

## 8: TRANSPORTATION DEMAND AND EMERGING TECHNOLOGIES

### INTRODUCTION

The transportation systems of cities, states, and nations are transforming. As a 2040 plan, *Horizon 2040* must respond not only to the transportation needs as they stand today, but also the potential changes in the future. To do this, we must look beyond the current transportation strategies and technologies being leveraged to better understand what trends are on the way.

This chapter describes strategies and technological applications that could combine with recommendations in previous chapters to change the transportation network in the future. As the plan is updated, the technology and application levels are sure to change. GPATS will do its best to promote the strategies and technologies that affect positive change in the region and set the transportation infrastructure up to incorporate them efficiently.

### *Elements of the Horizon 2040 Transportation Demand and Emerging Technologies Chapter*

- Transportation Demand Management
- Transportation System Management
- Advanced and Emerging Technologies

## RELEVANCE TO THE GUIDING PRINCIPLES

Throughout the *Horizon 2040* planning process, the guiding principles provided checks and balances to ensure the recommendations reflected community values and the region's best interests. In particular, the content in the transportation demand and emerging technologies chapter reflects the guiding principles in the following ways:



### *Culture and Environment*

Considering the needs of the future transportation system is vital to the region's long-term success. By planning for emerging technologies, the region will be better able to connect and protect regional destinations and landmarks.



### *Growth and Development*

Now and in the future, the region's land use choices need to respond to its transportation options. Changes in transportation technologies may contribute to shifts in how the region grows in the coming years.



### *Safety and Security*

The reduction of single-occupant vehicle trips leads to fewer cars on the road and, as a result, improves overall safety. In the future, emerging technologies will help foster a safer environment for travelers of all modes.



### *Economic Vitality*

The region has the opportunity to leverage emerging technologies that may lead to economic growth and increase regional competitiveness.



### *Mobility and Accessibility*

Providing attractive travel options across a variety of modes is a focal point of transportation demand management strategies and emerging technologies.



### *System Preservation and Efficiency*

By starting to think now about transportation technologies that may be prevalent in the future, maintenance and preservation efforts can be adapted to better serve these technologies.

## TRANSPORTATION DEMAND MANAGEMENT (TDM)

TDM refers to strategies to efficiently use the transportation system without adding additional capacity to the transportation network. TDM strategies are policies or programs that change travel patterns, such as shifting commuters from automobile to non-automobile modes, from single-occupant vehicles to higher occupancy vehicles, and from peak-hour travel to off-peak travel. In other words, TDM refers to attempts to change travel behavior (i.e., how, when, and where people travel) to increase the efficiency of transportation systems and roadways. Strategies of a TDM plan focus on the demand side (i.e., behavior changes) rather than the supply side (i.e., infrastructure improvements).

TDM strategies typically involve employers and public agencies who can influence the travel behavior of employees and citizens. Benefits of TDM include:

- Reduced congestion on area roadways
- Reduced car maintenance and usage costs
- Increased safety and community appeal
- Increased mobility and options for non-drivers
- Energy conservation
- Improved water and air quality

### Existing TDM Initiatives

TDM is a concept that has been explored in the Upstate region for a number of years. At this time, a formal carpool/vanpool program does not exist; however, several independent websites are available to encourage participants to share rides with other travelers. With GPATS now serving as the primary

coordinator between the Upstate's two major transit providers (Greenlink and CAT), the region can now consider how best to address TDM strategies.

### TDM Strategies

TDM strategies can generally be grouped into five categories—rideshare; bicycle and pedestrian; alternate work hours; land use and development; and marketing, education, and implementation. Specific strategies within these categories are detailed in this section.

#### Rideshare

Ridesharing typically refers to carpooling and vanpooling and is a direct effort to maximize the number of passengers in each vehicle. Ridesharing can be a cost-effective approach to reducing single occupancy vehicles (SOV), particularly in areas like the Upstate that have several major employment centers. Rideshare participation is maximized when it provides flexibility and commuters can choose to rideshare part-time (e.g., 2 or 3 times per week).

Ridesharing options can be categorized into the following alternatives:

- **Carpools** typically use vehicles owned by the users themselves.
- **Vanpools** are more suitable options for longer commutes and typically use vans supplied by employers, for-profit vanpool companies, non-profit organizations, or government agencies. If riders cover operating expenses, vanpools can be self-supporting.
- **Transit and shuttle services** can provide direct transportation from home to work or allow those who carpool or vanpool a way to move between destinations once they arrive at work.

An interesting dynamic of ridesharing, particularly in regard to carpooling and vanpooling, is how greater use of the service provides more opportunities for prospective riders to find someone with similar commuting patterns (e.g., origin, destination, time). This shows how marketing, education, and implementation strategies, described later in this plan, affect the success of rideshare programs.

Rideshare programs typically provide matching services as part of a marketing and implementation strategy. Participation incentives include, but are not limited to, priority lane use for high occupancy vehicles (HOV), preferential parking spaces, and reimbursements. Because the overall effectiveness of ridesharing depends on the number of active users, marketing and customer service is critical.

#### Bicycle and Pedestrian

The transportation systems of vibrant communities include infrastructure for bicycles and pedestrians as well as methods for travelers to conveniently switch modes. With some momentum for bicycling and walking in the region already, GPATS must pay attention to ancillary infrastructure and programs that encourage bicycling and walking. With respect to TDM implementation, a variety of bicycle and pedestrian issues exist. With a sound understanding of the benefits, safety concerns, planning issues, and infrastructure improvement opportunities related to bicycling and walking, TDM administrators and local officials can more easily secure investments in bicycle and walking infrastructure and programs.

Recommendations for bicycle and pedestrian infrastructure and supporting amenities are explored in detail in Chapter 5.

## Alternate Work Schedules

Alternate work schedules balance demand on the transportation system by modifying the time or frequency of travel and include compressed work weeks, flexible work hours, staggered work hours, and telecommuting.

- In a **compressed work week**, employees work more hours each day so they can reduce the total number of days worked. This process reduces the number trips to the work site. A common compressed work week includes 9-hour work days with one day off every other week. Because most employees choose Monday or Friday as their day off, the cumulative impact to congestion and other benefits is not as significant as compared to other alternate work schedule options.
- **Flexible work hours (or flex time)** provide employees options regarding their starting and quitting times. In this alternative, employees must adhere to a range of starting and quitting times and must be at work during core periods (typically 9:30AM to 11:30AM and 1:30PM to 5:30PM). Flex time has the potential to provide significant congestion relief near major employment centers.
- **Staggered work hours** are a more rigid approach to flexible work hours in which employee starting and quitting times are spread over a 1- to 3-hour period. Groups of employees report and leave at 15- to 30-minute intervals. Staggered work hours are an option in large facilities that have regular work schedules.

- **Telecommuting** (e.g., working from home) allows an employee to work at a remote location, such as their home, one or more days a week rather than commute to the work site. As with the other alternate work schedules, telecommuting employees generally have a fixed schedule negotiated with their employer.

## Marketing, Education, and Implementation

Marketing, education, and implementation are continuous needs of an inclusive process—from plan development, through initiation, to evaluation. These strategies further define consumer needs and preferences, refine appropriate products and services, distribute information about these products and services to existing and potential users, and promote their use. Because public knowledge and attitude have such a large impact on travel behavior, marketing, education, and implementation are critical components of implementing TDM strategies and reducing SOVs.

- **Marketing** is a dialogue between provider and consumer and extends beyond simply promoting a product, activity, or service. Effective marketing programs for TDM strategies involve numerous partners and stakeholders, including public officials, community organizations, and individuals, who support transportation alternatives. Marketing initiatives must be balanced by the level of service offered. In other words, the adequate level of service must be confirmed prior to marketing the service.
- **Education programs** maximize public investment by encouraging the use of TDM programs. A challenge for education programs is delivering different messages to different types of people.

For example, the message to encourage regular carpooling is different for those who have tried the program compared to those who have not tried it and perhaps perceive it as inconvenient or unfeasible.

- **Implementation** occurs in multiple phases. Initially, implementation refers to actions required to implement and enforce a policy or launch a new service or program. Consideration for marketing and education efforts should be ongoing and provide continued support and refinement. In this way, GPATS and local jurisdictions can adjust to changes in travel behavior and respond to future opportunities. Many implementation strategies are the framework upon which other strategies are built.

## TDM Application

The GPATS region has an attractive mix of employment and residential types within the path of growth. As such, the region is well positioned to consider applying one or more TDM strategies. *Horizon 2040* recommends a TDM study to fully vet each strategy's potential within the region and develop an implementation plan.

### Land Use and Development

Land use and transportation are intricately linked. Elements of the transportation system—including roads, pedestrian, bicycle, and transit infrastructure—impact the size, shape, density, and mix of land uses. Similarly, where land uses occur and how they are designed can favor one travel mode over others and may influence overall travel behavior. For example, if low-density development is spread across a wide area, employees and residents must rely almost entirely on automobiles to get from one location to another. On the other hand, compact centers that combine complementary land uses near each other enable greater transportation choice.

For decades, much of the GPATS region has developed in a low-density manner and relied almost entirely on automobiles for transportation. In planning for future growth, GPATS will consider how development patterns, along with increased multimodal investments, can combine to create a more efficient system that allows residents greater choice in where they live and how they travel. Connected street grids, infill development, and compact mixed-use centers can help the region manage congestion by encouraging housing development near regional job centers, enabling residents to accomplish short trips on foot or by bike, and shifting long-term travel patterns through smart growth patterns.

## TRANSPORTATION SYSTEM MANAGEMENT (TSM)

TSM is the process of optimizing the existing transportation system and infrastructure through less capital-intensive measures. Unlike TDM strategies, which focus on travel times and travel options, TSM strategies focus on physically enhancing the existing transportation infrastructure to increase roadway capacity, increase travel options, and reduce congestion and delay.

The basic premise of TSM is that minor targeted improvements to transportation infrastructure can significantly increase the capacity, efficiency, and usefulness of the transportation system. For example, the signal timings along a corridor can be optimized and intersection improvements, such as turn lanes, pedestrian crosswalks, and vehicle detectors, can be implemented to improve the traffic flow and increase capacity. Some of the commonly implemented TSM strategies include traffic signal optimization, geometric roadway modifications, spot roadway and lane modifications, intersection modifications, access management, and pedestrian and bicycle enhancements.

*Horizon 2040* embraces small-scale projects that address targeted needs as applications of the TSM approach. GPATS will continue to prioritize these projects as well as the funding types that best support their implementation.

### Intelligent Transportation Systems

One useful TSM strategy that is already being employed in the Upstate region is ITS, which describes various technologies that provide benefits when implemented as part of an overall transportation management strategy. ITS is one way transportation planners manage traffic flow to limit congestion for normal and unexpected delays, reduce crashes, and minimize fuel consumption and emissions. While some people may not be familiar with the term, they should be familiar with the many ITS applications they use or experience each day. These applications include dynamic message signs along highways, coordinated traffic signals, video cameras and special sensors to monitor traffic, and ways to give emergency and transit vehicles priority to proceed safely through signalized intersections.

The GPATS region should continue to leverage its existing ITS resources and improve its capabilities as technology advances. GPATS will continue to partner with SCDOT and its member jurisdictions to identify opportunities for ITS enhancements and seek funding. Since these projects have the ability to make better use of available transportation infrastructure, they are an efficient implementation strategy for the network both now and into the future.

## ADVANCED AND EMERGING TECHNOLOGIES

### *A Changing World*

Transportation technology is changing at a faster rate today than perhaps any other time since the invention of the automobile. Advances in transportation technology are likely to change everything about our travel experience, including how we travel, how the things we buy are transported, and whether or not we even own a vehicle. This technology may take the shape of enhancements to existing travel modes or include emerging travel modes, such as personal rapid transit and high speed rail. A range of emerging transportation technologies are identified on this page and introduce some of the transportation technologies currently under development, testing, or use that have the potential for future application in the Upstate.

### *Connected and Autonomous Vehicles*

Connected and autonomous vehicles communicate with their environment and with other vehicles, improving safety and traffic flow, and diminishing the need for a human behind the wheel.

### *Personal Rapid Transit*



Personal rapid transit is a network of small vehicles that operate on a system of designated rails or roadways. These vehicles carry a few people at a time and allow for non-stop travel.

### *Shared Ride Services*

Services, such as Uber and Lyft, are popular in urban areas across the country. They allow people to easily schedule a ride using a mobile application, diminishing the need to own a vehicle or to park in busy areas.

### *High Speed Rail*



Plans for a Southeast High Speed Rail Corridor that links Atlanta and Charlotte may one day include a stop near Greenville. This would improve mobility options for long-range travel and enhance the Upstate's economic connections throughout the Southeast.

### *Hyperloop*



Currently in development as an experimental transportation method, the Hyperloop connects two destinations with a sealed tube that transports passenger pods at high speeds. A hyperloop network would connect regional destinations similar to a rail network.

### *Delivery Drones*



Parcel delivery drones, currently in experimental use by some companies, deliver packages directly to their destination without the need for a delivery truck.

### *Parcel Delivery E-Bikes*



UPS and other delivery companies have been experimenting with performing deliveries in urban areas on electric bicycles to reduce use of heavy trucks in urban centers.

## Future Applications

GPATS will continue to stay at the forefront of these and other transportation technologies. To assist with this process, GPATS will identify and capitalize on funding that may become available in the future to expand on these emerging trends, whether through public funding sources or private and commercially-driven initiatives.

As the technology matures, state and federal legislation will likely adjust to keep pace with industry and infrastructure development. GPATS will be an active participant in developing any planning legislation and performance measures. Once automated and advanced transportation technologies become eligible for federal funding, GPATS will appropriately amend the LRTP to suit.

Until such time as these technologies yield feasible and fundable projects, GPATS will be in full support of collaborative efforts and policies which advance the technology levels of the region.