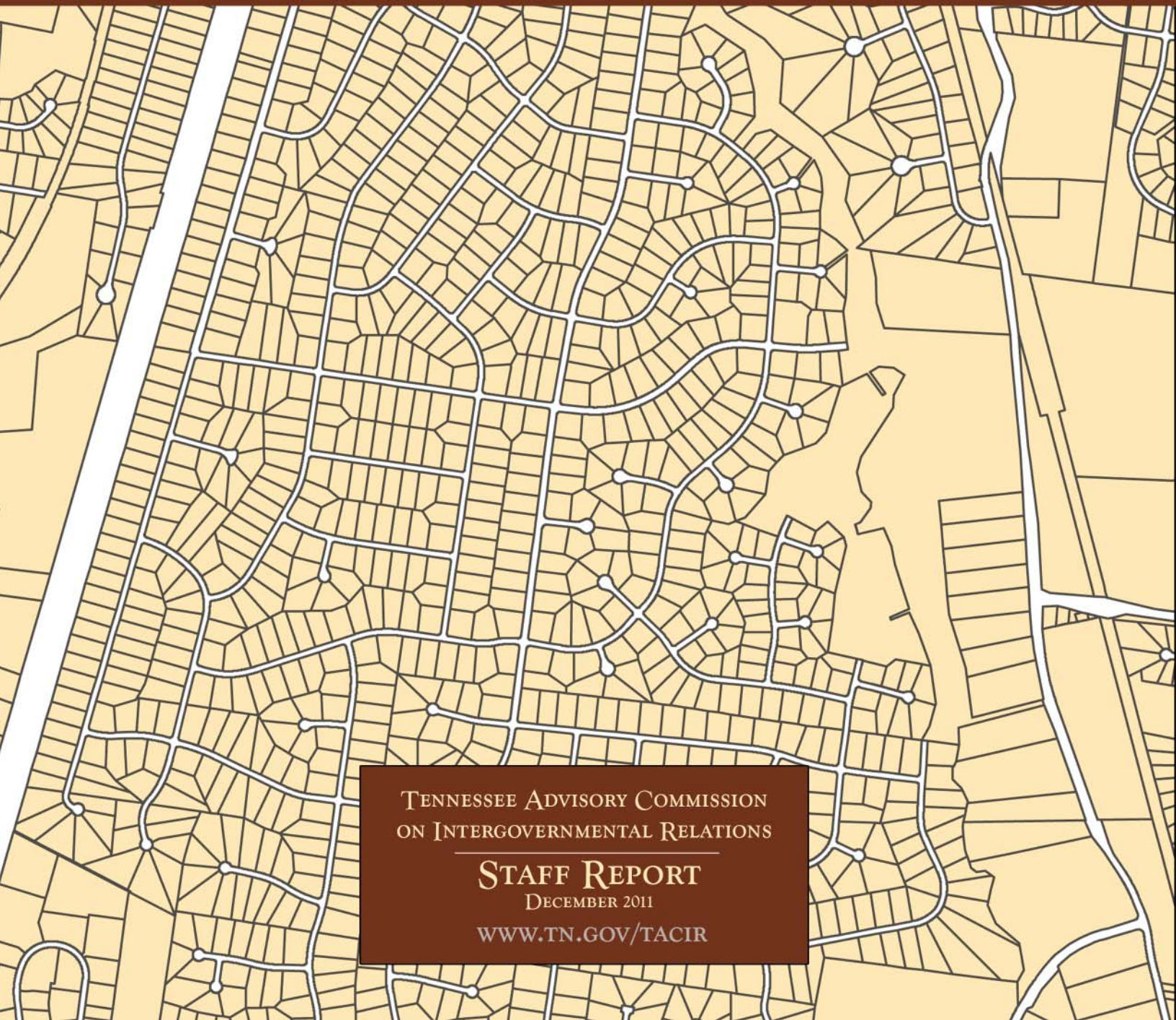




GETTING THERE: INCREASING ACCESS TO DESTINATIONS

PART IV: LAND USE AND TRANSPORTATION PLANNING



TENNESSEE ADVISORY COMMISSION
ON INTERGOVERNMENTAL RELATIONS

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Getting There: Increasing Access to Destinations

A TACIR Staff Report

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Purpose

This is a staff-generated TACIR report exploring the relationship between land use and transportation in Tennessee. It is part of a four-part series on transportation. This series is included under the broader category of growth policy and infrastructure, which is part of the fiscal year 2010 work program. The work program was approved by the TACIR Commission in June 2009.



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Executive Summary

Beautiful scenery, a relatively low cost of living, and a central location are just a few of the advantages of living and doing business in Tennessee. Public investments play an important role in maintaining this high quality of life. The ground transportation system, including both roads and mass transit, is a public investment used by millions of Tennesseans every day to reach jobs, schools, shopping destinations, and recreational activities. Due to poor levels of accessibility, however, travelers cannot always reach these destinations with ease. Long distances between origins and destinations, congestion, and unconnected street patterns lead to high transportation costs, limited transportation options, and poor job access. Additionally, there is increasing demand for transportation infrastructure, and the gap between needed transportation improvements and available funds persists. These challenges threaten to offset the high quality of life enjoyed by Tennessee residents.

Integrating land use with transportation to increase accessibility is one answer to these challenges. Land use and transportation have a cyclical relationship. Land development necessitates transportation infrastructure, and infrastructure, in turn, provides access to land and encourages more development. Because of this relationship, increasing accessibility will require action in both fields, and these actions should be coordinated. Transportation planners determine which projects are funded but have little authority in land use decisions. While they can work with local governments to encourage or suggest land use plans that foster improved accessibility, land use planning is under the purview of local governments in Tennessee. The preparation and adoption of a local comprehensive land use plan is optional for local governments. This issue is discussed at length in TACIR's report *Land Use and Planning in Tennessee*. To comply with Public Chapter 1101 (PC 1101), local governments must have growth plans, but PC 1101 does not specify that plans address issues like land use, transportation, public infrastructure, housing, and economic development. By coordinating decisions in these areas, Tennessee governments can better control costs, target investments, encourage development where it most makes sense, and give residents better access to their destinations.

Accessibility-based planning focuses on making it easier to get from location to location.

Increased accessibility helps maximize public investments, enhance economic development, improve job accessibility, reduce transportation costs, and improve transportation for disadvantaged populations.

Accessible communities share five characteristics: high densities of origins and destinations, mixed land uses, connected networks, a variety of transportation mode options for travelers, and highly connected modes that make it easy to use a mix of modes for trips. Better accessibility can positively affect transportation by shortening trips, making trips more direct, reducing the number of trips necessary for people to fulfill their needs, and giving travelers more mode choices.

Increased accessibility will benefit Tennessee in many other ways as well, including maximizing public investments, enhancing economic development and improving job accessibility, reducing transportation costs, and improving accessibility for transportation-disadvantaged populations.

Maximize Public Investments

Accessibility-based planning maximizes investments because it prioritizes and targets spending. Fostering development around existing transportation networks and infrastructure can help local and state governments get more for their money because it lessens the burden of building completely new infrastructure. Large amounts of development in outlying areas can leave governments struggling to cope with unmanageable infrastructure costs. This paper summarizes two studies that estimate future infrastructure costs based on various land use and transportation investment decisions. The “business as usual” scenarios in these studies represent dispersed development patterns, while the other scenarios represent development characterized by compact growth and urban infill. The studies showed that significant infrastructure cost-savings are possible when development is directed to desired areas.

Enhance Economic Development

Accessibility has a variety of positive effects on economic development and business profitability. Accessible locations have more appeal to businesses, and increased accessibility generally leads to more development. Better accessibility has the capacity to boost property values and draw more private investment. Additionally, transportation infrastructure connects businesses

to both suppliers and customers. Tennessee has two economic development programs in place to help communities achieve their economic development goals: the Tennessee Three-Star program and Jobs4TN.

The Tennessee Three-Star program assesses a community's planning, infrastructure, community development, leadership development, economic development, and education and workforce development. It encourages sustainable community economic growth and helps communities capitalize on their strengths and identify and address shortcomings. The Three-Star program presents an excellent opportunity to incorporate accessibility into a program structure that is already in place. Components related to accessibility-based planning could be implemented into Three-Star evaluation and benchmark criteria.

Jobs4TN focuses on strengthening and capitalizing on existing economic development resources and allocates funding to support and encourage innovative thinking and projects. Implementing a complimentary accessibility-based land use and transportation strategy could multiply the positive outcomes of Jobs4TN. Potential strategy components include committing funds for investment, focusing on utilizing infrastructure that is already in place, encouraging creative solutions, and ensuring more targeted transportation investments.

Improve Job Accessibility

The location of job centers significantly impacts transportation patterns and needs. In the past, jobs tended to be located in central cities. Now, however, there are multiple job centers, and commutes are characterized by suburb-to-city, reverse commutes, and suburb-to-suburb commutes. Though issues like traffic congestion and distance between home and work make getting to work more difficult for automobile drivers, the problems are more significant for persons without access to vehicles or persons for whom driving is not feasible. Public transit is more prevalent in metropolitan areas, but not all metro residents enjoy a good level of transit access. In a Brookings Institute analysis of the 100 largest Metropolitan Statistical Areas (MSAs) in the country, four Tennessee MSAs ranked poorly in a combined measure of transit coverage and job access (rankings of 69 or worse out of 100 MSAs).

Reduce Transportation Costs

Better accessibility can result in less required travel and lower transportation costs. Housing and transportation are two of the largest expenditure categories for most households. Buyers and lenders scrutinize housing affordability, but transportation affordability is largely ignored, though expenditures can have significant impacts on household budgets. A recent joint analysis by the Brookings Institute, the Center for Transit Oriented Development, and the Center for Neighborhood Technology evaluated housing and transportation expenditures in 337 MSAs nationwide, including seven in Tennessee. The analysis concluded that some Tennessee households spend more than 50% of their annual incomes on housing and transportation combined. In five of the seven Tennessee MSAs, transportation expenditures top housing expenditures. The problem is exacerbated because affordable housing is not always located near jobs. This results in people living further away from their jobs and paying higher costs for transportation. More accessibility-based planning would address these issues by coordinating housing locations with job locations. This has the capacity to relieve housing and transportation cost burdens for Tennessee households.

Accessibility-based planning could also help to reduce Tennesseans' vulnerability to volatile gas prices. With few alternatives to automobile travel, household expenditures on transportation increase when gas prices rise. National level data indicate that household spending on gasoline can jump nearly 36% in a single year due to fuel cost spikes. Designing more accessible communities can reduce Tennesseans' dependence on fuel and fluctuating oil prices because more accessibility means shorter distances and more alternative mode options.

Improve Accessibility for Transportation-Disadvantaged Populations

As a larger percentage of Tennessee's population reaches age 65, accessibility will become even more important to state residents. By 2040, 18% of the state population will be 65-years-old and older, compared with 13.5% today. The key to keeping this population mobile is accessibility-based planning. Strategically locating

services and designing communities in which alternative modes of transportation are feasible will help seniors have better access to healthcare, shopping, recreational activities, and other services.

Individuals without vehicle access also represent a transportation-disadvantaged group. An estimated 152,000 households across Tennessee do not have access to vehicles, according to 2005-2009 American Community Survey data. With limited public transportation options in many counties, it is a hardship for members of these households to reach employment opportunities, as well as satisfy daily travel needs.

Initiatives to Increase Accessibility

An increasing number of states, regions, and local governments—including some in Tennessee—are rethinking the status quo and implementing innovative programs to better coordinate land use with transportation and increase accessibility. Recent federal initiatives such as the establishment of the HUD-DOT-EPA partnership for Sustainable Communities have indicated that coordination is a federal priority. State and regionally initiated programs also aim to bring these types of principles to the forefront of the transportation and land use planning fields.

This paper highlights efforts of the Tennessee Department of Transportation (TDOT), Tennessee's Metropolitan Planning Organizations (MPOs), and local governments to coordinate land use and transportation and enhance accessibility. TACIR staff interviewed TDOT staff, as well as staff at several MPOs across the state.

Tennessee Department of Transportation

An effort by the Tennessee Department of Transportation (TDOT) to develop a corridor management agreement (CMA) template is the primary initiative to better coordinate land use and transportation. CMAs formally coordinate the actions of various entities in matters such as access management, land use and subdivision management, right-of-way needs and preservation, operational strategies, and financing of corridor management improvements. The TDOT effort is being carried out with guidance from the National Governor's Association Center for Best Practices (NGA).

An increasing number of states, regions, and local governments are rethinking the status quo.

NGA is providing technical assistance and expert guidance to help Tennessee create a system that better interfaces local land use planning with local and state transportation planning. In addition to developing the template, the state seeks to identify and propose corridor management incentives and assess existing legislation and programs for opportunities to institutionalize corridor management agreements.

TDOT also works to foster better land use and transportation planning by sponsoring MPO studies and projects. For instance, TDOT funded a transit corridor study in the Knoxville region and also sponsored the development of the Knoxville MPO's Complete Streets Study and Guidelines. The Knoxville MPO adopted a Complete Streets Policy in 2009.

Chattanooga-Hamilton County MPO

The Chattanooga-Hamilton County Regional Transportation Planning Organization (TPO), the MPO for the area, is taking many steps to increase accessibility in the region. The TPO made complete streets a strategic planning concept in the 2035 long-range transportation plan (LRTP). The term "complete streets" indicates a design strategy that seeks to make streets safer, more livable, and suited for all modes of transportation. In addition to making complete streets a key piece of the 2035 LRTP, the TPO developed an investment strategy to implement complete streets designs into several corridors in the region. The TPO calculated the incremental funding that would be needed to implement complete streets design elements into selected corridors and included these amounts into total project costs. The TPO plans to cover costs with federal Surface Transportation Program (STP) funds. The TPO also implemented a complete streets performance measure as a part of its performance-based planning framework.

Jackson MPO

The Jackson MPO reported good coordination of land use and transportation planning. MPO staff members also serve as city planners for the City of Jackson and perform planning functions for Madison County and the town of Three Way. The MPO reported that this allows seamless integration of all aspects of project review for jurisdictions within the MPO planning area. The Jackson MPO

said that one barrier to increasing accessibility measures is a lack of data.

Johnson City MPO

The Johnson City MPO is undertaking two transit initiatives intended to increase accessibility. The MPO is working with Johnson City Transit to develop and implement new routes for job access to major employment centers. It is also working with Northeast Tennessee Rural Public Transit to establish two fixed routes to take passengers to employment and education centers. The MPO reports that maintaining aging infrastructure is currently consuming most of the MPO's resources. The MPO has attempted to encourage local governments to better coordinate land use and transportation but reported that progress is difficult. Local governments are often pinched for revenue and feel that they must accommodate developers. The MPO reported that it makes recommendations to local governments to increase transportation effectiveness, but since MPOs have no land use regulatory control, the local jurisdictions are not required to consider the recommendations.

Knoxville MPO

The *Knoxville Regional Mobility Plan 2009-2034*, the MPO's latest LRTP, lists linking land use and transportation as a guiding principle. Strategies related to this goal include planning for vibrant communities in a proactive manner, ensuring that the environmental impacts of transportation are considered, encouraging local land use management, and linking transportation investments to local land use management.

The City of Knoxville—in partnership with the Metropolitan Planning Commission, the Knoxville MPO, and several other stakeholders—was awarded a \$4.3 million Sustainable Communities Planning grant in 2010. Grant funds will be used to develop a Regional Plan of Sustainable Development for the Knoxville MSA over a three-year period, which began in February 2011. Program goals include increasing the quality of housing and expanding housing choices; developing a platform to guide local, regional, and state government policies and investments in the region; coordinating the land use plans of individual jurisdictions; and increasing transportation choices and accessibility.

Several local governments in Tennessee are attempting to improve accessibility.

Nashville Area MPO

The Nashville Area MPO included many accessibility-related goals in the 2035 Nashville Area Regional Transportation Plan and took the additional step of using the goals to direct investments. The Urban Surface Transportation Investment Strategy was endorsed by the MPO Executive Board in August 2010. The MPO also includes several accessibility-related criteria in the project evaluation process. Among other things, the criteria gauge the level of support for quality growth principles and existing or planned economic development, and measure the incorporation of multi-modal solutions. Some specific criteria items include location in preferred growth areas, support of infill/redevelopment, proximity to existing jobs, and inclusion of existing or planned transit and pedestrian/bicycle facilities.

The MPO has also taken initiatives to increase coordination among local jurisdictions. The MPO led an effort to complete a Tri-County Land Use and Transportation study focusing on Robertson, Sumner, and Wilson counties. One result of the study was the adoption of an alternative growth scenario by the three counties. This gave the MPO leverage because proposed projects must be consistent with the plan.

Memphis MPO

The Memphis MPO is updating its LRTP as well as the bike/pedestrian plan, paying particular attention to connecting destinations and improving access to employment centers, particularly from lower-income neighborhoods. Staff reported that some accessibility-related evaluations were utilized to write the current LRTP. The MPO completed an analysis that overlaid roadway project alignments and/or locations onto a series of maps that identified natural features, cultural and community sites, and demographic data. Projects were also analyzed to determine how they related to other modes, how they addressed roadway congestion, how they dealt with safety and security, and how they impacted economic growth.

Tennessee Local Governments

Several local governments in Tennessee are taking action to increase accessibility.

Franklin – Local Street Plan

The 2007 Franklin Local Street Plan is a long-range plan for street interconnectivity. The plan was designed for use by City of Franklin staff and the Franklin Municipal Planning Commission. Its goal is to establish more local street connections that will help disperse traffic through the system. This will reduce volume on major corridors, increase accessibility, and potentially reduce vehicle miles traveled and average trip length.

Knoxville – Form-Based Development Code

In 2007, the Knoxville City Council passed an ordinance and adopted a form-based development code for the South Waterfront District. Traditional zoning codes regulate development by use, which results in the separation of land uses and produces limited opportunities for pedestrian-oriented development. The form-based code encourages mixed land uses and creates a comprehensive and stable pattern of development and land uses. This will help facilitate planning for transportation and utilities—such as water, sewage, and energy—as well as ensure that development is pedestrian friendly with minimal traffic congestion.

Nashville – Complete Streets

Mayor Karl Dean signed an Executive Order on October 6, 2010, formalizing the city's complete streets policy. Executive Order Number 40 requires "full consideration to the accommodation of the transportation needs of all users, regardless of age or ability, including those traveling by private vehicle, mass transit, foot, and bicycle."

Lebanon – Transit-Oriented Development

In March 2011, the Lebanon City Council approved a plan for a transit oriented development (TOD). Tennessee's only commuter rail, the Music City Star, carries people from Lebanon to downtown Nashville with stops in Martha, Mount Juliet, Hermitage, and Donelson. The TOD will feature a residential-commercial development on 260 acres of land adjacent to the Lebanon Music City Star station.

Lessons Learned From Other States

TACIR staff reviewed initiatives that other states, MPOs, and local governments are taking to increase accessibility. There are several models of action, including:

- comprehensive restructuring of transportation planning frameworks and processes
- implementation of financial incentives
- technical assistance
- legislation meant to ensure inclusion of accessibility-based standards.

Many states utilize a combination of these strategies. Based on staff's review, the following lessons can be learned from other states' experiences:

1. Initiatives must allow local jurisdictions to remain autonomous but should encourage regional cooperation.
2. Even when lacking direct authority to make land use and planning decisions, state governments have the power to make accessibility a priority through programs and spending.
3. State DOTs can take a leadership or supportive role in encouraging MPOs and local jurisdictions to include accessibility into planning processes.
4. Grant and incentive programs are an effective way to encourage land use and transportation coordination.
5. States should encourage and reward innovative problem-solving.

Staff Recommendations

Tennessee has already made major improvements in focusing various policies toward coordinated initiatives. Staff recommends the following actions to enhance these efforts:

1. Incorporate accessibility-based planning strategies into existing transportation, land use, and economic development plans and programs at the state level.
2. Encourage accessibility-based planning at the local level. Consider revising grant or financial incentive program standards to reward jurisdictions that incorporate accessibility plans into their comprehensive plans.

Introduction

Beautiful scenery, a relatively low cost of living, and a central location are just a few of the advantages of living and doing business in Tennessee. Public investments play an important role in maintaining this high quality of life. The ground transportation system, including both roads and mass transit, is a public investment used by millions of Tennesseans every day to reach jobs, schools, shopping destinations, and recreational activities. Travelers cannot always reach these destinations with ease, however, due to poor levels of accessibility. Long distances between origins and destinations, congestion, and unconnected street patterns lead to high transportation costs, limited transportation options, and poor job access. Additionally, there is increasing demand for transportation infrastructure, and the gap between needed transportation improvements and available funds persists. These challenges threaten to offset the high quality of life enjoyed by Tennessee residents. Innovative thinking and proactive policies are needed for Tennessee to maintain current levels of service and meet future demand.

Integrating land use with transportation to increase accessibility is one answer to these challenges. Land use and transportation have a cyclical relationship. Land use development necessitates transportation infrastructure, and infrastructure, in turn, provides access to land and encourages more development. This relationship indicates that increasing accessibility requires action in both sectors, and these actions should be coordinated. Transportation planners determine which projects are funded but have little authority in land use decisions. While they can work with local governments to encourage or suggest land use plans that foster improved accessibility, land use planning is under the purview of local governments in Tennessee. The preparation and adoption of a local comprehensive land use plan is optional for local governments. This issue is discussed at length in TACIR's report *Land Use and Planning in Tennessee*. To comply with Public Chapter 1101 (PC 1101), local governments must have growth plans, but PC 1101 does not specify that plans address issues like land use, transportation, public infrastructure, housing, and economic development. By coordinating decisions in these areas, Tennessee governments can better control costs, target investments, locate

Integrating land use with transportation to increase accessibility is one answer to today's infrastructure, quality of life, and economic development challenges.

development where it most makes sense, and give residents better access to their destinations.

Accessibility Factors

Accessible communities share five common elements: a high density of origins and destinations, mixed land uses, highly connected transportation networks, a choice of modes, and good connections between modes. The modes considered in this paper are automobiles, public transit, walking, and biking. The components of accessibility provide travelers with more choices regarding modes and routes, and provide them with more opportunities to reach their destinations.

Density of Origins and Destinations

Much discussion about density focuses on residential densities, but high destination density (e.g., workplaces, restaurants, retail stores) is also an important component of accessibility. Clustering destinations together can improve accessibility by increasing the locations a traveler can reach in a single trip. An area with high origin and destination density has a higher degree of accessibility because there are more potential places to go, and getting there is more convenient, quicker, and less expensive. Areas with higher density of origins and destinations tend to offer more diversity in terms of modes and require less travel.

Mix of Land Uses

When land use is mixed, more types of destinations are grouped in one place and accessibility is higher. When land uses are separated, there is less accessibility and people generally have to make more trips and may have to travel further to reach goods and services. Additionally, depending on other factors, mode choices for trips may be limited.

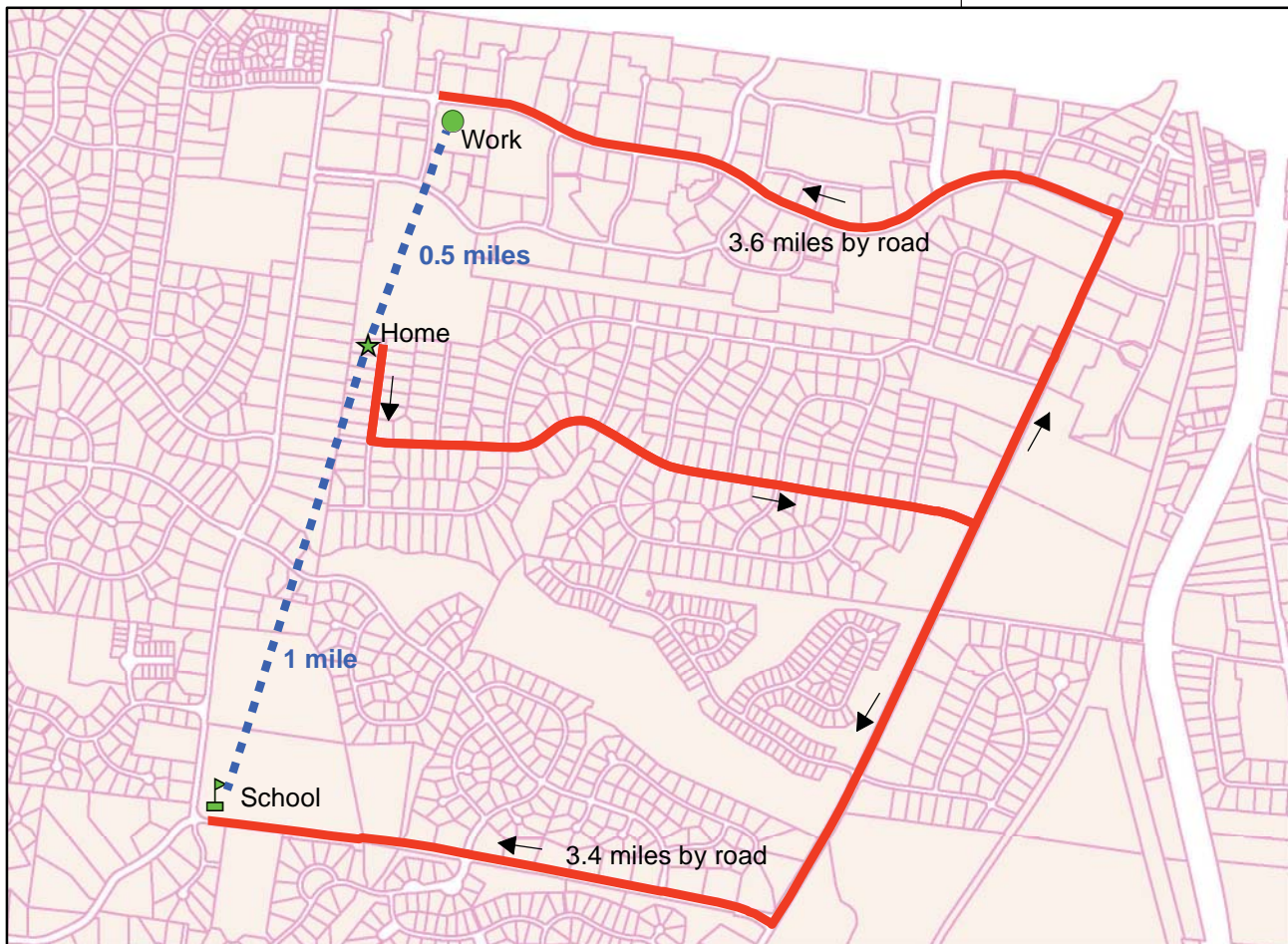
Network Connectivity

Street connectivity refers to the density of connections in road networks and the directness of links.¹ High street connectivity

¹Victoria Transport Policy Institute (2011).

means that there are several access points to an area from different street types (e.g., arterials, collector streets, and local roadways) and from surrounding urban development or future growth areas.² Higher connectivity indicates higher accessibility, as there are more alternative routes for travelers to take. Connectivity is associated with shorter travel distances, more route choices, more modal choices, and more direct travel opportunities.³ Figure 1 illustrates road connectivity and shows that the actual distances from trip origin and trip destination can be very short, but route limitations can result in longer trips for travelers.

Figure 1. Road Connectivity



²Zimmerman et al.

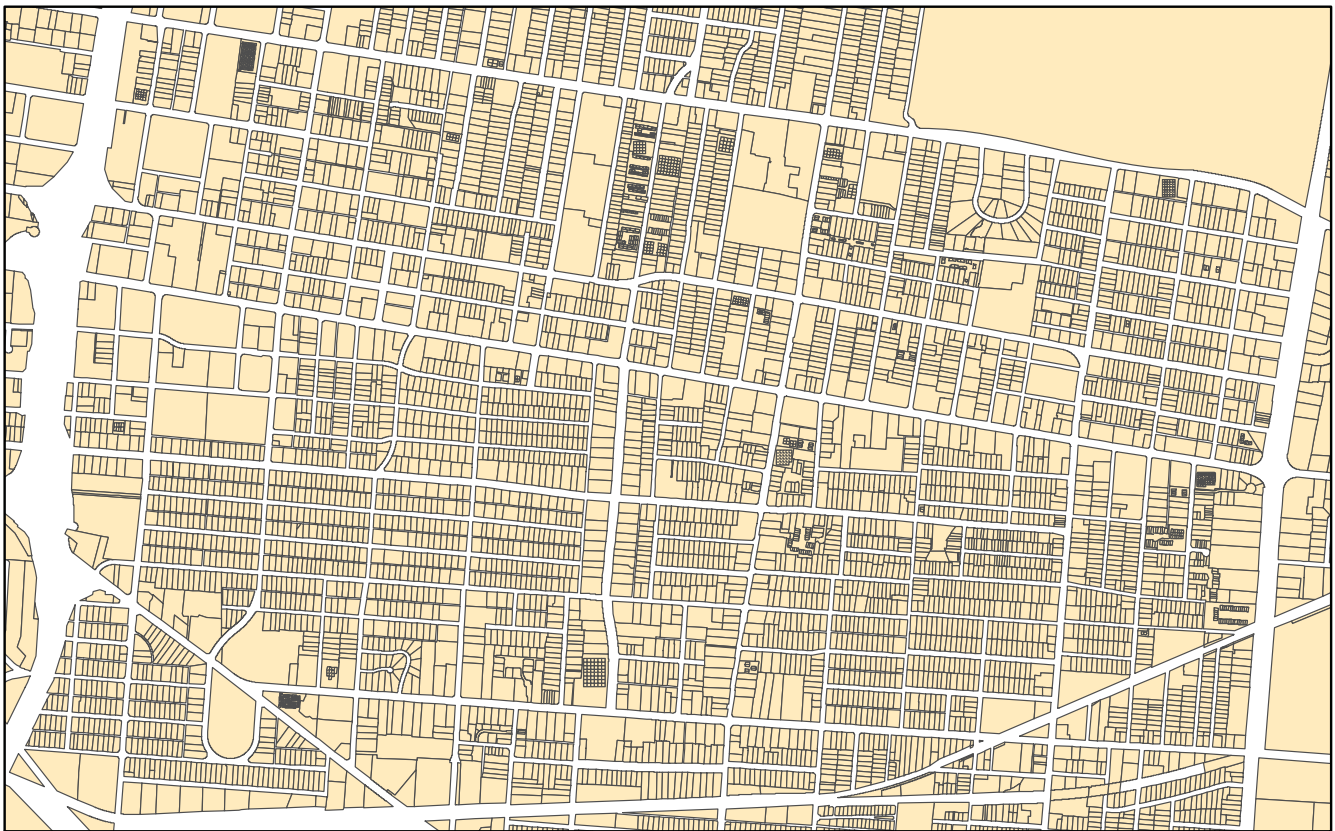
³Levine et al. (2002).

Various street designs feature different levels of connectivity. Two major street patterns are:

- Grid: highly connected streets that are primarily long and straight or parallel and perpendicular.
- Hierarchical: poorly connected streets, possibly cul-de-sacs, which are connected to larger, higher-volume arterials.⁴

Grid networks offer several different travel routes, spread traffic out over streets, and feature direct routes. These networks have high accessibility and high connectivity. Additionally, grid networks tend to support bike and pedestrian travelers in addition to automobile drivers. Direct links result in shorter travel distances, and many grid network streets are equipped with sidewalks (see Figure 2 for an illustration of a grid network).

Figure 2. Grid Street Design

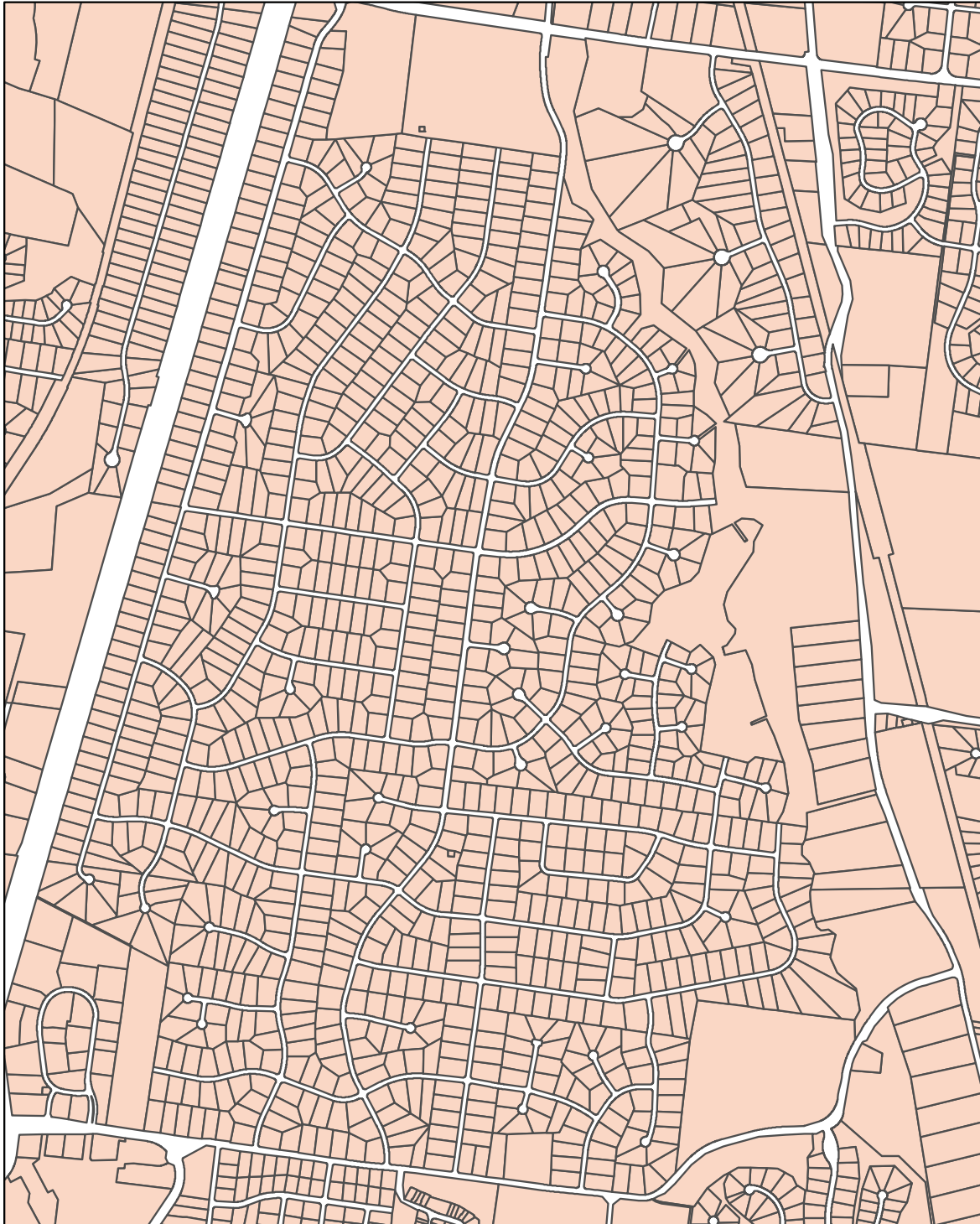


Hierarchical street patterns have been the dominant network design for many decades, particularly in suburban areas. Residents often favor this design because the amount of cut-through traffic is lessened. The design has its drawbacks, though: traffic is concentrated onto a few roads and

⁴Victoria Transport Policy Institute (2011).

requires more travel to reach destinations. Additionally, travelers typically have only one route to enter and exit the area, and accessibility for all travel—automobiles, bikes, and pedestrians—is lower (see Figure 3 for an illustration of a hierarchical network).

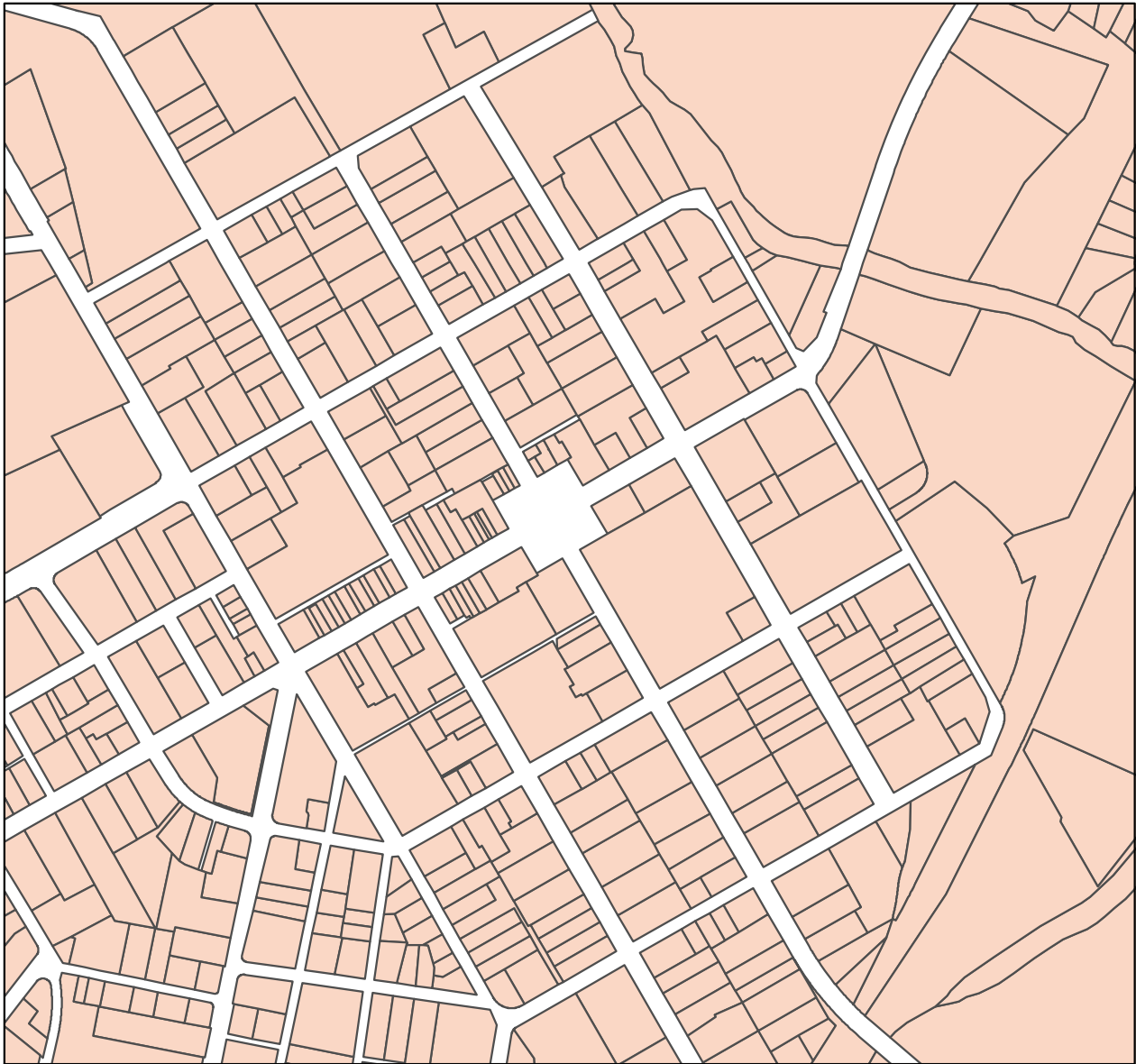
Figure 3. Hierarchical Street Design



A third type of network may be able to blend the benefits of grid and hierarchical street designs. Researchers name and describe this network design slightly differently:

- “Modified Grid”: highly connected streets that are short and connect at right angles⁵
or
- “Creative Cul-de-sacs”: defined spaces with automobile access that is limited to collector and/or arterial streets and walking and biking paths that connect to other streets.⁶

Figure 4. Modified Grid Street Design



⁵Ibid.

⁶Southworth and Ben-Joseph (2004).

Note that there are several points of access from each street in the network, though the pattern is not as boxy as a grid network (see Figure 4 for an illustration of this pattern). Travelers have more route options, pedestrian and bike accessibility are considered, and public spaces are included. This option features higher levels of accessibility than the hierarchical pattern.

Mode Choices

Increased transportation mode choices mean that travelers have more options to reach their destinations, which enhances accessibility. The density and design of communities has considerable impact on mode feasibility.

Automobiles

The basic requirement of automobile travel is access to a vehicle. An estimated 152,000 households in Tennessee do not have access to vehicles (see Map 1). These households are reliant on other forms of transportation to reach their destinations. Even if a person does have a vehicle, the distances between destinations can necessitate several segments of driving to reach them. Additionally, low street connectivity can cause automobile drivers to travel well out of the way to reach a destination that is actually nearby (see Figure 1).

Public Transit

Geography and service area configuration impact the feasibility, performance, and cost-effectiveness of transit services, with dispersed, low-density patterns being less cost-effective and less feasible for high ridership. Higher density development makes taking public transportation more feasible, since people, origins, and destinations are concentrated in common areas. The American Society of Civil Engineers (ASCE) ranks Tennessee's transit infrastructure at a Level D because the areas served by transit are limited. The ASCE notes that investment above current levels will be needed to serve projected urban ridership.

Demand for public transportation is expected to increase in the future. Many urban cores are being revitalized and becoming more dense. Meanwhile, suburban areas have a large existing stock of housing and multiple employment centers. This results in multi-

More modes mean more options for travelers.

directional commutes that can vary in distance. Additionally, as the baby boomer generation ages, many more individuals will rely on public transportation. The percentage of Tennesseans aged 65 and over is projected to increase from 13.5% to 18% of total population between 2010 and 2040.⁷ Currently, some level of public transportation is available in all 95 counties, though demand response transit (DRT) is the only form of public transit available in many rural areas. DRT is transit that functions without fixed-routes or fixed-schedules. Passengers or agencies contact the transit provider, and the provider schedules a ride for the passenger in a car, bus, or small van. This form of public transit is more feasible than fixed-route services in low-density and rural areas. These systems face challenges though, as rural DRT systems are often underfunded.⁸

Biking

Design and distance factors play a prominent role in the feasibility of biking as a mode of transportation. Obviously there is a suitable distance for biking to destinations; in most cases traveling from suburb to central city is not an option. Biking within suburban areas, however, is feasible provided that design characteristics make biking convenient and safe. Some of the factors that make locations accessible by bike include:

- **Road Riding Safety:** Bicycle lanes or paved shoulders must be present to ensure safety. Traffic must move at safe speeds and there should not be excessive bus or truck traffic. Roadways must be well lit to make riding at night possible.
- **Off-Road Riding:** Paths must intersect with roads that are easy and safe to cross and paths must not contain sharp turns or dangerous downhill stretches. Paths must be well lit.
- **Surfaces:** Surfaces must be free of potholes and broken pavement, as well as clear of debris like broken glass, sand, and gravel.

⁷University of Tennessee Center for Business and Economic Research (2011).

⁸Ellis and McCollum (2009).

- Intersections: Crossing traffic must be easily visible, and signals must allow cyclists enough time to cross roads.
- Drivers: Drivers must signal, must allow space between cars and bikes, and must not speed or run red lights.
- Ease of using bikes: Public transit must have methods for cyclists to bring bikes onto modes (eg., buses), and routes should be direct. There must be safe and secure places to leave bikes at destinations.⁹
- Cyclists: Cyclists must also obey traffic laws and rules, and exercise good defensive safety skills.

Walking

Similar to biking, design and distance are the primary factors related to pedestrian accessibility. Pedestrian supportive land use characteristics include sidewalks and public areas, street furniture, trees, narrow roads that can be crossed easily, low to moderate traffic speeds, and continuous development (i.e., no large tracts of vacant land or parking lots).¹⁰ Note also that single-occupancy vehicle trips and public transportation trips begin and end with walking, so enhancing the walking environment benefits many types of travelers.

Mode Connectivity

Good accessibility requires seamless connections among transportation modes. The American Public Transportation Association reports that nearly 64% of transit riders walk to their destinations after leaving transit vehicles, while almost 22% of riders transfer to another transit vehicle.¹¹ Since such a large percentage of people connect to public transit via walking, the distance between destinations and stops or destinations and other mode connections must be reasonably short. Many studies have estimated the distance people are willing to walk to and from transit stops to their destinations or other modes of transportation.

⁹First six bullet points adapted from the *Bikeability Checklist* from the U.S. Department of Transportation.

¹⁰Federal Transit Administration (2004).

¹¹American Public Transportation Association (2011).

Good accessibility requires seamless connections among transportation modes.

A commonly accepted figure is one-fourth of a mile.¹² Transit stops must be provided on both ends of trips, near the origin and the destination. Station or stop areas should provide for direct pedestrian access routes with continuous sidewalks, pedestrian crossings at intersections, and signalized crossings.

Benefits of Accessibility

Increased accessibility will benefit travelers and can also reduce government spending and household transportation expenditures and improve job access and economic development.

Maximize Public Investment

Accessibility-based planning maximizes public investment because it prioritizes and targets spending. Fostering development around existing transportation networks and infrastructure helps local and state governments get more for their money because it lessens the burden of building completely new infrastructure. Large amounts of development in outlying areas can leave governments struggling to cope with unmanageable infrastructure costs. State and local governments can protect the taxpayer investments in infrastructure by encouraging land use decisions that are coordinated with planned and existing transportation and infrastructure improvements.

Maintaining an aging transportation infrastructure is a challenge that many states face. The latest American Society of Civil Engineers (ASCE) Infrastructure Report Card gave U.S. roads a D-. Tennessee fares somewhat better, scoring a B-.¹³ The ASCE noted that recent and projected growth in vehicle miles of travel, when combined with inadequate funding for future maintenance and expansion, somewhat offsets Tennessee's historically good road infrastructure, lowering the rating. Based on the annual Public Infrastructure Needs Inventory completed by TACIR, state departments and local governments in Tennessee report \$18.9 billion in transportation needs over the period from 2009 to 2014.¹⁴ The largest need categories are roads (\$14.5 billion), bridges (\$2.3 billion), and rail

¹²Zhao et al. (2003).

¹³Tennessee Section of the American Society of Civil Engineers (2009).

¹⁴Tennessee Advisory Commission on Intergovernmental Relations (2011).

(\$1 billion) projects. These dollar figures illustrate the magnitude of transportation investments.

The Tennessee Department of Transportation (TDOT) estimated that from 2005 to 2030, \$85 billion would be needed to fulfill the goals of the long-range transportation plan (LRTP). TDOT reported a funding gap of \$16 billion between the revenue the state was expected to generate and what would be needed to complete transportation projects.¹⁵ Maintaining and preserving the system was expected to be almost completely funded (99.5% funded) because stakeholder input indicated that system maintenance should be the state's highest priority. This comes at a cost however, because it leaves less funding for system enhancement. In the LRTP, expansion and enhancement were projected to be underfunded by 30%, and safety and modernization needs were projected to be underfunded by 25%. This is especially worrisome because expansion and enhancement needs were the highest cost category in the long-range plan, projected to cost just over \$75 billion over 25 years. This indicates that the current network may become even more overburdened in the future. By creating more accessible communities, we have the capacity to reduce the miles of roads we need to build. This, in turn, can reduce the burden on taxpayers and stretch tax dollars.

Some state and local governments have used scenario modeling to estimate future infrastructure costs based on future land development scenarios. Scenario planning often includes a base case or "business as usual" scenario and at least one alternative or preferred scenario. New Geographic Information Systems-based scenario modeling tools (GIS) can be used to evaluate various land use and transportation investment scenarios. These determine how each affects infrastructure costs (i.e., capital and operational/maintenance), building energy and water consumption, CO2 emissions, and public health impacts. Vision California, a project jointly funded by the California High Speed Rail Authority and the legislatively authorized Strategic Growth Council, is using a model called Rapid Fire to analyze three land use options and two policy packages and their projected effects on costs.¹⁶

¹⁵Tennessee Department of Transportation (2005).

¹⁶Calthorpe Associates (2011).

Table 1. California Scenario Planning Categories (Statewide)
Vision California Project

Scenario Option	Description	Proportion of Growth in Each Category
Business as usual	Trend land use patterns of past decades	70% standard growth; 30% compact and urban growth*
Mixed growth	Approximately half of future growth in urban infill and compact forms	50-70% compact or urban growth
Growing smart	Increase in proportion of infill and compact growth	55% compact growth; 35% urban growth

*See Appendix 1 for descriptions of urban, compact, and standard growth characteristics.

Vision California’s model analysis shows that capital infrastructure costs through 2050 are highest in the “business as usual scenario”—\$8 billion higher than mixed growth and \$32 billion higher than the “growing smart” option. Operations and maintenance costs (ongoing city general fund expenditures required to operate and maintain infrastructure serving new residential growth) also show business as usual to be the most expensive category (\$85 billion by 2050 for business as usual, \$80 billion for mixed growth and \$70 billion for growing smart). This is because more dispersed development means more miles of roads and sewer pipes to maintain. Compact growth utilizes the efficiency of infrastructure capacity that already exists. Vision California evaluated household costs for fuel and auto expenditures, residential electricity, gas, and water in each scenario. The model shows that more land consumption, and the development characteristics that often accompany it, result in higher costs and higher vehicle miles traveled (VMT). The standard growth scenario results in annual household expenditures of \$21,000 in 2050 for fuel and auto, residential electricity, gas and water costs while the growing smart scenario resulted in annual costs of \$13,750 for the same categories. With the business as usual scenario, taxpayers may eventually be subjected to higher taxes and fees due to this large increase in infrastructure costs. This case study analysis demonstrates that roads are just the beginning of increased expenditures caused by inefficient spatial development.

Plan It Calgary also completed a cost analysis based on a preferred growth scenario (called “recommended direction” in the study) and a business as usual scenario (called “dispersed” in the study)

for the city of Calgary, located in the Canadian province of Alberta.¹⁷ The dispersed scenario represents the continuation of current trends and policies with the majority of new growth on urban fringes with some redevelopment in key areas (i.e., near light rail transit stations and along commercial corridors). The recommended direction scenario represents a balance of growth between greenfield development and redevelopment of existing areas. Most of the redevelopment in the recommended direction scenario is in mixed-use, higher density nodes, and corridors located in what the study calls “strategic areas.”

Street building and maintenance is the category in which costs for the two scenarios differ the most. The analysis concludes that the recommended direction scenario would save 36% over the next 60 years in costs to build, maintain, and replace aging streets. Factors for higher costs in the dispersed scenario include the broader area of developed land and less travel by transit, walking and cycling caused by distance between homes, and jobs and services. The Plan It Calgary study also evaluates water and waste system infrastructure costs, finding that the dispersed scenario would result in costs 54% higher than the recommended direction scenario—primarily because the dispersed scenario would require more new feeder mains to be built in greenfield development areas. The study does not find measurable cost differences between the scenarios for wastewater treatment.

Enhance Economic Development

Improved accessibility has a variety of positive effects on economic development and business profitability. Accessible locations have more appeal to businesses; increased accessibility generally leads to more development. Accessibility boosts the value of locations, drawing more investment and raising property values. Additionally, transportation infrastructure connects businesses to both suppliers and customers. Coordinating land use and transportation investments are a way for communities to guide economic development.

Businesses also benefit from increased access because it gives them better proximity to labor pools with specialized skills. This can

¹⁷Plan It Calgary (2009).

strengthen businesses by boosting productivity and efficiency, and enhancing the quality of goods and services. Increased accessibility also gives businesses more capacity to reach customers and allows manufacturers to access markets and supplies.¹⁸ Poor accessibility and high transportation costs are a threat to Tennessee’s business advantage. As industry becomes more reliant on “just-in-time” shipping and delivery, reliable travel times become increasingly important. Improving accessibility makes more modes of transportation feasible. This, in turn, can lead to fewer vehicles on the roads, decreasing usage and congestion. When businesses improve travel time reliability, they reduce warehousing and logistics costs, lower expenses by consolidating operations, and expand their range of choices for new locations and markets.¹⁹

Two Tennessee Department of Community and Economic Development initiatives—the Tennessee Three-Star Program and Jobs4TN—aim to help communities increase economic development. This paper suggests two ways that accessibility-enhancing strategies could be incorporated into these existing programs.

Tennessee Three-Star Program

The Tennessee Three-Star program was established to help urban and rural areas accomplish their development goals and recognize the relationship between a positive business environment and an effective planning program. The program has three benchmark levels; each level provides incentives in the form of grants, points on Community Development Block Grant applications, and points on certain state grant applications. Each benchmark also lowers the required local match for certain grant programs.

The Three-Star program assesses a community’s planning and infrastructure, community development, leadership, economic, and education and workforce development. It encourages sustainable community economic growth and helps communities capitalize on their strengths and identify and address shortcomings. The Three-Star program presents an excellent opportunity to incorporate accessibility into a program structure that is already in place. Components related to accessibility-based planning could be

¹⁸Cambridge Systematics (2003).

¹⁹Ibid.

implemented into the evaluation and benchmark criteria. For instance, in Section 4 of the scoring matrix, "Infrastructure and Planning," the highest point value description is stated as the following:

The community has an active planning commission, professional staff, an up-to-date comprehensive land use plan, adequate designation of industrial acreage, and zoning that is fairly and consistently enforced. There is strong community support for innovative growth management tools and concepts that promote environmentally sustainable development.

These requirements could be modified so that communities must also participate in some level of land use and transportation to receive the maximum point value. Coordination could involve evaluating development requests to be sure that access pedestrians, cyclists, public transit users, and drivers all will be able to access the development. Awarding points for the adoption of sidewalk ordinances or street connectivity ordinances would also work to increase accessibility. Finally, points could be awarded for encouraging mixed-use development and higher density development in certain areas, such as along major corridors. This would increase the feasibility of public transportation, walking and cycling, and increase accessibility for drivers.

Jobs4TN Program

In April 2011 Governor Bill Haslam and Tennessee Economic and Community Development Commissioner Bill Hagerty announced Tennessee's new economic development strategy, known as "Jobs4TN." A key objective of Jobs4TN is establishing regional job base camps in each of the nine state regions. The base camps will work with local partners to develop or revise regional economic development plans and align existing resources with the plan. Outreach to rural communities will be one aspect of the strategy, the goal of which is to incorporate the communities into regional economic development strategies.²⁰ An accessibility-based transportation strategy would be complementary to the

²⁰State of Tennessee Department of Economic and Community Development.

development objectives of Jobs4TN. The two could work in tandem to strengthen Tennessee's job and economic growth. Below are suggestions made by TACIR staff to demonstrate how accessibility could be incorporated into Jobs4TN:

Key Strategy #1

- Jobs4TN: Prioritize target occupational/industry clusters and existing industries and partner with other state agencies to support key clusters.
- Accessibility (TACIR staff suggestion): Guide development to geographic clusters with existing transportation infrastructure, and encourage accessible transportation planning in targeted areas.

Key Strategy #2

- Jobs4TN: Establish regional "jobs base camps" across the state and work with local partners to develop and/or revise a regional economic development plan. Align existing federal and state resources around that plan while reaching out to rural communities, incorporating them into the broader regional economic development strategies that leverage existing resources and maximize assets of rural communities.
- Accessibility (TACIR staff suggestion): Identify current accessibility strengths and weaknesses within the regional jobs base camps and work with local partners to revise or redevelop regional transportation plans that improve accessibility. Align existing resources around those plans while reaching out to rural communities to inventory and leverage their existing resources so that they will be included in accessibility plans.

Key Strategy #3

- Jobs4TN: Invest in innovation through a \$50 million initiative designed to support innovation across the state to raise Tennessee's profile in innovation-based economic development and drive growth in the creation of knowledge-based jobs. This includes four areas of strategy: innovation

coordination, commercialization, entrepreneurship, and co-investment funds.

- Accessibility (TACIR staff suggestion): Support innovators in attracting top quality employees by planning for competitive quality of life amenities such as accessible transportation. Potential investments should include those of innovative transportation entrepreneurs.

Strategy #4

- Jobs4TN: Take steps to reduce business regulation.
- Accessibility (TACIR staff suggestion): Review policies that stand in the way of innovative thinking and spending, as well as those that discourage accessibility-based planning—particularly those that prevent public-private approaches to improving accessibility.

Along with creating incentives to revitalize and restore the economies of targeted areas, a National Governors Association (NGA) report highlights the benefits of improving existing community infrastructure to create favorable business and residential locations and encourage investment.²¹ Governor Haslam's plan focuses on strengthening and capitalizing existing economic development resources and allocating funding to support and encourage innovative thinking and projects. The positive outcomes of his strategy could be multiplied with the implementation of a complementary accessibility-based land use and transportation strategy. This strategy would commit funds for investment, focus on utilizing infrastructure that is already in place, encourage creative solutions, ensure more targeted transportation investments, and support economic growth in Tennessee.

Tennessee can also look to its neighbor, North Carolina, for ideas about how to better integrate economic development and transportation. North Carolina's Strategic Highway Corridors (SHC) is a joint project of the Department of Transportation, the Department of Commerce, and the Department of Environment and Natural Resources.²² The SHC initiative seeks to protect and

²¹National Governors Association Center for Best Practices.

²²North Carolina Department of Transportation.

maximize mobility and connectivity of certain highway corridors in North Carolina, while promoting environmental stewardship. This initiative focuses on maximizing the use of existing facilities and fostering economic prosperity through fast and efficient movement of people and goods, which maximize business competitiveness.

Improve Job Access

The location of job centers significantly impacts transportation patterns and needs. In the past, jobs tended to be located primarily in central cities. Now, however, employment location is characterized by multiple job centers. The traditional suburb-to-city commute has been joined by reverse commutes and suburb-to-suburb commutes. Approximately 39% of all commutes are completely suburban.²³ Though issues like distance between home and work and traffic congestion make getting to work more difficult and costly for automobile drivers, the issue is more significant for persons without access to vehicles or for whom driving is not an option. Many transit agencies are providing a range of public transit options including nonstop express routes, reverse commutes, park and ride, and vanpooling, but these are not available in all areas. Transit agencies face challenges in the provision of services to suburban regions—these regions are generally larger than traditional cities and have lower densities meaning longer travel distances, more miles to serve, and fewer opportunities to walk from transit stops to origins and destinations.²⁴ As noted by the Brookings Institute, transit agencies lack the ability to directly affect metro growth directions, are limited in their abilities to adapt to rapidly changing conditions, and lack the resources to extend service to all areas that need it.

A recent analysis by the Brookings Institute evaluates transit coverage and job access rate for the 100 largest Metropolitan Statistical Areas (MSAs) in the nation.²⁵ Transit coverage is defined as the share of working-age residents within three-fourths mile of a transit stop. Job access was defined as the share of all jobs reachable via transit in 90 minutes. Four Tennessee MSAs were included in the analysis.

²³Tomer et al. (2011).

²⁴Urbitran Associates, et al. (1999).

²⁵Tomer et al. (2011).

A lack of access to vehicles and transit makes reaching employment difficult or impossible. Even for those who have vehicle access, the time and money required to reach job sites can be prohibitive. Improving accessibility can lead to increases in public transit feasibility, decreasing barriers to reaching employment. In this difficult economic time, when jobs are the number one issue for Americans, improving access to jobs is of paramount importance.

Table 2. Access to Transit in Selected Tennessee MSAs*

Tennessee MSA	Percent of Working-Age Residents with Transit Access	Share of All Jobs Reachable in 90 Minutes Via Transit	Combined Access Rank (Transit Coverage and Job Access Out of 100 MSAs)	Percent of Households without Vehicle Access
Chattanooga	23%	39%	87	7.2%
Knoxville	28%	25%	95	5.5%
Memphis	51%	26%	69	9.2%
Nashville-Davidson-Murfreesboro-Franklin	32%	27%	88	5.2%

*Source for transit access, job access, and rank data is *Missed Opportunity: Transit and Jobs in Metropolitan America*. Metropolitan Policy Program at Brookings. Source of vehicle access data is the American Community Survey 2005-2009.

Better accessibility lowers transportation costs by reducing travel time.

Reduce Transportation Costs

Better accessibility lowers transportation costs because it requires less hours of travel to reach destinations. Housing and transportation costs are the two largest expenditure categories for most households. Families evaluate housing costs when determining the house they can afford to purchase or the property they can afford to rent. Lenders also assess housing costs when determining the loan a family or individual will be able to repay. Transportation costs are not scrutinized as carefully by either group, partially because it is more difficult to estimate transportation costs and also because transportation cost has historically not been a component of housing affordability assessments.

A joint project by the Brookings Institution, the Center for Transit-Oriented Development, and the Center for Neighborhood Technology

is aiming to increase awareness of transportation costs and their effects on housing affordability. The Housing and Transportation Affordability Index assesses housing and transportation costs for 337 MSAs, including seven in Tennessee. Residents in these Tennessee MSAs are spending over 50% of their incomes on housing and transportation.²⁶ In one MSA, Johnson City, households are paying an average of over 60% for housing and transportation expenditures.

Table 3. Housing and Transportation Costs in Selected Tennessee MSAs

Metropolitan Area	Average Housing Cost as Percent of Regional Median Income	Average Transportation Cost as Percent of Regional Median Income	Housing & Transportation Costs as Percent of Regional Median Income
Average for all 337 MSAs in the study	22.9%	28.0%	50.9%
Chattanooga MSA	25.7%	29.1%	54.8%
Clarksville MSA	24.6%	29.8%	54.4%
Jackson MSA	25.0%	30.4%	55.4%
Johnson City MSA	26.8%	33.7%	60.5%
Knoxville MSA	26.9%	28.7%	55.6%
Memphis MSA	26.7%	25.2%	51.9%
Nashville MSA	26.7%	24.7%	51.4%

Housing and transportation burdens for working-class households are influenced by a lack of affordable housing, limited transit options, and a lack of employment centers near residential neighborhoods.²⁷ The following factors relate to accessibility: proximity to housing, transit, jobs, and services. Workers may be forced to choose between living near their jobs and paying more for housing or living further from their jobs and paying more for transportation. Lower income households usually have the least choice of housing location, sometimes leaving them little choice in commuting distances. More accessibility-based planning could

²⁶The Housing and Transportation Affordability Index determines the impact of transportation costs on housing affordability choices and is rooted in the notion that traditional definitions of housing affordability (30% or less of household income) may be too narrow, provided that households now live further from their workplaces and in auto-centric areas.

²⁷Roberto, Elizabeth (2008).

result in a better balance between jobs and affordable housing, lowering the strain of transportation costs.

Accessibility-based planning can also reduce Tennesseans' vulnerability to volatile gas prices. Based on the Consumer Expenditure Survey, the average annual household expenditure for gasoline and motor oil in 2000 was \$1,316, or 2.9% of household before-tax income (see Table 4). By 2009, households were spending approximately \$1,986 annually on gas, which is 3.1% of income. Consider, however, figures for 2008, a time of higher gas prices: household spending on gasoline during this year was \$2,715 annually, representing 4.3% of pre-tax income.²⁸ This jump shows how vulnerable household budgets are to fuel prices. Designing more accessible communities could lessen Tennesseans' dependence on fuel and fluctuating oil prices because more accessibility means shorter distances and more alternative mode options.

Table 4. Annual Household Expenditures on Gasoline and Motor Oil*

	2000	2008	2009
Average annual gasoline and motor fuel expenditures	\$1,316	\$2,715	\$1,986
As percentage of pre-tax annual income	2.90%	4.30%	3.10%

*Note that these figures represent national aggregate data. They do not reveal different spending patterns based on residential location, work location, or cost-of-living differences among areas.

Improve Accessibility for Transportation-Disadvantaged Populations

A larger percentage of the population will reach age 65 in the coming years, and this will bring transportation challenges. By 2040, 18% of Tennessee's population will be 65 years of age or older.

Though many seniors drive as long as they are able, driving can become unsafe or too difficult at some point, leading to a need for alternative transportation modes. In some cases, friends or family

²⁸Source of all data in this paragraph is the 2009 Consumer Expenditure Survey produced by the Bureau of Labor Statistics.

members can provide rides, but other seniors must rely on public transportation and demand response transit services. Demand response transit (DRT) functions without fixed-routes or fixed-schedules. Passengers or agencies contact the transit provider, and the provider schedules a ride for the passenger in a car, bus, or small van. A 2004 Government Accountability Office (GAO) study reported that the needs of seniors in rural and suburban areas are more likely to go unmet as alternatives to cars are less available in these locations.²⁹ The GAO report further pointed out that there are federal programs aimed to assist seniors who need transportation assistance, but not all seniors qualify for the programs because some need transportation assistance only in certain conditions (e.g. when a medical condition worsens or there is bad weather). The key to keeping this population sector mobile is accessibility-based planning. Strategically locating services and designing communities so that alternative modes of transportation are feasible will help seniors have better access to healthcare, shopping, recreational activities, and other services.

Table 5. Percentage of Population Age 65 Years and Older

	Percentage of Population
U.S. 2010*	13.40%
U.S. 2040 (projected)**	20.30%
Tennessee 2010***	13.50%
Tennessee 2040 (projected)****	18%

*U.S. Census Bureau (2010).

**U.S. Census Bureau (2008).

***U.S. Census Bureau (2010).

****University of Tennessee Center for Business and Economic Research (2011).

Individuals without access to a vehicle represent another transportation-disadvantaged group. Based on data from the 2005-2009 American Community Survey, an estimated 152,000 households in Tennessee do not have access to a vehicle.³⁰ Map 1 illustrates the percentages of households in each county without vehicle access.

²⁹U.S. Government Accountability Office (2004).

³⁰U.S. Census Bureau (2009).

Improving Accessibility

An increasing number of states, regions, and local governments—including some in Tennessee—are rethinking the status quo, implementing innovative programs that aim to better coordinate land use and transportation and increase accessibility. Recent federal initiatives, such as the establishment of the HUD-DOT-EPA Partnership for Sustainable Communities, indicate that coordination is a federal priority. This partnership, established in 2009, aims to expand housing and transportation choices, increase energy dependence, and protect air and water resources—as well as position communities for economic success. New programs and grant opportunities hint that federal policies are moving away from the old model of segregated planning by bureaucrats in agency “silos.” Significant funds may become available to help states and local governments. In 2010, \$100 million was appropriated to HUD for a Sustainable Communities Initiative, and \$95 million will be appropriated in FY 2011.³¹ The goal of the initiative is to improve regional planning efforts that integrate housing and transportation, and enhance zoning and land use.³² The Knoxville metro area received one of the 45 Sustainable Communities Initiatives grants; \$4.3 million was awarded to the Knoxville region to implement a region-wide, multi-jurisdictional plan for sustainable development over a 3-year period (see page 34-35 to read more about Knoxville’s plans).

State of Tennessee

An effort by the Tennessee Department of Transportation (TDOT) to develop a corridor management agreement (CMA) template is the primary initiative to better coordinate land use and transportation. CMAs formally coordinate the actions of various entities in matters such as access management, land use and subdivision management, right-of-way needs and preservation, operational strategies, and financing of corridor management improvements.³³ The TDOT effort is being carried out with guidance from the

³¹U.S. Congress (2009).

³²U.S. Department of Housing and Urban Development (2010).

³³Williams (2004).

National Governors Association Center for Best Practices (NGA).³⁴ NGA is providing technical assistance and expert guidance to help Tennessee create a system that better interfaces local land use planning with local and state transportation planning. In addition to developing the template, the state seeks to identify and propose corridor management incentives and assess existing legislation and programs for opportunities to institutionalize CMAs.³⁵ TDOT selected two pilot corridors for the project: a section of State Route (SR) 109 located in Sumner and Wilson counties, and Route 60, located in Bradley County and the city of Cleveland. Stakeholders identified goals for each corridor in 2010 workshops. Prioritized goals for SR 109 include improving regional travel and mobility for freight, commuters, and local residents; promoting economic development; and preserving community character.³⁶ Prioritized goals for SR 60 include managing and coordinating growth, expanding regional mobility, and improving community character by enhancing streetscape and gateway areas.³⁷ TDOT reports that the SR 60 project is on hiatus because of local budget issues but the SR 109 project is moving forward. Identifying and proposing corridor management incentives is a goal of the project, but this step may actually take place further in the future.

TDOT also works to foster better land use and transportation planning by sponsoring MPO projects that work towards this goal. For instance, TDOT funded a transit corridor study in the Knoxville region and also sponsored the development of the Knoxville MPO's Complete Streets Study and Complete Streets Guidelines. The MPO adopted a Complete Streets Policy in 2009.

Tennessee Metropolitan Planning Organizations

TACIR staff attempted to interview staff at each Tennessee MPO to gather information about accessibility-enhancing strategies. The information below highlights activities in select MPOs and was gathered through interviews, in some cases, and from MPO

³⁴State of Tennessee (2010).

³⁵National Governors Association.

³⁶Tennessee Department of Transportation (2010). *Tennessee NGA Transportation and Land Use Initiative. SR 109 Corridor Management Workshop #1.*

³⁷Tennessee Department of Transportation (2010). *Tennessee NGA Transportation and Land Use Initiative. SR 60 Corridor Management Workshop #1.*

documents in others.³⁸ Staff was encouraged by the number of initiatives being undertaken across the state. Most initiatives are admittedly in the early stages of implementation; many MPOs expressed plans to build on the initial steps in future years.

Several MPOs expressed an interest in implementing more accessibility-based performance measures but said that they lack the data to do so. It is much easier to measure mobility performance, as information about travel time by car, speed, and delay is readily available. To measure accessibility, much more detailed data is needed. Accessibility measures must include pairs of locations—as accessibility indicates ability to reach destinations from origins.³⁹ One possibility is to generate a set of measurements where one end is fixed, such as with an employment center. One can then measure accessibility to various locations from that fixed point. Accessibility is represented by opportunities to reach destinations: distances, routes, modes, etc. There are no standardized data sources for this data, making measuring accessibility a challenge.

Chattanooga-Hamilton County TPO

The Chattanooga-Hamilton County Regional Transportation Planning Organization (TPO)—the MPO for the area—is taking many steps to increase accessibility in the region. Complete streets is a strategic planning concept in LRTP 2035, and the TPO developed an investment strategy to implement complete streets designs into several corridors in the region.⁴⁰ Complete streets is an accessibility enhancing strategy that considers users of all modes, surrounding land use contexts, and street functions. Its goal is to make streets more accessible for all users, which is a broader view than a single-occupancy vehicle dominated strategy. The TPO calculated the incremental funding that would be needed to implement complete streets design elements into selected corridors and included the additional required funding amount into the total project cost. LRTP 2035 includes \$150 million for complete streets implementation in over 50 projects—complete streets elements include bike lanes, sidewalks, transit and bus shelters, or stops for several corridors in

³⁸Please see Appendix 2 for a list of interview participants.

³⁹Harris.

⁴⁰Chattanooga-Hamilton County Regional Transportation Planning Organization (2010).

the region.⁴¹ If project sponsors cannot cover the additional cost to implement complete streets elements, the LRTP report states that federal Surface Transportation Project (STP) funds may be available to cover these elements.

The TPO also implemented a complete streets performance measure as a part of its performance-based planning framework. LRTP 2035 states that the measure is a policy-level initial step in integrating the complete streets concept into the planning process. It reflects sponsor commitment to implementing the complete streets principles, since implementation is voluntary.

As a part of the regional bicycle and pedestrian plan, the TPO implemented level-of-service measures for biking and walking. These measures evaluate user comfort level with factors such as roadway geometry, the number of motor vehicles using the road, and the presence and condition of bicycle and pedestrian facilities. The TPO conducted a Bicycle Level of Service (BLOS) analysis based on a National Cooperative Highway Research Program model for segments inventoried in the region. The calculation includes average daily traffic volume, number of through lanes on the roadway segment, speeds, percentage of trucks, width of travel lane, shoulder and bike lane, condition of the pavement, and occupancy of on-street parking. When converted to an A through F rating, the evaluation showed that about 54% of roadways in the region are operating at an A, B, or C level of service (LOS). Similar inputs were used to calculate a pedestrian LOS. The analysis shows that 55% of arterial and collector roads operate at a D Level, with 26% of roads inventoried operating at an E Level.⁴²

The TPO also conducts a walking and biking needs analysis as a part of the non-motorized demand model (trip model). This model is fine-grained and parcel-level and uses eight specific trip types for walking and five trip types for biking, including travel to school, travel to recreation, travel to shop, travel to work, travel to errand, walk to transit, walk from transit, and walk from parking.

⁴¹See page 211 of the Chattanooga-Hamilton County Regional Transportation Planning Organization. 2010. *2035 Long Range Plan*.

⁴²Chattanooga-Hamilton County Regional Transportation Planning Organization (2010).

The model considers that distance between uses influences the likelihood of walking or biking.

Jackson MPO

The Jackson MPO reported a good level of coordination between land use and transportation planning. MPO staff members also serve as city planners for the City of Jackson and perform planning functions for Madison County and the town of Three Way. The MPO reports that this allows seamless integration of all aspects of project review for jurisdictions within the MPO planning area. The Jackson MPO cites a lack of data about alternative modes of transportation as a barrier to increasing the measurement of accessibility.

Johnson City MPO

The Johnson City MPO is undertaking two transit initiatives intended to increase accessibility. The MPO is working with Johnson City Transit to develop and implement new routes for job access to major employment centers, and is also working with Northeast Tennessee Rural Public Transit to establish two fixed routes to take passengers to employment and education centers. The MPO reports that maintaining aging infrastructure currently consumes most of the MPO's resources. The MPO has attempted to encourage local governments to better coordinate land use and transportation but reports that progress is difficult. Local governments are often pinched for revenue and feel that they must accommodate developers. In the past, the MPO commissioned a land use and transportation plan in the city of Elizabethtown. The MPO reports that it makes recommendations to local governments to increase transportation effectiveness, but since MPOs have no land use regulatory control, the local jurisdictions are not required to consider the recommendations. The MPO reported that Johnson City plans to move the building department into the same space as the planning department; the city hopes this will help new developments be more consistent with the city's planning goals.

Knoxville MPO

The Knoxville Regional Mobility Plan 2009-2034, the MPO's latest long-range transportation plan, includes linking land use and transportation as a guiding principle. Strategies related to this goal include planning for vibrant communities in a proactive manner,

ensuring that the environmental impacts of transportation are considered, encouraging local land use management, and linking transportation investments to local land use management. This principle also seeks to enhance the integration and connectivity of the transportation system across and between modes. The MPO plans to incorporate stronger policy-related steps in the next long-range plan and hopes to link policies to funding. MPO staff reports that all funds are required to maintain the transportation system, leaving little to pursue new initiatives. All cities and counties in the MPO's planning area have comprehensive plans, though the MPO indicates that some are quite outdated. The MPO has offered jurisdictions planning dollars to update plans, or parts of plans, if the jurisdiction contributes a match. Thus far no communities have taken advantage of this offer.

The City of Knoxville—in partnership with the Metropolitan Planning Commission, the Knoxville Regional Transportation Planning Organization and several other stakeholders—was awarded a \$4.3 million Sustainable Communities Planning grant in 2010. Grant funds will be used to develop a Regional Plan of Sustainable Development for the Knoxville MSA over a three year period, which began in February 2011. Program goals include: increasing the quality of housing and expanding housing choices; developing a platform to guide local, regional, and state government policies and investments in the region; coordinating the land use plans of individual jurisdictions; and increasing transportation choices and accessibility.⁴³

Nashville Area MPO

The Nashville Area MPO implemented many accessibility-related goals in the 2035 Regional Transportation Plan and took the additional step of using the goals to direct investments. The Urban Surface Transportation Investment Strategy was endorsed by the MPO Executive Board in August 2010. The Strategy ensures that a portion of future Surface Transportation Program (STP) revenues appropriated to the MPO be invested in three target areas:

1. *15% to encourage the development of active transportation choices and walkable communities*

⁴³City of Knoxville. *Regional Plan for Sustainable Development*.

2. *10% to support other regional investments in public transportation and mass transit*
3. *5% to improve the efficiency of the transportation system through innovative management and operations upgrades⁴⁴*

The MPO also includes several accessibility-related criteria in the project evaluation process. Among other things, the criteria gauge the following: support for quality growth principles, support for existing or planned economic development, and incorporation of multi-modal solutions. Specific criteria items include location in preferred growth area, support of infill/redevelopment, proximity to existing jobs, and inclusion of existing or planned transit and pedestrian/bicycle facilities.

The MPO has also taken initiatives to increase coordination among local jurisdictions. The MPO led an effort to complete a Tri-County Land Use and Transportation study, focusing on Robertson, Sumner, and Wilson counties. The project was originally initiated to generate input for the 2035 Regional Transportation Plan and involved significant public and stakeholder input. The MPO reported that it also succeeded in broadening perspectives regarding how local decisions affect the three-county region. One result of the study was the adoption of an alternative growth scenario by the three counties. This gave the MPO leverage because proposed projects must be consistent with the plan.

Memphis MPO

The Memphis MPO is updating its long range transportation plan as well as the bike/pedestrian plan. The MPO is paying particular attention to connecting destinations and improving access to employment centers, particularly from lower-income neighborhoods. Staff reported that some accessibility-related evaluations were utilized to write the current long-range plan. The MPO completed an analysis that overlaid roadway project alignments and/or locations onto a series of maps that identified natural features, cultural and community sites, and demographic data. Projects were also analyzed to determine how they related to other modes, how they addressed roadway congestion and safety

⁴⁴Nashville Area Metropolitan Planning Organization (2010).

and security, and how they impacted economic growth. The results of this analysis were put into a matrix and evaluation criteria were grouped into the following seven categories:

1. Congestion relief, access, and mobility (including how the project enhanced connectivity in the transportation system)
2. Ridership and usage (how roadway projects improve coordination between and connectivity among various modes—freight, transit, pedestrian, and bicycle)
3. Economic opportunities
4. Safety and security
5. Public/community support
6. Environmental impacts
7. Funding considerations

The MPO reported that the primary performance measures focused on level-of-service, including transit ridership and access and bike-pedestrian access. Staff hopes to enhance performance measures in the long-range plan update. MPO staff noted that a lack of data is one challenge to implementing more accessibility-related measures.

Tennessee Local Governments

There are many ways for local governments to utilize zoning ordinances to encourage more accessibility including:

- Subdivision layout – Provide safe, convenient, and direct pedestrian access to nearby and adjacent residential areas, bus stops, and neighborhood activity centers
- Cul-de-Sacs – Provide public accessways to connect cul-de-sacs with adjacent streets to accommodate bicyclists and pedestrians
- Future Street Extensions – Design properties, streets, bicycle paths, and sidewalks to connect to adjacent properties that are likely to be developed (preventing

single outlets to main thoroughfares with heavy traffic and difficult intersections)

- Lot Coverage – Amend zoning codes to raise allowable lot coverage along bus routes (encouraging intensification and more efficient use)
- Parking Reductions – Modify parking codes to allow for “reduced parking options” for developments located on bus routes and provide facilities that accommodate biking and walking
- Development Review Process – Require land developers to submit a pedestrian and bicycle mobility plan early in the site plan review process (plan should list all existing and proposed land uses adjacent to the site and illustrate a logical circulation plan for pedestrians and bikes within the development and between adjacent land uses)⁴⁵

There are additional steps local governments can take to encourage more street connectivity and make alternative modes of travel more feasible. Several Tennessee local governments are taking action to provide for more accessibility.

Franklin – Local Street Plan

The 2007 Franklin Local Street Plan is a long-range plan for street interconnectivity. The plan was designed for use by City of Franklin staff and the Franklin Municipal Planning Commission. Its goal is to establish more local street connections to help disperse traffic through the system. This will reduce volume on major corridors, increase accessibility, and potentially reduce vehicle miles traveled and average trip length.⁴⁶

Knoxville – Form Based Development Code

In 2007, the Knoxville City Council passed an ordinance and adopted a form-based development code for the South Waterfront District. Traditional zoning codes regulate development by use, resulting in the separation of land uses and limited opportunities for pedestrian-oriented development. The form-based code encourages mixed-

⁴⁵Federal Highway Administration (2006).

⁴⁶City of Franklin (2007).

land uses and creates a comprehensive and stable pattern of development and land uses. This will help facilitate planning for transportation, water supply, sewage, energy and other utilities, and ensure that development is pedestrian-oriented with minimal traffic congestion.⁴⁷

Nashville – Complete Streets

Mayor Karl Dean signed an Executive Order on October 6, 2010, formalizing the city's Complete Streets policy. Executive Order Number 40 requires, "full consideration to the accommodation of the transportation needs of all users, regardless of age or ability, including those traveling by private vehicle, mass transit, foot, and bicycle."⁴⁸

Lebanon – Transit-Oriented Development

In March 2011, the Lebanon City Council approved a transit-oriented development (TOD) plan. Tennessee's only commuter rail, the Music City Star, carries people from Lebanon to downtown Nashville with stops in Martha, Mount Juliet, Hermitage, and Donelson. The TOD will feature a residential-commercial development on 260 acres of land adjacent to the Lebanon Music City Star station.

Lessons Learned From Other States

TACIR staff reviewed strategies that other states, MPOs, and local governments are implementing to increase accessibility. There are several models of action, including:

- comprehensive restructuring of transportation planning frameworks and processes
- implementation of financial incentives
- technical assistance
- legislation meant to ensure inclusion of accessibility-based standards.

⁴⁷City of Knoxville (2007).

⁴⁸Metropolitan Government of Nashville and Davidson County (2010).

Many states utilize a combination of these strategies. Based on staff's review, the following lessons can be learned from other states' experiences:

1. Initiatives must allow local jurisdictions to remain autonomous but should encourage regional cooperation.
2. Even when lacking direct authority to make land use and planning decisions, state governments have the power to make accessibility a priority through programs and spending.
3. State DOTs can take a leadership or supportive role in encouraging MPOs and local jurisdictions to include accessibility into planning processes.
4. Grant and incentive programs are an effective way to encourage land use and transportation coordination.
5. States should encourage and reward innovative problem-solving.

Staff Recommendations

This report has shown the potential benefits of incorporating accessibility criteria and goals into transportation and land use planning. Tennessee has already made major improvements in focusing various policies toward coordinated initiatives. Staff recommends the following actions to enhance these efforts:

1. Incorporate accessibility-based planning strategies into existing transportation, land use, and economic development plans and programs at the state level.
2. Encourage accessibility-based planning at the local level. Consider revising grant or financial incentive program standards to reward jurisdictions that incorporate accessibility plans into their comprehensive plans or the transportation chapters of their comprehensive plans.

Conclusion

Coordinating land use and transportation can increase accessibility for Tennesseans. Accessibility affects transportation performance as well as other issues such as economic development outcomes, getting the most out of public investments, and assuring that Tennesseans have access to jobs and that they can reach their destinations in a timely and cost-effective manner. Many areas of the state have implemented strategies to increase transportation and land use coordination, but mechanisms to encourage more coordination would be beneficial and would help Tennessee become more accessible for all.

Appendix 1

Descriptions of growth categories in Vision California Study

Urban growth characteristics:

- higher densities and more mixed land uses that feature well-connected streets
- walkable environments
- high levels of regional and local transit service
- per-capita VMT range = 1,500 to 4,000 / year

Compact growth characteristics:

- less intense density than the Urban category
- highly walkable streets
- mixed-use development more likely in new growth areas on the urban edge
- Good service by regional and local transit service
- per capita VMT range = 4,000 to 7,500/year

Standard growth characteristics:

- low density
- separated uses and auto-oriented development
- low walkability, bikeability and transit service
- per capita VMT range = 9,500 to 18,000/year

Appendix 2

Interview Respondents

Glenn Barry: Transportation Planning Coordinator, Johnson City Metropolitan Transportation Planning Organization

Daniel Daniska: Senior Planner, Memphis Urban Area Metropolitan Planning Organization

Keith Donaldson: Transportation Planning Coordinator, Jackson Municipal Regional Planning Commission

Michael Skipper: Executive Director, Nashville Metropolitan Planning Organization

Jeanne Stevens: Director of Long-Range Planning, Tennessee Department of Transportation

Kyle Wagenschutz: Bike/Pedestrian Coordinator, Memphis Urban Area Metropolitan Organization

Jeffery Welch: Transportation Planning Coordinator, Knoxville Regional Transportation Planning Organization

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