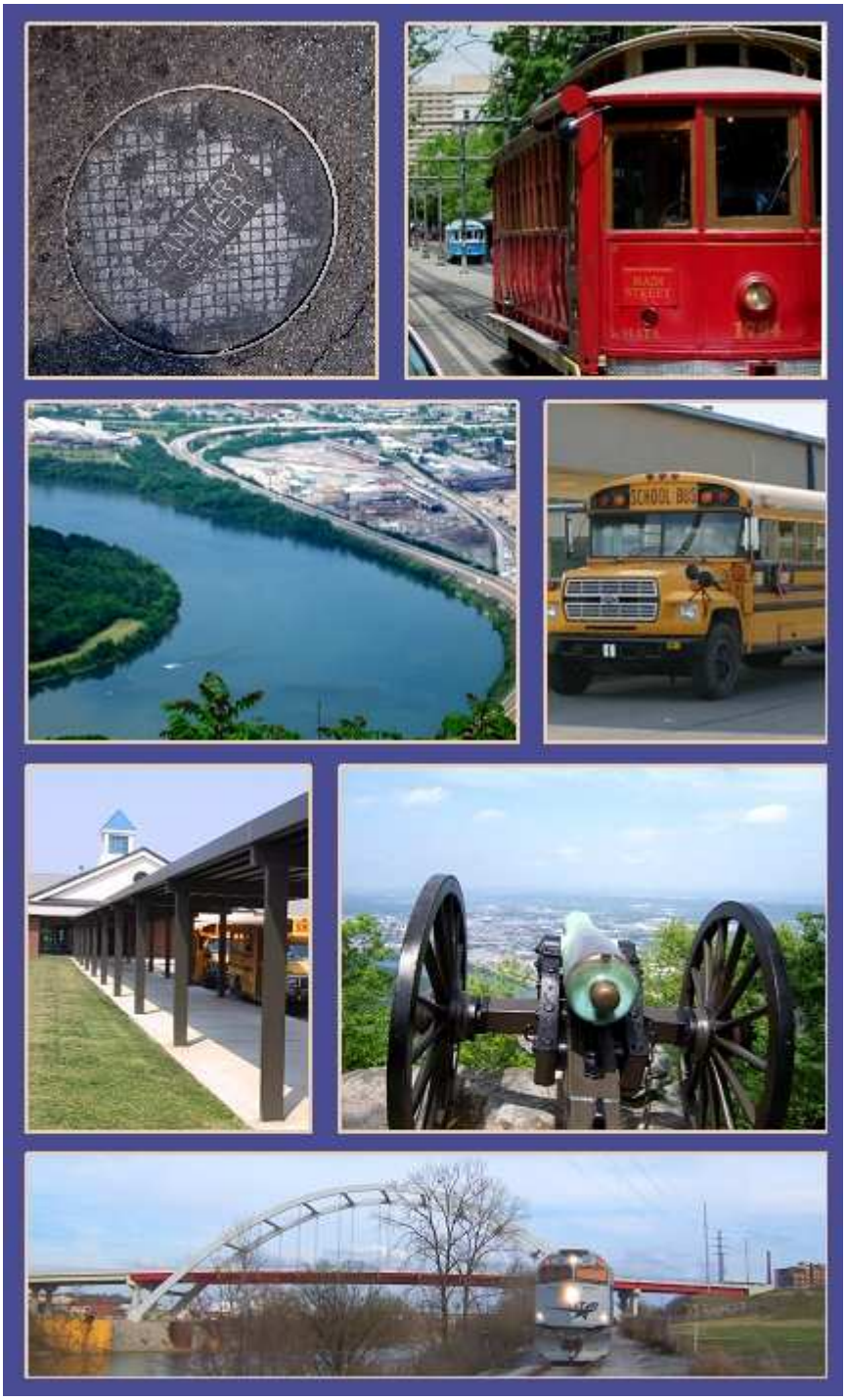

2009 ASCE TENNESSEE INFRASTRUCTURE REPORT CARD

MARCH 31, 2009

AMERICAN SOCIETY OF CIVIL ENGINEERS
TENNESSEE SECTION
www.TNASCE.ORG

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EXECUTIVE SUMMARY

Tennessee's infrastructure is deteriorating and is in critical need of maintenance and improvement to meet current and future demands. While the condition of Tennessee's roads, bridges and airports exceeds nationwide scores, Tennessee's schools and public park facilities lag behind the rest of the country. According to the US Census Bureau, Tennessee's population grew 26% from 1990-2007. This trend is expected to continue. With the growing population and subsequent economic growth, heavy demands have been and will continue to be placed on the state's infrastructure.

A healthy infrastructure is the backbone of a healthy economy. In these challenging times, infrastructure is essential to reviving the nation's fortunes and in maintaining our high quality of life. The American Society of Civil Engineers (ASCE) Infrastructure Report Card is an assessment by professional engineers of various categories of infrastructure. In January 2009, the national level of ASCE released an Infrastructure Report Card for the Nation. The result was a D average, unchanged from the version that was released in 2005. Beginning in the summer of 2008, the Tennessee section of ASCE began diligently working to prepare a state Infrastructure Report Card; an initiative that had not been undertaken in Tennessee before. Using Tennessee's 2009 Infrastructure Report Card, the Tennessee Section of ASCE hopes to bring the state of our local infrastructure to the attention of our elected officials here in Tennessee and at our Nation's capital.

The ASCE Tennessee Section 2009 Infrastructure Report Card is the first comprehensive assessment of the condition of the state's infrastructure. The Report Card presents an informed assessment made by the state's professional engineering community of the condition of the infrastructure critical to our quality of life in Tennessee. The Tennessee Section of ASCE represents more than 2,000 engineers who live and work in Tennessee, and who, like all Tennesseans, have a vested interest in the health of our state's infrastructure.

Tennessee's infrastructure received an overall grade of C with individual grades in nine infrastructure categories including aviation, bridges, navigable waterways, parks, railroads, roads, schools, transit, and water and wastewater. This report card offers guidance to Tennesseans and their leaders about where public works funds would be best spent to improve the overall quality of life.

METHODOLOGY FOR DEVELOPMENT OF THE 2009 INFRASTRUCTURE REPORT CARD FOR TENNESSEE

In the development of Report Card grades, four fundamental components of infrastructure were considered including: condition of existing infrastructure, capacity for future services delivery, deferred maintenance, and public safety.

Tennessee's 2009 Infrastructure Report Card Committee comprises experienced professional engineers in the fields of water, wastewater, waterways, transportation, aviation, and dams. Committee members evaluated the infrastructure in each subject area according to the four criteria and assigned a grade. Grades were assigned based on a traditional letter grade scale.

A = 90-100%
B = 80-89%
C = 70-79%
D = 51-69%
F = 50% or lower

In general, each subject area was evaluated using the following steps:

- Readily available, existing data sources were reviewed
- Data were compiled and analyzed, resulting in the development of a summary report
- A preliminary grade was assigned
- The summary report and grade were peer-reviewed and the final grade and assessment were determined

Tennessee Infrastructure 2009 Report Card

Infrastructure	TN		US
Aviation	B-		D
Bridges	B-		C
Navigable Waterways	C-		D-
Parks	D+		C-
Rail	C		C-
Roads	B-		D-
Schools	C+		D
Transit	D		D
Water/Wastewater	C		D-
Overall Grade	C		D

American Society of Civil Engineers
www.ASCE.org
Tennessee Section
www.TNASCE.org

AVIATION: B-

Introduction

In October 1997, Tennessee became one of nine states in the nation selected to participate in the FAA State Block Grant Program. As a participant in the Block Grant Program, Tennessee has the sole responsibility for deciding the distribution of federal funds for improvement projects at general aviation and non-primary commercial service airports. Primary benefits of the Block Grant Program are the ability to assess project justification based on local, regional and statewide conditions and to adapt state, federal and local funds to meet the immediate and future needs of the Tennessee aviation system.

Participating in the Federal State Block Grant Program requires the Aeronautics Division to implement certain responsibilities previously undertaken by the FAA Memphis Airports District Office. The Division is responsible for determining the level of environmental analysis required for airport improvement projects and for approving environmental assessments and impact statements at general aviation and non-primary commercial service airports. The Division also provides technical assistance and coordination throughout the environmental analysis process. As a FAA Block Grant State, the Aeronautics Division is responsible for approving airport layout plans, accepting airport master plans and monitoring airport sponsors' compliance with the federal grant assurances the airport accepted prior to receiving FAA airport improvement funds.

Grade

The overall condition of Tennessee airport facilities infrastructure overall is stable and relatively safe. The dedicated state employees are invaluable to the block grant program. However, the facilities could benefit from additional revenue investment to provide a more optimum level of service and would undoubtedly reap positive economic gains from this investment. Due to the current backlog of maintenance needs and the continued shortfall in both maintenance and capital project funding, ASCE gives Tennessee airports infrastructure a grade of B-.

Background

There are 126 heliports and 74 public/general aviation airports in the State. These airports have a priority ranking system in order to provide funding to address the specific needs of an airport. The priority system is based upon a specific project type with the emphasis on safety and security needs taking the most precedence. These projects alone can range from fencing to relocation of taxiways or runways.

The airport priority ranking system is the foundation for prioritizing airport needs and project funding recommendations for the State. The parameters of the priority ranking system are based on three broad areas of airport facilities. The first parameter gives points to the type of project being proposed. The second parameter provides points for airport usage. And the third parameter provides points related to the management of the airport. The points awarded are heavily weighted toward the implementation of the number one goal of the system plan that is to "maintain safe reliable airports."

Adequacy & Condition

Tennessee airports are virtually in the same predicament as the national airports system. Many airports have inadequate, antiquated, outdated equipment; pavement that has been in place for many years; outdated lighting systems; and instrument landing systems that have been around since the 1960's. This all adds up to increased safety violations and possible incursions.

The Nextgen program that the FAA is trying to move to is a great step in the effort to ramp up our airport technology to the next century; however, there is a great budget shortfall when faced with the massive amount of funds needed to cover the cost of training and new equipment that will be needed to fully implement the Nextgen program.

Funding

In the state of Tennessee, there is a need to fund safety projects that have been in some ACIP's [spell out ACIP] for multiple years. some municipalities are unable to access the matching funds required to participate in the FAA State Block Grant Program. In 2009, there is a need for approximately $150 million-worth of general aviation projects. In Tennessee, the budget allotted to the Tennessee Aeronautics Department will be less less $30 million. This does not take into consideration some of the projects needed at the larger air-carrier airports to handle current and future demand for more passengers and the need to update existing facilities. The amount of funding generated at the air carrier airports with the current Passenger Facility Charges (PFC) is not enough to support all of the needs of the airports in the state. The FAA Reauthorization, which has currently been drafted in Congress, is also vital to continue to operate these airports in a safe and reliable manner.

Sources

http://www.tdot.state.tn.us/aeronautics/001_TNSYSPlan.pdf

http://www.tdot.state.tn.us/aeronautics/handbook/SponsorsTOC.htm

BRIDGES: B-

Introduction

The state of Tennessee currently has 19,574 bridge structures according to the bridge inventory listing maintained by the Tennessee Department of Transportation (TDOT) Office of Inventory and Appraisal. The current capacity of each of these bridges is defined by their sufficiency rating. This analysis of the current bridge condition in Tennessee was based on extensive information made available from several offices at TDOT.

The sufficiency rating is determined through a formula that evaluates four separate factors to obtain a numeric value which indicate a bridge's sufficiency to remain in service. The end result is a percentage from 100 to 0 percent, where a 100 percent represents an entirely sufficient bridge and 0 percent represents an entirely insufficient (or deficient) bridge. This formula is made up of three main components: structural adequacy and safety (55 percent), serviceability and functional adequacy (30 percent), and the essentiality for public use (15 percent). When these three components add up to more than 50 percent than a fourth component comes into play which deals with detour length on high traffic volume structures that are difficult to detour around. The Federal Highway Administration (FHWA) indicates that a sufficiency rating of less than 80 percent is recommended for repair and a sufficiency rating of less than 50 percent recommended for replacement. In Tennessee, the sufficiency rating is used as the basis to prioritize repair or replacement of bridges, with the lower the rating the higher the priority. This Bridge Report Card will focus on several factors that include: condition, capacity, operation & maintenance, funding, future need and public safety. The following sections provide more in-depth examination of these factors.

Grade

The overall grade was determined by developing individual grades for six categories and calculating a weighted average. The results of the evaluation are found in the table below.

	Weight	Grade
Condition	25%	92
Capacity	15%	70
Operation & Maintenance	15%	95
Funding	15%	70
Future Need	15%	70
Public Safety	15%	93
	Final Grade	**82.7 = B -**

Grading Scale

A	**90 – 100%**
B	**80 – 89%**
C	**70 – 79%**
D	**51 – 69 %**
F	**50% or lower**

Condition

At the end of 2008, 18.2% of all bridges in the state were classified as either structurally deficient or functionally obsolete, which is approximately 30% less than the national average of 23.6%. Of the ten neighboring states, only Illinois has a similar percentage of total deficient and functionally obsolete bridges, the rest range between 1% and 24% higher. Nationally, only 8 states, about 16%, show overall lower numbers than Tennessee, with the lowest being 10%, reported by Arizona.

Structurally Deficient (SD)or Functionally Obsolete (FO) Bridges in Tennessee

Category	Number of Bridges 2007	Number of Bridges 2008	% 2007	% 2008
Interstate & State Bridges	7,597	8,150	**16.0**	**15.5**
Structurally Deficient (SD)	315	300		
Functionally Obsolete (FO)	937	963		
Total SD/FO	1,252	1,263		
City/County/Township Bridges	12,210	11,424	**20.0**	**20.0**
Structurally Deficient (SD)	895	800		
Functionally Obsolete (FO)	1,582	1,493		
Total SD/FO	2,477	2,293		
Total All Bridges	19,807	19,574	**19.0**	**18.2**
Combined Total SD/FO	3,729	3,556		

A structurally deficient bridge is closed or restricted to light vehicles because of its deteriorated structural components. These bridges are not necessarily unsafe, but must have posted limits of speed and weight. A functionally obsolete bridge does not meet current design criteria; while it is not unsafe for all vehicles, it can not safely accommodate current traffic volumes, and vehicle sizes and weights. Of the functionally obsolete On-System and Off-System bridges listed

above, approximately 30% and 65%, respectively, are as wide as the approach roadway.

For the last two decades Tennessee has worked steadily to improve the conditions of its bridges, both On- and Off-System. Since 1982 the total number of On-System bridges has increased by 50% but the number of posted weight limit bridges has decreased by 92%. The number of structurally deficient bridges has decreased by 57%; however, the number of functionally obsolete bridges has increased by 17%, which mainly reflects an aging bridge population and ever-increasing traffic demands. By contrast, the total number of Off-System bridges has declined by 7% since 1982 accompanied by an 82% decline in the number of posted weight-limit bridges; a decrease of 89% in the number of structurally deficient bridges; and a decrease of 23% in the number of functionally obsolete bridges.

The typical bridge design life is 50 years. Tennessee is fortunate that the average age of all bridges in Tennessee is about 36 years old, which is about 16% younger than the national average of 43 years. Nationally, one in five bridges is over 50 years old.

Capacity

The bridge capacity is directly tied to the highway system to which it belongs. Since it would be rather difficult to break bridges away from the highway system and view them separately, the discussion in this section will be in terms of highways. As of the end of 2005, there was a $40 billion backlog of accumulated or deferred highway needs. Generally speaking, the highway system is well-maintained, but cuts in federal and state funding in excess of $650 million throughout the last five years have not permitted the state to keep up with the rapid increase in highway travel, resulting in a significant portion of the 14,150 mile state highway system that is exceeding its design capacit, and an ever-increasing backlog of bridge repair/replacement projects.

Using the rule that unsatisfactory level of service (LOS) includes all segments with LOS E or F and small urban area freeways with LOS D, as of 2003, 8.2 % of rural and small urban areas were classified with an unsatisfactory LOS. By the year 2030, this unsatisfactory LOS rises to 28.7%. For urban areas, 42% of the state roads fall in the poor category, with an additional 16% listed as fair. By 2030, 69% of these state roads will have a poor category, and 16% will have a fair category. By contrast, there is a significant change in the LOS of the interstate segments, where 95% will be rated as poor and another 5% will be rated as fair by 2030.

Operation & Maintenance

Tennessee Department of Transportation (TDOT)'s Structure Inventory and Appraisal (SI&A) office is mainly concerned with the safety and condition of the over 19,000 bridges in Tennessee. The SI&A office maintains a complete computer inventory of these bridges and updates them on a two year cycle. The actual inspections are carried out by regional inspection teams spread throughout the state in each of the four regions. The information gathered in these inspections are used to plan bridge replacement and repair activities at the State level and is also submitted annually to the

Federal Highway Administration (FHWA) to help determine national highway funds needed for Tennessee. In addition, this information is used to post weight restrictions on bridges and when the public's safety is in question, close the structure.

TDOT's Bridge Repair Section is charged with the task of correcting structural or functional deficiencies, vehicular collision damage, concrete or steel deterioration, and scour problems on these inspected bridges. They are responsible for the design and plan preparation of repair details for all state maintained bridges. The work is carried out by TDOT in-house staff and consultant firms, which are under contact with the Department for four years. These repair projects are let to contract through the normal bid process and administered by the Regional Construction Office. During the actual construction, the Repair Section will assist the Regional Construction Office in construction inspection and in solving problems that develop.

Funding

TDOT's revenues are generated by a combination of highway user fees and federal funds. User fees are comprised of the state's gasoline and motor fuel taxes, special petroleum taxes and environmental fees, vehicle registration fees, and beer and bottle fees. These user fees are deposited into the State's Highway Fund, which pays for public road and bridge projects. The gasoline tax is 20.0 cents per gallon (cpg), which generates approximately $31 million per year (2005 estimate). The motor fuel tax is 17.0 cpg, which generates approximately $10 million per year (2005 estimate). The special petroleum tax and environmental fee is 1.4 cpg on both the gasoline and motor fuels, which generates approximately $64 million in revenue per year (2005 estimate), of which $33 million was allocated to the Highway Fund and the rest to the General Fund. Vehicle Registration fees generates $247 million in revenue, of which $194 million is sent to the Highway Fund; Beer and Bottle Tax imposes a 1.9% gross receipts tax on soft drink bottle, of which 21% goes to the Highway Fund. The state also imposes a $4.29 per barrel privilege tax on beer manufactured or sold in the state. In total, the beer and bottle tax generates about $5 million per year for litter control (2005 estimate).

From 1982 to 2007, TDOT spent more than $1.7 billion on bridge replacement and repair, which included $1.45 billion under the federal bridge replacement program and an additional $261 million from the state's bridge grant bridge program. It would take an estimated $1.75 billion to replace all deficient bridges in the state of Tennessee.

Future Need

In fiscal year 2007-2008, TDOT dedicated more than $130 million to the replacement and repair of bridges and will dedicate another $116.6 million in fiscal year 2008-2009. With an average bridge age of 35.7 years in Tennessee, additional funding from the state or federal level will most certainly be required to maintain the state's high standards. According to TDOT's Long Range Transportation Plan, in the next 25 years TDOT will need $6.8 billion to replace older bridges that have reached their useful service life.

Public Safety

As mentioned before, there are two classifications used to categorize deficient bridges. Functionally obsolete bridges are those that were built to standards no longer in use. These bridges are those that have inadequate lane widths, shoulder widths, or vertical clearances to serve current traffic demand, or those that may be flooded occasionally. In Tennessee, the percentage of functionally obsolete bridges is 12.5%, slightly lower than the national average of 12.8%. Structurally deficient bridges are bridges with significant load-carrying elements found to be in poor condition due to deterioration or bridges with extreme insufficiencies that cause intolerable traffic interruptions. These bridges are not necessarily unsafe, but they do require significant maintenance and repair and/or limits on speed and weight to remain in service. Tennessee's percentage of structurally deficient bridges of 6.7% is much lower than the national average of 10.7%.

These deficiencies pose major inconveniences and safety hazards to the general public. Weight restricting of bridges can force safety and emergency vehicles to take lengthy detours. Substandard lane and shoulder widths can cause increased congestion, especially when accidents occur in the vicinity of the bridge. Insufficient vertical and horizontal clearances can cause vehicles to take detour routes and can cause vehicle collisions with bridges.

Sources

2008 Better Roads National Bridge Inventory

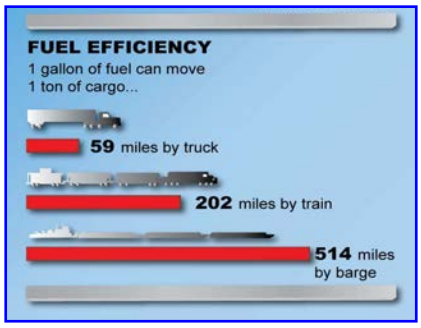
TDOT

- "Tennessee Bridge Facts" http://www.tdot.state.tn.us/bridgeinfo/reports/BridgeFacts.pdf , 2008
- "Tennessee Long Range Transportation Plan" http://www.tdot.state.tn.us/plango/pdfs/plan/ModalNeed.pdf , 2005
- "Structure Inventory and Appraisal Office" http://www.tdot.state.tn.us/Chief_Engineer/assistant_engineer_design/structures/inspect.htm
- "Bridge Repair Section" http://www.tdot.state.tn.us/Chief_Engineer/assistant_engineer_design/structures/repair.htm
- "Tennessee Long Range Transportation Plan" http://www.tdot.state.tn.us/plango/pdfs/plan/Financial.pdf , 2005

AASHTO

- "Bridging the Gap, Restoring and Rebuilding the Nation's Bridges", http://www.transportation1.org/BridgeReport/docs/BridgingtheGap.pdf , 2008

NAVIGABLE WATERWAYS: C-



Source: Hanson Professional Services Inc.

Barges can carry large volumes of commodities over long distances. A typical barge tow may consist of four or six barges on smaller waterways and up to over 40 barges on the Mississippi River below its confluence with the Ohio River. A 15-barge tow is common on rivers such as the Tennessee River. Such tows are an extremely efficient mode of transportation, moving about 22,500 tons of cargo as a single unit. A single 15-barge tow is equivalent to about 225 railroad cars or 870 tractor-trailer trucks and is generally the least costly mode of transportation. Barge transportation also reduces roadway congestion, creates a fraction of the noise and air pollution produced by railcars and trucks and is statistically the safest mode for moving goods.

Introduction

Source: Tennessee Valley Authority

Inland navigation is a key element of state and local government economic development and job creation efforts and is essential in maintaining economic competitiveness. According to the US Census Bureau, Tennessee's population grew 26% from 1990-2007. This trend is expected to continue. With the growing population and subsequent economic growth, heavy demands have been and will continue to be placed on the state's transportation system. Intensifying roadway congestion and increasing transportation-related pollution are by-products of a growing economy. Transportation planning with emphasis on freight mobility and utilizing all modes of transport will be critical to addressing these issues. Tennessee's marine navigation system provides a transportation infrastructure that is already in place and one that not only guarantees fuel efficient and environmentally advantageous transport of goods, but also reduces highway congestion and the related maintenance costs, and stimulates the economy. Without near-term solutions to rehabilitate and renovate Tennessee's navigable waterway infrastructure, waterborne commerce will struggle to survive without the modern and well-maintained navigation system on which it depends.

Grade

The Tennessee Section of ASCE assigned navigable waterways a 2009 grade of "C-" based on aging infrastructure, unscheduled closures, inadequate lock capacity, increased demand, inadequate funding, impact of failure to local economy, and very low resilience in the event of system failures. As the population and subsequent economic growth of Tennessee continues to increase, heavy demands will be placed on the state's

transportation system, intensifying roadway congestion and increasing transportation-related pollution. Transportation planning with emphasis on freight mobility, utilizing all modes of transport, will be critical to addressing these issues.

Background

The State of Tennessee is centrally located on the nation's inland waterway system. The State's three major navigable arteries, the Cumberland, Mississippi, and Tennessee rivers and their tributaries connect the state's four public riverports and 169 private river terminals to riverports in 21 states and directly link to ocean ports along the Gulf Intracoastal Waterway.

The Mississippi River borders the western boundary of the State from river mile (RM) 715.2 to RM 896.8. RM 725 to 740 harbors the International Port of Memphis, the fourth largest inland port in the US and the 2nd largest inland port on the shallow draft portion of the River. With 68 water-fronted facilities, 37 of which are terminal facilities moving products such as petroleum, tar, asphalt, cement, steel, coal, salt, fertilizers, rock & gravel, and of course grains, the port received 19.1 million tons of commodities in 2006 creating a foundation for 5,500 direct and 9,900 indirect jobs.

The Cumberland River flows nearly 700 miles from east to west, through the northern section of Tennessee. It dips down to Nashville, then back northwestward into Kentucky to its mouth on the Ohio River. River Miles 74.6 to 385.6 encompasses the portion of the river that lies within the State.

The Tennessee River is formed at the confluence of the Holston and French Broad Rivers on the east side of Knoxville. From Knoxville, it flows southwest through East Tennessee toward Chattanooga before crossing into Alabama. It loops through northern Alabama and eventually forms a small part of the state's border with Mississippi, before returning to Tennessee. At this point, the river flows almost due north into Kentucky and finally empties into the Ohio River near Paducah, KY. The segments of the river that fall in the State comprise RM 49.2 to 215 on the western portion of the state and river miles 416.5 to 652 on the eastern portion of the State.

The Clinch River is a tributary of the Tennessee River. Navigation on the river is limited to 61 miles from its confluence with the Tennessee River to Clinton, primarily providing development to the area between Oak Ridge and Knoxville.

In most of the United States, the US Army Corps of Engineers (USACE) has responsibility for the operation and maintenance of commercial navigation projects, while the U.S. Coast Guard (USCG) ensures safe transportation on America's waterways and protection of the marine environment. On the Cumberland and Mississippi rivers, the USACE is responsible for the direction of all water resource activities. This entails the operation and maintenance of four navigation lock projects on the Cumberland River. The USACE also maintains a commercial navigation channel along the segment of the Mississippi River that borders Tennessee. Since there are no locks or dams on the Mississippi River below St. Louis, the USACE's responsibility on this portion of the river is primarily river maintenance for navigability.

On the Tennessee River however, the USACE works in partnership with the Tennessee Valley Authority (TVA) and the USCG. The locks and dams are owned by the United States and operated by TVA and the USACE. In accordance with the TVA Act, TVA is entrusted with the possession, operation and control of the dams and all related buildings, machinery and lands, with the exception of the navigation locks that are operated by the USACE. The USCG installs and maintains the navigation aids along the commercial channel while TVA installs and maintains the navigational aids on the recreational channels throughout the Tennessee Valley.

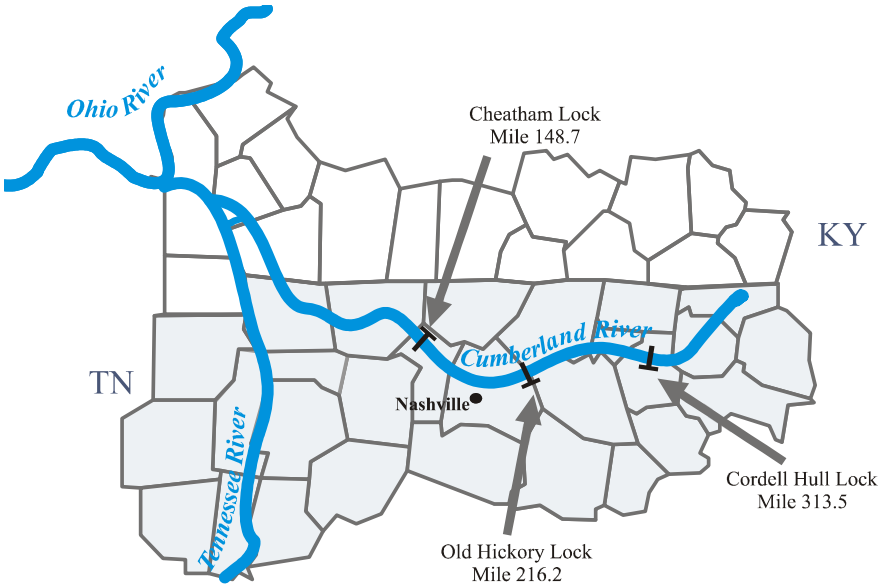
In 2002, nearly 616 million tons of commodities were shipped to, from and within Tennessee. Of this tonnage, 34.6 million tons, mostly coal, aggregates and other commodities travelled by water. Forecasts indicate that by the year 2035, total freight in the state will more than double to over 1,327 million tons while waterborne commerce will increase by over 66% to 57.5 million tons.

Lock Conditions

The state's nine navigational locks and dams (three on the Cumberland River, five on the Tennessee River, and one on the Clinch River) have made commercial navigation possible, eliminating variances in water levels and serious obstructions to navigation.

All of these locks, however, were built between 1937 and 1982. With an average age of over 53 years, most of the locks in Tennessee are past their planned design life of 50 years. To keep the aging locks operational, dewatering of the locks to perform ongoing maintenance and necessary repairs is commonplace, resulting in frequent lock closures and costly delays in the transport of goods. The age of the system also affects the efficiency of modern-day tows. As freight shipments have increased over the years, modern commercial tows on these rivers can have 12 or more barges with a 15-barge tow being common. The locks on Tennessee's rivers were built to accommodate the largest commercial tows at that time. The lock dimensions are no longer adequate to accommodate the size of these tows. Multiple lockages are required in which the tow is decoupled into two or more segments to pass through the river systems' locks causing significant lock delays. The projected increase in inland waterway freight traffic for Tennessee's waterways will substantially increase congestion and delays at system locks, increasing transit times and decreasing the system's efficiency. As indicated in the following sections, the transportation importance of Tennessee's lock system is significant.

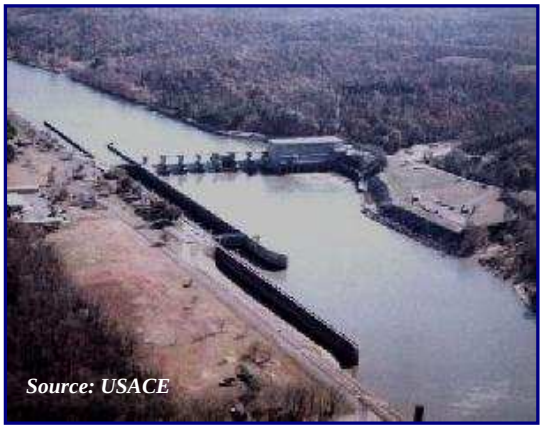
Cumberland River Locks and Dams



Source: Hanson Professional Services Inc.

Locks and Dams in Tennessee on the Cumberland River

Cheatham Lock – Grade C



Cheatham Lock is located near Ashland City, at river mile 148.7 on the Cumberland River. It opened to navigation in 1952. The lock chamber is 110' x 800'.

Transportation Importance - Cheatham Lock processed 11.2 million tons of waterborne commerce in 2007. Coal and aggregates are the dominant commodities. Electric utilities serving the southeast move coal from mines in Wyoming and Kentucky through Cheatham Lock. Construction companies move cement and aggregates and steel fabricators move iron and steel products into the urban areas of the Cumberland Valley through Cheatham Lock. These and other shippers relying on Cheatham Lock realize transportation cost savings of more than $81.2 million annually.

Risk & Reliability, Economic Impacts of Unscheduled Lock Outages - The upper closure structure is essential for inspecting the chamber miter gates at Cheatham Lock; however, the closure structure can no longer be pulled up from the water and set in place. This increases the likelihood of an unexpected failure of the miter gates and means that any repair will take three months longer because there is no closure structure. In the event of a 90-day closure of the Cumberland River at Cheatham Lock,

shippers can be expected to make short-term, emergency arrangements with other product sources and transportation providers to the greatest extent possible in order to keep their generating stations and manufacturing plants operating. Transportation impacts associated with a 90-day closure would likely be over $18 million dollars.

In 2007, 6,586 loaded barges passed through Cheatham Lock. Twenty-seven percent of these barges were delayed with an average lock time of 1.6 hours. During the normal course of operation in 2007, the lock was unavailable to commercial traffic for 211 hours, all of which was for unscheduled repair.

Old Hickory Lock & Dam – Grade C

Old Hickory Lock and Dam is located on the Cumberland River at river mile 216.2, approximately 25 miles upstream from Nashville. Built in 1954, the lock's dimensions are 84' x 400'.


Source: USACE

Transportation Importance - Old Hickory Lock processed 4.8 million tons of waterborne commerce in 2007. Coal and industrial chemicals are the dominant commodities. Electric utilities serving the southeast move coal from mines in Wyoming and Kentucky through Old Hickory Lock. Industrial chemical companies move chemicals from the Gulf Coast and construction companies move cement and aggregates into the urban areas of the Cumberland Valley through Old Hickory Lock. These and other shippers relying on Old Hickory Lock realize transportation cost savings of more than $27.1 million annually.

Risk & Reliability, Economic Impacts of Unscheduled Lock Outages - The upper closure structure is essential for inspecting the chamber miter gates at Old Hickory Lock; however, the closure structure can no longer be pulled up from the water and set in place. Without the ability to perform routine maintenance, the likelihood of an unexpected failure of the miter gates increases. Any repair will take three months longer because there is no closure structure. In the event of a 90-day closure of the Cumberland River at Old Hickory Lock, shippers will not be able to supply coal to the Gallatin Steam Plant. A supply of less than 25 days is all that is maintained at this plant. Recent studies show there are no other methods for coal delivery to the electric generation plant. Transportation impacts associated with such a closure would likely be in the millions of dollars.

In 2007, 2,668 loaded barges passed through Old Hickory Lock. Fifteen percent of these were delayed with an average lock time of 0.9 hours. During the normal course of operation in 2007, the lock was unavailable to commercial traffic for 1,850 hours, 70percent of which was for unscheduled repair.

Cordell Hull Lock & Dam – Grade D

Cordell Hull Lock and Dam is located at Cordell Hull Lake on the Cumberland River at River Mile 313.5. Built in 1973, the lock dimensions are 84' x 400'. The facility was built for development of water resources in the Cumberland River Basin and is primarily used for hydropower generation.

Transportation Importance – Cordell Hull Lock processed only 1,000 tons of commodities in 2007.

Risk & Reliability, Economic Impacts of Unscheduled Lock Outages
Routine maintenance is required to ensure proper safety and reliable operation levels of the lock.

Tennessee and Clinch River Locks and Dams

Source: Hanson Professional Services Inc.

Pickwick Lock – Grade C

Pickwick Lock is approximately 12 miles south of Savannah, just north of the Mississippi state line. Located at Tennessee River Mile 206.7, it is 52.7 miles below Wilson Lock and 184.7 miles above Kentucky Lock. There are two locks. The main lock is 110' x 1,000'. The auxiliary lock is 110' x 600'. Construction on the first lock was completed in 1937 by TVA. The larger lock was completed and put into operation in 1982.

Transportation Importance - Pickwick Locks and Dam processed 15.2 million tons of waterborne commerce in 2007. Coal is the principal commodity at Pickwick, though aggregates, salt, grains, chemicals and steel products are all present in large numbers. Electric utilities move coal from mines in Wyoming, Kentucky and West Virginia to power plants serving the southeastern region of the country. Aggregates move to construction related companies and to electric utilities for use in desulphurization equipment. Gypsum moves from Ohio River power plants to manufacturing plants in the Tennessee Valley. Salt and chemicals move to chemical plants directly supporting the paper and textile industry in the region. Grains move from the upper Mississippi and Ohio valleys to both corn syrup plants and terminals serving the southeastern poultry feed market. Steel products move to fabricators in urban areas located in the Tennessee and Cumberland valleys. These and other shippers relying on Pickwick Lock realize transportation cost savings of more than $188.4 million annually.

Risk & Reliability, Economic Impacts of Unscheduled Lock Outages - In the event of an unexpected closure of the Tennessee River at Pickwick Lock, shippers can be expected to make short-term, emergency arrangements with other product sources and transportation providers to the greatest extent possible in order to keep their generating stations and manufacturing plants operating. Transportation impacts associated with such a closure would likely be in the millions of dollars.

In 2007, 9,662 loaded barges passed through Pickwick Lock. Forty-one percent of these barges were delayed with an average lock time of 1.8 hours. During the normal course of operation in 2007, the lock was unavailable to commercial traffic for 435 hours, 92% of which was for unscheduled repairs.

It is anticipated by the USACE that Pickwick Lock will need to be entirely replaced by the year 2025 for a projected cost of $200 million.

Nickajack Lock – Grade B

Nickajack Lock is located 35 miles west of Chattanooga, near the city of Jasper at River Mile 424.7. It is 46.3 miles below Chickamauga Lock and 75.3 miles above Guntersville Lock. Construction began on the 110' x 600' Nickajack Auxiliary Lock in March of 1964. TVA completed it for operation in December 1967. The foundation for an 800 ft. long main lock was also laid, but it remains incomplete. This lock will not be completed until the amount of traffic exceeds the capacity of the current auxiliary lock.


Source: USACE

Transportation Importance - Nickajack Lock and Dam processed 2.3 million tons of waterborne commerce in 2007. Salt, sand and gravel, corn, cement, asphalt, and iron and steel are the principal commodities at Nickajack. Aggregates, asphalt and cement move to construction related companies. Salt and chemicals move to chemical plants directly supporting the paper and textile industry in the region. Grains move from the upper Mississippi and Ohio valleys to both corn syrup plants and terminals serving the southeastern poultry feed market. Steel products move to fabricators. These and other shippers relying on Nickajack realize transportation cost savings of more than $50.6 million annually.

Risk & Reliability, Economic Impacts of Unscheduled Lock Outages - The maintenance of the structures are approaching the point where repairs are becoming costlier and unscheduled outages are longer, which causes industry to lose valuable time and adds cost to the companies that use the locks. There is no auxiliary lock at Nickajack Lock. In the event of an unexpected closure of the Tennessee River at Nickajack Lock, shippers can be expected to make short-term, emergency arrangements with other product sources and transportation providers to the greatest extent possible in order to keep their generating stations and manufacturing plants operating. Transportation impacts associated with such a closure would likely be in the millions of dollars.

In 2007, 1,431 loaded barges passed through Nickajack Lock. Fourteen percent of these were delayed with an average lock time of 0.6 hours. During the normal course of operation in 2007, the lock was unavailable to commercial traffic for 486 hours, all of which was for unscheduled repairs.

Chickamauga Lock & Dam – Grade D

Chickamauga Lock and Dam is located at River Mile 471 of the Tennessee River in the port of Chattanooga. TVA built the project in the 1930's. The lock was placed in temporary operation in 1938 and was completed in 1940.


Source: USACE

The lock chamber measures 60' x 360'. Chickamauga Lock has a history of problems associated with concrete expansion. A study conducted by the USACE recommended the construction of a new 110' x 600' lock chamber. The existing lock requires aggressive maintenance to confront its Alkali Aggregate Reaction (AAR) problem. This expansion of concrete features is causing misalignment of mechanical components and would eventually cause the lock to be closed. Congress has authorized construction of a 110' x 600' replacement lock riverward of the existing structure that will remove four of the existing spillway bays. Project construction began in 2004. The Corps of Engineers [spell out] currently projects the entire lock project could be completed by 2014, pending congressional funding. $200 million of the $375 million project is still needed to complete the project.

Transportation Importance - Chickamauga Lock and Dam processed 1.1 million tons of waterborne commerce in 2007. Grain, ores and minerals, and petroleum products are the principal commodities at Chickamauga Lock followed by aggregates, industrial chemicals and iron and steel. Asphalt and sand and gravel move to construction supply companies. Salt and chemicals move to chemical plants directly supporting the paper and textile industry in the region. Corn moves from the upper Mississippi and Ohio valleys to both corn syrup plants and terminals serving the southeastern poultry feed market. Steel products move to fabricators. These and other shippers relying on Chickamauga Lock realize transportation cost savings of more than $29.1 million annually.

Risk & Reliability, Economic Impacts of Unscheduled Lock Outages - Concrete aggregate problems will cause the current lock to be closed soon after 2010 without aggressive maintenance. If the lock has to be closed temporarily or even permanently, approximately 318 miles of navigable waterway above Chattanooga would be abandoned. This could result in possible closure of barge terminals and water-dependent industries. According to TVA, a general rise in regional transportation rates could occur along with a shift of some traffic movements to trucks using highway and interstate systems. The defense facilities at Oak Ridge would be denied shipment of oversize cargoe that cannot be moved by another mode of transportation. Halting inter-reservoir traffic could result in loss of jobs in east Tennessee and hinder waterfront development and recreational boating. Economic and transportation impacts associated with such a closure would likely be in the hundreds of millions of dollars.

In 2007, 655 loaded barges passed through Chickamauga Lock. All of these were delayed with an average delay time of over 7.5 hours to lock through. During the normal course of operation in 2007, the lock was unavailable to commercial traffic for 1,573 hours primarily due to the lock replacement project.

Watts Bar Lock – Grade C


Source: USACE

Watts Bar Lock is located near Decatur, at Tennessee River Mile 529.9. It is approximately halfway between Chattanooga and Knoxville. The lock is 72.4 miles downstream from Fort Loudoun

Lock and 58.9 miles above Chickamauga Lock. Built in 1942, the lock's dimensions are 60' x 360'.

Transportation Importance - Watts Bar Lock and Dam processed 655,000 tons of waterborne commerce in 2007. Grain, ores and minerals, and petroleum products are the principal commodities at Watts Bar followed by aggregates, iron and steel, and chemicals. Asphalt, gypsum, and sand and gravel move to construction supply companies. Salt and chemicals move to chemical plants directly supporting the paper and textile industry in the region. Corn moves from the upper Mississippi and Ohio valleys to both corn syrup plants and terminals serving the southeastern poultry feed market. Steel products move to fabricators. These and other shippers relying on Watts Bar Lock realize transportation cost savings of more than $20.1 million annually.

Risk & Reliability, Economic Impacts of Unscheduled Lock Outages - A closure of this lock would result in the abandonment of several hundred miles of navigable waterways upriver. This would ultimately affect Fort Loudon Lock, Melton Lock, water-dependent industries, barge terminals and recreational traffic. The defense facility at Oak Ridge would be denied shipment of oversize cargo forcing it to an already overstressed highway and interstate traffic system. Economic and transportation impacts associated with such a closure would likely be in the millions of dollars.

In 2007, 367 loaded barges passed through Watts Bar Lock. Fifty-four percent of these were delayed with an average lock time of 2.2 hours. During the normal course of operation in 2007, the lock was unavailable to commercial traffic for 207 hours, 100% of which was due to unscheduled repairs.

It is anticipated by the USACE that Watts Bar Lock will need to be replaced by the year 2020 for a projected cost of $300 million.

Fort Loudoun Lock – Grade C

Fort Loudoun Lock is located near Lenoir City, 55 miles downstream from Knoxville. It is at Tennessee River Mile 602.3, 73.4 miles upstream of Watts Bar Lock. Completed in 1944, the lock's dimensions are 60' x 360'.


Source: USACE

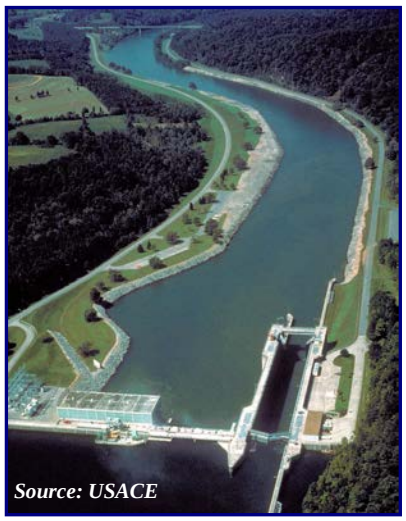
Transportation Importance – Ft. Loudoun Lock and Dam processed 637,000 tons of waterborne commerce in 2007. Ores and minerals and petroleum products are the principal commodities at Ft. Loudoun Lock followed by aggregates and iron and steel. Asphalt, gypsum, and sand and gravel move to construction supply companies. Salt and chemicals move to chemical plants directly supporting the paper and textile industry in the region. Steel products move to fabricators. These and other shippers relying on Ft. Loudoun Lock realize transportation cost savings of more than $9.1 million annually.

Risk & Reliability, Economic Impacts of Unscheduled Lock Outages - A closure of this lock would result in the abandonment of several hundred miles of navigable waterways upriver. This would ultimately affect Melton Lock and the Oak Ridge National Laboratories upriver and Chickamauga Lock downriver. Water-dependent industries, barge terminals and recreational traffic would be affected significantly. Economic and transportation impacts associated with such a closure would likely be in the millions of dollars.

In 2007, 233 loaded barges passed through Ft. Loudon Lock. Thirty-two percent of these were delayed with an average lock time of one hour. During the normal course of operation in 2007, the lock was unavailable to commercial traffic for 3,893 hours, 89% of which was for unscheduled repairs.

Clinch River

Melton Hill Lock – Grade D


Source: USACE

Melton Hill Lock is located in Lenoir City, nine miles southwest of Oak Ridge and 19 miles west of Knoxville. Located 23.1 miles from the confluence of the Clinch with the Tennessee River, it is the only USACE lock on the Clinch River. Completed in 1963, the lock's dimensions are 75' x 400'.

Transportation Importance – Melton Hill Lock processed 9,000 tons of waterborne commerce in 2007.

Risk & Reliability, Economic Impacts of Unscheduled Lock Outages - Oak Ridge National Laboratory is using Melton Hill Lock to transport oversized and delicate equipment for the developing Spallation Neutron Source project. This project is estimated to have a $4.0 billion economic impact in the Southeastern United States. No other means of transporting much of this equipment exists.

In 2007, 16 loaded barges passed through Melton Hill Lock. None of these were delayed. During the normal course of operation in 2007, the lock was unavailable to commercial traffic for 7,422 hours, 4% of which were for unscheduled repairs.

River Navigation Conditions – Grade B

The USACE Nashville District is responsible for maintaining over 1,150 miles of navigable channel on the Tennessee and Cumberland Rivers. This includes repairs/replacement of over 200 federally-owned navigation cells and similar navigation aids. The USACE Memphis District is responsible for the maintenance and improvement of 355 miles of the Mississippi River main channel from Cairo, Illinois to the mouth of the White River in Arkansas. This includes maintaining levees and dikes to control flooding and securing a

navigation channel for barges. Continued hydrographic inspections, planned maintenance dredging, and mooring structure repairs are ongoing activities provided by both districts to provide unhindered navigation on Tennessee's rivers.

Transportation Importance - Authorized channel dimensions and mooring structures are vital in the stretches of river between the navigation locks. Dependable and expected navigation features are used by commercial navigation interests to arrange tows. Unexpected conditions are a hazard to vessels and pose an environmental risk.

Maintenance of Federal Mooring Structures - Built to aid commercial traffic during lockages, provide berthing during delays and assist in transiting difficult stretches of the river, the federally owned mooring structures are part of the USACE's maintenance responsibility. There are over 200 such structures in the Nashville district alone.

In 2006, the federal mooring facility at RM 97.4 on the Tennessee River was condemned as unsafe for use by navigation traffic. The cells are reportedly damaged to the point that they are considered structurally unstable. The damage to this facility is so extensive that complete removal and replacement of the cells will be required before it can be reopened for use. As of February 2009, there are no plans to repair this facility due to insufficient funds.

Reports by a key marine carrier on Tennessee's rivers indicate that dredging and lock conditions to date have not been a major concern for their operations since the USACE has been responsive to navigation issues as they arise. The condemned mooring facility at Tennessee RM 97.4 is, however, adding cost to operations for all commercial shippers who use this facility as a safe landing zone.

Funding

The Waterways Trust Fund (WTF) is funded through contributions generated by a 20-cent per gallon diesel fuel tax. The WTF is meant to pay for one-half the cost of new construction and major rehabilitation of locks and dams. The other half of the cost is paid from general revenues. The trust fund, which collects approximately $90 million a year, has been depleted by the number and enormity of lock and dam projects. Lengthy delays caused by the depletion of the trust fund are affecting rehabilitation and replacement projects already underway and other projects that have yet to receive funding.

According to the 2005 Tennessee Department of Transportation's (TDOT) 25 Year Transportation Plan, the navigable waterway needs in Tennessee were $1.03 billion. This amount encompassed funding needs for maintenance and preservation, safety and modernization, and expansion and enhancement. Of that amount, TDOT anticipated that $810 million of those needs would be met through TDOT's budget (approximately 6%) and estimated partnering funds from outside TDOT (approximately 94%), leaving $220 million in unmet needs. As of 2009, the USACE identified $900 million in near-term expenditures to complete the Chickamauga Lock replacement project and to replace the deteriorating Watts Bar and Pickwick locks. Other than the TDOT estimate, which assumes that 79% of the total need will be met over the next 25 years, no solid

information has been readily available to estimate the funding that will be available long term for Tennessee's waterways.

The National Waterways Conference recently indicated that the USACE could efficiently expend an additional $7 billion above and beyond the normal funding amount available in each of the next several years toward a national backlog of $61 billion in neglected needs.

Sources

Tennessee Infrastructure Alliance – Tennessee Navigable Waterways Infrastructure Analysis

Tennessee Department of Transportation – Tennessee's 25-Year Transportation Plan: Plan Go

Tennessee Department of Transportation – Tennessee Long Range Transportation Plan: Modal Needs Final Report

US Army Corps of Engineers – Navigation Information Connection

US Army Corps of Engineers – Five Year Development Perspective

US Army Corps of Engineers – Great Lakes & Ohio River Division

US Army Corps of Engineers – Nashville District

US Army Corps of Engineers – Navigation Data Center

US Department of Transportation – Freight Analysis Framework

US Department of Transportation – Bureau of Transportation Statistics

PARKS: D+

Introduction

The Tennessee landscape varies from the Mississippi River bottoms in the west to the Appalachian Mountain range in the east providing diversity in its State Park system. At present, Tennessee ranks 17th in state population with approximately 5,797,000 citizens. Of this number, 63.6% live in urban area. It is projected that by the year 2025, the total Tennessee population will increase to 6,700,000.

The total land area of Tennessee is 41,219 square miles (26,380,160 acres). An estimated 13,603,000 acres of Tennessee is forested with 692,000 acres of this area owned by the State. The Tennessee State Park system contains 53 State Parks (168,850 acres) and 79 Natural Areas (112,325 acres). Twenty of these Natural Areas are contained within the boundaries of the State Parks along with various historical and archeological sites.

Nationally, state parks represent less than 2% of the total outdoor recreation areas. However, more than 29% of all visitors at outdoor state or federal recreation areas are visitors at state parks. In the 2007-2008 budget year, Tennessee State Parks generated $37,804,000 in revenue with 30,672,700 visitors. This revenue is added to the State General Fund and budget appropriations are made for the State Parks general operations. As throughout our nation, Tennessee State Parks prove to be an important resource.

Grade

The overall condition of Tennessee State Parks facilities infrastructure is stable and safe. The dedicated state park employees prove to be great assets of Tennessee State Parks. However, the park facilities could benefit from additional revenue investment to provide a more optimum level of service and would undoubtedly reap positive economic gains from this investment. Due to the current backlog of maintenance needs and the continued shortfall in both maintenance and capital project funding, ASCE gives state park infrastructure in Tennessee a grade of D+.

Background

In 1933, President Franklin Roosevelt established the Civilian Conservation Corp (CCC). When Tennessee State Parks was established through legislation in 1937, the CCC began work on the state park system establishing sites throughout the state. The term

park, as written in the 1937 legislation, was "all areas of land acquired by the State, which by reason of having natural and historic features, scenic beauty or location, possesses, natural or potential physical, aesthetic, scientific, creative, social, or other recreational values; and is dedicated to and forever reserved and administered by the state for recreational and cultural use and enjoyment of the people." Thus, the visitor finds a deep cultural heritage embedded within state park sites as well as natural, scenic or recreational value.

Today, Tennessee State Parks contain approximately $650 million in building assets and furnishings. Since 2003, Tennessee State Parks have reopened 14 parks that had previously been closed; removed restrictive access to 23 state parks; acquired park adjacent properties with exceptional conservation value; partnered with the Nature Conservancy and timber companies to protect 124,000 acres on the Cumberland Plateau; worked with community organizations to open the first Boundless Playground in the country; and purchased renewable "Green Power" in all state parks where it's available. These accomplishments were instrumental in the selection of Tennessee State Parks for the 2007 Gold Metal Award for Excellence in Park and Recreation Management.

Adequacy & Condition

Tennessee State Parks have six parks with inns; 21 with conference centers; 20 with cabins; and over 2,800 RV sites and campsites along with multiple recreational amenities. Although the parks are expected to be at/or near full capacity during the three major summer holidays and during local festivals, inns and campsites are adequately providing for visitors throughout the year. Over 98% of Tennessee State Parks have been fitted with handicap accessible facilities and limited accessible facilities in nature areas. One remaining park is being funded for handicap accessible access at this time. With $650,000,000 of building and furnishing assets, a yearly maintenance budget of $10-$13 million is needed. Much of the building and infrastructure of the park system is nearing sixty years of age dating to construction by the CCC. Due to the historic value of these facilities, special care is needed in the maintenance and will be needed in the future for the preservation of these facilities. Many of the park employees have spent their careers working at a state park and have taken great pride in maintaining these facilities and sharing the park culture and history with visitors. Still, some state parks have an area history that cannot be fully told to the visiting public because of inadequate funding for visitor and learning center improvements.

Funding

Funding for state parks comes through annual appropriations by the Tennessee government. Annual maintenance and capital budget requests are prepared each year by Parks Operations. Typically the maintenance budget request is near $10 million with state allocations from $2-$4 million. This has created an ever-increasing maintenance deficit of near $100 million. Capital budget requests are typically near $25 million with state allocations from $4-$5 million. As with maintenance, these figures show that outlays for new or replacement capital projects are inadequate.

Federal Funding comes to the state from the National Park Service (NPS) Land & Water Conservation Fund (LWCF). The 2008 LWCF apportionment for Tennessee was $428,050. However, the NPS unmet need reported for Tennessee for the year 2008 was $1.261 billion or 100% unmet. Federal Funds can be designated for a particular capital project or in times of shortfall, have been used to subsidize the maintenance budget.

Friends of State Parks provide some funding for "maintaining and enhancing the purposes, programs and functions of the state park system". Although useful for "enhancement projects", funds provided by the 33 active and established Friends groups are not used for the maintenance or capital budget projects.

Future

A rustic lodge in the Ocoee River area is a long-term vision for the state park system. Land purchases and development cost for such a project in 2009 dollars are estimated at $12-$15 million. Improvement to Visitor Centers to share the particular park's history and cultural importance with visitors is a continual vision of Tennessee State Parks.

Efficient maintenance with carefully selected capital improvement projects will be the continued yearly goal of Tennessee State Parks. In August of 2005, the "Tennessee State Parks Strategic Direction – a Vision for the Future" was released. It reiterated the same agenda as was enacted into Tennessee law in 1937 with a mission to "preserve and protect, in perpetuity, unique examples of natural, cultural, and scenic areas" affirming that the primary purpose of state parks is "to conserve natural, aesthetic, cultural, and historic resources, to provide opportunities for enjoying healthful outdoor recreation and to serve as outdoor classrooms for environmental and cultural resource education". This was and will be accomplished "through a well planned and managed system of state parks". Management Plans for each park are being developed to assist local park professionals to better provide services for visitors to Tennessee State Parks. The Natural Areas Program continues to expand to preserve Tennessee's irreplaceable natural sites. Tennessee State Parks continue to partner with other agencies, communities, and private groups to provide awareness and experience to citizens of the natural and cultural resources provided by Tennessee State Parks.

Sources

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TDEC Division of Natural Areas http://www.state.tn.us/environment/na/natareas

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Tennessee Department of State: State Facts http://www.state.tn.us/sos/

RAILROADS: C

Introduction

The existing rail system in Tennessee has been the object of neglect over an extended period of time. The possibilities are endless however, when the situation is examined in the light of the present turn of economic events. The rail infrastructure is capable of supporting freight haul operations over a wide geographic range; and at the same time is capable of serving both the intermediate distance passenger market, and the commuter markets in the vicinity of major population centers. Most importantly, the rail system, with some improvement and enhanced maintenance, could serve to relieve the pressures on other infrastructure systems (highways, aviation, transit, etc.).

The railroad industry is composed of a number of elements, each with its own set of operating conditions and business emphases. As a result, each element has its own specific infrastructure dependence. The overall railroad infrastructure report card grade thus represents a composite of the set of grades on the individual elements, in the same sense that a student report card is composed of a set of individual course grades.

In preparing an infrastructure grade for a railroad system, the following elements would appear to be appropriate:

Passenger Transport:
Intercity long haul service (Amtrak)
Commuter short haul service (Light Rail)

Freight Transport:

Interstate long haul service ("Class I")
Light traffic feeder service (Short Lines)

Grade

The report card grades presented here are based on the condition of the railroad infrastructure in Tennessee with particular reference to the capability to support both the present level of service and the potential for enhanced expanded service. Consideration has been given to the following factors in assigning the grades: System condition, System capacity, Operational efficiency, Level of Maintenance, Adequacy of funding, Security and safety.

Grades for the selected infrastructure elements are proposed as follows:

Intercity passenger routes	D
Commuter Light Rail routes	C-
Class I freight lines	C+
Short Line freight lines	B-

The proposed composite report card grade for the railroad infrastructure in the State of Tennessee is C.

Background

The railroad network in the United States was born early in the 19th century and expanded rapidly from that point. Unlike other transport modes, the rail system was developed with private capital and without significant competition. A large amount of right-of-way was acquired by the railroad companies in the process.

With time, highway-based systems successfully acquired a significant share of the freight business, while air-based systems successfully acquired much of the long distance passenger traffic. As a result, the rail industry found itself overbuilt and reacted accordingly.

By the middle of the 20th century, the railroad network was in the process of shrinking. The physical evidence presented itself in the form of deferred maintenance, reductions in the standard of service and the ultimate abandonment of a significant amount of track mileage. As might be expected, under these conditions the rail infrastructure entered an era of deterioration.

Existing System Network

The maps attached illustrate the extent of the existing rail network in Tennessee. Note that long haul passenger transport is particularly limited, with Amtrak service only available on the Chicago-New Orleans segment that serves Memphis via the Illinois Central (Class I). Note also that only one commuter light rail line operates in the State, serving Nashville from Lebanon via trackage shared with the Nashville and Eastern short line.

With respect to freight transport, a number of north-south Class I operations provide a significant level of service. East-west routes are, however, limited. A total of 20 short lines operate in the State, with all using former Class I track that had at one time been designated for abandonment by the larger carriers.

Priorities

The individual factors referenced in determining the report card grades were not "weighted." To develop a course of action for infrastructure improvement, priorities must be established as a means of focusing the effort within the limits of the resources that might be available.

Future

The following possibilities are offered as a basis for consideration in the determination of infrastructure priorities:

Provide increased funding for implementing light rail commuter service as a means of conserving energy, and at the same time relieving pressures on the urban highway system. Establish routes based on projected ridership (demand). Apply funding to

trackage improvement (with particular emphasis on routes shared with short lines and on the construction of parallel track on Class I rights-of-way).

Provide increased funding for short line expansion. Establish priority routes based on creating east-west connections (new trackage) in Tennessee. Also coordinate short line expansion to serve "transportation dependent" industries and accessible industrial sites in rural Tennessee communities.

With respect to the future, move to avoid the loss of any and all railroad rights-of-way that would result from abandonment.

Implement intermodal connections with particular emphasis on urban rail-airport passenger operations, and rail-highway freight operations.

Since rail systems are linear, they are exposed and vulnerable to attack by unfriendly interests. Conventional security methods traditionally used to protect such systems are expensive and generally do not provide full coverage. Experimentation in alternative technical security measures would appear to be in the national interest, as well as the infrastructure interests of the State of Tennessee.

Sources

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"Tennessee Shortline Capital Projects" (Recent but undated) by the Tennessee Department of Transportation.

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"How to Fix Amtrak" by Rush Loving, Jr. March 2009 Trains Magazine.

Edge of Disaster by Stephen Flynn, Random House, New York, 2007.

ROADS: B-

Introduction

Tennessee is well known for its superior roads. For the third consecutive year, Interstate 40 in Tennessee was rated as the best road segment in the country in 2008 (survey published in Overdrive magazine). In fact, Tennessee has consistently ranked in the top 5 for overall roadway system since the poll began 13 years ago.

Tennessee accommodates more than 70 billion vehicle miles of travel on more than 90,000 miles of roadway. Since a large portion of the miles traveled are on TDOT- (Tennessee Department of Transportation) maintained roads and better records are available through TDOT, this study is primarily based on such roadways. When evaluating road conditions in Tennessee from a civil engineering perspective, several factors are considered. In addition to the physical road conditions, other aspects such as capacity, operation & maintenance procedures, public safety, resilience of the network, and funding adequacy are given high consideration. The following sections in this report consider each of these criteria.

Grade

The overall grade was determined by developing individual grades for six categories and calculating a weighted average. A committee of seven civil engineers from throughout the state of Tennessee contributed to developing the grades. The results of the evaluation are found in Table 6.

Table 6. Assessment of Tennessee Roads

	Weight	Grade
Pavement Quality	25%	87
Capacity	20%	76
Operation & Maintenance	15%	83
Funding & Future Need	15%	70
Public Safety	15%	83
Resilience	10%	85
	Final Grade	**81 = B-**

Grading Scale

A	**Excellent**	**90 – 100%**
B	**Good**	**80 – 89%**
C	**Average**	**70 – 79%**
D	**Poor**	**51 – 69 %**
F	**Failing**	**< 50%**

Pavement Quality

TDOT's Pavement Management System, which was instituted in 1997, incorporates smoothness and distress data. Smoothness is measured by the International Roughness Index (IRI) which is converted into a Present Serviceability Index (PSI). Distress data is reported using the Pavement Distress Index (PDI). PSI and PDI are combined to obtain the Pavement Quality Index (PQI). PQI is based on a scale of 0-5, with 5 being excellent. As can be seen in Tables 1 and 2, the vast majority of TDOT maintained roads are in the good or excellent category.

Table 1. PQI Averages for Interstates

2006-07 PQI Interstate Averages	
Percentage	**Values**
0.0%	Very Poor (0.00 - 0.50)
0.0%	Poor (0.51 - 1.75)
1.1%	Fair (1.76 - 3.25)
42.1%	Good (3.26 - 4.50)
56.8%	Excellent (4.51 - 5.00)

Table 2. PQI Averages for State Routes

2006-07 PQI State Routes Averages	
Percentage	**Values**
0.0%	Very Poor (0.00 - 0.75)
0.0%	Poor (0.76 - 1.75)
3.0%	Fair (1.76 - 3.25)
47.5%	Good (3.26 - 4.25)
49.5%	Excellent (4.26 - 5.00)

Capacity

Capacity is a key consideration when assessing roads because it aids in determining if the roads can accommodate present and future VMT (vehicle miles of travel) demand. A good measure of capacity is level of service (LOS). LOS values are based on a volume-to-capacity ratio. TDOT's long range plan divides LOS results into two groupings: 1) rural/small urban areas and 2) urbanized areas. The study shows that for rural/small urban areas, the LOS was excellent-good in 2003 and is expected to go into the good-fair range by 2030. However, for urbanized areas, the LOS in 2003 was in the good-fair range and is expected to go into the fair-poor range by 2030. A detailed look at the LOS for 2003 and the projections for 2030 in urban areas are presented in Tables 3 and 4.

Table 3. LOS YEAR 2003 Urban Areas

TOTAL (Both Interstate and State Routes)								
	Centerline Mileage by LOS				% Centerline Mileage by LOS			Weighted
	A,B & C	D	E & F	Total	A,B & C	D	E & F	Average
MPO	Exc./Good	Fair	Poor		Exc./Good	Fair	Poor	Rating
Bristol	53	8	19	80	66%	10%	24%	Exc./Good
Chattanooga	78	46	81	205	38%	22%	40%	Fair
Clarksville	36	20	34	90	40%	22%	38%	Fair
Cleveland	16	16	22	54	30%	30%	41%	Fair
Jackson	40	5	18	63	63%	8%	29%	Exc./Good
Johnson City	79	24	28	131	60%	18%	21%	Exc./Good
Kingsport	74	25	33	132	56%	19%	25%	Exc./Good
Knoxville	46	66	140	252	18%	26%	56%	Fair
Lakeway	45	9	19	73	62%	12%	26%	Exc./Good
Memphis	126	71	92	289	44%	25%	32%	Fair
Nashville	524	139	622	1285	41%	11%	48%	Fair
Davidson	69	44	252	365	*19%*	*12%*	*69%*	Poor
Rutherford	118	51	89	258	*46%*	*20%*	*34%*	Fair
Sumner	118	18	91	227	*52%*	*8%*	*40%*	Fair
Williamson	104	13	117	234	*44%*	*6%*	*50%*	Fair
Wilson	98	5	73	176	*56%*	*3%*	*41%*	Fair
Springfield	17	8	0	25	*68%*	*32%*	*0%*	Exc./Good
Total	*1117*	*429*	*1108*	*2654*	42%	16%	42%	Fair

Table 4. LOS YEAR 2030 Urban Areas

TOTAL (Both Interstate and State Routes)								
	Centerline Mileage by LOS				% Centerline Mileage by LOS			Weighted
	A,B & C	D	E & F	Total	A,B & C	D	E & F	Average
MPO	Exc./Good	Fair	Poor		Exc./Good	Fair	Poor	Rating
Bristol	27	16	37	80	34%	20%	46%	Fair
Chattanooga	37	27	141	205	18%	13%	69%	Poor
Clarksville	12	3	75	90	13%	3%	83%	Poor
Cleveland	15	2	37	54	28%	4%	69%	Fair
Jackson	21	8	34	63	33%	13%	54%	Fair
Johnson City	34	25	72	131	26%	19%	55%	Fair
Kingsport	35	16	81	132	27%	12%	61%	Fair
Knoxville	17	9	226	252	7%	4%	90%	Poor
Lakeway	29	14	30	73	40%	19%	41%	Fair
Memphis	73	39	177	289	25%	13%	61%	Fair
Nashville	264	107	914	1285	21%	8%	71%	Poor
Davidson	19	8	338	365	*5%*	*2%*	*93%*	Poor
Rutherford	84	18	156	258	*33%*	*7%*	*60%*	Fair
Sumner	51	32	144	227	*22%*	*14%*	*63%*	Poor
Williamson	49	33	152	234	*21%*	*14%*	*65%*	Poor
Wilson	47	14	115	176	*27%*	*8%*	*65%*	Fair
Springfield	14	2	9	25	*56%*	*8%*	*36%*	Exc./Good
Total	*564*	*266*	*1824*	*2654*	21%	10%	69%	Poor

Operation & Maintenance

Maintaining high quality roads is a top priority in Tennessee. TDOT uses various pavement preservation techniques such as crack sealing, microsurfacing, and 1.25" asphalt overlays to extend the life of Tennessee's roads. TDOT also has smoothness targets for roadways, and provides incentives to contractors who pass acceptance testing conducted by TDOT personnel. Such dedication to pavement quality has not gone unnoticed. TDOT has been awarded five national Perpetual Pavement awards in just the past seven years. Also, Tennessee recently ranked as first among the 32 states which participated in the national pavement smoothness study conducted by the American Association of State Highway and Transportation Officials (AASHTO).

Safety

In 2003, the U.S. Census Bureau reported a traffic fatality rate of 1.73 (per 100 million vehicle miles) for Tennessee, ranking it 16th in the nation. The fatality rate rose to 1.89 in 2004 and then dropped down to 1.80 in 2005. Since the safe movement of people and goods is a high priority in Tennessee, TDOT has sought ways to improve public safety on its roadways. Detailed strategies are being implemented in regards to keeping vehicles in the proper lane, intersection safety, work zone safety, motor carrier safety and driver behavior. One of Tennessee's most effective safety campaigns has been "Click It or Ticket." As can be seen in Figure 1, Tennessee has seen a significant increase in seat belt usage since the start of the "Click It or Ticket" campaign in 2001. Tennessee also authorized the primary seat belt law in July 2004.

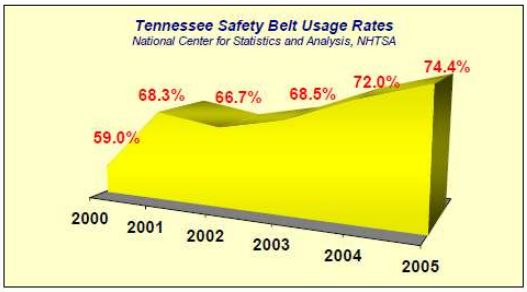

Figure 1. Seat Belt Usage Trends

Resilience

Tennessee's intelligent transportation system, TDOT SmartWay, improves resilience by using advanced information technologies to improve safety and operation. Some key features of TDOT SmartWay are: roadway traffic sensors, camera video surveillance, dynamic message signs, HELP freeway service patrols, incident management, and information on weather-related road conditions. Benefits of the system include:

- Providing live video to local television stations (used during their rush hour traffic reports).
- Website access to current construction and incident information.
- Shorter crash response time by emergency response agencies including TDOT HELP trucks.
- Using the system to assist in AMBER ALERTS.
- Radio reports of current construction and incident information available on the highway advisory radio (HAR) system.
- Use of the system to complement Homeland Security evacuation plans.
- Warning messages on dynamic message signs about crashes allow traffic to divert to other routes while also reducing the potential for secondary crashes caused by drivers running into unanticipated backups.

In addition, Tennessee's roadways are well-connected and numerous alternate routes between cities are available in the event that a major route becomes unavailable. However, overall infrastructure resilience in Tennessee could be greatly improved by placing a heavier emphasis on intermodalism. If, for any reason, road access in Tennessee became crippled, transit via rail, air, and water would be essential. Although Tennessee does not currently have a strong intermodal emphasis, the need has been identified by TDOT and included in the long range plan. Nevertheless, lack of adequate funding in the coming years could impede progress in this area.

Funding

TDOT estimates that in the 25 year period between 2005 and 2030, $130 billion worth of investments will be needed. This amount includes the cost of building and maintaining roads, bridges, railroads, locks, dams, airports and operating public transportation systems.

Table 5 breaks down the 25 year modal needs into investment categories. It can be seen that highway needs are the most costly, requiring almost $90 billion out of the $130 billion total.
It is estimated that only about 83.5% of the highway needs will be met by available funding. Not only does this present a problem for the future, but it is also a major concern now because, as of December 2005, there was already a $37 billion backlog of projects in the highway mode. Although the highway system is generally well-maintained, limited funding resources hinder the state from keeping pace with the rapid increase in highway travel. This results in deteriorated highway conditions and roadways which are over-capacity. Adequate funding is essential to maintain Tennessee's high standards.

Table 5. 25-Year Modal Needs

Investment Category	25-Year Modal Needs								
	25-Year Modal Need (regardless of funding source) in $M YOE	Highway	Public Transp.	Aviation	Railroad	Water	Bicycle/ Pedestrian	ITS	TDM
I. Maintenance/Preservation									
25-Year Modal Need (regardless of funding source) in $M	30,010	20,110	5,010	1,320	0	700	60	2,660	150
Proposed 25-Year TDOT Budget in $M	25,690	20,110	2,100	670	0	20	30	2,660	100
Estimated Partnering Funds Outside TDOT Budget in $M	4,265	0	2,910	650	0	640	15	0	50
Total TDOT and Other Modal Investment in $M	29,955	20,110	5,010	1,320	0	660	45	2,660	150
% of Modal Needs Met By Total Proposed Investment	99.8	100.0	100.0	100.0	N/A	94.3	75.0	100.0	100.0
II. Safety/Modernization									
25-Year Modal Need (regardless of funding source) in $M	24,420	21,510	100	1,320	1,310	80	100	0	0
Proposed 25-Year TDOT Budget in $M	17,120	15,770	70	670	580	10	20	0	0
Estimated Partnering Funds Outside TDOT Budget in $M	1,250	0	30	650	510	40	20	0	0
Total TDOT and Other Modal Investment in $M	18,370	15,770	100	1,320	1,090	50	40	0	0
% of Modal Needs Met By Total Proposed Investment	75.20	73.3	100.0	100.0	83.2	62.5	40.0	N/A	N/A
III. Expansion/Enhancement									
25-Year Modal Need (regardless of funding source) in $M	75,310	47,590	9,010	1,990	12,650	250	180	3,640	0
Proposed 25-Year TDOT Budget in $M	42,450	38,620	1,770	340	620	20	80	1,000	0
Estimated Partnering Funds Outside TDOT Budget in $M	10,290	0	5,790	1,650	1,690	80	80	1,000	0
Total TDOT and Other Modal Investment in $M	52,740	38,620	7,560	1,990	2,310	100	160	2,000	0
% of Modal Needs Met By Total Proposed Investment	70.0	81.2	83.9	100.0	18.3	40.0	88.9	54.9	N/A
Totals									
25-Year Modal Need (regardless of funding source) in $M	129,740	89,210	14,120	4,630	13,960	1,030	340	6,300	150
Proposed 25-Year TDOT Budget in $M	85,260	74,500	3,940	1,680	1,200	50	130	3,660	100
Estimated Partnering Funds Outside TDOT Budget in $M	15,805	0	8,730	2,950	2,200	760	115	1,000	50
Total TDOT and Other Modal Investment in $M	101,065	74,500	12,670	4,630	3,400	810	245	4,660	150
% of Modal Needs Met By Total Proposed Investment	77.9	83.5	89.7	100.0	24.4	78.6	72.1	74.0	100.0

Recommendations

The Tennessee Section of ASCE offers the following recommendations for improving roadways in the state:

- Pursue additional funding for highway safety and expansion.
- Encourage the use of cost-benefit analysis and value engineering to reduce overall costs.
- Document progress made towards the implementation of the Long Range Transportation Plan.
- Continue researching and applying new pavement preservation techniques.
- Place more emphasis on intermodalism.
- Continue the expansion of TDOT SmartWay across the state.
- Maintain up-to-date records and reports about Tennessee's roadways.

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SCHOOLS: C+

Introduction

Rapid enrollment growth, aging facilities, a deficit of elementary and secondary teachers and general funding for all school projects will be issues to address in Tennessee in the next five years. The recent economic adjustment has most states searching for funds in unorthodox places. In Tennessee, the Governor has declared that school funding, both infrastructure and administration, will not suffer because of the economic downturn. However, sales tax revenue, the main source of funding for education, is lagging well behind recent years in both actual and anticipated collections. The state lottery, which is still young in Tennessee, is a source of revenue not fully exploited for infrastructure needs and is being used primarily for student scholarships. Money to build and renovate is not seen as a priority. Instead, maintaining buildings and offices will be the focus of education administrators for the foreseeable future. Although Tennessee has reduced the amount of funding needed to upgrade facilities by more than half in the last eight years, the state is recognizing about $608 million to renovate and upgrade school facilities.

Grade

The grade assigned to Tennessee school facilities, C+, reflects the general aging of all facilities within the state. Generally, new schools are not being built; old schools are being renovated, and many schools are in need of structural repair, with state and county monies not readily available.

Current Conditions

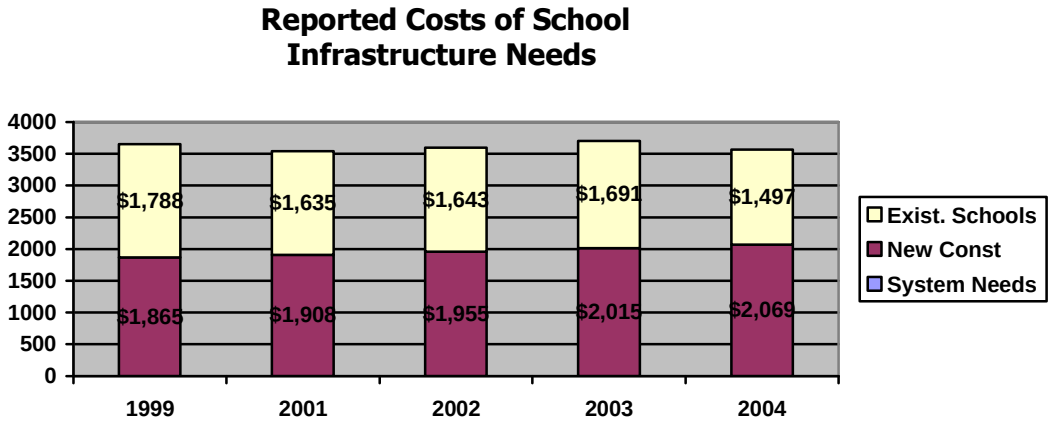
The Tennessee Department of Education (TDE) recently released its annual comprehensive report card on pre-K through 12th grade education, including state, district and school-level information on achievement, demographics, discipline and educator preparation for the year 2008. State-level results show Tennessee met federal achievement benchmarks in all but one category, improved achievement in reading / language arts at the elementary level and increased the state's graduation rate to 82.2 percent. The report card shows an increase in the percentage of courses taught by highly qualified teachers and a decrease in student suspensions and expulsions.

Tennessee was chosen as one of eight states to launch the Career and College-Ready Policy Institute, a national initiative to help other states' graduate students prepare for 21st century expectations.

Tennessee has 1,710 schools, with a total population of 953,928 in 2005-2006, the last available data. Total expenditures for all education (including colleges and universities) in that time frame were $7,287,053,893, of which $6,681,456,333 was allocated to public elementary and secondary schools. Per pupil expenditures were $7,639.99, below the national average of $8,157.00. Compared to the national average of 98.76%, the TDE spent 99.72% of revenues for education were expended on education.

Infrastructure Projections

According to "Building Tennessee's Tomorrow," a report on infrastructure needs in the state, the overall condition of Tennessee's public school buildings has continued to improve between July 2004 and June 2009. And despite increased enrollment growth, the cost of school facility needs reported by local officials statewide is declining. However, there are concerns in individual school systems, including rapid enrollment growth and continued reliance on portable classrooms. School infrastructure improvements – including new schools and improvements or additions to existing schools – that needed to be started or completed sometime during the five year period of July 2004 through June 2009 were estimated to cost nearly $3.6 billion.



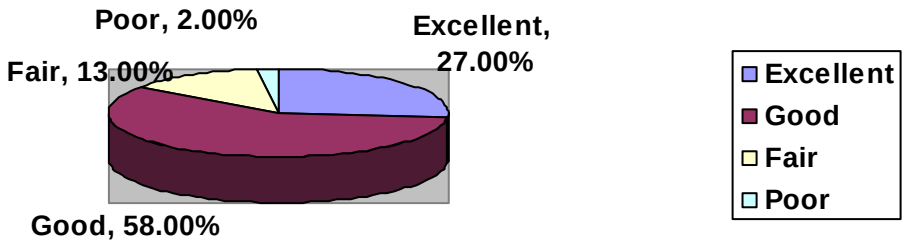
A major concern for some local officials is the cost of keeping up with rapid enrollment growth. Statewide growth has accelerated in the last few years. It was about one quarter of one percent ten years ago, but enrollment reached nearly a full percentage point in 2004 and topped one percent in 2005. More than half of that increase occurred in four school systems in Middle Tennessee and three were in counties which adjoined the Nashville / Davidson County Metro system.

Rutherford County	24%
Williamson County	17%
Montgomery County	9%
Sumner County	8%

With an average school size of roughly 550 students, the growth from 2000 to 2005 should have required approximately 49 new schools. The actual number, however, is more than double that, most likely because of the number of new classrooms needed to meet the lower EIA class-size mandate.

Currently, 91% of public schools are considered by local officials to be in good or better condition, considerably better than the 59% reported in 1999. Estimated costs to upgrade all facilities at existing schools to good or better condition peaked in the 2001 inventory at almost $1.5 billion. Now the cost of upgrades and improvements stands at $608 million.

Overall Condition of Schools
As Reported by Local Officials



Defining what constitutes a high-quality learning environment is both subjective and difficult. Rating individual schools and school components is left to the judgment of local officials. Upgrade needs reported by these officials include estimated costs to put individual components as well as entire schools in "good" condition.

Two-thirds of Tennessee's public school systems and about one-third of its individual schools have portable or temporary classrooms. Nine systems have more than 10% of their classes in portables. It should be noted that portable classrooms are not necessarily inferior to permanent classrooms; in fact, the opposite is sometimes true. One reason portables are sometimes used is to replace substandard permanent classrooms.

Technology Needs

The total need for new technology infrastructure more than doubled between 2001 and 2002 yet has changed little since. All of that dramatic increase is attributable to a new technology initiative in the Memphis school system, an initiative estimated to cost $590 million. Aside from Memphis, technology needs are declining. This may indicate that technology has gone from being a new type of need with initial large investments to being a less costly but recurring need.

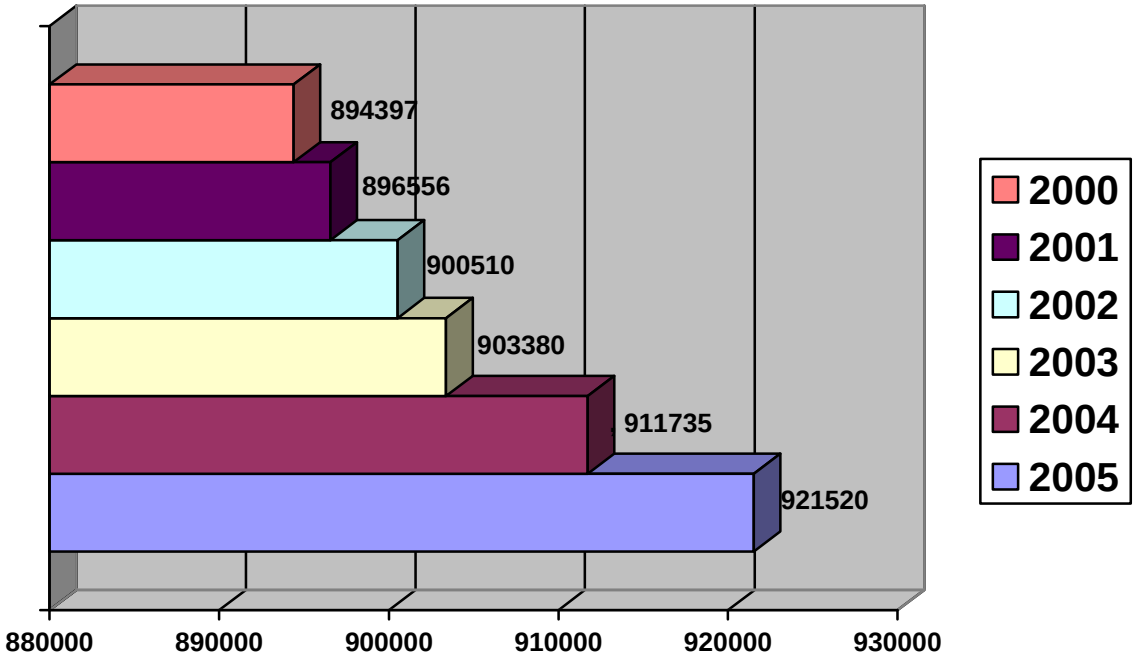
Forty-five school systems now report no need to upgrade technology in their schools, and only thirty-eight systems now need more than $100 per student to meet their technology needs.

Student Projections

In 1999, Tennessee graduated 41,568 students. By 2007-2008 that number was 51,620, an increase of just over 24%. However, that growth is projected to slow over the next 10 years. Projections of growth for the 2004-2005 to 2011-2012 school years is expected to reach only 3.9%, well below the 15.4% growth rate of the 1999-2000 to 2004-2005 period. That number picks up again when the 2012-2017 period comes into play. The growth rate then sees a 10.9% gain in percentage change, well below the national projections of 7.9% for the same period.

It is difficult to assess the impact of the "Tennessee Diploma Project," an effort to implement more rigorous graduation requirements for all public high school students. Presently, 20 total credits are required for graduation. Beginning in the Fall of 2009, that requirement goes up to 22 credits. Math credits are increased by 1.0, Personal Finance will be required for an additional 0.5 credits, and Physical Education and Wellness will increase by 0.5 credits.

Number of Students in Public Schools
2000 through 2005



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Tennessee Department of Education, "Tennessee Diploma Project: Graduation Requirements"

TRANSIT: D

Introduction

Tennessee is a centrally-located state with access to three-quarters of the country within a day's drive. The state's roadways are well known for their condition and their quality. However, only 3% of Tennesseans in urban areas utilize public transportation. With the rise in fuel prices and future uncertainties in oil supply, residents may become more dependant on public transportation to carry out their lives.

Grade

The access to and the areas serviced by public transit in Tennessee is somewhat limited in both urban and rural areas. Additional investment in capital improvements, expansion of routes and additional equipment is needed to meet projected demands and lure current non-users to utilize the systems. Due to the current backlog of capital projects and the continued shortfall in both maintenance and capital project funding, ASCE gives public transit infrastructure in Tennessee a grade of D.

Background

Today there are 26 public transit agencies that can be grouped into Large Metro, Urban, Trolley, or Rural systems. These agencies operate a total of 1,556 buses, trains, trolleys and vans providing transportation to residents of Tennessee. The use of transit in 2006 was 14% more than the previous five years. In addition, over 80 non-profit and other organizations supplement the state's public transit agencies.

Adequacy & Condition

But is Tennessee ready for an increase in the use of Public Transportation? Urban ridership is projected to grow by 27 % by 2025 if the current services are held at their current levels. If services are doubled by 2025, ridership is projected to grow by 97 percent for fixed-route services. Also, demand response services would grow by 69 percent and operating expenses by 122 percent if services were doubled by 2025.

Funding

In 2003, total funding of $106 million for urban public transit systems came from local governments (39 %), fares and generated revenues (29 %), state funding (16 %), and federal funding (16 %). Rural systems had an expenditure of $20.9 million that came from contract fares (39 %), federal funding (29 %), state funding (29 %), local government funding (3 %), and other generated revenues (3 %).

Future

To better serve the public, transit agencies must add additional routes and vehicles. Light rail projects, Nashville's commuter and high capacity transit projects, the Sevierville bus rapid transit project, vehicle acquisition, technology equipment, transit

amenities, and transit facilities will require an outlay of capital expenditures in excess $2.7 billion in urban areas. A major needs estimate prepared by the Tennessee Department of Transportation (TDOT) has projected an expenditure in excess of $14 billion to meet the state's public transportation demands through 2025, only 28 percent of that which has been allocated in TDOT's budget.

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Tennessee Public Transportation Infrastructure Analysis

Tennessee Department of Transportation Long Range Plan

WATER AND WASTEWATER: C

Introduction

Tennessee enjoys an abundance of water resources with more than 600 miles of rivers and streams and over 570,000 lake and reservoir acres. The State's Department of Environment and Conservation through its Divisions of Water Supply and Water Pollution Control is entrusted with protecting the citizens' right to enjoy clean water for intended uses.

Grade

Division of Water Supply

The Division of Water Supply (DWS) is the administration agent for carrying out the provisions of the Tennessee Safe Drinking Water Act, which regulates the quality and quantity of drinking water in the State. The Division is charged with general supervision over construction and operation of public water supplies, including design, construction and operation of public water works systems.

The Division is authorized to review and approve engineering reports and plans and adopt rules and regulations governing the location, design, construction, continuous operation and maintenance of systems. The Division is also authorized to enforce these rules and regulations. An enforcement program requires water supplies to meet requirements of the Safe Drinking Water Act with respect to water quality and information reporting.

Division of Water Pollution Control

The Division of Water Pollution Control (DWPC) is responsible for administration of the Tennessee Water Quality Control Act of 1977. Annually, the Division monitors, analyzes and reports on the quality of Tennessee's water. Advisories are issued to the public when levels of contaminants exceed levels considered to be protective of public health.

Municipal, industrial and other discharges of wastewater are permitted by the Division. Through 2008, approximately 1,700 permits have been issued under the federally delegated National Pollutant Discharge Elimination System (NPDES). These permits establish pollution control and monitoring requirements based on protection of designated uses through implementation of water quality standards and other applicable State and Federal rules.

Another function of the Division is the review of wastewater construction plans and specifications for municipal and industrial facilities.

Water

In January 2005, the Division of Water Supply published the "Tennessee Rural Water Needs Report." Data was collected and presented with regard to existing utility service

areas, areas without public water, water quantity and quality issues, costs estimates, obstacles to the extension of water service and population.

The report stated that over 92 percent of the State's total population, estimated at 5.6 million people based on the 2000 census, is served by public water supplies. While many areas in Tennessee are blessed with adequate water supplies, there are rural areas around the State where water sources are limited. Before major water service extensions are considered in these areas of limited supply, the water sources must be evaluated for adequacy. Growth and increasing water demands could result in voluntary or mandatory water conservation/rationing if sources become limited during drought conditions. Having a continuous supply of water that is adequate in quantity and quality is imperative to the health and well-being of the people of Tennessee.

In response to the State's Safe Drinking Water Act (SDWA), the Division of Water Supply adopted a capacity development strategy which must be submitted in a report to the Governor every three years. All new public water systems are required to demonstrate technical, managerial and financial capacity. Known as a capacity development plan, new systems must demonstrate ability to be in compliance with the SDWA on the day service of water begins. Systems that cannot demonstrate capacity are not approved.

To determine the effectiveness of the State's Capacity Development Strategy, the Division compared the list of public water systems with a history of significant non-compliance in 1997 to those systems with a 2008 history of violations. The results reflected an improved capacity of many water systems to comply with established SDWA requirements.

Where new systems could not demonstrate capacity prior to operation start-up, many potential new systems elected to construct lines to existing systems. From July 1, 2005, to June 30, 2008, the number of community water systems declined from 685 systems to 485 systems, even though 19 community water systems were created during the period.

Despite the challenges facing the water systems and Tennessee's Drinking Water Program, the success of the State's Capacity Development Strategy is encouraging. Recent drought and other challenges encourage systems to merge, take regional approaches to water supply issues and collaborate on compliance issues and new rules.

Wastewater

Impairment due to point source discharge from municipal wastewater treatment plants continues to decline. Municipal sewage treatment plants have permits designed to prevent impacts to the receiving body of water. On rare occasions, sewage treatment systems fail to meet permit requirements. Sometimes, a body of water downstream of a facility is found to not meet biological criteria and the upstream facility is listed as a potential source of the pollutant of concern, even if permit limits are being met. In those cases, permit requirements must be adjusted along with other watershed improvements to address water quality concerns.

Collection systems convey raw sewage to treatment plants through a series of pipes and pump stations. Unfortunately, these systems occasionally malfunction or become overloaded, which can result in the discharge of high volumes of untreated sewage to a stream or river. A serious concern near urban areas is children being exposed to elevated bacteria levels while playing in streams and rivers after heavy rains.

Sanitary sewer collection systems are monitored by municipalities to insure that they are not leaking. NPDES permits contain provisions that prohibit overflows and require that any overflows be reported to DWPC. Enforcement action must be taken against systems that fail to report and correct sewage system problems.

In Tennessee, only three cities – Nashville, Chattanooga and Clarksville – have combined sewers, i.e. sanitary waste and storm water carried in the same sewer. Permits require that when these sewers overflow during storm events, monitoring must be conducted. Several water contact advisories are due to combined sewer overflows.

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