 | Dyer | 37,279 | 37,600 | 321 | 0.9% | 510 | 74 | 33,439,334 | \$889 |
| 94 | Sequatchie | 11,370 | 13,580 | 2,210 | 19.4% | 266 | 51 | 8,748,118 | \$644 |
| 95 | Weakley | 34,895 | 33,375 | (1,520) | -4.4% | 580 | 58 | 21,191,522 | \$635 |
| Bottom Ten Subtotal | | 369,265 | 379,144 | 9,879 | 2.7% | 5,067 | 727 | \$ 466,548,676 | \$1,231 |
| Grand Total | | 5,689,283 | 6,214,888 | 525,605 | 9.2% | 41,217 | 151 | \$ 24,198,792,914 | \$3,894 |

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 it can 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 process. 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 26. 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 as the other decreases. A perfect relationship between the two sets of numbers would be either 1.0 or -1.0.

Table 26 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

Table 26. Correlation between Reported Infrastructure Needs and Related Factors in Order of Strength of Relationship

| Factors Related to Reported Needs | Correlation Coefficient |
|--|--------------------------------|
| Taxable Property Value | 0.965 |
| Taxable Sales | 0.951 |
| Personal Income | 0.952 |
| 2008 Population Density | 0.913 |
| 2008 Population | 0.932 |
| Population Gain or Loss | 0.658 |
| Land Area (square miles) | 0.296 |
| Population Growth Rate | 0.250 |

coefficient for population growth rate and reported needs, at only 0.250, 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 rates, with the correlation coefficient below 0.3, are 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.